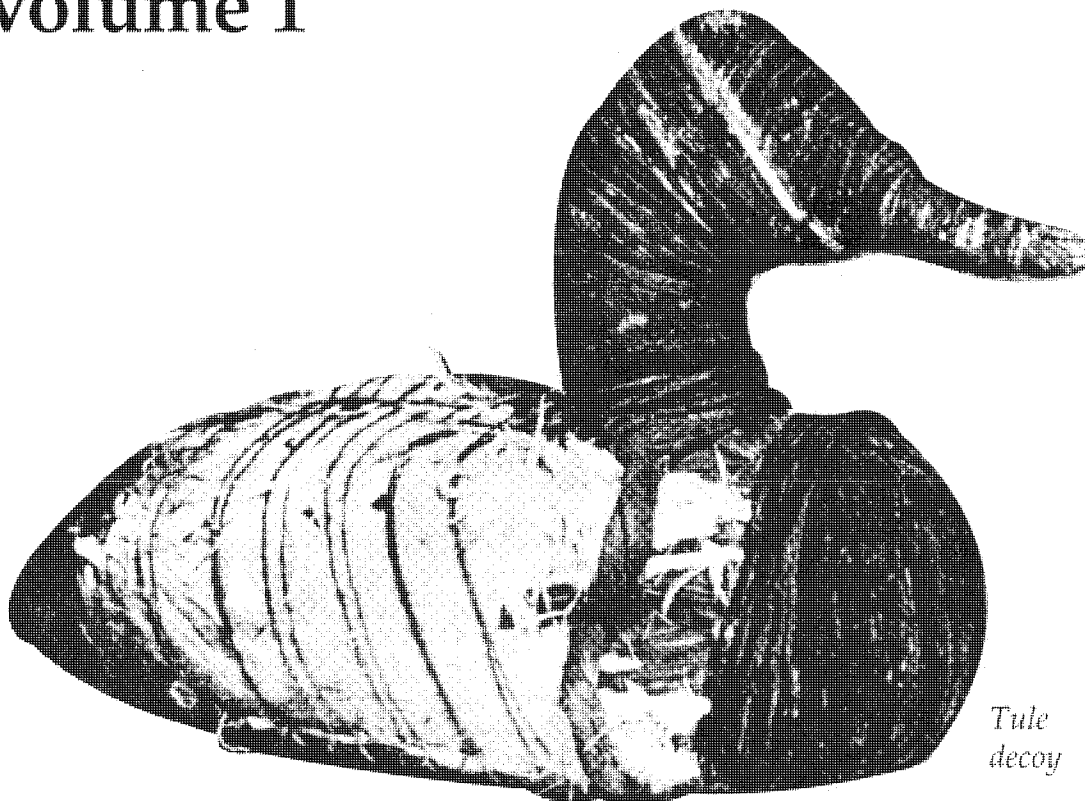

Final Environmental Impact Statement

Water Rights Acquisition for Lahontan Valley Wetlands

Churchill County, Nevada

Volume 1



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U.S. Department of the Interior
Fish and Wildlife Service
Region 1, Portland, Oregon

September 1996

Final Environmental Impact Statement

Water Rights Acquisition for Lahontan Valley Wetlands

U.S. Department of the Interior
Fish and Wildlife Service
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Final Environmental Impact Statement

**WATER RIGHTS ACQUISITION
FOR LAHONTAN VALLEY WETLANDS**

Churchill County, Nevada

Submitted by:

U.S. Department of the Interior
Fish and Wildlife Service

This Final Environmental Impact Statement (FEIS) is prepared in compliance with the National Environmental Policy Act (NEPA) and U.S. Fish and Wildlife Service (Service) NEPA procedures.

The Truckee-Carson-Pyramid Lake Water Rights Settlement Act (Public Law 101-618) directs the Secretary of the Interior to acquire enough water and water rights to sustain, on a long-term average, approximately 25,000 acres of primary wetland habitat in the Lahontan Valley. This FEIS describes and evaluates a Proposed Action and three action alternatives for accomplishing this objective; a No Action Alternative also is addressed. The five alternatives are: (1) No Action Alternative, which includes the acquisition of 20,000 acre-feet (AF) of water rights from within the Carson Division of the Newlands Project; (2) Proposed Action, which proposes the acquisition of up to 122,000 AF of water rights; (3) Least Cost Alternative, which would result in the acquisition of up to 100,000 AF of water rights; (4) Maximum Acquisition Alternative, which would result in up to 133,500 AF being acquired; and (5) the Service's Preferred Alternative, which would result in (a) the acquisition of up to 75,000 AF of water rights in the Carson Division, (b) leasing of water, (c) acquisition of water rights from the Middle Carson River corridor, (d) use of conserved U.S. Navy water as available, and (e) pumping of groundwater.

This FEIS evaluates the alternatives relative to their potential effects on: (1) Newlands Project operations and infrastructure; (2) water resources; (3) biological resources; (4) regional agriculture, farmlands, and the local economy; (5) regional recreation; (6) land use; and (7) social values. Estimated acquisition costs are also disclosed.

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ACRONYMS

AF	Acre-feet
BIA	United States Bureau of Indian Affairs
BLM	United States Bureau of Land Management
BLR	Below Lahontan Reservoir (computer model)
BOR	United States Bureau of Reclamation
EA	Environmental Assessment
EDF	Environmental Defense Fund
EIS	Environmental Impact Statement
EPA	United States Environmental Protection Agency
E-T-S	Endangered, Threatened, and Sensitive Species
GWh	Gigawatt hours, equal to one million watts
LESA	Land Evaluation and Site Assessment
MGD	Millions of gallons/day
NAC	Nevada Administrative Code
NAS-FALLON	Naval Air Station Fallon
NEPA	National Environmental Policy Act
NDOW	Nevada Division of Wildlife
NIWQP	National Irrigation Water Quality Program (Interior)
NSM	Truckee River system Negotiated Settlement Model
NWR	National Wildlife Refuge
OCAP	Operating Criteria and Procedures
O&M	Operation and Maintenance [costs]
NRCS	United States Natural Resources Conservation Service
TCID	Truckee-Carson Irrigation District
TCLA	Truckee-Carson Leasing Authority
TROA	Truckee River Operating Agreement
TSP	Total Suspended Particles
UBC	Unquantified or unquantifiable Baseline Conditions
UNR	University of Nevada, Reno
USGS	United States Geological Survey
WMA	Wildlife Management Area

SELECTED ABBREVIATED TERMS

Carson Lake	Carson Lake and Pasture
Interior	United States Department of the Interior
Reclamation	United States Bureau of Reclamation
Secretary	Secretary of the Interior
Service	United States Fish and Wildlife Service
State Parks	Nevada Division of State Parks
Tribal wetlands	Fallon Paiute-Shoshone Indian Reservation wetlands

CHAPTER 1

PURPOSE AND NEED FOR ACTION

1.1 INTRODUCTION

Lahontan Valley is a basin at the terminus of the Carson River within Churchill County in west-central Nevada. The valley is a remnant of an ancient lake bed, characterized by sedimentary soils with old river channel and lake deposits, sand dunes, wetlands and playas. The Stillwater Marsh, Carson Lake, and Carson Sink are large terminal wetlands created where the Carson River discharges in the valley. These terminal wetlands have supported a diversity of wildlife for at least 4,000 years. They are representative of the Great Basin wetlands ecosystem, where a continuous shrinking and swelling of wetland areas occurs, both seasonally and over geologic time. The Lahontan Valley wetlands are unique in that they are located in the second driest inland desert in North America.

During the late 1800s, the Carson River provided irrigation water only to farmlands adjacent to the river. At the turn of the century, there was strong support for development of a large irrigation project on the Carson River to expand agriculture and encourage settlement in Nevada. With passage of the Reclamation Act by the U.S. Congress in 1902, the Reclamation Service (later renamed the Bureau of Reclamation) was given jurisdiction over public lands to construct and operate the Newlands Irrigation Project (Newlands Project), which was designed to irrigate thousands of acres of land in Lahontan Valley.

The Newlands Project's Lahontan Dam impounded Carson River flows, created Lahontan Reservoir, and allowed water to be diverted into project irrigation canals for delivery to newly created farmlands in Lahontan Valley. The project also diverted water into Lahontan Reservoir via the 32.5-mile-long Truckee Canal from the Truckee River basin west of Lahontan Valley. The canal substantially increased the amount of water available for irrigation and subsequently increased drainwater flows to the wetlands. These Federal actions changed the hydrology and nature of Lahontan Valley wetlands and the lower Truckee River ecosystems, including Winnemucca and Pyramid Lakes.

Following Newlands Project construction, the water that reached valley wetlands consisted of excess irrigation water delivered to but not utilized by the crops, water that seeped out of irrigation canals, and spills from Lahontan Reservoir. This "lost" water, referred to as drainwater or return

flows, and water released for winter hydropower generation and spills, was collected by a system of drains that flowed to the Stillwater Marsh and Carson Lake wetlands. Because of the important wildlife values inherent in these areas, the U.S. Fish and Wildlife Service (Service) and Nevada Division of Wildlife (NDOW) have actively pursued ways to better manage and protect the Lahontan Valley wetlands.

As the population of Nevada has grown and other competing demands have been placed on the Carson and Truckee Rivers, Newlands Project operations and irrigation practices have been altered. These changes have continually reduced the volume of drainwater flowing to valley wetlands. Decreased water has caused a decline in both quantity and quality of wetland habitat in the valley, and has adversely impacted migratory bird and wildlife populations.

In order to resolve many of the problems associated with the increased demands on the Carson and Truckee rivers, Congress passed the Truckee-Carson-Pyramid Lake Water Rights Settlement Act, Title II of Public Law 101-618 (Public Law 101-618, Appendix 1), *which was signed into law on November 16, 1990*. In passing Public Law 101- 618, one of the intents of Congress (see section 202(g)) was to lay the foundation for the restoration and permanent protection of Great Basin wetland ecosystems in Lahontan Valley, including the Stillwater National Wildlife Refuge (Senate Report 3084, 1990). The law specifically provides for the preservation and enhancement of *wetland habitat in* four designated primary wetland areas in Lahontan Valley.

1.2 PURPOSE OF THE PROPOSED ACTION

The purpose of acquiring water rights for Stillwater National Wildlife Refuge (Stillwater NWR), Stillwater Wildlife Management Area (Stillwater WMA), Carson Lake and Pasture (Carson Lake), and the Fallon Paiute-Shoshone Indian Reservation (Tribal wetlands) is to protect significant wetlands in the Lahontan Valley from further degradation and to enhance the habitat of the many wildlife species that depend on these wetlands (Public Law 101-618 sections 202(g), 203(e), and 206(a)(1)). More specifically, the purpose of the Proposed Action and other action alternatives is to sustain, on a long-term average, approximately 25,000 acres of primary wetland habitat within Stillwater NWR and WMA, Carson Lake, and Tribal wetlands. These areas comprise the designated Lahontan Valley wetlands (primary wetlands) cited in section 203(e) of Public Law 101-618.(See Figure 1.A, location map.)

The 25,000- acre figure is based on section 206 of Public Law 101-618, in which the Secretary of the Interior (Secretary) is authorized and directed, in conjunction with actions by the State of Nevada, to acquire water and water rights to sustain, on a long-term average, approximately 25,000 acres of primary wetland habitat in the *designated* Lahontan Valley wetlands. For the purpose of this document, primary wetland habitat *refers to the habitat provided by shallow to deep water (up to 6-feet deep) and associated vegetation in the primary wetlands. As such, primary*



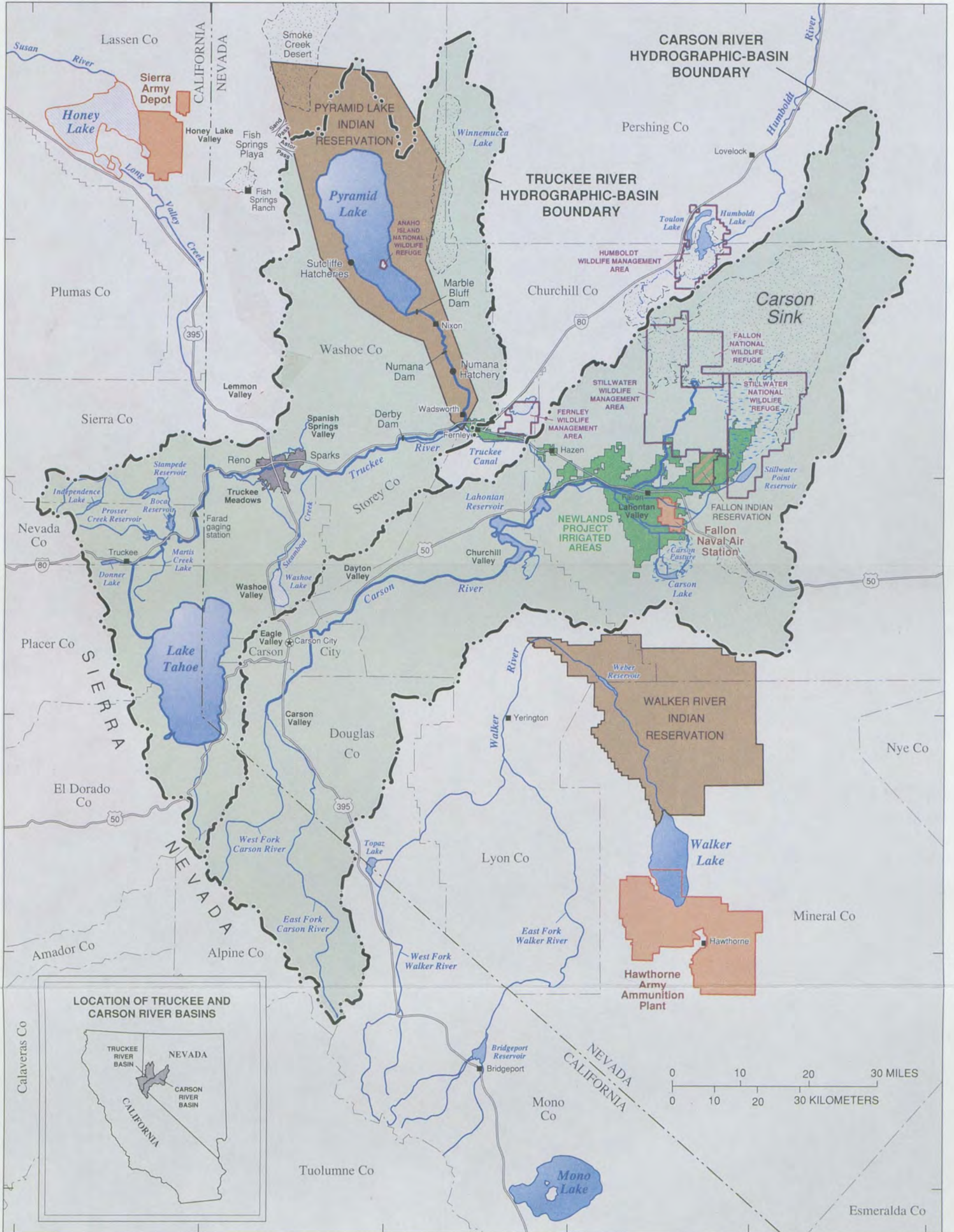
HYDROLOGIC FEATURES OF THE TRUCKEE AND CARSON RIVER BASINS AND ADJACENT AREAS, WESTERN NEVADA AND EASTERN CALIFORNIA

By
Jeffrey V. Trionfante and Lorri A. Peltz
1994



U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 93-368



General Location Map • Lahontan Valley Wetlands Environmental Impact Statement

Base from U.S. Geological Survey digital data 1:100,000, 1977-85
Albers Equal-Area Conic projection
Standard parallels 29°30' and 45°30', central meridian -119°00'

For additional information, contact
District Chief / U.S. Geological Survey
333 W. Nye Lane / Carson City, NV 89706

A product of the Truckee-Carson Program

wetland habitat only exists to the extent that a primary wetland or portion of a primary wetland is covered with water. The amount of wetland habitat thus varies over time.

The Service's Proposed Action would acquire sufficient water resources necessary to comply with Public Law 101-618 and permanently enhance habitat for wetland-dependent wildlife in Lahontan Valley. The acquisition of water resources is necessary to compensate for wetland losses that have resulted from changes in management and use of water in the Newlands Project and the Truckee-Carson River systems.

1.3 NEED FOR THE PROPOSED ACTION

The Great Basin wetlands ecosystem encompasses important historical wetlands that once covered vast areas of Lahontan Valley and provided an important natural habitat for waterfowl, shorebirds and other wetland-dependent wildlife. Historically, the Carson River sustained an average of about 150,000 wetland acres in the Carson Lake, Stillwater, and Carson Sink marshes (Kerley and others, 1993). But since the turn of the century, more than 82 percent of the wetland habitat in western Nevada has been lost (Thompson and Merritt, 1988). As recently as 1992, the Lahontan Valley wetlands recorded a low of fewer than 2,000 acres of wetlands habitat (USFWS and NDOW aerial surveys, 1992). Since the early 1900s, both the quality and quantity of wetland habitat in Lahontan Valley has been reduced significantly.

Public Law 101-618 addressed the need to restore and protect some portion of the historic wetlands habitat, and set a long-term average of approximately 25,000 acres of primary wetland habitat in four designated areas as the objective. The Service, State of Nevada and other public interest groups have supported the Public Law wetland objectives.

In order to meet its 25,000-acre objective in Lahontan Valley the Service has calculated that an annual average total of up to 125,000 acre-feet (AF) of water is needed. This total is based on historical wetlands operations data for Lahontan Valley, evaporation rates, and water requirements for a palustrine marsh habitat. From these data, the Service has calculated that the annual average water demand for one acre of primary wetland habitat is 5 AF (Kerley and others, 1993). Wetlands water requirements are addressed in Appendix 4.

The Service's objective to sustain a Great Basin wetlands ecosystem requires that a diversity of wetland habitats be represented. This mix would include wetted playa wetlands, wet meadows, emergent marsh and open water habitat.

Water demands vary for these different wetland habitats. Perennial marshes require as much as 7-8 AF/acre/year, while an ephemeral shallow wetlands requires as little as 1.5 AF/year to sustain one

acre per year. Therefore, the Service's 5 AF/acre/year water demand is an average of the total water needed to sustain the varied habitats that are reflective of a Great Basin wetlands ecosystem. For the purposes of this document, existing management practices serve as the baseline of Refuge operations.

At present, the wetlands are primarily dependent upon Newlands Project drainwater. The Service has projected that this source offers inadequate inflow volume to meet long-term wetland objectives. Because drainwater quality is of concern (Hoffman, 1994), the Service also seeks to ensure that wetland inflows be of suitable quality to sustain, over the long term, 25,000 acres of primary wetland habitat.

As the Newlands Project's 1988 Operating Criteria and Procedures (OCAP) for mandated water delivery efficiency requirements are achieved, both quantity and quality of available drainwater will be reduced. The Service has determined that acquiring irrigation water rights is the most direct means of obtaining suitable-quality water for the wetlands. This action would offset reductions in both quality and quantity of wetland inflows, and is consistent with Public Law 101-618 which authorizes and directs the Secretary to purchase water and water rights from willing sellers *and to acquire water from willing persons by other means, including donations*, for the protection of Lahontan Valley wetlands.

1.4 DECISIONS NEEDED

The Service has prepared this document to help the Regional Director (Region 1) and his staff make decisions based on a clear understanding of environmental consequences of the Proposed Action, alternatives, and other variables. After completion of this *final* environmental impact statement (FEIS), a Record of Decision (ROD) will be completed to identify and explain the decisions made relative to the acquisition of water and water rights. Decisions to be considered in the ROD include the following:

- ▶ **determination of methods and sources for acquiring water or water rights;**
- ▶ **determination of mitigation measures for reducing impacts associated with acquisition of water rights;**
- ▶ *identification of an environmentally preferred alternative; and*
- ▶ *determination of water monitoring needs for assessing wetland inflows.*

The Record of Decision *is expected to* be signed by the Service's Region 1 Director.

1.5 LEGAL AUTHORITIES UNDER PUBLIC LAW 101-618

The Service has legal authority under a number of laws, treaties and agreements to acquire and manage lands and water to benefit fish and wildlife and their habitats under the National Wildlife Refuge System. Most recently, the U.S. Congress passed Public Law 101-618, of which section 206 specifically authorized acquisition of water rights for the Lahontan Valley wetlands. See Sections 1.9 and 1.10 for listings of additional authorities for this action.

The major provisions of section 206 of Public Law 101-618 are as follows:

Paragraph 206(a)(1) - "The Secretary is authorized and directed, in conjunction with the State of Nevada and such other parties as may provide water and water rights for the purposes of this section, to acquire by purchase or other means water and water rights, with or without the lands to which such rights are appurtenant, and to transfer, hold, and exercise such water and water rights and related interests to sustain, on a long-term average, approximately 25,000 acres of primary wetland habitat within the Lahontan Valley wetlands"

Paragraph 206(a)(2) - "Acquisition of water rights and related interests shall be subject to the following condition[s]: (A) Water right purchases shall be only from willing sellers"

Upon completion of this EIS, the Service will determine preferred methods and sources to acquire the necessary water rights to sustain 25,000 acres of primary wetland habitat in Lahontan Valley. Purchases will be made only from willing sellers. In addition to purchases, acquisitions will be made through leases and exchanges with willing parties and through voluntary donations made to the Service by third parties.

Subparagraph 206(a)(1)(A) - "...water right acquired under this subsection shall, to the maximum extent practicable, be used for direct application to such wetlands..."

Subparagraph 206 (a)(1)(B) - "...the Secretary shall select from any water rights acquired pursuant to this subsection those water rights or portions thereof, if not all, that can be transferred to the wetlands referenced in this subsection consistent with subsection 209(b) of this title; and

Subparagraph 206(a)(1)(C) - "... Those water rights or portions thereof, if not all, which the Secretary selects for transfer shall then be transferred in accordance with applicable court decrees and State law, and shall be used to apply water directly to wetlands. No water rights shall be purchased, however, unless the Secretary expects that the water rights can be so transferred and applied to direct use to a substantial degree."

All water rights acquired by the Service for the protection of wetlands will be transferred in accordance with applicable court decrees and State water law. The Service recognizes that it will acquire some water rights, as part of larger water rights transactions, which are considered ineligible for transfer to the wetlands because they are contested, inactive, have never been perfected, or are otherwise ineligible for transfer under State law. Although the Service would not seek to acquire such water rights, it recognizes that many water-right holders often own both eligible and ineligible water rights. Therefore, it may be *necessary for the Service* to purchase all of an individual's package of water rights (including some water rights ineligible for transfer) in order to conclude a purchase. In the event of such purchases, the Service would retire the ineligible rights. However, no water rights would be considered for purchase unless the Service expects that they can be transferred and applied to direct use to a substantial degree.

Subparagraph 209(b) - Truckee River Diversions. - "The Secretary shall not implement any provision of this title in a manner that would:

- (1) increase diversions of Truckee River water to Newlands Project over those allowed under applicable operating criteria and procedures; or
- (2) conflict with applicable court decrees."

The Service's Proposed Action *and action alternatives* will not increase diversions from the Truckee River over those allowed by the 1988 OCAP. *Neither the Proposed Action nor the Preferred Alternative* is expected to increase Newlands Project irrigation demand. If the Service determines that its actions under this water rights acquisition program increase diversions from the Truckee River over those that now occur (a long-term average of 105,000 AF/year as calculated using the BLR Model baseline assumption set) the Service will do what is necessary to eliminate the effects of reducing Truckee River flow below Derby Dam. The Service will implement the Proposed Action *and action alternatives* consistent with the Alpine and Orr Ditch Decrees.

Subparagraph 206(a)(2)(A) - " . . . the Secretary may target purchases [of water rights and related interests] in areas deemed by the Secretary to be most beneficial to such a purchase program"

The Service has developed eligibility criteria (Section 2.8.2, MANAGEMENT REQUIREMENTS) for water right transfers that offer a limited type of targeting. Due to Subparagraph 206(a)(2) of Public Law 101-618, willing sellers will be incorporated into any targeting strategy developed by the Service. In this document, the Service identifies various targeting strategies that would serve to mitigate potential impacts of water rights acquisitions. As such, targeting is considered to be a mitigation measure to offset anticipated impacts of the Service's action.

Paragraph 206(a)(3)(A) - " [The Secretary is authorized to] use, modify, or extend, on a non-reimbursable basis, Federal water diversion, storage, and conveyance systems to

deliver water to wetlands referenced in paragraph (a)(1) of this subsection, including the Fernley Wildlife Management Area [Fernley WMA]. . ."

The Service's Proposed Action *and action alternatives* depend exclusively on the use of Newlands Project facilities to convey water acquired by the Service to the Lahontan Valley wetlands. At this time, the Service does not plan to construct any new delivery facilities to convey acquired water. Although the Secretary has authority to use Newlands Project facilities to deliver water to the Fernley WMA, which is located outside of the Lahontan Valley, none of the alternatives seeks to acquire water for this wetland area.

Paragraph 206(a)(4) - ". . . the Secretary shall study and report on the social, economic, and environmental effects of the water rights purchase program.The study shall be reported to Congress no later than November 16, 1993."

In November 1993, the Service prepared a report to the U.S. Congress titled "Water Rights Acquisition Program for Pyramid Lake and Lahontan Valley Wetlands, Nevada." The report summarizes the social, economic and environmental effects anticipated as a result of the wetlands water rights acquisition program. Copies of the report were mailed to more than 300 individuals who had indicated an interest in the water rights acquisition program during the EIS Scoping Process.

1.6 AFFECTED AREA

The affected area is the area where there is potential for direct or indirect impacts to area resources as a result of the Service's Proposed Action and alternatives (Figure 1.B). The affected area includes, but is not limited to: Federal, State, and private lands within the boundaries of the Carson Division of the Newlands Project, water-righted lands downstream from Lahontan Dam (including U.S. Naval Air Station lands (NAS-Fallon), Fallon Paiute-Shoshone Indian Reservation lands, all Lahontan Valley wetland areas, Lahontan Reservoir, the Middle Carson River corridor from Lahontan Reservoir to Dayton, the Fernley area, and the Lower Truckee River corridor from Pyramid Lake to Derby Dam.

1.7. HISTORY AND BACKGROUND OF AFFECTED AREA

1.7.1 NEWLANDS PROJECT

The Newlands Project was one of the first five projects to be built by what was then called the Reclamation Service (later renamed the Bureau of Reclamation) after the agency was formed in 1902. Construction on the massive irrigation system began in 1903 and major features, such as Derby Dam on the Truckee River and Lahontan Dam on the Carson River, were completed by 1905 and 1914, respectively.

The Newlands Project was designed to provide for the irrigation of federally withdrawn homesteaded lands in the vicinities of Fernley and Fallon, Nevada. During the early years of the Newlands Project (1902-15), the Federal Government encouraged farmers to come to Lahontan Valley to homestead lands and farm. The Bureau of Reclamation (Reclamation) advertised nationwide and encouraged homesteaders with offers of choice lands. Descriptions by the Fallon Chamber of Commerce extolled the dairy, farming, and stock-raising possibilities of the area.

In 1918, the Truckee-Carson Irrigation District (TCID), a group of Newlands Project water-users, organized in an attempt to solve the area's irrigation drainage problems. Between 1921-28, drains were constructed to lower the water table in the valley. TCID has operated the Newlands Project for Reclamation under both long-term and temporary (interim) contracts since 1926.

History of OCAP

In 1964, the Secretary formed a task force to study and report on Newlands Project operations and management to resolve controversies among the various users over the right to use water from the Carson and Truckee Rivers. Subsequently, a Department of the Interior (Interior) committee was established to formulate Operating Criteria and Procedures (OCAP) for the Newlands Project.

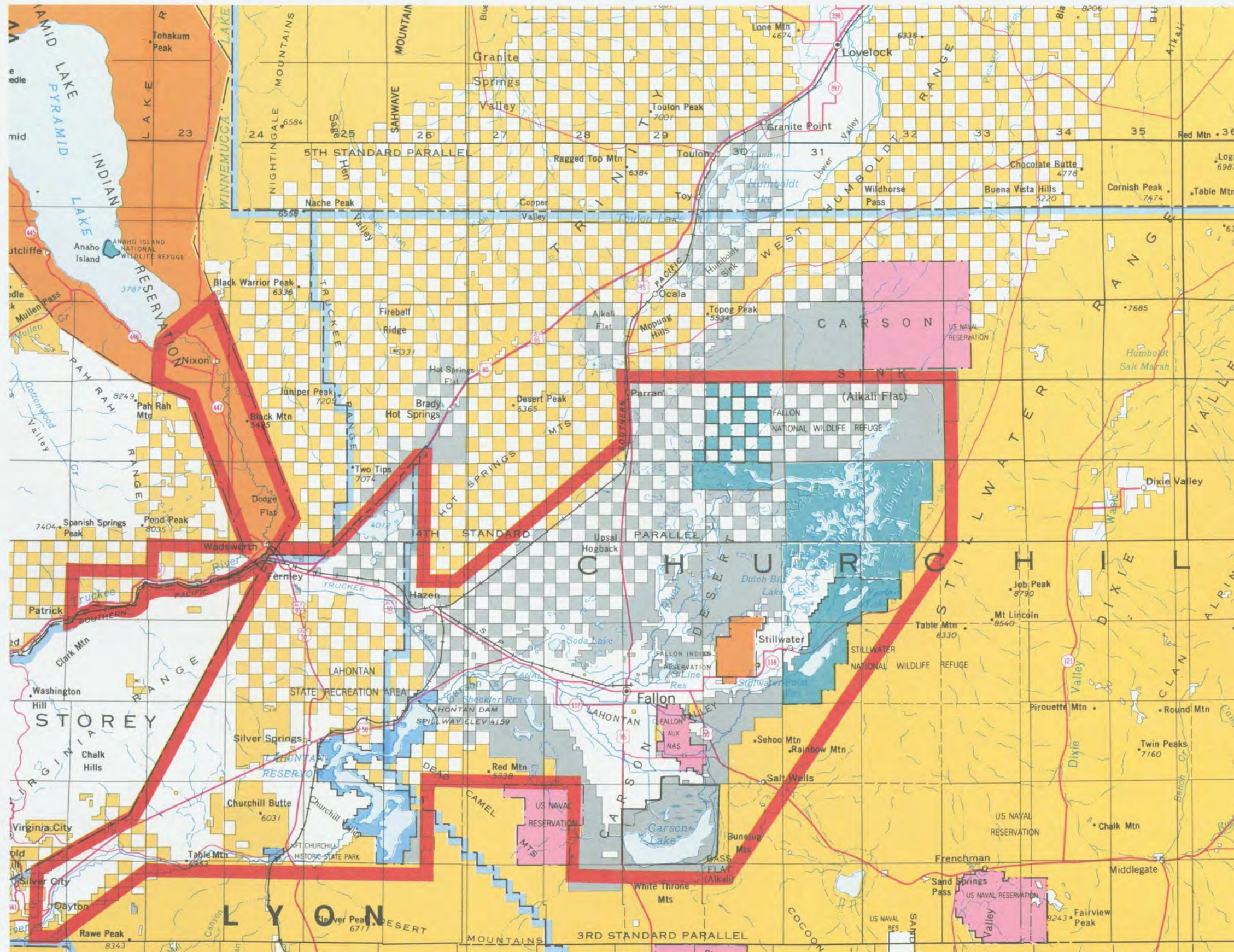
The primary intent of the OCAP was to minimize use of the Truckee River and maximize use of the Carson River while meeting Newlands Project irrigation *demands* for both the Carson and Truckee Divisions of the Newlands Project. The OCAP were to allow local control and initiatives for project operations to the maximum extent possible while still addressing concerns about cui-ui, a species of lake sucker unique to Pyramid Lake that was federally listed as an endangered species in 1967. Project diversions from the Truckee River were reduced when OCAP were first instituted in 1967.

Prior to 1967, diversions of Truckee River water were largely unregulated. Water was diverted to provide for carry-over storage in Lahontan Reservoir, produce hydroelectric power and to minimize the potential for water shortages to the Carson Division during years when Carson River flows were inadequate to supply irrigation needs. One consequence of the 1967 OCAP was to curtail winter electric power generation below Lahontan Dam which eliminated a substantial source of water to the wetlands but benefitted Pyramid Lake and its species.

Further legal controversy over water use was followed by several court decisions affecting OCAP and the Newlands Project. Reclamation prepared an Environmental Assessment (EA) on OCAP in response to the 1983 court decisions and issued interim OCAP in 1985 with a

AFFECTED AREA

LAHONTAN VALLEY WETLANDS ENVIRONMENTAL IMPACT STATEMENT



- PUBLIC LANDS
- INDIAN RESERVATION
- STATE LANDS
- DEPARTMENT OF DEFENSE
- FEDERAL WILDLIFE REFUGES
- BUREAU OF RECLAMATION WITHDRAWS
- PRIVATE LANDS
- AFFECTED AREA, WETLAND EIS



range of alternatives. In response to public comments on the 1985 EA, Reclamation prepared an EIS and developed interim OCAP for 1986 and 1987.

In 1988, the Secretary approved the current OCAP which set further requirements for the Newlands Project operator to reduce Truckee River diversions and improve Newlands Project delivery efficiency rates. One of the outcomes of the 1988 OCAP was that Truckee River diversions were reduced, thereby benefitting Pyramid Lake *resources*. These requirements further reduced the volume of Newlands Project return flows that reached Lahontan Valley wetlands.

1.7.2 LAHONTAN VALLEY WETLANDS

Ancient Lake Lahontan reached its last high water mark (4,380 feet elevation) around 13,000 years ago (Benson and Thompson, 1987). Periodically, Lake Lahontan inundated most valleys of northwestern Nevada including Lahontan Valley. As the climate became more arid, the lake alternately receded and advanced, finally leaving many smaller lakes at the ends of the remaining river systems. A series of such shallow lakes, marshes and meadows formed at the terminus of the Carson River in Lahontan Valley. During this period, waterfowl, marsh birds, shorebirds, and other wetland-dependent wildlife used the Lahontan Valley for migratory stopovers, and as wintering, foraging, and breeding grounds.

In the spring of 1859, Captain James H. Simpson, an Army surveyor, camped at Carson Lake marsh in the southern part of the Lahontan Valley. There he described a lush ecosystem in which the wildlife were plentiful.

"The water is beautifully blue... margined with rushes; the shores covered with mussel shells, pelicans and other aquatic food . . . and the lake is filled with fish. A number of Paiutes, some two dozen, live near our camp, and I notice they have piles of fish lying about drying, principally chubs and mullet (suckers). They catch them with a seine." (Simpson, 1876).

In the 1860s, Pony Express riders who crossed the area described the skies over Carson Lake as "black with ducks". Early white settlers traveled many miles in horse-drawn wagons to hunt in the area known as a waterfowl hunter's paradise.

The Federal Government's interest in valley wetlands began in the late 1800s when the Bureau of Biological Survey, the predecessor to the Service, conducted the first bird surveys in the area. Survey biologists *recorded* diverse populations of migratory birds as early as 1889 (Stillwater NWR Archives collection).

Since those early surveys, the Federal Government has continued to monitor and survey wildlife use in the Lahontan Valley. The Fallon National Wildlife Refuge, the first Service refuge in the valley, was established in Carson Sink in 1931. Before the irrigation project and until the mid-1980s, the Lahontan Valley wetlands were the most heavily used areas in Nevada for migratory birds.

1.7.2.1 History of Stillwater WMA and Stillwater NWR

In 1935, TCID approached the Bureau of Biological Survey proposing to establish a wildlife management area encompassing the Stillwater marsh areas and portions of the Carson Desert. The Service, NDOW (then Nevada State Board of Fish and Game Commissioners) and TCID agreed to manage approximately 163,000 acres of public land which had been withdrawn by Reclamation for the *irrigation* project.

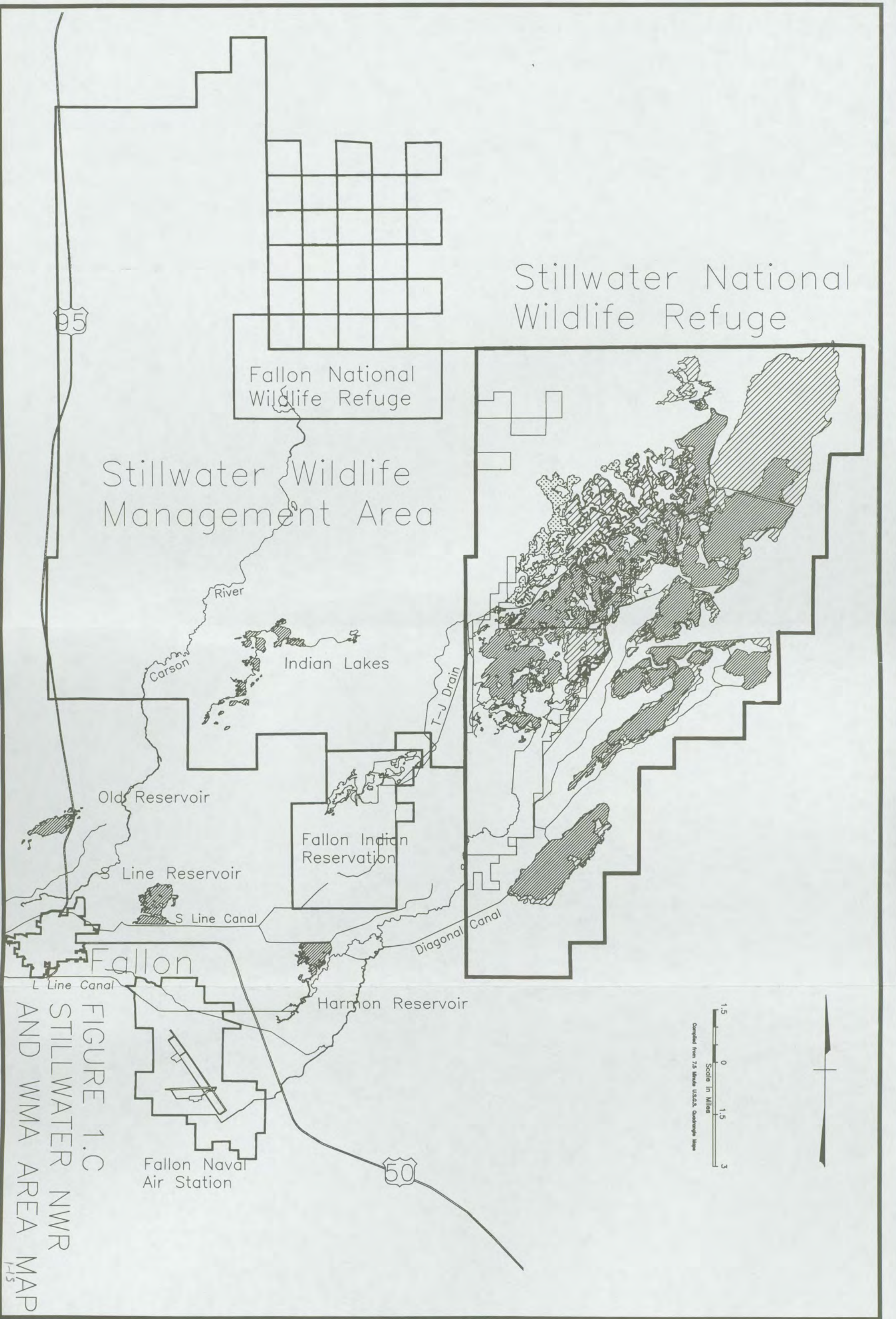
The area, known as the Stillwater WMA (Figure 1.C), was to be used for grazing and wildlife. This 50-year management arrangement was established on November 26, 1948, as the Tripartite Agreement.

Subsection 206(b) of Public Law 101-618 created Stillwater NWR. Approximately 77,520 acres of public land within the original Stillwater WMA were formally transferred from Reclamation's jurisdiction to the Service on September 27, 1991, to create the Stillwater NWR.

1.7.2.2 History of Carson Lake and Pasture

Carson Lake and Pasture, the major wetland area in the southern part of Lahontan Valley, (Figure 1.D) was historically recognized as an important area for migratory birds. The meadows surrounding the shallow lake were used as a common pasture for area ranchers.

In March 1928, TCID entered into an agreement with Greenhead Hunting Club (founded in 1912) to manage the Newlands Project Federal lands at Carson Lake for wetland development and migratory bird hunting. In the late 1970s, TCID set aside the central portion of Carson Lake as a wildlife area and dedicated more than 7,500 acres of the 22,220 acres for management of wildlife. The area not dedicated for wildlife is still used by local ranchers for livestock grazing. In the Fleischmann Agreement between TCID and NDOW, signed June 19, 1980, the two agencies agreed to jointly manage the wetlands and to create the Carson Lake Advisory Board with members representing TCID, NDOW, Greenhead Hunting Club and area livestock grazing permittees.



Stillwater National Wildlife Refuge

Fallon National Wildlife Refuge

Stillwater Wildlife Management Area

River

Carson

Indian Lakes

T-J Drain

Old Reservoir

S Line Reservoir

S Line Canal

Fallon Indian Reservation

Diagonal Canal

Fallon

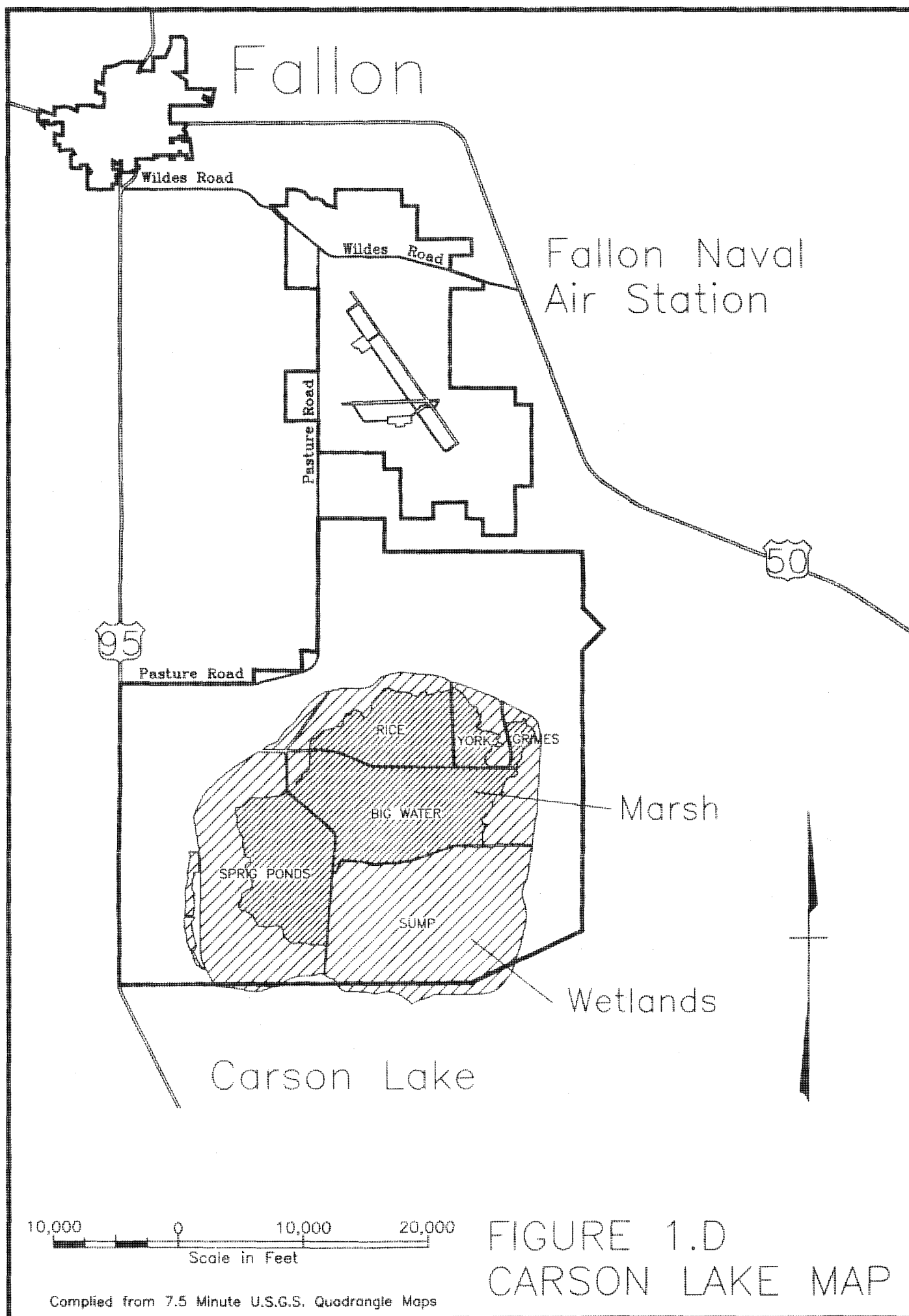
L Line Canal

Harmon Reservoir

Fallon Naval Air Station

Scale in Miles
1.5 0 1.5 3
Compiled from 7.5 Minute U.S.G.S. Quadrangle Maps

FIGURE 1.C
STILLWATER NWR
AND WMA AREA MAP
1-5



1.7.2.3 History of the Fallon Paiute-Shoshone Indian Reservation Wetlands

Before the Newlands Project, the Lahontan Valley Paiute had a history of using the wetland areas for hunting, fishing and gathering.

These people, variously known as the Marsh People, or Toidikadi (Cattail-Eaters), lived at Stillwater marsh, Carson Lake and along the Carson River. After the General Allotment (Dawes) Act went into effect in 1887, the government granted 196 individual allotments of Lahontan Valley land to certain Paiute and Shoshone native people. Later, after the authorization of the Newlands Project, most of those land deals were renegotiated by the U.S. Government. Most tribal members traded their lands for 10-acre allotments of fully irrigable land with water rights *in the Newlands Project*. In addition, Interior reserved 4,640 acres of land to be farmed on behalf of the Paiute and Shoshone people who had relinquished their original allotments. Later, Interior added 3,460 acres of irrigable land to the area known as the Fallon Indian Reservation for use by the Fallon Paiute-Shoshone Tribes (Senate Report 101-555, Oct. 1990). The Indian lands were to be served with irrigation water from the Newlands Project in perpetuity.

The lands identified as Tribal wetlands (*shown at the northern end of the Fallon Indian Reservation in Figure 1.C*) have, in the past, been sporadically flooded with drainwater or irrigation water to facilitate grazing and waterfowl hunting. Because the area had a high water table, (Seiler, written communication, 1993) irrigation saturated the soils, creating wetland habitat. Bureau of Indian Affairs (BIA) authorized the construction of TJ Drain in 1983. The purpose of TJ was to drain waterlogged irrigation fields. Construction of TJ Drain, adjacent to the Tribal wetland area, was completed in May 1983. The drain has effectively lowered the water table and drained the wetlands.

1.8 RELATED ACTIONS

1.8.1 RELATED ACTIONS UNDER PUBLIC LAW 101-618

(1) Acquisition and Use of Land and Water Rights for the Fallon Tribes (sec. 103).

Under Section 103 of Public Law 101-618, water rights appurtenant to the Fallon Reservation which are served by the Newlands Project was capped at 10,587.5 AF/year. The law also set up the Fallon Paiute-Shoshone Tribal Settlement Fund and authorized the expenditure of funds for a number of purposes, one of which is the acquisition of lands, water rights, or related interests from willing sellers. The law caps such land and water right acquisitions within Churchill and Lyon Counties at 2,415.3 acres of land, and 8,453.55 AF/year of water rights, the title to which shall

be held in trust for the Tribes by the United States. No water rights or land had been purchased under this authority as of July 1996.

(2) Closure/Modification of TJ Drain (sec. 106).

Section 106 of Public Law 101-618 calls for the closure of TJ Drain in recognition of the environmental problems associated with that system. Water from this drain flows into the Stillwater WMA and Stillwater NWR. The Secretary, in consultation with the Tribes and in accordance with applicable laws, is to develop and implement a plan for the closure of the TJ Drain in order to address any significant environmental problems with the drain and its closure. Between 1987-90, water from TJ Drain was found to contain some of the highest recorded concentrations of trace elements in drainwater sampled in the Newlands Project. Potentially toxic concentrations of trace elements, such as dissolved arsenic, boron, lithium, molybdenum, and selenium, were found in samples of TJ Drain water (Lico, 1992; Finger and others, 1993).

The Bureau of Indian Affairs (BIA), in consultation with the Fallon Tribes, is working to develop a closure plan for TJ Drain. Pursuant to a September 11, 1992, inter-agency agreement, Reclamation is providing technical assistance to BIA for the planning and closure of the TJ Drain system. On July 7, 1994, BIA entered into a Public Law 93-638 contract with the Fallon Tribes for consultation and construction activities for closure of the TJ Drain. On June 25, 1996, BIA awarded a construction contract to the Fallon Tribes for closure of the TJ Stub, a portion of the TJ Drain system. The Fallon Tribes and BIA are presently investigating the feasibility of blending TJ agriculture drainwater with irrigation water to sprinkler irrigate pasturage for tribal grazing purposes. A closure plan is expected by the fall of 1996.

(3) Truckee River Water Supply Management - Truckee River Operating Agreement (sec. 205).

Subsection 205 (a) of Public Law 101-618 authorizes *and directs* the Secretary to negotiate an operating agreement for Truckee River reservoirs (TROA) with the States of Nevada and California. The agreement is to provide criteria and procedures for operating Federal and selected private reservoirs on the Truckee River system. Such agreement must ensure that the reservoirs would be operated to:

- (1) satisfy dam safety and flood control requirements;
- (2) enhance spawning flows in the lower Truckee River for endangered cui-ui and threatened Lahontan cutthroat trout;

- (3) carry out the terms and conditions of the Preliminary Settlement Agreement (PSA) as modified by the Ratification Agreement;
- (4) ensure storage in and releases from reservoirs to satisfy the exercise of water rights in conformance with applicable decrees; and
- (5) minimize operating and maintenance costs of Stampede Reservoir.

Negotiations commenced in 1991 to develop a draft operating agreement for the Truckee River *and are continuing at this time. The Secretary, representatives from the States of Nevada and California, the Pyramid Lake Paiute Tribe, Sierra Pacific Power Company, and other interested parties involved in the operations of the Truckee River reservoirs and facilities, are working to complete a draft EIS. Completion of a draft EIS is scheduled for early 1997 and the final EIS is anticipated to be released in late 1997.*

(4) Management of Stillwater NWR (par. 206(b)(2)).

As directed by paragraph 206(b)(2) of the law, the Service will manage Stillwater NWR for the purposes of:

- (1) maintaining and restoring natural biological diversity;
- (2) providing for conservation and management of fish and wildlife and their habitats;
- (3) *fulfilling* international treaty obligations of the United States *with respect to fish and wildlife*; and
- (4) providing opportunities for scientific research, environmental education, and fish and wildlife oriented recreation.

In addition, the law states that the area shall be administered in accordance with the provisions of the National Wildlife Refuge System Administration Act of 1966, as amended, except that any activity provided for under the terms of the 1948 Tripartite Agreement may continue under the terms of that agreement until its expiration date of *November 26, 1998 (par. 206(b)(3)).*

The Stillwater WMA Management Plan (which includes Stillwater NWR) currently sets goals and objectives related to wildlife and habitats in the Refuge. Water demand is directly related to habitats, and examples of possible water demands for three representative wetland habitats is discussed in Appendix 5. Service and NDOW experience gained from almost 50 years of managing wetland habitats in the Lahontan Valley indicates that primary wetland habitats on average require about 5 AF/acre/year.

The Tripartite Agreement (see Section 1.7.2.1) also outlines general use objectives (grazing and wildlife) for the Stillwater WMA. The Service utilizes a mix of drainwater and some acquired prime irrigation water to sustain small areas of wetland habitat at both Stillwater WMA and NWR. The general management directions, as defined in the 1987 *Stillwater WMA Management Plan* (Appendix 2), are to provide habitat for spring and fall migrants and nesting birds. The species of special concern include bald eagles, peregrine falcons, Swainson's hawks, white-faced ibis, snowy plovers, tundra swans, redhead, and canvasback ducks.

The Service is developing a comprehensive management plan for Stillwater NWR, the environmental impacts of which will be analyzed as part of an EIS being prepared by the Department of the Interior for water management issues on the lower Truckee and Carson Rivers. The plan is scheduled to be completed by November 1997. It will define Refuge habitat objectives and will describe the Service's strategies for water and wetland management, public recreation, livestock grazing and other management programs. It will also address possible expansion of the Stillwater NWR boundaries in fulfillment of subpar. 206(b)(5) of Public Law 101-618.

Stillwater WMA will continue to be managed consistent with the 1948 Tripartite Agreement until November 26, 1998. *The Secretary will make recommendations to Congress by November 1997 regarding any additional Federal lands within Stillwater WMA that, if added to Stillwater NWR, would enhance the Service's ability to carry out the purposes of Stillwater NWR.* When the 1948 Tripartite Agreement expires, Stillwater WMA will formally cease to exist. Therefore, *for the purposes of this EIS*, Stillwater WMA primary wetlands are considered collectively as part of the Stillwater NWR.

(5) Water use within Fallon Naval Air Station (subsec. 206(c)).

Paragraph 206(c)(3) "All water no longer used and water rights no longer exercised by the Secretary of the Navy as a result of the implementation of the modified land management plan or measures specified by this subsection shall be managed by the Secretary for the benefit of fish and wildlife resources referenced in sections 206 and 207 of this title...."

This section of the law goes on to state in subsections (206)(c)(3)(A) and (B) that water conserved will be managed primarily for the conservation of Pyramid Lake *resources*, with some water rights to be used for the benefit of the Lahontan Valley wetlands.

Pursuant to section 206(c) of Public Law 101-618, the Service and the Navy have signed a Memorandum of Agreement (MOA) that calls for the irrigation water saved or conserved at NAS-Fallon in the future to be used by the Service for fish and wildlife purposes, primarily for cui-ui and secondarily for wetlands protection. Based on the provisions in the MOA, about 2,300 AF/year of water could be available from the Navy under this agreement.

The Navy uses these water rights to grow crops adjacent to runways to control dust and foreign objects and suppress aircraft-caused brush and grass fires. In response to subsection 206(c) of the Public Law, the Navy completed a report titled "Land and Water Use Assessment Update for the Greenbelt Area, Naval Air Station, Fallon, Nevada" in July 1992. Subsequently, the Navy has prepared an EA for "The Management of the Greenbelt Area at Naval Air Station (NAS) Fallon, Nevada," (U.S. Department of the Navy, 1994). This document proposed different alternatives that addressed safety objectives, farming practices, and water conservation. *These became the basis of the MOA.*

(6) State (Nevada) Cost-sharing (subsec. 206(d)).

Pursuant to subsection 206(d) of the law, the Secretary has entered into an agreement with the State of Nevada for the use by the State of not less than \$9 million in State funds for water and water rights acquisition and other protective measures to benefit the Lahontan Valley wetlands. As stated in subsection 206(d), the Secretary's authority under subsection 206(a) is contingent upon the State making such sums available pursuant to the terms of the agreement.

In 1990, State voters approved the Proposition 5 Bond Issue which provided \$5 million for Lahontan Valley wetland water right purchases. In the previous year, the State Legislature had redirected \$4 million for the wetland water right purchases. *The State of Nevada has informally agreed to make these additional funds available contingent upon the State entering into an agreement regarding allocation of the water associated with the Truckee and Carson Rivers. As of July 1996, the State of Nevada has spent about \$3.25 million on the water rights acquisition program.*

The water rights acquisition program for Carson Lake started in 1989 when the Nevada Waterfowl Association purchased Newlands Project water rights for the area.

(7) Transfer of Carson Lake and Pasture (subsec. 206(e)).

Under subsection 206(e) of the law, the Secretary is authorized to convey to the State of Nevada those federal lands in the area known generally as the Carson Lake and Pasture for use as a wildlife refuge. As a condition of the transfer: "... the Secretary and the State of Nevada shall execute an agreement, in consultation with affected local interests, including the operator of Newlands Project, ensuring that the Carson Lake and Pasture shall be managed in a manner consistent with applicable international agreements and the designation of the area as a component of the Western Hemisphere Shorebird Reserve Network. The Secretary shall retain a right of reverter under such conveyance if the terms of the agreement are not observed by the State."

Should Carson Lake be transferred to the State of Nevada as a wildlife area, NDOW would most likely develop a management plan as part of the above referenced agreement to describe the State's strategies for water management, public use, grazing, and facilities development. By virtue of paragraph 206(a)(3), Carson Lake will be eligible to receive water through Newlands Project facilities.

A Bureau of Land Management cadastral survey of the Carson Lake area is underway and is anticipated to be completed by the fall of 1997. An agreement is being prepared by the Department of the Interior and the State of Nevada, per Section 206(e) of Public Law 101-618, relative to the management of Carson Lake. An environmental assessment is also in the process of being prepared. It is anticipated that the transfer will be completed by late 1997.

(8) Transfer of Indian Lakes (subsec. 206(g)).

"... the Secretary is authorized to convey to the State or Churchill County, Federal lands in the area generally known as the Indian Lakes area." (See Figure 1.C.) Conveyance of these lands would require an agreement between the Secretary and the State or Churchill County, outlining the details of the transfer and management of the area.

In a January 1993, document titled "Indian Lakes, A Report to the 1993 State Legislature," the Nevada Division of State Lands recommended that the State of Nevada not acquire the Indian Lakes area due to the following concerns:

- (1) possible liability should this area be considered for cleanup as a result of Environmental Protection Agency (EPA) actions associated with the

Carson River Mercury Site (see Section 1.8.2 (3), RELATED PROGRAMS);

- (2) there are no provisions to provide a source of water for the lakes; and**
- (3) no State agency is willing to manage the area.**

Churchill County has expressed similar reservations about acquiring the Indian Lakes area (Churchill County written communication, Aug. 27, 1993). However, the City of Fallon has stated that the area should be preserved for public use and is working with the County to acquire the area (Lahontan Valley News, Feb. 24, 1995).

The Indian Lakes area will continue to be managed by the Service under the 1948 Tripartite Agreement for wildlife and grazing pending any future decisions related to conveyance of these lands to the State of Nevada or Churchill County, or inclusion of the area into the Stillwater NWR system. There are no plans for the Service to purchase water rights specifically for Indian Lakes under the Proposed Action or alternatives.

An Environmental Assessment (EA) "Transfer of Indian Lakes Area To Churchill County, Nevada" was completed by the Service in March 1996. Based on analysis in the EA, a Finding of No Significant Impact was issued. Under the proposed action in the EA, the Indian Lakes portion of Stillwater WMA would be transferred to Churchill County, Nevada for the purposes of fish, wildlife, and outdoor recreation. Based on communications between Churchill County and the City of Fallon, Churchill County intends to subsequently convey the Indian Lakes area to the City of Fallon for the same purposes. Although the transfer of the Indian Lakes area has not occurred, as of July 1996, the Service has received written confirmation by Churchill County of the County's desire to acquire the Indian Lakes area and to subsequently convey the title of the area to the City of Fallon (letter dated July 10, 1996).

(9) Recovery Actions for Endangered and Threatened Pyramid Lake Fishes (sec. 207).

Subsection 207(a) of Public Law 101-618 requires the Secretary to expedite the development and implementation of recovery plans for endangered cui-ui and threatened Lahontan cutthroat trout. The "Cui-ui Recovery Plan, Second Revision", was approved by the Service on May 15, 1992 (U.S. Fish and Wildlife Service, 1992); the Cutthroat Trout Recovery Plan was approved Jan. 31, 1995 (U.S. Fish and Wildlife Service, 1995).

Cui-ui

The objective of the Cui-ui Recovery Plan is to improve the status of cui-ui so that the species has at least a 95 *percent* probability of persisting for 200 years. Part of this objective may be achieved by securing and maintaining additional spawning and rearing habitat for cui-ui in the lower Truckee River and Pyramid Lake. According to the recovery plan, sufficient habitat would be provided if Truckee River inflow to Pyramid Lake was supplemented with up to 110,000 AF/year of water. Equivalent habitat benefits could also be generated by implementing a variety of other water management measures and habitat improvement strategies:

- (1) reducing Truckee River diversions to the Newlands Project by implementing Reclamation's revised bench and bottom land map, modifying OCAP, improving structural and operational delivery facilities, reducing annual carry-over storage in project reservoirs, conserving irrigation water on NAS-Fallon, and reducing irrigation demand in the upper portions of the Carson River;
- (2) rehabilitating the Lower Truckee River;
- (3) improving fish passage over the Truckee River delta;
- (4) implementing the Truckee River Operating Agreement;
- (5) acquiring water rights; and
- (6) recouping excess water from the Newlands Project.

Implementation of some or all of these conservation measures have been identified as actions necessary for meeting objectives of the recovery plan. The Service is at various stages in accomplishing the measures, and it is too early to determine the exact amount of water and equivalent benefits that have been secured or achieved.

Lahontan Cutthroat Trout

A draft recovery plan for Lahontan cutthroat trout was distributed for public/agency review in February 1993 and a final plan was approved by the Service on January 31, 1995 (U.S. Fish and Wildlife Service, 1995). The plan will provide for separate de-listing of three population subgroups, protection and management of all existing populations to prevent the species from declining irreversibly, securing and maintaining habitats to sustain viable populations, and reintroduction of trout to some sites within historic ranges.

Recovery objectives are proposed to maintain and enhance 155 stream populations and two self-perpetuating lake populations. Pyramid and Walker Lakes are identified as areas for Lahontan cutthroat trout population viability research related to recovery

of *lake-dwelling* stocks. The Service plans to complete population modelling to *determine whether* sufficient numbers of viable populations of Lahontan cutthroat trout are being maintained, and will de-list the species as recovery goals are achieved. In addition, Pyramid and Walker Lakes will be considered as part of an ecosystem planning effort that could contribute to the recovery of *lake-dwelling* Lahontan cutthroat trout over the long run if measures are completed to restore the Truckee and Walker River ecosystems.

(10) Newlands Project Improvement: OCAP, Project Efficiency, and Recoupment (sec. 209).

OCAP

In Pyramid Lake Paiute Tribe of Indians v. Morton, 354 F. Supp. 252 (D.D.C. 1973), United States District Court Judge Gerhard Gesell held that the Secretary, in keeping with his tribal trust responsibilities, must ensure that all Truckee River water not obligated by court decrees or contract with Newlands Project irrigators or TCID flow to Pyramid Lake and not be diverted at Derby Dam. In what is now known as the "Gesell opinion," the Court ordered the Secretary to submit a proposed amended regulation to provide an effective means to measure water use within the Newlands Project, minimize unnecessary waste, end delivery of Truckee River water within the Project lands not entitled to receive Project water under applicable decrees, and ensure compliance by the district (TCID). As a result, the Operating Criteria and Procedures (OCAP) were amended (see Section 1.7.1, NEWLANDS PROJECT HISTORY, History of OCAP).

OCAP are intended to maximize use of the Carson River and minimize use of the Truckee River in meeting decreed Newlands Project water right entitlements. The current OCAP, adopted by the Secretary in 1988, are to remain in effect unless the Secretary decides that changes are necessary to comply with his obligations, including the ESA, pursuant to paragraph 209(j)(2) of Public Law 101-618.

The Department of the Interior (Interior) has initiated development of an adjusted OCAP to consider possible technical revisions to current OCAP to reflect more current conditions related to core assumptions such as irrigated acreage base, percent use of headgate entitlement, and Lahontan Reservoir storage targets. In the fall of 1995, Interior conducted a series of public meetings to discuss possible revisions for an adjusted OCAP. Although Interior is in the process of developing such revisions, no proposed action has been defined. Pursuant to NEPA, Interior will analyze the consequences of the action and a series of alternatives before an adjusted OCAP is adopted.

Newlands Project Efficiency

Pursuant to Public Law 101-618, the Secretary shall study the feasibility of improving the efficiency of Newlands Project facilities with a goal of obtaining 75-percent project delivery efficiency consistent with OCAP calculations. Reclamation completed a Newlands Project Efficiency Study (U.S. Department of the Interior, 1993) in compliance with Public Law 101-618 in January 1994. As of July 1996, no further action has been taken.

Two alternatives developed and discussed in the document identify methods to attain 75-percent efficiency. The Newlands Project Efficiency Study's Least Cost Alternative relies on acquisition of water rights from targeted areas, transferring them to the wetlands, installing measuring devices at 49 percent of the turnouts, and lining the first 5.9 miles of the V-line Canal with concrete. The second alternative (Structural Improvement) relies on acquisition of water rights from targeted areas, installing measuring devices at 50 percent of the turnouts, and lining 44.9 miles of major canals with concrete.

Recoupment

Pursuant to paragraph 209 (j)(3) of Public Law 101-618, the Secretary is directed to pursue recoupment (i.e., "restitution") of water diverted from the Truckee River by the Newlands Project in excess of the amounts permitted by whatever project operating criteria and procedures that were in effect at a given time. Paragraph 209 (j)(3) further provides that the Secretary shall have the exclusive authority and responsibility to pursue such recoupment either through a settlement agreement in accordance with subsection 209 (h), or through a judicial proceeding,

"... except that, if an agreement or order leading to such recoupment is not in effect as of December 31, 1997, any party with standing to pursue such recoupment prior to enactment of this title may pursue such recoupment thereafter. ... In any recoupment action brought by any party, other than the Secretary, after December 31, 1997, the only relief from any court of the United States will be the issuance of a declaratory judgment and injunctive relief directing an unlawful user of water to restore the amount of water unlawfully diverted. ..."

The Department of the Interior has determined that 1,058,000 AF of water was improperly diverted during the period from 1973 through 1987 and thus is subject to recoupment. *Efforts to negotiate a settlement agreement on recoupment have failed, and, in January 1996, the federal government filed suit against TCID in the*

Federal District Court for Nevada, and seeks to have TCID repay 1,058,000 acre-feet of water over-diverted from the Truckee River. The exact quantity of water to be recouped, the method of recoupment, and the time allowed for recoupment will be determined by litigation or negotiation.

Recoupment is separate and apart from the Service's action to acquire water for the Lahontan Valley wetlands. *Furthermore, until litigation is resolved*, the Service will not have adequate information to quantify how recoupment will impact the wetlands water rights acquisition program.

(11) Groundwater studies (par. 210(b)(16).

"The Secretary, in consultation with the State of Nevada and affected local interests, shall undertake appropriate measures to address significant adverse impacts, identified by studies authorized by this title, on domestic uses of groundwater directly resulting from the water purchases authorized by this title."

The Service and Reclamation have contracted with the United States Geological Survey (USGS) to study groundwater resources *near Fernley and in* Lahontan Valley. USGS has published two water resources investigation reports: "Water-Level Changes and Directions of Ground-Water Movement in the Shallow Aquifer, Fallon Area, Churchill County, Nevada - Report 93-4118" and "Hydrogeology and Potential Effects of Changes in Water Use, Carson Desert Agricultural Area, Churchill County, Nevada - Report 93-463," addressing this issue.

1.8.2 RELATED PROGRAMS NOT IDENTIFIED IN PUBLIC LAW 101-618

The following programs, plans, and acts are in place and may impact the affected area presently or in the near future.

- (1) **The Churchill County Master Plan** provides a long-term general plan for the physical development of Churchill County. Some meetings have been conducted to update the plan.
- (2) **Department of the Interior National Irrigation Water Quality Program (NIWQP), Phase IV**, includes a study of Irrigation Drainage In and Near Wildlife Management Areas, West-Central Nevada. The Drainwater Study will be the basis for developing strategies and criteria to manage Newlands Project drainwater.

- (3) **The Environmental Protection Agency (EPA) Remedial Investigation Feasibility Study of the Carson River Mercury Site, Carson River, Nevada (Superfund).** A preliminary draft assessment, "Human Health Risk Assessment/Remedial Investigation Report Carson River Mercury Site," has identified mercury, arsenic and lead as contaminants of potential concern in the Mercury Site study area (Hogan and Smucker, 1994). Actions to remedy contamination at the Carson River Mercury Site have not yet been determined.
- (4) **The Defense Base Closure and Realignment Act of 1990 (Public Law 101-510),** includes NAS-Fallon's plans to relocate other units (including the TOPGUN training unit) to the Fallon area.
- (5) **The Newlands Project Operation and Management Agreement.** The Newlands Project is presently being operated under a temporary agreement. Negotiations between Interior and TCID for a long-term agreement are *currently underway*.
- (6) ***The Truckee River Water Quality Settlement Agreement*** is a proposed settlement of water quality litigation brought about by the Pyramid Lake Paiute Tribe against the cities of Reno and Sparks, the Nevada Department of Environmental Protection, and the U.S. Environmental Protection Agency. The settlement proposes that Reno, Sparks, Washoe County, and the Department of the Interior operate a joint program to improve water quality in the Truckee River based on purchase and management of \$24,000 million in water rights from the Truckee River basin and the Truckee Division of the Newlands Project. It also includes provisions for storage agreements for this water and make-up water for effluent reuse programs. Purchase of water rights from the Carson Division of the Newlands Project for the joint program is not allowed under the settlement. The agreement is expected to be approved by all parties (the above named parties plus the U.S. Department of Justice) in the summer of 1996.
- (7) ***Operating Criteria and Procedures for the Newlands Project*** will be given more fundamental consideration over the next several years and alternative approaches will be reviewed in a Department of the Interior's EIS that is currently being prepared to address water resources issues of the Truckee and Carson Rivers. A proposed action has not yet been formulated for this action.

1.9 SUMMARY OF PRIOR LEGAL ACTIONS, LAWS, REGULATIONS, AND NEPA DOCUMENTS

1.9.1 COURT DECREES AND DECISIONS

The Proposed Action *and action alternatives* would be implemented in a manner consistent with the Orr Ditch and Alpine Decrees.

The 1944 Orr Ditch Decree established:

- (1) the priority of individual Truckee River water rights, *including the water rights of the United States for the Pyramid Lake Indian Reservation and the Newlands Project*; and
- (2) *through incorporation of the 1915 Truckee River General Electric Decree and the 1935 Truckee River Agreement, conditions for storage and release of water from certain Truckee River reservoirs, including Lake Tahoe.*

Water duty is defined as the maximum amount of water that water-right holders are entitled to take at their headgates (Newlands Project) for a specific beneficial use. Water duty is based on a variety of factors, such as soil characteristics, crop types, point of delivery, type of distribution system, and beneficial uses.

The 1980 Alpine Decree established:

- (1) the Carson River water rights (surface water only) for parties in both California and Nevada; and
- (2) established water duties for the Newlands Project. The decree established a water duty for Newlands Project bottom land of 3.5 AF/acre/year. For bench land, the water duty was set at 4.5 AF/acre/year.

If the U.S. District Court for the District of Nevada should decide to modify, amend, eliminate, add to, or change any provision of the Alpine or Orr Ditch Decrees, the Service would reassess its actions to remain in compliance with the revised decrees, if and as applicable.

1.9.2 OPERATING CRITERIA AND PROCEDURES (OCAP)

The 1988 OCAP, approved on April 15, 1988, shall remain in effect at least through December 31, 1997, unless the Secretary decides that changes are necessary to comply with obligations under Public Law 101-618, including those under the ESA. *Currently, the Department of the Interior is considering some technical modifications to the existing OCAP. An adjusted OCAP is not expected to be adopted for the 1996 irrigation season. The 1988 OCAP remains as the baseline in this document, as these procedures are enacted and implemented, and are currently the law. Possible changes that may result from an adjusted OCAP are noted in the resource sections in this document where information is available, and are also addressed in Section 4.26.9 OCAP MODIFICATIONS.* The Secretary shall ensure that actions taken to comply with Public Law 101-618 will also *comply with OCAP.*

1.9.3 INDIAN TRUST RESPONSIBILITIES

The Federal Government has a trust responsibility to protect and maintain rights and trust resources reserved by or granted to American Indian (Indian) tribes or Indian individuals by treaties, statutes, and executive orders. Pursuant to Secretarial Order 3175 (1993), Interior bureaus and offices are to consider these responsibilities and potential impacts to trust assets during the NEPA process. These agencies are to consult with potentially affected tribes, Indian organizations, Bureau of Indian Affairs (BIA), and the Office of the Solicitor regarding any actions that might impact Indian trust resources.

The Service has met with local tribal officials throughout development of the EIS, and BIA officials from the Carson City office have played a key role in scoping, developing, and editing the document. As part of the scoping process, BIA officials and tribal representatives often attended the Service's bi-monthly inter-agency coordination meetings. The Service has met with representatives from the Regional Solicitor's Office, the Pyramid Lake Tribe, and Fallon Paiute-Shoshone Tribe to specifically address tribal concerns relative to the acquisition of water and water rights for wetlands.

1.9.4 FARMLAND PROTECTION POLICY ACT

The Farmland Protection Policy Act (FPPA; subtitle I of Title XV of the Agriculture and Food Act, Public Law 97-98) was passed by Congress on December 22, 1981 to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. Under FPPA, Federal agencies are to consider the effects of their programs on the conversion of farmland and to consider alternatives, as appropriate, to lessen any adverse effects. FPPA does not expressly require a Federal agency to modify any project solely to avoid or minimize the effects of the conversion of farmland to non-agricultural uses so long as the adverse impacts are evaluated and alternatives to lessen adverse impacts are considered.

In accordance with the FPPA, the U.S. Department of Agriculture (USDA), in cooperation with other Federal agencies, developed a set of criteria to be used by Federal agencies to identify and take into account adverse effects, if any, of their programs on farmland (7 CFR § 658). Appendix 10 lists and discusses these criteria in more detail. If a site being considered for a Federal program registers over a certain score, USDA recommends that "Alternative sites, locations, and designs that would serve the proposed purpose [i.e., sustaining a long-term average of 25,000 acres of primary wetland habitat] but convert either fewer acres of farmland or other farmland that has a lower relative value," be considered by the action agency.

Because all farmland in Churchill County has been classified by the Natural Resources Conservation Service as either prime farmland or farmland of statewide importance, all irrigated farmland in Churchill County are covered by FPPA.

1.9.5 Refuge Revenue Sharing Act and Uniform Relocation Assistance and Real Property Acquisition Policies Act

Refuge Revenue Sharing Act:

The Federal Government is exempt from the payment of local or state taxes for the properties it owns or products it may produce. Congress recognized that the acquisition of private property and the conversion of private lands into National Wildlife Refuges would impact local governments in their ability to collect taxes from such lands.

Congress, in an effort to offset the tax losses that local governments would incur as a result of its designations or actions to create National Wildlife Refuges passed an act (Public Law 88-523) in August 1964 to increase the participation by counties in revenues originating from lands that had become part of National Wildlife Refuge System.

That act was later amended in 1978 by Public Law 95-469, now referred to as the "Refuge Revenue Sharing Act". The purpose of Public Law 95-469 was to provide for payments in lieu of taxes to local governments for lands acquired by the Service for the National Wildlife Refuge System. Payments are based on the acreage of fee title lands or receipts collected from National Wildlife Refuge System lands within the boundaries of the local government.

As the Service acquires water rights for the Lahontan Valley wetlands, it may also acquire privately owned lands as part of its transactions. For these "fee title" lands acquired by the Service, Congress appropriates funds each fiscal year (FY) for the Service to make payments to local governments under the provisions of the Refuge Revenue Sharing Act.

Refuge Revenue Sharing Act provisions prescribe payments of three-fourths of 1 percent of the fair market value of the lands it has acquired in fee title. The Secretary is responsible to make equitable determinations of fair market value for such lands. The actual payments received by local governments each year are dependent upon Congressional appropriations to the Refuge Revenue Sharing fund. The payment rate (three-fourths of 1 percent) does vary each year based on actual Congressional appropriations. Details and calculations of actual Refuge Revenue Sharing Payments are included in Section 3.25, ACQUISITION COSTS AND PROBABILITY OF MEETING SERVICE OBJECTIVE.

1970 UNIFORM RELOCATION ASSISTANCE REAL PROPERTY ACQUISITION POLICIES ACT (PUBLIC LAW 91-646)

The purpose of this Act is to provide for the uniform and equitable treatment of persons displaced from their homes, businesses, or farms by Federal and federally assisted programs. It also establishes uniform and equitable land acquisition policies for Federal and federally assisted programs. Any Service acquisition of land or interests therein are governed by the Act.

The Act provides for reimbursement for certain reasonable and necessary expenses incurred in selling real property to the government. Steps necessary to comply with the Uniform Relocation Assistance Real Property Acquisition Policies Act will be taken when the Service acquires fee title to land with water rights.

1.9.6 PRIOR LEGISLATIVE ACTS AND ORDERS ALLOWING OR DIRECTING LAND ACQUISITIONS FOR REFUGES

A number of prior legislative acts and orders have allowed or directed the acquisitions of lands for refuges. They are:

An Act Authorizing the Transfer of Certain Real Property for Wildlife, or other purposes
(16 U.S.C. 667b-667d) as amended;

Emergency Wetlands Resources Act of 1986 (100 Stat. 3582-91);

Fish and Wildlife Act of 1956 (16 U.S.C. 742 (a)-754) as amended;

Lea Act (16 U.S.C. 695-695c);

Migratory Bird Conservation Act (16 U.S.C. 715-715r) as amended;

Migratory Bird Hunting and Conservation Stamp (16 U.S.C. 718) as amended; and

North American Wetlands Conservation Act (16 U.S.C. 4401-4413).

1.9.7 RELATION OF THE PROPOSED ACTION *AND ACTION ALTERNATIVES* TO THE SERVICE'S ONGOING WATER RIGHTS PURCHASE PROGRAM AND PRIOR ENVIRONMENTAL ASSESSMENT

The Service's Proposed Action *and action alternatives* would be a continuation of a water rights acquisition program for the Lahontan Valley wetlands which was first initiated by the

Service in 1989 under previous appropriations and existing authorities (not Public Law 101-618). Congress has appropriated about \$10.5 million to the Service to acquire water rights in the Carson Division for delivery to the Stillwater NWR and Carson Lake. Water rights acquired *are to* meet eligibility requirements discussed on pages 10 and 11 of the December 1991 Environmental Assessment (EA): "Acquisition of Water Rights for Stillwater National Wildlife Refuge" (U.S. Fish and Wildlife Service, 1991). *The EA* addressed the consequences of acquiring and transferring up to 20,000 AF of water rights at an agreed-upon 2.99 transfer rate, and specified that water acquired would be transferred to Stillwater NWR and/or Carson Lake. The Fallon Tribal wetlands were not addressed as part of the action under the EA.

As of May 1996, a combined total of 16,933 AF of water rights have been acquired by the Service and the State of Nevada. The Service anticipates that the 20,000 AF water rights purchase program will be completed by August 1996.

1.9.8 STATE OF NEVADA, QUESTION 5 BOND FUND FOR LAHONTAN VALLEY WETLANDS

In 1990, Nevada voters approved the Question 5 Bond Fund providing \$5 million for Lahontan Valley wetland water right purchases. *The State of Nevada has informally agreed to make additional funds available contingent upon the State entering into an agreement with the Department of the Interior regarding allocation of the water associated with the Truckee and Carson Rivers, the Lahontan Valley wetlands and the Newlands Project (as provided in Chapter 478, Statutes of Nevada 1983 as amended by Chapter 785, Statutes of Nevada 1989). These additional funds could potentially amount to as much as \$4 million for wetland water right acquisitions.*

Water rights purchased by the State of Nevada are expected to be transferred to Carson Lake for wetlands protection. The State of Nevada is expected to continue purchasing water rights under its program until funding is exhausted. The Service anticipates, based on current market values, that the State *funding from Bond 5 will* permit the acquisition of 12,800 - 23,000 AF of water rights. The Service expects these State acquisitions to be accomplished by purchasing Newlands Project Carson Division water rights.

While the State of Nevada's wetlands water rights acquisitions are a separate action, the Service has incorporated this source of water into the total volume of water to be acquired under the Proposed Action and alternatives. In this document, the total volume of water to be acquired (both Federal and State portions) is analyzed to allow the Service to better address the cumulative impacts of the total water rights acquisition program for the Lahontan Valley wetlands.

1.10 REGULATORY FRAMEWORK AND AGENCIES

1.10.1 FEDERAL LAWS, REGULATIONS, AND EXECUTIVE ORDERS

Before a decision can be made to implement the Proposed Action or an alternative, the Service must obtain all required Federal, State, and local permits. The Service also must follow procedures and meet requirements related to the following Federal laws (and any associated regulations) and executive orders:

Archeological, Antiquities, and Historic Preservation Acts including:

- Antiquities Act of 1906;
- Historic Sites Act of 1935;
- National Historic Preservation Act of 1966; and
- Archaeological Resources Protection Act of 1979;

National Environmental Policy Act

Endangered Species Act of 1973, as amended, section 7;

Clean Water Act, sections 404 and 401;

Clean Air Act, as amended;

Farmland Protection Policy Act as amended June 17, 1994;

1970 Uniform Relocation Assistance and Real Property Acquisition Policies Act, as amended, March 2, 1989;

Comprehensive Environmental Response Compensation and Liability Act, as amended (CERCLA/SUPERFUND); and

Executive Orders (E.O.) including:

- E.O. 12372 - Intergovernmental Review of Federal Programs;
- E.O. 11593 - Protection of Archeological, Historic, and Scientific Properties;
- E.O. 11988 - Floodplain Management; and
- E.O. 11990 - Protection of Wetlands.

1.10.2 GOVERNMENTS AND AGENCIES IN THE AFFECTED AREA

The following governments and agencies would possibly have some regulatory jurisdiction or operational interest in actions taken by the Service to acquire water rights for wetlands protection.

U.S. Army, Corps of Engineers

U.S. Department of the Interior

Fish and Wildlife Service

Bureau of Reclamation

Bureau of Indian Affairs

Bureau of Land Management

Geological Survey

U.S. Department of Agriculture

Natural Resources Conservation Service

Rural Economic Community Development

Farm Services Agency

U.S. Environmental Protection Agency

U.S. Department of Defense, Navy

State of Nevada, Department of Business and Industry

Division of Agriculture

State of Nevada, Department of Conservation and Natural Resources

Division of Wildlife

Division of State Lands

Division of Environmental Protection

Division of State Parks

Division of Conservation Districts

Division of Water Planning

Division of Water Resources (State Engineer)

State of Nevada, Department of Museums, Library and Arts

State Historic Preservation Office

Truckee-Carson Irrigation District

Churchill County

City of Fallon

Fallon Paiute-Shoshone Indian Tribes

Pyramid Lake Paiute Tribe

1.11 SCOPING SUMMARY - PUBLIC INVOLVEMENT PROCESS

The Service has worked with Cooperating Agencies, technical consultants, and interested groups and individuals to identify issues and concerns, analyze the affected area, estimate the environmental effects and write the EIS using a systematic, interdisciplinary approach. *Public meetings provided an opportunity for minority and low-income populations to attend and voice their concerns about the proposed project.*

Cooperating Agencies are:

Nevada *Division* of Wildlife (formerly the *Department* of Wildlife under the Nevada Department of Conservation and Natural Resources), U.S. Bureau of Reclamation, U.S. Bureau of Indian Affairs, U.S. Bureau of Land Management, U.S. Natural Resources Conservation Service, Naval Air Station - Fallon, Churchill County, and the Fallon Paiute-Shoshone Indian Tribes.

Technical consultants and other interested groups include:

Nevada Department of Conservation and Natural Resources (Divisions of Water Planning and State Lands), University of Nevada, Reno (Department of Agricultural Economics), U.S. Geological Survey, The Nature Conservancy, Environmental Defense Fund, Robertson Software, Inc., Truckee-Carson Irrigation District, Bookman - Edmonston Engineering, Inc., Meyer Resources, Inc., and Professor David Sunding, University of California at Berkeley.

The Service *requested* members of the public, interest groups, and State, Federal, and local agencies to voice concerns and help identify major issues in regard to the Service's action. Through meetings with interested parties and government agencies, and in EIS Scoping Workshops held in January 1992, the Service gathered information about issues and areas of concern. Those concerns were identified in the Service's September 1992 Scoping Report (Appendix 2), see (5) below.

The public involvement process has included the following:

- (1) Holding bi-monthly inter-agency meetings in Reno, Nevada, beginning in April 1991. Government agencies, tribes, private organizations and the public have been invited to participate in these open meetings;
- (2) Publishing a Notice of Intent to prepare an Environmental Impact Statement (EIS) and a Notice of Public Meetings in the Federal Register, Vol. 56, No. 246, pages 66451-66452, on December 23, 1991;

- (3) Sending more than 2,500 public notices (mailed on January 10, 1992,) to residents of the Newlands Project area, water-right holders in the project, governmental agencies, tribes, private organizations, news media and the public.
- (4) Holding public scoping workshops in Fallon, Nevada, on January 28 1992, (approximately 180 people in attendance) and in Reno, Nevada, on January 29 1992, (approximately 45 people in attendance). The written comment period was open through February 14, 1992. Twenty-five written comments were received;
- (5) Sending out more than 250 copies of the Service's "Scoping Report, Proposed Water Acquisition Program for Lahontan Valley Wetlands Under Public Law 101-618," to various agencies, organizations and persons on the EIS mailing list (which included a number of persons who attended the scoping workshops); and
- (6) Sending out more than 250 copies of the November 1993, "Report to Congress; Water Rights Acquisition Program for Pyramid Lake and Lahontan Valley Wetlands, Nevada," to various agencies, organizations, and interested members of the public.

1.12 CONCERNS IDENTIFIED

The Service, at a November 16, 1992, meeting with Cooperating Agencies and technical consultants, narrowed the list of public and agency concerns to significant resource issues that would be impacted (either beneficially or negatively) by any of the alternatives. Participants with special expertise in resource areas were requested to complete a matrix correlating how the identified alternatives might impact various resources. Specific concerns identified at the November 1992 meeting related to the following questions.

Economics

How would each of the alternatives affect the following?

- ▶ Regional agriculture, including farmland conversion?
- ▶ Regional recreation?
- ▶ Local/County business, including local agriculture, recreation-related, service-related and other business?
- ▶ Land use, including land values, tax revenues and impact to Churchill County services?
- ▶ Newlands Project economic concerns, including construction of additional structures/facilities, expansion of the delivery system, system operation and maintenance, system revenue maintenance, and power generation?

Social Values

How would each of the alternatives affect the following?

- ▶ Public health?
- ▶ Population density and trends?
- ▶ Rural lifestyle?
- ▶ Open space/landscape character?
- ▶ Air quality?
- ▶ Recreational use?
- ▶ Preservation values of farming and/or wetlands/wildlife?

Agricultural Production

How would each of the alternatives affect the following?

- ▶ Quantity of individual crops?
- ▶ Quantity of prime and important farmlands?
- ▶ Quantity of abandoned farmland?
- ▶ The erosion potential from land conversion?

Water Resources

How would each of the alternatives affect the following?

- ▶ Newlands Project efficiency?
- ▶ Newlands Project delivery schedule and operations?
- ▶ The quality of primary and other valley wetlands? (including adverse effects of possible contaminants)
- ▶ The quantity of wetlands in the valley?
- ▶ Drainwater/return flow quality and quantity?
- ▶ Groundwater resources in the area?

Biological Resources

How would each of the alternatives affect the following?

- ▶ Stillwater NWR/valley biodiversity?
- ▶ Migratory birds?
- ▶ Fish?

- ▶ Mammals?
- ▶ Reptiles/amphibians?
- ▶ Invertebrates?
- ▶ Endangered, threatened, and sensitive species?
- ▶ Plant communities?

Cultural Resources

- ▶ How would each of the alternatives affect the cultural resources in primary wetland areas and in the valley?

Meeting Service Objectives

- ▶ How reliable will each of the alternatives be in meeting Service acquisition goals and wetland habitat goals?

Acquisition Costs

- ▶ What will the acquisition costs be for each of the alternatives?

1.13 SIGNIFICANT ISSUES

The above-listed concerns have been condensed into a list of eight significant resource issues. These issues will be tracked through subsequent chapters of this document.

- ▶ **POTENTIAL EFFECTS ON NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE**, including Newlands Project operations, OCAP compliance, delivery system efficiency, project facilities, water delivery patterns, project drainwater and hydroelectric power generation. Indicators include Newlands Project delivery efficiency rates, Lahontan Reservoir storage levels, hydropower generation, and Truckee River diversions.
- ▶ **POTENTIAL EFFECTS ON WATER RESOURCES**, including aquifers, surface water and municipal and industrial water supply needs. Indicators are groundwater levels and aquifer recharge.
- ▶ **POTENTIAL EFFECTS ON BIOLOGICAL RESOURCES**, including wetlands, other vegetative communities, fish and wildlife resources, federally listed endangered and candidate species, sensitive species, species of concern, and biodiversity. Indicators include acres of primary wetland habitat sustained, desert shrub habitat, and irrigated farmland; riparian habitat; the numbers of species of fish, birds, mammals, and other

wildlife (including federally listed and candidate species) and their relative abundance; and production of wetland-dependent birds.

- ▶ **POTENTIAL EFFECTS ON AGRICULTURE AND FARMLANDS**, measured in acreage, crops produced, revenue, income and jobs. Includes provisions of the Farmland Protection Policy Act and erosion potential of abandoned or converted farmlands. Indicators are acres of water-righted and irrigated agricultural land, crop production, revenues, income, and jobs.
- ▶ **POTENTIAL EFFECTS ON RECREATION**, measured in the opportunity provided to use recreational areas, and the participation of people in outdoor recreation. Indicators are acreage of primary wetland habitat made available for public recreational use, Lahontan Reservoir storage levels, numbers of use-days for hunting and general recreation, and revenues and jobs associated with outdoor recreational use in the affected area.
- ▶ **POTENTIAL EFFECTS ON LAND USE**, includes population density, County tax base, County services (fire, law enforcement, etc.), and changes in land use from agricultural to other uses. Indicator is parcels of land that show a change of use as a result of the Service's action.
- ▶ **POTENTIAL EFFECTS ON SOCIAL VALUES**, includes community values about the rural lifestyle and "farm preservation values" as related to the agrarian lifestyle, growth and diversification, and recreational opportunity in the area. Indicators for impacts to social values are acres of agricultural lands taken out of production; rate of population growth, and change that would occur in the County; and the acres of lands made available for recreation.
- ▶ **ACQUISITION COSTS**, includes the cost of acquiring water rights (and some appurtenant lands). Indicators are the total capital costs to purchase water rights and the associated annual costs (lease payments, Operation and Maintenance (O&M) fees, and revenue sharing payments).

1.14 MITIGATION MEASURES RECOMMENDED DURING SCOPING

During scoping, various mitigation measures to offset adverse impacts anticipated to occur as a result of the Service's action were identified. The following comments were identified as recommended mitigation measures during scoping hearings.

Physical

- Modify OCAP storage and diversion criteria.
- Time wetland deliveries to benefit farmers.

- Use storage reservoirs, drains and canals as wetland habitats.
- Draw-down water before and after the traditional irrigation schedule to enhance hydroelectric power.
- Pay losses from loss of hydroelectric power.
- Consider an independent system for water delivery to the Refuge that is not tied to the TCID system schedules.
- Establish cover crops before water is taken off to reduce dust problems.
- Concentrate acquisitions in core areas to keep weed problems from adjacent farm lands, and reduce irrigation and production losses (don't checkerboard water rights ownerships).
- Acquire from the periphery, don't fragment good farmlands and the delivery system.
- Use sewage effluent for the wetlands.
- Buy water from non-farm sources.
- Go upstream to get water.
- Consider Dixie Valley as a water source.
- Limit groundwater pumping to protect the aquifer.

Biological

- Use prime water to dilute contaminants.
- Use sewage effluent for the wetlands.
- Flush to cleanse contaminants in sediments.
- Scatter mini-wetlands throughout the Lahontan Valley on both public and private lands.
- Re-establish old marshes.
- Buy and maintain farms with strip harvesting to feed the birds.
- Change OCAP to benefit secondary wetland areas.

Socio-Economic

- Exchange acquired farmlands for poorer quality lands that should be taken out of production (i.e., contaminated lands).
- Exchange or sell abandoned farmlands.
- Use short-term leases in which there is no loss of water rights to reduce economic losses to the community.
- Consider low production lands or peripheral lands first for acquisition.
- Hold water in Lahontan Reservoir and only allow fall releases to improve Lahontan Reservoir recreation.
- Look at condemnation and friendly condemnation to minimize checkerboard effect.
- Phase in purchasing, designate target areas for first consideration for purchasing, and set priorities for blocks of areas to be purchased in later units.

1.15 MITIGATION MEASURES IDENTIFIED FOR CONSIDERATION

Some of the suggestions heard in Scoping were incorporated into this document as water sources, methods of acquisition, or as part of an alternative. Other comments suggested as mitigation measures were not considered to be effective. Those mitigation measures which were considered to be least effective were eliminated from further study. The following mitigation methods were considered reasonable, feasible and effective:

- (1) target areas for protection or water rights acquisition;
- (2) protect balance of Federal and private ownership by returning acquired lands back to private ownership by sale or trade;
- (3) revegetate to offset impacts on disturbed lands;
- (4) modify Newlands Project operations to increase drainflows (assurances) to the wetlands;
- (5) protect domestic water supplies; and
- (6) apply various ranking factors to acquisition offers to maximize water right acquisitions for dollars spent.

CHAPTER 2

ALTERNATIVES

2.1 INTRODUCTION

This chapter describes *five alternatives including the No Action Alternative, the Proposed Action, the Least Cost Alternative, the Maximum Acquisition Alternative and the Preferred Alternative*. All of the action alternatives, if fully implemented, would provide enough water to meet the U.S. Fish and Wildlife Service's (Service) goal of sustaining a long-term average of 25,000 acres of primary wetland habitat in Lahontan Valley. The No Action Alternative does not provide sufficient water to meet the Service's objective for wetlands protection in Lahontan Valley. *For the purposes of this document, primary wetland habitat refers to the habitat provided by shallow to deep water (under 6-feet deep) and associated vegetation in the primary wetlands (the Glossary provides a more detailed definition).*

The Service has selected Alternative 5 (Minimum Acquisition) as its Preferred Alternative, but has continued with the original Draft Environmental Impact Statement (DEIS) approach of addressing and comparing alternatives against Alternative 2 (Proposed Action), in addition to the comparisons against Alternative 1 (No Action Alternative). Alternative 5 has been revised from the DEIS to address issues and concerns that were brought up in public comments on the DEIS (Chapter 6).

This chapter is organized in the following manner: the process used to formulate alternatives is described in detail in Section 2.3, and the baseline assumptions for the action alternatives are addressed in Section 2.4. Alternatives are discussed in Section 2.5. Management and monitoring requirements and the acquisition process and strategy are contained in Sections 2.6 and 2.7. Water sources and acquisition methods eliminated from consideration are addressed in Section 2.8. A comparison of alternatives is contained in Table 2.E.

It should be noted that all of the alternatives rely on assumptions about return flows of drainwater from Carson Division irrigation and usable spills. The estimates of these in this description of alternatives and in Chapter 4, "Environmental Consequences," are based on the calculations from the Below Lahontan Reservoir (BLR) Model. (See Section 2.3.4 MODELLING CALCULATIONS USED TO FORMULATE THE ALTERNATIVES and Appendix 5.) These calculations are based on the Service's interpretation of current conditions related to the 1988 OCAP. *In addition, the Department of the Interior (Interior) is in the process of making technical changes to OCAP which could alter Lahontan Reservoir storage targets and Carson Division acreage base, and apply a lower*

percentage of irrigation use in the Newlands Irrigation Project (Newlands Project) as compared to baseline conditions discussed in the DEIS. Although these changes are being discussed, they have not been approved and are therefore not incorporated into the baseline of this document. General discussions of the consequences of an adjusted OCAP are provided in Section 2.3.1.1, *Factors Affecting the Volume of Water to be Acquired*, in Chapter 3, Section 3.2, **NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE**, and in *Cumulative Impacts*, Section 4.26.9, **OCAP MODIFICATIONS**. There are those who estimate that the Service's baseline wetland inflow calculations for drainwater and usable spills are conservative and that higher volumes of drainwater and spills are available for wetlands protection. The Service's impact analysis using these estimates depicts a high-end condition relative to water rights acquisition needs so as not to underestimate impacts to the *affected area, including the Newlands Project and the local agricultural community*. If volumes of return flows and usable spills are actually higher than the BLR Model calculations used in this analysis, the amount of *water and water rights to be acquired from other sources (e.g., purchased Carson Division water rights, groundwater, Navy conserved water)* will be reduced accordingly. Factors affecting the volume of water to be acquired, including drainwater, spills, and possible management easements for other wetlands (e.g. Canvasback Gun Club) are discussed further in Section 2.3.1.1.

2.2 PROPOSED ACTION

Alternative 2 is the Service's Proposed Action. However, it is not the Service's Preferred Alternative as noted above. Under the Proposed Action, the Service would acquire sufficient water and/or water rights to provide a total annual average of up to 125,000 acre-feet (AF) of inflow to the primary wetlands. The amount acquired would supplement available drainwater, spills, water acquired under earlier authorizations, and water acquired by the State of Nevada for Lahontan Valley wetlands, in order to provide sufficient water to sustain a long-term average of 25,000 acres of primary wetland habitat in Lahontan Valley. The Service would utilize the water to sustain wetland habitat within the existing boundaries of the Stillwater National Wildlife Refuge (Stillwater NWR), Carson Lake and Pasture (Carson Lake), and the Fallon Indian Reservation wetlands (Tribal wetlands), which are the primary wetland areas.

Under this alternative, water and water rights would be acquired predominately by purchase from willing sellers in the Carson Division of the Newlands Project. Up to 122,000 AF of water rights may need to be acquired, *including the 20,000 AF of water rights described in the 1991 environmental assessment and finding of no significant impact (FONSI) for the acquisition of water rights for Stillwater NWR*, to meet the 25,000-acre primary wetland habitat objective. Due to the variable nature of certain factors, such as drainflow amounts and spill usage, the actual amount of water rights acquired could be less. If less water was acquired, impacts associated with this alternative would also be reduced. Alternative 2 is further defined in Section 2.5.2. A comparison of impacts of all alternatives is provided in Table 2.E.

2.3 PROCESS USED TO FORMULATE THE ALTERNATIVES

To formulate alternatives, the Service considered both water needs and issues raised during the EIS Scoping Process. The process used to solicit public and agency involvement in the development of this document is summarized in Chapter 1 and in the Scoping Report in Appendix 2. The Service considered a number of factors associated with acquiring water, including volumes, sources, and methods of acquisition, in order to formulate the set of alternatives evaluated in this document. In developing alternatives, the Service considered both State and Federal laws and regulations that related to water rights and water rights acquisitions. Those laws and legal authorities are described in Sections 1.5, LEGAL AUTHORITIES UNDER PUBLIC LAW 101-618, and 1.8, RELATED ACTIONS. In the process of formulating action alternatives, the Service developed baseline assumptions that are addressed in Section 2.4.

2.3.1 VOLUME OF WATER REQUIRED TO MEET MANAGEMENT TARGET

Service and NDOW experience gained from almost 50 years of managing wetland habitats in the Lahontan Valley indicates that about 5 AF/year is needed to maintain one acre of primary wetland habitat (see Appendix 4 and Kerley and others, 1993). This rate incorporates the various water regimes associated with *primary wetland habitats* that occur in Lahontan Valley. Water demand associated with the different habitats ranges from 7-8 AF/acre/year for open water perennial habitat, to as little as 1.5/acre/year for intermittent, shallow mud-flat habitat (Appendix 4). Although evaporation rate, timing, and delivery of water can affect the annual amount of water needed to sustain 25,000 acres of primary wetland habitat, this document relies upon current conditions and practices, as described in the *Stillwater WMA Management Plan* (Appendix 2). Based on these considerations, the Service calculates that an annual average of up to 125,000 AF of water will be required to sustain 25,000 acres of primary wetland habitat.

2.3.1.1 Factors Affecting the Volume of Water to be Acquired

Many interconnected factors affect the amount of water that will ultimately be acquired to meet the wetland habitat objectives defined in Public Law 101-618. Changes in Newlands Project operations, drainwater availability for wetland areas, the ability to use spill water for wetland habitat, and the Service's decisions on the timing and use of acquired water can all change the amount of water that must be acquired to meet wetland objectives. The volume of drainwater reaching the wetlands and the availability of spill water have the most direct effect on the amount of additional water to be acquired. In addition, if the Service obtained management easements to other *wetland* habitats in Lahontan Valley, the volume of water acquired could be reduced.

Drainwater

Drainwater amounts can be affected by a number of variables, including acres of irrigated farmland in the Carson Division of the Newlands Project, Lahontan Reservoir releases, and Newlands Project operations. Drainwater volumes are correlated to Lahontan Reservoir releases and the amount of irrigated acreage, and changes in either factor would alter drainflow volumes.

The amount of irrigated farmland in the Carson Division influences the volume of water to be acquired, in that, as less farmland is irrigated, the volume of drainwater flowing down to the wetlands will also decrease. Conversely, if more farmland is irrigated than what occurs under existing conditions, the volume of drainwater flowing to the wetlands can also increase. *Currently, the Bureau of Reclamation is reassessing baseline irrigated acreage values. This change in baseline irrigated acreage assumptions will be incorporated into adjusted OCAP calculations.*

The Newlands Project operator can also alter the volume of drainwater flowing to the wetlands by routing drainwater back to Newlands Project canals or by holding the drainwater in small regulating reservoirs for later delivery to downstream irrigators. Conversely, the project operator could increase drainwater inflow to the Carson Lake primary wetland area by curtailing or reducing drainwater deliveries to pasture lands.

If the Newlands Project operator, water-users or other interested parties could develop and implement a cooperative drainwater assurance plan (as suggested during the Truckee-Carson Second Settlement Negotiations) to increase drainwater inflows to the wetlands, water right purchases would be reduced. Such drainflow assurances, which would increase drainflows over the Service's baseline estimates, would ultimately decrease the amount of water acquired for wetlands protection.

The Secretary of the Interior (Secretary) was directed by Public Law 101-618 (subsec. 209(c)) to study the feasibility of improving Newlands Project conveyance (deliveries) to a 75 percent efficiency rate. In the Newlands Project Efficiency Study Report to Congress in 1993, Reclamation identified a number of methods to reach that target. Although there were no mandates to increase efficiency to 75 percent in Reclamation's Efficiency Study, the Department of the Interior's *Truckee Carson Coordinating Office is working with an* inter-agency study team to evaluate possible changes to the 1988 Operating Criteria and Procedures (OCAP). The Service estimates that increasing irrigation delivery efficiency rates to 75 percent would reduce Lahontan Reservoir releases and decrease drainwater inflows to the wetland areas.

In 1989, a year in which full irrigation entitlements were available, Newlands Project efficiency was calculated to be 61.8 percent (U.S. Bureau of Reclamation Annual Report, 1990), and the wetlands received about 61,000 AF of drainwater. The Service estimates that when Newlands Project efficiency rates achieve the 1988 OCAP target of 68.4 percent (U.S. Department of Interior, 1988), drainwater to the wetlands will be effectively reduced to 30,000 - 35,000 AF/year. Bookman-Edmonston Engineering, Inc., (as consultants to Churchill County representatives during the Truckee-Carson Second Settlement Negotiations) estimated that baseline drainflows to the wetlands could amount to as much as 60,000 AF/year. The Service has insufficient documentation of the Bookman-Edmonston analysis to warrant adjusting BLR Model assumptions or calculations. However, it should be noted that in earlier evaluations of the BLR Model, Bookman-Edmonston Engineering Inc. supported baseline assumptions for the BLR Model, including baseline drainflow volumes to the wetlands (see Appendix 5, Summary of BLR Model Validation Process). If drainwater monitoring in the future supports increasing baseline drainflow volumes to the wetlands, then such adjustments would be incorporated into the Service's baseline drainflow assumptions in the BLR Model, and the volume of water needed would be reduced under each alternative.

The Service's calculations relative to drainwater inflow to the primary wetlands are based on the assumption that existing conditions associated with project operations, efficiency rates, and the correlation between Lahontan Reservoir releases and drainwater outflows will continue. The Service recognizes that some consider the Service's estimations of drainwater availability to the primary wetland areas to be conservative. The Service acknowledges that drainwater inflow volumes can vary, but existing conditions and current project operations would have to change before the average annual drainwater inflow to the primary wetland areas would increase.

The Service has no authority to regulate Newlands Project operations or efficiency, and is obligated to accept Newlands Project drainwater at Carson Lake, Stillwater NWR, and Stillwater WMA (Public Law 101-618, para. 206(b)(4)). Due to water quality concerns, the Service could decide not to use certain drainwater for the designated primary wetland habitats.

Spills

Reservoir spills, both precautionary and emergency, typically occur only in high runoff years. The Service has calculated an average spill volume that incorporates anticipated volumes and conveyance limitations to depict an annual average volume of water that could actually reach the wetlands. Factors affecting the Service's spill volume calculations include Lahontan Reservoir operations (storage levels), spill

routing, timing of spills relative to the irrigation season, and canal capacities for conveyance of spill water to the primary wetlands. *An adjusted OCAP that reduces Lahontan Reservoir storage targets would likely result in decreased average spill volumes over the long-term.*

The Service's average annual spill volume calculations for primary wetland habitat portray conditions in which about 17 percent of the average spill is routed or available for primary wetland habitat use. Preliminary data (Reclamation and Service records, 1996) show that the primary wetlands received about 38,000 AF (20 percent) of the 193,000 AF of water that was classified as Lahontan Reservoir spill water in 1995. While this constitutes only one year of actual data, it does suggest that the Service's DEIS estimates closely approximate existing conditions under the 1988 OCAP.

Since the DEIS, the Service has reevaluated calculations and values for average annual spill volumes to the primary wetland areas and found its estimates to be conservative. Based on new information regarding canal capacities and spill timing the Service recognized that the volume of spill water available for use at primary wetlands may be about 3,000 AF/year higher than previously calculated. While such modifications may represent conditions that local interests and representatives support, the Service, for purposes of impact analysis, will continue to rely on its more conservative values of average annual spill volumes to the primary wetlands.

The Service bases its decision to use conservative estimates of average annual spill volumes in determining the mix of acquired water, drainwater, and spill for primary wetland habitat on the following factors. Use of conservative estimates of wetland spill volumes prevent underestimating acquisition needs and the potential impacts resulting from water rights purchases; actual spill data from 1995 support the Service's DEIS estimates; and actions to adjust OCAP could modify Lahontan reservoir storage targets in such a manner as to reduce the volumes and frequency of spills from the Newlands Project. For these reasons, it appears that the use of higher average spill volume in the Service's annual water demand is not warranted at this time.

Water right acquisition could decrease if the higher estimates of usable spill volumes are proven to be accurate based on actual spill data. There are no indications that water right acquisitions would increase due to changes in spill volumes or other factors related to adjusted OCAP. In light of the Service's anticipated 10-20 year time frame for wetland water rights acquisitions, the Service will have sufficient time to evaluate actual spill data and modify its calculations before completion of the acquisition program. If actual spill data show that the spills to the primary wetlands

areas constitute a greater volume than analyzed in this document, the Service will adjust its calculations and reduce the amount of water and water rights to be acquired from other sources for the wetlands regardless of the alternative chosen.

Easements

Easements or cooperative agreements could *potentially* allow for the management of private lands as primary wetland habitats in the Lahontan Valley wetlands. Specifically, the Service has approached the Canvasback Gun Club (Stillwater Farms) *to discuss* a long-term agreement for development and management of the gun club's marshes as primary wetlands habitat. The Canvasback Gun Club has sufficient water rights to sustain an annual average of 2,500 acres of wetlands over the long term. Since this wetlands area has existing water rights, inclusion of this area into the Service's primary wetland habitat acreage would reduce the volume of water to be acquired by about 10 percent under all action alternatives. *Discussions between the Service and the Canvasback Gun Club regarding a possible easement are ongoing at this time.*

It may be possible to negotiate cooperative agreements or easements to manage other Lahontan Valley wetlands (e.g., S-Line and Harmon Reservoirs), as part of the 25,000-acre wetland habitat objective. However, the inclusion of these areas into the designated Lahontan Valley wetlands (primary wetlands) may require Congressional approval, and would not reduce the volume of water to be acquired unless there were assurances by the Newlands Project operator or other interested parties that guaranteed an annual water supply to these areas. (Other concerns about incorporating these areas as part of the 25,000 acre primary wetland habitat objective are described in Section 2.8.4, NEWLANDS PROJECT IRRIGATION REGULATING RESERVOIRS.)

2.3.1.2 Potential Effects From *Restitution* of Excess Truckee River Diversions (Recoupment)

Recoupment is one variable that could temporarily impact the volume of water required to meet the Service's wetland objective. (See Section 1.8.1, RELATED ACTIONS, (10).) *The Secretary has initiated litigation on the recoupment issue, but the outcome of the action is as yet undetermined, the time frame for resolving the issue is unknown, and, depending on the Court's findings, recoupment could be settled in a number of ways.* As a Newlands Project water-right user, the Service does not expect to be exempt from recoupment strategies to recover water for Pyramid Lake. If recoupment decreases irrigation deliveries, wetland inflows (both

irrigation deliveries and drainflows) would also be adversely impacted during the recoupment period.

2.3.2 SOURCES CONSIDERED IN FORMULATING ALTERNATIVES

During the Scoping Process a number of water sources were suggested for review in this document. Water sources identified included Newlands Project (both Truckee and Carson Divisions), groundwater pumping, sewage effluent, inter-basin transfers (Dixie Valley and Humboldt River basin), upper Carson River, and water from Navy irrigation conservation methods.

In considering these potential water sources, the Service determined that three factors were critical to formulating viable alternatives. First and foremost, a water source must provide an adequate volume of suitable quality water. Secondly, water sources must be accessible, and transferrable to the Lahontan Valley wetlands under Nevada State statutes without increasing Newlands Project Truckee River diversions. Finally, the Service precluded water sources that entailed either out-of-basin transfers or long-distance transport, which would require extensive conveyance or canal systems and could potentially cause *adverse* ecological impacts (Meador, 1992).

The Service recognized that only the Carson Division of the Newlands Project could provide a sufficient supply of water to formulate a single-source alternative. In order to formulate viable alternatives that evaluated other water sources, the Service found that a combination of sources was needed to meet the primary wetland habitat's water demand. Groundwater pumping, sewage effluent, use of water from the Middle Carson River corridor and *increased reliance on leasing* were additional water sources that were incorporated into the *Preferred Alternative, Alternative 5*.

Water sources considered in formulating alternatives and water sources eliminated from further review are discussed below. Sources eliminated from further review are in Table 2.B.

2.3.3 ACQUISITION METHODS

The term acquisition in this document refers to any method of obtaining water and water rights and does not refer solely to acquisition through purchase. Methods of acquiring water and water rights for all action alternatives are described below. The No Action Alternative has relied primarily on the methods described in Section 2.3.3.1, *Purchase of Water Rights*, and Section 2.3.3.2, *Purchase of Water Rights With Land*, to meet its 20,000 AF acquisition goal.

2.3.3.1 Purchase of Water Rights

Acquiring water for the wetlands through the purchase of water rights from private owners appears to be the most permanent, reliable, and dependable long-term source of all the methods identified.

Purchasing water rights is a direct means of obtaining fee title to available water rights. All purchases would be on a *voluntary*, willing seller basis. *No one would be obligated to participate in the program.*

The 1970 Uniform Relocation Assistance and Real Property Acquisition Policies Act requires that all land and water right purchases by the Federal Government be based on market value as determined by qualified appraisers. *The market value used in all Federal acquisitions is defined by the Uniform Appraisal Standards for Federal Land Acquisitions, 1992, and is similar to definitions used by all appraisers as required by the Uniform Standards of Professional Appraisal Practice. The Federal Government does not have the option to pay less than market value in its purchase transactions, nor does it have the ability to set the price of water. Local market transactions are the determining factor for market value, and are derived by comparing comparable sales of water rights and water rights with appurtenant land in the area. For more information on acquisition process and market value see Section 2.6.4, ACQUISITION PROCESS AND STRATEGY.*

2.3.3.2 Purchase of Water Rights with Land

Some landowners have indicated that they would not sell their water rights unless they could also sell the appurtenant land. In such cases, the Service would consider buying land with water rights and could also acquire related interests (houses, buildings, and other improvements). When the Service acquires lands located within the Stillwater NWR boundary, those lands will become part of the National Refuge system. *Acquired lands* would be administered in accordance with the Service's policies under the National Wildlife Refuge System Administration Act of 1966, as amended.

For lands acquired within the boundary of Stillwater NWR, activities provided for under the terms of the 1948 Tripartite Agreement would continue under the terms of that agreement until its expiration date (November 26, 1998), unless such agreement is otherwise terminated. Those activities that are compatible with the

purposes for which the Stillwater NWR was created *may* be permitted on lands that the Service owns in fee title.

The Service would seek to dispose of acquired lands that do not meet its objectives to sustain primary wetland habitat or *otherwise* do not warrant inclusion into the National Wildlife Refuge system. Public Law 101-618 (subpar. 206(b)(5)(C)) recognizes the need for such disposal and directs the Secretary to make recommendations for disposal of acquired lands in a Report to Congress scheduled no later than November 26, 1997.

Under current procedures, lands not needed by the Service would be disposed of according to applicable Federal laws and regulations, and in coordination with the General Services Administration (GSA).

2.3.3.3 Lease of Water Rights

Under this method, the Service would lease water rights from owners and convey the water to primary wetlands. Leases can be dry-year options or other forms of recurring but intermittent acquisitions (from willing lessors) that make full or specified use of water rights in return for payment. Leases can be negotiated for any time period. When a lease expired, the water would revert back to the owner unless the parties agreed to renew it.

Owners would receive market value for any water rights covered by lease agreements. The process to determine market value for leases would be accomplished by comparative analysis of lease fees based on transactions between private parties.

Leasing could be a useful option in the interim period before full water acquisition has been achieved, during drought years, and as a strategy to offset water reductions resulting from possible *restitution* strategies associated with recoupment. In these instances, leasing would allow the Service to lessen the impacts associated with water shortages.

Transferring water rights from one point of use to another in the Newlands Project under a leasing program would require an application for a water right transfer with the Nevada State Engineer. There are currently no State statutes that specifically relate to water right transfers by lease. Applications could be filed as temporary transfers, as provided for under Nevada State law.

2.3.3.4 Transfer of Federal Water Rights

Under subparagraph 206(c)(3) of Public Law 101-618, the Secretary of the Navy may, under specified conditions, transfer water rights *that it no longer needs* to the Service to be managed for the benefit of *Pyramid Lake fishes and Lahontan Valley wetlands*.

As required by Section 206(c)(1) of Public Law 101-618, the Navy has completed a National Environmental Policy Act (NEPA) document "The Management of the Greenbelt Area at Naval Air Station Fallon (NAS-Fallon), Nevada," that describes actions to minimize hazards to aircraft operations as well as conserve irrigation water, (see Section 1.8.1 (5) RELATED ACTIONS UNDER PUBLIC LAW 101-618). The NEPA document on the Navy's conservation plan was completed in April 1994.

2.3.3.5 Donation of Water Rights

An individual or group may wish to donate land and/or water rights to the Service or Nevada Division of Wildlife (NDOW) for wetland habitat or wildlife purposes. The Service is authorized to receive donated water or land. The Lahontan Valley and Pyramid Lake Fish and Wildlife Fund was established under Section 206(f) of the Public Law to receive monetary donations that may be used for water acquisitions.

2.3.3.6 Exchange of Land and/or Water Rights

Pursuant to the National Wildlife Refuge System Administration Act of 1966, the Federal Land Policy and Management Act of 1976, the Federal Land Exchange Facilitation Act of 1988, and other applicable Federal laws and regulations, the Service is able to participate in exchanges of available Federal lands for privately owned lands and interests in lands (including water rights). The Service anticipates using existing exchange authorities to acquire Newlands Project land and water rights, and to dispose of acquired lands which are not needed for program purposes. This document provides compliance with the National Environmental Policy Act (NEPA) for non-Federal land and water rights acquired for the Lahontan Valley wetlands through exchange. NEPA compliance related to the Federal lands available for exchange will be the responsibility of the appropriate Federal agency.

Purchasing of Water from Purveyors

Purchasing water rights from a purveyor can differ from leasing. There are no long-term contract for water delivery and the purchaser pays for the amount of water used on a monthly or annual schedule.

If this method were used, the Service would pay a private land owner or purveyor who owns water rights for the ability to use water. The period of use and the amount of water used is not necessarily specified in advance. Water use is generally tallied from month-to-month with payment based on the actual amount of water delivered. Because it may be possible to purchase water from a number of purveyors, the price would likely be determined based on an appraisal of market value.

2.3.4 MODELLING CALCULATIONS USED TO FORMULATE THE ALTERNATIVES

Because the Newlands Project irrigation deliveries have not yet achieved the efficiency targets set by the 1988 OCAP, there are no existing data that pertains to project operations with full achievement of OCAP targets. The Service used the Below Lahontan Reservoir (BLR) Model developed by the Environmental Defense Fund (EDF) to calculate the various hydrologic conditions and components of the Newlands Project operations for the alternatives evaluated in this document. The BLR Model is a public domain software program designed for integrated use with the Truckee-Carson River system Negotiated Settlement Model (NSM). The model calculated Newlands Project hydrologic conditions, reservoir storage levels, reservoir releases, irrigation deliveries, shortages, canal volumes, capacities, and drainflows under the expected 1988 OCAP conditions (detailed explanations of the BLR Model are in the "BLR Model Documentation and User Guide, Version 3.40," in Appendix 5). Bookman-Edmonston Engineering, Inc., working under the direction of Reclamation and the Truckee-Carson Irrigation District (TCID), reviewed the BLR Model and made suggestions to further refine baseline assumptions. These suggestions were incorporated into the model calculations to further fine-tune and validate the model.

The BLR Model calculates monthly demands at Lahontan Reservoir for each month and year of the 92-year hydrologic simulation period (1901-92) based on a representative network of Newlands Project canal reaches, service districts, and irrigated lands. The calculated monthly demand for the Newlands Project is passed to the NSM to calculate monthly water supplies to the Newlands Project based on hydrologic, physical, and legal constraints. The BLR Model can then calculate water volumes and deliveries that would occur through the network of Newlands Project canals below Lahontan Reservoir. From this information, a variety of results can be calculated on a monthly or annual basis for such things as OCAP delivery efficiencies, hydroelectric power generation, farm deliveries, wetland deliveries, spills, shortages, and finally, the amount of primary wetland habitat that would be sustained under various alternatives.

From these model calculations the Service developed the hydrologic elements (volumes of water) for the different alternatives to be evaluated. The Service, in conjunction with EDF and Robertson Software, Inc., used the model to develop simulated data that enabled the Service to evaluate and compare variations in Newlands Project operations, wetland acquisition scenarios, and wetland habitat results based on a common and comparable set of baseline conditions.

2.3.5 AMOUNT OF IRRIGATED FARMLAND THAT COULD BE CONVERTED TO NON-IRRIGATED USES

A major concern associated with the purchase of water rights in the Carson Division for Lahontan Valley wetlands protection is the amount of irrigated farmland that subsequently would be taken out of production. In the NEPA process, alternatives can be designed to minimize impacts to particular resources (40 CFR §1502.14(f) and CEQ's Forty Most Asked Questions no. 19a). This subject addresses information contained in some of the previous sections (e.g., Section 2.3.2, SOURCES CONSIDERED IN FORMULATING ALTERNATIVES, and Section 2.3.3, ACQUISITION METHODS CONSIDERED IN FORMULATING THE ALTERNATIVES). Within this framework, this section deals specifically with alternative designs that could minimize adverse impacts to irrigated farmland.

Two reasonable ways that were identified to lessen impacts to farmland, while still meeting the 25,000-acre objective, were (1) to maximize the use of acquired water by transferring and using the full headgate entitlement, and (2) to increase the reliance on water sources other than purchased irrigation water rights. As described in Section 2.5.3, Alternative 3 would rely on a 3.5 AF/acre/year transfer and use-rate, which would reduce the amount of water rights that would have to be purchased in the Carson Division as compared to a use-rate of 2.99 AF/acre/year (e.g., Proposed Action). Alternative 5, as outlined in Section 2.5.5, would minimize the purchase of water rights in the Carson Division by maximizing the use of other water sources to fulfill the Service's objective for wetlands protection. Alternative 5 was developed in large part as a response to concerns raised by Churchill County and other local entities regarding potential adverse impacts that would be incurred to the agricultural community as a consequence of purchasing and transferring water rights to the primary wetlands.

Considering alternatives that would lessen impacts to irrigated farmland in the Carson Division also addresses requirements of the Farmland Protection Policy Act (FPPA; subtitle I of Title XV of the Agriculture and Food Act, Public Law 97-98). FPPA was passed by Congress on December 22, 1981 to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. Under the FPPA, Federal agencies are to consider alternatives, as appropriate, that

could lessen any adverse effects to farmland protection when a Federal program has the potential to adversely impact the protection of farmland (Public Law 97-98 §1541(b)).

USDA has recommended that Federal agencies integrate FPPA evaluations into the NEPA process where possible, before a program design or site is selected (7 CFR §658.4(e)). The Service's water rights acquisition program is, by definition (7 CFR § 658.2(c)), a Federal program, and it has the potential to adversely affect farmland in the Carson Division of the Newlands Project. It is at the program level (i.e., formulation of alternatives in this NEPA process) that opportunity exists to modify program design to lessen adverse impacts to farmland. The design of the water-rights acquisition program will in large part determine the magnitude of the potential impacts on irrigated farmland; after the FEIS is completed and the Record of Decision (ROD) is signed, modifying the program design to lessen impacts to farmland could be difficult and untimely. The Service has elected to integrate FPPA evaluations into this FEIS, which considers and evaluates several alternative program designs, each of which would have differing adverse impacts to Carson Division farmland.

USDA has recommended that Federal agencies consider "alternative sites, locations, and designs that would serve the proposed purpose (i.e., sustaining a long-term average of 25,000 acres of primary wetland habitat) but convert fewer acres of farmland or other farmland that has a lower relative value" (7 CFR § 658.4(c)(4)(iii)) when making decisions on Federal programs affecting farmland sites that received a score of greater than 160 points in a FPPA evaluation (Farmland Conversion Impact Rating form, Appendix 10). The two sites being considered in this EIS are the Carson Division and the Middle Carson River. Both of these sites received a score greater than 160 points (Section 3.16.4, Appendix 10), meaning that alternative actions, as appropriate, that could lessen adverse impacts to farmland protection should be considered by the Service.

Alternative actions include alternative sites, locations, and designs. The primary site (or location) being considered for water-rights purchases is the Carson Division. The only other reasonable site (or location) for water-rights purchases is the Middle Carson River. Purchase of water rights from the Middle Carson River would reduce impacts to farmland in the Carson Division. However, even though water rights of the Middle Carson River could supplement those acquired from the Carson Division, sufficient water rights do not exist in the Middle Carson River, and, therefore, it is not a true "alternative" to the Carson Division. No other feasible sites or locations exist.

Alternative actions can also include alternative design. This EIS presents and evaluates a range of alternatives with different program designs (as described in Section 2.5), each of which would result in differing amounts of irrigated farmland that would be converted to non-irrigated uses. Adverse impacts to farmland would be lowest under the No Action Alternative (Alternative 1), but sustaining a long-term average of 25,000 acres of primary

wetland habitat would not be possible under this alternative. According to USDA guidelines implementing FPPA, the Service only has to consider alternatives whereby the purpose of the program could be met. FPPA does not preclude the Service from acquiring water rights from willing sellers of prime farmlands and farmlands of statewide importance. In order to meet the 25,000-acre primary wetland objective authorized by Public Law 101-618 (§206(a)(1)), it will be necessary for the Service to acquire water rights from prime farmlands and farmlands of statewide importance in the Carson Division.

Alternative 3 would reduce the conversion of irrigated farmland to non-irrigated uses by relying on a 3.5 AF/acre/year transfer and use-rate, which would reduce the amount of water rights that would have to be purchased in the Carson Division as compared to the Proposed Action's adherence to a use-rate of 2.99 AF/acre/year. Alternative 5 was designed in large part to minimize the purchase of water rights in the Carson Division and minimize the conversion of irrigated farmland to non-irrigated uses while still providing sufficient water and water rights to sustain a long-term average of 25,000 acres of primary wetland habitat.

USDA regulations also recommend that agencies consider the "Use of land that is not farmland..." (7 CFR §658.4(c)(4)(i)). However, purchase of water rights from lands not designated as prime farmland or farmland of statewide importance within the Carson Division and Middle Carson River is not an option because these lands would not have water rights associated with them. All irrigated farmland in the Carson Division and Middle Carson River corridor was designated by the Natural Resources Conservation Service (NRCS) as either prime farmland or farmland of statewide importance. For the above reasons, evaluation and consideration of alternative locations and non-farmland areas was not appropriate for this analysis -- 7 CFR §658.4 states that Federal agencies are to only consider alternative actions "as appropriate".

FPPA also requires that Federal agencies (1) evaluate the adverse effects of Federal programs on the protection of farmland that has been determined to be suitable for protection and (2) assure that Federal programs are, to the extent possible, compatible with state, local, and private programs and policies to protect farmland. These are addressed in Sections 4.16.4 and 4.27, respectively.

2.4 ASSUMPTIONS FOR ACTION ALTERNATIVES

The following assumptions are applicable to each of the action alternatives (Alternatives 2,3,4, and 5). The assumptions do not *necessarily* apply to the No Action Alternative (Alternative 1).

- (1) The Newlands Project will continue to be operated within the framework and objectives of the 1988 OCAP.

- (2) Pursuant to Sections 203(e) and 206(a) of Public Law 101-618, the Service would, in cooperation with the Bureau of Indian Affairs, purchase approximately 4,000 AF of water rights for about 800 acres of primary wetland habitat on the Fallon Indian Reservation. This volume of water is incorporated into the total volume of water rights to be acquired under each action alternative.
- (3) The primary wetland habitat sustained and enhanced within the boundaries of the Stillwater NWR will be managed under the auspices of the existing Refuge Management Plan for Stillwater NWR and Stillwater WMA (Appendix 2). *Carson Lake is expected to be transferred to the State of Nevada under authority of Public Law 101-618, and a management plan and environmental assessment are anticipated. The Service will assist in development of a separate management plan for Tribal wetland areas in consultation with the Fallon Paiute-Shoshone Tribes.* See Section 1.8.1 (1) and (4), RELATED ACTIONS.
- (4) Federal funding for the Service's portion of the wetlands water acquisition is expected to come *primarily* from the Land and Water Conservation Fund. Other money could become available through the Lahontan Valley and Pyramid Lake Fish and Wildlife fund or other Federal sources.
- (5) Each alternative includes, *as an integral part, the completion of the 20,000 AF water rights acquisition program* described in the Service's December 1991 EA, "Proposed Acquisition of Water Rights for Stillwater Wildlife Management Area and Stillwater National Wildlife Refuge."
- (6) The State of Nevada *is expected to acquire between 12,800 AF and 23,000 AF of water under a separate authority (Question 5 Bond Fund) for the Lahontan Valley wetlands. The Service assumes that this water will be transferred to the primary wetland areas to assist in meeting the 25,000-acre wetland habitat objective. Therefore, these volumes of water are incorporated into the total volume of acquired water for all of the action alternatives.*
- (7) All *eligible* water rights acquired by the Service will be transferred to the primary wetland areas.
- (8) *To the greatest extent possible, only those water rights that are eligible for transfer to Lahontan Valley wetlands would be acquired by the Service (see Section 2.6.2, ELIGIBILITY CRITERIA; and Figure 2.A).*
- (9) All deliveries of acquired irrigation water will be made through the existing Newlands Project delivery system. Should additional delivery points or increased delivery capacity be required to convey irrigation water to the primary wetland areas, new construction

NEWLANDS PROJECT

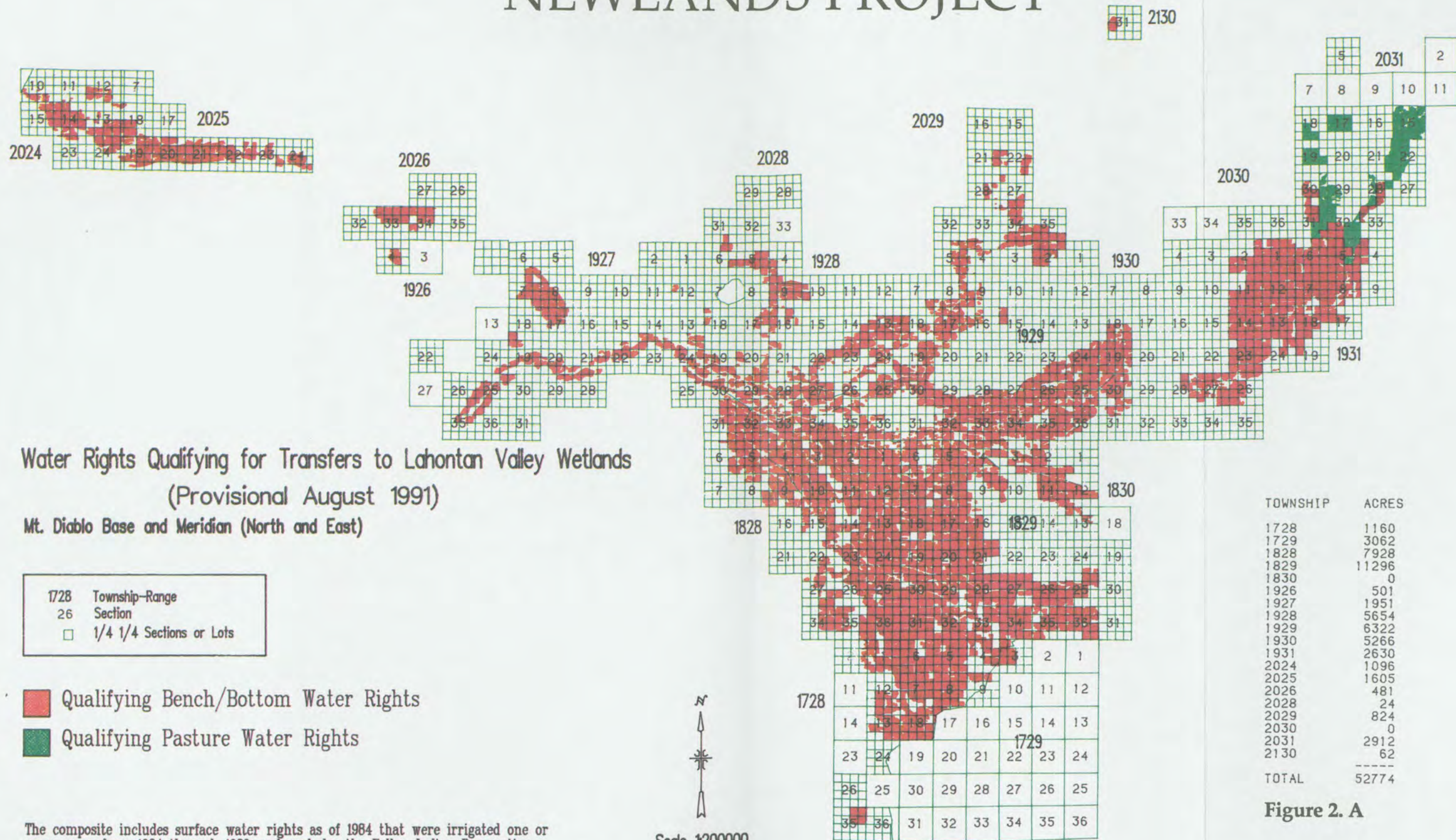


Figure 2. A

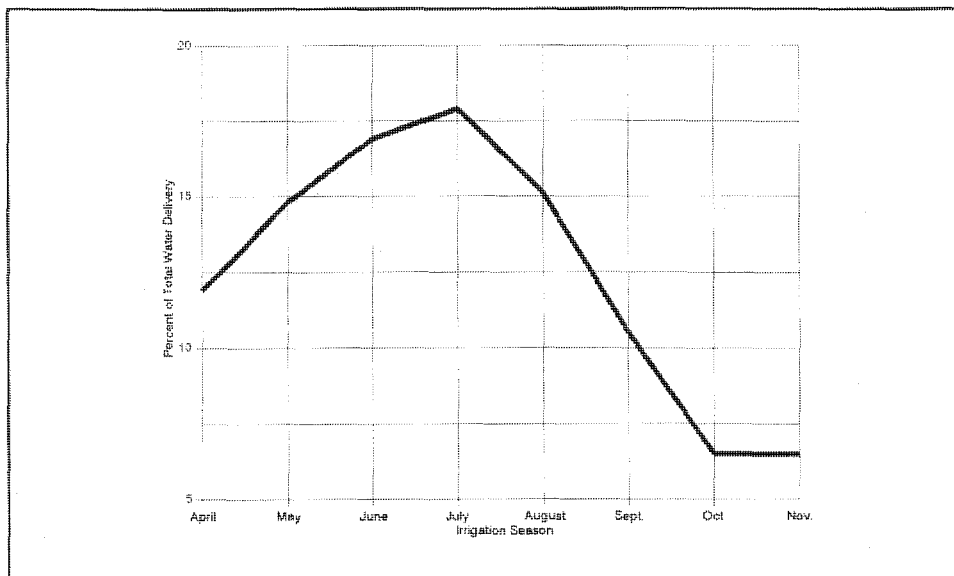


The composite includes surface water rights as of 1984 that were irrigated one or more years from 1984 through 1989, and excludes the Fallon Indian Reservation. The surface water rights include bench, bottom and pasture duty project water rights.

projects would be reviewed under separate National Environmental Policy Act (NEPA) documents.

- (10) The Service will use the current irrigation pattern, based on full allocation of agricultural irrigation deliveries as the basis for impact assessment in this document (Figure 2.B). Delivery of acquired project irrigation water to wetlands would *primarily* occur during the normal irrigation season (March 15 - November 15). No project water-user is allowed to divert more than 40 percent of their total entitlement in any one calendar month (*United States v. Alpine Land & Reservoir Co.* Final Decree. 1980. (Alpine Decree) p. 163). The Service, under a Cooperative Agreement for delivery of water and payment of operations and maintenance (O&M) charges, is required to provide the Newlands Project operator with a wetland irrigation water use plan by February 15 of each year.
- (11) None of the alternatives discussed in this document are expected to increase diversions from the Truckee River over baseline conditions. If the Service determines that its acquisition program would increase Carson Division diversions within the provisions of the 1988 OCAP, the Service will take the necessary steps to reduce its irrigation demand so as not to increase Truckee River diversions over baseline conditions. *This is pursuant to subsection 209(b)(1) of Public Law 101-618 and the Endangered Species Act.*

Figure 2.B BASELINE IRRIGATION DELIVERY PATTERN



Source: TCID 1989 Delivery Records and BLR Model 3.20

2.5 ALTERNATIVES CONSIDERED

In this document, the Service assesses a range of alternatives that incorporate various water sources and acquisition methods, and apply different use-rates to water acquired for wetlands protection. Except for the No Action Alternative, volumes of water required and the wetland acreage that would result are fairly constant across alternatives. The designated Lahontan Valley wetlands (Public Law 101-618) are the place of use for all alternatives. All action alternatives incorporate the 20,000 AF water rights acquisition authorized and described in Alternative 1. Alternatives include a No Action Alternative, *the Proposed Action, a Least Cost Alternative with Maximum Use-rate, a Maximum Acquisition Alternative, and the Service's Preferred Alternative*, each with defining characteristics. (See CHARACTERISTICS OF ALTERNATIVES, Table 2.A.) Each of the action alternatives considered will meet the Service's objective to sustain 25,000 acres of primary wetland habitat. The No Action Alternative will not meet the wetlands objective of Public Law 101-618. Management and monitoring requirements are discussed below in Sections 2.7 and 2.8.

2.5.1 ALTERNATIVE 1 - NO ACTION BEYOND CURRENT 20,000 AF ACQUISITION PROGRAM

The No Action Alternative would take no action beyond the 20,000 AF water right acquisition program addressed in the Service's December 1991 EA. This acquisition program was *initiated prior to enactment of Public Law 101-618* and would occur even if no action was taken by the Service pursuant to Public Law 101-618. It is therefore an inherent part of the No Action Alternative. Appropriations for this initial 20,000 AF acquisition program were approved in various Congressional actions. Purchases for the previous program are ongoing, and include water rights purchased by the State of Nevada for the protection of Lahontan Valley wetlands. Based on current acquisition rates, the Service estimates that the 20,000 AF acquisition program could be completed during fiscal year 1996 (FY 96). The No Action Alternative is the baseline condition for comparison of alternatives, and is characterized as such in the Affected Environment in Chapter 3.

In the Service's December 1991 EA (the basis of this alternative), the proposed action called for the acquisition of up to 20,000 AF of water rights by the Service and State of Nevada. This amounts to about 11 percent of the water held in the Carson Division (*total volume of water held in the Carson Division is calculated to be about 185,000 AF (52,768 acres X 3.51 average entitlement)*). Total wetland inflow under Alternative 1 would comprise 17,100 AF/year of irrigation water (see restrictions section below), about 30,000 AF/year of drainwater and about 8,600 AF/year of water from spills. As a result of the No Action Alternative, *about 12,100 acres of primary wetland habitat would be maintained over the long term in Stillwater NWR and Carson Lake.*

Under the current acquisition program, water rights have been purchased based on specific criteria that restrict the transfer of water rights to the wetlands (as agreed upon by the Service, NDOW and the Pyramid Lake Tribe). In order to transfer acquired water rights without protest, the Service and NDOW informally agreed:

- (1) not to transfer any water rights that have been involved in a transfer since 1985;
- (2) that only water rights for lands that were water-righted and irrigated between 1984-89 would be transferred to wetlands as depicted on the August 1991 composite map (Figure 2.A); and
- (3) to apply for transfer of only 2.99 AF/acre/year of acquired water rights.

The Service and NDOW have reserved the remaining 0.51 AF/acre of water rights not transferred due to conditions mentioned above. Due to limits imposed by these agreements, the Service estimates that only 17,100 AF/year of the 20,000 AF of acquired water rights will be available for delivery to wetlands upon completion of the program. *Of the 17,100 AF/year, only about 16,500 AF is expected to reach the wetlands each year on average over the long term, due to shortages.*

The No Action Alternative relies on irrigation drainwater and spills for 70 percent of its inflow. The Service has little control over the timing or volume of drainwater or spills reaching the primary wetland areas, so resulting wetland habitat will fluctuate from year-to-year due to these variables. This alternative relies on a high percentage of drainwater (54 percent) for wetland inflows. Newlands Project irrigation drainwater has been shown to adversely affect aquatic life and fish and wildlife in the Lahontan Valley wetlands due to high concentrations of total dissolved-solids and toxic elements (Hoffman, 1994). Continued reliance on substantial amounts of drainwater for wetlands protection, as described in the No Action Alternative, could potentially cause adverse impacts to these resources.

Reservoir spills have been incorporated into the total annual average of water delivered to the wetlands. Average annual spills were calculated using the BLR Model for the 92-year hydrologic simulation period; however, spills typically occur only in years of high runoff. In addition, not all spill water reaches the wetlands during flood years, as some is utilized by other users, or bypasses the primary wetland areas. Because spills occur on such an unpredictable basis, and in varying volumes, wetland managers depend upon them primarily for their ability to flush contaminants and salts from wetland units.

The following are conditions anticipated to occur under *the No Action Alternative*:

- ▶ Estimated agricultural acreage to be retired from production -- 5,670 acres;
- ▶ Use-rate -- 2.99 AF/acre/year;
- ▶ Total volume of acquired irrigation water available for wetlands protection -- 17,100 AF;
- ▶ Estimated annual average of spills available to wetlands -- 8,600 AF;
- ▶ Estimated volume of drainwater -- 30,000 AF/year;
- ▶ Drainwater would comprise about 54 percent of total volume of water delivered to the wetlands.
- ▶ Total average annual primary wetlands acreage to be sustained -- 12,100 acres;
- ▶ Total *annual* volume of water *available* to the wetlands -- 55,700 AF.
- ▶ Estimated capital cost -- \$8.5 million
- ▶ Estimated range of total annual costs (operations and maintenance fees and revenue sharing payments) --- \$167,000 to \$201,000.

2.5.2 ALTERNATIVE 2 - PROPOSED ACTION

As a result of Alternative 2, 25,000 acres of primary wetland habitat would be sustained over the long term at Stillwater NWR, Carson Lake, and the Tribal wetlands.

Under *Alternative 2*, water rights would be acquired predominately by purchase from willing sellers in the Carson Division of the Newlands Project. These acquisitions would include the purchase of some lands with appurtenant water rights. Leasing, donations, and exchange of water rights would be utilized if the opportunities existed, *including land exchanges with private entities*.

This alternative would seek to follow the intent of the informal agreement between the Service, NDOW and Pyramid Lake Tribe regarding the transfer and use of water rights. The Service would transfer all eligible water rights and commit to a 2.99 AF/acre/year use-rate for water rights acquired for wetlands protection. This use-rate is defined by the Alpine Decree and has gone unchallenged in the past. The Service has relied on the 2.99 use-rate as a matter of policy.

Under Alternative 2, as much as 122,000 AF of water rights would be acquired by the Service and the *State of Nevada*, which amounts to about 66 percent of the water held in the Carson Division of the Newlands Project. *As noted in assumptions 2 and 5 of Section 2.4, the 122,000 AF of water rights includes the 20,000 AF acquisition program and 4,000 AF of water rights to be acquired in trust for Tribal wetlands*. As a result of reductions due to use-rates, the acquisition of 122,000 AF of water rights would result in the delivery of 102,000 AF/year of irrigation water to the wetlands. Drainwater (13,000 AF/year) and spills (10,000 AF/year) would comprise the remainder of water required to meet the 125,000 AF/year wetlands demand. If wetland inflows associated with drainflows and spills were increased over the Service's calculations, fewer water rights would need to be purchased to meet the 25,000 acre wetland objective.

Based on current market prices, the Service calculates that the State of Nevada under this alternative, would purchase between *12,800 AF and 23,000 AF* of water rights for wetlands protection *under authority of the Question 5 Bond Fund. The Service would acquire the remainder of water required for wetlands (between 99,000 AF and 109,200 AF).*

Under this alternative, only water rights from irrigated and water-righted lands (eligible lands) would be transferred. Carson Division water rights have headgate entitlements of 4.5, 3.5, or 1.5 AF/acre/year depending on whether they are bench, bottom or pasture lands. Alternative 2, by using 2.99 AF/acre/year of the acquired bench or bottom land water rights, would leave the remaining 1.51 or 0.51 AF/acre/year unused. As a result, this alternative would effectively reduce the total irrigation demand for the Newlands Project. Decreased Newlands Project irrigation demand would reduce Lahontan Reservoir releases, thereby reducing Truckee River diversions. These actions would ultimately benefit Pyramid Lake *resources*.

This alternative could potentially take as much as 34,800 acres of irrigated, water-righted lands in the Carson Division of the Newlands Project out of agricultural production. The loss of agricultural irrigation would diminish drainwater inflow to Stillwater NWR, Stillwater WMA, and Carson Lake wetlands.

The following are conditions anticipated to occur under Alternative 2, *including the 20,000 AF acquisition program*:

- ▶ Estimated agricultural acreage to be retired from production -- 34,800 acres;
- ▶ Use-rate -- 2.99 AF/acre/year;
- ▶ Volume of acquired irrigation water available for wetlands protection -- 102,000 AF;

- ▶ Estimated annual average of spills available to wetlands -- 10,000 AF;
- ▶ Estimated volume of drainwater -- 13,000 AF/year;
- ▶ Drainwater would comprise about 10 percent of the total volume of water delivered to the wetlands.
- ▶ Total average annual wetlands acreage to be sustained -- 25,000 acres;
- ▶ Total *annual* volume of water *available* to the wetlands -- 125,000 AF/year.
- ▶ Estimated range of total capital costs -- \$49.8 million to \$100.3 million.
- ▶ Estimated range of total annual costs (operations and maintenance fees and revenue sharing payments) -- *\$995,000 to \$1.2 million.*

2.5.3 ALTERNATIVE 3 - LEAST COST WITH MAXIMUM USE-RATE

This is considered the Least-Cost Alternative due to its reliance on a 3.5 AF/acre/year transfer and use-rate, which maximizes the use of water acquired. This alternative offers the lowest total cost (capital and annual) of the action alternatives. This alternative uses the same acquisition process as Alternative 2, that is, purchase from willing sellers. Similar to Alternative 2, these acquisitions could include the purchase of some lands with appurtenant water rights, and leasing, donations, and exchange of water rights would be utilized if the opportunities existed, *including land exchanges with private entities.*

The 3.5 AF/acre/year use-rate is the only factor that differentiates this alternative from Alternative 2. The Least Cost Alternative would sustain a long-term average of 25,000 acres of primary wetland habitat at Stillwater NWR, Carson Lake and the Tribal wetlands.

Under this alternative, nearly all of water rights acquired would be put to full use. The Service would most likely acquire some water rights at the 4.5 AF/acre/year bench land entitlement which would allow a small portion of water rights to remain unused. As a result, this alternative would result in slight reductions in Project demand over baseline conditions.

There is some dispute as to whether transfers at a rate as high as 3.5 AF/acre/year could be made. First, some people are of the opinion that this rate would be inconsistent with the Alpine Decree. Second, the ability to transfer at this rate would be contingent upon the State Engineer finding that downstream water-right holders would not be injured by a proposed transfer at this rate and accepting the argument that wetland uses would be similar enough to existing agricultural irrigation so as not to constitute a change in use.

Such a finding of change in use would invoke a reduction in the use rate to 2.99 AF/acre/year. Finally, the analysis performed by the Service for this document indicates that the 3.5 AF/acre/year use-rate would probably have no effect on Truckee River diversions for the Newlands Project over the long term and would, therefore, neither benefit nor adversely impact the recovery of endangered Pyramid Lake fishes. *However, if this alternative were implemented by the Service, and if a more refined analysis, or actual experience, indicated that the 3.5 AF/acre/year use-rate would be detrimental to Truckee River flows and Pyramid lake resources the Service would reduce the irrigation use-rate for wetlands protection. This is required by the Endangered Species Act and subsection 209(b)(1) of Public Law 101-618, which mandates that the Secretary shall not implement any provisions under Title II of the Public Law that would increase Truckee River diversions to the Newlands Project over those allowed under OCAP.*

Because the 3.5 AF/acre/year use-rate might be detrimental to Truckee River flows into Pyramid Lake, the Service therefore, actually may reduce the use-rate of Newlands Project water to something less than 3.5 AF/acre/year. The use-rate under this alternative would be a maximum rate, under any reasonable set of assumptions, at which water would be transferred from agricultural use and applied to wetlands. Since this one factor can potentially affect a number of other components in the water rights acquisition process, this alternative uses the 3.5 AF/acre rate so as to allow comparison of impacts based on use-rate alone.

The Service expects that a test transfer application would have to be filed with the State Engineer to obtain a ruling on the 3.5 AF/acre/year transfer and use-rate before this alternative could be implemented. Even if the State Engineer ruled favorably on the test application, other factors, such as litigation or conflicts with the Endangered Species Act (ESA) *and subsection 209(b)(1) of Public Law 101-618*, could prevent the Service from implementing this alternative.

Under the Least Cost Alternative, as much as 100,000 AF of water rights would be acquired, which amounts to about 54 percent of the water held in the Carson Division of the Newlands Project. *As noted in assumptions 2 and 5 of Section 2.4, the 100,000 AF of water rights includes the 20,000 AF acquisition program and 4,000 AF of water rights to be acquired in trust for Tribal wetlands.* The acquisition of 100,000 AF of water rights would result in the delivery of 97,700 AF/year of irrigation water over the long run. Drainwater (18,600 AF/year) and spills (8,700 AF/year) would make up the remainder of water sources needed to meet the 125,000 AF/year wetlands demand. If wetland inflows associated with drainflows and spills were increased over the Service's calculations, fewer water rights would need to be purchased to meet the 25,000-acre wetlands objective.

Based on current market prices, the Service calculates that the State of Nevada, under this alternative, would purchase *between 12,800 AF and 23,000 AF* of water rights for wetlands protection as authorized by the Question 5 Bond Fund. The remaining 77,000 AF-87,200 AF of water rights would be acquired by the Service.

The following are conditions anticipated to occur under *Alternative 3, including the 20,000 AF acquisition program* :

- ▶ Estimated agricultural acreage to be retired from production -- 28,500 acres;
- ▶ Use-rate -- 3.5 AF/acre/year;
- ▶ Total volume of acquired irrigation water available for wetlands protection -- 97,700 AF;
- ▶ Estimated annual average of spills available to wetlands -- 8,700 AF;
- ▶ Estimated volume of drainwater -- 18,600 AF/year;
- ▶ Drainwater would comprise about 15 percent of the total volume of water delivered to the wetlands.
- ▶ Total average annual primary wetlands acreage to be sustained -- 25,000 acres;
- ▶ Total *annual* volume of water *available* to the wetlands -- 125,000 AF/year.
- ▶ Estimated range of total capital cost -- \$42.2 million to \$77.1 million.
- ▶ Estimated range of total annual costs (operations and maintenance fees and revenue sharing payments) -- \$815,500 to \$986,500.

2.5.4 ALTERNATIVE 4 - MAXIMUM ACQUISITION

Alternative 4 relies almost entirely on the acquisition of irrigation water rights to meet the 25,000-acre wetlands objective. This alternative represents the maximum acquisition scenario and *does not make use or rely on any drainwater* to sustain primary wetland habitat. Irrigation water would make up the largest proportion of wetland inflows under this alternative, and as a result, wetland inflows would be of higher quality than that which would occur under all other alternatives. Due to the water quality factor, this alternative would offer the most benefit to fish and wildlife resources in the wetlands.

This alternative would acquire water rights predominately by purchase from willing sellers in the Carson Division of the Newlands Project. These acquisitions would include the purchase of some lands with appurtenant water rights. Leasing, donations, and exchange of water rights would be utilized if the opportunities existed, *including land exchanges with private entities*. This alternative also makes use of the 2.99 AF/acre/year use-rate for wetlands protection. As a result of this alternative, a long-term average of 25,000 acres of primary wetland habitat would be sustained at Stillwater NWR, Carson Lake, and the Tribal wetlands.

Under the Maximum Acquisition Alternative, as much as 133,500 AF of water rights would be acquired, or about 72 percent of the water held in the Carson Division of the Newlands Project. *As noted in assumptions 2 and 5 of Section 2.4, the 133,500 AF of water rights includes the 20,000 AF acquisition program and 4,000 AF of water rights to be acquired in trust for Tribal wetlands.* As a result of reductions due to the use-rate, the acquisition of 133,500 AF of water rights would result in the delivery of 113,200 AF/year of irrigation water, no drainwater and 11,800 AF/year of water from spills. If wetland inflows associated with spills were increased over the Service's calculations, fewer water rights would need to be purchased to meet the 25,000-acre wetland objective.

Based on current market prices, the Service calculates that the State of Nevada under this alternative would purchase between *12,800 AF and 23,000 AF* of water rights for wetlands protection as authorized by Proposition 5. The remaining *110,500 AF to 120,700 AF* of water rights would be acquired by the Service.

Under this alternative, irrigation water would provide as much as 90 percent of the water needed to sustain 25,000 acres of primary wetland habitat. Due to the large percentage of agricultural lands taken out of production, the Service expects that very little drainwater would reach the primary wetland areas. Any drainwater that did reach the primary wetlands would be segregated in sumps and managed separately. The Service would designate disposal areas for such drainwaters. If these disposal areas were considered to be hazardous to wildlife, the Service would construct barriers or use additional measures to preclude wildlife access. The Stillwater NWR Comprehensive Master Plan would address various aspects of separating drainwater, and managing it to preclude wildlife access if Alternative 4 was chosen.

This alternative decreases Newlands Project demand and Truckee River diversions to the extent that it offers the greatest increase in Pyramid Lake inflow. As a result, the Maximum Acquisition Alternative offers the most positive benefit for Pyramid Lake *resources* of the alternatives considered. Over the long term, this alternative increases Pyramid Lake inflow by about 6 percent over conditions of the No Action Alternative. This alternative offers 2 percent more Pyramid Lake inflow than Alternative 2.

The following are conditions anticipated to occur under *Alternative 4, including the 20,000 AF acquisition program*:

- ▶ Maximum agricultural acreage retired from production -- 38,100 acres;
- ▶ Use-rate -- 2.99 AF/acre/year;
- ▶ Volume of acquired irrigation water available for wetlands protection -- 113,200 AF;
- ▶ Estimated annual average of spills available to wetlands -- 11,800 AF;
- ▶ Estimated volume of drainwater -- none;
- ▶ Total average annual primary wetlands acreage to be sustained -- 25,000 acres;
- ▶ Total *annual* volume of water *available* to the wetlands -- 125,000 AF/year.
- ▶ Estimated range of total capital costs -- \$53.8 million to \$112.4 million.
- ▶ Estimated range of total annual costs (operations and maintenance fees and revenue sharing payments) -- \$1.08 million to \$1.31 million.

2.5.5 ALTERNATIVE 5 - PREFERRED ALTERNATIVE

Alternative 5 has been chosen as the Service's Preferred Alternative in the FEIS. This alternative limits acquisition of agricultural surface water rights (through purchase, exchange, or donation) in the Carson Division to about 75,000 AF and also relies on other acquisition methods and water sources to provide sufficient water to sustain 25,000 acres of primary wetland habitat in Lahontan Valley, as mandated by Section 206(a) of Public Law 101-618. As noted in assumptions 2 and 5 of Section 2.4, the 75,000 AF of water rights includes the 20,000 AF acquisition program and 4,000 AF of water rights to be acquired in trust for Tribal wetlands.

Similar to *Alternative 2*, water rights *would be acquired* by purchase from willing sellers in the Carson Division of the Newlands Project, and through donation and exchange, *including land exchanges with private entities*. This alternative also emphasizes leasing as an option that benefits farmers and reduces impacts to the agricultural economy in the community. In addition to Carson Division agricultural water rights, drainwater and spills, this alternative would rely on upstream water right purchases from the Middle Carson River corridor, use of sewage effluent and conserved Navy water as available. *It could also rely on Lahontan*

Valley groundwater pumping for up to 7,500 AF of water to make up the volume required to meet wetlands demand.

This alternative spreads acquisition impacts across a greater area, while relying on a wider range of water sources. It allows the Service to choose between water resources that may change from year-to-year as a result of both man-made and natural factors. If for instance, more lessors are available in any one year, the Service could decrease groundwater pumping, and increase leasing. If less water was available from the Middle Carson River corridor (in a shortage year), leasing and groundwater pumping could be increased to offset deficiencies.

Under this alternative, the Service would continue purchasing water rights from the Carson Division and begin working on a leasing program and an acquisition plan for the purchase and transfer of water rights from the Middle Carson River corridor. In conjunction with the purchase component, the Service would work to develop a funding mechanism necessary to support the leasing component of this alternative. The acquisition plan under this alternative would include: using water made available by the Navy as a result of water conservation efforts associated with its NAS-Fallon greenbelt management plan, and conveying City of Fallon sewage effluent directly to the primary wetland areas. The Service has an agreement with the Navy regarding use of conservation water, but would have to secure an agreement with the City of Fallon to transfer and make use of sewage effluent generated by its Fallon treatment plant. Over time, as Fallon grows and other residents are serviced by the Fallon sewage disposal system, greater volumes of water may become available from this source. Another method under this alternative would be to develop groundwater wells for wetland water supply.

This alternative decreases diversions from the Truckee River over existing conditions, and offers some benefit to Pyramid Lake resources in the form of increased flow to the lake. However, these benefits are less than those expected from Alternatives 2 or 4.

The Service has determined that about 75,000 AF of water, which is about 40 percent of the water held in the Carson Division of the Newlands Project, would be acquired through fee purchase, donation, and exchange under the Preferred Alternative. As a result, about 21,000 acres of water-righted agricultural land in the Carson Division would be changed to other uses. Based on the Service's policy to use 2.99 AF/acre/year of the water rights acquired from the Carson Division, the amount of water delivered to the primary wetland habitats would be about 62,000 AF/year. Under the Preferred Alternative, the Service expects drainflows to average about 19,700 AF/year and spills to amount to about 9,700 AF/year over the long term. If wetland inflows associated with drainflows and spills were increased over the Service's calculations, less water would need to be acquired from other

sources or through fee purchase. *The Service anticipates that it may be able to make use of acquired irrigation water rights at a higher use-rate (not greater than 3.5 AF/acre/year) sometime in the future if operational conditions in the Newlands Project change with respect to the Truckee River and it can clearly be demonstrated that such use does not adversely impact Truckee River and Pyramid Lake resources. The Service also recognizes the need to obtain approvals from the Nevada State Engineer for higher use-rates and to resolve other issues relating to the Alpine Decree before higher use-rates could be implemented.*

Under the Preferred Alternative, the following methods and sources in addition to purchases from the Carson Division, drainflows and spills, would be used to meet the 125,000 AF/year primary wetlands habitat demand. These methods and sources could include a combination of the following and are discussed below in the expected order of implementation.

- ▶ Increased reliance on leasing water rights
- ▶ Purchasing upstream Segment 7 water rights
- ▶ Use of Navy conserved water
- ▶ Use of treated sewage effluent from municipal facilities
- ▶ Pumping Lahontan Valley groundwater

Leasing

Alternative 5 emphasizes reliance on leases, dry-year options and other forms of intermittent acquisitions from willing sellers as a method of acquisition. Leases are best implemented with other acquisition sources, and act to fill acquisition gaps not covered by other sources. The Service estimates that leasing as much as 21,600 AF/year would be required about 50 percent of the time. In many years, leasing would contribute less than this amount, and in about 1/3 of the years, no leasing would occur. Leasing would offer farmers a flexible way to earn additional income in any given year, and would benefit the community's economy by not taking agricultural lands out of production permanently.

For the Service, however, leasing is the most costly method of acquiring water. The Service estimates that *a leasing program could up to \$3.88 million and would accrue annually.*

Middle Carson River

This alternative also includes the transfer of water rights from the Middle Carson River (Segment 7) to the primary wetlands in Lahontan Valley (Segment 8). About 6,450 acres of water-righted irrigated lands are located in the Carson River corridor between Lahontan Reservoir and the Carson City gaging station.

The Service has determined that water right acquisitions from the Middle Carson River could potentially provide an average of about 8,200 AF/year to the wetlands. Transfers from one segment of the river to another could change the priority date of the transferred water rights to the year of purchase. As a result, water rights that are transferred from Segment 7 to Segment 8 may have little or no yield in some years because their priority date makes them junior to those users with more senior rights. Nevada water law allows a water right to retain its priority when transferred to a downstream segment provided that all senior downstream users agree to honor the priority date for the water right being transferred. In Segment 8, TCID is the representative for nearly all the downstream private water-right holders. TCID and Reclamation (Federal agency controlling the Newlands Project) would have to agree to honor the older priority date for water rights being transferred from Segment 7 to the primary wetlands in order for the Service to transfer water rights from Segment 7 to Segment 8. In comments to the DEIS, TCID staff stated that board members are not generally opposed to considering such an agreement.

The Alpine Decree further stipulates that in water right transfers that include change in manner of use, only the net consumptive use-rate may be transferred and applied. For Segment 7, the irrigation diversion rate is 4.5 AF/acre/year, but the net consumptive use (allowable transfer) rate is 2.5 AF/acre/year.

According to the Alpine Decree, there are 6,450 acres of water-righted land in Segment 7. The Service has insufficient information to determine the number of willing sellers in the Middle Carson River corridor. In order to quantify the effects of transferring water from Segment 7 to Segment 8 and the primary wetland habitats, the Service has depicted a 75 percent acquisition rate for Segment 7 water rights. Based on this 75 percent acquisition scenario, Service calculations for this example show that water rights from about 4,838 acres of land would be acquired from willing sellers through purchase.

As depicted in this example, the acquisition of 21,770 AF (4,838 acres @ 4.5 AF/acre/year) of water rights in Segment 7 equates to 12,100 AF/year of water eligible for transfer downstream to Segment 8 applying the 2.5 transfer rate. However, of the 12,100 AF volume of water released from Lahontan Reservoir, only 8,200 AF would be available to the primary wetland habitats due to conveyance losses that occur in the Newlands Project. Using a simulated 92-year hydrologic data set, the Service has calculated that the long-term average wetland delivery as depicted in this example, would amount to only 6,200 AF/year as a result of drought years. From this example, it can be seen that under existing conditions and laws, only about 30 percent of the total water rights acquired can reasonably be expected to be delivered to the primary wetland areas.

Based on the example above, the Service has calculated that the costs associated with these upstream acquisitions are about \$16.9 million. These calculations show that cost per

acre-foot of upstream water rights delivered to the wetlands is substantially higher than the Carson Division *water rights delivered to the wetlands*.

About 1,244 acres of water-righted lands in Segment 7 of the Carson River corridor have already been acquired by the Nevada State Parks. These water rights are not directly available to the Service for wetlands protection because they were purchased through the Question 5 Bond Fund designated for State Park purposes. A portion of these water rights might be transferred or exchanged to NDOW if State Parks determined that the water available was in excess of State Park needs.

The Service would *use Newlands Project facilities to convey* water acquired from Segment 7 to the wetlands. The Service expects to be subject to the same conveyance losses as other irrigators in the Carson Division of the Newlands Project.

Navy Water

NAS-Fallon holds title to 2,934 acres of water-righted land which would have a Newlands Project irrigation entitlement of 10,269 AF/year. Through the years (1984-93) the Navy's irrigation deliveries have averaged about 6,275 AF/year for non-drought years. The Navy has begun to implement a greenbelt management plan (U.S. Department of the Navy, 1994) which will reduce irrigation deliveries to about 4,400 AF/year as a result of water conservation efforts and on-site irrigation efficiency improvements.

Pursuant to section 206(c) of Public Law 101-618, the Service and the Navy have signed a Memorandum of Agreement (MOA) that calls for the irrigation water saved or conserved at NAS-Fallon in the future to be used by the Service for fish and wildlife purposes, primarily for cul-ui and secondarily for wetlands protection. Based on the provisions in the MOA, the Service has identified that about 2,300 AF/year of water could be available from the Navy under this alternative. The full potential of this water source may be as high as 5,870 AF/year, if it is determined that all water rights from the Navy are eligible for transfer to the wetlands and their transfer would not increase Truckee River diversions.

The Service may determine that this water source is necessary for the recovery and protection of endangered Pyramid Lake fish species or to offset increases in California diversions under Section 204 of Public Law 101-618, and choose to exercise its option to make use of Navy waters for the Endangered Species Act (ESA). Such use of this water source could occur permanently or intermittently, as in years when additional Truckee River inflow to Pyramid Lake is critical to the recovery or protection of endangered fishes.

Sewage Effluent

Under existing conditions, the City of Fallon and NAS-Fallon sewage treatment plants discharge between 800 - 900 AF of effluent into Newlands Project drains each year. The Service would have to make specific arrangements with the City of Fallon and the Navy to ensure that the effluent is discharged in such a manner that it will reach the wetlands and be available to sustain primary wetland habitat. Such an agreement could be amended to allow for greater wetlands deliveries of sewage effluent as population and treated discharges increase in the future. *The Service expects that over the long term this water source may provide as much as 2,000 to 3,000 AF/year. The Service has based this estimate of available water on population projections and NAS-Fallon expansion plans.*

Groundwater

Groundwater is a water source that could be used to augment total supply *in the event that the other sources of water or methods of acquisition prove not to provide sufficient water to sustain 25,000 acres of primary wetland habitat.* For the Service to utilize groundwater, it would have to *either* drill and develop a number of high-volume wells that could pump adequate volumes of water to meet wetlands protection objectives, *or acquire existing wells with water right permits.* *In drier years, groundwater pumping could be used to offset surface water shortages. In spill years, groundwater pumping would decrease proportionately, or cease.* Based on these assumptions, the Service estimates groundwater may provide from 6,800 AF to as much as 14,300 AF annually and could require as many as nine wells with 1,000 gallons per minute (gal/min) capacities.

The Service views groundwater pumping as the least likely source of water for wetlands protection due to two key issues. One issue relates to obtaining new groundwater appropriations from the Nevada State Engineer. Staff from the Engineer's Office has indicated that any groundwater application that would require the volumes described in this alternative would be cause for concern and evaluated closely. The Lahontan Valley is currently closed to new appropriations of groundwater for agricultural use (Palm, oral communication, 1994), and the Service's use of groundwater for wetlands protection could be subject to this same restriction. The Service could acquire existing groundwater permits and transfer those permits to the wells it would have to drill, or acquire the existing wells and convey the water to the wetlands via existing irrigation ditches. Any new construction (well drilling, pipelines, etc.) that would result from this alternative would require additional site-specific impact analysis for construction activities, as required by NEPA.

A second issue relates to groundwater quality in the eastern portions of the valley. Under this alternative, the Service would drill these wells on Federal lands on, or adjacent to, the primary wetland areas (Carson Lake, Stillwater NWR, Tribal wetlands). Studies have shown that total dissolved-solids concentrations *in groundwater in the areas described above*

regularly exceed 1,000 milligrams per liter (mg/L) and are often as high as 4,000-5,000 mg/L (Maurer and others, 1994). These concentrations of dissolved solids would be of concern to the Service, and may be considered unsuitable for the management objectives of sustaining primary wetland habitat (Hoffman, 1994). *Groundwater would only be used to the extent that it does not degrade water quality of wetland inflows as compared to baseline conditions. It is estimated that if less than about 7,500 AF/year of groundwater is pumped from the areas described and delivered to primary wetlands, water quality of wetland inflows would not be adversely impacted. Water quality of wells would be tested initially and monitored over time to ensure that wetland inflows would not be adversely impacted by this water source.*

Wells would be drilled into the intermediate aquifer (50 to 1,000 feet below the surface) and would most likely have sufficient capacity and recharge to fulfill the Service's pumping demands. The eastern portions of Lahontan Valley where the well sites would be located are within the discharge zones of the shallow and intermediate aquifers (Glancy, 1986, Maurer and others, 1994, Seiler and Allander, 1993). Therefore, pumping groundwater is not expected to adversely affect aquifer recharge or other groundwater users in the *western and west-central portions of the Lahontan Valley (Fallon area and areas to the west of Fallon)*. Based on preliminary assessments of groundwater recharge, the Service estimates that about 20,000 AF/year could be pumped from this source without impacting other groundwater users, *except possibly those in the immediate vicinity where the pumping would occur* (Maurer, oral communication, 1993). *Groundwater pumping could cause localized declines in water levels in the shallow and intermediate aquifers in the immediate area where the pumping would occur.*

The Service calculates that the cost of pumping would range from \$244,000 to about \$503,000 *per year* in electric costs. Capital investment costs associated with drilling nine wells would range from \$500,000 to \$700,000 based on previous well drilling costs on Refuge lands.

The following are conditions anticipated to occur under the Preferred Alternative, including the 20,000 AF acquisition program:

- ▶ Estimated agricultural acreage to be retired from production -- 21,000 acres *in the Carson Division* and as much as 6,450 acres *in the Middle Carson River corridor*;
- ▶ Use-rate -- 2.99 AF/acre/year
- ▶ Total volume of Carson Division irrigation water delivered for wetlands protection -- 62,000 AF/year
- ▶ Estimated annual average of spills available to wetlands -- 9,700 AF/year

- ▶ Estimated volume of drainwater -- 19,700 AF/year
- ▶ Drainwater would comprise about 16 percent of the total volume of water delivered to the wetlands.
- ▶ Estimated average volume of leased water to be obtained -- 0 to 21,600 AF/year
- ▶ Estimated average of upstream water rights available for wetlands protection -- 6,200 AF/year
- ▶ Estimated range of groundwater pumped -- 6,800 AF/year to 14,300 AF/year
- ▶ Estimated volume of Navy water that could be made available for wetlands use-- 2,300 AF/year to 5,870 AF/year
- ▶ Estimated volume of treated waste water conveyed to wetlands -- 800 AF/year - 2,000 AF/year
- ▶ Total *annual* volume of water *available* to the wetlands -- 125,000 AF/year
- ▶ Total average annual wetlands acreage to be sustained -- 25,000 acres
- ▶ Estimated range of total capital cost -- \$49 million to \$75.2 million.
- ▶ Estimated range of total annual costs (operations and maintenance fees, revenue sharing payments, leasing , and pumping costs -- \$2.79 *million* to \$3.17 *million*.

The following mitigation measures would be implemented as part of the Preferred Alternative :

- ▶ Lands bought as part of the water rights acquisition program that are outside the Service management boundary would be sold or exchanged and returned to private ownership or Indian Trust. The purpose of this mitigation is to protect the current balance of private and Federal lands in the Lahontan Valley.
- ▶ *Due to water quality concerns, the Service would use groundwater only to the extent that it does not degrade water quality conditions of total wetland inflow below baseline conditions. It is estimated that the use of less than 7,500 AF/year would not have adverse impacts.*
- ▶ Private lands bought by the Service within the Stillwater NWR boundary would remain in Federal ownership and would be revegetated with native species or crop species that benefit wildlife and prevent wind erosion.

Table. 2.A COMPARISONS of ALTERNATIVES

	Alternative 1 No Action	Alternative 2 DEIS Proposed Action	Alternative 3 Least Cost	Alternative 4 Maximum Acquisition	Alternative 5 Preferred Alternative
Agricultural Acres	47,008	17,968	24,268	14,668	31,768
Acquired Water- Righted Acres	5,670	34,800	28,500	38,100	21,000
Percent of Carson Division	11%	66%	54%	72%	40%
Total Acquisition (AF)	20,000	122,000	100,000	133,500	75,000
under Service's EA (AF)	20,000	20,000	20,000	20,000	20,000
State of Nevada (AF)	0	12,800 - 23,000	12,800 - 23,000	12,800 - 23,000	12,800 - 23,000
under P.L. 101-618 (AF)	0	79,000 - 89,200	57,000 - 67,200	90,500 - 100,700	32,000 - 42,200
Use-Rate (AF/ac/yr)	2.99	2.99	3.5	2.99	2.99
Wetland Irrigation Entitlement (AF/yr)	17,100	102,000	97,700	113,200	62,000
Wetlands Drainwater (AF/yr)	30,000	13,000	18,600	0	19,700
Spill to Wetlands (AF/yr)	8,600	10,000	8,700	11,800	9,700
Other Sources ^A (AF/yr)	0	B	B	B	33,600 ^A
Potential Wetlands Inflow (AF/yr)	55,700	125,000	125,000	125,000	125,000
Primary Wetland Habitat Acres	12,100	25,000	25,000	25,000	25,000
Capital Costs (in thousands)	\$7,850 - \$11,600	\$49,800 - \$100,300	\$42,200 - \$77,100	\$53,800 - \$112,400	\$49,050 - \$75,425
Annual Costs (in thousands)	\$164 - \$192.5	\$978 - \$1,153	\$801.5 - \$945	\$1,070 - \$1,261	\$2,784 - \$3,149

^A Other water sources include leased water, upstream Carson River water rights, groundwater, Navy conservation water, treated sewage effluent, and increased irrigation use-rates. 'B' indicates that these water sources will be considered as part of the acquisition process described in the various alternatives. However, analyses in the alternative are based primarily on water right purchases and do not rely on non-purchased sources to meet the Services wetland objectives.

Baseline agricultural acreage on Carson Division is 52,768 for these calculations.

2.6 MANAGEMENT REQUIREMENTS: WATER RIGHT TRANSFER PROCEDURES, ELIGIBILITY CRITERIA, TRANSFER RATES, AND ACQUISITION STRATEGY

Management requirements involve policies, regulations and State laws that are related to the action of acquiring and transferring water and water rights. In this section, the Service has identified four management requirements applicable to the Proposed Action and alternatives. These management requirements pertain to water right transfer procedures, eligibility criteria, transfer rates and water right acquisition strategies.

2.6.1 WATER RIGHT TRANSFER PROCEDURES

Acquired water rights *would* be transferred from *their existing place of use* to wetland areas pursuant to Nevada State law (NRS 533.345), which requires that the Service file an application with the State Engineer. There is a 30-day protest period in which protests may be filed by *any interested person*. These protests may be withdrawn if the parties involved are able to resolve their concerns; if not, the Nevada State Engineer may hold a hearing before deciding whether to deny the transfer, condition the approval, or approve the transfer as filed. For transfers which are approved, the Service would then be required to prove that it has made beneficial use of the transferred water *in order to perfect the water right in its new place of use*. The water right transfer process (permanent and temporary) applies to all water rights that would be acquired and transferred as a result of the Service's action.

The Service is authorized under subparagraph 206(a)(3)(A) of Public Law 101-618 to use Federal conveyance systems to deliver acquired water to wetland areas. The Service is *authorized* to reimburse the Newlands Project operator for reasonable and customary operation and maintenance (O&M) costs under subparagraph 206(a)(3)(B). O&M charges for the wetland water rights will be paid pursuant to the April 1993 Cooperative Agreement for Delivery of Water and Payment of Operation and Maintenance Charges.

2.6.2 ELIGIBILITY CRITERIA

All of the alternatives considered by the Service are predicated on the commitment that, to the greatest extent possible, only those water rights which are eligible for transfer to Lahontan Valley wetlands would be acquired. This policy conforms to Section 206(a)(1)(C) of Public Law 101-618 which requires that acquired water rights must be utilized for wetlands purposes to a substantial degree.

For purposes of determining eligibility, the Service would rely on Reclamation's August 1991 composite map, "Water Rights Qualifying for Transfer to Lahontan Valley Wetlands" (Figure 2.A), as amended in October 1993, and consistent with any future amendments, updates, or corrections.

In some cases, the Service may acquire ineligible water rights incidental to a fee purchase of water rights and land. The Service would not attempt to transfer these rights to Lahontan Valley wetlands, but may choose to exercise them in their existing place of use if such use would not result in increased diversions from the Truckee River.

2.6.3 TRANSFER RATES

The Alpine Decree sets the water duty for Newlands Project water-users at 3.5 AF/acre on bottom land and 4.5 AF/acre on bench land. Transfers that seek to change the point of diversion or purpose of use of a water right from irrigation to any other use can only be transferred at the net consumptive use-rate (transfer rate) of the water right (*United States v. Alpine Land & Reservoir Co.* Final Decree. 1980. p. 162). The net consumptive use-rate (transfer rate) for water rights below Lahontan Reservoir is 2.99 AF/acre (*United States v. Alpine Land & Reservoir Co.* Final Decree. 1980). The net consumptive use-rate for water rights in Segment 7 of the Carson River is 2.5 AF/acre (*ibid*).

The Service anticipates that it may be able to make use of acquired irrigation water rights at a higher use-rate (not greater than 3.5 AF/acre/year) sometime in the future (under Alternatives 2, 4, and 5) if operational conditions in the Newlands Project change in respect to the Truckee River and it can clearly be demonstrated that such use does not adversely impact Truckee River and Pyramid Lake resources. The Service also recognizes the need to obtain approvals from the Nevada State Engineer for higher use-rates and to resolve other issues relating to the Alpine Decree before higher use-rates could be implemented.

2.6.4 ACQUISITION PROCESS AND STRATEGY

The Service has developed a step-by-step description of a typical water rights acquisition process to provide the reader with the existing Federal procedures associated with voluntary private property acquisitions. In addition, the Service has developed an acquisition strategy that portrays the various objectives that the Service considers in assessing potential water rights and properties for acquisition. The acquisition process is discussed here, and the more general acquisition strategy is described below.

Acquisition Process

Section 206(a)(2)(A) of Public Law 101-618 states that water rights are to be purchased from willing sellers only. Sellers typically contact the Service in person or by telephone and ask to be included in the water rights acquisition program before the Service's Realty staff proceeds with the following steps:

- (1) The water rights offered are identified and their eligibility for transfer to the wetlands is confirmed. Records from the Truckee-Carson Irrigation District and U.S. Bureau of*

Reclamation are reviewed, and a summary description of the water rights is prepared at the Service's expense by a local water rights surveyor. The Service conducts an initial assessment to determine whether further actions are merited, if so;

- (2) A preliminary title report is ordered from a local title company to confirm ownership of the water rights, at the Service's expense;*
- (3) Market value of the water rights is estimated by a qualified appraiser who utilizes recent comparable sales, and other recognized appraisal approaches. The appraisal report is completed at no cost to the property owner. However, a property owner may provide his own current appraisal prepared by a State Certified appraiser. The purpose of the appraisal is to estimate the market value of the interest to be acquired (water only, or land and water). As defined by the Uniform Appraisal Standards For Federal Land Acquisition, market value is defined as the amount in cash, or on terms reasonably equivalent to cash, for which in all probability the property would be sold by a knowledgeable owner willing but not obligated to sell to a knowledgeable purchaser who desired but is not obligated to buy. Implicit in this definition is the consummation of a sale as of a specific date and the passing of title from seller to buyer under conditions whereby: buyer and seller are typically motivated; both parties are well-informed and well-advised with each acting in what they consider their own best interest; a reasonable time is allowed for exposure in the open market; payment is made in terms of cash in United States dollars or in terms of financial arrangements comparable thereto; and the price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.*
- (4) The Service conducts a second evaluation of the property in consultation with other agencies and partners. The property is assessed for its ability to meet various objectives, as discussed below in Acquisition Strategy;*
- (5) If the property meets objectives, a purchase agreement is prepared and sent to the property owner. The purchase price is the appraised market value. If the property owner decides to sell, the Service usually has a 3 to 6 month option period to consider the agreement. The primary purpose of this option period is to verify that funding is available to complete the acquisition;*
- (6) Once the Service accepts the purchase agreement, a water rights survey is completed, an application is filed with the Nevada State Engineer to transfer the eligible water rights to the Lahontan Valley wetlands, the condition of title to the water rights is reviewed by the office of the Regional Solicitor, escrow is opened at a local escrow company, and funds are ordered; and*

- (7) *When a permit has been issued by the State Engineer transferring the water rights to the wetlands, and any outstanding title issues have been resolved, the property owner is paid and escrow is closed.*

In cases where the Service purchases land as well as water rights, the steps are essentially the same.

Acquisition Strategy

Public Law 101-618 (sub.par. 206(a)(2)(A)) provides for the targeting of water right purchases in areas deemed to be most beneficial to the Federal water rights acquisition program. For the purposes of this document, targeting refers to a ranking or screening process that *can be used to weigh the merits of one potential acquisition as compared to another.*

Different acquisition strategies can be used to identify certain lands for either protection or acquisition. The Service is committed to acquiring only those water rights which meet the eligibility criteria discussed above (Section 2.6.2, ELIGIBILITY CRITERIA). The Service is primarily interested in an acquisition strategy that involves incentive-based participation with continued reliance on willing sellers.

The Service has developed an acquisition strategy to evaluate potential water rights acquisitions when there are more *water rights available than funds* in any given year. Each water right purchase is considered individually, and as funding availability changes, so may the acquisition strategy. *The purpose of this strategy is to help the Service evaluate acquisitions on a case-by-case basis to provide the most benefit to the Federal water rights acquisition program while remaining mindful of a variety of other objectives, as described below.*

- ▶ **Cost effectiveness** -- Obtain sufficient quantities of water rights for wetlands protection expeditiously and in the most cost effective manner. First preference is to buy water rights only. Second preference is to purchase water rights with appurtenant land. Third preference is to purchase water rights, appurtenant land and improvements.
- ▶ **Location (for acquisitions that include land)** -- Properties located within or close to the primary wetland areas are more desirable than those situated at the community core or along the growth corridor. First preference is to buy those water-righted lands within the Stillwater NWR boundary. Second preference is to acquire water-righted land adjacent to the primary wetlands that have wildlife values. Third priority is to acquire water-righted lands in the Stillwater and Island Districts of the Newlands Project.

- ▶ **Leasing** -- Acquisition by leasing offers some flexibility for water acquisition in any one year, but could be limited by funding or hydrologic conditions. A variety of lease arrangements, such as dry-year options, reverse auction or one-time leasing, could be incorporated into the Service's acquisition strategy.

- ▶ **Indirect Cost Savings** -- The Service would seek to acquire properties that would offer indirect savings or improvements for other Federal programs. For instance, improving *Newlands Project* efficiency and improving drainwater quality are two programs that could benefit from *certain* water right acquisitions.

- ▶ **Protection** -- The Service *may* seek to avoid acquisitions in certain areas to maintain or protect important resources or cultural values. For instance, valuable farmlands, greenbelt areas, and key aquifer recharge areas are examples of areas that could be avoided for the water rights acquisition program. *As one means to lessen impacts to the protection of farmland beyond measures defined by the alternatives, the Service could, in consultation with NRCS, consider land evaluation and site assessment (LESA) scores of individual parcels (among other considerations) in determining which water rights or water rights and land to purchase in cases when more water rights or water rights and land are being offered to the Service than the Service has available funds to acquire. If LESA scores are available for all farmland parcels in Churchill County, making it possible to assess the quality of particular farmland parcels relative to all others in Churchill County, the Service could use the scores to assess potential impacts of potential acquisitions during the acquisition process. These and other potential farmland-protection measures are discussed in the Mitigation section of Section 4.16.4.*

More specific and complex targeting and other strategies, including those generally described above, could be used to offset impacts associated with the Service's water rights acquisitions. However, to date, a lack of interagency commitments and community support for specific targeting strategies has made such actions premature. This FEIS does not preclude the Service from participating in the development of targeting and other strategies in the future.

2.7 MONITORING REQUIREMENTS

The Service will assess its progress towards achieving the 25,000-acre wetland habitat objective by measuring, on a regular basis, the number of acres showing "visible surface water" on the Stillwater NWR, Carson Lake, and the Tribal wetlands. The reason for using visible surface water as an indicator of wetland habitat is that standing surface water is a common attribute of these habitats. The comprehensive management plan to be developed for Stillwater NWR will define the mix of wetland habitat types, each of which has a characteristic water depth, that will be maintained on refuge. Once a long-term annual average of 25,000 acres of primary wetland habitat is being sustained, the Service will terminate water rights purchases. For the purpose of defining long-term

average in this document, the Service will make calculations using the 10-year-running average of the annual average compilation of wetland habitat acres.

Irrigation deliveries must be measured and recorded at various points to account for the water acquired for wetland protection. Seasonal readings or recordings of irrigation water deliveries would be the responsibility of Reclamation or TCID, with the Service maintaining a tracking system of the delivery data as part of its regular wetland water management planning.

The Service would be responsible for the installation of new monitoring devices and gauges on drainwater to wetland areas. Drainflow data provided from continued monitoring would be used to validate drainwater flow estimations or modelled calculations, and would provide an essential feedback mechanism on water right acquisition needs. If monitoring showed that BLR Model assumptions on drainwater flows were inaccurate, the Service would adjust water right acquisitions accordingly. The resulting data combined with irrigation delivery records would provide the Service with complete water delivery information necessary for management of wetland areas. The Service would install water quality monitoring devices or sample water quality in delivery system canals and drains to evaluate the quality of water delivered to the wetlands. Water delivery and water quality monitoring conducted by the Service for the wetlands water rights acquisition program would supplement monitoring being carried out by other agencies. *Churchill County offered monitoring recommendations to the Draft EIS that are included as part of the County's comments in Appendix 11.*

2.8 WATER AND WATER RIGHT ACQUISITION SOURCES AND METHODS ELIMINATED FROM DETAILED CONSIDERATION

After consideration of various water and water right acquisition sources and methods, the Service determined that the following methods and sources would not be effective or appropriate. The following subsections describe the water acquisition methods and sources eliminated from further consideration. Table 2.B (page 44) summarizes the different water sources eliminated from detailed consideration.

2.8.1 ACQUISITION METHODS

Traditional land acquisition options for establishing or enlarging refuges (as identified in the Service's Realty Manual) such as permit restrictions, public domain withdrawal, zoning, and administrative regulations, do not apply to the Service's action in this document. These options are not designed for water right acquisitions or sustaining primary wetland habitat and are therefore not applicable to the Service's actions in these areas.

2.8.2 CONDEMNATION

The use of condemnation as a method to acquire water rights is founded on the government's power of eminent domain (the government's right to take private property for public use upon payment of just compensation). The Service does not have the authority to utilize condemnation under Public Law 101-618 (subpar.206(a)(2)(A)) for wetlands protection. Congress would have to specifically authorize the Service to acquire water rights by condemnation for sustaining primary wetland habitat in Lahontan Valley because of the willing seller restriction in Public Law 101-618.

In order to pursue condemnation, the Service would have to justify the need for such action to Congress, identify lands to be condemned, and receive Congressional approval. Because such an action constitutes a taking of property, it requires that property owners receive just compensation. The courts determine and award just compensation, which equals or exceeds the market value of the property. Additionally, because condemnation constitutes an involuntary conversion of private property, owners are allowed more time to reinvest the capital gains associated with such sales, and the government is responsible for all closing costs.

The Service has determined there is neither justification nor public support to request condemnation authority. The Service has therefore eliminated condemnation as an acquisition method in this document.

2.8.3 TRUCKEE DIVISION OF THE NEWLANDS PROJECT

The Truckee Division of the Newlands Project has been eliminated from further evaluation as a source for water rights acquisition for the Lahontan Valley due to the following reasons.

- (1) Use of Truckee Division water rights would entail an out-of-basin transfer. In the past, the Service has opposed out-of-basin transfers as a matter of policy.
- (2) The Service believes it is highly unlikely that the State Engineer would approve these transfer applications because such actions could adversely affect existing water rights, and may create adverse regional impacts.
- (3) *Water right purchases from the Truckee Division are likely to be needed for cui-ui recovery and for the pending Truckee River Water Quality Settlement Agreement. Additionally, some of these water rights are being acquired by the town of Fernley to meet its water needs as it urbanizes.*

For the above-listed reasons, and because this water source does not meet the criteria discussed in Section 2.3.2, SOURCES CONSIDERED IN FORMULATING ALTERNATIVES, the use of Truckee Division water rights for the Service's action has been eliminated from further consideration.

Table 2.B COMPARISON OF WATER SOURCES ELIMINATED FROM DETAILED CONSIDERATION

WATER SOURCE	VOLUME (AF) (MAXIMUM)	PRICE (\$/AF)	DEVELOPMENT COSTS	ANNUAL CONVEYANCE or O&M COSTS	AVAILABILITY	POTENTIAL TO PROVIDE IDENTIFIED VOLUME	CONSTRAINTS
TRUCKEE DIVISION	18,000	\$500	NONE	\$7.50/AF	PRESENT	UNLIKELY	<ul style="list-style-type: none"> ◆ Entails out-of-basin transfer ◆ Would increase Truckee River diversions ◆ Unlikely to obtain transfer approval
MIDDLE CARSON RIVER (Above Segment 7)	30,000 plus	UNKNOWN	UNKNOWN	UNKNOWN	FUTURE	UNLIKELY	<ul style="list-style-type: none"> ◆ Conveyance agreement ◆ Would probably involve exchange ◆ Loss of priority date ◆ Transfer and conveyance losses are high
RENO-SPARKS TREATED EFFLUENT	19,000 (40,000 projected with growth)	NONE	\$136M - \$148M	UNKNOWN	FUTURE	POOR	<ul style="list-style-type: none"> ◆ Reduces Truckee River Flows ◆ Not available ◆ Complicated third party negotiations
REGULATING RESERVOIRS	9,000 - 39,000	NONE	NONE	NONE	PRESENT	POOR	<ul style="list-style-type: none"> ◆ Managed for irrigation deliveries ◆ Could adversely impact project efficiency ◆ Would require TCID to supply water ◆ Artificial wetlands that can dry up
DIXIE VALLEY	16,000	NONE	\$131 M	\$520/AF	FUTURE	POOR	<ul style="list-style-type: none"> ◆ Involves inter-basin transfer ◆ Construction of conveyance system and drill wells ◆ Requires EIS and R/W approvals
ECO-VISION	143,000	UNKNOWN	\$121 M - \$219 M	UNKNOWN	FUTURE	UNLIKELY	<ul style="list-style-type: none"> ◆ Involves inter-basin transfer ◆ Construction of conveyance system ◆ Requires EIS and R/W approvals

2.8.4 NEWLANDS PROJECT REGULATING RESERVOIRS

Regulating Reservoirs have been eliminated from further discussion as a water source because they *are located outside the Lahontan Valley wetland areas designated in Public Law 101-618 and are not managed primarily for wildlife values.*

TCID maintains and operates a number of regulating reservoirs within the Carson Division of the Newlands Project. These reservoirs are designed to capture and store drainwater, spills, and irrigation water for later delivery to Newlands Project irrigators. TCID reservoirs include Sheckler, Old River, Harmon, Indian Lakes, S-Line and Ole's Ponds. All of these reservoirs are generally shallow (less than 6 feet in depth) and cover a couple of thousand acres (see Section 3.6.2, SECONDARY WETLANDS). TCID has limited the use of most of these regulating reservoirs (except S-Line and Harmon) in an effort to decrease evaporative and seepage losses and achieve 1988 OCAP irrigation delivery efficiency targets.

Many people have suggested that the regulating reservoirs be counted as primary wetland habitat, based on the concept that this would reduce the overall amount of agricultural irrigation water needed to meet the Service's wetland objective. If water used to sustain and maintain these regulating reservoirs was provided by the Newlands Project operator, this would, indeed, be the case. However, if the Service is responsible for buying water to be placed in the regulating reservoirs, the total water demand for the water rights acquisition program would not be diminished. Questions pertaining to use of regulating reservoirs *include the following.*

- (1) Can these reservoirs be managed in such a manner as to provide primary wetland habitat?
- (2) Will the Service be required to transfer acquired irrigation water to these areas to sustain the habitat?
- (3) Will the Newlands Project operator modify current practices and utilize project water to maintain reservoir levels at critical times to ensure wildlife protection?
- (4) Do these areas exhibit and warrant inclusion into the National Wildlife Refuge system?

In the past, year-round water storage in these reservoirs has periodically created conditions that allowed wetlands and riparian vegetation to be established. When wet, these reservoirs have attracted migratory birds and wildlife. However, they are not located in areas designated as the Lahontan Valley wetlands (Stillwater NWR and WMA, Carson Lake, and the Tribal wetlands) in Public Law 101-618 (section 206(a)(1)). *These wetlands* are classified as artificial wetlands (National Wetlands Inventory) because they are man-made and can be de-watered at any time.

Experience has shown that although there is wildlife use of these reservoirs, operations for irrigation delivery have sometimes adversely impacted wildlife. Sporadic water regimes in the regulating reservoirs *can adversely impact nesting shorebirds (Neel, oral communication, 1994) and other wetland bird-nesting birds.*

For these reasons, the Service has determined that under existing conditions the regulating reservoirs do not meet the Service's purposes *nor do they* fulfill its objectives to sustain 25,000 acres of primary wetland habitat. The use of regulating reservoirs as a water source *has, therefore, been* eliminated from more detailed consideration.

2.8.5 OTHER WATER SOURCES ELIMINATED FROM CONSIDERATION

The Service has identified a number of potential non-project water sources that are either not available for transfer to Lahontan Valley wetlands at this time, or would be impractical sources for wetlands protection. Additional planning and impact analysis would be necessary before any of the following water sources could be considered in further detail.

2.8.5.1 Reno/Sparks/Carson City Sewage Effluent

Sewage effluent from Northern Nevada municipalities is one water source that was considered as a potential source of water for Lahontan Valley wetlands. Four treatment plants are permitted by the State to discharge treated effluent to surface waters (Table 2.C). Discharge from waste water treatment facilities is measured in millions of gallons/day (MGD).

Water from these discharge facilities could potentially be acquired and conveyed to Lahontan Valley wetlands via existing surface water drainage, Newlands Project canals, and drains.

Treated effluent discharged from the City of Fallon and NAS-Fallon currently enters Newlands Project drains and may reach the Stillwater NWR or Carson Lake. There is very little treated sewage effluent discharged to Carson River from the Carson City treatment plant because the effluent is used at parks and recreational areas. Washoe County may convert a portion of the Reno/Sparks waste water treatment facility from river discharge to land application to cut costs associated with meeting Truckee River water quality standards (Washoe County, 1993).

Table 2.C WASTE WATER FACILITIES DISCHARGING TO SURFACE WATER

Facility	Permitted Discharge(MGD)	Reported Discharge(MGD)	Volume (AF/year)
Carson City	5.47	3.8	4,281
Reno/Sparks	40.0	24.9	27,035
Fallon	1.2	0.416	469
Navy-Fallon	0.5	0.35	394
Total	47.17	29.466	32,179

Source: Nevada Department of Environmental Protection, 1993.

Sewage effluent from the Reno/Sparks and Carson City treatment facilities were eliminated from further consideration because it appears that none of these municipalities will have any effluent available for transfer to the wetlands. *Additionally, Reno/Sparks effluent conveyance costs would be prohibitively expensive for the volumes involved (see Table 2.B).*

Sewage effluent from the City of Fallon and NAS-Fallon is evaluated as a water source in Alternative 5 of this document, as such waters are available, and under certain conditions are readily available to Stillwater NWR and Carson Lake.

Five sewage treatment plants (under three permits) located upstream of the Lahontan Valley wetlands (Table 2.D) are permitted by the State to use land application methods to dispose of effluent. Together, these sources would provide a total of 5,871 AF of water.

Table 2.D PERMITTED WASTE WATER FACILITIES UTILIZING LAND APPLICATION

Facility	Permitted Discharge (MGD)	Reported Discharge (MGD)	Volume (AF/yr)
Incline Village	2.14	1.5	1,690
Fernley	0.85	0.4	447
Douglas County (three plants)	5.475	3.315	3,734
Total	8.465	5.215	5,871

Source: Nevada Department of Environmental Protection, 1993.

Sewage treatment facilities that rely on land application generally produce effluent of poorer quality than those that are permitted by the State for surface discharge. In order to use water produced from these facilities and comply with State discharge standards, it would be necessary to convey the effluent via pipeline to Lahontan Valley wetlands. Construction of a pipeline or other controlled conveyance system from these areas to the Lahontan Valley wetlands would require rights-of-way, other permits, and approvals. Due to the small amount of water provided by these land application treatment facilities, and the long distances required for their conveyance, the Service has determined that these water sources are neither feasible nor reasonable.

2.8.5.2 Inter-basin Transfers

Transfers of water from other basins was also considered as a potential source of water for the Lahontan Valley wetlands.

Dixie Valley

Dixie Valley, located about 60 miles east of Fallon, is the nearest basin with groundwater potentially available for acquisition. Most lands in Dixie Valley are owned by the Federal Government, and the Navy has acquired a large percentage of the water rights in the valley. Studies suggest that the

annual yield available from the valley aquifer ranges from 15,000 AF (Cohen and Everett, 1963) to 60,000 AF (Water Research and Development, 1988).

The Northern Nevada Water Augmentation Study (U.S. Bureau of Reclamation and Nevada Department of Conservation and Natural Resources, 1992) has estimated that the costs to construct a conveyance system from Dixie Valley to Lahontan Valley would range from \$117.5 million to \$131.3 million (ibid.). Annual operation and maintenance (O&M) costs for delivery would range from \$3.5 million/year to \$8.3 million/year (ibid.). The estimated operation and maintenance costs for Dixie Valley water are about \$212-\$508 AF/year. The O&M costs to physically transfer Dixie Valley water to Lahontan Valley are 28-68 times higher than the O&M costs of using Carson Division irrigation water. These estimates do not include costs associated with obtaining the necessary pipeline rights-of-way, or other permits and approvals.

The Service has determined that conveyance system construction, delivery and O&M associated with Dixie Valley make the cost of this water source prohibitive. It is unlikely that transfers of Dixie Valley water could be implemented anytime in the near future, as this project has not been approved or permitted. Due to the number of uncertainties related to this water source, the Service has determined that it is unfeasible for the purposes of the action in this document.

Humboldt River Basin (Eco-Vision)

A private company, Eco-Vision, Inc., has developed a preliminary project plan to make use of groundwater underlying the carbonate aquifer in northeastern and central Nevada. The area is currently being studied as a potential source of groundwater in the Great Basin. Presently, a number of mining companies in northeastern Nevada are pumping approximately 160,000 AF per year of water to de-water their open-pit mines. Based on this information and recent discoveries related to mega-basin watershed modelling, a feasibility study is being developed by Summit Engineering Corporation and Sierra Pacific Power Company on a proposal to pump groundwater from the carbonate aquifer and supply water to a variety of users across northern Nevada. The intention of the Eco-Vision project is to supply a reliable source of water for all uses across northern Nevada. Eco-Vision, Inc. has pending water right applications on 385,000 AF of groundwater for the northern phase of the plan. It is proposed that approximately 140,000 AF/year of water could be conveyed via the Humboldt River and diverted for use within Lahontan Valley. Total cost estimates (University of Nevada-Reno, 1993) range from \$121 million to \$219 million for construction, development, and delivery of Eco-Vision water.

Plans to develop and access Eco-Vision water are being developed by private interests and are in the conceptual phase. Before implementation, this project would require rights-of-way across public lands, other permits, and approvals. The Service believes that the costs associated with this program are prohibitive, and that it is unlikely that the project will be implemented anytime in the near future. This project has not been approved or permitted, and no target dates for its completion have been set. Because this water source is so uncertain, the Service has determined that for the purposes of this document, it is not feasible.

2.8.5.3 Upper Carson River

Water rights from the upper Carson River basin (upstream from Segment 7) are potentially a source of water for Lahontan Valley wetlands. The Service lacks sufficient information on the amount or availability of water rights for sale in these upper segments of the Carson River. Growth and development in the Douglas and Carson City counties has increased the demand for converting agricultural water rights in these areas for domestic supply.

The acquisition and changing the place of use of these water rights from these upper segments of the Carson River to the Lahontan Valley wetlands in segment 8 would entail an intra-basin transfer of water rights subject to the provisions of the Alpine Decree. As discussed in Section 2.5.5 ALTERNATIVE 5, transfers from one segment of the Carson River to another segment changes the priority date of the transferred water rights to the year of purchase. As a result, water rights that are transferred from one segment to another segment may have little or no yield in many years because their priority date makes them junior to those users with senior rights.

While there are provisions in Nevada water law to allow such transfers without loss of priority, it requires agreement from all senior downstream users. The Service believes it would be highly unlikely or impossible to obtain consensus from the large number of water-right holders that would be involved. Without such agreement, the more senior water rights (which would include essentially all of the existing water-right holders) would make upstream rights unavailable for wetlands in *some* average and *all* low water years.

Without some collective agreement or commitment from water-right holders in these upper Carson River segments, this source of water is essentially unavailable and does not provide a reliable source of supply for sustaining primary wetland habitat. At this time, the Service has little indication that such a collective agreement is desired by the majority of the upstream water-right holders. For these reasons, the Service has determined that water and water rights from these upper Carson River segments is not reasonable or feasible and is eliminated from further evaluation at this time.

Additionally, the Service is entering into an agreement with the Carson River Water Subconservancy District, representing the three upper Carson River counties, for the study of long term Carson River flows, examination of compliance with the Alpine Decree, development of modelling tools to improve understanding of Carson River flows under varying conditions, and the exploration of potential water right acquisitions that could be mutually beneficial. If work done under this agreement results in estimates of greater Carson River flows as the upper basin urbanizes, meeting its water needs through conversion of water-righted agricultural lands, or mutually beneficial water-righted acquisitions, the amount of Carson Division water rights needed to be acquired under the Proposed Action or other alternatives could decrease. It will be a few years before much is known about whether this effort will result in any substantial reduction in the long term acquisition of Carson Division water rights.

TABLE 2.E. POTENTIAL IMPACTS OF THE ACTION ALTERNATIVES ON RESOURCES IDENTIFIED IN ISSUES, CONCERNS, AND OPPORTUNITIES.

	ALTERNATIVE 1 No Action	ALTERNATIVE 2 Proposed Action	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5 Preferred Alt.
ISSUES	BASELINE	CHANGE FROM BASELINE CONDITIONS			
NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE					
Farm Deliveries (AF ^A)	153,600	62% decr.	49% decr.	69% decr.	44% decr.
Wetland Deliveries					
Irrigation ^B (AF)	16,500	6-fold incr.	6-fold incr.	7-fold incr.	5-fold incr.
Drainwater (AF)	30,000	57% decr.	36% decr.	100% decr.	34% decr.
Spills (AF)	8,600	16% incr.	1% incr.	37% incr.	13% incr.
Other Sources ^C (AF)	0	no change	no change	no change	16,500 AF incr.
Delivery Efficiency	68.1%	3.7% incr.	3.0% incr.	9.0% incr.	1.8% incr.
Lahontan Reservoir					
Inflow (AF)	350,200	5% decr.	1% decr.	7% decr.	3% decr.
Releases (AF)	250,700	11% decr.	2% decr.	18% decr.	6% decr.
June 1 Storage (AF)	255,300	3% incr.	0.4% decr.	5% incr.	unknown
Hydropower					
Power (GWh)	22.71	11% decr.	4% decr.	16% decr.	7% decr.
Revenue (\$)	\$894,700	14% decr.	2% decr.	23% decr.	7% decr.
Truckee Canal @ Derby Dam (AF)	102,200	17% decr.	4% decr.	24% decr.	10% decr.
WATER RESOURCES					
Lower Truckee River (AF)	448,800	4% incr.	1% incr.	5% incr.	2% incr.
Carson River @ Ft. Churchill (AF)	287,700	no change	no change	no change	0-3% incr.
Wetland Inflow					
Quantity (AF)	55,700	127% incr.	127% incr.	127% incr.	127% incr.
Water Quality (TDS µg/l)	700 ^D	54% improv.	47% improv.	64% improv.	0-46% improv.
Groundwater					
Groundwater Level	BC ^E	possible loc. decl. ^F	possible loc. decl.	decline	possible loc. decl.
Domestic Supply	BC	low impact ^G	slight impact	moderate impact	low-mod. impact
continued on next page...					

^a AF = acre-feet.

^b Irrigation deliveries are less than the irrigation demand (headgate entitlement) due to the effects of drought cycles in the natural hydrological regime, these are factored into long term averages as "shortages".

^c Other sources of wetland inflow include leased irrigation water, Middle Carson River water rights, groundwater, Navy conservation water, and treated sewage effluent.

^d Baseline water quality estimate of 700 µg/l was based on field measurements and weighted averages.

^e BC = baseline conditions that were not or cannot be numerically quantified, but are expected to be similar to existing conditions.

^f Possible localized declines.

^g Impact, for the purposes of this table denotes adverse impact and benefit denotes positive impact.

TABLE 2.E (Cont'd). POTENTIAL IMPACTS OF THE ACTION ALTERNATIVES ON RESOURCES IDENTIFIED IN ISSUES, CONCERNS, AND OPPORTUNITIES.

	ALTERNATIVE 1 No Action	ALTERNATIVE 2 Proposed Action	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5 Preferred Alt.
ISSUES	BASELINE	CHANGE FROM BASELINE CONDITIONS			
BIOLOGICAL RESOURCES					
Vegetative Communities					
Wetland (acres)					
Primary Wetlands	12,100	107% incr.	107% incr.	107% incr.	107% incr.
Secondary Wetlands	4,500	slight decr.	no sign. change	slight decr.	no sign. change
Riparian (miles)					
Lower Carson/L. Truckee Rivers	60	no change	no change	no change	no change
Artificially-created (Carson Div.)	722	small-large decr.	small-mod. decr.	small-large decr.	small decr.
Agricultural (acres; Aff. Area)	57,000	51% decr.	40% decr.	57% decr.	35% decr.
Desert Shrub (acres; Aff. Area)	500,000 +	slight incr.	slight incr.	slight incr.	slight incr.
Fish (population)					
Game Fish	BC ^e	slight incr.	slight incr.	slight incr.	slight incr.
Non-game Fish	BC	moderate incr.	moderate incr.	moderate incr.	moderate incr.
Wildlife (use/population)					
Waterfowl (winter peak)	200,000	large incr.	large incr.	largest incr.	large incr.
Shorebirds (fall peak)	40,000	mod.-large incr.	mod.-large incr.	mod.-large incr.	mod.-large incr.
Other Wetland-associated Wildlife	BC	mod.-large incr.	mod.-large incr.	mod.-large incr.	mod.-large incr.
River Riparian-associated Wildlife	BC	no change	no change	no change	no change
Drain/Canal-associated Wildlife	BC	small-large decr.	small-mod. decr.	small-large decr.	small decr.
Agriculture-associated Wildlife	BC	large decr.	moderate decr.	large decr.	moderate decr.
Desert Shrub-associated Wildlife	BC	slight incr.	slight incr.	slight incr.	slight incr.
Endangered Species					
Cui-ui (Cui-ui Index)	152,100	38% incr.	3% incr.	70% incr.	15% incr.
Bald Eagles (winter population)	30	large benefit	large benefit	largest benefit	large benefit
Wetland Toxicity	BC	moderate improv.	moderate improv.	large improv.	small degr.
Ability to Control Avian Disease	BC	moderate improv.	moderate improv.	moderate improv.	moderate improv.
Biodiversity (Affected Area)					
Native Biodiversity	BC	large benefit	large benefit	largest benefit	large benefit
Overall Biodiversity	BC	unknown	unknown	unknown	unknown
continued next page...					

^e see footnote on previous page.

TABLE 2.E (Cont'd). POTENTIAL IMPACTS OF THE ACTION ALTERNATIVES ON RESOURCES IDENTIFIED IN ISSUES, CONCERNS, AND OPPORTUNITIES.

	ALTERNATIVE 1 No Action	ALTERNATIVE 2 Proposed Action	ALTERNATIVE 3	ALTERNATIVE 4	ALTERNATIVE 5 Preferred Alt.
ISSUES	BASILINE	CHANGE FROM BASELINE CONDITIONS			
AGRICULTURE, FARMLAND, LOCAL ECONOMY					
Alfalfa Production (tons/year)	283,122	69% decr.	56% decr.	76% decr.	42% decr.
Alfalfa Sales (Churchill Co.)	\$25 million	\$17.3 M decr.	\$14.2 M decr.	\$19.1 M decr.	\$10.6 M decr.
Alfalfa Profit (Churchill Co.)	\$3.5 million	\$2.4 M decr.	\$2.0 M decr.	\$2.7 M decr.	\$1.5 M decr.
Total Agricultural Income	\$8.5 million	\$6.1 M decr.	\$5.0 M decr.	\$6.8 M decr.	\$3.8 M decr.
Income Gains ^H (Churchill Co.)	\$0	\$2.0 million	\$1.6 million	\$2.2 million	\$1.2 million
Employment (number of jobs)					
Agricultural Jobs	1,025	682 lost	552 lost	757 lost	404 lost
New Jobs Created ^I (Churchill Co.)	0	339 gained	224 gained	424 gained	168 gained
Farmland					
Irrigated Farmland (acres; <i>Aff. Area</i> ^J)	57,312	51% decr.	40% decr.	57% decr.	35% decr.
Prime Farmland (acres; <i>Carson Div.</i> ^K)	30,900	39-59% decr.	19-47% decr.	50-66% decr.	13-31% decr.
RECREATION					
Recreational Use of Wetlands					
Use (visitor days/year)	28,297	48% incr.	48% incr.	48% incr.	48% incr.
Non-local Expenditures (\$/year)	\$65,289	3-fold incr.	3-fold incr.	3-fold incr.	3-fold incr.
Recreational Use of Lahontan Reserv.					
Non-local Expenditures (\$/year)	\$117,800	43% incr.	43% incr.	43% incr.	43% incr.
LAND USE (Churchill County)					
Population Growth Rate (incr./year)	2-3%	no change	no change	no change	no change
Land-use Conversion <i>Rate</i>					
From Agricultural to Residential	BC ^L	no change	no change	no change	no change
Land Values (per acre for ag. lands)	\$229 - \$3,000	no change	no change	no change	no change
Property Taxes ^K	\$50.3 million	\$14,964 incr.	\$12,255 incr.	\$16,363 incr.	\$9,030 incr.
Municipal Services ^L	BC	no change	no change	no change	no change
SOCIAL VALUES					
Growth and Diversification	BC	no change	no change	no change	no change
Agricultural	BC	adverse impact	adverse impact	adverse impact	adverse impact
Recreation	BC	benefit	benefit	benefit	benefit
INDIAN TRUST ASSETS	BC	benefit	benefit	benefit	benefit
PREHISTORIC CULTURAL RESOURCES	BC	benefit	benefit	benefit	benefit
ACQUISITION PROGRAM COSTS					
Capital Costs (median amount)	\$8,500,000	7x higher	6x higher	8x higher	6.5x higher
Annual Costs (median amount)	\$33,600	5x higher	4x higher	6x higher	16x higher

^E see footnote on first page of the table.

^H Gains in jobs and income generated by selling water rights, with or without appurtenant lands.

^I Farmland in the Newlands Project and Middle Carson River corridor.

^J Prime farmland in the Carson Division of the Newlands Project.

^K Conservative estimates based on the lowest tax rate.

^L Excludes domestic water supply.

CHAPTER 3

AFFECTED ENVIRONMENT

3.1 INTRODUCTION

This chapter describes the resources that could be impacted by the Proposed Action and other action alternatives within the affected area as described below in Section 3.1.1, GEOGRAPHIC AREA. The baseline condition described in this chapter serve as the basis for comparison of the consequences and impacts of the Proposed Action and action alternatives in Chapter 4.

The baseline for certain resources in the affected area reflects a condition that will occur in the near future once the 20,000 acre-feet (AF) water rights acquisition program has been completed, and the Newlands Project's 1988 Operating Criteria and Procedures (OCAP) delivery efficiency targets have been fully achieved. In order to represent this baseline within the affected area, both model calculations and existing data are used. In this document, the affected environment is *often* described *using ranges for some resources areas*. The wetlands environment is itself a widely fluctuating ecosystem affected by a range of both man-made and natural variables. Any one date or year would not itself provide a true overall picture of the affected environment. By applying a boundary type analysis, the U.S. Fish and Wildlife Service (Service) is able to use past and present trends in the affected environment to characterize baseline conditions. As such, certain components of the baseline reflect a calculated condition expected to occur in the near future, while other resources, which would be unaffected by either OCAP or the ongoing water rights acquisition program, rely on available recent data.

To restate: two ongoing actions are incorporated into the baseline of this Environmental Impact Statement (EIS) with the expectation that they will be completed or achieved before the proposed project is fully implemented. They are: the completion of an ongoing water rights acquisition program to purchase 20,000 AF of water rights to protect Lahontan Valley wetlands; and the achievement of Newlands Project efficiency, as set forth in the 1988 OCAP.

For the purpose of this document, the full effects of achieving the 1988 OCAP delivery efficiency targets have been incorporated into the Below Lahontan Reservoir (BLR) Model to simulate hydrologic conditions and Newlands Project operations. Historical data on Newlands Project operating conditions (prior to the 1988 OCAP) provide only past conditions that do not reflect the current environment and which will not occur under current laws and regulations. *The Service also recognizes that Interior is in the process of preparing an adjusted OCAP that would revise and*

update some aspects or conditions that were core to the 1988 OCAP to reflect more current conditions relative to irrigation demand in the Carson Division, but that Interior has not made any final changes or decisions regarding an adjusted OCAP to date (July 1996). While the Service will discuss the possible effects of updating or revising OCAP in this document where information is available, the Service will continue to portray baseline conditions based on core assumptions regarding Newlands Project operations from the 1988 OCAP. Impacts associated with the adjusted OCAP are addressed in Section 4.26.9, OCAP MODIFICATIONS.

Under baseline conditions, the Service expects long-term average wetland inflows to decrease as Newlands Project efficiency targets are fully achieved. As irrigators conserve and re-use water to achieve higher efficiency, both the volume and quality of drainwater is expected to decrease. As a result, the quality of drainwater that flows into these terminal wetlands may be cause for concern. The BLR Model calculates that about 12,100 acres of primary wetland habitat will be sustained in the Lahontan Valley wetlands over the long run by inflows from drainwater, spills, and the 20,000 AF of purchased water rights. Although this encompasses more primary wetland habitat than has existed most recently, it represents only 8 percent of wetland *habitat* acreage that existed historically (Kerley and others, 1993). *Primary wetland habitat is defined and discussed in Section 3.6.1, PRIMARY WETLAND HABITAT.*

3.1.1 GEOGRAPHIC AREA

For the purposes of describing the existing environment, the affected area (see Section 1.6) is separated into four distinct geographic areas: Lahontan Valley, the Middle Carson River corridor, the Lower Truckee River, and the Fernley area. See Figure 1.A, General Location Map, and Figure 1.B., Affected Area Map.

Lahontan Valley

The Lahontan Valley is a hydrologic basin of the lower Carson River that includes the Lahontan Reservoir and extends to the Carson Sink. The area includes the City of Fallon (population 7,060), and the Fallon Paiute-Shoshone Indian Reservation and Colony (population 970), and depends upon light industry, the U.S. Naval Air Station - Fallon (NAS-Fallon), and agriculture for most of its commerce. Fallon residents make up about 35 percent of Churchill County's population (Churchill County Master Plan, 1990) and the County experienced a population growth rate increase of about 3 percent between 1990 and 1994 (ArcForm Inc., public hearing, September 1994). Lahontan Reservoir, the Carson River, canals and regulating reservoirs associated with the Carson Division of the Newlands Project represent the major water resources in the area. Agricultural fields provide a lush greenbelt in the area. Lahontan Reservoir State Park is the major recreational area.

Middle Carson River

The Middle Carson River area encompasses a 30-mile-long corridor west of the Carson Division of the Newlands Project. It encompasses the Carson River corridor just upstream of Lahontan Reservoir to the Dayton area. This area may constitute the largest gallery cottonwood riparian forest in the State of Nevada, with a wide belt of mature cottonwoods, and a diverse willow understory that provides habitat for an abundance of wildlife.

Land within this area includes agricultural fields, portions of two State Parks, (Fort Churchill and Dayton State Park), and the rural communities of Dayton (population 9,000) and Silver Springs (population 3,300). Dayton and Silver Springs are located in Lyon County, the fastest growing county in Nevada with a 4 percent annual growth rate (Sierra Pacific Resources, 1993). As in other small towns in Nevada, a strong growth rate and increased municipal and industrial use of local resources is evident in these areas. Dayton has experienced a rebirth as a manufacturing center, and Silver Springs recently added several major industrial developments (ibid).

Fernley

The Fernley area includes the town of Fernley (population 6,700) and Fernley Wildlife Management Area (Fernley WMA). Fernley is a commuter community that serves Sparks/Reno, and, as part of Lyon County, is also experiencing increased growth. The area recently developed an industrial base, with a focus on production of building materials. Fernley WMA is owned by the State of Nevada, and operated by the Nevada Division of Wildlife (NDOW). This area relies on irrigation seepage losses from the Truckee Division of the Newlands Project for sustenance. In good water years the Fernley WMA provides some recreational opportunities for waterfowl hunting.

Lower Truckee River

The Lower Truckee River area includes the river corridor between Derby Dam and Pyramid Lake. Within this area are the towns of Wadsworth and Nixon, as well as a portion of the Pyramid Lake Paiute Tribe Reservation, with a total tribal population in the area of about 1,776 (Sargent, oral communication 1995). Tribal members farm small agricultural areas in Wadsworth and Nixon. Most economic activity is centered around recreational use at Pyramid Lake (Millsap, oral communication, 1994). A small number of people work at the tribal offices and stores, and others commute to Reno for work. The tribe's Numana Lake Fish Hatchery is located near Wadsworth. The Service's Marble Bluff Fish Facility is located downstream from Nixon, near the Pyramid Lake delta.

3.1.2 RESOURCE ORGANIZATION

For this document, resources for the affected area are described within Physical, Biological and Socio-economic sections. Generally, the majority of information is for Lahontan Valley, as it is the area where the most impact is expected to occur as a result of the Service's action. Specific resources for the Middle Carson River, Fernley, and the Lower Truckee River are described in sections where an impact is expected to occur as a result of the Proposed Action or alternatives. The following resources will be described:

Physical Environment

- Newlands Project Operations
- Water Resources
- Vectors, Erosion, and *Agricultural Pests*
- Air Quality

Biological Environment

- Wetlands
- Vegetative Communities
- Fish
- Birds
- Mammals
- Reptiles and Amphibians
- Invertebrates
- Endangered, Threatened, and Sensitive Species
- Toxicity and Avian Diseases
- Biodiversity

Socio-economic Environment

- Agriculture, Farmland, and Local Economy
- Recreation
- Population Characteristics
- Land Use
- Land Values
- Property Taxes
- Municipal Services
- Social Values
- Indian Trust Assets and Cultural Resources*
- Acquisition Costs and Probability of Meeting the Service Objective*

PHYSICAL RESOURCES

3.2 NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE

The Below Lahontan Reservoir (BLR) Model and Negotiated Settlement Model (NSM) were used to assess key aspects of Newlands Project operations. The BLR Model constructed an assumption set and baseline parameters that were then applied to calculate conditions associated with the Proposed Action and alternatives. The BLR Model was the only analytic tool available that could calculate the effects of the Proposed Action *and alternatives*. The BLR Model simulates Newlands Project operations, irrigation deliveries, and drainwater outflow for the Carson Division of the Newlands Project. It also estimates irrigation demand and the corresponding Lahontan Reservoir releases. Using this information, the NSM calculates the volume of Truckee River diversions needed for Newlands Project irrigation, Lahontan Reservoir storage, and Pyramid Lake inflows.

The NSM and BLR Model require certain numerical inputs characterizing the physical conditions that occur, or are expected to occur, on the Newlands Project and in the Truckee River basin upstream of Derby Dam. Both models use Bureau of Reclamation (Reclamation) supplied water data for a 92-year hydrologic simulation of the Carson and Truckee Rivers. The BLR Model, in conjunction with the NSM, provides the ability to apply present conditions and restrictions to historical hydrologic data. This allows the Service to create long-term monthly and annual averages for water resources for comparative analysis. Although the modelling calculations for the 92-year period are not predictive (because historical conditions are not expected to repeat), they do provide a common, *long-term* basis for comparing the baseline conditions with the Proposed Action and the alternatives. The origin of the BLR Model, its assumption set, inputs and calibrations are *summarized in the following sections of this Chapter and* in full detail in Appendix 5.

Below Lahontan Reservoir (BLR) Modelling Assumptions

A variety of BLR assumptions about project conditions are required to generate simulated Newlands Project operations. Discussions of those *core* assumptions and conditions are incorporated in the other subsections of this section on Newlands Project operations and infrastructure. Detailed input listings of the *core* assumptions and hydrologic data for both the BLR Model and Negotiated Settlement Model (NSM) are contained in Appendix 5. Certain NSM assumptions must be made in conjunction with BLR-simulated Newlands Project operations. The more important of the NSM assumptions concern the 1988 OCAP and upstream diversions on the Truckee River. The NSM assumes that both OCAP targets and upstream diversions will be fully achieved. These two assumptions are summarized below.

Newlands Project Operating Criteria and Procedures (OCAP)

In accordance with the Department of the Interior's 1988 decision and section 209(j) of Public Law 101-618, the 1988 OCAP are to govern Newlands Project operations. This is achieved in the BLR

Model by the irrigation delivery efficiency requirements and other assumptions as they relate to project conditions. Lahontan Reservoir and Truckee Canal operations are incorporated into the NSM to reflect OCAP assumptions which in turn are incorporated into NSM operations through the Lahontan Reservoir storage targets. However, the BLR Model assumptions regarding irrigated acreage, delivery rates, non-use rates, and demand versus entitlement in the Newlands Project is different than that used in the OCAP EIS and Record of Decision (U.S. Bureau of Reclamation, 1987) as it is based on more current data that reflect a lower acreage base and lower non-use percentages for the Carson Division of the Newlands Project. For these reasons, the BLR Model calculations reflect a lower irrigation demand for the Carson Division as compared to the OCAP EIS (ibid).

Truckee River Operations

Public Law 101-618 directs the development and execution of a Truckee River Operating Agreement (TROA) to put into effect the 1989 Preliminary Settlement Agreement (PSA) between the Pyramid Lake Paiute Tribe and Sierra Pacific Power Company. At this time, TROA is not complete, and a scoping process for the TROA EIS is under way. Because TROA is incomplete, all simulation analyses and results described below are based on the June 1992 Reclamation version of the NSM and the associated PSA assumptions. Key assumptions are as follows:

- ▶ Sierra Pacific's normal-year demands are set at 119,000 AF. Drought condition demands are set at 107,100 AF/year, or 10 percent less than normal year demands.
- ▶ Both the Pyramid Lake Tribe and Sierra Pacific can create water credits to be stored in Stampede Reservoir. Sierra Pacific's credit storage is limited to a total of 39,500 AF on April 1 of average water years.

California Demands on Truckee River Supply

Consistent with Section 204 of Public Law 101-618, it is assumed that more water will be diverted from the Truckee River in California for municipal and industrial use. These upstream uses are expected to divert 12,825 AF annually from the Truckee River.

3.2.1 NEWLANDS PROJECT IRRIGATED ACREAGE BASE

The Newlands Project irrigated acreage base is one of the primary inputs to the BLR Model. In the Newlands Project, there are more acres of land with water rights than are irrigated. Reclamation records (written communication, 1992) show some 74,000 acres of land have recorded water rights, not all of these lands receive irrigation deliveries, and some lands without recorded water rights receive irrigation deliveries (see Table 3.2.A). For the purpose of this document, the water-righted, irrigated acreage figures for 1989 that were supplied by Reclamation are used in the BLR Model to determine Carson Division irrigation

demand. The Service believes that the 1989 acreage base is representative of pre-acquisition conditions, and it is used as a core assumption in the BLR Model calculations. Under baseline conditions, the amount of water rights acquired to sustain wetland habitat would, if used instead for farmland irrigation, irrigate about 5,670 acres of Carson Division farmland. Due to the higher wetland-habitat demand (5 AF/acre/year) and implementation of a 2.99 AF/acre/year use rate (less than the 3.5 AF/acre/year use-rate of the irrigated farmland from which water rights were acquired), the baseline irrigation water deliveries to wetlands is expected to sustain less wetland habitat acres than it would irrigated-farmland acres. Irrigated, water-righted farmland in the Carson Division is expected to be about 47,000 acres under baseline conditions and is referred to as irrigated farmland throughout this chapter. The Truckee Division maintains 3,855 acres of irrigated, water-righted farmland under baseline conditions.

TABLE 3.2.A NEWLANDS PROJECT WATER-RIGHTED, IRRIGATED ACREAGE

	1984	1985	1986	1987	1988	1989	Avg.
TRUCKEE DIVISION							
Wtr Righted(1)	5,999	5,999	5,999	5,999	5,999	5,999	5,999
Irrigated (2)	4,175	4,196	4,131	4,073	4,053	4,003	4,105
Wtr Rtd/ Irrgtd.	3,918	3,982	3,922	3,887	3,884	3,855	3,908
CARSON DIVISION							
Wtr Righted (1)	67,841	67,841	67,841	67,841	67,841	67,841	67,841
Irrigated (2)	55,815	55,657	55,983	56,687	56,211	56,215	56,095
Wtr Rtd/ Irrgtd.	49,004	50,595	51,043	52,046	52,129	52,768	51,264
TOTAL							
Wtr Righted (1)	73,840	73,840	73,840	73,840	73,840	73,840	73,840
Irrigated (2)	59,990	59,853	60,114	60,760	60,264	60,218	60,200
Wtr Rtd/ Irrgtd.	52,922	54,577	54,965	55,933	56,013	56,623	55,172

(1) U.S. Bureau of Reclamation, Mid-Pacific Regional Office, Final Environmental Impact Statement for the Newlands Project Proposed Operating Criteria and Procedures, Table 1-2, December 1987.

(2) U.S. Bureau of Reclamation, Mid-Pacific Regional Office, Newlands Project Geographic Information System, January 1992

The Service recognizes that irrigated acreage varies year to year as depicted in Table 3.2.A above. The significance of the varying acreage base is the interrelationship of irrigated acreage to Newlands Project demand, reservoir releases, drainwater, and to a lesser extent Truckee River diversions. Discussions regarding an adjusted OCAP look at using a Carson Division irrigated acreage base totalling about 55,700 acres (which includes wetland water rights), based on Reclamation information that such a figure better represents average or more current conditions. If a higher acreage base was used in the BLR Model calculations it would result in increased irrigation demand, larger reservoir releases, greater Truckee River diversions, and potentially increased drainwater volumes. There are other factors affecting

these aspects of Newlands Project operations and these interrelationships are discussed in subsequent Sections below.

3.2.2 IRRIGATION DELIVERIES

Irrigation deliveries are based on the number of acres of land to be irrigated, the headgate entitlement (i.e., bench, bottom, pasture, or wetland), and the actual requests for irrigation water by the different water-users. *One of the core assumptions in the BLR Model calculations is that annual irrigation demand averages 97 percent of headgate entitlement. While this portrays a higher demand than what was used as a 1988 OCAP core assumptions, it represents a total demand that is representative of more recent conditions and attitudes regarding farm irrigation and wetland water right deliveries.* Under baseline conditions (which include transferring water rights from about 5,670 acres of farmland to the primary wetlands), Carson Division headgate demand is calculated to be 174,800 AF/year.

Information on irrigated acreage, monthly irrigation deliveries for each of the subdistricts in the Newlands Project, and actual irrigation use by farmers was supplied by Reclamation for use in the BLR Model. In the Carson Division, the irrigation delivery pattern for agricultural use is *from March 15 to November 15. The irrigation delivery pattern is illustrated in Figure 2.B, Baseline Irrigation Delivery Pattern.*

The BLR Model calculates average irrigation deliveries (the amount of irrigation water credited to individual water-right holders in the Newlands Project) to be closer to 170,100 AF/year *based on 97 percent irrigation use rates. Shortages related to hydrologic conditions in drought years also cause long-term irrigation delivery averages to be less than headgate entitlement in most years.* Based on the magnitude and frequency of drought conditions simulated in the 92-year hydrologic data set, the BLR Model calculates that over the long run, the average shortage for the Newlands Project under baseline conditions is 2.7 percent. *Reduced irrigation use rates, and hydrologic shortages combine to account for the difference between irrigation entitlement/demand and irrigation delivery.*

Reclamation has continued to evaluate irrigation use-rates and will most likely adjust the irrigation use-rates for an adjusted OCAP at a higher percentage than the 90 percent averaged used in the 1988 OCAP, but at a rate that is less than the Service's 97 percent baseline assumption. A consequence of using a lower percentage of irrigation use results in reduced calculated amounts of drainwater, Lahontan Reservoir releases, and Truckee River diversions. However, the calculated effects of a lower use rate (such as the lower use rate factored into adjusted OCAP calculations) would essentially be offset by the use of a higher irrigated acreage base than the 1989 figure used by the Service (e.g., 55,700 acres being discussed for use in the adjusted OCAP). The net effect of changing these core

assumptions (i.e., replacing the irrigated-acreage base and use-rate figures used in this document with those being discussed for an adjusted OCAP) on calculated baseline volumes of drainwater, Lahontan Reservoir releases, and Truckee River diversions would be negligible.

As compared to actual figures for 1993, Truckee-Carson Irrigation District (TCID) records show that 179,405 AF of water was actually delivered in the Carson Division. The Newlands Project acreage base, one factor that defines irrigation delivery, can vary from year-to-year (see Table 3.2.A). Due to variations in acreage base and other factors, TCID records of actual deliveries will generally be higher than what is calculated for the baseline condition.

TCID records for actual Truckee Division irrigation deliveries in 1993 totalled 16,509 AF. Based on the 1989 acreage base, the BLR Model calculates that irrigation deliveries for the Truckee Division would average about 17,000 AF/year under baseline conditions.

3.2.3 WETLAND DELIVERIES AND INCIDENTAL INFLOW

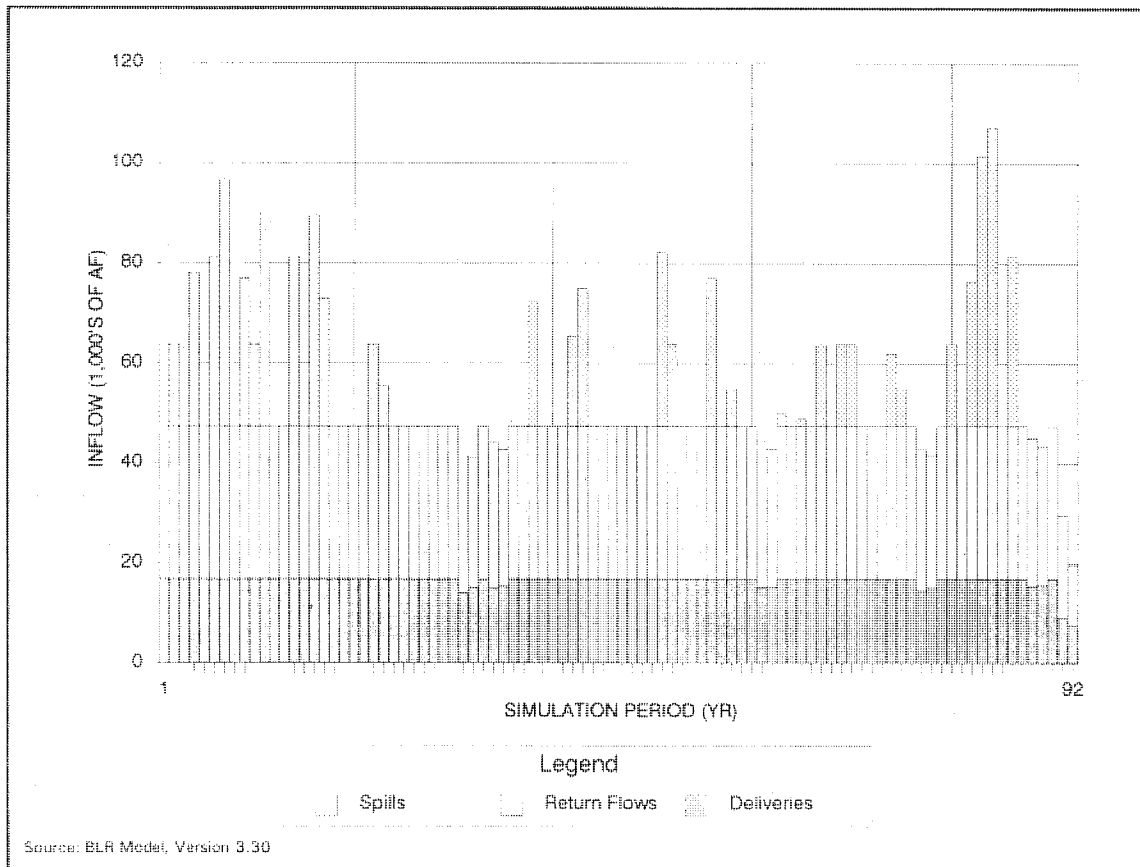
3.2.3.1 Deliveries

Three sources supply water to the primary wetlands under baseline conditions. These consist of irrigation deliveries, drainwater, and spills (when available) from Lahontan Reservoir. Irrigation deliveries from the 20,000 AF of acquired water rights are calculated to be *17,100 AF/year as a result of reductions due to reduced use rates, but due to hydrologic shortages, long-term averages drop to about 16,500 AF/year*. The combined average annual wetland inflow from drainwater and spills is calculated to range from 38,600 to 43,400 AF/year (30,000 - 32,000 AF/year from seepage and return flows, and 8,600 - 11,400 AF/year from spills or other sources). Under baseline conditions, the combined total wetland inflow from these three sources *is estimated to average about 55,700 AF/year* under baseline conditions.

3.2.3.2 Drainwater

Irrigation drainwater, return flows (tailwater), subsurface drainage, and irrigation canal seepage account for the incidental inflows to the wetland areas referred to as drainwater inflow in this document. The volume of drainwater inflow to the wetlands varies each year with Newlands Project operations and hydrologic conditions. During shortage years, drainwater inflow declines as irrigation delivery is reduced (Figure 3.2.A, Incidental Wetland Inflows, Drainwater and spills).

FIGURE 3.2.A LONG-TERM INCIDENTAL WETLAND INFLOWS



The relationship between Lahontan Reservoir releases, changes in Newlands Project efficiency, and drainflows to the wetlands was examined in detail by the Nevada Division of Water Planning (Pahl, 1992a and 1992b). Using linear regression techniques for two different periods of past data, these analyses indicate that increased Newlands Project efficiencies and/or reductions in either irrigated acreage or reservoir releases will lead to greater-than-proportionate declines in drainflows to the wetlands. This can be attributed to the relatively constant loss rates that occur in Newlands Project canals and laterals as a result of seepage.

Under baseline conditions the BLR Model calculates that an average of 30,000 to 32,000 AF/year of drainwater inflow will reach the primary wetland areas over the long term. During the Carson-Truckee Settlement Negotiations in 1994-95, Bookman and Edmonston, Inc. offered data that suggested drainflows could be as high as 60,000 AF/year on average. *Based on possible adjusted OCAP, the Service estimates that drainwater inflow to the primary wetland areas could increase over baseline conditions because of changes in assumptions for irrigated acreage and*

irrigation use-rates of less than 97 percent. However, there is insufficient information available to substantiate these volumes, or adjust the BLR Model at this time to reflect the possible changes. Under baseline conditions, the Service will continue to monitor drainflow volumes to update and verify baseline values for this resource.

3.2.3.3 Spills

"Spills" refer to water released from Lahontan Reservoir (accidental, operational, or precautionary releases) that are not destined to meet irrigation demand. Spills provide a potentially large but intermittent and unreliable source of water for wetland areas in Lahontan Valley. The use of these waters for sustaining primary wetland habitats is limited by the ability of the wetland managers to "capture" or route spill water through the existing canal and drain systems. In high-water years, spills often provide voluminous flows that are difficult to route to the wetland areas due to *their timing*, limited canal, and drain capacities.

The Service and the Nevada Division of Water Planning have analyzed canal capacities relative to spills. This analysis suggests there is sufficient canal capacity to deliver up to 300 cubic feet/second (cfs) of spill water during the spring irrigation months, when most spills occur. *The Service has continued to evaluate canal capacities figures relative to traditional irrigation demands and patterns for the early spring months and have found that there may be sufficient capacity to deliver as much as 465 cfs under certain conditions. This information would suggest that the baseline average spill estimates related to wetland inflow may be conservative, and through cooperative spill management with TCID, Reclamation, and the Service there is a potential to effectively increase "useable" spills for wetland protection. The Service recognizes, however, that possible revisions to Lahontan Reservoir storage targets under an adjusted OCAP could reduce spill volumes and frequencies. Although Interior has not made final decisions on what an adjusted OCAP would entail, the Service believes the more conservative "useable" spill volumes are warranted and are reasonably representative of what is anticipated for the future.*

Based on the 92-year hydrologic simulation used in BLR Model calculations, spills are calculated to occur in 32 years and range from 1,500 AF to as high as 60,000 AF. The average volume of these 32 years of spills amounts to 24,700 AF. (See Figure 3.2.A.) "Useable" spills as calculated by the BLR Model tend to be less than this amount, due to factors related to limited canal capacity and the short-term duration of spill flows. Useable spills are averaged over the 92-year period to determine a long-term annual (yearly) average.

Under baseline conditions, the BLR Model projects that the annual average of "useable" spills will be *from 8,600 to 11,400 AF/year. These "useable" spill volumes constitute about 17 percent of total spill volume which is consistent with preliminary spill data from the 1995 Newlands Project spill where the wetland habitat areas were able to capture about 20 percent of the total spill volume. While these estimates may be conservative, they provide the Service with a reasonable baseline condition for long-term planning purposes.*

3.2.4 NEWLANDS PROJECT EFFICIENCY

Newlands Project efficiency for the Carson Division is defined as the ratio of valid headgate deliveries to Lahontan Reservoir releases (excluding spills). The 1988 OCAP set project-wide efficiency targets at 68.4 percent at full headgate entitlement. This means a minimum of 68.4 percent of the water diverted to the Newlands Project (from Lahontan Reservoir and the Truckee Canal) is to be delivered to headgates for use by water-right holders *in a full water year with 100 percent use of entitlements.* By isolating each division's share of the project-wide totals, a 68.1 percent target efficiency rate is calculated for the Carson Division. *The BLR Model calculations show a 67.8 percent irrigation delivery efficiency rate using a 97 percent use-rate for irrigation delivery. This calculated baseline efficiency also incorporates the long-term effects of shortage years and is consistent with project operating experience during the recent drought (1990-93).¹*

3.2.5 LAHONTAN RESERVOIR OPERATIONS

The assumptions that are used with the BLR Model to calculate annual operations at Lahontan Reservoir are based on reservoir inflows. Reservoir outflows and storage are a function of demand and supply. Figures 3.2.B, 3.2.C, and 3.2.E (Lahontan Reservoir inflow, outflow and monthly storage) illustrate the fluctuation and variability in these factors based on the 92-year hydrologic simulation.

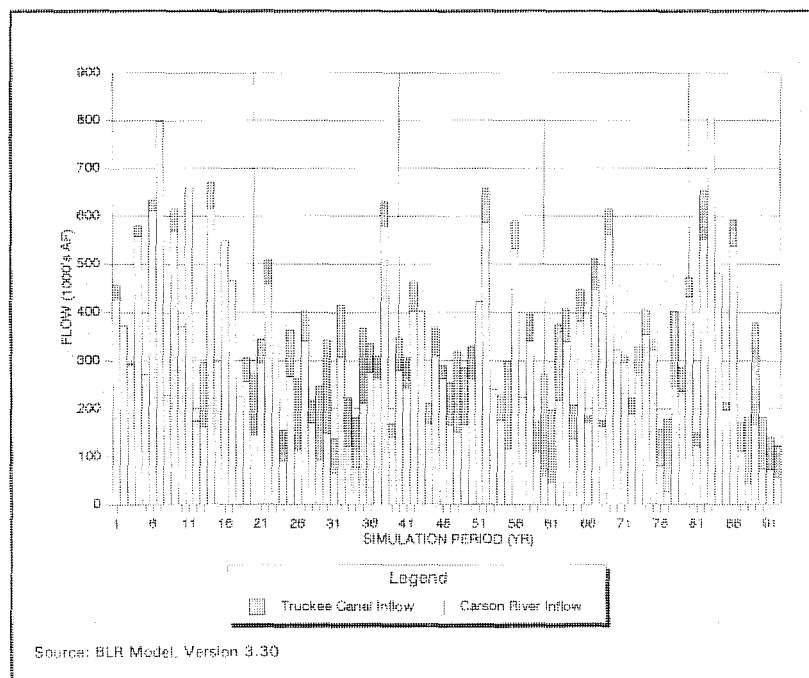
3.2.5.1 Inflow

Inflow consists primarily of Carson River runoff and Truckee River imports delivered to the Lahontan Reservoir. *Using the 92-year hydrologic simulation, average annual inflow to Lahontan Reservoir is calculated to be about 350,000 AF/year. Most of the calculated inflow is derived from the Carson River, (287,700 AF/year) with (delivered) Truckee River imports averaging about 62,400 AF/year (Figure 3.2.B).* (This should not be confused with the total volume of water diverted from the

¹This result is based on version 3.31 BLR Model. Version 3.30, released in June 1993, contains an error that limits efficiency adjustments to changes in project demands (as opposed to supply-induced shortages). That error, now corrected, does not significantly affect the results described here.

Truckee River at Derby Dam, which averages about 102,200 AF/year under baseline conditions.) The range of Truckee River imports varies due to variations in hydrologic conditions (i.e., droughts and floods). Data from Figure 3.2.B show that *20 times during* the 92 years in the hydrologic simulation period, no Truckee River diversions were needed to meet Carson Division irrigation demand. This is in contrast to *13 times during* the simulation period when drought conditions persisted on the Carson River, and Truckee River imports provided the majority of Lahontan Reservoir inflow.

FIGURE 3.2.B LAHONTAN RESERVOIR INFLOW



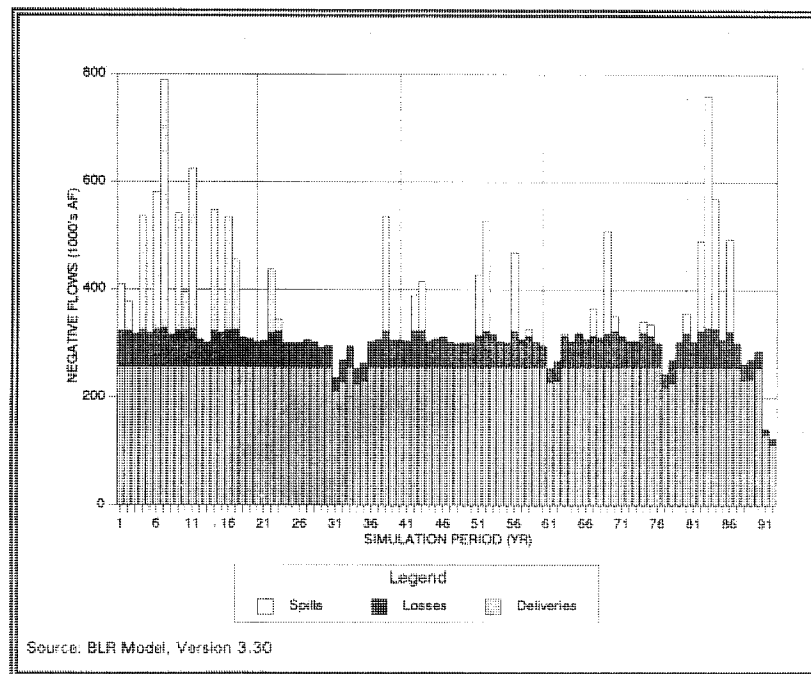
USGS stream gage records on the Carson River above Lahontan Reservoir show an average of 263,200 AF/year but cover a somewhat shorter time span (1912-92) than the 92-year simulation period. To provide a consistent set of assumptions and baseline conditions, the long-term, 92-year simulation average of 287,700 AF/year of *Carson River* inflow is used as input for BLR Model calculations.

Annual inflow can be divided into monthly averages (Figure 3.2.D) to compare the seasonal variations of inflow volume between the Truckee and Carson Rivers. Total inflow is greatest during April, May and June and lowest during August, September and October.

3.2.5.2 Outflow and Losses

Lahontan Reservoir outflow is divided into three categories: releases to satisfy headgate deliveries to Carson Division water-users; reservoir losses (due to seepage and evaporation); and spills. Figure 3.2.C illustrates *these* outflow data for the 92-year hydrologic simulation period.

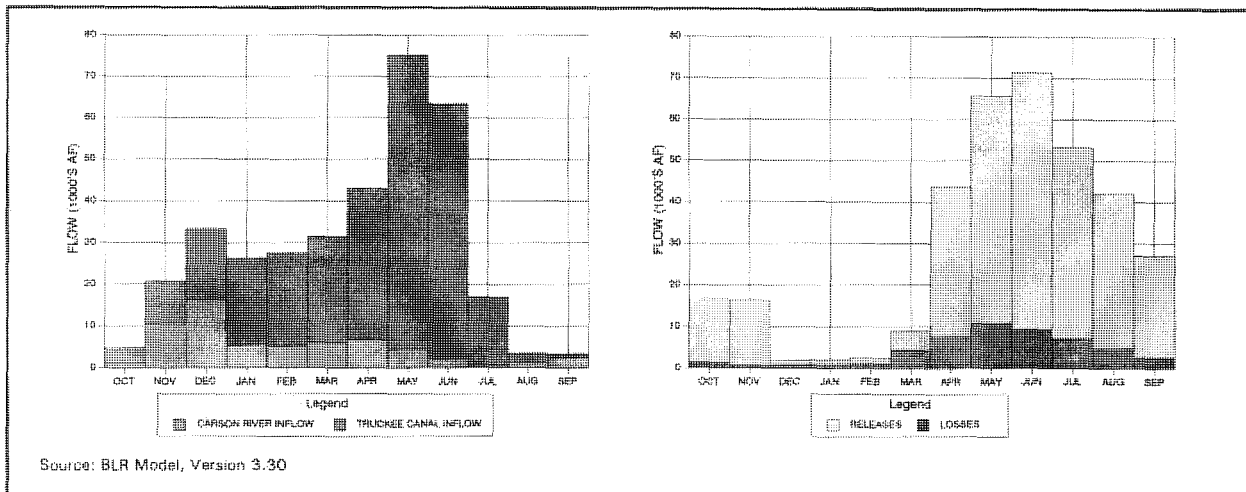
FIGURE 3.2.C LAHONTAN RESERVOIR OUTFLOWS



Under baseline conditions, the BLR Model calculates that, over the long run, an *average of about 250,700 AF/year would be released to meet irrigation demand and an average of about 51,100 AF/year would be lost to reservoir evaporation and seepage*. BLR Model calculated average annual outflow is the sum of releases and losses and does not include spills that occur irregularly in high water years. Spills are shown in Table 3.2.C, but are not incorporated into the outflow calculations. For comparison, actual annual average Lahontan Reservoir outflow (including releases and spills) from 1912-92 was 380,852 AF/year according to water-resources data (USGS, 1994).

Outflow is highest in June, and gradually decreases through November (Figure 3.2.D) when the irrigation season ends. Shortage generally occurs between July and November.

FIGURE 3.2.D MONTHLY LAHONTAN RESERVOIR INFLOWS AND OUTFLOWS



Reservoir losses constitute a consistent source of Lahontan Reservoir outflow. These losses have held comparatively constant at an average of 51,500 AF/year over the 92-year simulation period. Evaporative losses vary with reservoir storage levels, and fluctuate from year-to-year. *Reclamation has been re-evaluating its calculations relative to evaporation rates and surface acreage at various reservoir levels and believes that reservoir losses are probably less than previously reported with long-term averages about 17 percent lower than what the Service has calculated. Such re-calculations would increase values generated for carry-over storage and potential spill volumes. The Service has not adjusted the BLR Model calculations to reflect reduced evaporative losses since it is possible that an adjusted OCAP could change reservoir storage targets to correspond to changing irrigation demand which could reduce carry-over storage and potential spill volumes.* Reclamation reports show actual losses from Lahontan Reservoir have ranged from 5,300 AF in 1992 to 80,500 AF in 1993. In April, May, and June, when Lahontan Reservoir's surface area is greatest, evaporative losses are also at their highest (Figure 3.2.D).

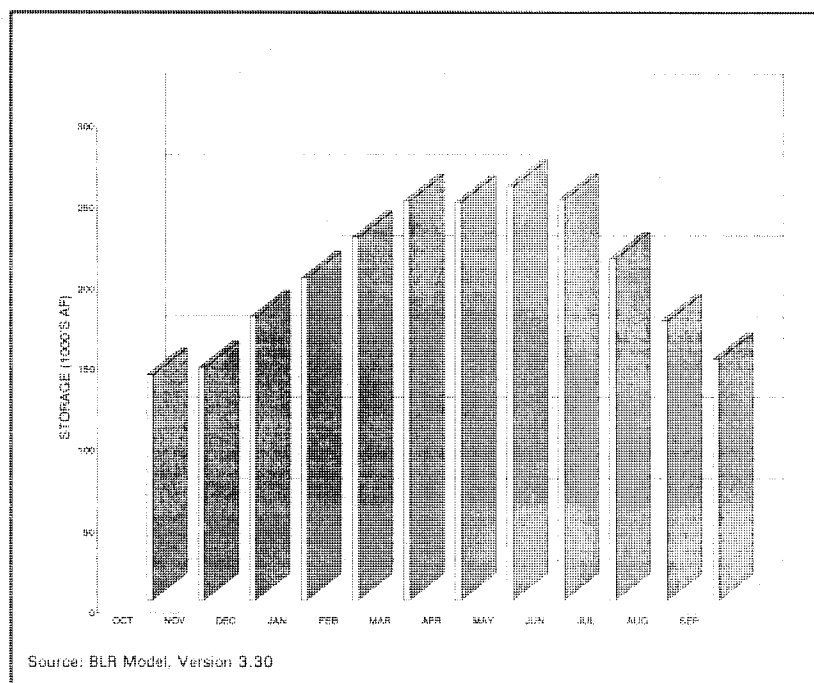
3.2.5.3 Storage

Lahontan Reservoir storage varies greatly throughout the year. In general, highest water levels occur between March and June in response to spring runoff and Truckee River diversions. In the ensuing months, water levels decline through evaporation and as water is released to satisfy downstream irrigation demands.

If revisions associated with an adjusted OCAP include changes to Lahontan Reservoir storage targets, particularly if those spring storage targets are lowered, then long-term Lahontan Reservoir levels would change. Lower reservoir storage targets affect Truckee River diversions, and if reduced, would result in lower reservoir levels than identified for the Service's baseline condition. No revisions have been made to the 1988 OCAP storage targets and there is no decision on an adjusted OCAP, therefore, the Service has not adjusted its baseline conditions.

Under baseline conditions, the BLR Model calculates long-term averages for the months of June and November. Those baseline figures are 255,300 AF on June 1 and 142,800 AF on November 30. These dates represent key periods of interest; June 1 the beginning of the recreational season, and November 30 the end of the irrigation season. On a monthly basis, average storage levels would range from 140,000 AF in October, to about 250,000 AF in May (Figure 3.2.E).

FIGURE 3.2.E AVERAGE MONTHLY LAHONTAN RESERVOIR STORAGE



3.2.6 HYDROPOWER RESOURCES

Irrigation demands, not hydropower generation, dictate Lahontan Reservoir releases. Because reservoir releases vary each month with irrigation demand, power generation and revenue calculations are similarly variable.

Controlled releases at Lahontan Dam are made preferentially through the Old Lahontan Power Plant. This facility is a 1.9 mega-watt power plant that is leased to Sierra Pacific Power Company (Sierra Pacific) by TCID for a 30-year term that began in 1968. Under the 1968 agreement, TCID receives monthly lease payments from Sierra Pacific for electricity sold within TCID's franchise area. These payments are not tied to the amount of power generated by the Old Lahontan Plant. A small downstream power plant on the V-Line Canal at the 26-foot-drop structure also generates power as part of the 1968 lease agreement.

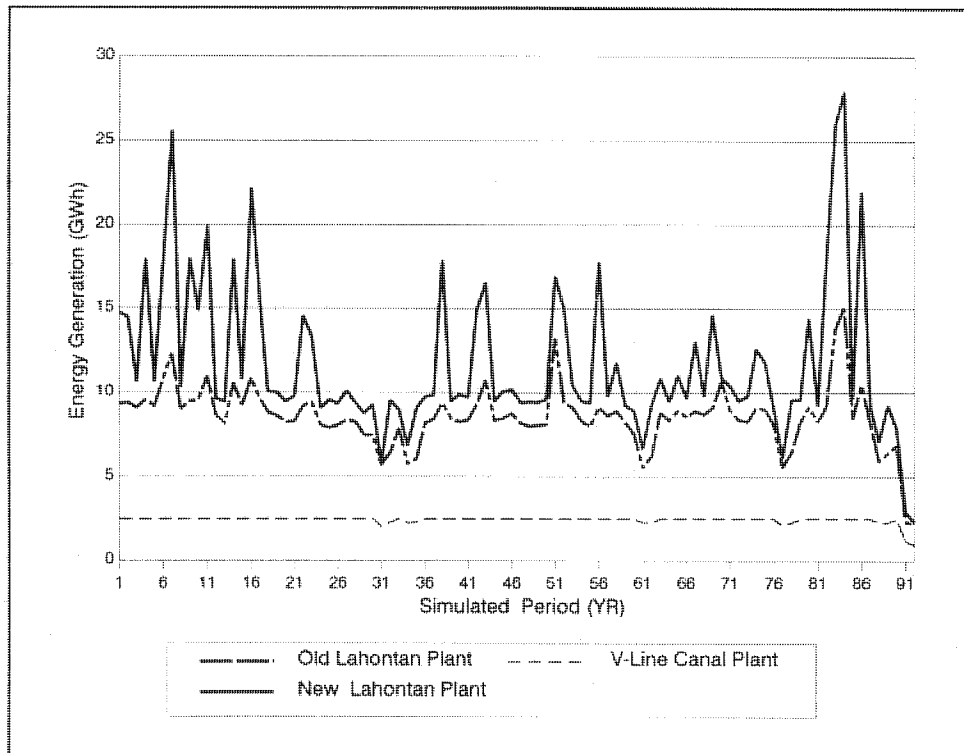
Controlled releases at Lahontan Dam are made secondarily through the New Lahontan Power Plant, a 4.8 mega-watt facility completed in 1989 by TCID and Lahontan Hydropower, Inc. Under an amended 1987 agreement, electricity generated by the New Lahontan Plant is purchased by Sierra Pacific at specified rates. Lahontan Reservoir releases are scheduled solely for irrigation uses, hydropower generation remains incidental to the primary water supply purposes of the Newlands Project.

The BLR Model used the 92-year simulated hydrologic period to calculate long-term power capabilities of the Old Lahontan, New Lahontan, and V-Line Canal Power Plants. Under baseline conditions, the model calculated that the three power plants together would produce an average of about 22,700 mega-watt hours/year (MWh/year). Power generation varies with fluctuations in hydrology as illustrated in the 92-year simulation period shown in Figure 3.2.F.

Revenues associated with the Old Lahontan and V-Line Canal Power Plants are not tied to power generation and therefore are not affected by varying the reservoir releases. The revenues associated with long-term annual power generation at the New Lahontan Power Plant would vary with hydrologic flow as shown by the 92-year hydrologic simulation (Figure 3.2.G), and are calculated to average about \$894,700/year based on pricing stipulations set forth in the amended 1987 Sierra Pacific agreement.

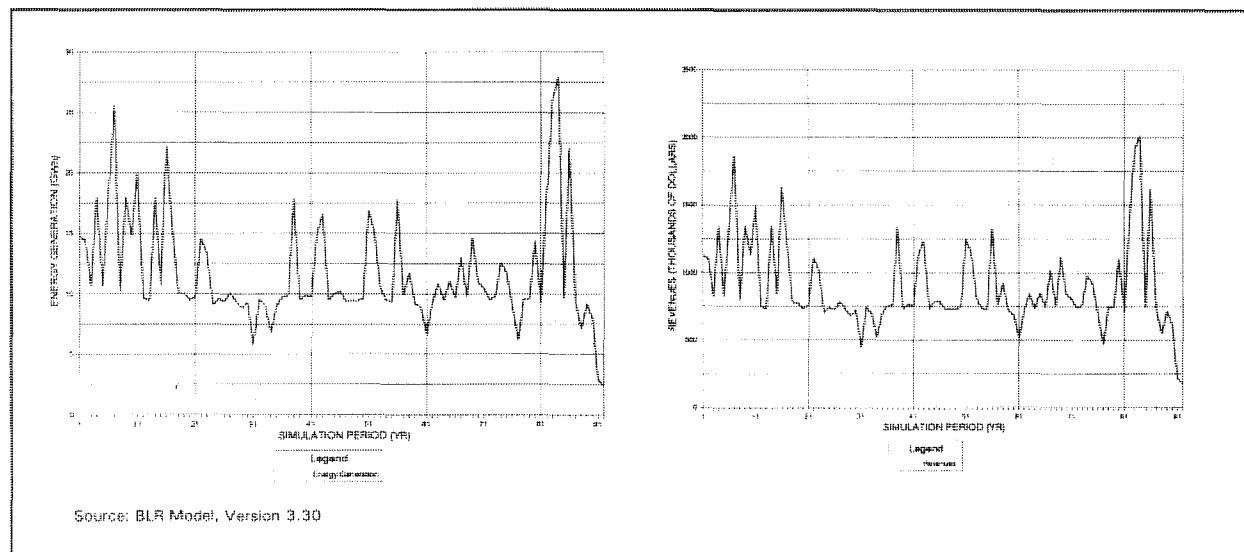
The BLR Model also calculates monthly variations in power generation for the Old Lahontan, New Lahontan, and V-Line Canal Power Plants as well as the monthly revenues for the New Lahontan Plant (Figure 3.2.H).

FIGURE 3.2.F YEARLY HYDROPOWER GENERATION

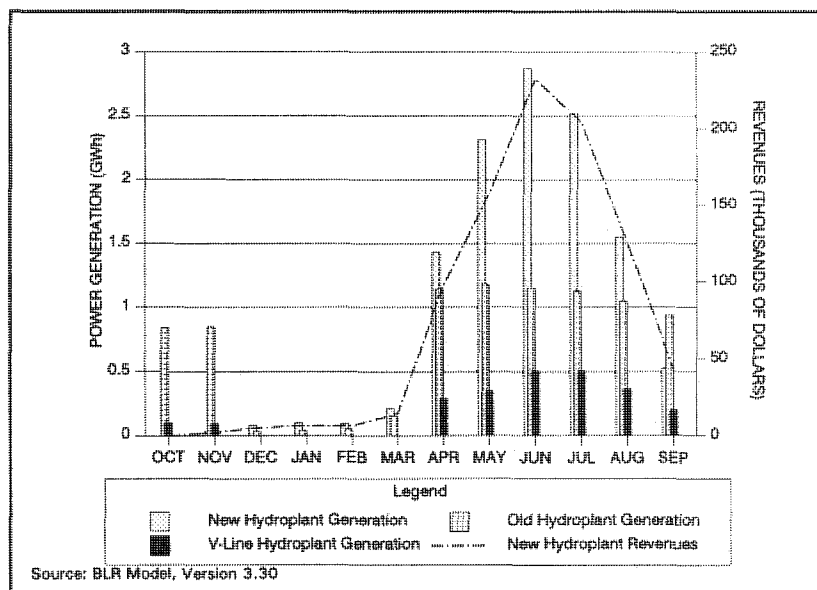


Source: BLR Model, Version 3.30

**FIGURE 3.2.G HYDROPOWER GENERATION AND REVENUES,
NEW LAHONTAN PLANT**



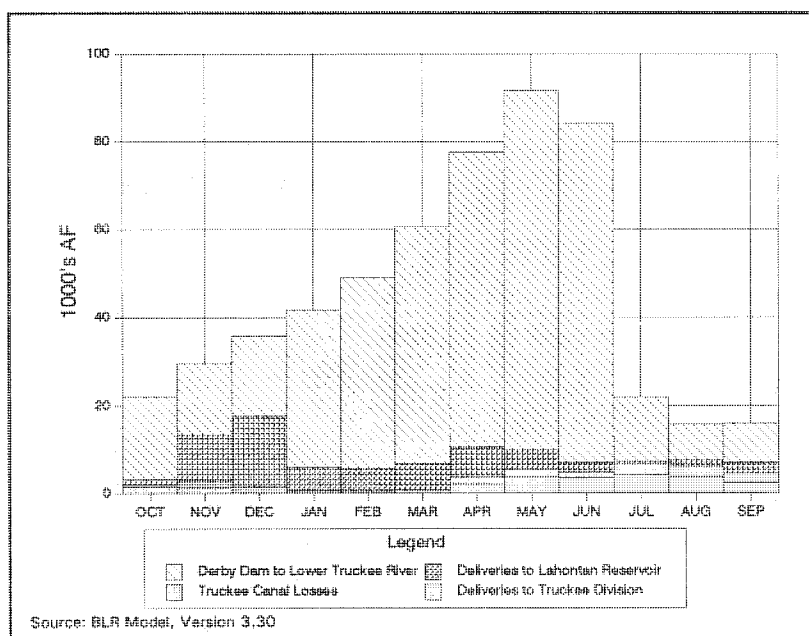
**FIGURE 3.2.H MONTHLY HYDROPOWER
GENERATION AND NEW LAHONTAN PLANT REVENUES**



3.2.7 DERBY DAM AND THE TRUCKEE CANAL

The Truckee River diversions for the Newlands Project occur at Derby Dam, where water is routed via the Truckee Canal for irrigation delivery in the Truckee Division and to supplement irrigation supply in the Carson Division. At Derby Dam, Truckee River flows are either diverted into the Truckee Canal as allowed by OCAP, or are released downstream to satisfy lower Truckee River water right demands and inflow to Pyramid Lake. The average monthly distributions of these Derby Dam inflows are depicted in Figure 3.2.I based on NSM and BLR Model calculations. *Approval and implementation of an adjusted OCAP could potentially change Truckee River diversions from the baseline conditions depicted by the Service. Lowering Lahontan Reservoir storage targets could potentially reduce Truckee River diversions while changes in irrigated acreage base could change irrigation demand which could also potentially change Truckee River diversions. Since no action or final decision has been made relative to an adjusted OCAP, the Service calculated long-term Truckee River diversions based on 1989 acreage figures and the 1988 OCAP.*

FIGURE 3.2.I MONTHLY DISTRIBUTION OF DERBY DAM FLOWS

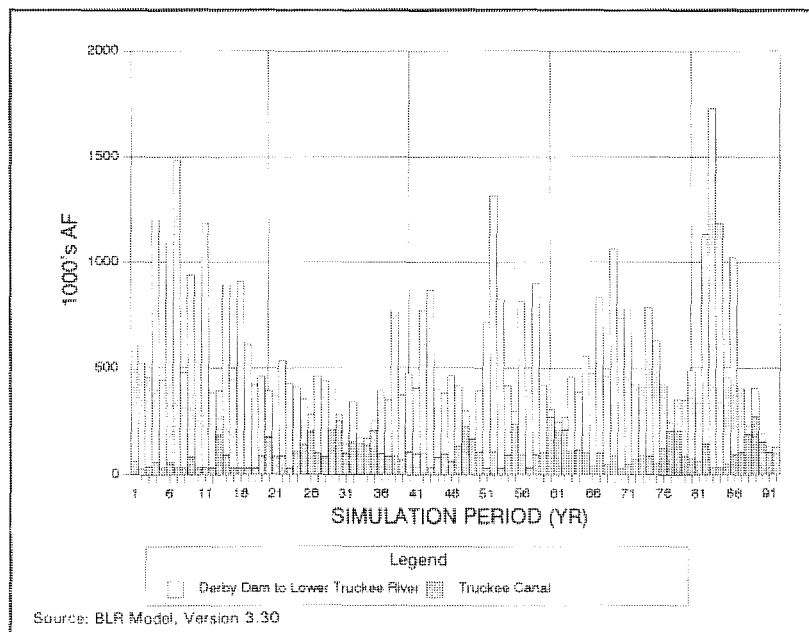


Using the 92-year hydrologic simulation period data to develop long-term average Truckee Canal diversions (Figure 3.2.J) based on the restrictions and conditions required by the 1988 OCAP, the NSM calculates Truckee Canal diversions to average 102,200 AF/year under baseline conditions. Of this total, 22,500 AF/year would be diverted for Truckee Division irrigation deliveries (see Section 3.2.2, IRRIGATION DELIVERIES), 17,300 AF/year

would be lost to evaporation and canal seepage, and 62,400 AF/year would be delivered to Lahontan Reservoir.

Under actual conditions, Truckee Canal diversions averaged 194,500 AF/year for the 1967-92 period (Interior's Newlands Project Efficiency Study, 1993). The actual data *are* based on a 25-year span when delivery efficiency targets were either not in effect or not achieved. The BLR Model's 92-year period incorporates full achievement of the Newlands Project delivery efficiency targets and depicts simulated long-term hydrologic conditions.

FIGURE 3.2.J YEARLY DISTRIBUTION OF DERBY DAM FLOWS



3.3 WATER RESOURCES

3.3.1 SURFACE WATER QUANTITY

Prior to the creation of the Newlands Project and agricultural irrigation in the Truckee and Carson River basins, the flow of both rivers was unregulated and fluctuated widely from year to year. Carson and Truckee River basin hydrology is dominated by snowpack and runoff from the upper portions of the watershed in the Sierra Nevada.

Although the annual precipitation rates in the upper portions of the Truckee River watershed are as high as 70 inches per year on the west side of Lake Tahoe, an average of 40-50 inches per year is more representative of the upper watershed precipitation rates for the Carson and Truckee Rivers (California Dept. of Water Resources, 1991a). At the terminal reaches of these watersheds, precipitation rates drop to an average of 4-8 inches per year

(ibid). Carson River flow into Lahontan Valley is tied to the amount of runoff from the Sierra Nevada each spring, while Truckee River flows are controlled by upper watershed reservoir storage and releases.

Truckee River

Truckee River flows are controlled by several upstream reservoir operations, including Boca, Donner, Lake Tahoe, Stampede, and Prosser Reservoirs. Actual stream gage records (USGS, Water Resources Data, Nevada, 1992) for the Truckee River at Clark, Nevada, (above Derby Dam), show a 20-year (1972-92) annual average of 580,700 AF. Using the hydrologic data from the 92-year simulation period with the NSM and the BLR Model, baseline river flow conditions above Derby Dam are calculated to average about 546,100 AF/year. Under baseline conditions, Truckee Canal diversions to the Carson Division of the Newlands Project are calculated to average 102,200 AF/year over the long term.

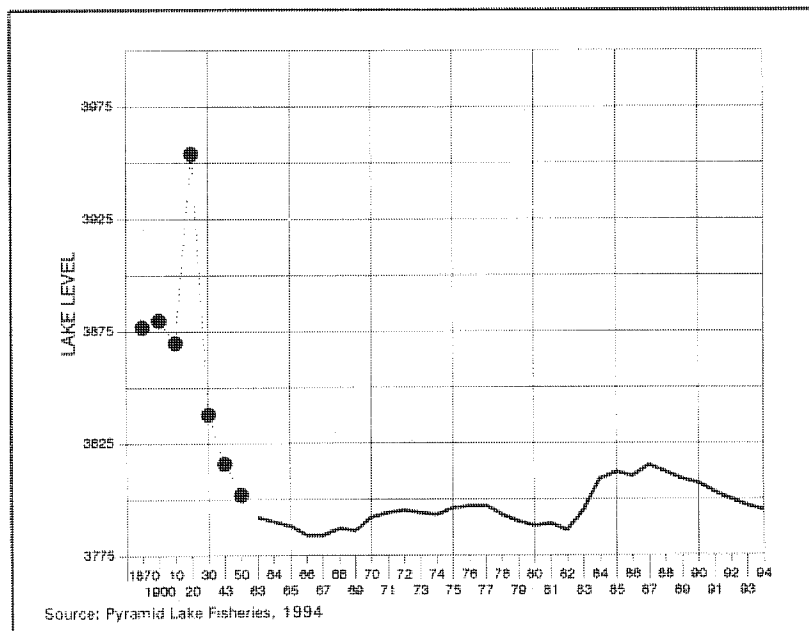
Most of the Truckee River flow downstream of Derby Dam ends up in Pyramid Lake. Some river flow is diverted for small agricultural operations adjacent to the river, which subsequently generates irrigation return flow to the river. In order for the Service to apply a consistent baseline, the NSM and BLR Model again used the 92-year hydrologic simulation period, 1989 Newlands Project demand, and 1988 OCAP to calculate a long-term annual average Truckee River inflow of 448,800 AF to Pyramid Lake.

Actual flow records of the Truckee River at Nixon, Nevada (near the inlet to Pyramid Lake) average 363,000 AF for the 1958-93 period of record (USGS, Water Resources Data, Nevada, 1993). Implementation of the 1988 OCAP and curtailment of Newlands Project winter power generation (1967) have reduced Truckee River diversions, thereby increasing flows in the lower Truckee River. Although actual data do not fully reflect the magnitude of this increase, use of the NSM and BLR Model allows the Service to calculate a long-term average based on the 92-year simulation period.

Pyramid Lake is the terminus of the Truckee River and in the earlier years of record (1880-1910) the lake level remained relatively stable, as Truckee River inflow and evaporation were roughly in balance (California, Dept. of Water Resources, 1991b). Lake records show it peaked at 3,887 feet above sea level in 1870 (Wagner, personal communication, 1994), and began to decline around 1910 (Figure 3.3.A) due to increased upstream diversions and Newlands Project operations which diverted an average of 239,700 AF/year from the Truckee River between 1910 and 1966 (Federal Water Master's Gaging Station, Sierra Hydrotech data, 1980). In 1967, operating criteria for the Newlands Project curtailed winter power generation, thereby reducing Truckee River diversions. In the 1980s, changes in Newlands Project operations and several years of record runoff from the Sierras, brought Pyramid Lake levels up 30 feet from the lowest recorded elevation of 3,784 feet in 1967. Most recently, lake levels again dropped due to a 9-year drought, and in 1994, Pyramid

Lake dropped to the 3,795-foot-elevation mark (Wagner, personal communication, Pyramid Lake Fisheries Data, 1994). The NSM and BLR Model calculations *project* that over the long-term, Pyramid Lake levels would stabilize at an elevation of about 3,830 feet under baseline conditions.

FIGURE 3.3.A PYRAMID LAKE ELEVATIONS



Carson River

Carson River records (USGS, Water Resources Data, Nevada, 1992) in the Lahontan Valley since 1912 show an annual average flow volume of 263,200 AF (measured at Fort Churchill Gaging Station). Flows varied widely during this period of record, with a high average annual inflow of 804,300 AF (1983 water year) and a low average annual inflow of 26,300 AF (1977 water year). Prior to the 1860s, the average annual Carson River flow into Lahontan Valley was estimated at about 410,000 AF (Kerley and others, 1993). The BLR Model applies the 92-year simulation period to calculate long-term average Carson River flows into Lahontan Valley (at Fort Churchill Gaging Station) to be about 287,700 AF/year.

Carson River flows downstream of Lahontan Reservoir comprise releases from Lahontan Reservoir that usually include diversions from the Truckee River. The actual average annual Carson River flow below the reservoir was 375,100 AF/year for water years 1966-92 (Maurer and others, 1994). This figure represents a short period of record in which three voluminous spills occurred.

Lahontan Reservoir releases are linked to headgate demand and delivery efficiency. Lahontan Reservoir releases fall below average or baseline conditions if there is insufficient storage to meet the headgate demand or if the baseline irrigation demand (headgate demand) is reduced. Using the BLR Model, the Service analyzed various project conditions to predict variations in reservoir releases based on the 92-year hydrologic simulation period.

Under baseline conditions, the BLR Model calculates that a long-term annual average of 250,700 AF/year will be released from the Lahontan Reservoir for irrigation, with additional releases of 49,900 AF/year through drawdown or spills (Table 3.3.A). The long-term average baseline flow below Lahontan Reservoir is calculated to total about 300,000 AF/year. This baseline figure is lower than the actual average cited above (1966-92) because it incorporates full achievement of the Newlands Project delivery efficiency targets and a lower irrigation demand associated with the transfer of 20,000 AF of water rights to wetlands use.

Other water use analyses, for example the USGS report by Maurer and others (1994) or Reclamation's OCAP EIS (1987), calculate different annual average reservoir releases and spills. The information from these reports is shown in Table 3.3.A to provide a sense of how reservoir release and spill data could vary when a higher irrigated acreage base is used (Reclamation's OCAP EIS, 1987), or how releases could vary if the Newlands Project operated without the 1988 OCAP restrictions (Maurer and others, 1994).

TABLE 3.3.A RANGE OF LAHONTAN RESERVOIR RELEASES COMPARING VARIOUS DATA SETS

	Representative Estimate w/o OCAP ¹	Assumed Average Under 1988 OCAP ²	BLR Model Baseline Conditions ³
Releases for Irrigation	340,000 AF/yr	280,200 AF/yr	250,700 AF/yr
Drawdown/Spills	30,000 AF/yr	40,500 AF/yr	49,900 AF/yr
Total Release	370,000 AF/yr	320,700 AF/yr	300,600 AF/yr

Sources: 1) Maurer and others, 1994

2) Based on Record of Decision, OCAP Final EIS Assumption Set (U.S. Bureau of Reclamation, 1987) and BLR Model, 1994

3) BLR Model, 1994

Surface water released from Lahontan Reservoir for irrigation is distributed through the Carson Division by 381 miles of canals and laterals. Currently, the Carson River channel in Lahontan Valley is used to convey irrigation water, drainflows, and spills. The natural hydrologic cycle of the river flow below Lahontan Dam is completely altered and is now a function of Newlands Project operations. The present-day hydrology of the Lahontan Valley is dominated by the effects of 80 years of surface water irrigation (Maurer and others, 1994).

Routing of surface water in the distribution system is complex, changing almost daily during the irrigation season, and from year-to-year to meet both short-term and long-term irrigation demands (Maurer and others, 1994). The TCID Water Master is responsible for scheduling Newlands Project irrigation deliveries.

Surface water resources in Lahontan Valley are subject to the high evaporative loss rates of the desert climate. Lahontan Reservoir, regulating reservoirs, and the primary wetland areas show evaporative losses of 60 or more inches per year (Service field notes, 1993-94). The long-term average (1940-90) evaporative loss rate for Fallon is 52.57 inches/year (Newlands Agriculture Research Station). Evaporation rates in wetland areas differ from readings in town and are generally 5 to 30 percent higher in May, June, and July based on the preliminary data collected by the Service at Stillwater NWR and Carson Lake. (See Appendix 4, Wetland Water Requirements and Evaporative Rates.) One explanation for these higher evaporation rates is that the primary wetlands are adjacent to, and downwind of, large expanses of dry, sparsely vegetated, desert land. The hot, dry winds from these areas may increase evaporation rates above those recorded at the Agriculture Station monitoring site, which is adjacent to irrigated farm fields.

Drainwater Inflow to Primary Wetlands

There are approximately 341 miles of open drains that ultimately route project drainwater to the primary wetland areas (Figure 3.3.B). Drainwater consists of runoff from farm fields (return flows), groundwater seepage, and operational spills of irrigation water. Drainflow volume to the wetlands changes from year to year depending on Newlands Project delivery efficiency, the irrigated acreage base, and Lahontan Reservoir releases. As delivery efficiencies increase, and as irrigated acreage, headgate deliveries, and Lahontan Reservoir releases decline, drainflows to the wetlands are expected to decline. The relationship between Lahontan Reservoir releases, changes in project efficiency, and drainflows to the wetlands were examined in detail by the Nevada Division of Water Planning (Pahl, 1992a and 1992b) and by the Service for the BLR Model. Using linear regression techniques and two different periods of past data, these analyses indicate that increased Newlands Project efficiencies and/or reductions in either irrigated acreage or reservoir releases will lead to greater-than-proportionate declines in drainflows to the wetlands. This can be attributed to the relatively constant loss rates that occur in project canals and laterals as a result of seepage.

The relationship between Lahontan Reservoir releases and total Newlands Project outflows (drainwater inflows to primary wetlands, surface-water discharges to the Carson Sink, and other miscellaneous deliveries of drainwater) was also examined by Maurer and others (1994) using linear regression techniques and data for years when Lahontan Reservoir releases were less than or equal to 350,000 AF/year. Their analysis indicates that project outflows will be non-existent when reservoir releases are less than about 70,000 AF/year.

Subject to adjustments for the difference between total Newlands Project outflows and drainwater inflows to primary wetlands, their results corroborate the findings of the Nevada Division of Water Planning. This factor is important because under baseline conditions, drainwater provides 54 percent of total wetlands inflow.

In early 1993, the BLR Model was modified and re-calibrated to reflect the initial findings of the Nevada Division of Water Planning. As Newlands Project efficiency increases under the 1988 OCAP, and as both irrigated acreage and total deliveries decline, BLR Model results now calculate that drainwater inflows to the primary wetlands will drop from approximately 62,000 AF (actual values in 1989), to a long-term average of about 30,000 AF/year under baseline conditions. Changes in Newlands Project operations or practices such as - reduced pasture irrigation at Carson Lake, redirection of Stillwater slough drainflows to the Stillwater NWR, increased drainflows associated with Newlands Project drainwater assurances, or increased irrigated acreage, could increase drainwater inflow to the primary wetland areas. Bookman-Edmonston Engineering, Inc. has estimated that baseline drainflows to the wetlands could amount to as much as 60,000 AF/year. As the Service continues to monitor actual drainflows to the primary wetland habitats, adjustments to baseline conditions and the BLR Model assumptions will be made if warranted, and the estimated volume of water needed to meet the objective of Public Law 101-618 would be reduced.

3.3.2 SURFACE WATER QUALITY

Irrigation water standards and criteria

Irrigation water acquired by the Service is subject to water quality standards set by the Nevada Administrative Code (NAC). Water acquired under baseline conditions (authorization for 20,000 AF) is used to sustain and enhance wetland habitat for fish and wildlife. Because the water is acquired from Newlands Project agricultural users, the project operator is only required to continue to meet agricultural water quality standards set by the State of Nevada.

In Churchill County, surface waters are classified as Class C waters with agriculture as the dominant beneficial use. Wildlife propagation, recreation, and aquatic life are other beneficial uses of Class C waters. The Service does not have the authority under NAC to require the operator of the irrigation project to meet the Service's particular water quality requirements for water it acquires from other Newlands Project users (NAC 445.120, page 445-29). The Service would take delivery of irrigation water as long as the quality and level of toxic elements of that water are within the range specified in the Nevada criteria and standards for Class C irrigation water.

Nevada water quality standards for toxic materials applicable to Class C waters does not list specific standards for the propagation of wildlife (a recognized beneficial use). Water that

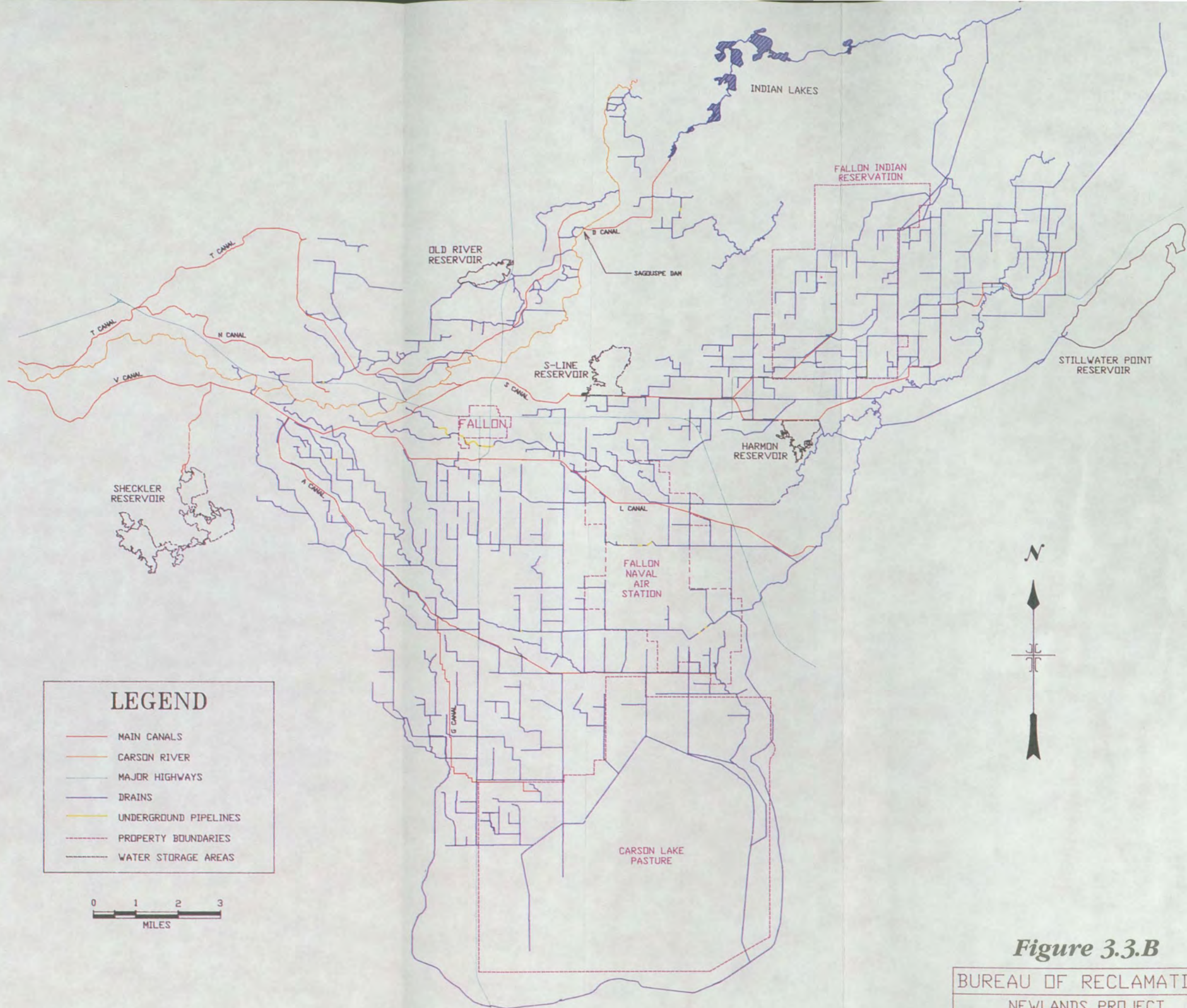


Figure 3.3.B

BUREAU OF RECLAMATION
NEWLANDS PROJECT
LAHONTAN BASIN PROJECTS OFFICE NEWLANDS EFFICIENCY STUDY OFFICE
FALLON AREA DRAINS
BASED ON 9/2/90 AERIAL PHOTOGRAPHY
DRAWN BY: L. HEATH DATE: MARCH 3, 1993

meets irrigation quality standards is expected to meet the Service's wetland habitat objectives under current management. The Service does not anticipate that it will receive irrigation water that will always meet water quality standards for aquatic life under existing conditions and pursuant to NAC 445.120 would not have the ability to require the Newlands Project operator to meet aquatic life standards.

The quality of irrigation water is measured using concentrations of total dissolved-solids. Under existing conditions, irrigation water released from Lahontan Reservoir has an average total dissolved-solids concentration of about 240 mg/L (Lico, 1992).

Drainwater Standards and Criteria

The Service is concerned about the quality of Newlands Project drainwater. Public Law 101-618 authorizes the Secretary of the Interior (Secretary) (par. 206(b)(4)) to take the necessary actions to prevent, correct, or mitigate for adverse water quality attributable to agricultural drainwater. The Service is participating in a number of studies with Reclamation, the Bureau of Indian Affairs, and the U.S. Geological Survey to formulate an Interior Study of Irrigation Drainage In and Near Wildlife Management Areas, West-Central Nevada (Drainwater Study). This Drainwater Study, which is part of Interior's National Irrigation Water Quality Program, is ongoing, and will be the basis for developing strategies and criteria to manage Newlands Project drainwater. The Service anticipates that the study will make specific recommendations on drainwater quality management objectives and on changes in Newlands Project operations to improve drainwater quality and protect wildlife. It is not known when the Drainwater Study will be completed. *Another study report prepared by the Service for EPA in 1992, titled "An Overview of Irrigation Drainwater Techniques, Impacts on Fish and Wildlife Resources, and Management Options" also provides information and recommendations relative to managing irrigation drainwater to prevent or reduce the impacts of poor quality drainwater on fish and wildlife resources.* Interior does not have the authority to set water quality standards for drainwater, but may make recommendations to the State and EPA related to this issue.

The Service and NDOW have been granted water rights by the State Engineer for drainwater leaving the irrigation district. The standards for drainwater that flows into the wetlands are much less stringent than those set for acquired irrigation water. Drainwater is not considered a Newlands Project irrigation water delivery, therefore, irrigation water quality standards cannot be applied. The Service cannot refuse to use Stillwater NWR lands to dispose of Newlands Project drainwater, unless those waters are determined to be toxic to migratory birds (par. 206(b)(4) of the Public Law).

Drainwater Quality

Using period-of-record data on stream flow and dissolved-solids (a measure of water quality) for the lower Carson River, an average historical (1845-60) concentration of dissolved solids entering Carson Lake and Stillwater marsh is estimated to have been 170 mg/L and 270 mg/L, respectively (Kerley and others, 1993). After 60 years of agricultural activities in the Lahontan Valley (1862-1922), the dissolved-solids concentration of water entering Carson Lake wetlands was about 1,000 mg/L (Hart and Bixby, 1922). More recent studies projected that dissolved-solids concentrations for drainwater reaching the wetland areas average about 1,170 mg/L (Kerley and others, 1993). This total dissolved-solids concentration serves as the baseline for drainwater quality in this document. As compared to drainwater, the dissolved-solids concentration of water released from Lahontan Reservoir for irrigation remains at about 240 mg/L (Lico, 1992).

The quality of spill water is generally comparable to irrigation water, but when spills become voluminous and flooding occurs, water quality can be degraded. As flow volume increases, water becomes more sediment-laden and often inundates alkaline playas, thereby picking up contaminants and dissolved-solids. The worst water quality conditions related to flooding occur after floods, shallow playa lakes recede, evaporate and further concentrate contaminants. Such conditions prevailed in the Carson Sink and in many small playa areas after the floods of the early 1980s.

Seepage from un-lined irrigation delivery canals and flood irrigation of farmlands has continually leached naturally occurring salts and minerals into the groundwater. This leaching process has been shown to mobilize salts and trace elements such as arsenic, boron, selenium, molybdenum, and lithium (Hoffman and others, 1990) with a corresponding increase in dissolved-solids concentrations. Generally, high dissolved-solids concentrations negatively affect small fish species and some aquatic organisms (ibid).

Increases in dissolved-solids concentrations in wetland waters are important because living organisms respond physiologically to the increased concentrations. Studies to characterize drainwater quality problems in the Newlands Project and associated wetlands were conducted from 1986 to 1990 (Finger and others, 1988; Hoffman and others, 1990; Rowe and others, 1991; and Lico, 1992). These studies showed that fish, wildlife, and wetland habitat were being negatively impacted by agricultural drainage. Increased dissolved-solids concentrations in drainwater resulting from agricultural irrigation (Hoffman, 1994) indicate that there has been an increase in the concentrations of other trace elements. Because of the known positive correlation between dissolved-solids concentrations and arsenic (Tuttle, written communication, 1994), boron, sodium, and chloride concentrations (Hoffman, 1994), the elevated concentrations of these elements singly, or in combination with other

properties of drainwater are suspect in the loss of emergent and submergent wetland vegetation in Stillwater NWR and Carson Lake (Hoffman, 1994).

Under existing conditions, trace element levels in some of the drains that flow into Stillwater NWR are moderately to acutely toxic to living organisms (Table 3.3.B), with TJ and Hunter Drains (Hunter Drain has been closed, and no longer contributes contaminants to the Stillwater NWR wetlands) showing the highest concentration levels (Finger and others, 1993).

Studies conducted by Finger and others (1988), Hoffman and others (1990), Rowe and others, (1991), Lico (1992), and Tuttle (written communication, 1994) have shown that concentrations of arsenic, boron, chromium, copper, lithium, mercury, molybdenum, selenium, zinc, dissolved solids, sodium, and un-ionized ammonia in water, sediment, and/or biota of the Lahontan Valley wetlands have approached or exceeded Federal and State baseline standards for the protection of aquatic life or the propagation of wildlife. A later study by Finger and others (1993) found that arsenic, boron, selenium, molybdenum, and lithium were the trace elements with concentrations that generally exceeded living organism limits while other trace elements such as aluminum, antimony, beryllium, bismuth, chromium, cobalt, copper, iron, nickel, silver, tin, titanium, thallium, and tungsten did not exceed reporting limits. Based on these studies, the Service has identified arsenic, boron, mercury, and selenium as contaminants of primary concern. Arsenic, boron, and selenium are trace elements that occur naturally in the soils and geologic formations of the Lahontan Valley.

Table 3.3.B - STILLWATER NWR DRAINWATER QUALITY

Inorganic Contaminants	TJ Drain	Diagonal Drain	Standard or Biological Effect Level
TDS. mg/L	2,700 - 29,800 ¹	423 - 1,890 ¹	500 ⁶ 4,800 ⁴
Arsenic $\mu\text{g/L}$	20 - 470 ²	59 - 120 ³	40 ⁴
Boron $\mu\text{g/L}$	6,900 - 25,000 ⁵	840 - 4,000 ³	550 ⁷
Selenium $\mu\text{g/L}$	0.2 - 4.2 ²	< 1.0 ³	2 - 5 ⁴ 20 ⁷
Lithium $\mu\text{g/L}$	320 - 810 ⁵	51 - 90 ³	None
Molybdenum $\mu\text{g/L}$	270 - 950 ⁵	23 - 83 ³	19 ⁷
Mercury $\mu\text{g/L}$	0.2 - 4.2 ²	< 0.1	2 ⁷

Sources: ¹ - Lico, (1992); ² - Tokunga and Benson, (1991); ³ - Hoffman, (1994); ⁴ - Hoffman and others, (1990); ⁵ - Rowe, (1991); ⁶ - Nevada standard for Class C waters; and ⁷ - Nevada standard for aquatic life (11-hour averages)

Elevated levels of mercury have been attributed to historic mining practices in and around the Dayton, Nevada, area. Mercury released to the Carson River in the late 1800s by Comstock gold and silver milling practices has contaminated the river sediment downstream of the Comstock mining district near Virginia City, Nevada (Smith, 1943; and Cooper and others, 1985). In the past, mercury-contaminated sediment flowed downstream, and gradually deposited over a large portion of the Lahontan Valley. While mercury was deposited in the area through flooding prior to the construction of Lahontan Dam, it continues to be absorbed by algae, invertebrates, and detritus (dead plant and animal material) to this day. This is of concern due to the ability of wildlife to gradually accumulate mercury from these sources (Hoffman and others, 1990), resulting in long-term toxicity. Studies have found the levels of mercury in sediments, detritus, and algae in many project drains to be high and of concern, but drainwater sampling has not found mercury concentrations to exceed reporting limits (Finger and others, 1993). Mercury contamination is not attributed to agricultural irrigation practices. Mercury-laden sediments are mobilized during flooding or when excessively voluminous flows occur in drainages or canals, moving sediment downstream.

3.3.3 GROUNDWATER

Groundwater throughout the affected area is a critical and important water resource. Baseline information on groundwater is limited in some areas, and more extensive information is generally available in the more populated areas. Groundwater is the predominant source of domestic and industrial water in the affected area.

3.3.3.1 Groundwater Recharge and Levels

Middle Carson River Area

The groundwater of the Middle Carson River area (from the upper Lahontan Reservoir to near Dayton, Nevada) is contained in a series of semi-independent basins. These basins are composed of alluvium fill (sediments deposited by moving water) surrounded by consolidated bedrock divides (Glancy and Katzer, 1975). The alluvial fill varies in thickness from *about 500 to 3,000 feet (Harrill and Preissler 1994)*. The groundwater systems (aquifers) are complex, in that several aquifers may exist at varying depths, and may act semi-independently of each other (Glancy and Katzer, 1975) with regard to recharge, yield, and quality. The water table in this area can be near the surface (within 20 to 50 feet) in some areas and as deep as 500 feet below the surface in the higher elevation areas around Moundhouse, Nevada (Lawson, personal communication, 1994). A number of the wells in the Moundhouse area are low yield wells pumping only 20 to 40 gallons per minute. The groundwater yield from the alluvial fill basins along the Middle Carson River are generally higher, and a number of commercial wells produce as much as 1,500

gallons per minute (gal/min). Many of the wells operated by the Dayton Town Utilities are 100-200 feet deep and produce 100-500 gal/min. There are some wells in the Rose Peak area near Dayton, Nevada, that produce geothermally heated water with temperatures ranging from 65 to 130 degrees Fahrenheit (Lawson, personal communication, 1994).

Groundwater quality within this series of semi-independent basins is moderately good with indications of mineralized recharge from the Virginia Range to the area north of the Middle Carson River. Dissolved-solids concentrations of 400-600 mg/L (Glancy and Katzer, 1975) are common in many of the wells in this area. The recommended limits for dissolved-solids in drinking water is 500 mg/L. Sulfate and nitrate concentrations in this area also approach or exceed recommended limits for drinking water (Glancy and Katzer, 1975).

Groundwater recharge of the alluvial fill aquifers in this area comes from precipitation in nearby mountainous areas, seepage losses from streams in the area, from underground flow through consolidated rocks (Glancy and Katzer, 1975), *and possibly from the Carson River below Dayton (USGS unpubl. data, Water Resources Division, Carson City, Nevada)*. Some groundwater inflow is assumed to move downstream from upper alluvial basins along the river corridor. Glancy and Katzer (1975) stated that the groundwater flow is from the mountain recharge areas to the lowlands or valley basins toward the Carson River. The presence of geothermally heated groundwater suggest that in certain areas the recharge is from deeper consolidated rock aquifers.

In the Silver Springs area, water company officials indicate that well water levels are influenced by Lahontan Reservoir (Lang, personal communication, 1994).

Fernley and the Lower Truckee River Area

This portion of the affected area is characterized by the Fernley hydrologic area and the lower Truckee River basin, which are discussed separately below. The Fernley hydrologic area is defined by the Fernley Sink which is small confined basin. This basin is composed of unconsolidated stream-laid deposits (cobble, gravel, sands and clay) buried by lake sediments of ancient Lake Lahontan (Sinclair and Loeltz, 1963). The Fernley basin's valley fill sediments are poorly sorted and not very permeable, but the well sorted sand and gravel layers are the most important aquifers (ibid). Groundwater is essentially confined in this basin, with no groundwater inflow from adjacent basins and little outflow except back into the Truckee River basin. The town of Wadsworth is underlain by alluvial deposits of the Truckee River and deeper valley-fill lake sediments. Sinclair and Loeltz (1963) state that the recoverable

groundwater in the Fernley and Wadsworth area is in the unconsolidated sediments of the valley-fill.

Fernley

Groundwater recharge for the Fernley basin is dominated (99 percent) by Truckee Canal seepage losses, irrigation canal losses, and agricultural irrigation (Van Denburgh and Arteaga, 1979, rev. 1985). In the recent past, the basin was considered to be in a state of balance, with groundwater recharge and outflow equal to one another (ibid). More recently, residential and industrial growth has increased groundwater pumping demands, and Van Denburgh and Arteaga have determined that these factors have altered the "steady state" condition of the Fernley aquifer (ibid). The Town of Fernley's wells are about 300 feet deep and are drilled into a more confined aquifer than the water-bearing zone near the surface (above 200 feet). The shallower, water-bearing zone was once pumped for domestic supply but its use was discontinued due to drawdown problems (Kramer, Fernley Town Utilities, personal communication, 1994). See Section 3.3.3.2, DOMESTIC SUPPLY, Fernley and Lower Truckee River Area.

Lower Truckee River Area

The aquifers of the Wadsworth area are recharged from outflow from the Fernley basin and more directly from the Truckee River into the shallow aquifers (Sinclair and Loeltz, 1963). These aquifers also discharge back into the Truckee River basin downstream toward Pyramid Lake (Van Denburgh and Arteaga, revised, 1985) and from the shallower strata moving downward to the deeper aquifers (Sinclair and Loeltz, 1963). The water-bearing zone of the three wells drilled by the Washoe County Utilities Division in the Wadsworth area is from 120 to 130 feet below the surface. Water from these wells is of good quality and provides an adequate supply for the existing demand. See Section 3.3.3.2, DOMESTIC SUPPLY, Fernley and Lower Truckee River Area.

Fallon and Lahontan Valley

The major groundwater resources in the Lahontan Valley are contained in the two basic aquifer types (sedimentary and volcanic) that operate beneath the Lahontan Valley. These aquifers may store as much as 200 million AF of groundwater (Glancy, 1986).

3.3.3.1.1 Description of Aquifers

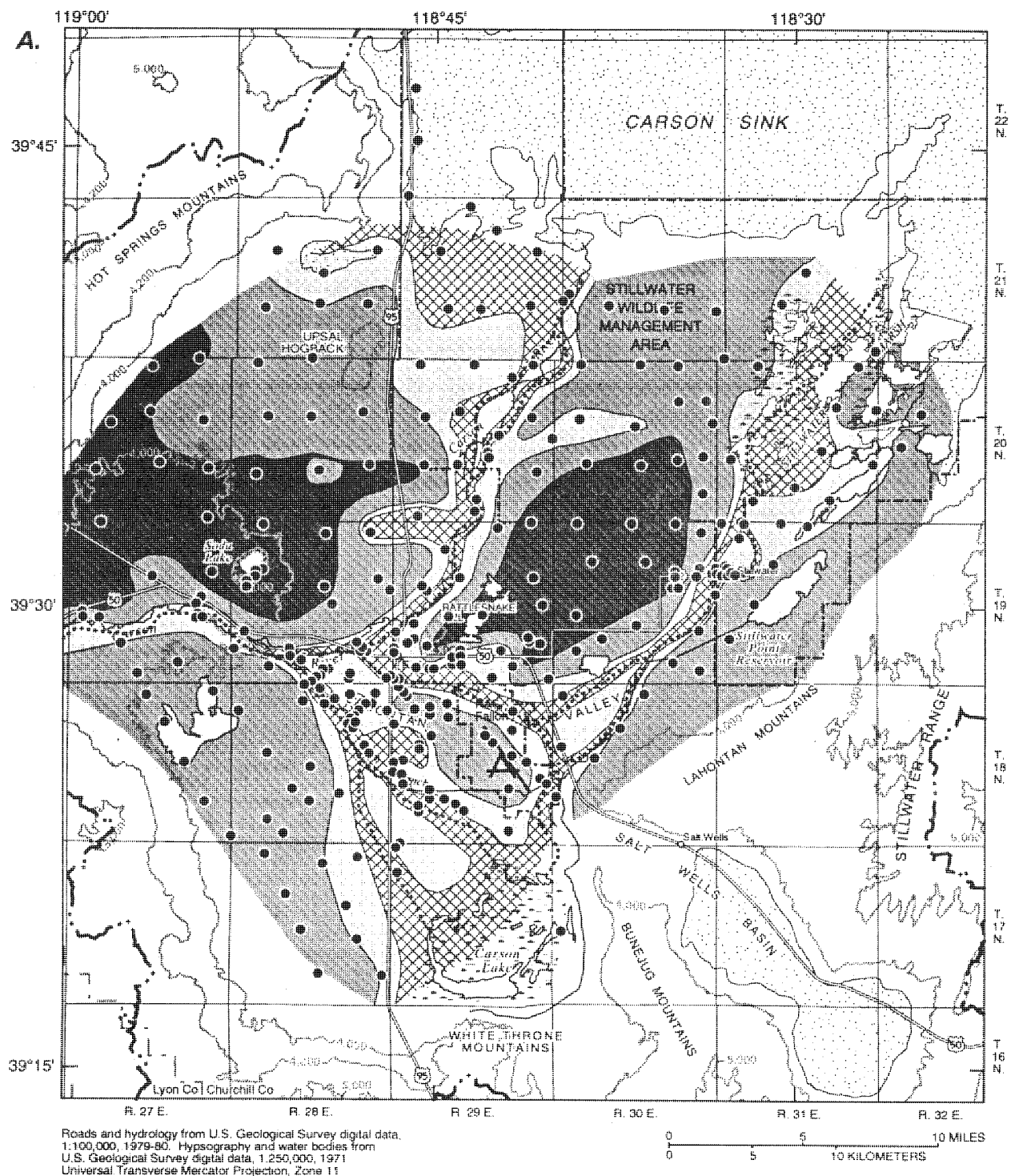
The Lahontan Valley aquifers consist of expansive, unconsolidated sedimentary depositions, a narrower basalt cone, and a deep volcanic layer. The unconsolidated sedimentary aquifers are made up of a mix of river-laid alluvium, alluvial-fan deposits, and lacustrine (ancient Lake Lahontan) sediments (Glancy, 1986). These unconsolidated "alluvial aquifers" provide voluminous underground reservoirs that readily receive, transmit, and store substantial volumes of water. The volcanic, or basalt aquifer underlies the unconsolidated sediment deposits but is exposed at the surface as a vertical volcanic cone (Rattlesnake Hill) that transects the alluvial aquifers.

The "alluvial aquifers" described by Glancy (1986) consist of (1) a shallow aquifer present from the near-surface water table to about 50 feet below land surface, (2) an intermediate aquifer extending from 50 feet to between 500 and 1,000 feet below land surface, and (3) a deep aquifer extending from 500 to 1,000 feet below land surface to between 3,000 and 8,000 feet below land surface.

The basalt aquifer is a mushroom-shaped body of basalt that is exposed near Fallon at Rattlesnake Hill and generally extends from 200 to 600 feet below land surface to more than 4,000 feet below land surface (Maurer and others, 1994).

Shallow Aquifer

The shallow aquifer is a discontinuous hydrogeologic unit created by constantly changing depositional environments that produced a complex mixture of sediment deposits. Glancy (1986) defined the shallow aquifer by its water chemistry (hardness greater than 70 mg/L). The delivery of irrigation water, and construction of canals and drain network for the Newlands Project have changed the water levels in the shallow aquifer (Seiler and Allander, 1993). Maps showing depth to water in 1904 and 1992 are presented in Figures 3.3.C and 3.3.D. *In 1904, before water deliveries began as part of the Newlands Project, depth to the water table in areas along the Carson River and Stillwater Slough was less than 5 feet. At distances greater than 1-2 from the river channels, the water table was more than 10 feet below the land surface. Depth to the water table was more than 25 feet deep in areas to the northeast and northwest of Fallon (Seiler and Allander 1993).*



EXPLANATION

- | | |
|--|---|
| Discharging plays — From Glancy and Katzer (1975, plate 1) | Hydrographic area boundary — From Rush (1968) |
| Depth to shallow groundwater — In feet below land surface | |
| Less than 5 | Topographic contour — Shows altitude of land surface. Contour interval, 1,000 feet, with supplemental contour at 4,200 feet. Datum is sea level |
| 5 to 10 | Channels of Carson River in 1904 |
| 10 to 25 | Well at which depth to water was measured |
| Greater than 25 | |

Figure 3.3.C. Depth to shallow groundwater in the Lahontan Valley, 1904 (from Maurer and others, 1994).

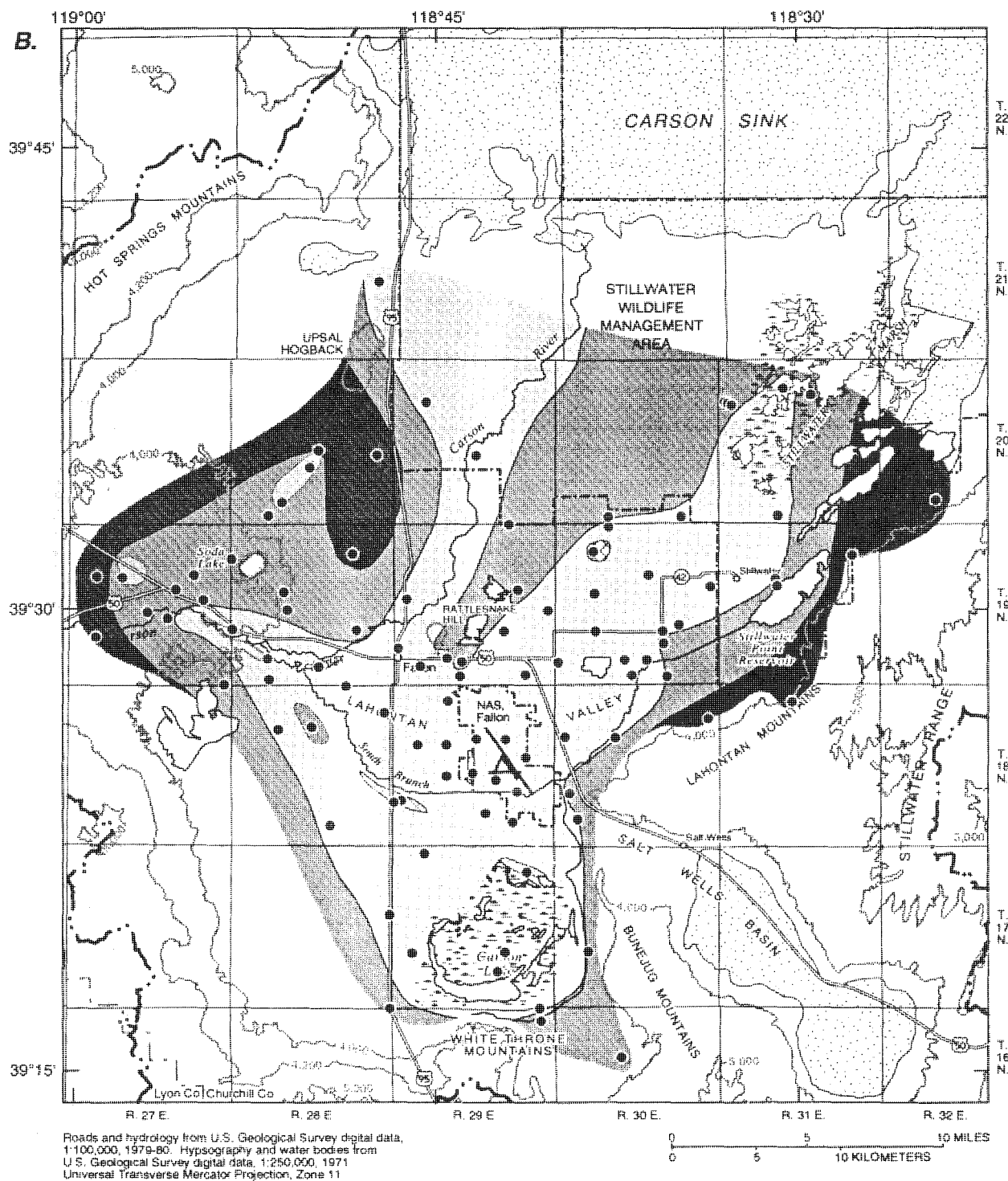


Figure 3.3.D. Depth to shallow groundwater in the Lahontan Valley, 1992 (from Maurer and others, 1994).

The direction of groundwater flow in the shallow aquifer (Figure 3.3.E) is northeastward in the north part of the valley and southeastward in the southern parts of the valley (Maurer and others, 1994). Studies have shown that the direction of shallow groundwater flow varies greatly and is often controlled by the presence of canals and drains (Lico, 1992; Lico and others, 1987).

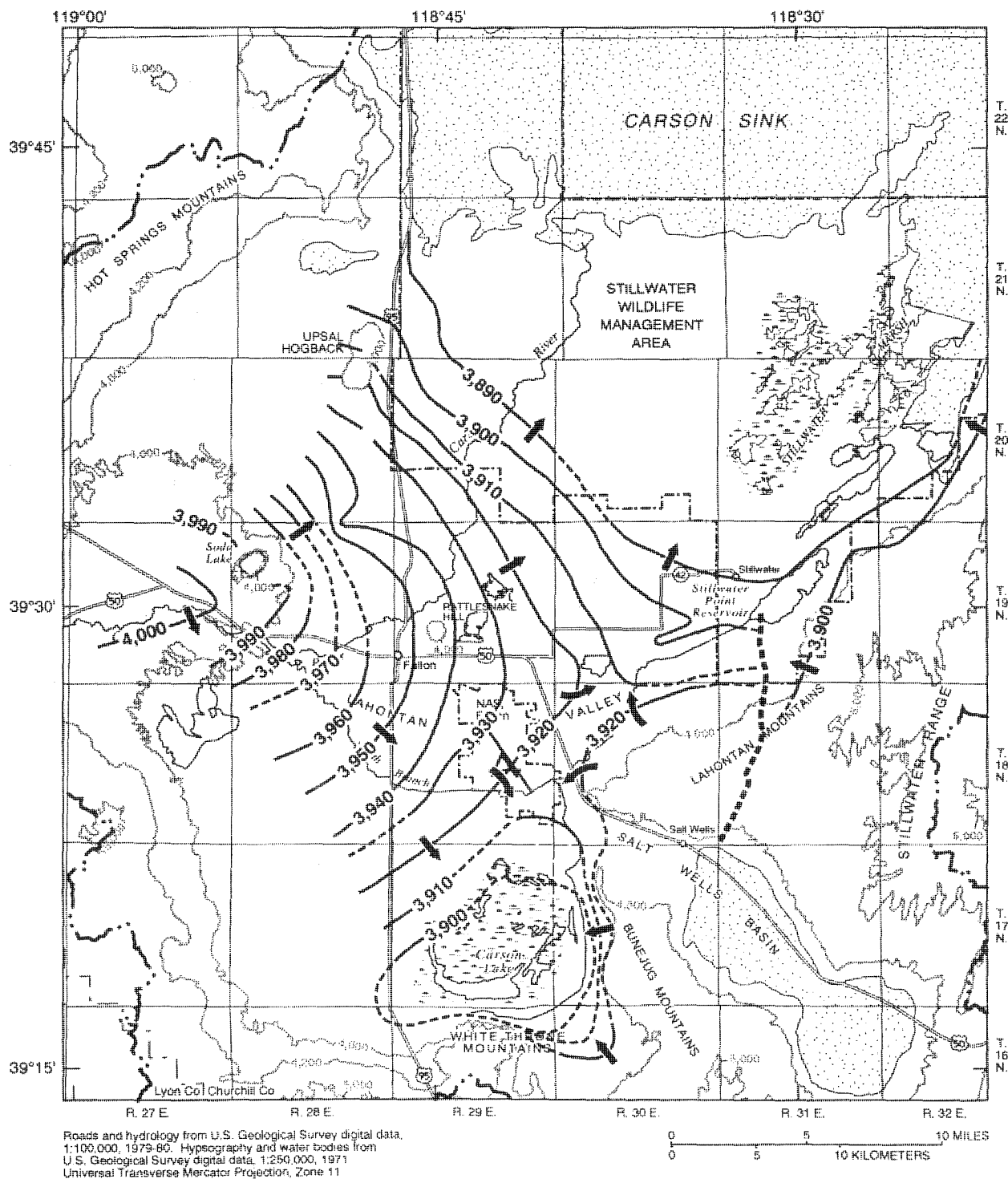
Water quality in the shallow aquifer changes greatly from west to east. Generally this is attributed to the flow gradient and the naturally occurring salts in the soils, with dissolved-solids concentrations ranging from less than 250 mg/L west of Fallon to more than 1,000 mg/L east of town (Glancy, 1986). As shallow aquifer groundwater moves farther to the northeast and southeast, water quality degrades substantially, with dissolved-solids concentrations of more than 40,000 mg/L near Carson Lake (Lico and Seiler, 1993, written communication) and as high as 90,000 mg/L near Stillwater (Lico, 1992). Concentrations of dissolved arsenic range from less than 50 $\mu\text{g/L}$ to over 150 $\mu\text{g/L}$ (Glancy, 1986) and generally exceed the drinking water standard of 50 $\mu\text{g/L}$ for Nevada.

Intermediate Aquifer

The intermediate aquifer, a deeper, unconsolidated sedimentary aquifer, generally extends from 50 feet below the surface to between 500-1,000 feet below the land surface (Glancy, 1986). Groundwater flow in the intermediate aquifer is not as well understood as the shallow aquifer, but Maurer (1994) suggests the flow gradient is from west to east. Well records show the water-bearing zone for the intermediate aquifer to be from 50 feet to 200 feet west of Fallon and from 80 feet to 140 feet east of Fallon (ibid).

Before 1974, the intermediate aquifer was generally not known to be suitable for domestic use and Glancy (1986) reports that only about 100 wells tapped the intermediate aquifer in 1979. It is estimated that as many as 1,000 domestic wells could now tap the intermediate aquifer (Maurer and others, 1994). Few wells have been drilled into the intermediate aquifer to depths greater than 300 feet below the surface, therefore the water properties of this aquifer at depth are largely unknown.

The intermediate aquifer can be characterized by its generally soft water and slightly alkaline (median pH value of 9.1) water chemistry. Dissolved-solids concentrations range from 100 to 1,000 mg/L in this aquifer for the areas west-northwest of Fallon, northeast along the Carson River and perhaps only



EXPLANATION

- | | |
|---|--|
| Discharging playa — From Glancy and Katzer (1975, plate 1) | General direction of ground-water flow — From Sieler and Allander (1993, pl.1) |
| 3,910 — Water-table contour — Shows altitude of water table, 1992. From Sieler and Allander (1993, pl.1). Dashed where uncertain. Contour interval, 10 feet. Datum is sea level | Hydrographic area boundary — From Rush (1968) |
| Zone of faulting thought to control water-table configuration — From Greene and others (1991) | 4,200 — Topographic contour — Shows altitude of land surface. Contour interval 1,000 feet, with supplemental contour at 4,200 feet. Datum is sea level |

Figure 3.3.E. Water-level altitude and general direction of groundwater flow in the shallow aquifer (from Maurer and others, 1994).

5 miles to the southeast of Fallon (Glancy, 1986). In areas farther from Fallon, such as Soda Lake, Upsal Hogback, Stillwater NWR and Carson Lake, the dissolved-solids concentrations degrade substantially, with values of 4,000-8,000 mg/L for wells tapping the intermediate aquifer. Dissolved arsenic concentrations in the intermediate aquifer are less than 25 $\mu\text{g/L}$ in areas west of Fallon, increasing to more than 150 $\mu\text{g/L}$ beneath and southeast of Fallon and are as high as 1,400 $\mu\text{g/L}$ near Stillwater NWR (Glancy, 1986; Rowe and others, 1991). Dissolved arsenic concentrations generally exceed State of Nevada drinking water standards in the intermediate aquifer. In addition, Maurer (1994) cites information from Lico and Seiler (1993, written communication) that indicate State standards are exceeded for manganese (near and west of Fallon), chlorides, and dissolved solids (near Upsal Hogback, Stillwater NWR, and Carson Lake) in this aquifer.

Deep Aquifer

Unconsolidated sediments below 500-1,000 feet are defined as the deep aquifer. The depositional sediments in this aquifer may be 200-8,000 feet in thickness, and volcanic rocks underlie the depositional layer (Glancy, 1986). Little is known about the groundwater flow through the deep aquifer but it is thought to be very slow. In some areas of Lahontan Valley the groundwater in the deeper volcanic zones (8,000-10,000 feet below the surface) is geothermally heated. This geothermal action causes deep aquifer groundwater to rise, contributing as much as 4,000 AF/yr to the intermediate and shallow aquifers in the Soda Lake/Upsal Hogback and Stillwater geothermal areas (Maurer and others, 1994).

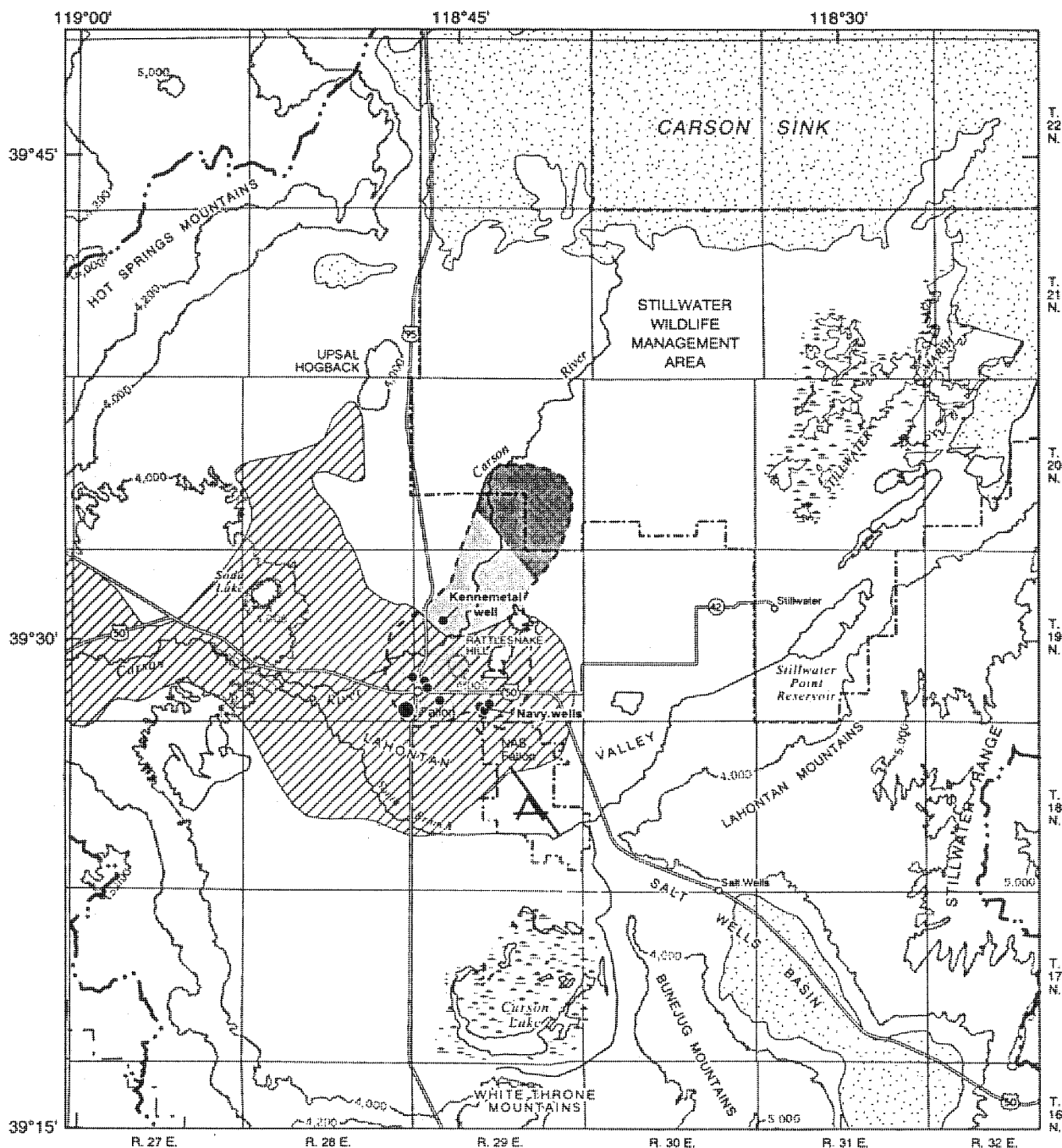
Water quality in the deep aquifer is probably saline with dissolved-solids concentrations averaging about 5,000 mg/L (Glancy, 1986). Olmstead and others (1984) show the geothermal water near Soda Lake/Upsal Hogback areas to have dissolved-solids concentrations ranging from 4,000 to 6,000 mg/L, but the Stillwater geothermal water is more diluted than the shallow and intermediate aquifers (Morgan, 1982). The geothermal water in both areas is distinguished by higher concentrations of silica and fluoride as compared with non-geothermal groundwater (Morgan, 1982; Lico and Seiler, 1993, written communication).

Basalt Aquifer

The basalt aquifer is comprised of a basaltic mass ranging from dense, fractured lava flows to basalt rubble and cinders between the flows, which is exposed at Rattlesnake Hill (Glancy 1986; Maurer and others, 1994). The approximate hydrographic boundary of the basalt aquifer is depicted in Figure 3.3.F. The basalt that forms the aquifer appears to be a mushroom-shaped mass (Glancy 1986). The canopy of the mushroom-shaped mass is approximately 400 to 600 feet below the surface to the south, west and northwest of Rattlesnake Hill (Maurer and others, 1994). To the northeast (generally), this canopy becomes constricted and slightly elongated, and reaches a depth of about 200 to 300 feet 5 miles northeast of Rattlesnake Hill (Glancy 1986; Maurer and others, 1994). It has not been encountered by wells more than 700 feet deep to the east and south of Rattlesnake Hill (no wells tap the basalt aquifer at depths greater than 600 feet). The basalt mass decreases in lateral extent between 1,000 and 4,000 feet below the land surface (ibid).

The basalt aquifer is the most prolific in the Fallon area and is the main source of water for the City of Fallon, Fallon Paiute-Shoshone Reservation, NAS-Fallon, and Kennametal, Inc. Wells tapping the basalt aquifer produce more than 1,000 gal/min with a fairly rapid recharge rate. Water levels in the basalt aquifer show a fairly flat gradient with a slight movement toward the northeast of Fallon (Maurer and others, 1994). Maurer and others (ibid) cite information showing that water withdrawals from the basalt aquifer have increased from about 1,700 AF/yr in the 1970s to more than 3,000 AF/yr in 1992. Wells that now tap the basalt aquifer extend about 500-600 feet below land surface although the aquifer is more than 4,000 feet deep. Water levels declined in the basalt aquifer between 1971 and 1992 (Maurer and others, 1994) as illustrated in Figure 3.3.G. Water use rates now appear to be greater than recharge rates, which could indicate that the aquifer is being mined.

Groundwater quality in the basalt aquifer is similar to that found in the shallow and intermediate aquifers. The water chemistry characteristics of the basalt aquifer are described as alkaline (median pH of 9.3), sodium bicarbonate chloride water that is uniformly soft (Glancy, 1986). Glancy suggested that the groundwater in the basalt aquifer is a blend of fresh and saline water, with *the saline water coming from deeper surrounding aquifers, and the fresh water coming from the shallow and intermediate aquifers closer to the surface.*



Roads and hydrology from U.S. Geological Survey digital data, 1:100,000, 1979-80. Hypsography and water bodies from U.S. Geological Survey digital data, 1:250,000, 1971. Universal Transverse Mercator Projection, Zone 11.

0 5 10 KILOMETERS
0 5 10 MILES

EXPLANATION










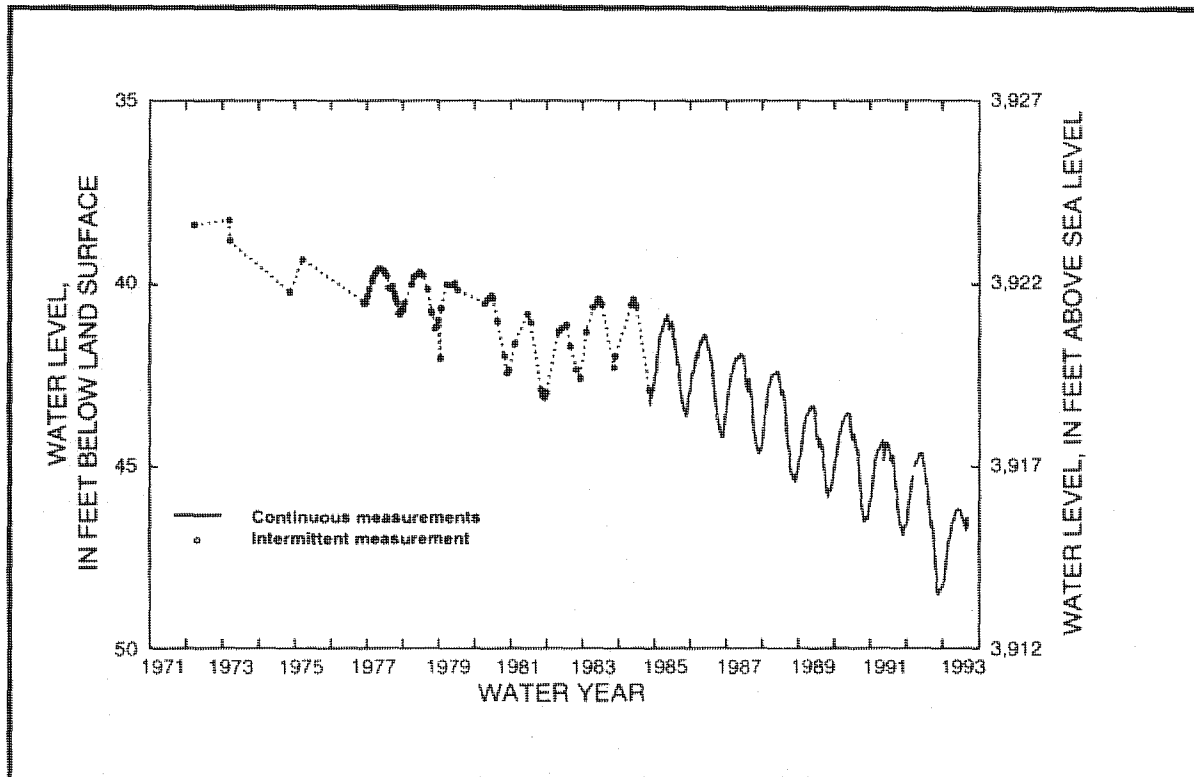
- | | | | |
|---|---|---|---|
|  | Discharging plays — From Glancy and Katzer (1975, plate 1) |  | Hydrographic area boundary — From Rush (1968) |
|  | Downward vertical gradient from shallow aquifer to intermediate aquifers in late 1970's; beneath valley floor outside this area, vertical gradient was upward from intermediate aquifer to shallow aquifer in late 1970's and 1992 — Modified from Glancy (1986, fig. 26) |  | 4,200 — Topographic contour — Shows attitude of land surface. Contour interval, 1,000 feet, with supplemental contour at 4,200 feet. Datum is sea level |
|  | Downward vertical gradient from shallow and intermediate aquifers to basalt aquifer in late 1970's — From Glancy (1986, fig. 10) |  | Extent of basalt aquifer at depth of 600 feet — From Glancy (1986, fig. 2) |
|  | Upward vertical gradient from basalt aquifer to shallow and intermediate aquifers in the late 1970's — From Glancy (1986, fig. 10) |  | Well in basalt aquifer where water-level fluctuations have been measured from 1971 to 1992 (see fig. 13) |
| | |  | Well where withdrawals are made from the basalt aquifer for municipal and industrial use |

Figure 3.3.F. Extent of basalt aquifer and directions of vertical gradient among shallow, intermediate, and basalt aquifers (from Maurer and others, 1994).

Figure 3.3.G BASALT AQUIFER LEVELS



Source: USGS

Dissolved-solids concentrations in basalt aquifer wells range from about 300 to 700 mg/L with arsenic concentrations ranging from 70 to 140 $\mu\text{g/L}$ (Maurer and others, 1994). As with the other sedimentary aquifers, arsenic levels exceed State of Nevada drinking water standards. Analysis of basalt aquifer water quality data from 1962 to 1992 shows a *statistically significant* increase in chloride concentrations (Maurer and others, 1994).

3.3.3.1.2 Groundwater Recharge

Groundwater hydrology in the Lahontan Valley is complex and *not fully understood*. A conceptual groundwater flow system (Figure 3.3.H) was developed by Maurer and others (1994) to study the potential effects of water use changes in Lahontan Valley. The recharge flow patterns for the different aquifers vary dramatically, especially in terms of circulation periods- the time it takes for water to move through an aquifer. The geothermal aquifer, which may extend throughout the valley at depths of 10,000 feet, experiences a full circulation period every 35,000 years. The shallow aquifer, which *is discontinuous but* extends across the valley, is often only

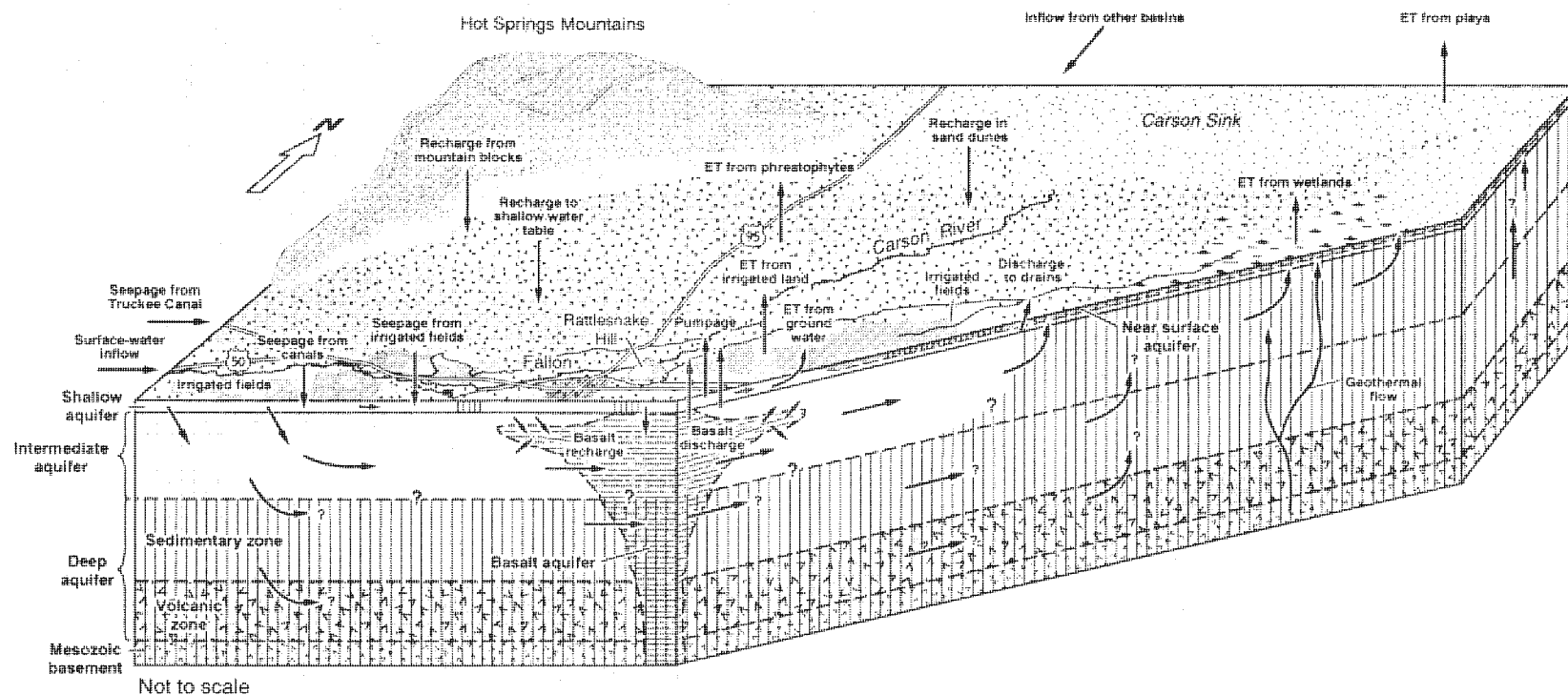


Figure 3.3.H. Conceptualized groundwater flow paths and sources of inflow to and outflow from aquifers in the Carson Desert. ET, evapotranspiration. Boundaries between aquifers are dashed lines where uncertain; arrows depicting groundwater flow paths are queried where uncertain. Vertical line pattern indicates possible extent of nonpotable water (from Maurer and others, 1994).

10 feet below the surface, and circulates water over distances as short as 200 feet every few days (Maurer and others, 1994).

Shallow Aquifer

Recharge of the shallow groundwater aquifer is dominated by the Lahontan Valley surface-water system (*Newlands Project irrigation*). The shallow aquifer is highly susceptible to contamination from land-use activities (dumped contaminants, pesticides, and septic leachate) because of the proximity of the water table to the surface. Lahontan Reservoir releases, irrigation deliveries, drainage systems, and evapotranspiration all affect the recharge, flow and discharge of the shallow aquifer.

USGS has used a network of wells in the Lahontan Valley to monitor changes in shallow aquifer levels in the area (Seiler and Allander, 1993). Data from these wells, as reported by Seiler and Allander (1993), indicate that water levels of the shallow aquifer have varied during the past 20 years, largely in response to wet and dry periods. According to their report, water levels in the shallow aquifer appear to have changed little during the period 1977-1992. The median (similar to "average") water level change in 14 shallow aquifer wells between 1977 and 1992 was a decline of 0.58 feet (the maximum decline was 2.7 feet in one well). Between 1977 and 1992, the median change in water levels was a rise of 2.13 feet (the maximum rise was 2.67 feet in one well), based on 5 wells. The rise in water levels likely was a consequence of the 1980-1984 period being wetter than average. Between 1984 and 1992, water levels declined, corresponding with the drier than average conditions during that period.

Seiler and Allander (ibid) used the difference between the shallowest measured water level during 1983-1984 (during a wetter-than-average period) and the deepest measured water level in 1992 (during a drier-than-average period) as an index of the 1984 to 1992 decline in the water levels in the shallow aquifer. The median change in water levels for 13 wells, based on this analysis, was a decline of 2.49 feet; the maximum decline was 7.53 feet in one well. The median change of about 2.5 feet may represent the change in water level between a wetter-than-average period and drier-than-average period; i.e., the median change in water levels should not vary more than 2.5 feet over the long term. Between 1988 and 1992, the median water level change in 10 wells was a decline of 1.35 feet (a maximum figure was not provided in the report).

Seasonally, changes in water levels in the shallow aquifer are strongly related to seasonal changes in water lost along unlined canals and irrigation of fields (ibid). In 1992, water levels in many wells in irrigated areas rose 1 to 2 feet during the irrigation season. Conversely, wells located away from canals and agricultural areas showed little seasonal change in water level (ibid).

Water levels were also shown to change as a consequence of canal lining. The most dramatic decline in the shallow aquifer water table was observed in wells adjacent to the T-Line Canal after it was lined with concrete (ibid). Water level declines in wells along the T-Line Canal ranged from 7.5 feet to more than 10 feet. According to Maurer and others (1994), when major canals are lined (or abandoned) within areas taken out of production, water levels could decline to more than 10 feet below the land surface within one or two miles of these canals. The above information suggests that some methods of improving irrigation delivery efficiency have the potential to affect shallow aquifer recharge.

The amount of surface water moving from the irrigation delivery system into the shallow aquifer is controlled by:

- (1) the frequency and duration of flow through the canals,
- (2) the proximity of the water table to the canals, and
- (3) the soil moisture content and hydrologic conductivity (seepage rate) of the canals.

The volume of water lost to the shallow aquifer from the irrigation delivery system ranged from about 102,000 AF/year to as much as 170,000 AF/yr prior to the 1988 OCAP (Maurer and others, 1994). Under baseline conditions, irrigation delivery losses are expected to be about 80,600 AF/year on average.

The greatest interchange of surface water with the shallow aquifer probably occurs where unlined canals and drains intersect relict sand channels of the Carson River (Maurer and others, 1994). An excellent example of this occurs on the A-Line Canal about 5 miles southwest of Fallon where the canal follows a relict channel for about 3.5 miles.

The amount of irrigation water percolating to the shallow aquifer beneath irrigated farm fields is controlled by:

- (1) the amount of water applied to the field,
- (2) the soil's water-holding capacity and moisture content,
- (3) evapotranspiration, and
- (4) the rate of groundwater discharge to surface soils.

The volume of water that percolates to the shallow aquifer from farm irrigation ranges from 48,000 AF/year to 70,000 AF/year based on pre-1988 OCAP conditions (Maurer and others, 1994). *Based on the report by Maurer and others (ibid), it is estimated that the on-farm losses under baseline conditions will be approximately 42,700 AF/year due to more efficient on-farm irrigation practices and the acquisition of 20,000 AF of water rights under baseline conditions.*

The principal recharge area for the shallow aquifer is west of Fallon along the Carson River and major canals (Seiler and Allander, 1993). Groundwater moves laterally in the aquifer eastward and divides, with some lateral flow moving toward Stillwater marsh and the Carson Sink and some going southeast to Carson Lake. Due to the discontinuous nature of the aquifer, lateral recharge can be impeded by depositional clay lenses and recharge is very localized. The areas northeast and southeast of Fallon are regional discharge areas for the shallow aquifer, where groundwater flows into the drains or moves upward to the surface soils and is subject to evaporation. Groundwater from the shallow aquifer also is taken up (consumptive use) by agricultural crops and vegetation in the Lahontan Valley. Maurer (1994) summarizes numerous consumptive use studies and estimates that vegetative use from the shallow aquifer amounts to about 50,000 AF/year. Groundwater flow from the shallow aquifer into Newlands Project drains probably accounts for about half of the drainwater inflow to the wetland areas with the remaining drainwater coming from surface water discharges. Maurer (ibid) suggests that a minimum inflow from the shallow aquifer to the drains is about 36,000 AF/year which is approximately 60 percent of the total 1989 wetland inflow (see Section 3.3.1, SURFACE WATER QUANTITY, Drainwater Inflow to Primary Wetlands).

Intermediate Aquifer

Recharge of this aquifer comes from downward flow through the shallow aquifer on the western side of the Lahontan Valley. Quantitative estimates show shallow aquifer flow to the intermediate aquifer to be about 32,000 AF/year (Maurer and others, 1994). Maurer (1994) indicates that the permeable relict river channels in the western portion of the valley create

preferential flow paths for recharge. In the west-central and central parts of the valley there is seasonal potential for downward flow from the shallow aquifer to the intermediate aquifer from canal irrigation water and agricultural applications. This downward flow is slowed by the ever-increasing presence of alluvial clay deposits in the aquifers. On the eastern side of the valley, clay deposits are more prevalent, slowing groundwater movement. Once again, the permeable relict river channels provide preferential flow paths for horizontal flows when they cut through these clay deposits.

In the eastern portions of the valley, the intermediate aquifer recharges the shallow aquifer with an upward vertical flow. Maurer and others (ibid) estimate that there is about 21,000 AF/year of upward vertical flow from the intermediate aquifer to the shallow aquifer. This upward flow, combined with evapotranspiration from the shallow aquifer, would account for the increased dissolved-solids concentrations of groundwater on the eastern side of the Lahontan Valley.

Deep Aquifers

Groundwater flow through the deep aquifer is not well understood. Maurer and others (ibid) suggest there is some recharge of the deep aquifer from downward flow from the intermediate aquifer, but they make no quantitative estimate of the volume of recharge. This study (Maurer and others, 1994) further speculates that there is vertical flow from the deep aquifer upward into the intermediate aquifer. A deep volcanic aquifer could exist below the deep aquifer and there is probably some interbedding of deep aquifer sediments and volcanic rocks which suggest that groundwater from the deep aquifer could supply some recharge to the basalt aquifer (Glancy, 1986).

Basalt Aquifer

Little is known about the flow paths from the shallow, intermediate, and deep aquifers to the basalt aquifer. Maurer and others (1994) suggest that the basalt aquifer is recharged by the sedimentary aquifers. Municipal pumping of the basalt aquifer appears to induce additional recharge from the shallow aquifer. *The downward and lateral recharge of the basalt aquifer occurs through the preferential flow path provided by the permeable sediments between the volcanic plug that constitutes the basalt aquifer and the shallow, intermediate, and possibly deep aquifers overlaying and immediately surrounding the basalt aquifer (Figure 3.3.F) (Maurer and others,*

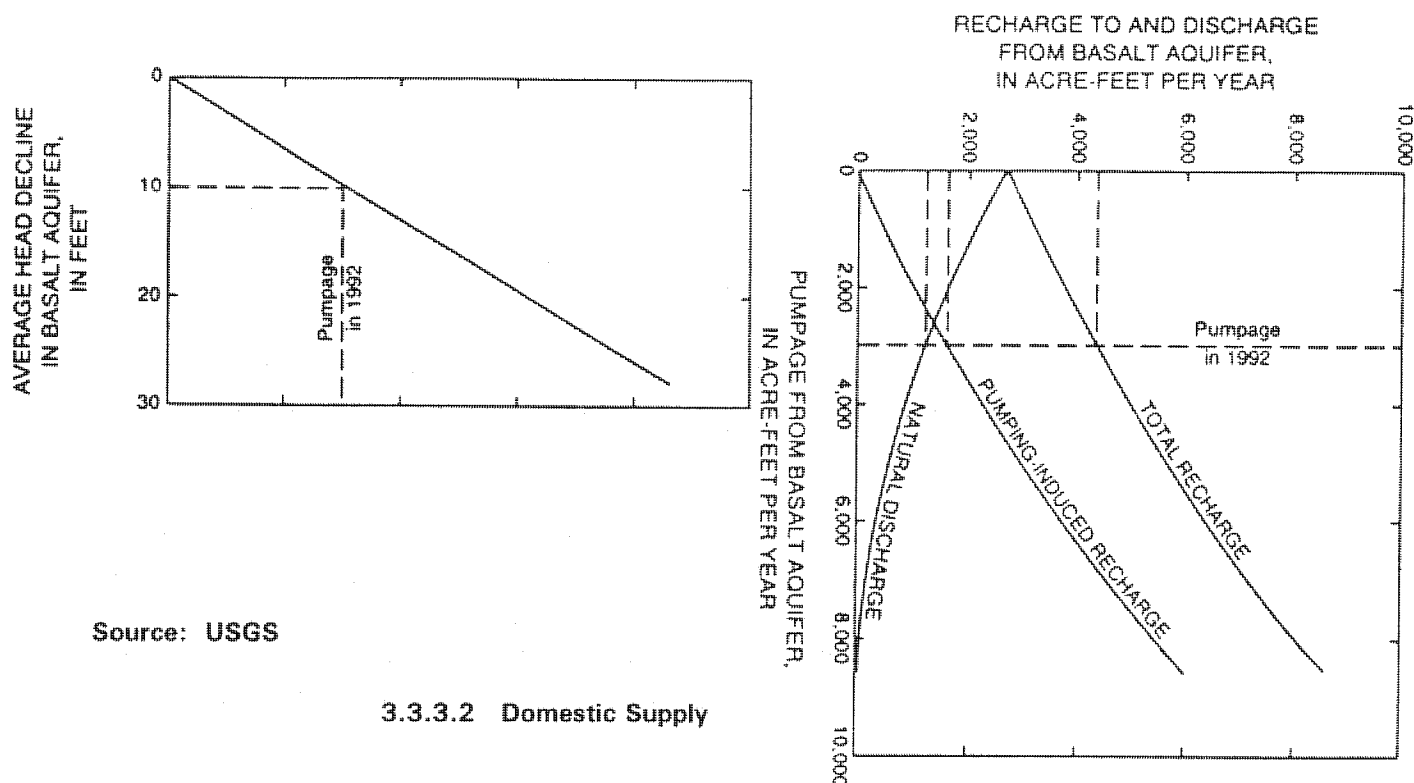
1994). *Because changes in canal and on-farm losses can affect shallow aquifer recharge (Seiler and Allander, 1993; Maurer and others 1994) and because the basalt aquifer receives at least some water recharge from the shallow aquifer immediately above the basalt aquifer (Glancy 1986; and as depicted in Figure 3.3.F), reducing canal losses and on-farm losses within the area delineated by the basalt aquifer could potentially reduce basalt aquifer recharge. Reduced canal losses in this area would likely have a greater impact than reduced on-farm losses (Maurer and others 1994). It is unclear whether, or to what extent reduced shallow aquifer recharge outside of the basalt aquifer area would have on basalt aquifer recharge. The rate of downward flow from the land surface and shallow aquifer to the basalt aquifer is related to the degree of pumping stress (Glancy, 1986) induced by municipal users.*

Historically, the long-term, permanent recharge source for the basalt aquifer has been the Carson River (Glancy, 1986). Carbon dating of groundwater from basalt aquifer wells in the far northeastern portion of the aquifer show water as old as 8,800 years, while samples from wells nearer to Fallon show younger water, aged 1,100-4,400 years (Glancy, 1986). This suggests two things:

- (1) that the majority of recharge to the basalt aquifer from the Carson River occurred a long time ago, and
- (2) that the water in the basalt aquifer is blended with newer, younger sources, such as irrigation-canal and on-farm losses, providing recharge.

The basalt aquifer also discharges horizontally to the east into the sedimentary aquifers. If municipal pumping increases (Section 4.26.12, CUMULATIVE EFFECTS, GROWTH AND DIVERSIFICATION) from the current rate of about 3,000 AF/year to more the 8,000 AF/year, (Figure 3.3.I) the basalt aquifer will eventually cease this natural discharge to the shallow and intermediate aquifers to the east (Glancy, 1986). More critical is the possibility that pumping-induced recharge, which draws recharge water in as water is pumped out, may effect an upward movement of volcanic or deep aquifer recharge. These deeper sources of recharge are of poorer quality and could degrade water quality in the current production zones of the basalt aquifer. Evidence of this possibility is cited by Maurer and others (1994) in their analysis of water quality data showing a continued long-term increase in chloride concentrations of basalt aquifer wells.

Figure 3.3.1 BASALT AQUIFER RECHARGE AND PUMPING EFFECTS



Source: USGS

3.3.3.2 Domestic Supply

Middle Carson River Area

There are two major water purveyors in the Middle Carson River area: the Dayton Town Utilities and the Silver Springs Mutual Water Company. Both are experiencing rapid growth and area purveyors expect to expand service in 1995. The Silver Springs water company has 5 wells and serviced about 750 residences and businesses in the area. Dayton Town Utilities has 27 wells within its service district that serve about 1,800 residences and businesses. Dayton Town Utilities officials estimate that another 1,000 residences rely on individual domestic supply wells within their service area. There are a couple of major private commercial wells (1,500 gal/min) in the Dayton area that provide water for industrial or commercial use. The largest of these commercial uses may be the Dayton Valley Country Club golf course well, which pumps about 30 million gallons of water a year to keep golf course ponds full (Lawson, personal communication, 1994).

Fernley and Lower Truckee River Area

The Town of Fernley Utility has five wells and pumps from two of those to provide service to about 1,750 businesses and residences. There may be as many as 200 individual domestic supply wells in the area plus a few major

industrial wells (e.g., Nevada Cement Company) that rely on groundwater. Because the area relies on Newlands Project seepage and canal losses for groundwater recharge, Fernley residents and town officials are concerned that changes in Newlands Project operations may cause aquifer levels to drop, resulting in an inadequate public water supply. Under baseline conditions, the 20,000 AF water rights acquisition for the Lahontan Valley wetlands is not expected to alter Newlands Project operations in the Truckee Division.

Washoe County provides water to residents of the Stamp Mill subdivision near Wadsworth, Nevada, from two wells in the area. In addition, the County has the Gregory Street well in the town of Wadsworth, which was drilled to supply irrigation water to the community. The Stamp Mill subdivision wells provide metered service to approximately 30 residences, but have the potential to provide domestic water for up to 400 hook-ups (Svetich, Washoe Utilities Division, personal communication, 1994).

Residences in and around the Pyramid Lake Paiute Reservation, Wadsworth, and Nixon, rely on a number of individual domestic supply wells. There is one community well for the Pyramid Lake Paiute Tribal housing project in Wadsworth. There are plans to expand the Washoe County's Stamp Mill water system into reservation lands in the Wadsworth area. This would provide a more reliable and better quality source of water to residences on the reservation.

Fallon and Lahontan Valley

The number of domestic water supply wells tapping the shallow aquifer is estimated to be about 4,500. Although the Churchill County Health Department maintains records of domestic wells, it has not tabulated the number of active wells (Maurer and others, 1994). Based on drillers' logs and other reports (Glancy, 1986), Maurer and others (1994) estimate as many as 1,000 domestic supply wells tap the intermediate aquifer. There may be 20 or so wells drilled into the basalt aquifer, and the City of Fallon, Fallon Paiute-Shoshone Tribes, NAS-Fallon and Kennametal, Inc., wells are the major production wells. There are a limited number of wells drilled into the deep aquifer and few are known to be active. There are a number of geothermal wells drilled in the Upsal/Hogback and Stillwater geothermal areas, but they are not utilized for domestic supply.

The Service estimates that under existing conditions, total demand for domestic water supply in Fallon and Lahontan Valley amounts to 10,000 AF/year from the shallow and intermediate aquifers. This calculation is based on the number of known active groundwater wells in Lahontan Valley, and assumes an annual pumping rate of about 2 AF/year (the maximum volume allowed by the State of Nevada for domestic wells.) Withdrawals from the basalt aquifer totaled about 3,000 AF/yr for 1992 (White and Fields, 1993, written communication).

Using a total of 13,000 AF/yr as the baseline domestic supply demand (from shallow, intermediate and basalt aquifers), per capita water use (based on a Churchill County population of 19,850 (Nevada State Demographers Office, written communication, 1995), is about 0.675 AF/year or about 600 gallons/day. This value is high for per capita demand because it relies on the maximum volume allowed, which is a high-end scenario. The City of Fallon metered water shows that per capital demand for domestic supply amounts to about 250 gallons/day. In rural areas, where larger parcels are irrigated, it is expected that landscaping and gardens would lead to higher per capita use.

3.4 VECTORS, EROSION, AND AGRICULTURAL PESTS

The control of noxious or annoying substances, conditions, plants or animals is generally a desired goal in most communities. Only Lahontan Valley is addressed in this section, as it is the area where these resources could be impacted by the action alternatives.

3.4.1 VECTOR CONTROL

The Churchill County Mosquito Abatement District (CCMAD) was formed in 1985 to provide public health protection to the citizens and visitors of Churchill County from the annoyance and potential disease transmitting mosquitoes occurring in the county. CCMAD uses both non-chemical and chemical techniques to control mosquito populations within tolerable levels. CCMAD's intent is to use those techniques that will cause the least adverse impact to the environment while providing the highest level of mosquito control. (CCMAD, written communication, Sept. 1, 1995.)

Mosquitoes require water to successfully complete their life cycle. Within Churchill County, there are 11 mosquito species in 4 different genera. They can be separated into those that can lay their eggs on soil and debris, and those that lay their eggs on the water. Fluctuating water levels are conducive for Aedes species, which lay their eggs on the soil. By keeping the water level at a particular level for several weeks or longer, Aedes mosquitoes do not

develop succeeding generations. By keeping water levels constant, Culex, Culiseta, and Anopheles species will develop succeeding generations. Culex tarsalis, a standing water species, is the most abundant mosquito in the affected area, and is a known vector for Western equine and St. Louis encephalitis, diseases that affect humans and horses. To date, there have been a few cases of human and horse mosquito-borne encephalitis in Nevada (ibid.). More detailed information on mosquito species in the affected area is included in CCMAD's Comments in Appendix 11.

Mosquitoes hatch and develop in areas of standing water, such as ponds, drainage ditches, shallow reservoirs, irrigated pastures, wetlands, and other natural and artificial depressions which intermediately hold water. Continuous wetting and drying of lands create conditions that are most conducive to hatching of floodwater mosquitos, or Aedes species (O'Brien, oral communication, 1994). Standing-water mosquito species usually develop in 7-20 days.

Generally, mosquitoes can disperse about 5-10 miles from where they hatch. One species found in the area has a range of more than 20 miles (ibid). Mosquitoes can be transported greater distances by the wind and can be problematic throughout Lahontan Valley during the warmer months of spring and summer.

Several species are capable of transmitting diseases including encephalitis in humans and horses and one species is capable of transmitting heartworm in dogs. Each year, encephalitis is detected in sentinel chickens in Churchill County (CCMAD, written communication, Sept. 1, 1995). Although cases of encephalitis in humans is rare in the county, it is of concern to CCMAD.

CCMAD has an annual budget of about \$250,000-\$275,000 to control mosquitoes. CCMAD uses non-chemical and chemical techniques to control mosquito populations. Biological controls, such as the use of mosquito fish and bio-rational pesticides are emphasized over chemical control. Larval/pupal control oils and insecticides to control adult mosquitos are used as a last resort when biological controls would be ineffective or the timing is wrong for biological controls (ibid). A detailed list of CCMAD's mosquito control techniques is included in the CCMAD Comments in Appendix 11.

Under baseline conditions, mosquitoes occur in both artificial and natural depressions that hold water in the affected area. Mosquito abatement is required for the comfort of Churchill County residents.

3.4.2 EROSION CONTROL

Wind is the primary cause of soil erosion in Lahontan Valley, and wind erosion is believed to be the principal source of dust in Lahontan Valley. The Natural Resource Conservation

Service (NRCS) has developed a process called the Wind Erosion Equation (WEQ), to estimate potential wind erosion for specific soils, land forms, and vegetative covers. The WEQ has been calibrated and adjusted for use in the Lahontan Valley by NRCS and is generally suited to evaluations of individual parcels or tracts of land. Winds are considered erosive when they reach a velocity of 13 miles/hour at 1 foot above the ground, *or 18 miles/hour at 30 feet above the ground surface*. The peak winds predominately come from the west and southwest in Lahontan Valley. The critical months for wind erosion in Lahontan Valley are March and April.

Strong winds which create soil erosion may cause particulate concentrations to be high where vegetation is removed due to man-made or natural causes (Nevada Division of Environmental Protection, Bureau of Air Quality, written communication, 1994). Disturbed lands that leave bare, loose soil during the critical months, and farming practices such as new plantings or crop rotations that till the land, add to the serious wind erosion problems in Lahontan Valley. NRCS recommends various farming practices to help manage or reduce wind erosion for agricultural lands.

Vegetative cover and crop residue are the most important aspect of controlling or reducing wind erosion. NRCS is conducting a revegetation plant materials study on abandoned farmlands in the Lahontan Valley. Based on observations of previously abandoned farmland and results of research, NRCS (written communication, 1995) has appraised that natural revegetation of abandoned sites could take from 30 to 100 years. This appears to be in reference to the establishment of late successional, and possibly climax, vegetation communities. Pioneering vegetation (including weeds) that invade vacant lands (lands that are no longer irrigated to grow a crop) or disturbed lands can offer protection from wind erosion. Weed problems are addressed in the following section.

Revegetation work in other parts of Nevada show native shrub species can become established on disturbed areas that receive only natural rainfall in as few as four years (Borteilho, personal communication, 1994). Beginning in 1990, the Bullfrog Mine in Nye County broadcast seeded 160 acres on waste rock dump overburden as part of its reclamation work. Native species such as fourwing saltbush, spinach saltbush, ryegrass, shadscale, creosote, and deburred ambrosial dumosa established on 40 percent slopes receiving an average of 8.4 inches of rainfall per year (ibid; and Borteilho, 1995). After four years, native shrubs were 1-3 feet tall, and an understory of grasses and other native species was fully established (Borteilho, personal communication 1994).

Based on this information, the Service expects that under baseline conditions, natural revegetation of disturbed lands could occur within four years for some species. Beginning in the fall of 1994, the Service revegetated about 200 acres of acquired farmlands. The Service will likely continue to revegetate acquired lands that are within the Stillwater NWR boundary. There are no State or County regulations or laws requiring the Service or private

property owners to revegetate disturbed or vacant lands. In those cases where farmlands are converted to residential use, homeowners will most likely landscape their properties. Under baseline conditions the Service is not revegetating acquired lands that are located outside the refuge boundary.

Under baseline conditions, the Carson Sink playa is extremely susceptible to wind erosion, as evidenced by the large dust clouds that occur during critical periods.

3.4.3 AGRICULTURAL PESTS

Agricultural pests include weeds, vertebrate pests (e.g., rodents and rabbits), and invertebrate pests (e.g., aphids).

TCID and most farmers take steps each year to control weeds on or around farm fields and irrigation canals. The two Conservation Districts (Lahontan and Stillwater) both encourage and promote programs and assist farmers with weed control. The Nevada Department of Agriculture lists 16 noxious weed species statewide. Plants that invade an area, are undesirable, or have low forage value for livestock are often classified as weeds. When lands are cleared of native plants and the soil is disturbed or the agricultural crops are no longer irrigated, the lands are susceptible to invasion by weed species.

The most common weeds in the Lahontan Valley are kochia, Russian thistle, Russian knapweed, gumweed, pepper weed, and hoary cress. Of these weeds, only Russian knapweed is listed as a noxious weed species for Nevada. Gumweed *and kochia* are native to the western United States, but the other weed species have been introduced from other continents. Kochia, while considered a weed by many, has at times been harvested as feed for livestock and does have some forage value.

Weeds can be controlled by burning, irrigating, cultivating, spraying with chemicals, or planting other species (revegetation). Generally all of these methods are employed in the Lahontan Valley to control weeds. The conservation districts encourage the revegetation of lands if they are left *vacant*. The City of Fallon regulates weed control on vacant lands within the city. Churchill County has no rules or regulations requiring property owners to control weeds or revegetate lands that have been cleared or destroyed. *Revegetation is addressed in the previous section.*

Pocket gophers appear to be the most costly mammal pest to alfalfa producers in Nevada based on a Nevada-wide survey of alfalfa producers (Lewis, 1989). Other vertebrate pests include black-tailed jackrabbits and ground squirrels. The Nevada-wide survey revealed that pocket gophers are present on nearly 90 percent of alfalfa farms in Nevada, and that about 80 percent of farmers practice at least some level of control. Apparently, pocket gophers

pose the biggest vertebrate pest problem in Churchill County (Nevada Cooperative Extension, oral communication, 1996). Pocket gopher mounds can reduce alfalfa hay quality (ibid); their tunneling can damage irrigation delivery ditches (NRCS, written communication, 1995), and their activities in general can reduce hay yield and damage equipment (Lewis, 1989).

Alfalfa producers in Nevada generally rated rodent and rabbit damage and control costs as the second highest management cost (Lewis, 1989), with weeds rated third highest, meaning that substantial costs likely occur under baseline conditions.

3.5 AIR QUALITY

Air quality is defined by the concentration of various pollutants in the atmosphere. The Federal Clean Air Act, (as amended in 1970, 1977, and 1990) established standards for air quality and the authority of the U.S. Environmental Protection Agency (EPA) to enforce the standards. In Nevada, the State has the authority to implement the air quality program with the Nevada Revised Statutes (NRS) 445.401 - 445.601 stating the powers of the State and the state standards. The Nevada standards are equal to, or more stringent than, the Federal standards (National Ambient Air Quality Standards) set by EPA. The pollutants addressed by air quality standards are: nitrogen dioxide, total suspended particulates (TSP), inhalable particles (PM_{10}), sulfur dioxide, ozone, carbon monoxide, lead, and hydrogen sulfide.

The Clean Air Act, as amended, established deadlines for states to attain their own or Federal air quality standards and required the states to designate areas as attainment, non-attainment, or unclassifiable areas, as determined by air quality. Areas designated to be in non-attainment for ozone or PM_{10} are required to implement more stringent regulatory controls in order to achieve air quality standards.

In December 1991, Nevada adopted PM_{10} as the ambient standard for suspended particulate matter, replacing TSP counts. Suspended particulates that are less than 10 microns (PM_{10}) are considered to be inhalable and correlate to adverse health effects of particulates. The Nevada standards for PM_{10} are 50 micrograms per cubic meter ($\mu g/m^3$) for the annual arithmetic mean and 150 $\mu g/m^3$ for a 24-hour period.

Since May 1993, the State of Nevada Division of Environmental Protection's Bureau of Air Quality has regularly monitored PM_{10} levels at a sampling station in Fallon. The results of this sampling (62 recordings available) show an arithmetic mean of 35 $\mu g/m^3$ for the period of record (Nevada Bureau of Air Quality, written communication, 1994). The highest 24-hour sample was 111 $\mu g/m^3$ the first week of October, 1993 (ibid).

Suspended particulates are derived from numerous sources. A particulate emissions study done in 1975 by the Nevada Bureau of Air Quality showed that fugitive dust from the desert landscape

accounted for about 89 percent of the total suspended particulates in Churchill County. This study showed that the other major dust contributors are agriculture practices (6 percent) and dirt streets and roads (4.5 percent). The PM₁₀ data for Fallon show that the higher 24-hour recordings generally occur in the fall and winter months while in the more windy months of spring the PM₁₀ numbers were around the annual average. *One possible* reason for this may be that the particle-sized dust associated with the desert landscape or with agriculture is too large to be measured as a suspended particulate by PM₁₀ samplers. In addition, smaller, inhalable particulates are often associated with sources related to the combustion of fuel, which is more predominant in winter.

The large expanse of desert lands in the affected area, which are naturally low in percentage of vegetative cover, appear to contribute the most to dust problems. The extent that any one tract of vacant or tilled farmland contributes to erosion and dust problems in Lahontan Valley depends upon soil type, size of the field, soil moisture, *wind velocity, ridge roughness, climate, unsheltered distance, soil erodibility,* and the vegetative cover of the vacant land.

Although a dust and sand ordinance was passed by the Churchill County Commission in May 1990 (Bill No. 90-G, Ordinance 32) requiring the control of sand and dust, a moratorium was placed on the ordinance soon thereafter and it has never been implemented (Sugg, personal communication, 1995).

Open burning, which is allowed throughout the affected area, is a major source of particulate emissions (Smith, 1994). Soot, ash and chemicals from burning, combined with dust can adversely affect suspended particulate concentrations and visibility. *Agricultural emissions could contribute to particulate levels in the affected area, as agricultural land lies in close proximity to the sampling site (Smith, Nevada Bureau of Air Quality, written communication, 1995).* Most open burning occurs in the affected area in relation to agricultural burning and home trash incineration. Neither activity is regulated and both are common throughout the affected area.

Dust and smoke may be more of a visibility issue than a health issue in the affected area. All of the valleys in Nevada have the potential for air quality problems due to natural meteorological conditions (inversions), but the problem is limited to a few areas due to small populations in most valleys of the State (Smith, Nevada Bureau of Air Quality, personal communication, 1994). Less densely populated areas generally have fewer sources of emissions that contribute to air quality problems.

Under baseline conditions, the Service estimates that air quality conditions are comparable to existing conditions. The affected area is considered to be in attainment for all monitored air quality pollutants under existing conditions. Visibility will be adversely affected during certain periods of the year due to dust and/or burning. The major source of fugitive dust will continue to come from *winds acting upon* the naturally sparse desert areas and disturbed lands where vegetation is removed or destroyed.

BIOLOGICAL RESOURCES

For the purpose of this document, biological resources are divided into sections on wetlands; vegetative communities; fish; birds; mammals; reptiles and amphibians; invertebrates; endangered, threatened, and sensitive species; toxicity and avian diseases; and biodiversity. Species lists for biological resources are located in Appendix 8.

3.6 WETLANDS

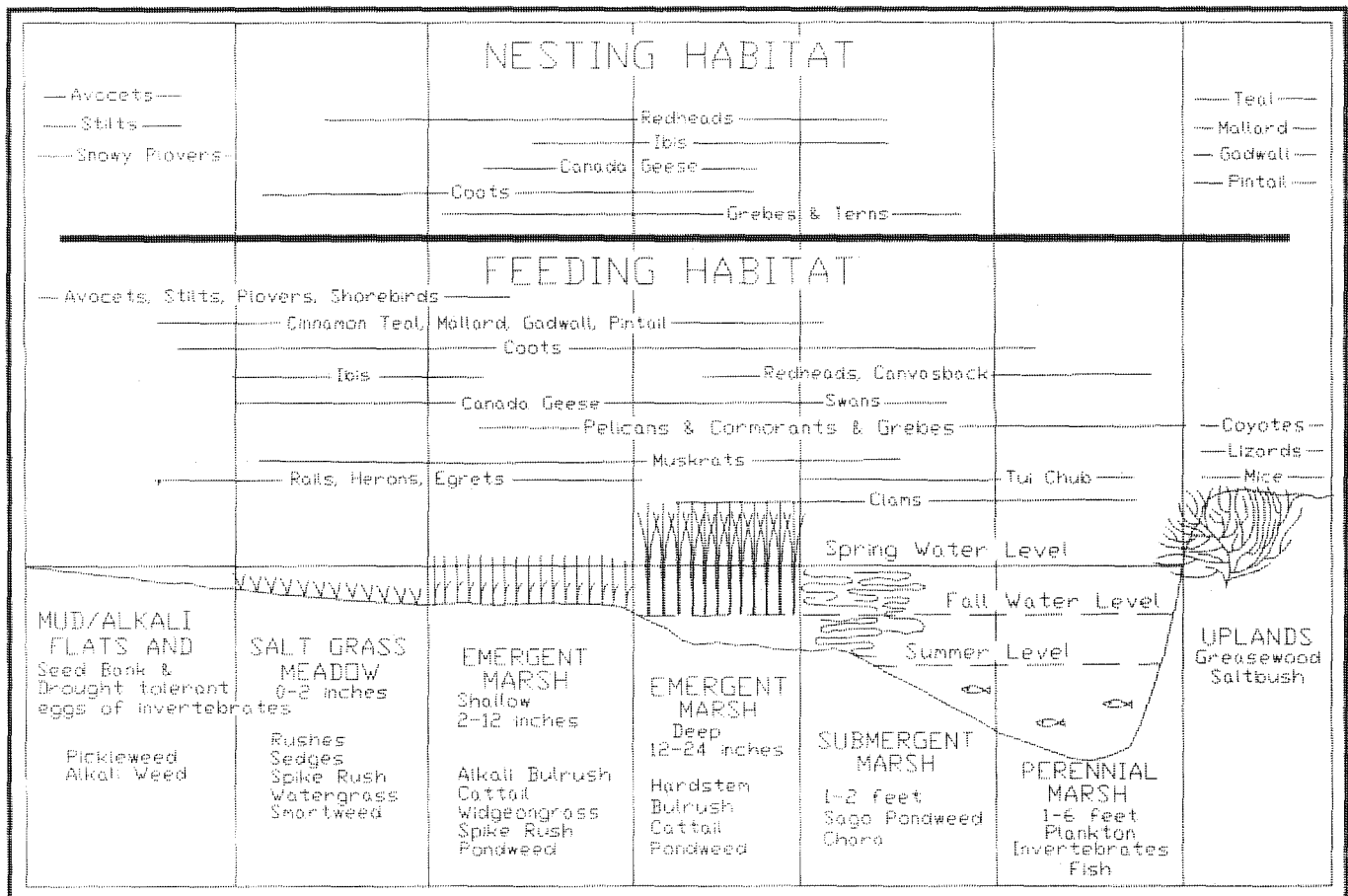
In general, wetlands are lands that are at least periodically saturated or covered with water (Cowardin and others, 1979). A more detailed definition of wetland is provided in the glossary. Based on the wetland classification system developed by Cowardin and others (1979), more than 300,000 acres of land in the Lahontan Valley have been classified as wetlands (U.S. Fish and Wildlife Service National Wetlands Inventory, 1984).

For the purposes of this document, wetland habitat refers to habitat provided by shallow to deep water (less than about 6-feet deep) and associated vegetation in wetlands, and, therefore, wetland and wetland habitat have different meanings in this document. Wetland habitat only exists when a wetland or portion of a wetland contains water (visible surface water).

The Lahontan Valley wetlands have supported a wide diversity of wildlife for at least 4,000 years (Kelly, 1988, Warburton and others, 1990). These areas are some of the most productive in the western United States when they have water. They are unique in that they provide expansive areas of uniformly shallow wetland habitats with waters of varying salinity. The Lahontan Valley wetlands are characterized by a continuous shrinking and swelling, both seasonally and over geologic time. This fluctuation creates the diverse Great Basin wetland ecosystem, which encompasses a wide range of wetland habitat types within a localized area. Within the span of one season, these wetlands can transform from shallow lakes with clear, fresh water, to shallow, brackish marshes with high salt concentrations. Figure 3.6.A illustrates the various habitat types that are representative of the Great Basin's terminal marshes.

Archaeological evidence and pollen cores indicate that a relatively permanent marsh has existed in the Stillwater area for the last 4,000 years (ibid). Although the Lahontan Valley wetlands have fluctuated in size and shifted as the Carson River changed its flow, evidence shows that the wetlands covered as much as 400,000 acres of the valley during the time that Ancient Lake Lahontan was at its peak (Russell, 1885). Kerley estimated that an average of 150,000 acres of wetland habitat covered Carson Lake, Stillwater marshes and other terminal wetlands in Lahontan Valley between 1845-60 (Kerley and others, 1993).

Figure 3.6.A Representation of Great Basin Wetland Habitats



Source: U.S. Fish and Wildlife Service, 1992.

The Lahontan Valley wetlands provide some of the most biologically diverse habitats in the State of Nevada. As seasonal wetlands, these areas support ephemeral resources and transient species, and are completely dependent upon water availability. As such, the wetlands have been impacted both by changes in Carson River flows, Newlands Project operations, and by management of water in the marshes.

Historically, runoff from the Sierra Nevada (via the Carson River) *constituted the primary* inflow to the Lahontan Valley wetlands, expanding them to their maximum annual size and flushing the wetlands with fresh water. Runoff from April through July accounted for about 40-60 percent of the total annual flow (Glancy and Katzer, 1976). In most years, the maximum spring flow volumes flushed the initial wetlands of accumulated salts and other dissolved solids. During the summers, as Carson River inflow decreased and evaporation increased, the wetlands shrank, leaving shallower, more saline marsh habitats. These seasonal fluctuations created a variety of riparian and wetland habitats, including braided river channels, closed oxbows, perennial and ephemeral marshes and

wetted playas in Lahontan Valley's terminal wetlands. This diversity of habitats attracted a wide range of animal species, including vast populations of ducks, geese, pelicans, wading birds and shorebirds.

Upstream diversions required for agriculture have steadily dried the Stillwater marshes, Carson Lake and Carson Sink in all but the wettest years (Kelly and Hattori, 1985; Morrison, 1964; Townley, 1977). Since the early 1900s, the Lahontan Valley wetlands have subsisted on seepage losses and drainflows from the Newlands Project irrigation system, water from winter power generation, and from periodic spills in high water years.

In effect, the Newlands Project completely altered the natural hydrologic regime in the Lahontan Valley wetlands. Episodic flooding, which had once sent voluminous springtime flows into the marshes, was contained by Lahontan Dam and stored in Lahontan Reservoir for irrigation use. Newlands Project drainwater inflows allowed the wetlands to survive, but water quality was lower than Carson River inflows, with increased dissolved-solids and contaminants from agricultural use. Most of the water that did reach the wetlands arrived gradually, over a 6-7 month period in the summer. These flow volumes were generally too low to flush accumulated salts, dissolved solids and contaminants from the wetlands.

By 1948, with migratory bird numbers in the marshes decreasing, the Service, Nevada Fish and Game Commission (now NDOW), and TCID entered into an agreement to manage the marshes. A series of dikes, canals, ditches and water control structures were built in the Stillwater marshes to better utilize drainwater and spills for wetland habitats. Dikes contributed to the perennial, more stabilized nature of the wetlands, as they impounded waters and created a variety of smaller manmade wetland units. Most of the Stillwater wetland units south of Division Road were created as a result of these efforts.

Diking and altered natural water regimes substantially changed the area's vegetative communities. This was evident to Service biologist, D.B. Marshall (1952), when he documented that Stillwater NWR's wetland vegetative community had changed from an ephemeral marsh to a perennial marsh.

Flow patterns to the wetlands were again altered in the late 1960s when the Secretary implemented Newlands Project operating criteria. These actions eliminated diversions for winter power generation and limited Lahontan Reservoir releases for irrigation. Without releases for winter power generation, large volumes of quality water that had previously flushed and sustained the wetlands during the winter months were no longer available. Due to the decreased flow, the wetlands manager's options for flushing salt accumulations were reduced, leading to fewer, less effective spring flushes. As a result, the marshes became saline and could no longer support a warm water sport fishery. Marsh vegetation shifted to those species which could tolerate higher concentrations of dissolved salts, and many stands of hardstem bulrush and cattails were lost.

Between 1972-1975, an average of about 40,300 acres of wetlands (primary and secondary) remained in the Lahontan Valley (USFWS/NDOW August aerial surveys, 1972-75). Since then, the Department of the Interior has implemented more efficient OCAP and there have been both floods, and a drought. As a result, wetland acreage has fluctuated widely. By 1992, the effects of a 6-year drought had caused wetland acreage to drop to a record low of about 2,400 acres valley-wide (ibid).

Over the long term, the Service estimates that baseline wetland habitat in the primary and secondary wetlands in Lahontan Valley averages about 16,600 acres over the long run. *For comparative purposes, it is estimated that an average of about 14,300 acres of wetland habitat would exist in primary and secondary wetlands assuming no acquisitions of water rights for the primary wetlands and efficiency targets of the 1988 OCAP being met.*

3.6.1 PRIMARY WETLAND HABITAT

Of the 300,000 acres of wetlands delineated in the Lahontan Valley in the Service's National Wetlands Inventory of 1984, only those that exist within the primary wetland areas are considered primary wetlands. Furthermore, only a portion of the primary wetlands provide wetland habitat for wetland-dependent wildlife in most years (please refer to definitions of wetland and wetland habitat in Section 3.6 above and in the Glossary).

There are no authorizations for sustaining primary wetland habitat on the Fallon Paiute-Shoshone Tribal wetlands under baseline conditions. (However these wetlands are designated in Public Law 101-618 and are incorporated into the Service's Proposed Action *and alternatives*.) Historically, these Tribal areas have supported wetlands in high water years.

Wetlands at Stillwater NWR and Carson Lake have traditionally provided habitat for more than 75 percent of Nevada's wetland-dependent and migratory bird populations. The highest density of use by these birds occurs on wetlands, which make up only a small portion of Lahontan Valley (about 8 percent of the valley). Species that make use of these habitats are described in Sections 3.9 - 3.13 that follow.

Stillwater WMA and NWR have been managed under a 1948 Triparty Agreement between the Service, Nevada State Board of Fish and Game Commissioners, and TCID. Under the agreement, the lands were to be managed for the purposes of conserving, rehabilitating, and managing wildlife, its resources and habitat, and for the purpose of operating and maintaining a public shooting ground and wildlife refuge. Commensurate with the program for managing wildlife, livestock grazing was also identified as a use of Stillwater WMA.

Under baseline conditions, Stillwater NWR and WMA are managed as follows:

- ▶ the marsh areas east of Hunter Road and South of Division Road are closed to vehicular traffic and hunting, and are managed as a wildlife sanctuary;
- ▶ the northern marsh areas of Stillwater NWR allow public use and are open for hunting and vehicular travel; and
- ▶ Stillwater WMA is the "open area" described in the 1987 Refuge Management Plan that is primarily managed to "provide grazing with collateral benefits for wildlife."

Water management and prescribed burning are the preferred management tools for vegetation and wetland habitat management *under the 1987 management plan*. *Livestock grazing, in accordance with the 1987 management plan, has been reduced in the North Marsh and marshes south of Division Road* to improve nesting cover for dabbling and diving ducks. More specific wildlife management objectives and management strategies are identified in the 1987 Refuge Management Plan (Appendix 2) with goals for: waterfowl, shorebird, and migratory bird use days; waterfowl and shorebird production; fishing; hunting; and the mix of wetland habitat types desired.

Under baseline conditions, Carson Lake is jointly managed by NDOW and TCID for both wildlife and grazing. As determined in the Fleischmann agreement of June 19, 1980, the central portion of Carson Lake is managed as a wildlife area, with the remaining areas used by local ranchers for livestock grazing.

Between 1972 and 1975, the Lahontan Valley primary wetland habitats averaged about 24,500 acres. Tables 3.6.A and 3.6.B illustrate the variability in wetland habitat acreage that has occurred over the past 20 years. The 1972-75 average depicts a period of stable water conditions prior to the 1988 OCAP. In 1992 primary wetland habitat had dropped to 845 acres as the result of a severe drought, and changing conditions in the Newlands Project. Under the baseline conditions, which include the acquisition of 20,000 AF of water rights, the BLR Model calculates that a long-term average of 12,100 acres of wetland habitat will be sustained in the primary wetland areas.

3.6.2 SECONDARY WETLANDS

There are numerous other "secondary" wetland habitats in the affected area (Figure 3.6.B). The term "secondary" is not an indication of quality or importance of wetland habitat, but refers to those wetlands in the affected area that are not designated as Lahontan Valley wetlands in Public Law 101-618 (Section 203).

Table 3.6.A WETLAND HABITAT ACRES (1972 - 1977 August Figures)

	1972	1973	1974	1975	1976	1977	Average
Primary Wetland Habitat							
Stillwater	16,144	13,598	11,150	15,460	8,500	3,400	11,375
Carson Lake	14,040	13,840	10,740	13,000	7,000	1,900	8,136
Secondary Wetland Habitat							
Fernley WMA	4,913	4,913	4,750	4,900	4,100	3,400	4,496
Massie & Mahala	510	510	500	510	400	300	455
Soda Lakes	980	946	900	950	800	700	879
Harmon Reservoir	1,276	1,276	1,270	1,275	1,000	900	1,166
S-Line Reservoir	1,479	1,445	1,440	1,450	1,200	1,200	1,369
Canvasback Gun Club	3,120	3,120	3,100	3,120	2,800	2,200	2,910
Total	42,462	39,648	38,600	40,665	25,800	14,000	33,529

Table 3.6.B WETLAND HABITAT ACRES (1986 - 1993 August Figures)

	1986	1987	1988	1989	1990	1991	1992	1993	Average
Primary Wetland Habitat									
Stillwater	23,179	8,842	4,217	4,905	3,213	1,459	700	2,813	6,166
Carson Lake	12,665	5,624	4,090	2,703	2,177	1,155	145	1,565	3,765
Secondary Wetland Habitat									
Fernley WMA	367	610	253	120	482	657	380	130	375
Massie & Mahala	415	2,018	199	816	656	141	180	180	575
Soda Lakes	1,332	738	627	894	628	663	480	530	736
Harmon Reservoir	1,332	1,060	668	628	670	729	70	565	715
S-Line Reservoir	1,265	1,268	533	651	608	768	200	170	683
Canvasback Gun Club	3,000	2,384	3,944	1,461	2,088	1,491	285	1,280	1,654
Total	43,555^A	22,544	14,531	12,178	17,585	7,063	2,440	7,233	15,891

^A Spring floods inundated the Stillwater wetlands and filled the Carson Sink, with the Sink reaching a maximum size of 250,000 acres of playa wetland which is not represented in these figures for 1986

The secondary wetland habitats addressed in this document are associated with Fernley WMA, Massie and Mahala Sloughs, Soda Lakes, Old River Reservoir, Sheckler Reservoir, Sagouspe Dam, Harmon Reservoir, S-Line Reservoir, Indian Lakes and the Canvasback Gun Club.

These secondary wetland habitats often look similar to the Lahontan Valley's primary wetland habitats, and are used by waterfowl, shorebirds and other wetland-dependent wildlife. However, most are not under the direct management and control of the Service or NDOW and could change use in the future. With the exception of the Canvasback Gun Club, none of the secondary wetlands have water right allocations. The regulating reservoirs are managed for irrigation purposes and cyclically rise or drop with demand and use. *In order to meet efficiency targets, Sheckler and Old River Reservoirs are not used and do not provide wetland habitat in most years. Other reservoirs, such as Harmon Reservoir, S-Line Reservoir, and the reservoir associated with Sagouspe Dam, provide wetland habitat under baseline conditions.*

NDOW manages the largest of the secondary wetland habitats at the Fernley WMA which is located outside of Lahontan Valley. The wetlands of the Fernley Sink received increased inflow and became more productive wetland habitat after the construction of the Truckee Canal in the early 1900s, and the irrigation of the Fernley bench (Wright, 1953). In the 1970s, the Fernley WMA wetlands encompassed as much as 4,900 acres. Although the Fernley wetlands are now nearly dry due to 6 years of drought, the Service expects them to recover somewhat over the long term. Under baseline conditions, the Service estimates that the Fernley WMA wetlands may sustain about 475 acres of wetlands over the long run.

Of the other secondary wetlands, the marshes now within the Canvasback Gun Club (also known as Stillwater Farms) existed prior to the creation of the Newlands Project. Mahala Slough, Soda Lakes, and small ponds in the Indian Lakes area supported some wetland habitat prior to the Newlands Project, but they became larger and more permanent as the project developed. Massie Slough and the Newlands Project regulating reservoirs were created as a result of the Newlands Project operations or canal seepage losses.

The Canvasback Gun Club maintained an average of about 2,600 acres of wetland habitat between 1972 and 1991 (Table 3.6.A). Under existing conditions, the Canvasback Gun Club owns about 5,465 AF of Newlands Project water rights. The Service has approached the Canvasback Gun Club in an attempt to negotiate a long-term agreement for development and management of the gun club's marshes as primary wetland habitat. *As of June 1996, a cooperative agreement or conservation easement between the Service and the Canvasback Gun Club has not been established.* (See Section 2.3.1.1, Factors Affecting the Volume of Water to be Acquired, Easements.)

Recently, due to the drought and efforts to improve irrigation delivery efficiency, drainflows and seepage to most of the secondary areas has diminished considerably. Secondary wetland acreage has dropped from an average of about 13,400 acres (1972-75) to a recorded low of 1,156 acres in 1992 after seven years of drought. The Service expects that secondary wetlands are recovering somewhat from the drought. Under baseline conditions, the Service estimates that secondary wetland areas will sustain an average of 4,500 acres of habitat over the long term.

3.7 VEGETATIVE COMMUNITIES

In the 1800s the Lahontan Valley supported lush wetlands with a wide variety of aquatic plants (Kerley and others, 1993). Emergent plants were represented by thick stands of alkali bulrush, hardstem bulrush, and cattails along shallow margins (Marshall, 1952). These marsh plants are known to provide food, cover and nesting habitat for both migratory and resident waterfowl, and also serve as an important food source for muskrats and some ducks and geese. Submergent plants such as sago pondweed, coontail, muskgrass and wigeon grass were well established in the marshes, and provided protective cover and forage for wildlife.

Stillwater NWR biologists have shown that diversity of both emergent and submergent vegetation in the Carson Lake and Stillwater marshes has substantially declined over the past 20 years (Kerley and others, 1993). Changes in water regimes, such as discontinuing releases for winter power generation, have impacted wetland vegetation by increasing the presence of salt-tolerant species while reducing the density of cattails, a salt-sensitive species (ibid, 1993).

Plant communities within the affected area are described in four major groupings: wetlands, riparian, agricultural, and desert shrub. Appendix 8 contains the species lists for plant communities.

3.7.1 WETLAND PLANT COMMUNITIES

Donohue and Baumgartner (1994) identified 28 wetland plant associations within the lacustrine (lake) and palustrine (marsh) wetland areas in the Lahontan Valley. Generally, the community types fall into five main categories, each associated with different hydrologic regimes and salinity levels in the basin wetlands. The categories are:

- ▶ **open water** - characterized by various species of pondweed, *Chara* and wigeon grass;
- ▶ **emergent marsh** - characterized by hardstem bulrush, cattail, pondweed, alkali bulrush, spike rush and pondweed;

- ▶ **wet meadow** - characterized by rushes, sedges, spikerush, water grass, smartweed and saltgrass;
- ▶ **alkali mud flats/playa** - characterized by pickleweed, alkali weed and wigeon grass; and
- ▶ **shrub** - characterized by greasewood, quailbush and saltgrass; or saltcedar with variable understories.

The second community type (emergent marsh) is the primary source of marsh habitat in the affected area. Wet meadows, alkali mud flats and shrub communities provide marsh habitat when they are inundated by water. References made to marsh habitat or marsh plant communities in this document refer to emergent marsh, wet meadow and alkali mud flats/playa plant communities when they are inundated by water. Wetland habitat includes marsh and open water habitats, but for the purpose of this EIS does not include riparian habitat.

Alkali bulrush, hardstem bulrush, and cattails provide food, cover and nesting habitat for both migratory and resident waterfowl, and also serve as an important food source for muskrats and some ducks and geese. Leaves, stems, seeds and tubers from these plants provide nourishment for a variety of wetland dependent wildlife. Aquatic plants, such as sago and horned pondweed provide important food for some ducks, swans, and geese. The seeds of pondweed, sedges and smartweed, and the leaves of coontail, pondweed and duckweed are common forage for a variety of waterfowl. Submergent plants, such as pondweed, coontail, muskgrass and wigeon grass also provide protective cover for fish and food for waterfowl.

Cattail and bulrush marshes have been shown to consume as much as 84 inches of water per year (7 AF/acre/year in a cattail marsh) (Christiansen and Low, 1970). *Saltgrass marshes, consisting of more salt-tolerant species, can consumes about 33 inches of water per year (about 2.7 AF/acre/year in a saltgrass marsh) (ibid).*

Under baseline conditions, the Lahontan Valley wetlands at Carson Lake and Stillwater NWR are expected to sustain about 12,100 acres of emergent marsh, open water, and wet meadow vegetative communities.

Fernley WMA, Canvasback Gun Club, and other secondary wetlands in the affected area have also suffered losses of wetland vegetation due to drought and changes in Newlands Project operations. Under baseline conditions, the Service estimates that secondary areas will sustain about 4,500 acres of emergent marsh, open water and wet meadow vegetative communities.

3.7.2 RIPARIAN PLANT COMMUNITIES

Riparian plant communities are associated with the lower Truckee River from Derby Dam to Pyramid Lake, and with the Carson River from the Carson Sink upstream to near Dayton, Nevada. In addition, riparian plant communities are associated with Newlands Project drains and canals in both Lahontan Valley and the Fernley area.

The Lower Truckee River supports riparian scrub and riparian forest in the river corridor between Derby Dam and Pyramid Lake. Riparian scrub includes broad-leaved, deciduous willow thicket, with abundant narrow-leaf willow, yellow and shining willows. Herbaceous species include white sweet-clover, white clover, whitetop, and slender-beak sedge. The cottonwood-willow riparian forest along the lower Truckee River has been reduced in size and width due, in part, to agricultural activities, wood cutting, grazing, and fire and a decline in the high flows necessary for cottonwood regeneration. *Riparian habitat has also been adversely affected by logging, livestock grazing, beaver, channelization of the river, urbanization, and the introduction of exotic species.* More than half the existing cottonwood stands are less than one acre in size. The largest stand along the lower reach of the river is 13.5 acres in size. The Lower Truckee River corridor also contains about 25 acres of small emergent marsh vegetative communities on gravel bars and in cut-off oxbow areas (ibid, 1993).

Historically, the banks of the Carson River in Lahontan Valley were dominated by cottonwoods, willows, cattails, buffaloberry and grasses. At present, saltcedar and Russian olive, which are introduced and highly invasive species, also inhabit riparian areas. Both native and introduced species occur along the Carson River corridor and along a few project drains and canals. Cottonwoods have become more widespread in the valley due to the high water table and use of the trees for landscaping and windbreaks. Buffaloberry, a valuable forage and cover shrub, has been nearly eliminated from the affected area due to clearing and grazing.

The Middle Carson River corridor from the Dayton area downstream to Lahontan Reservoir provides about 30 miles of riparian corridor and contains a unique and high quality riparian shrub and forest habitat not found elsewhere in the State of Nevada (Neel, oral communication, 1994). The gallery cottonwood stands and willow understory in the area west of the Lahontan Reservoir delta are some of the most complete such habitats in the Nevada (ibid). The vegetative stratification in the area includes gallery cottonwood, a middle story of black willows, with an understory of sand bar willows. Russian olive, buffaloberry, sweet clover and meadow clover are found here. Some white top, peppergrass and saltcedar invasion is also evident.

The Carson River delta at Lahontan Reservoir inundates seasonal wet meadows in high-water years that have provided as much as 4,000 acres of wetland habitat in some years (1989 aerial photo). Cottonwoods surround Lahontan Reservoir, but lower operating levels have caused about 45 percent of the trees in the area to die (Francke, oral communication, 1994). The dry reaches of the reservoir now support the growth of sapling cottonwoods.

The Carson River corridor below Lahontan Reservoir provides approximately 30 miles of riparian habitat. The vegetative structure in this portion of the riparian corridor has been altered as river flows have changed. An extensive growth of willows, Russian olive, saltcedar and emergent vegetation has now encroached upon the river's channel.

The Newlands Project has created strips of riparian habitat along its many miles of drains, laterals, and canals that criss-cross the area. Quality of these "artificially created" riparian habitats ranges from concrete-lined laterals that provide virtually no *qualities as* riparian habitat, to a number of drains that are constantly wet and are overgrown with cottonwoods, willows, sedges and rushes. Of the artificially created riparian habitats, drains appear to provide the better quality habitat. Although detailed information is lacking, most drains are lined by sedges, rushes, cattails, and grasses. Some drains are lined by cottonwoods, willows, and Russian olive trees.

Most laterals run water intermittently and as such, provide little riparian habitat. Most laterals and other canals are burned periodically to remove weeds, and some are concrete-lined. Main delivery canals run water continuously throughout the irrigation season (although water levels fluctuate widely) and are lined by grasses, rushes, and cattails. However, because they are often burned or removed, they do not provide standing vegetative cover throughout the year. Most drains, canals, and laterals are adjacent to roads that diminish their value for wildlife. *Under baseline conditions, Newlands Project artificially created riparian habitat, of varying quality, amounts to about 340 miles of drains and approximately 380 miles of canals and lateral.*

3.7.3 AGRICULTURAL VEGETATION

Agricultural vegetation generally represent monocultural blocks where single species dominate large areas. Within an agricultural area, cultivated species, introduced species of weeds, and to a limited extent, native grasses and forbs occur. There are about 60,000-62,000 irrigated acres in the affected area that support agricultural crops and associated species.

Perennial crops such as alfalfa and pasture grasses are the primary crops in the affected area. Grain crops such as wheat, barley, and corn are also cultivated, but to a lesser

extent. Grasses and forbs (native and introduced) have survived due to the higher groundwater table and frequent surface watering. Based upon the NRCS's Nevada Irrigation guide, state use-rate allocations for bench and bottom land (3.5/AF/acre/year and 4.5 AF/acre/year) do not provide enough water to meet the actual consumptive use of crops such as alfalfa and pasture in the Newlands Project. In Fallon, the average consumptive use for alfalfa is 47 inches, and the consumptive use for irrigated pasture is 40 inches (Hughes, written communication, 1994). Maurer and others (1994) have identified that about 50,000 AF/year is drawn from groundwater resources as consumptive use for crop production. The Service assumes groundwater makes up the difference between total consumptive use and irrigation delivery.

3.7.4 DESERT SHRUB PLANT COMMUNITIES

Desert shrub plant communities in the affected area typically are made up of plant species that can tolerate moderate to highly alkaline soils and can survive on minimal precipitation (about 5 inches per year). They provide the most common habitat in the Lahontan Valley.

Desert shrub plant communities can be divided further into greasewood, greasewood-shadscale, saltgrass, rabbitbrush, and sagebrush communities. The greasewood-shadscale community is most prevalent in the affected area. Common plant species include Bailey greasewood, shadscale (a species of saltbush), Indian rice grass, and saltgrass. Very little sagebrush habitat exists in the area. There are no native trees associated with desert shrub areas in the valley.

Desert shrub plant communities are most closely associated with upland areas, as defined by soil and geologic characteristics. However, greasewood communities also occur within the perimeters of basin wetlands under dry conditions.

As agriculture developed in the affected area, desert lands were leveled for irrigation, and desert shrub plant communities were cleared. Under existing conditions, desert shrub plant communities are impacted by increased growth and urbanization in the affected area.

3.8 FISH

Lahontan Valley, Fernley and Lahontan Reservoir

In the early 1970s, there were up to 27,000 acres of surface waters used for fishing in Lahontan Valley. In 1989, the areas which were still able to sustain fish populations had decreased to approximately 16,500 surface acres, 5,500 acres in Lahontan Valley and 11,000 acres at Lahontan Reservoir. Lahontan Reservoir has been the third most important

game fishery in the State of Nevada for a number of years (Sevon, oral communication, 1994).

Lahontan Reservoir is eutrophic and moderately turbid; it supports a cool and warm-water fishery. Almost every conceivable fresh-water game fish has been stocked in Lahontan Reservoir at one time or another. Game fish numbers have dropped by at least 64 percent from populations that occurred in the reservoir between 1982-1991 (NDOW Job Progress Reports, 1992). As of 1993, the dominant fish species included white bass, channel catfish, white catfish, walleye, wiper (a white bass and striped bass hybrid), white crappie, yellow perch and largemouth bass. Due to low storage levels in that year, major game fish were relatively scarce (Nevada Division of Wildlife, 1993, Federal Aid Job Progress Report, F-20-29). By 1993, Sacramento blackfish and carp made up 98 percent of the fish populations, with white bass the most predominant game fish. The reservoir supports a commercial fishery for Sacramento blackfish, a large minnow.

When Lahontan Reservoir experiences low water levels early in the summer, higher water temperatures occur and growth of blue-green algae increases. In 1992, low water levels (about 4,000 AF) caused NDOW to coordinate with TCID and the Nevada Division of State Parks to install an aeration system in the dam forebay to increase dissolved oxygen in the reservoir and prevent a fish die-off from algal bloom (ibid).

In April 1986, the Nevada Division of Environmental Protection and the Consumer Health Services issued a public health advisory which recommended that consumption of fish from Lahontan Reservoir be limited due to high levels of methyl mercury in the lake sediment. Recent studies show that mercury contamination of sport fish continues to be a cause for concern in the Lahontan Reservoir and Lahontan Valley fishery (Sevon, oral communication, 1994).

The cold-water fishery in the Lower Carson River is seasonal at best. Habitat quality is low, and there are relatively few areas that are not heavily silted. Macroinvertebrate abundance and species diversity are low (Sollberger, written communication, 1994).

About 15 warm-water fish species are known to inhabit the regulating reservoirs and deeper wetlands in Lahontan Valley. Prior to elimination of winter power releases in 1967, the Stillwater marsh areas supported some of the largest populations of bass, crappie, catfish and sunfish in Nevada (Saake, oral communication, 1993). Fish populations within the regulating reservoirs and wetlands continued to provide good fishing opportunities until the 1990-92 drought, particularly at the Canvasback Gun Club, Stillwater NWR, and Indian Lakes.

According to Sevon, (oral communication 1994) Lahontan Valley sport fisheries have been diminished to the point that they are nearly nonexistent due to the drought and OCAP. In the past, NDOW maintained small "put and take" trout fisheries at Indian Lakes and Carson River below Lahontan Dam. Indian Lakes is still periodically stocked with black bullhead and bass fry, but the trout "put and take" fishery on the Carson River was discontinued in 1990 due to poor water quality and a lack of public access (ibid). In 1994, NDOW began a cutthroat trout stocking program in the area just below Lahontan Reservoir which continued on a trial basis through 1995. In the past, few stocked game fish survived through the year, and no natural reproduction occurred.

Non-game fish, which generally have a greater tolerance to highly saline and poor quality waters, are still found in Lahontan Valley wetlands, but reduced inflows have impacted their habitat. Non-game fish include: carp, Sacramento blackfish, tui chub, Lahontan redbside shiners, speckled dace, Lahontan mountain suckers, Tahoe suckers, fathead minnows, and mosquito fish.

Although Fernley WMA once sustained populations of largemouth bass, cutthroat trout and non-game fish species, the loss of water to this area has caused the demise of fish populations.

The Lahontan tui-chub, *a species of concern*, may occur in some wetlands in the Lahontan Valley, and in the Carson River (Sevon, oral communication, 1994). For more information, see Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES.

Lower Truckee River

Beginning in the late 1800s, many exotic fish species were introduced into the Truckee River basin. Non-native fish species occurring in the lower Truckee River include rainbow and brown trout, carp, largemouth bass, green sunfish, black crappie, mosquito fish, channel catfish, brown bullhead, and fathead minnow. Of these species, carp and mosquito fish are considered commonly occurring species. Rainbow and brown trout do not usually reproduce in the lower reaches of the river, and both species are stocked in this section of the Truckee River by NDOW.

Native fish species found in the Truckee River include the Lahontan redbside shiner, speckled dace, Tahoe sucker, and mountain sucker. The Lahontan tui chub is occasionally found in the lower river. Both the cui-ui and Lahontan cutthroat trout are seasonal residents of the lower river. Both are addressed in more detail in Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES.

3.9 BIRDS

The variety of habitats, including wetlands, riparian corridors, agricultural lands and desert shrub plant communities supports a wide variety of habitats in the affected area. These diverse habitats sustain a myriad of bird species (see Species List in Appendix 8). The Lahontan Valley wetlands in the affected area support a wide diversity of migratory and wetland-dependent birds, and serve as one of the most important sites on the Pacific Flyway, a western migratory route, because they provide wetland habitat in the midst of one of the driest portions of North America.

The Lahontan Valley wetlands offer an oasis for migratory species to feed and rest. Transient waterfowl and other migratory birds that winter in the Central Valley of California make regular use of the Lahontan Valley wetlands (see also Banks and Springer, 1994). It has been used as a major breeding area for redheads, white-faced ibis, and Canada geese. In spring and fall, migrating avocets, black-necked stilts, Wilson's phalaropes, and long-billed dowitchers can occur by the tens of thousands (Jehl, 1994).

Without this foraging area, many younger or weaker birds might not successfully complete their migration. The two migration periods are generally between August and November, and February to May of each year.

Changes in water regimes, coupled with growth and development in the area, have been major factors affecting the overall abundance and diversity of birds in the affected area. Changes in the riparian environment along the lower Truckee River has caused the abundance of birds that require dense riparian thickets for nesting to decline since the 1800s (Ridgeway, 1877; Morrison, 1993). Affected species along the Truckee River include the black-chinned hummingbird, willow flycatcher, common yellowthroat, and yellow-breasted chat (ibid).

Surveys have shown wetland-dependent bird populations have also been adversely impacted over the past 25 years. At least two species of ducks, three species of shorebirds, and seven species of colony-nesting and other marsh birds in the Lahontan Valley have experienced declines in populations and/or reproductive success since 1970. The Service believes most of these losses are due to a lack of wetland acreage.

In this document, birds are discussed under the following headings: Waterfowl; Shorebirds; Colony-nesting and Other Marsh Birds, Passerines, Raptors, and Other Birds. In addition, peregrine falcons, bald eagles, white-faced ibis, trumpeter swans, ferruginous hawks, black terns, Western least bitterns, Western snowy plovers, mountain plovers, long-billed curlews, yellow-billed cuckoos, and loggerhead shrikes, are further discussed in Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES.

3.9.1 WATERFOWL

The Lahontan Valley wetlands offer the most important and productive waterfowl habitat in the affected area. In many years, up to 70 percent of the State's migratory waterfowl pass through and feed in these wetlands (Saake, oral communication, 1993). Peak populations of migrating waterfowl are generally recorded in the fall. The major species of ducks that use the wetlands during migration are northern pintails, *mallard*, *gadwalls*, green-winged teal, northern shovelers, American wigeon, canvasbacks and redheads. Canada geese, snow geese, tundra swans, and small numbers of trumpeter swans migrate through the affected area as well.

Shallow waters and abundant food supplies attract large numbers of waterfowl to Lahontan Valley wetlands. Most of the waterfowl use in the affected area occurs on Stillwater NWR and Carson Lake, where more than 80 percent of the wetland habitat has been less than 18 inches deep. Shallow waters provide quality feeding habitat.

Between 1970 and 1975, the peak totals for Lahontan Valley wetlands averaged 259,500 ducks, 13,200 geese, and 3,000 swans, *most of which occurred on Stillwater NWR and Carson Lake*. By 1989, these peak population numbers had dropped to 180,200 ducks, 11,300 geese and 700 swans (NDOW records, 1993).

The four major species of ducks that have traditionally used *wetland habitat in the Lahontan Valley* include northern pintail, green-winged teal, northern shoveler and American wigeon. In the early 1970s, populations of canvasback (27,300) and redheads (20,000) amounted to some of the highest concentrations of these species in the Pacific Flyway. In some years, Stillwater NWR has supported between 25 percent and 50 percent of the total population of canvasbacks in the entire Pacific Flyway (US Fish and Wildlife Service records, Jehl, 1994). By 1989, the number of canvasbacks had dropped to 1,200 birds, and redheads had decreased to 1,500 (ibid).

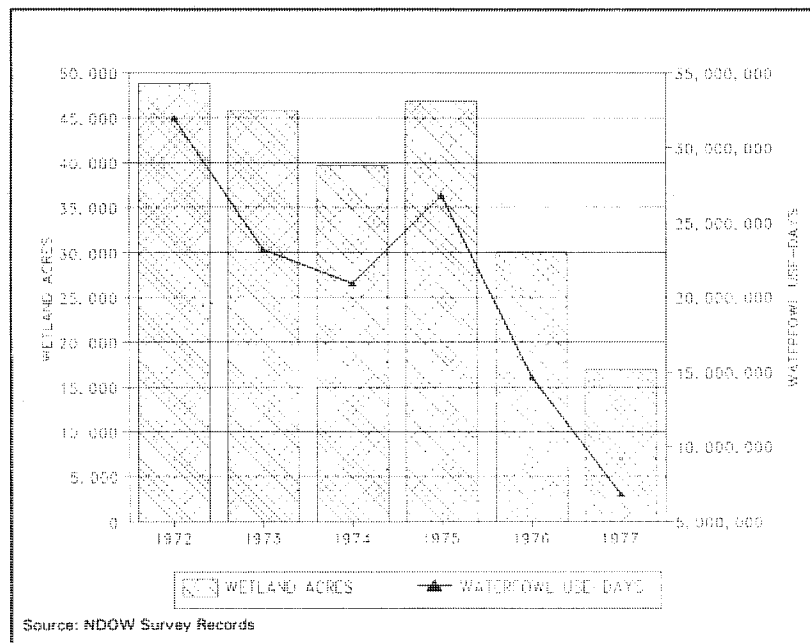
Waterfowl use in the wetlands declined substantially between 1975 and 1989. Osugi and Barber (1976) determined the average waterfowl use for the 1972-75 period was 25,722,700 use-days per year². This number dropped substantially by 1989 when waterfowl use-days were calculated to be 14,898,750 (Service and NDOW records for 1989). Figure 3.9.A illustrates the correlation between wetland acres and waterfowl use. Based on *these* data and over 50 years of waterfowl management in Lahontan Valley, the

² Waterfowl use-days are calculated by multiplying the number of birds times the number of days the birds are in the area to equal use-days.

Service has concluded that waterfowl use is directly linked to the available acres of wetland habitat.

Lahontan Valley wetlands are not only important for migrating waterfowl, they are one of the most important duck breeding grounds in Nevada. The numerous small islands combined with a good ratio of emergent vegetation to open water make many of the valley wetlands highly attractive to nesting ducks. About 67 percent of waterfowl nesting activity occurs at Stillwater NWR and Carson Lake, with much of the remainder occurring on secondary wetlands. Some ducks, such as mallards, cinnamon teal, and wood ducks, also commonly nest along Newlands Project drains and canals. Wood ducks are common nesters along the Carson River below Lahontan Reservoir.

FIGURE 3.9.A COMPARISON OF WETLAND HABITAT AND WATERFOWL USE DAYS



Wildlife managers nationwide are concerned about the poor reproductive success and declining numbers of redheads. The Lahontan Valley wetlands is recognized as one of the most important redhead breeding areas in the nation (as recognized in the North American Waterfowl Plan, U.S. Fish and Wildlife Service, 1992b).

The number of breeding ducks and the reproductive success of these species have declined in the Stillwater NWR and Carson Lake wetlands over the last 25 years. The number of breeding ducks observed in these areas has declined from 3,525 pairs in the early 1970s (when primary wetland habitat averaged some 27,000 acres), to 1,365 pairs in 1989 when there was only 7,600 acres of wetland habitat for the same areas (NDOW records, 1993).

Saake (oral communication, 1993) suggests that there is also a strong association between waterfowl production (nesting success) and wetland habitat acres. Cinnamon teal (39 percent), redheads (37 percent), and gadwalls (16 percent) are the three most common duck species nesting in the area.

An average of 22,900 young ducks were produced annually in Lahontan Valley from 1972 to 1975 (Table 3.9.A). The majority of successful nesting attempts occurred on the Stillwater NWR and Carson Lake. Nesting success has been shown to be greatly hindered by factors such as drought and nest predation by ravens during the breeding period.

Table 3.9.A COMPARISON OF WATERFOWL PRODUCTION BETWEEN PRIMARY AND SECONDARY WETLANDS

AREA	1972	1973	1974	1975	1976	1977	Average
Primary Wetland Areas							0.00
Stillwater NWR	12,869	14,229	8,272	11,980	4,280	514	8,690
Carson Lake	4,563	6,407	1,221	3,754	968	75	2,831
Secondary Wetland Areas							
Fernley WMA	1,436	1,128	489	799	353	201	734
Canvasback Club	1,519	1,137	742	1,548	356	309	935
Massie/Mahala	1,750	2,203	855	1,371	557	296	1,172
Soda Lakes	320	510	265	461	238	135	321
Old River Res.*	130	245	175	336	17	14	152
Sheckler Res.*	106	640	452	926	22	111	376
Harmon Res.*	365	446	323	483	89	159	310
S-Line Res.*	718	995	506	753	193	175	556
TOTAL	23,776	27,940	13,300	22,411	7,073	1,989	16,081

Source: NDOW and Service field survey records

Notes: * denotes Regulating reservoirs

Reduced quality of nesting cover, which can result in higher depredation of waterfowl nests, can result from low water availability and quality, and other factors such as overuse of vegetation by livestock. The impacts of some of these factors are illustrated (Table 3.9.A) by the low average number of young ducks that were produced during the 1976-77 drought (Barber, 1977 and 1978). During that time, numerous nesting attempts had failed due to nest depredation, which apparently was a consequence of reduced nesting cover.

Although some species of ducks, such as mallards, pintail and wigeon, make use of agricultural areas (e.g., corn for grain harvest), use of these areas is minimal in the Lahontan Valley. Most of their foraging takes place in wetland habitats.

The wintering peak populations of Canada geese have doubled from 2,100 in the early 1970s, to 5,100 in 1991 (NDOW data, 1991) and are the second highest in Nevada, exceeded only by the goose population in the Truckee Meadows. This can be attributed to an increase in the number of both lesser and Western Canada geese in the Pacific Flyway, and the relative abundance of agricultural fields in Lahontan Valley, which maintain a constant forage source for this species. Canada geese feed on grains, cereals, and green forage, and are attracted to grain fields that are large and open with an undisturbed body of water nearby (Bellrose, 1976). *In the Lahontan Valley agricultural areas, wintering Western Canada geese feed in corn fields (those harvested for grain as opposed to silage) and other grain fields (e.g., rye, barley, and wheat), while wintering lesser Canada geese tend to feed in fields where green forage is available, such as alfalfa fields (especially newly planted alfalfa).*

The number of Canada geese observed breeding in the Lahontan Valley has increased from 54 pairs in the 1972-1975 period to about 176 nesting pairs in 1989, and is consistent with the overall increase of western populations of Canada geese. In the past, S-Line, Harmon, and Sheckler Reservoirs served as important goose-nesting areas. Under baseline conditions the future of these regulating reservoirs as viable goose-nesting habitat remains doubtful.

Migrating snow geese are especially attracted to the Carson Lake wetlands, which offer pasture, native grasses, and stands of alkali bulrush preferred by foraging snow geese. In recent years, there has been shift in the snow geese migration pattern to the extent that the peak spring migratory population is now more than twice as large as the fall peak population. From 1970 to 1975, an average of 11,100 snow geese used the area, as compared to the 1989 peak of 5,800 snow geese. Recent spring populations of over 30,000 snow geese have been documented (Henry, oral communication, 1994).

Lahontan Valley's tundra swan population (6,000 swans in 1986) is the largest of any area in Nevada. The relatively mild winters and an abundant supply of various pondweeds attract these large concentrations of swans to the small ponds, lakes and marshes that comprise the Lahontan Valley wetlands. A few trumpeter swans also migrate through the area and are discussed in Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES.

Under baseline conditions, the Service estimates that waterfowl populations may be similar to populations that occurred in the Lahontan Valley in 1989, when waterfowl totalled about

190,000 ducks, geese and swans. In that year, wetland habitat in the Lahontan Valley was about 13,000 acres, an acreage base similar to that expected under baseline conditions.

3.9.2 SHOREBIRDS

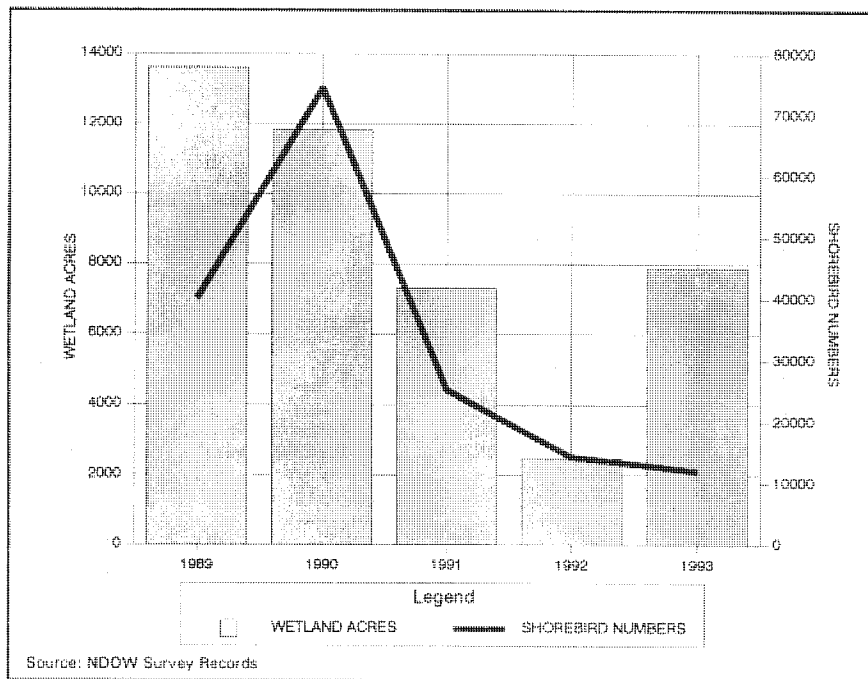
The Lahontan Valley wetlands provide critical habitat for a variety of migrating shorebirds. This value was recognized in 1988 when Stillwater NWR and the Carson Lake wetlands were designated as part of the Western Hemispheric Shorebird Reserve Network (WHSRN), one of only 17 such reserves *in the western hemisphere*. These reserves are comprised of North, Central and South American wetlands and coastal sites considered to be critical habitat for the migration of shorebirds.

Shorebird populations have been monitored periodically in Lahontan Valley since the early 1970s, but unfortunately, shorebird and colony nesting bird numbers were not separated during this period. It was not until 1989 that biologists began conducting standardized population surveys of shorebird migrations as part of the Point Reyes Bird Observatory's Pacific Flyway survey.

Shorebird numbers vary at each area from spring to fall and from year to year (Table 3.9.B) depending on water depth and wetland habitat available to accommodate feeding shorebirds. A comparison of wetland habitat acres (surveyed in August), to (August) shorebird migration counts between 1989-93 shows that shorebird populations have declined as wetland habitat acreage has decreased (Figure 3.9.B). Stillwater NWR and Carson Lake are the two areas within Lahontan Valley that attract the major concentrations of shorebirds. Shorebird and colony nesting bird-use data for 1972-75 showed that Stillwater NWR and Carson Lake supported 79 percent of the use by these birds in the Lahontan Valley, with the remainder of use occurring in the secondary wetlands at Fernley WMA, Massie and Mahala Sloughs and Soda Lakes (NDOW data, 1972-75).

In the spring of 1987, extensive areas of prime shorebird habitat were created in the Lahontan Valley wetlands as flooded playa wetlands receded. Service biologists observed more than 250,000 shorebirds at this time, with long-billed dowitchers, American avocets, and sandpipers as the three most abundant shorebird species in this extensive shallow wetland habitat. Other species, such as black-necked stilts, least sandpipers, marbled godwits, dunlins, and phalaropes are also numerous during the migration peaks. Willets, greater and lesser yellowlegs, long-billed curlews, killdeer, plovers, and several species of sandpipers also have been observed in the Lahontan Valley during fall and spring migrations, but in fewer numbers than the other shorebird species. Western snowy plovers, *a species of concern*, have shown a dramatic decrease in the Lahontan Valley since 1980 (see Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES).

FIGURE 3.9.B COMPARISON OF WETLAND HABITAT AND SHOREBIRD NUMBERS



Of the shorebirds, American avocet and black-necked stilts are the two major species of migratory shorebirds that nest in the Lahontan Valley in substantial numbers. In the early 1990s when wetland habitats were severely impacted by the drought, nesting efforts of these two species were reduced to practically nothing. In 1994, NDOW utilized acquired irrigation water to enhance shorebird nesting habitat for avocets and black-necked stilts at Carson Lake. As a result of these water management efforts, a total of 400 pairs of avocet and black-necked stilts were observed nesting at Carson Lake in 1994 (Neel, oral communication, 1994).

Other shorebirds that nest in or near the wetlands include snowy plovers, killdeer, common snipe, long-billed curlew, and Wilson's phalarope. *There are few records of these species nesting in Lahontan Valley.*

Long-billed curlew, a *species of concern* (see Section 3.13, ENDANGERED, THREATENED, AND CANDIDATE SPECIES) is a summer resident in meadows and pastures in Lahontan Valley, and is known to nest in the Carson Lake and Stillwater marsh areas.

The Service estimates that under baseline conditions, August populations of migratory shorebirds could amount to as many as 40,000 shorebirds. This figure approximates the August migratory shorebird counts in 1989. In that year, wetland habitat in the Lahontan Valley was about 13,000 acres, an acreage base similar to that expected under baseline conditions.

TABLE 3.9.B SHOREBIRD MIGRATION COUNTS ON LAHONTAN VALLEY WETLANDS 1989-93

APRIL SURVEYS

SPECIES	1989	1990	1991	1992	1993
American Avocet	7,980	12,489	11,127	4,196	322
Black-necked Stilt	162	1,262	448	286	175
Dowitcher sp.	39,285	28,442	22,721	13,943	2,644
Sandpiper sp.	43,112	62,346	26,052	20,633	4,427
Dunlin	11,131	6,385	9,320	600	2,130
Other	1,608	1,313	986	760	173
TOTAL	103,278	112,237	70,654	40,418	9,871

Source: NDOW records

AUGUST SURVEYS

SPECIES	1989	1990	1991	1992	1993
American Avocet	16,876	23,641	5,969	1,935	845
Black-necked Stilt	844	1,743	394	457	960
Dowitcher sp.	14,175	28,917	13,204	4,541	5,990
Sandpiper sp.	3,562	13,297	2,396	3,394	423
Phalarope sp.	1,940	4,531	1,115	1,569	1,378
Other	670	363	228	538	403
TOTAL	38,067	72,492	23,306	12,434	9,999

Source: NDOW records

3.9.3 COLONY NESTING AND OTHER MARSH BIRDS

Substantial numbers of colony nesting and other marsh birds migrate through and nest in the Lahontan Valley wetlands. Colony nesting birds include gulls, terns, egrets, herons, cormorants, pelicans, and white-faced ibis. Other marsh birds include grebes, rails, and Western least bitterns (see Section 3.9.4, PASSERINES, for marsh nesting passerine species).

Bird species in this group use the wetland habitat for nesting, brood rearing, and summer foraging areas. Egret, heron and ibis also forage in nearby agricultural fields, but return to the wetlands to nest. Colony-nesting species that nest in the valley include white-faced ibis, black-crowned night heron, great egret, snowy egret, and cattle egrets, great blue

heron, double-crested cormorant, eared grebe, Western grebe, Clark's grebe, pied-billed grebe, black tern, Forster's tern, California gull, and ring-billed gull.

Foraging conditions for fish-eating colonial species, such as American white pelican, double-crested cormorant, grebes, and great blue heron, were exceptional between 1983 and 1986. During this time, a number of high water years occurred, and fish populations flourished. However, in 1987, conditions began to decline. NDOW surveys show that the number of breeding pairs of colonial nesting species declined substantially between 1986 and 1989 (see Table 3.9.C). Only breeding populations of white-faced ibis and black-crowned night heron experienced increases during this period, a time in which water supplies were diminished and wetland acreage began to dwindle.

In 1987, thousands of fish died on the Stillwater NWR and WMA, and approximately 7 million fish died as the Carson Sink began to evaporate (Thompson, 1987, oral communication). The loss of water and fish was detrimental to most fish-eating colonial species.

TABLE 3.9.C NUMBER OF BREEDING PAIRS OF COLONIAL NESTING WATER BIRDS IN LAHONTAN VALLEY, NEVADA (1986-89)

SPECIES	1986	1987	1988	1989
Great Blue Heron	510	560	20	50
Great Egret	205	485	80	160
Snowy Egret	312	330	225	145
Cattle Egret	0	10	200	145
White-faced Ibis	2,090	4,200	3,430	4,400
Double-crested Cormorant	70	200	0	3
Black Crowned Night Heron	745	1,800	770	1,300
Caspian Tern	475	110	0	0
Forster's Tern	75-100	0	0	0
Black Tern	50	0	0	0
California Gull	1,200	2,700	0	0
Franklin's Gull	50	0	0	0
Eared Grebe	250	60	50	22
American White Pelican	350	0	0	0

Source: NDOW records

American white pelicans are a fish-eating colonial species that forage for fish in the Lahontan Valley wetlands to sustain themselves and their young. Traditionally, the pelicans nest at Anaho Island National Wildlife Refuge in Pyramid Lake, and often make daily flights to area wetlands to feed in the shallow waters associated with reservoirs and marshes. The pelicans use a cooperative herding and dipping method to capture fish and therefore require shallow waters where prey is accessible. In 1986, high waters created by flooding provided suitable nesting habitat and optimum foraging areas in the Carson Sink. That summer, approximately 350 pelican pairs successfully fledged young on Pelican Island in the Carson Sink area of Lahontan Valley. Pelicans have not nested in the valley since that time.

Other colonial-nesting species, such as Caspian terns, and California, ring-billed, and Bonaparte's gulls, commonly migrate through the Lahontan Valley, and all but Bonaparte's gulls nest in the area. Islands in Lahontan Reservoir provide nesting sites for large colonies of ring-billed and California gulls, as well as small numbers of great blue heron, black-crowned night heron, great egret, and snowy egret. White pelicans, double-crested cormorants and Western grebes are often found on the reservoir from early spring to late fall.

Nesting populations of Franklin's gull, Caspian tern, Forster's tern, and black tern have declined since the 1970s (Alcorn, 1988, and NDOW survey data 1986-1989). Although Franklin's gull were repeatedly seen at Carson Lake in spring and summer months between 1970-75 (Alcorn, 1988), the last documented colony of 40 pairs nested at Carson Lake in 1986. Forster's and black terns commonly nested in the Lahontan Valley wetlands during the 1970s but the last recorded population of nesting pairs for these species was in 1986 at Carson Lake. Black terns are *species of concern* (see Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES). Caspian terns nested in the Carson Sink areas during the flood years of 1986-1987. There were 475 nests recorded in 1986, and 110 nests observed in 1987. Caspian terns have not successfully nested in the Lahontan Valley since 1987.

Populations of Western grebe and eared grebe have also declined in the past 25 years. In 1971, spring populations of Western grebes numbered as high as 1,200. By 1986, the population had dropped to 200. In 1989, the number dropped even further; only 25-30 birds were sighted in the Lahontan Valley. Likewise, the number of eared grebes nesting in Lahontan Valley has declined greatly since the beginning of the drought in the mid-1980s (Table 3.9.C). The largest number of grebe nests (500) were recorded at Carson Lake in 1971. Eared grebe populations dropped to 250 nesting pairs in 1986 despite a wetland habitat that should have encouraged their numbers (Neel, oral communication, 1994). A small, sporadic number of grebes nest in the Lahontan Valley when wetland habitat is available. Twenty pairs were sighted at Stillwater NWR in 1992 (Henry, 1994, oral communication), and up to 60 pairs were sighted at Harmon Reservoir in 1994 (Neel, oral communication, 1994).

Although breeding populations of white-faced ibis, a *species of concern*, more than doubled in Lahontan Valley between 1986 and 1990 (from 2,100 breeding pairs observed in 1986, to 5,900 pairs in 1990), a loss of sufficient nesting habitat in the wetlands caused nesting to fail in 1991 (Janik, oral communication, 1995). (See Section 3.13, ENDANGERED, THREATENED, AND ENDANGERED SPECIES.)

The number of great blue herons nesting in the valley has also declined since 1987. In 1989, 50 pairs of great blue herons initiated nests, but few young were hatched.

Virginia rails, soras, common moorhens, and American coots are common in the wetlands from spring until early winter. Although seldom seen, adult Virginia rails, soras, and common moorhens with unfledged young have been observed in Lahontan Valley. Coots are the most common rails in the valley. In the 1970s, peak numbers of these birds averaged more than 70,000 annually. In 1989, the peak number had declined to fewer than 7,300 birds.

The Service estimates that under baseline conditions, the number of colonial nesting breeding pairs in Lahontan Valley could amount to as many as 6,000 pairs of birds. This figure approximates 1989 August survey data (NDOW). In that year, wetland habitat in the Lahontan Valley was about 13,000 acres, an acreage base similar to that expected under baseline conditions.

3.9.4 PASSERINES

There are very few population records on passerine species in the affected area. Generally, habitat preferences are known, and accounts by Alcorn (1988), and by Service and NDOW biologists provide the basis for this section.

There are both upland dependent and marsh dependent passerine species that inhabit the affected area. Marsh-dependent passerine species include long-billed marsh wrens, common yellowthroats, yellow-headed blackbirds, savannah sparrows, and song sparrows. Tree, bank, barn, and cliff swallows use marsh habitat for roosting and feeding. Savannah sparrows, Western meadowlarks and common nighthawks nest on the ground in meadow and upland areas, and forage in wetland meadows, rush and saltgrass plant communities.

Most passerine species diversity in the Lahontan Valley is associated with riparian habitat. These areas provide a mix of cottonwood, willow, buffaloberry, Russian olive, cattail, grass, and other stream-side plant communities and act as transition zones between water (e.g., rivers, canals, drains) and upland habitats (e.g., desert, agricultural). This provides a diversity of habitats within a small area, which can thereby serve the needs of many different species.

Many of the passerines associated with riparian areas are neotropical migrants (birds that winter in Central and South America but nest in *North America, including* the Lahontan Valley). Examples of species that depend on or are associated with riparian areas include Western wood peewees, house wrens, yellow warblers, MacGillivray's warblers, Bewick's wrens, black-headed grosbeaks, and Northern orioles. Many of the species that are associated with marsh, agricultural, and desert plant communities also make use of riparian habitats.

Riparian communities provide nest sites (primarily cottonwood trees) for cavity-nesting species such as sapsuckers, northern flickers, and *other* species of woodpeckers that are known to inhabit the affected area. *Cottonwood* trees also provide nest sites for secondary cavity nesters such as wood ducks, American kestrels, screech owls, tree swallows, violet-green swallows, house wrens, and Western bluebirds. Yellow-billed cuckoos (see Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES) are known to rely on gallery cottonwood habitat in the Middle Carson River corridor. Loss of cottonwoods *along the Middle Carson River corridor* could adversely impact this species (Neel, oral communication, 1994, Laymon and Halterman, 1989). Under existing conditions, cottonwoods in riparian habitats along the Truckee and Carson Rivers, around Lahontan Reservoir, and other areas within the Newlands Project are dying due to drought and other factors.

The introduction of agricultural plant communities has increased the overall diversity of passerine birds in the uplands of the affected area as compared to pre-settlement conditions. While adverse impacts of diverting water to agricultural lands has reduced available nesting habitat for red-winged and yellow-headed blackbirds, conversion of desert lands to agricultural lands has increased food resources for these species. Mourning doves are most frequently observed in agricultural lands, and they nest in adjoining trees and shrubs. They also are common in urban areas. Agricultural lands adjacent to riparian habitats are used as feeding areas by a variety of species that nest in riparian areas or perch in trees in the riparian zone. Few species of passerine birds depend on agricultural plant communities for nesting.

Common ravens, black-billed magpies, and American crows are also found in the Lahontan Valley. These birds commonly nest in upland and riparian areas but forage in and near the wetlands, and agricultural communities.

Some species, such as sage thrashers, black-throated sparrows, and sage sparrows depend on desert plant communities where shrubs dominate the communities. Other species such as water pipits, horned larks, and Western meadowlarks forage in plant communities dominated by plants such as alkali wild rye, saltgrass, and iodinebush. The loggerhead

shrike is a *species of concern* that nests in greasewood but also uses riparian areas, areas bordering marshes, and agricultural areas (see Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES).

Several species of birds in the affected area are associated with housing subdivisions and other residential developments. House sparrows, feral pigeons and European starlings are three such introduced species that are directly associated with human habitation and activities. A large number of species that are associated with riparian plant communities also can be found in residential areas where trees and shrubs are common. However, the quality of habitat in residential areas generally is considered inferior to riparian areas due to the preponderance of cats and dogs, human disturbance, manicured lawns and gardens, and abundance of aggressive introduced bird species (house sparrows and starlings).

The Service has no population data to quantify baseline conditions for passerine species. Generally, wetland-dependent and upland passerine species are expected to maintain existing populations (with 12,100 acres of wetland habitat and broad expanses of desert shrub habitat). Riparian dependent passerine species would be impacted by any substantial changes in water delivery patterns, including abandonment of canals and drains that offer riparian habitat.

3.9.5 RAPTORS

There is very little quantitative *information* on most raptor species in the affected area. Data provided in this section *are* compiled from Service and NDOW field data, and from Alcorn (1988).

Wetland-dependent raptors found in the affected area include bald eagles, northern harriers, peregrine falcons, ospreys, and short-eared owls. The bald eagles and peregrine falcons are further discussed in Section 3.13, ENDANGERED, THREATENED, AND SENSITIVE SPECIES. Other raptor species, such as golden eagles, prairie falcons, red-tailed hawks, Swainson's hawks, rough-legged hawks, Cooper's hawks, sharp-shinned hawks, American kestrels, turkey vultures, great horned owls, long-eared owls, screech owls, and common barn owls are common in the Lahontan Valley as year-round residents, migrants and nesters. These species are not wetland-dependent, but because they are opportunistic hunters, *some species can be found hunting in wetland habitats at times.*

Species that are associated with riparian tree communities include red-tailed hawks, Swainson's hawks, Cooper's hawks, sharp-shinned hawks, American kestrels, great horned owls, long-eared owls, screech owls, and common barn owls. Most of these species use trees provided in riparian areas, and other areas supporting trees, for nesting and for hunting perches from which to scan adjacent upland or agricultural habitats for prey. Some species,

such as sharp-shinned hawks and screech owls, also use open-forest conditions provided in some residential areas for nesting and hunting.

Short-eared owls and northern harriers nest in Lahontan Valley wetland habitats. As such, they would be directly affected by changes in the number of wetland habitat acres. There are only three active osprey nests in Nevada, and one of those pairs has nested on the Newlands Project's S-Line Reservoir since 1989. In 1993, osprey nesting in the area failed, perhaps due to the reservoir being reduced in size.

Burrowing owls nest *in upland areas of the Lahontan Valley*. American kestrels commonly nest in cavities of cottonwood snags along irrigation ditches, farm fields, river channels, reservoirs, and wetlands. Swainson's and red-tailed hawks, and great horned owls commonly nest in live cottonwood trees scattered throughout the Lahontan Valley. The nesting population of Swainson's hawks appears to be expanding in the valley. Ongoing conversion of agricultural land and associated riparian areas (where cottonwoods commonly grow) to housing subdivisions directly impacts raptors that use these lands and associated cottonwood trees.

Rough-legged hawks are observed in the Lahontan Valley from November to late March. Other raptor species, such as merlins, and ferruginous hawks, are uncommon winter residents and migrants.

With the exception of bald eagles, the Service has no population data to quantify baseline conditions for raptors. (Bald eagle data are provided in Section 3.13.) Generally, the Service expects that populations of wetland-dependent raptors such as bald eagles, northern harriers, peregrine falcons, ospreys, and short-eared owls will be maintained at existing levels under baseline conditions. Opportunistic hunters, such as golden eagles, prairie falcons, red-tailed hawks, Swainson's hawks, rough-legged hawks, American kestrels, and great horned owls, common barn owls, and burrowing owls are also expected to maintain existing populations under baseline conditions.

3.9.6 OTHER BIRD SPECIES

Other bird species in the affected area include California quail, ring-necked pheasants, wild turkey and chukar.

All four were introduced for recreational hunting. California quail are highly adaptable, inhabiting agricultural lands and associated riparian habitat as well as urban areas in the valley. Ring-necked pheasants, on the other hand, are dependent on agricultural land. Turkeys have succeeded in establishing a viable population in the agricultural and riverine

portions of the valley. Unlike the other three species of gallinaceous birds, chukar are found in rocky uplands occupied by native desert plant communities.

Under baseline conditions, the Service expects these other bird species to maintain populations that are comparable to existing conditions.

3.10 MAMMALS

Upland Mammals

Mammals are found throughout the affected area with the highest diversity of mammals occurring in the upland desert plant communities. Specific data on mammal populations within the Lahontan Valley are very limited, but 49 species from 15 families have been recorded in the area. Species lists for the affected area are included in Appendix 8.

Upland mammals comprise the largest number of species, have the widest distribution, and account for the largest mammal populations in the Lahontan Valley. They range in size from pocket mice to mule deer. All non-domesticated species of upland mammals are native to the area.

About two-thirds of the upland mammals in affected area are rodents, and nearly all of these are primarily associated with desert plant communities. Examples of rodents that can be found in lower elevation greasewood communities include white-tailed antelope ground squirrels, pale kangaroo mice, and Great Basin kangaroo rats. Some species of desert rodents, such as Merriam's kangaroo rat, can be found in alkali flats that are nearly devoid of vegetation (Hall, 1946). House mice are commonly found in urban areas.

Mule deer populations have increased in recent years in the affected area and are close to, or at record levels in the Lahontan Valley. Black-tailed jackrabbits are common throughout desert plant communities in the valley. The most common carnivore in the valley is the coyote. Kit foxes are also common in many of the less developed areas. Bobcats and mountain lions are occasionally encountered within the affected area. Striped skunks are common in agricultural areas. Long-tailed weasels and raccoons were common in the Lahontan Valley in the 1950s, but occur only rarely now.

Under baseline conditions, the Service expects that upland mammal populations will remain comparable to existing conditions.

Wetland and Riparian Corridor Mammals

Beaver, mink, muskrats, and raccoons were once common in the wetland areas in Lahontan Valley. Mink have vanished, but muskrat and beaver populations remain. Beaver and muskrat may have

been introduced into the Lahontan Valley prior to the turn of the century as a means of increasing the fur harvest in Nevada, but this has not been substantiated. *Beaver are frequently found along the Carson River and occasionally found in canals and drains.* Raccoons were common along the Carson River and Newlands Project canals and drains in the 1950s, but are rarely encountered now.

Muskrats are one of the most numerous wetland-dependent mammal species, and are found in marsh communities *and along the Carson River, canals, and drains.* Until the recent *low-water years*, muskrats were trapped in considerable numbers for their fur. *During the low water years of the late 1980s and early 1990s*, the muskrat population dropped to a remnant of its former size due to the loss of wetland habitat. *However, the muskrat population is increasing again as a result of Lahontan Reservoir spill-water expanding the size of wetland habitat in the Lahontan Valley during the high water years of 1994-1995 and 1995-1996.*

Other mammals that inhabit marsh and riparian areas include the Western harvest mouse and long-tailed voles. Western harvest mice prefer dense vegetation near water.

Bats generally roost in the surrounding foothills, and they forage over the wetlands and agricultural lands. The silver-haired bat is found around trees along the Carson River during the fall migration (Alcorn, unpublished data).

In the Truckee River corridor, species known or expected to occur include muskrats, water shrew, beaver, river otter, bats, raccoons, skunks, mountain cottontail, western harvest mouse, long-tailed vole, western jumping mouse, bushy-tailed woodrat, porcupine, long-tailed weasel, and skunks.

Under baseline conditions, the Service expects populations of wetland-dependent mammals to be comparable to existing conditions.

3.11 REPTILES AND AMPHIBIANS

Reptile and amphibian surveys are not known to have been conducted in the affected area, so there are no data to analyze population trends. A table of the species that commonly occur in the affected area is included in Appendix 8.

Several species of reptiles live in the affected area and are generally found in the upland vegetative communities. Lizards include the desert horned lizard, Great Basin collared lizard, long-nosed leopard lizard, zebra-tailed lizard, side-blotched lizard, yellow-backed spiny lizard (a subspecies of desert spiny lizard), Great Basin fence lizard, northern sagebrush lizard and Great Basin whiptail lizard. Snakes include the Great Basin rattlesnake, desert striped whipsnake, Western yellow-bellied racer, Western coachwhip, Great Basin gopher snake, Western long-nosed snake, wandering garter snake, night snake, and California kingsnake. Western terrestrial garter snake, Western fence lizard, and Western aquatic garter snake are also found in the affected area.

It is unknown whether the northwestern pond turtle, which is a *species of concern* (see Section 3.13, THREATENED, ENDANGERED, AND SENSITIVE SPECIES), is native to Nevada. Reports (La Rivers, 1962) confirm this turtle's presence in the Truckee and Carson River drainages.

Frogs and toads have been documented in historical accounts of the area (Fowler, 1992). Amphibians are sensitive to poor water quality, and concentrations of certain trace elements have been shown to adversely affect amphibian embryos (Birge, 1978). Kerley and others (1993) have found that frogs have been impacted by the high concentrations of dissolved solids entering the wetlands. However, specific data pertaining to the occurrence and distribution of amphibian species, either historically or currently, *are* not available for the affected area.

Northern leopard frogs are found in the wetland areas, river channels and irrigation canals. Their numbers have declined since the 1970s. Bullfrogs were introduced in the valley in the late 1800s. Their populations appear to have survived despite many periods of drought and have remained somewhat stable in the valley along riparian areas and irrigation canals.

The Service has insufficient data to quantify baseline conditions for reptiles and amphibians in the affected area. *However, based on studies (Birge, 1974, and Kerley and others, 1993) that show amphibians are sensitive to poor water quality, and drainwater studies that have shown high dissolved solids concentrations, it can be assumed that amphibian species that do occur in the area are most likely impacted by total-dissolved solids concentrations in the affected area.*

3.12 INVERTEBRATES

There is little information on the occurrence or abundance of invertebrates in the affected area. Comprehensive surveys are lacking. Historical accounts indicate that mollusks, including fresh-water clams, mussels, and snails, were once abundant in some wetlands of Lahontan Valley.

Freshwater clams have recently been found in Stillwater Point Reservoir (Neel, 1994, oral communication). An introduced species of freshwater clam, *Corbicula*, has been identified in some Newlands Project regulating reservoirs and canals. Gastropods have been recently identified in one of the Stillwater NWR wetland units (Tuttle, 1994, oral communication).

Recent studies have noted the occurrence of a variety of aquatic invertebrates. Of note, *Daphnia* species (water fleas), and copepods are abundant in certain reservoirs and delivery canals. Crayfish occur in the Carson River, but are uncommon in Lahontan Valley and absent in terminal wetlands. A variety of aquatic insects are found in aquatic areas of the Newlands Project, including wetlands. Most major orders of aquatic or semi-aquatic insects are represented. However, diversity of aquatic insects appears to decline with decreasing water quality (Tuttle, oral communication, 1994), and diversity in terminal wetlands is limited to only a few species.

Toxicity tests in TJ, Hunter, and Paiute Diversion Drains have shown elevated levels of selenium and mercury in aquatic invertebrates (Finger and others, 1993). Consumption of contaminated invertebrates has been shown to cause reproductive failure or mortality in fish and birds through bioaccumulation (ibid).

Under baseline conditions the Service anticipates that invertebrates will continue to be adversely impacted by poor water quality.

3.13 ENDANGERED, THREATENED, AND SENSITIVE SPECIES

There are two endangered species within the affected area. The peregrine falcon is found in the Lahontan Valley, and cui-ui, a lake sucker, is endemic to Pyramid Lake and the lower Truckee River. Additionally, two threatened species, the bald eagle and Lahontan cutthroat trout, *and one candidate species, the mountain plover*, also occur in the affected area. *In addition to endangered, threatened, and candidate species, the section addresses species of concern (formerly classified by the Service as Category I Candidate Species, Category II Candidate Species, or Category III Candidate Species). As of February 1996, the Service no longer maintains lists of species classified as Category I Candidate Species (C1 Species), Category II Candidate Species (C2 Species), or Category III Candidate Species (C3 Species) (Federal Register 61(40):7596-7613). Most of these former candidate species are now termed "species of concern" for the Service's purposes, but are in no way connected with the Endangered Species Act. Several species that had been classified as C1 species are now termed "candidate species." An internal Section 7 Consultation was completed for endangered, threatened, and candidate species in the affected area. This section begins with discussions of endangered, threatened, and candidate species followed by discussions of species of concern. Table 3.13.A identifies the endangered, threatened, candidate, and species of concern that are known to occur in the affected area.*

A few peregrine falcons have been regularly sighted at both Carson Lake and Stillwater NWR since 1985, with the most consistent sightings occurring at Carson Lake. Over the years, adult males, females, and juvenile birds have been observed in this area. Peregrines are normally observed from February through November of each year. In spring 1989, field biologists observed a peregrine falcon hunting at Carson Lake on several occasions (Neel, oral communication, 1994). Due to the frequent sightings, it was presumed to be nesting nearby. Rock cliff areas surrounding Carson Lake were surveyed by helicopter and by foot, but no peregrine nesting activity was discovered.

Bald eagles, now federally listed as a threatened species, are generally observed between November and March in the wetlands and reservoirs of Lahontan Valley. The bald eagle population is concentrated in the area of Stillwater NWR, Lahontan Reservoir, and Carson Lake and this species is known to winter along the Carson River. A record number of 70 bald eagles spent the winter of 1986-87 in the Lahontan Valley. Timber Lake, located north of Fallon, is the primary historic bald eagle winter roost site in Lahontan Valley. Other areas commonly frequented by wintering eagles

TABLE 3.13.A ENDANGERED, THREATENED, AND CANDIDATE SPECIES, AND SPECIES OF CONCERN IN THE AFFECTED AREA

<u>Common Name</u> ¹	<u>Scientific Name</u> ¹	<u>Federal Status</u> ²	<u>Habitat</u> ³
Birds			
Western least bittern	<u><i>Ixobrychus exilis</i></u>	*	wet
White-faced ibis	<u><i>Plegadis chihi</i></u>	*	wet/ag
Trumpeter swan	<u><i>Olor buccinator</i></u>	*	wet
Western snowy plover	<u><i>Charadrius alexandrinus</i></u>	*	wet
Mountain plover	<u><i>Charadrius montanus</i></u>	C	up/ag
Long-billed curlew	<u><i>Numenius americanus</i></u>	*	wet/up
Black tern	<u><i>Chlidonias niger</i></u>	*	wet
Bald eagle	<u><i>Haliaeetus leucocephalus</i></u>	T	wet/rip/up/ag
Ferruginous hawk	<u><i>Buteo regalis</i></u>	*	wet/rip/up/ag
American peregrine falcon	<u><i>Falco peregrinus anatum</i></u>	E	wet/up/ag
Yellow-billed cuckoo	<u><i>Coccyzus americanus</i></u>	*	rip
Loggerhead shrike	<u><i>Lanius ludovicianus</i></u>	*	up/ag
Reptiles			
Northwestern pond turtle	<u><i>Clemmys marmorata marmorata</i></u>	*	rip/wet
Fish			
Cui-ui	<u><i>Chasmistes cujus</i></u>	E	lak/str
Lahontan cutthroat trout	<u><i>Oncorhynchus clarki henshawi</i></u>	T	str/lak
Lahontan tui chub	<u><i>Gila bicolor obesa</i></u>	*	lak/str
Invertebrates			
Nevada viceroy	<u><i>Limenitus archippus lahontani</i></u>	*	rip

¹ Scientific nomenclature and common names follow: Banks, et. al.(1987); AOU (1983); Jones, et. al. (1986).

² Status- Federal: E = endangered and T = threatened (under the Endangered Species Act); C = candidate species; and * = Service's species of concern (not under the Endangered Species Act)

³ Habitat: wet = wetland habitat, rip = riparian, up = upland, ag = agricultural, lak = lake, str = stream.

include Indian Lakes, and the S-line and Harmon regulating reservoirs. Under baseline conditions the Service speculates the bald eagle populations would be comparable to 1989, when 32 bald eagles were sighted in the area (NDOW aerial census, 1989).

Cui-ui is a member of the lake sucker family unique to Pyramid Lake and the lower reaches of the Truckee River. This species has been listed as endangered due to upstream diversions which have reduced the frequency of years in which the species can successfully spawn in the lower Truckee River.

Under existing conditions, cui-ui is maintained through natural riverine reproduction augmented by artificial hatchery releases. The total population of this fish is calculated to be several million, with an estimated adult population of about 700,000 (Mendoza, written communication, 1995). The Service has developed a recovery plan for this species (Section 1.9, RELATED ACTIONS (9), Recovery Actions for Endangered and Threatened Pyramid Lake Fishes). Two critical factors in cui-ui recovery are Pyramid Lake elevation (and its relationship to the Truckee River delta) and Truckee

River inflows. In 1994, Pyramid Lake's level was 3,795-feet (Wagner, written communication, Pyramid Lake Fisheries data, 1994). Pyramid Lake elevation between 1910-94 (based on 37 years of actual lake elevation records) averaged 3,804 feet (ibid). Actual flow records of the Truckee River at Nixon, Nevada (near the inlet to Pyramid Lake) average 363,000 AF for the 1958-93 period of record (USGS, Water Resources Data, Nevada, 1993).

The Cui-ui Recovery Plan uses the cui-ui population index to compare possible effects of various water management plans on cui-ui population dynamics (U.S. Fish and Wildlife Service, 1992a). The cui-ui index simulates the reproductive response of the cui-ui population to varying instream

flow and Pyramid lake elevation over time (Buchanan and Strekal, 1988). This number represents an index of the relative population size for cui-ui under various water regimes associated with the alternatives in this document. These index numbers do not represent actual populations, but are calculated numbers used for comparison of alternatives.

To calculate baseline conditions for Pyramid Lake elevations, Truckee River inflows, and the cui-ui index, the Service relied on the NSM and BLR Model, and applied a different assumption set from the cui-ui recovery plan. This was necessary in order to apply a consistent set of assumptions to compare consequences of alternatives in this document (see Section 3.2, NEWLANDS PROJECT OPERATIONS). The Service uses calculated data for this element because it provides a common baseline that can calculate conditions for comparison of alternatives.

Under baseline conditions (using the 92-year hydrologic simulation period) average lake level is set at 3,830 feet over the long run, Truckee River inflow averages 448,800 AF/year, and the cui-ui index averages 152,100.

Lahontan cutthroat trout is federally listed as a threatened species, and is found in Pyramid Lake and many other streams and lakes in Nevada and California. Lahontan cutthroat trout in Pyramid Lake is the result of introductions of other cutthroat strains following the disappearance of the original Pyramid Lake strain in the 1940s. No natural reproduction occurs in the affected area, and this species is maintained through hatchery production. Lahontan cutthroat trout provides a valuable trophy fishery in Pyramid Lake, and the lake is not listed as a recovery site for the fish (see Section 1.8.1 (9), Recovery Actions for Endangered and Threatened Pyramid Lake Fishes).

Mountain Plover, a *candidate species (former C2 Species)*, rarely visits Lahontan Valley. Two mountain plovers were sighted during December 1990 and 1994 Audubon Christmas counts (Henry, oral communication, 1994), and a single sighting of a Mountain Plover was recorded in the Lahontan Reservoir flood plain during a time of drawdown in the fall of 1991 (Neel, oral communication, 1994). *They inhabit relatively barren areas, such as heavily grazed pastures and plowed fields.*

Western least bittern, a *species of concern (former C2 Species)*, is known to occur in the Lahontan Valley wetlands (Neel, oral communication, 1994). One documented record shows that Western least bitterns have nested in the valley (ibid).

White-faced ibis, also a *species of concern (former C2 species)*, forages in a variety of habitats including wetland habitat and agricultural fields, and nests in wetland habitat. The nesting population of white-faced ibis in the valley is one of the three largest in the western United States. Between 1986 and 1989, the number of breeding ibis pairs ranged from 2,100 to 4,400 (Table 3.8.C). The record nesting population of 5,900 pairs occurred in 1990. White-faced ibis relies on good stands of emergent vegetation to build nesting platforms. In 1991, nesting at Stillwater NWR and Carson Lake failed due to a the low amount of available wetland habitat in these areas (NDOW, written communication, 1995).

Trumpeter swan, a *species of concern (former C2 Species)*, is an infrequent winter visitor. Alcorn (1988) estimates that the Stillwater marshes are the southernmost range of this large bird in Nevada. Although hunted almost to extinction, the trumpeter swan has made a good recovery and was removed from the list of rare wildlife in 1968. As many as 10 trumpeters have been sighted at Stillwater marsh at one time, though the groups are most usually between 1-4 birds (Henry, oral communication, 1994).

Western snowy plover, a *species of concern (former C2 Species)*, has shown a dramatic decrease in the Lahontan Valley since 1980. Intensive snowy plover surveys were conducted on wetland areas within the Lahontan Valley in 1980, 1988, and 1991. These surveys showed that the number of these birds dropped from 761 in 1980, to 74 in 1991 (Herman and others, 1981, and Page and others, 1991). Western snowy plover is a spring and summer resident and transient species. Some nesting has been documented in Stillwater NWR and WMA (Alcorn, 1988 and Henry, oral communication, 1994).

Long-billed curlew is a *species of concern (former C3 Species)* that nests in limited numbers in uplands and drier areas of the wetlands in Lahontan Valley. Alcorn (1988) documented curlew nesting sites in the Carson Lake and Stillwater marsh areas. Long-billed curlews forage in wetland marshes and wet meadow habitats and often nest in the adjacent upland areas. Data from the Point Reyes Bird Observatory Counts in the month of August between 1989-94, show that the number of long-billed curlew dropped from 195 in 1989, to 25 in 1994.

Although once abundant in Lahontan Valley, black terns *are now uncommon* in the affected area and are considered to be a *species of concern (former C2 Species)*. The black tern is a summer resident in northern and western Nevada. This species prefers nest sites in dense vegetation in freshwater marshes, sloughs, and wet meadows. The species has been in decline throughout its range in North America (Ehrlich, 1992) due to loss or degradation of marsh habitat. In 1946, Alcorn (1988) reported that these birds were frequently seen in the Lahontan Valley from April to August, with nesting in the Carson Lake area each year. *No nesting of black terns was documented from 1986 through 1993. However, beginning in 1994, black terns are again nesting in the Lahontan Valley.*

Although not abundant, ferruginous hawk, another *species of concern (former C2 Species)*, is an infrequent, but regular fall migrant and winter resident in Lahontan Valley. Between 1962-1967, Alcorn made eight sightings of the bird. This species is regularly sighted in the affected area between Sagouspe Dam and Diversion Dam, in the Stillwater agricultural district, and at Indian Lakes.

Yellow-billed cuckoo, a *species of concern (former C3 Species)*, was once a regular summer visitor in the affected area. Alcorn (1988) cites the birds occurrence in large cottonwoods in Lahontan Valley, and also along the Truckee River. Since 1946, these birds have become rare in the affected area and no longer occur in the Truckee River region. Alcorn (1988) indicates that breeding populations of the Western yellow-billed cuckoo in Nevada are possibly extinct, or threatened with extinction. However, a few yellow-billed cuckoos have been sighted in both Lahontan Valley and the Middle Carson River area above Lahontan Reservoir. Single sightings of this species have been documented in the gallery cottonwood area at the west end of the Lahontan Reservoir State Park (Neel, oral communication, 1994). Cuckoos nest in cottonwood-willow stands that are greater than 32 acres in size and wider than 1,970 feet (Laymon and Halterman, 1989). The Middle Carson River gallery cottonwood riparian corridor may be the last place in northern Nevada where the cottonwood-willow stands meet the criteria for optimum nesting habitat (Neel, oral communication, 1994).

The loggerhead shrike, a *species of concern (former C3 Species)*, is commonly found in the Lahontan Valley greasewood upland areas and agricultural zones in the affected area. The shrikes nest in greasewood uplands.

Northwestern pond turtle, a *species of concern (former C2 Species)*, is known primarily from the Carson River drainage but a few animals may persist at sites along the Truckee (Jennings and others, 1992). This turtle inhabits rivers, ponds, streams, lakes, marshes, irrigation ditches, and other seasonal and permanent wetlands (Stebbins, 1985). Three or four sightings of this turtle have occurred in the last five years, and one turtle was found on a drainage ditch in the spring of 1994 (Henry, oral communication, 1994 and Anglin, oral communication, 1994). The Service was

petitioned to list this turtle as an endangered species, but in 1993, the Service determined that it did not warrant listing.

The Nevada viceroy, a willow-dependent butterfly, is *another species of concern (former C2 Species)* that occurs mainly along the Humboldt River and its lower tributaries with additional colonies near Fallon and Fernley (Austin, written communication, 1990). The species is not known to occur outside of Nevada, and some colonies have disappeared since 1985. The Nevada Viceroy is found in the vicinity of willows, which are the larval host plant. Loss of willows along waterways is a major threat to this species (ibid).

Lahontan tui-chub, a *species of concern (former C2 Species)*, has been known to occur in Diagonal Drain, Little Soda Lake, Stillwater Point Reservoir, and in the lower Carson River (Sevon, oral communication, 1994). Lahontan tui-chub is also known to occur in the Truckee and Walker Rivers.

3.14 TOXICITY AND AVIAN DISEASES

Toxicity and avian disease problems have been documented in the Lahontan Valley wetlands within the past eight years. Toxicity is related to concentrations of contaminants and total dissolved-solids in wetland waters. Avian diseases such as botulism are associated with conditions in which water temperatures are high and oxygen is lacking (Bellrose, 1976).

3.14.1 TOXICITY

Historically (1845-60), the concentration of dissolved-solids entering the primary wetlands ranged from 170 mg/L to 270 mg/L (Kerley and others, 1993). Under existing conditions the water quality of water supplying Stillwater NWR and Carson Lake wetlands has degraded with dissolved-solids concentrations for drainwater reaching 1,170 mg/L and about 600 mg/L for irrigation water entering the wetland areas (Kerley and others, 1993). In any terminal wetland, a natural water quality degradation process occurs seasonally due to evapotranspiration. In the Lahontan Valley wetlands, these natural processes are exacerbated by lower quality inflows at the onset and an absence of spring flushing flows.

The results of three separate, but related, toxicity studies conducted during 1988-89 on the drains that flow directly or indirectly into Stillwater NWR *revealed that the drainwater in these drains was* acutely toxic to both freshwater and saltwater shrimp and fish species (Finger and others, 1993). The toxicity to freshwater species was likely due to high salinity levels. Toxicity to salt-tolerant species may have been due to exposure to atypical ionic composition and mixtures of trace elements (Burge, written communication, 1991).

Prior to the construction of the Newlands Project, the wetlands received 40-60 percent of its total inflow in a four-month period (April-July) with the peak flows occurring in May and June (Glancy and Katzer, 1976). The peak spring runoff was generally a good quality and high volume flow that diluted and flushed the wetlands each year. Under existing conditions, wetland inflows are spread over a 6-7 month period, and drainwater inflows peak in late July and August. Lower quality inflows and a lack of spring flush have created conditions in which dissolved-solids concentrations in some of the shallower playa portions of the wetlands are as high as 28,400 mg/L (Kerley and others, 1993). In addition, the high evaporative rates (see Section 3.3.1, SURFACE WATER QUANTITY, Carson River, and Appendix 4, Defining Wetland Water Requirements and Evaporation Rates Relative to the Lahontan Valley) of these desert wetlands concentrate salts and inorganic contaminants contained in drainwater inflows, further degrading wetland water quality.

Recent studies by Tuttle (written communication, 1994) and others (see Section 3.3.2, SURFACE WATER QUALITY, Drainwater Quality, for study references) confirm that levels of inorganic contaminants such as arsenic, boron, selenium, and mercury correspond to the increased dissolved-solids concentrations recorded in the primary wetlands. These studies have shown that the inorganic contaminants are not only in the water but have accumulated in the sediment, plants, insects, and fish at the Stillwater NWR and Carson Lake wetland areas.

According to Hallock and Hallock (1993) as well as Tuttle (written communication, 1994) there has been an accumulation of arsenic, boron, selenium, and mercury by aquatic plants and insects in the drains and wetlands at Stillwater NWR and Carson Lake. The bioaccumulation of these trace elements in plants and insects has led to elevated contaminant levels in waterfowl, shorebirds and other wildlife species (Hoffman and others, 1990) at higher levels of the wetland food chain. Studies of edible portions of waterfowl in 1986-87 found elevated levels of selenium and mercury in certain waterfowl (Hallock and Hallock, 1993). These elevated levels of mercury in waterfowl caused human health warnings to be issued in 1989 for shoveler ducks taken at Carson Lake. Evidence of high mercury levels were confirmed in subsequent studies in other duck species from Stillwater NWR and Carson Lake (Hoffman, 1994). In both studies, high levels of selenium were also found in ducks, but they did not exceed human-health standards.

In Lahontan Valley, there is no "cause and effect" evidence linking specific contaminants in wetland waters directly to wildlife mortality. A few deformities have been documented over the past eight years. In August 1987, two juvenile coots with deformed wings and feet were found at Lead Lake (Janik and Henry, oral communication, 1994). A juvenile white-faced ibis found at Carson Lake in June 1985 showed a leg deformity (ibid). Such deformities can occur naturally, and there is no conclusive evidence to show that they are caused by contaminants present in Lahontan Valley wetlands.

The Service recognizes that reliance on large volumes of drainwater inherently increases levels of inorganic contaminants in the wetlands, and probably adversely impacts the lower levels of the food chain (aquatic insects and invertebrates). Under existing conditions, there is evidence that toxicity problems occur in some drains that provide inflow to the wetlands. Poor quality water greatly accelerates the water quality degradation process in the wetlands.

Under baseline conditions, the Service would continue to rely on a high percentage of drainwater for wetland inflows, and the potential for toxicity problems would persist. In total, a long-term annual average of 55,600 AF of water will comprise wetland inflows. Of that volume, the BLR Model calculates that a little more than half, 30,000 AF, would come from drainflows.

3.14.2 AVIAN DISEASES

Avian botulism is a disease that afflicts waterfowl and can cause massive losses if uncontrolled. Botulism is caused by toxin produced by an anaerobic bacterium, *Clostridium botulinum* (Bellrose, 1976). Botulism bacteria develop when high temperatures cause spores to germinate when both a suitable nutrient medium and an environment devoid of oxygen exists (ibid). Hunter and others (1970) suggest that the nutrient medium consists almost entirely of animal matter. Hunter (ibid) also found that botulism outbreaks occur as a result of altered water regimes, (such as when water recedes, exposing mud flats and causing the death of aquatic invertebrates that provide a suitable medium) or when changes in water quality cause the death of invertebrates. Maggots devouring the flesh of dead fish or other dead organisms are other sources of the toxin (Bellrose, 1976). There is no evidence of free botulism toxin in water or soils where botulism outbreaks occurred (ibid). Once an outbreak of botulism occurs, it is essential that carcasses of dead waterfowl be removed to reduce the fly maggot cycle. Bellrose (ibid) suggests that manipulation of water regimes, such as draining or flooding an area, are methods that can be used to change conditions in infected habitat areas in order to control infection.

The Lahontan Valley wetlands experience botulism outbreaks almost every year. The number of birds and the areas where the outbreaks occur vary from year to year depending on conditions. In the late summer of 1988 a major botulism outbreak occurred in which 13,567 birds died (Vega, 1987). Most of these losses occurred on two private gun clubs where about 13,165 (97 percent) birds died (ibid). This outbreak can mostly likely be attributed to *an interruption in irrigation delivery when Newlands Project was shut down in September of that year due to reduced water allocations (NDOW, written communication, 1995)*. At Stillwater NWR, a 1983 botulism outbreak killed about 52,000 birds as the wetland acreage receded from the flood-swollen acreage in 1982 (ibid).

Other avian diseases, such as avian cholera, have occurred in isolated incidents, but are not considered to be prevalent problems in the affected area. In January 1987, an avian cholera outbreak killed about 1,500 birds in the Carson Sink (Vega, 1987). Over 500 ducks, geese, and coots died from an avian cholera outbreak on Carson Lake in March 1996. Cholera generally occurs when waterfowl congregate in dense numbers. The disease is introduced to waterfowl through direct contact with infected domestic fowl or contact with contaminated soil, food and water (Bellrose, 1976).

3.15 BIODIVERSITY

Biological diversity, or biodiversity, is the variety of life and its processes (Keystone 1991, Noss and Cooperrider, 1994). Important elements of biodiversity include *genetic diversity*; the variety of plant and animal species and their relative abundance; and the variety, relative abundance, shape, size, and distribution of different habitats in an area (Noss, 1990). Genetic diversity is an important element of biological diversity at many different levels (e.g., population, species, community) (Smith and Rhodes, 1992).

There are a number of different types of biodiversity. For the purposes of this document, "native biodiversity" refers to the biological diversity that existed in an area prior to Euro-American settlement. Changes in the number and abundance of native species reduces native biodiversity (Noss and Cooperrider, 1994). Changes in ecological processes (e.g., hydrologic cycles) can result in reductions in native biodiversity. Introductions of non-native plant and animal species generally reduce native biodiversity (Soulé, 1990, and Noss and Cooperrider, 1994).

"Overall biodiversity" refers to the biological diversity that exists in an area regardless of whether species and communities are native to the area or whether the ecosystem is self-sustaining or is maintained by human activities (intentional or unintentional). "Maximum biodiversity" refers to the largest amount of overall biodiversity that can be achieved in an area.

A standard procedure for enumerating biodiversity currently does not exist. A primary reason is that biodiversity is such a complex parameter to measure. Factors that must be considered in evaluating biodiversity include: the number of species in the affected area, the relative abundance of each species within each biological community, the number of biological communities, and the size and distribution of each biological community throughout the affected area. To most accurately depict the current status of native biodiversity, the differences between present-day biodiversity and biodiversity that existed prior to Euro-American settlement is described. To maintain consistency, the same reference point is used in describing the current status of overall biodiversity.

Available information, summarized below, indicates that native biodiversity in the affected area is lower now than it was prior to the Newlands Project, and lower than it was 25 years ago. Native

biodiversity has declined in wetland, riparian, and upland habitats. While overall biodiversity associated with wetlands has declined (Kerley and others, 1993) and overall biodiversity of the uplands appears to have increased during the same period, it is not clear whether overall biodiversity in the entire affected area has increased or decreased during the past 100 years.

Native biodiversity in the Lahontan Valley has been adversely impacted by agriculture and urban development in the Lahontan Valley. Native biodiversity appears to have declined even further during the past 25 years as various factors acted to decrease volumes of water to the wetlands (winter hydropower generation ceased, Newlands Project efficiencies increased, and a 6-year drought took its toll). As wetland inflows dwindled, so did water quality. Species such as mink, otters, turtles, frogs, and clams, which historically were common to abundant in Lahontan Valley wetlands, are now rare or nonexistent (Kerley and others, 1993). Several species of fish, including Lahontan tui chub, Tahoe sucker, redbreasted sunfish, and speckled dace, existed in sufficient numbers in the valley to be used by the native Paiute Indians as a food source (Fowler, 1992). Kerley and others (1993) reported that most native fish are now absent from most areas. Also contributing to the decline of native biodiversity was the introduction of carp, brown bullhead, black bullhead, largemouth bass, and other non-native fish species. Although the introduction of non-native fish has added to overall biodiversity in terms of numbers, these species negatively impacted native fish populations. This, in conjunction with the sharp decline in water availability in the valley, has reduced overall biodiversity.

Recent reductions in the use of the valley by wetland-dependent birds have contributed to declines in native biodiversity and have negatively impacted overall biodiversity as well. Several species of waterfowl, shorebirds, and other wetland-dependent birds that once were common or abundant in the valley are now less common (Kerley and others, 1993). For instance, long-billed curlews and white-fronted geese are now much less common (Marshall, 1952; Fowler, 1992; and Kerley and others, 1993). Some species of birds, such as Franklin's gull, no longer nest in the area but are still found during migration and could potentially re-establish breeding populations if habitat is restored (note: Franklin's gulls nested at Carson Lake in 1995; NDOW, written communication, 1995). Other species that may have never been abundant, such as the American bittern, apparently were more common in the early 1900s than they are today (Fowler, 1992). In the last 25 years, waterfowl use of Lahontan Valley wetlands has declined even more (Section 3.9.1), primarily as a result of reduced wetland acreage and possibly degraded water quality (Kerley and others, 1993; Hallock and Hallock, 1993; Tuttle, U.S. Fish and Wildlife Service, unpubl. written comm.). Jehl (1994) presented information showing that bird species diversity (and overall biodiversity) in saline wetlands declines as water salinity increases, as has been the case in the Stillwater marshes and Carson Lake (Kerley and others, 1993).

Wetland plant communities have changed substantially in extent, distribution, and composition since before the Newlands Project was constructed. Marshall (1952), Fowler (1992), and Kerley

and others (1993) provide documentation, based on historic accounts and interviews with native Paiute Indians, of reductions in the kind and amount of emergent and submergent vegetation in the Stillwater marshes and Carson Lake. For the wetland habitat that remains, relative composition of plant communities has changed. For instance, submergent vegetation currently consists of a larger proportion of the more salt-tolerant species (Kerley and others, 1993). Reductions in the amount and quality of water have been identified as the major causes of the changes (Kerley and others, 1993, and Hoffman, 1994). Several introduced plant species, such as white-top and saltcedar (i.e., noxious weeds), also have changed the composition of plant communities. Changes in wetland plant communities have reduced both native and overall biodiversity.

Use of the Lahontan Valley by several species of native wildlife appear to have increased during the past 100 years. For instance, white-faced ibis may be more common now in the Lahontan Valley than they were historically (Fowler, 1992), which may be related to the introduction of flood-irrigated agriculture in the area. The number of Canada geese that use the valley during migration also has increased (Section 3.9.1). Another species that has increased in number in the Lahontan Valley is the California quail. Although historic information is not available, it can reasonably be inferred that use of the Lahontan Valley by some passerine bird species that prefer wooded habitat has increased as a result of urban and residential landscaping. While increases in populations of native species (over historic levels) may positively influence overall biodiversity, the net affect on native biodiversity may be negative.

During the last century, numerous species of plants and animals were introduced into the affected area during the development of agriculture. Irrigated farm fields and plant communities associated with irrigation canals and drains have replaced desert plant communities in some areas. Agricultural development brought with it an increase in the types of habitats (e.g. alfalfa and corn fields, artificially created riparian areas) available to wildlife in the Lahontan Valley. This occurred without substantial reductions in the amount of desert shrub habitat. While irrigated farm fields positively impacted overall biodiversity in the valley, the farm fields themselves are relatively low in species diversity. Added to the collection of species brought into the affected area with agriculture are the ring-necked pheasant, wild turkey, and valley quail.

Creation and expansion of the Fallon urban area and other scattered areas of development brought with it a whole host of new species, including ornamental trees, shrubs, and herbaceous plants. Urbanization also expanded the variety of habitats, bringing with it wood lots, lawns, and flower gardens. Urban areas, in conjunction with agricultural areas, attracted several introduced species of wildlife, including the European starling, house sparrow, and rock dove. Domestic cats and dogs, which potentially can adversely impact overall and native biodiversity, accompanied urban and rural development.

SOCIO-ECONOMIC RESOURCES

Historically, farming, ranching, livestock production, and a rural lifestyle have dominated social and economic resources in the affected area. In the past few years, rapid population growth and increased commercial development have caused Fallon and Fernley to experience significant changes. In general these changes represent a transition toward a more urban lifestyle. One example of this transition is in Churchill County, where personal income from farming has dropped *over the past 18 years* from 18 percent of the County's total income to less than 3 percent (*Nevada Department of Conservation and Natural Resources, 1992*). *These* data suggest that more residents in the affected area are finding employment in businesses and occupations other than farming and ranching. With Nevada leading the nation in population growth (*Reno Gazette Journal*, Dec. 28, 1994), it can be expected that the transition from a farm/ranching rural society to a more suburban and service-oriented community will continue.

3.16 AGRICULTURE, FARMLAND, AND LOCAL ECONOMY

Cattle ranching and dairy production are the primary agricultural activities in the affected area. Alfalfa is the dominant crop with some small grains (wheat and barley) also grown in the area. Alfalfa is the preferred crop in the Lahontan Valley because of the favorable climate, ability to store and ease of transportation, availability of support services, flexibility of production techniques, and the viable market in the area (Schank and Matley, written communication, 1994). In addition, alfalfa is suitable for vertical integration in the grower's operations (ibid).

3.16.1 AGRICULTURAL PRODUCTS AND RECEIPTS

Churchill County provides a representative baseline of agricultural economic data for the affected area in this document. Because only a small portion of Lyon County is within the affected area, agricultural economic data for the specific area within the affected area *are* generally lacking or insufficient. For these reasons, this document often depicts Churchill County economic data to provide a baseline condition, with the expectation that Lyon County agricultural conditions are similar. For instance, UNR Technical Reports UCED 93-14 and 93-05 (MacDiarmid and others, 1994a, 1994b) show that the two counties have similar industry outputs, jobs and income for the agricultural sector. In addition, the number of cattle raised in both counties has been comparable over the last five years. Lyon County economic information for 1990 shows that agriculture generates about \$43,900,000 (11 percent) of the County's economic activity (ibid). This is comparable to Churchill County's agricultural sector, which generates about \$50,900,000 (11.5 percent) of the County's economic activity (ibid).

Irrigated acreage in Churchill County supports most all the crop production and provides feed for a majority of the County's livestock and dairy operations. The Service estimates

that the irrigated acreage that lies within the Lyon County portion of the affected area amounts to about 10 percent of the total irrigated acreage in Lyon County (see Section 3.16.3, FARMLANDS).

According to the 1994 Nevada Agricultural Statistics, Churchill and Lyon Counties have been the third and fourth largest producers of livestock in Nevada over the past five years (1989-94). Livestock operators rely on rangeland grazing, private pasture lands, and feedlots to feed livestock. Many of these livestock operations rely on irrigated farmland for winter feed and pasture. Churchill County cattle and calves totalled 41,000 head, about 9 percent of the statewide total in 1994 (Nevada Agricultural Statistics, 1994). According to another UNR Technical Report, UCED 93-05 (MacDiarmid and others, 1994b), livestock account for about 30 percent (\$15 million) of Churchill County's agricultural economic activity and \$2.5 million in agricultural income (see Table 3.16.A). Lyon County cattle and calves also totalled 41,000 head in 1994 (Nevada Agricultural Statistics, 1994).

Dairy operations within Churchill County contribute the highest percent of agricultural economic activity. Churchill County leads the state in milk production and number of dairy cows with 7,800 head in 1993 (Nevada Agricultural Statistics, 1994). Dairy production in Churchill County accounts for 38 percent of the entire state production (ibid) and generates almost \$18 million (see Table 3.16.A) of the County's agricultural activity (ibid). Lyon County dairy operations rank fourth in the state, but there is insufficient information to determine the number of Lyon County dairies that operate within the affected area.

Table 3.16.A AGRICULTURAL ECONOMIC ACTIVITY IN CHURCHILL COUNTY, 1990

Agricultural Sector	Industry Output	Employment	Personal Income
Livestock	\$15,109,000 30%	196 30%	\$2,498,000 30%
Dairy	\$17,829,000 35%	231 35%	\$2,947,000 35%
Alfalfa Hay	\$16,008,000 31%	207 31%	\$2,646,000 31%
Other Hay	\$1,437,000 3%	19 3%	\$238,000 3%
Barley and Wheat	\$504,000 1%	7 1%	\$83,000 1%
TOTAL	\$50,887,000 100%	660 100%	\$8,412,000 100%

Source: UNR Technical Report UCED 93-05, MacDiarmid and others, 1994b

In 1993, Lyon and Churchill Counties produced 30 percent of the alfalfa hay in Nevada according to the Nevada Agricultural Statistics (1994). Lyon County led the state in total alfalfa hay production with 184,000 tons. Churchill County was third in alfalfa production with 134,000 tons. In the economic analysis done by Sunding (1994) he calculates that the baseline alfalfa hay production potential is about 283,000 tons/year. This figure is derived from an average production potential of about 6 tons/acre based on soil characteristics and average cuttings per year for the irrigated farmland in Churchill County. Average yield for 1993, amounted to 4.72 tons per acre in Lyon County, and 4.32 tons per acre in Churchill County (Nevada Agricultural Statistics, 1994). The differences between reported production from the Nevada Agricultural Statistics and the production potential calculations done by Sunding (1994) are attributable to the way that production data *are* reported and how alfalfa crop production is often consumed "on-farm" as part of a larger integrated agricultural operation or is involved in non-market transactions.

Alfalfa hay production generates about \$16 million annually in economic activity in Churchill County (MacDiarmid and others, 1994b). Using figures from Sunding (1994, see Appendix 6), alfalfa sales amounted to about \$25 million per year in Churchill County and generated about \$3.5 million in profits. To determine the economic activity in Lyon County that may be attributable to alfalfa hay production in the affected area, the Service proportioned the total county alfalfa production based the estimated irrigated acreage within the affected area (8,500-9,000 acres). Based on this proportion, the Service estimates that alfalfa hay production in the portion of Lyon County within the affected area (Middle Carson River corridor and Fernley) could account for as much as \$1.99 million annually in economic activity. Data from the Nevada Agricultural Statistics indicate that more than 20 percent of Nevada's alfalfa hay is shipped to California.

Total agricultural receipts for Churchill County (Table 3.16.B) ranged from approximately \$34 million in 1987 to a high of \$47 million in 1990. In 1992, total agricultural receipts for Churchill County amounted to \$38.7 million (Nevada Agricultural Statistics, 1994). Reclamation tracks the gross crop values (total revenue potential) generated from Newlands Project farms (Table 3.16.B). These gross crop values are compiled by TCID and, although the estimates are not validated, represent additional information that characterizes the Newlands Project contribution to the Churchill County agricultural output. These estimates are higher than the Nevada Agricultural Statistics figures for crop receipts. The Service speculates that this difference may be explained by "on-farm" consumption of crops for livestock and dairy operations, or to exchange through non-market transactions. In essence, "on-farm" consumption occurs when dairy and livestock operations grow their own alfalfa, which is then consumed "on-farm." In spite of this "on-farm" consumption, the agricultural sector (including livestock, dairy, and crops) in both Churchill and Lyon Counties is classified as an export sector (MacDiarmid and others, 1994a, 1994b). *An export sector is one that makes sales outside of the county and brings an injection of funds into the county.*

Table 3.16.B AGRICULTURAL RECEIPTS AND GROSS CROP VALUES (in thousands)

Churchill County	1987	1988	1989	1990	1991	1992
Livestock & Dairy	\$26,123	\$30,207	\$29,186	\$43,399	\$33,047	\$32,193
Crops	\$7,918	\$8,020	\$9,026	\$12,568	\$8,623	\$6,518
Total Cash Receipts ¹	\$34,041	\$38,227	\$38,212	\$55,967	\$41,670	\$38,711
Total Newlands Project Gross Crop Value ²	\$19,037	\$18,282	\$25,088	\$25,586	\$13,305	NA
Carson Division ³ Gross Crop Value	\$17,704	\$17,002	\$23,332	\$23,795	\$12,374	NA

(1) Nevada Agricultural Statistics; excludes "other income"

(2) Bureau of Reclamation Summary Statistics: Water, Land, and Related Data, 1990

(3) Calculated proportion based on irrigated acreage using a 93% factor for Carson Division

The University of Nevada Reno (UNR) Center for Economic Development (UCED) technical reports describe agriculture "industry output" as the value of farm commodities produced each year. As noted above, the value of farm commodities (especially crops) is greater than reported cash receipts (income received from the sale of those commodities) due to "on-farm" consumption or non-market transactions. MacDiarmid and others (1994b) estimate Churchill County's total agriculture economic activity (no year given) to be \$50.9 million annually. Livestock and dairy operations accounted for nearly 80 percent of these receipts, while crop sales accounted for the remaining 20 percent (Table 3.16.A).

UNR's Department of Agricultural Economics estimates the total economic activity in Churchill County to be \$442 million (Table 3.16.C), *excluding the State and Federal sectors*. This report (ibid) shows that \$50.9 million in agricultural economic activity gives rise to an additional \$37.1 million in other "industry output" due to the "economic linkages" that exist between agriculture and other economic sectors. Thus, according to MacDiarmid and others, (ibid), each dollar of agricultural output in Churchill County accounts for an additional \$0.73 of non-agricultural economic output.

3.16.2 INCOME AND EMPLOYMENT

There is *little* information *on* employment and income data specific to that portion of Lyon County that lies within the affected area. The Service believes Churchill County agricultural employment and income data *are* similar enough to Lyon County to provide an adequate baseline condition for the affected area.

Based on employment and income estimates reported by the Bureau of Economic Analysis, the UCED technical report 93-05 referenced above (MacDiarmid and others, 1994b) shows

Table 3.16.C TOTAL ECONOMIC ACTIVITY FOR CHURCHILL COUNTY, 1990

Economic Sector	Industry Output	Industry Output Created by Agriculture
Agriculture	\$50,887,000 (12%)	\$50,887,000
Agricultural Services	\$2,947,000 (1%)	\$2,738,473
Mining	\$61,039,000 (14%)	\$53,787
Construction	\$57,182,000 (13%)	\$1,510,537
Manufacturing	\$33,186,000 (8%)	\$2,908,431
Transportation & Public Utilities	\$48,176,000 (11%)	\$3,736,519
Wholesale & Retail Trade	\$48,784,000 (11%)	\$7,252,399
Finance, Insurance & Real Estate	\$34,261,000 (8%)	\$4,926,110
Services	\$79,227,000 (18%)	\$9,596,357
Local Government	\$26,360,000 (6%)	\$4,355,838
State & Federal Government	Not Available	Not Available
TOTAL	\$442,049,000	\$87,965,451

Source: UNR Technical Report 93-05, MacDiarmid and others, 1994b.

that about 7 percent (660) of the jobs in Churchill County are full and part-time agricultural employment. This report breaks down agricultural employment (Table 3.16.A) by livestock (196 jobs), dairy (231 jobs), and crop production (233 jobs). Using the input-output analysis developed by MacDiarmid and others (1994b), an additional 606 full and part-time jobs are created indirectly as a consequence of agricultural production. Lyon County figures are similar, with 7 percent (557 jobs) of the County's employment in agriculture (MacDiarmid and others, 1994a). *Similar to the data for Churchill County, MacDiarmid's data on Lyon County do not include information on State and Federal government employment.*

The major employers in Churchill County are *State, Federal and local government; the service industry; and wholesale and retail trade* (see Table 3.16.D). Based on information in Table 3.16.D, *State, Federal and local government and the services industry each provide about one-quarter of the total jobs in the community. This is followed by wholesale and retail trade with 17 percent of the employment. Agriculture and its associated service sector, mining, construction, manufacturing, transportation and public utilities, finance, insurance and real estate make up the remainder of employment in Churchill County.*

Table 3.16.D CHURCHILL COUNTY EMPLOYMENT AND INCOME, 1990

Economic Sector	Employment (jobs)		Personal Income	
Agriculture	660	7%	\$8,412,000	5%
Agricultural Services	118	1%	\$1,483,000	1%
Mining	154	2%	\$1,481,000	1%
Construction	650	7%	\$13,515,000	8%
Manufacturing	272	3%	\$7,967,000	4%
Transportation & Public Utilities	485	5%	\$15,587,000	9%
Wholesale & Retail Trade	1,589	18%	\$22,283,000	13%
Finance, Insurance & Real Estate	443	5%	\$4,649,000	3%
Services	2,388	26%	\$43,775,000	24%
Local Government	652	7%	\$17,043,000	10%
State & Federal Government ¹	1,722	19%	\$39,744,000	22%
TOTAL	9,133	100%	\$175,939,000	100%

Source: UNR Technical Reports UCED 93-05, MacDiarmid and others, 1994b, and 93-01, Harris and Stoddard, October 1993.

(1) Based on written communication (Harris and others, 1995), Unidentified Source. *This figure does not include the added employment associated with the expansion of NAS-Fallon. According to NAS Fallon source (Petty Officer Collins, oral and written communication, May 1996), the station provided 948 jobs in 1990 compared to 2,516 jobs in 1996. This would increase the employment figure for the State and Federal Government to 3,290.*

However, recent expansion of NAS-Fallon has greatly increased the State and Federal government sector employment in the affected area. As of June 1996, NAS-Fallon reports 2,516 active duty military and civilian personnel (including contractors) and an annual payroll of \$53.7 million (Petty Officer Collins, oral and written communication, May 1996). NAS-Fallon is also host to more than 6,000 military personnel who come to NAS-Fallon each year for training. In addition to employment dollars, NAS-Fallon reports that 1995 airstation purchases and contracts (local and outside) were in excess of \$40 million (ibid).

According to information provided by Harris and others (written communication, 1995) Federal, State, and local government employment accounts for *over one-third* the total personal income in Churchill County (Table 3.16.D). Other personal income sources correspond to the employment figures, with service industry second, wholesale and retail trade third, transportation and public utilities fourth, construction fifth, and *manufacturing and agriculture* sixth (Table 3.16.D). *Information from Harris and others (written communication, 1995) indicates that Churchill County total personal income is reported at \$176 million.*

Personal income derived from agriculture is evaluated in more detail in this section, as it has the potential to be impacted by the Service's action. Net agricultural income (agricultural receipts plus "other income" from agricultural production less agricultural production expenses) ranged from a single-year loss of \$1.5 million in 1983 to a high of \$9.75 million in 1990 (MacDiarmid and others, 1994b). Personal income in the agricultural sector (farmer's income and farm labor income in the form of wages and salaries) was also reported at \$8.4 million annually, but no year was given (ibid). (See Table 3.16.D.) While this figure is higher than the \$6.203 million in total farm-related personal income reported for Churchill County in 1989 by the U.S. Department of Commerce (Nevada Division of Water Planning, 1992), it accounts for only 1 percent difference in the countywide total for personal income. MacDiarmid and others (1994a) show that personal income from agriculture in Lyon County accounted for \$13,727,000 annually, or about 10 percent of the countywide total (ibid). It should be reiterated that neither of these reports (MacDiarmid and others, 1994a, 1994b) include personal income of Federal Government employment in the countywide total.

Many farmers rely on non-farm income to supplement their personal incomes. Non-farm income is generated by work or investments that are not related to farming or agriculture. The Nevada Division of Water Planning's Churchill County Agriculture Analysis (1992) shows that smaller farms (1-10 acres) tend to derive a greater amount of income from non-farm activities (75 percent) than the larger farms (1,000 acres or more) with no off-farm income. Interestingly, the non-farm income of farmers on farms in the 100-140 acre size reported the largest levels of non-farm income. These farms derived 44 percent of their non-farm income from labor and almost 50 percent from investments (ibid). This same

report showed that profits (gross income *minus* gross expense) were greatest for farms larger than 260 acres (ibid).

One interesting aspect of the Nevada Division of Water Planning's above-referenced analysis was that the Churchill County farmers surveyed indicated that they spent nearly 80 percent of their personal income in Churchill County. Of the remaining 20 percent, 15 percent was spent in the state, and 5 percent was spent elsewhere.

3.16.3 FARMLANDS

According to the 1987 Census of Agriculture (U.S. Department of Commerce, 1989), total farm acreage in Churchill County amounted to nearly 360,000 acres. Of that total, some 62,540 acres (17 percent) were irrigated, with 43,750 acres classified as harvested cropland and 18,790 acres classified as pasture and other land. About 80 percent of the agricultural lands in Churchill County are open rangelands used for livestock grazing.

Lyon County has some 93,218 acres of irrigated farmland (ibid). Of that total, the Service calculates there are about 8,500-9,000 acres of irrigated land within the affected area. There are more than 5,000 acres of irrigated land along the Middle Carson River corridor. Of that acreage, some 1,244 acres has been acquired by Nevada State Parks for recreational purposes and in the future probably will not be used for crop production. The Newlands Project's Truckee Division (predominately in Lyon County) contains about 6,000 water-righted acres. Of those, an average of about 3,900 acres were irrigated each year between 1984-89 (U.S. Bureau of Reclamation, written communication, 1992).

The Newlands Project's Carson Division, located entirely within Churchill County, contains an average of 56,100 acres of irrigated land (ibid). Of this irrigated land about 91 percent occurs on lands with recorded water rights.

Approximately 90 percent of Carson Division lands are classified as bottom lands by Reclamation and are thus entitled to deliveries at the farm headgate (i.e., for irrigation purposes) of up to 3.5 AF/acre/year. The balance of Carson Division lands are classified either as bench lands or pasture lands, with maximum annual headgate delivery entitlement of 4.5 and 1.5 AF/acre, respectively. Virtually all lands in the Truckee Division are classified as bench lands, which, like Carson Division bench lands, carry a maximum water duty of 4.5 AF/acre/year for irrigation purposes. TCID disputes Reclamation's land classifications, arguing that about 10,000 acres of Reclamation-classified bottom lands should be classified as bench lands.

3.16.4 PRIME FARMLANDS AND FARMLANDS OF STATEWIDE IMPORTANCE

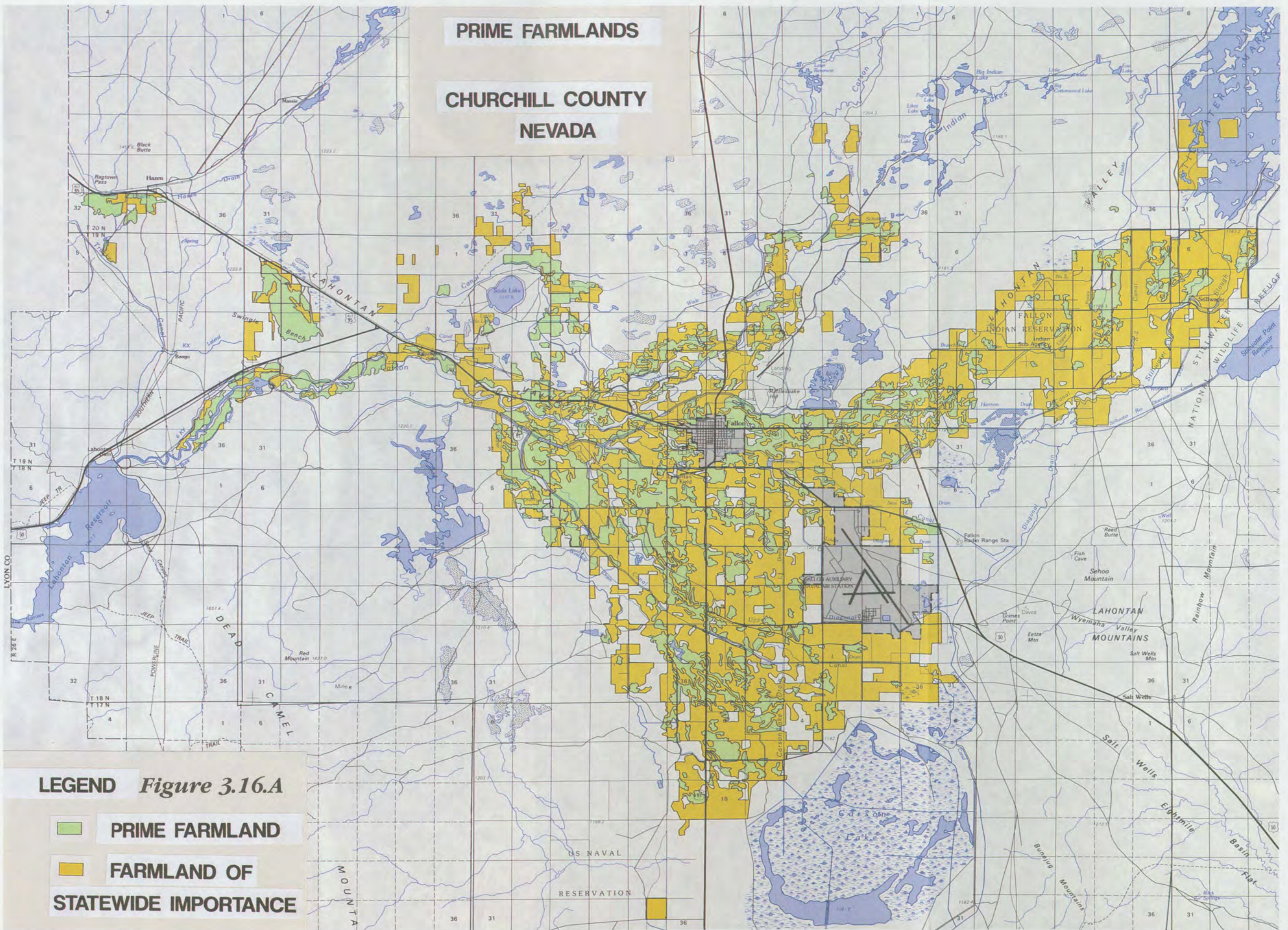
The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) categorized all farmland in Churchill County as either prime farmland or farmland of statewide importance (NRCS, written communication, 1995) (Figure 3.16.A). According to the Farmland Protection Policy Act (FPPA) all lands that are identified as prime farmland or farmland of statewide importance, among other categories of farmland, are covered under the provisions of FPPA. Of the irrigated farmland in Churchill County, only those that have active water rights are of relevance to this EIS. Of the approximately 56,100 acres of irrigated farmland in Churchill County, approximately 52,800 acres are water-righted. Additionally, there are approximately 6,450 acres of water-righted irrigated lands along the Carson River corridor between Lahontan Reservoir and the Carson City gaging station in Lyon County, most or all of which are considered by NRCS as prime farmland or farmland of statewide importance.

Figure 3.16.A, a reproduction of a portion of a 1980 Important Farmlands map produced by NRCS, illustrates the prime farmland and farmland of statewide importance in Churchill County. According to NRCS, all prime farmland areas may not be accurately delineated because the map was prepared and published prior to the most recent prime farmland update, and all prime farmland delineations may be subject to on-site evaluations.

Based on Geographic Information System data supplied by the Bureau of Reclamation, there are about 30,900 acres of irrigated and water-righted farmland in the Carson Division that would qualify as prime farmland (as opposed to farmland of statewide importance) under NRCS criteria. Consequently, about 55 percent of the irrigated, water-righted farmland in the Newlands Project is classified as prime farmland. The remaining 45 percent is classified as farmland of statewide importance.

The U.S. Department of Agriculture (USDA), in cooperation with other Federal agencies, developed a set of criteria to be used in determining the relative quality of sites as farmland and to determine whether they are subject to FPPA. If a site receives a combined score of more than 160 points (of 260 total) for land evaluation criteria (completed by NRCS) and site assessment criteria (completed by the Federal agency) on the Farmland Conversion Impact Rating Form (Form AD-1006), the site is considered suitable for protection. Based on an FPPA evaluation completed by the Service and NRCS, the Carson Division received a score of 176 and the Middle Carson River received a score of 167 (Appendix 10). For scores over 160 points, USDA recommends that Federal agencies consider alternative actions that would serve the proposed purpose of the program (i.e., sustaining a long-term average of 25,000 acres of primary wetland habitat), but that could lessen impacts to the protection of farmland to the extent practicable (7 CFR § 658.4). Section 2.3.5 of this FEIS addresses the Service's consideration of alternative actions to lessen impacts to the protection of farmland (refer also to the mitigation discussions in Sections 4.16.3 and 4.16.4).

PRIME FARMLANDS
CHURCHILL COUNTY
NEVADA



LEGEND *Figure 3.16.A*

- PRIME FARMLAND**
- FARMLAND OF STATEWIDE IMPORTANCE**

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USDA recommends that, if a local land evaluation and site assessment (LESA) system has been approved by the local governing body (i.e., Churchill County) and NRCS's State Conservationist, Federal agencies use this local system. NRCS assisted a local team of agencies, local groups, and individuals in developing a local LESA system for the farmland of Churchill County. As with the national criteria, the local LESA system was designed to determine the quality of land for agricultural uses and to provide a means for evaluating the potential impacts of the conversion of irrigated farmland to non-irrigated uses. The local LESA system was specifically developed to evaluate the potential impacts of purchasing water rights from irrigated farmland for Lahontan Valley wetlands protection. The local LESA criteria were completed in February 1995. If approved at the local level and by the State Conservationist for NRCS, the local LESA system could be used in place of the national criteria. As of July 1996, the LESA system for Churchill County has not been approved.

Just over half of the farmland in the Carson Division is estimated to occur in areas designated for agricultural use (based on Map #25 of the Churchill County 1990 Master Plan in conjunction with NRCS's 1980 Important Farmland map for Churchill County). The remaining farmland occurs primarily in areas designated as agricultural/low density residential, which allows for a minimum parcel size of 5 acres, and areas designated as medium density residential, which allows for a minimum parcel size of 1/2 acre. Other farmlands occur in areas designated as high density residential, and arterial/commercial, general commercial, and industrial.

3.17 RECREATION

Most outdoor recreation in the affected area occurs on public lands that are under the jurisdiction of the Bureau of Land Management (BLM), Reclamation, Nevada State Parks, or the Service. Lahontan Reservoir State Park, Stillwater NWR, Carson Lake, Fort Churchill State Park, and Dayton State Park are the principal structured recreational use areas within the affected area. Unstructured recreational use also occurs at Newlands Project regulating reservoirs, Soda Lakes, Indian Lakes, along the Carson and Truckee Rivers, and in the Carson Sink.

3.17.1 RECREATIONAL USE AREAS

Wetlands

The wetland areas within the affected area offer waterfowl hunting, birdwatching, and sightseeing. Some fishing occurs in these areas *when water conditions are conducive to sustaining game fish populations*. Wetlands managed for recreational use include the Stillwater NWR, Carson Lake, Fernley WMA, and the Canvasback Gun Club. Most available

data relate to recreational use at Stillwater NWR, Stillwater WMA, and Churchill County (Table 3.17.A).

As shown, an average of almost 34,000 people visited Stillwater NWR and WMA each year during this period, with annual visits ranging from 17,000 to nearly 50,000. Of these, about half were for general recreation such as birdwatching and sightseeing.

Table 3.17.A RECREATION USE-DAYS 1972-92 AVERAGES

STILLWATER NWR					LAHONTAN VALLEY	
Year	Hunting	Fishing	Gen. Rec.	Total	Hunting ^A	Fishing ^B
1972	6,339	10,924	5,902	23,165	39,832	39,484
1973	6,085	19,900	7,085	33,070	27,412	36,856
1974	3,800	17,900	9,082	30,782	26,264	37,246
1975	8,563	9,985	15,282	33,830	24,422	28,413
1976	3,725	18,775	8,496	30,996	20,587	19,077
1977	2,455	15,045	11,667	29,167	11,578	13,996
1978	4,850	8,375	8,707	21,932	20,733	20,822
1979	10,440	13,000	13,016	36,456	22,757	20,285
1980	10,645	9,735	27,390	47,770	22,461	21,207
1981	8,575	1,150	32,865	42,590	25,626	18,370
1982	11,060	10,295	22,693	44,048	28,076	19,454
1983	10,574	14,960	11,883	37,417	25,892	28,975
1984	6,804	22,176	18,407	47,387	26,745	25,818
1985	3,877	22,650	22,142	48,669	14,631	24,757
1986	3,236	12,378	22,731	38,345	15,199	22,025
1987	2,550	14,184	22,652	39,386	13,470	20,348
1988	375	4,681	23,970	29,026	8,145	6,482
1989	1,940	3,377	24,968	30,285	7,079	5,032
1990	1,940	2,425	19,960	24,325	7,339	3,842
1991	50	2,256	14,692	16,998	5,648	9,453
1992	1,222	2,868	20,848	24,938	849	n/a
Average	5,195	11,288	17,354	33,837	18,797	20,092

Source: Meyer, 1993. Tables 27, 36, and 37

^A Includes Stillwater NWR, Stillwater WMA, and Churchill County.

^B Includes Carson River, Shackler Reservoir, Indian Lakes, Stillwater NWR, and Canvasback Gun Club.

According to detailed survey responses collected by the Meyer (1993) in 1992, the vast majority of visits to the Stillwater area (approximately 84 percent) are made by Fallon-area residents. On average, local residents visited the area one or two times annually. Most non-local visits (about 80 percent) originated in the Reno/Sparks area, or in other locations in Nevada.

The Fernley WMA is managed by NDOW and at times has provided good waterfowl hunting and fishing. In the past, the wetlands were deep enough to support populations of northern pike, large-mouth bass, cutthroat trout, and non-game fish. Since 1988, the wetlands at Fernley WMA has all but dried up due to drought conditions and improved Newlands Project irrigation delivery efficiency. There are no available data on past recreational use at Fernley WMA, but when there is sufficient water to sustain wetlands waterfowl hunting has occurred. Under the baseline conditions, the Fernley WMA wetlands will continue to exist, but will be more ephemeral in nature and not as large as in the past.

Recreational use at Carson Lake wetlands is predominately for waterfowl hunting. Access to the area is controlled by the Greenhead Club, a private gun club operating the area under a joint agreement with TCID and NDOW. *While the Greenhead Club and NDOW make recommendations, final decisions are made by TCID.* Although Carson Lake is a federal property, it has been operated as a private gun club for the past 66 years and public access has been restricted. The public now is allowed access into the Carson Lake wetlands but the gun club continues to monitor and regulate use of the area to protect the facility from vandalism and misuse. The Secretary is authorized to transfer Carson Lake to the State of Nevada, and it is anticipated that the area will be transferred, managed and operated for wildlife by the State of Nevada's Department of Wildlife sometime in the near future. This action is expected to substantially increase recreational use in the area over baseline conditions.

There are a number of other private gun clubs that either own or have exclusive access to wetland areas and are used primarily for waterfowl hunting. The Canvasback Gun Club (Stillwater Farms), which is located on private lands within the Stillwater NWR boundary, is one of the largest of these gun clubs.

Newlands Project Regulating Reservoirs

The regulating reservoirs include Harmon, Sheckler, S-Line/Oles Pond, Old River, Sagouspe, and Indian Lakes. Recreational use of the reservoirs is generally limited due to water availability. These reservoirs are small (400-1,000 acres) and operated as part of the Newlands Irrigation Project. Recreation in these areas is a secondary use that is not specifically authorized as a Newlands Project purpose. Generally the recreational use of these reservoirs is unregulated. People hunt, fish, shoot, hold retriever trials, and operate radio-controlled boats and planes at these regulating reservoirs. The recreation use data for

these areas are reflected under the Churchill County totals in Table 3.17.A shown above. The Service, TCID and NDOW allow overnight camping at Indian Lakes and the area is often used for that purpose.

Lahontan Reservoir

Lahontan Reservoir is the largest recreation area within the affected area. The 12,100-acre reservoir was completed in 1915 and stores water for the Newlands Project. The Federal lands surrounding the reservoir are under the jurisdiction of Reclamation but managed by Nevada Division of State Parks as a state park since 1971. Lahontan Reservoir is one of Nevada's prime water-oriented recreation sites with annual visitation approaching one-half million visitors in good water years. The area is the heaviest-used camping and boating park in the state system due to its ready access to the urban areas of Reno and Carson City. Studies show that 89 percent of the park's visitors come from Washoe, Carson, Douglas, Storey, Lyon and Churchill Counties (Francke, oral communication, 1994).

In the early 1980s, with high runoff and stable lake levels, nearly one-half million visitors used the park each year. (See Table 3.17.D.) According to a 1988 park user survey, park visitors reportedly generated \$2.5 million in economic activity in Lyon and Churchill Counties.

Between 1982-87, visitation ranged from 340,000 to 470,000, and water levels ranged from 288,896 AF to 310,394 AF. In 1992, one of the worst years on record for Carson River inflows, Lahontan Reservoir's annual visitation dropped to 118,520, as lake levels dropped below boat ramps. By September, the lake contained less than 4,000 AF of water. In 1993, a 150 percent water year, water levels reached 249,000 AF, and about 356,559 people visited the park.

Table 3.17.B LAHONTAN RESERVOIR RECREATION QUALITY RATINGS

Volume of Water Stored in Reservoir (Acre-feet)	Recreational Quality
Greater than 290,000	Fair
200,000 - 290,000	Optimum
175,000 - 200,000	Good
140,000 - 175,000	Fair
120,000 - 140,000	Poor
90,000 - 120,000	Very Poor
Less than 90,000	Unusable

Source: Nevada Division of State Parks

According to data from the Lahontan Reservoir State Park, recreational use of the lake is strongly tied to water levels in the reservoir (Francke, written communication, 1994). Park managers use the following criteria (Table 3.17.B) to rank reservoir volumes in terms of recreation quality.

Because of the many variables affecting annual recreation use at Lahontan Reservoir (i.e., seasonal storage levels, climate, etc.), no attempt was made to correlate user-days with storage levels. Instead, boat ramp accessibility was utilized as a measure of recreation potential. Currently, Lahontan Reservoir has two boat ramps that provide boating access. According to the Nevada Division of State Parks, 120,000 AF is the minimum level necessary for reasonable use of boat ramps (Francke, written communication, 1994). Below 90,000 AF, virtually no boat use is possible (ibid).

Storage level statistics for baseline conditions were developed by the BLR Model using the 92-year simulation period. The model calculated lake storage for the three highest recreational use periods (Memorial Day, Fourth of July, and Labor Day weekends). Historically, the highest water levels are experienced on the Memorial Day weekend, and the lowest levels on the Labor Day weekend. For the purpose of this document the Service assumes that 110,000 AF is the minimum lake level for boating use.

Under baseline conditions, water levels are sufficient to provide boating access during most months and years of the 92-year simulation period. The highest boat ramp accessibility occurs on Memorial Day, with water levels for that day dropping below the 110,000 AF threshold in only 5 years of the 92-year simulation period. On the Fourth of July, the 110,000 AF threshold is not attained 7 times; and on Labor Day, 9 times during that same 92-year simulation period.

Fort Churchill State Park

Fort Churchill State Park is located on Highway 2B between Highway 95A and Highway 50. The park contains the ruins of an 1860s military outpost and provides a visitor's center, park headquarters, interpretive trails, picnicking, group camping and 20 camping units along the Middle Carson River. The area accommodates both day-use and over-night use.

Fort Churchill received an average of about 73,500 visitors annually between 1991-93 (Harrington, oral communication, 1994). Use-fees for that period averaged about \$5,800 per year (ibid).

The Nevada State Parks recently purchased 1,244 acres of water-righted irrigated lands in the area adjacent to the Carson River between Lahontan Reservoir and Fort Churchill. Current plans call for an expansion of Fort Churchill, and a master plan is under way to

proceed with such development. The master plan is scheduled for completion in 1995 (Prida, oral communication, 1994).

Dayton State Park

Dayton State Park is located just north of the town center on Highway 50. The area contains 12 camping units, and offers both day-use and overnight use. Between 1991-93, Dayton State Park received an average of about 41,850 visitors annually (Harrington, oral communication, 1994). Use-fees for that period averaged about \$6,580 (ibid).

Dayton State Park is within the Carson River Mercury Site Study Area, an Environmental Protection Agency Superfund Site. Possible clean-up efforts may affect park use and visitation in the future. Actions to remediate contamination found within the Carson River Mercury Site have not yet been determined.

3.17.2 RECREATION EXPENDITURES

Recreation expenditure data *are* available for the Lahontan Valley wetlands at Stillwater NWR, Carson Lake, and for the Lahontan Reservoir. There *are* no data to quantify recreation expenditures that occur in relation to recreational opportunity at the regulating reservoirs, along the Carson and Truckee Rivers, or in the Carson Sink.

The predominance of local visitors to the wetland areas suggest that average per-trip wetland recreation expenditures will be small as compared to other areas where visitors travel long distances. Indeed, the 1992 survey data (Meyer, 1993) suggest that median expenditures per trip were about \$20 per party, or slightly less than \$7 per person per trip, given an average of about three people per party.

This, of course, does not imply that recreation expenditures amount to \$7 per person per trip, for all activities. For instance, the Service's "1985 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation" (U.S. Fish and Wildlife Service, 1989) suggests that expenditures in Nevada for hunting, fishing, and general recreation averaged about \$77, \$73, and \$9 respectively, per person per trip, (Meyer, 1993). Kay (1989) interpreted this same survey and determined the net economic value of waterfowl hunting in Nevada to be \$39/day based upon reports by Hay (1988). From this information it appears that *estimates of recreational expenditures in Nevada may vary depending upon economic interpretation of such studies*. The Service provides a range of recreational expenditures that includes both the low end (Sunding) and the high end (Meyer) recreation expenditures.

Table 3.17.C provides two different sets of estimates of recreation-oriented expenditures at Stillwater NWR, both based on the Service's 1985 National Survey results. The first set of

Table 3.17.C WETLAND RECREATION EXPENDITURES AND CONSUMER SURPLUS FOR STILLWATER MARSHES

Recreation Expenditures Based on 1985 USFWS National Survey for Nevada					
	Hunting	Fishing	General	Total	Implied
\$/Person-Day	\$77.32	\$73.18	\$9.10		
\$/Yr. in:					
1985	\$299,770	\$1,657,527	\$201,492	\$2,158,789	\$44.36
1992	\$94,485	\$209,880	\$189,717	\$494,082	\$19.81
Average	\$401,714	\$826,024	\$157,923	\$1,385,662	\$40.95
Recreation Expenditures Adjusted to Yield the 1992 Stillwater Survey Weighted Average of \$7.00/person					
\$/Person-Day	\$27.30	\$25.84	\$3.21		
\$/Yr. in:					
1985	\$105,842	\$585,276	\$71,076	\$762,194	\$15.66
1992	\$33,361	\$74,109	\$66,922	\$174,392	\$6.99
Average	\$141,837	\$291,671	\$55,707	\$489,214	\$14.46
Consumer Surplus (3)					
\$/Person-Day	\$23.00	\$20.00	\$25.00		
\$/Yr. in:					
1985	\$89,171	\$453,000	\$553,000	\$1,095,721	\$22.51
1992	\$28,106	\$57,360	\$521,200	\$606,666	\$24.33
Average	\$119,496	\$225,751	\$443,855	\$779,102	\$23.02

Source: USFWS National Survey for Nevada (1985) as reported by Meyer (1993) and USFWS survey data adjusted to yield \$7.00/person-day in 1992. See Meyer (1993) and Sunding (1994).

estimates, as reported by Meyer, is then applied to the visitor statistics summarized in Table 3.17.A for 1985 (the year of the National Survey), 1992 (the year of the Stillwater NWR survey), and then to the 1972-92 average.

The second set of Stillwater NWR expenditure estimates is derived from adjustments made by Sunding (1994). For the second set, the Service's National Survey data reported by Meyer are adjusted to yield a 1992 weighted average of just under \$7 per person. These adjustments were necessary to compensate for a National Survey that seemed to overstate recreational expenditures in the Lahontan Valley, based on the Stillwater NWR survey data collected in 1992.

From *these* data, average expenditures for recreational activities at Stillwater NWR can be expected to range from as little as \$7 per person per trip, to as much as \$44 per person per trip (which is close to Kay's expenditure values). The corresponding recreation expenditure totals could range from approximately \$174,000 to nearly \$2.2 million annually.

Lahontan Reservoir Expenditures

Recreation opportunities at Lahontan Reservoir are largely dependent upon storage volumes in the reservoir. During low water years (and thus low storage volumes), recreational use of the reservoir would be reduced from that in average years.

According to the Nevada Division of State Parks, the number of recorded visitors at Lahontan Reservoir varied from 134,000 to 470,000 annually between 1982-92 (Table 3.17.D). During that time, an average of \$117,800 in user fees was collected each year at Lahontan Reservoir State Park, or about \$0.35 per visit. *Table 3.17.D portrays visitor-days and user fees at Lahontan Reservoir relative to reservoir storage levels.* For the purposes of this document, *user fees will provide an index to Lahontan Reservoir recreational expenditures.*

Table 3.17.D LAHONTAN RESERVOIR - RECREATION VISITS, USER FEES, AND STORAGE

Year	Visitor-Days	User Fees	Fee per Visitor Day	Reservoir Storage (AF) on:		
				Memorial Day - July 4 - Labor Day		
1982	336,024	\$110,852	\$0.33	278,400	299,100	223,300
1983	413,093	\$122,434	\$0.30	207,700	307,400	251,500
1984	469,522	\$173,800	\$0.37	245,400	263,800	167,200
1985	443,074	\$176,822	\$0.40	276,300	240,900	126,100
1986	377,923	\$179,655	\$0.48	297,700	301,800	202,400
1987	435,569	\$155,260	\$0.36	250,800	203,400	96,900
1988	236,901	\$62,803	\$0.27	141,100	107,200	18,300
1989	274,483	\$137,748	\$0.50	198,700	196,400	94,900
1990	258,691	\$102,236	\$0.40	186,100	144,000	52,800
1991	182,792	\$51,469	\$0.28	102,700	97,900	33,200
1992	133,694	\$22,524	\$0.17	55,600	21,600	4,600
Average	323,797	\$117,782	\$0.35	203,600	198,500	115,600

Source: Nevada Division of State Parks, Summary of User Fees Collected and Visitation Records
U.S. Geological Survey, Water Resources Data, Lahontan Reservoir near Fallon, Nevada

3.17.3 CONSUMER SURPLUS

The economic value placed on amenities provided by Stillwater NWR and other Lahontan Valley wetlands is not entirely captured by reported recreation expenditures. For example, if users were "willing to pay" more than \$7 per person per trip in 1992 to enjoy the wetland areas, the above-reported expenditure data will under-represent the value that users place on the wetlands.

Economists have suggested that "willingness to pay" is an appropriate measure of the value of natural resources to those who actually use and enjoy them. The difference between expenditures and actual willingness to pay is known as "consumer surplus." Consumer surplus (the standard economic measure of consumer well-being) captures the value placed on the enjoyment that a recreational user receives that is not captured in the economic or market expenditures that she or he is required to make as part of that experience.

A number of studies have estimated consumer surplus per trip for environments similar to Stillwater NWR and other Lahontan Valley wetlands. As discussed by Meyer (1993) and Sunding (1994), typical consumer surplus values for waterfowl hunting range from \$23-\$36 per person per hunting day. For fishing, estimates of consumer surplus range from \$17-\$28 per person per fishing day. For wildlife-oriented general recreation, typical values range from \$6-\$37 per person per day.

In Lahontan Valley, a December 1994 survey titled "A Community Assessment of Quality of Life Issues in Churchill County, Nevada," reflected some willingness to pay for increased recreational facilities. In the survey, 83 percent of the 400 people surveyed indicated they were willing to pay from \$3 to \$5 more in property taxes to improve cultural and recreational facilities in Lahontan Valley. Of those not wishing to pay more in property taxes, about 69 percent indicated they were willing to pay more in recreational use-fees (ibid). The Mooney and Associates survey did not define what recreational facilities would include, and the Service considers *these* data as an indication of interest in, and support for, recreational opportunity and use in the Lahontan Valley.

3.17.4 NON-USE VALUES

Enjoyment of Lahontan Valley wetlands is not limited to those who use it directly for hunting, fishing, or general recreation. Economists have developed the concept of "non-use benefits" to capture the value of natural resources to those who have never, and may never, use them.

Non-use benefits are of three principal types: existence values, bequest values, and option values. Existence values stem from the comfort most individuals take in a well-functioning

ecosystem, e.g., the role of the Lahontan Valley wetlands in maintaining biological diversity and in providing nesting, breeding, and staging habitat for declining species of migratory and resident birds and waterfowl. Bequest values reflect the fact that most individuals would like to preserve the wetlands for future generations, if only as a matter of inter-generational equity. Finally, option values are motivated by the desire to preserve resources for future use: someone who has never visited the wetlands may suffer from their loss or degradation because he or she wishes to preserve the option to go there and hunt, fish, or birdwatch in the future.

Non-use values are highly controversial among economists. They are typically estimated by a survey method known as "contingent valuation," under which individuals are queried as to their willingness to pay for various levels of environmental protection or quality, with survey responses then aggregated to determine average non-use values.

No such survey has been conducted for the Lahontan Valley wetlands. Other surveys concerning similar natural resources have potentially relevant results. For example, Cooper and Loomis (1991) conducted a study of non-use values for wetlands in California's San Joaquin Valley. Based on their calculated result (\$174 per household per year, on average) a non-use value for the Lahontan Valley wetlands of more than \$20 million per year could be imputed for households within the Truckee-Carson watersheds. This estimate holds for the Lahontan Valley wetlands only if existing conditions are similar to those in the California study area.

The Cooper and Loomis (1991) results have come under intense, critical scrutiny by environmental economists, and by others who believe that resources like the Lahontan Valley wetlands are simply "priceless." Either way, non-use values do exist, and they could significantly exceed use-related recreation values.

However, because non-use values are so controversial, for the purposes of this document they will not be included in impact assessment. Discussion of non-use values is included in this section to show that the recreational value of the Lahontan Valley wetlands, by some standards, is much higher than the baseline the Service has chosen to apply.

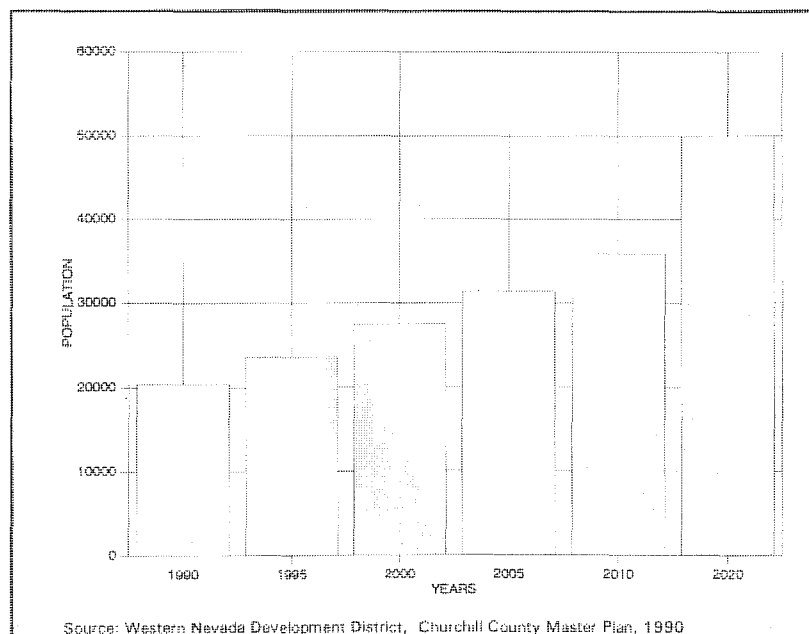
3.18 POPULATION CHARACTERISTICS

Populations in the smaller communities of the affected area are growing at a steady rate. Lyon County has experienced a 23 percent increase in population growth since 1990 (Nevada State Demographer's Office, written communication, 1994). Projections are that Lyon County will continue to experience a 5-6 percent growth rate in the near future (ibid). The major communities in the Lyon County portion of the affected area include Dayton (population 9,050), Fernley

(population 6,352), Silver Springs (population 2,771), and the Pyramid Lake Paiute Tribe (population 1,776).

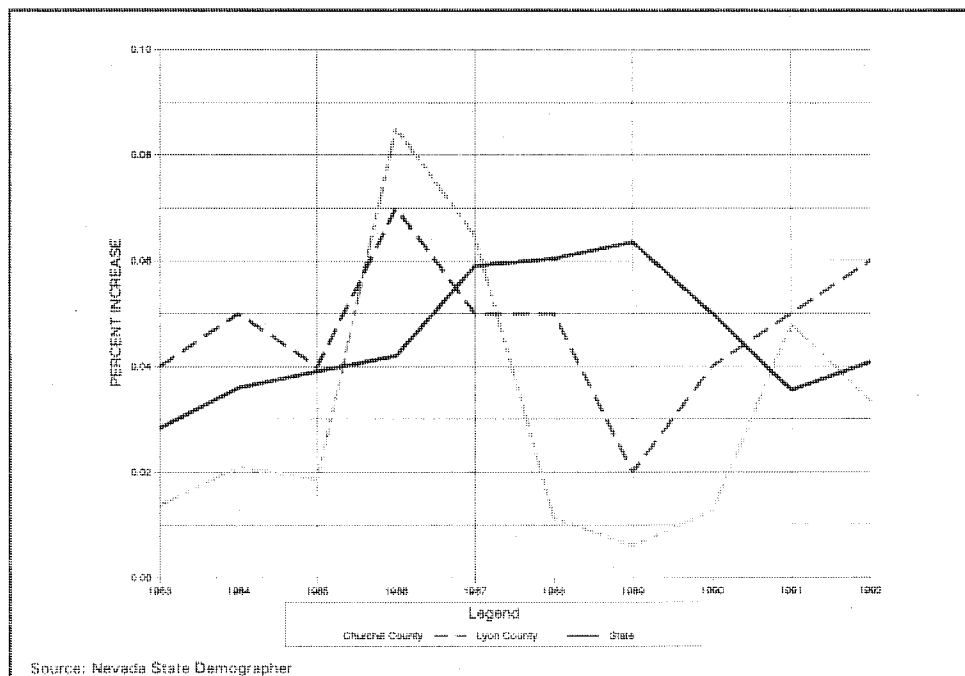
Churchill County's population is growing at about 3 percent and will continue to experience a 2-3 percent growth rate over the next five years, according to projections and population forecasts by the Nevada State Demographer's Office (written communication, 1995). These population forecasts were based in part on assumptions and scenarios in which TOPGUN training facilities would move to NAS-Fallon in 1995-96, with construction commencing on the program's expansion in 1994-95. No federal prison was anticipated under this low-end growth scenario (ibid). According to the Demographer's Office and Department of Taxation population estimates, Churchill County population in 1993 was estimated at 19,850. About 7,060 (approximately 35 percent) are residents of Fallon. The Churchill County Master Plan combined several methods and indices (employment to population ratio, school enrollment, utility hookups, tax rolls, and other indices) to project population increases. The Churchill County Master Plan is based on a 3 percent growth rate, but relies on a different base population than the State Demographer's Office. According to Churchill County figures, the area's population base is closer to 20,422, and includes residents of the Fallon Paiute-Shoshone Indian Reservation. (Figure 3.18.A).

**FIGURE 3.18.A POPULATION PROJECTIONS FOR
CHURCHILL COUNTY**



Churchill County as well as the communities of Dayton, Silver Springs, and Fernley are experiencing strong population growth. The population growth rates for the State of Nevada and a few selected counties are represented in Figure 3.18.B for comparison. Information presented by ArcForm, Inc., (consultant to Churchill County) on school enrollment increases that have averaged 5.5 percent per year for the period from 1990 to 1994 reflect this population growth. This increase in population growth is also reflected in a 90 percent increase in the number of single-family building permits issued between 1989-93 (Churchill County assessor records).

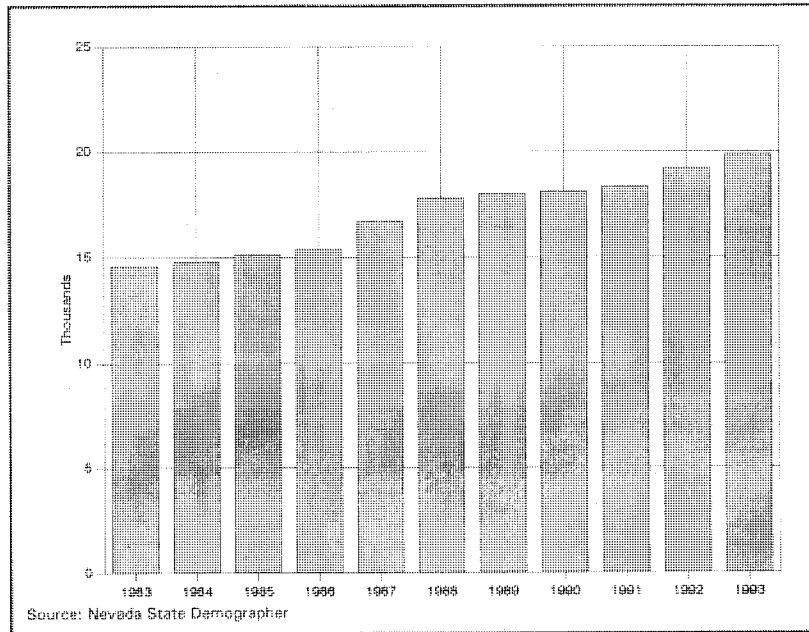
FIGURE 3.18.B POPULATION GROWTH RATES



Population growth or migration into the affected area is consistent with the growth patterns in the western United States. Often populations migrate from regions of economic stagnation to regions of growth with migration shifting to rural towns in the west (Brownridge, 1989), with many rural western communities recording significant population growth in the past few years. High Country News (September 5, 1994) describes the migration from California to Nevada between 1992-93 showing that in that year alone, more than 29,200 people moved into the state from California. Federal estimates show Nevada's population increased by 21.2 percent between April 1, 1990, and July 1, 1994 (Reno Gazette-Journal, Dec. 28, 1994).

Under baseline conditions, the population growth rate in the affected area is expected to be about 3-6 percent (Figure 3.18.C). In Churchill County, population *is projected* to increase at a rate close to 3 percent as anticipated in the 1990 Churchill County Master Plan, and in State Demographer projections. The Service expects this growth rate to be a low-end representation of growth rates in

**FIGURE 3.18.C ACTUAL CHURCHILL COUNTY POPULATION,
1983-93**



the affected area, with some areas experiencing even greater population growth (5-6 percent in portions of Lyon County). It can be expected that the rural setting, economic growth, climate, low-crime rate and expansion of both industrial and governmental facilities (NAS-Fallon) will continue to attract more people to the affected area.

3.19 LAND USE

Churchill County prepared the Churchill County 1990 Master Plan according to Nevada Revised Statutes (NRS) section 278.150. The intent of this master plan is to provide a long-term general plan for the physical development of Churchill County, and address goals and objectives determined to be related to future physical development of the County. The master plan covers a 20-year planning horizon, therefore, it is applicable to current and future conditions analyzed in this document.

The term "land use" can include all aspects of occupying, exploiting, or modifying the surface of the earth (Churchill County Master Plan, 1990). In this document, land use focuses on the types of use (i.e., farming, commercial, industrial, residential, public, or recreation) that occur, or are allowed on, lands within the affected area. Often land use can be directed to conform to or be regulated by zoning at the county or city level. In Churchill County, land use planning is defined by goals for a few different land use zones. This process provides a general framework, recognizes compatible uses, but often requires the Churchill County Planning Commission and County Commission to interpret the 1990 master plan for specific applications and requests.

While there are 13 different land use zones in Churchill County, the land use patterns can best be described as discontinuous. There is little or no homogeneity in land use and few distinct neighborhoods. It is not uncommon to find residential use occurring adjacent to industrial or commercial use, all of which is surrounded by agricultural lands. This diverse land use mix is prevalent in the County but is not as common in the City of Fallon.

The axial model of growth best describes the growth pattern of Churchill County (Floyd, 1990). New commercial and industrial land use radiates out from the City of Fallon's core along major transportation corridors. New residential areas develop alongside these transportation routes.

For the purpose of this document, the Service has limited its impact analysis to land use changes that involve the conversion of lands from agricultural to residential use. The information provided in this section is derived from land value maps and data prepared by the Churchill County Assessor's Office, unless otherwise indicated. *Additional information is included in LVEA's report on Land Use in Churchill County, a three part series of reports from Mary Reid and Kevin Kesler of the University of Nevada Reno Cooperative Extension Office, entitled, Land Use in Churchill County, Commercial, Industrial and Unimproved Land. This report is included in LVEA's comments in Appendix 11, and is labeled Exhibit F.*

The Churchill County Assessor's Office separates lands for agricultural and non-agricultural uses for tax assessment purposes. Agricultural lands are further separated by use and production into grazing, pasture, cultivated, and intensive use (feed lots, dairies). Non-agricultural parcels are classified as vacant (parcels with minor or no improvements), residential, commercial, industrial, and mining.

More than 80 percent of Churchill County's 3.1 million acres is classified as fourth-class grazing lands or rangelands. When this category is excluded, 355,364 acres remain classified as agricultural as of September, 1993. Cultivated and pasture lands account for 57,399 acres in the area, an 11.3 percent decline from 64,698 acres in 1987 (Table 3.19.A). These countywide acreage figures are higher than acreage figures for water-righted, irrigated lands identified previously in Section 3.16.3, FARMLANDS, because those figures only address water-righted lands in the Carson Division, which make up only a portion of Churchill County.

From 1987 to 1993, the total number of parcels of land in Churchill County increased by 12.9 percent, caused primarily by an increase (36.7 percent) in subdivisions (Figure 3.19.A). During this period, there has been a downward shift in the ratio of agricultural parcels to residential parcels. For instance in 1987, agricultural parcels accounted for 27 percent of the total number of parcels, while in 1993, they fell to 23 percent of the total. Residential parcels increased from 38 percent of the total in 1987 to 46 percent of the total in 1993. Vacant parcels declined from 29 percent of the total to 25 percent of the total for the same period. This indicates an increased demand for residential parcels (Figure 3.19.B).

The number of home-building permits issued in the past five years dramatically demonstrate an increased demand for housing in Churchill County. Building permits for single-family residences in the City and County combined increased 90 percent between 1989-93. Most of this increase has occurred since 1991 (Figure 3.19.C). Mobile home permits have increased 24 percent in the period.

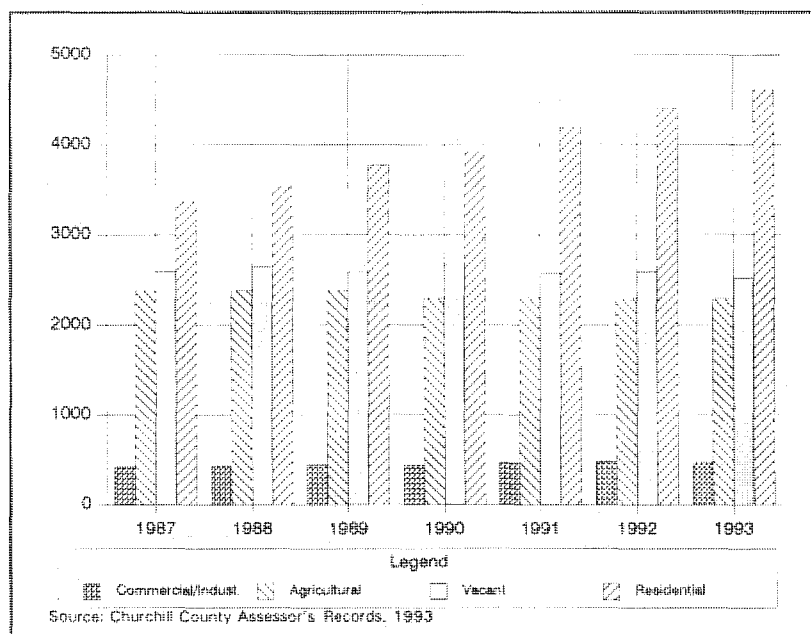
Between 1987-93 approximately 2,200 acres of agricultural land with water rights (parcels greater than 7 acres in size) were subdivided. Of these 2,200 acres, approximately 700 acres of the subdivided land continues to be classified for agricultural use. The Churchill County Assessor has

TABLE 3.19.A. CHANGES IN CHURCHILL COUNTY AGRICULTURAL LAND USE

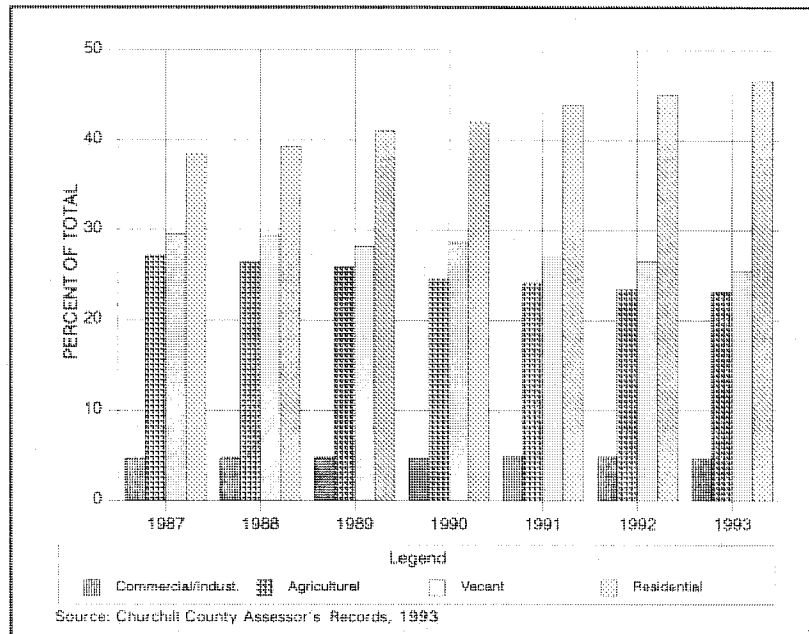
Agricultural Use	1987 acres	1993 acres	Change
Intensive	11	194	+ 1664.0%
Cultivated	48,681	43,152	-11.4%
Pasture	16,017	14,247	-11.1%
Grazing	303,055	297,771	-1.7%
TOTAL	367,764	355,364	-3.4%

Source: Churchill County Assessor's records, 1993.

FIGURE 3.19.A. COMPARISON OF CHURCHILL COUNTY PARCELS BY LAND USE



**FIGURE 3.19.B COMPARISON OF CHURCHILL COUNTY
PARCELS BASED ON LAND USE BY
PERCENTAGES**

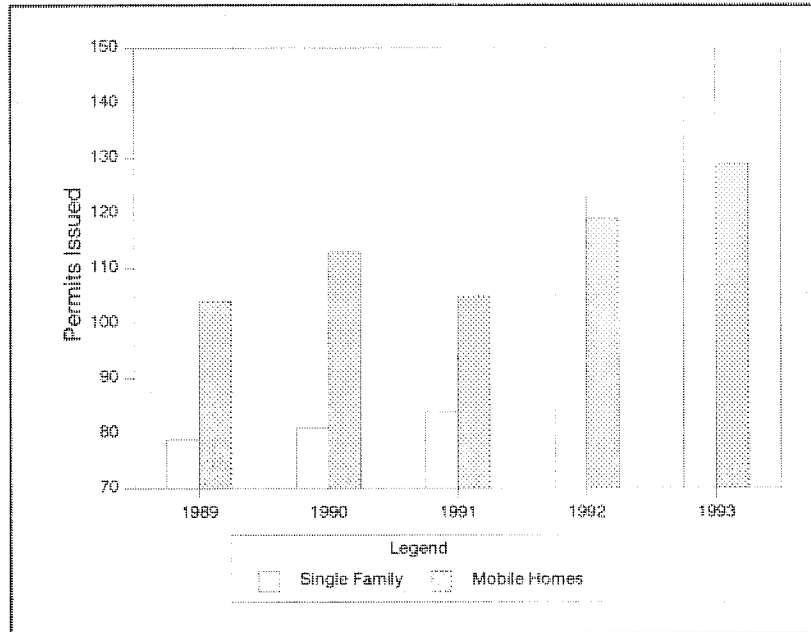


said it is likely that 500 of the 700 acres will be converted to residential use within the next five years. (Bartlett, oral communication, 1993).

Some agricultural lands have been subdivided into residential parcels over the past five years (1989-93). Between 1989-93, 31 water-righted agricultural parcels were subdivided into 352 vacant parcels. About 100 of the new parcels (28 percent) were created on land from which water rights were transferred to wetlands. *According to data compiled through the County Assessor's Office by LVEA, (see Appendix 11, LVEA comments, Exhibit F), all agricultural classes except cultivated, class 1 and pasture 2 have shown a loss of acreage since 1987. For total privately owned, taxable irrigated acreage classified as cultivated and pasture in Churchill County, there was a 17.5 percent reduction from 1987 to 1995. No further data regarding the correlation between loss of agricultural acreage and an increase in subdivision parcels could be extracted from Churchill County Assessor computer files (Bartlett, William, oral communication, May 19, 1996.)*

The majority of lands along the Middle Carson River in Lyon County are designated agricultural or open space (1990 Lyon County Master Plan). About three-quarters of the farmland along the Middle Carson River corridor is estimated to occur in areas designated for agricultural use or open space. Near Dayton, a large portion of the farmland occurs in areas designated medium-density residential. Farmland also occurs in areas designated low density residential, high density residential, and commercial.

FIGURE 3.19.C RESIDENTIAL BUILDING PERMITS



Source: Churchill County Assessor's Records, 1993

3.20 LAND VALUES

The market values of lands within the affected area can be measured by the sale price of properties in the area. Although market values for vacant parcels in Churchill County have increased in the past few years, Nevada still ranks second to last nationally for average per acre value of farm real estate (Nevada Agricultural Statistics, 1993-94).

While Nevada's average per acre farm real estate value (\$229) is low (ibid), the value of irrigated farmland in the affected area is much higher, and averages about \$2,000-\$3,000 per acre (Bartlett, oral communication, 1993). The average market value for vacant parcels (1-20 acres in size) has increased 8.3 percent from tax years 1987-88 to 1992-93 (Churchill County Assessor). Since 1989, the market value of small farms (20-57 water-righted acres) has increased approximately 8 percent per year (Smith and Scanland, written communication, 1993). The market value for medium-sized farms (58-160 water-righted acres) has increased 5-6 percent per year, while larger farms appreciated at only 2-5 percent per year. The appreciation rate for these larger farms is close to the inflation rate for the 1990-93 period and may not constitute a net increase in value.

Sales data compiled by Lee B. Smith and Associates show the market value of water rights is about \$285-\$342/AF of water. The Churchill County Assessor's Office has identified three sales of small water-righted parcels (2 acres in size) in which the value of the water rights were almost three times as high as the average market value. This sample seems to indicate that buyers in the Lahontan Valley are willing to pay premium prices for small water-righted parcels of land.

TABLE 3.20.A. LAND VALUES IN CHURCHILL COUNTY (1992-93)

Type of Parcel	Size	Value
Small Homesites	1.0 - 1.5 acres	\$21,000
Small Homesites	1.5 - 2.5 acres	\$23,000
Homesites - fair	10 acres	\$22,500
Homesites - poor	10 acres	\$13,000
Larger Homesites	20 - 40 acres	\$25,000
Remote Parcels	up to 640 acres	\$35 - \$375 /acre
Vacant Agricultural		\$2,000 - \$3,000 /acre

Source: Churchill County Assessor's Office, 1993.

3.21 PROPERTY TAXES

Because most of the water-righted agricultural land to be acquired under the Service's action is within the Carson Division of the Newlands Project, discussions of Churchill County tax base will be used to provide representative baseline conditions for the affected area.

The tax rate for Churchill County has steadily increased over the past nine years. Using 1993 tax rates and current property values, representative property tax revenues can be calculated. The tax revenue for agricultural land ranges from \$1.07 to \$2.76 per acre³ based on Churchill County assessed values for agricultural land values, which depend on the crop production of the land. The revenue generated for vacant non-agricultural land with water rights, would be between \$11.96-\$15.90 per acre.⁴ The market values for such lands are based on recent sale prices. The tax revenue that could be expected from agricultural lands that have had the water rights transferred to the wetlands would range from \$3.19-\$4.78 per acre⁵ based on the residual value of the land.

Subdivision of agricultural lands into smaller homesite parcels (e.g., 1- to 10-acre lots) increases the market value substantially to \$13,000-\$25,000 per lot. The tax revenue generated by the subdivision of agricultural land into residential parcels would range from \$103.65-\$199.33 per parcel⁶.

³ The assessed value for property values are determined in the following way: Cultivated agricultural land ranges from \$47 to \$121/acre x 2.2781% tax rate = \$1.07 to \$2.76/acre.

⁴ \$1,500 to \$2,000/acre x 35 % x 2.2781% tax rate = \$11.96 to \$15.90/acre.

⁵ \$400 to \$600/acre x 35% x 2.2781% tax rate = \$3.19 to \$4.78/acre.

⁶ \$13,000 to \$25,000/parcel x 35% x 2.2781% tax rate = \$103.65 to \$199.33/parcel.

Under Nevada Revised Statutes, Chapter 361A, certain property tax benefits are offered to the owners of agricultural lands. Upon application by the owner, and upon satisfaction of requirements listed in the statute, agricultural lands are assessed at a value which is based on agricultural use, a value which is usually substantially below the property's current market value. Taxes on the difference in value are deferred, and become a lien against the property each year. Should the owner convert the property to a higher use (such as a residential subdivision) the deferred taxes for up to seven years can be collected from the property owner. The provisions of the statute create an exemption for the collection of deferred taxes if the property is sold to the Federal Government. Therefore, property owners that sell their entire property to the Service are exempt from the recapture of deferred taxes. Under other provisions of the statute, property owners who sell the Service their water rights (but keep their land) may lose their eligibility to continue being assessed at the agricultural rate, but are not subject to the recapture of deferred taxes until they convert the land to a higher use.

In cases where the Service acquires land and water rights, and maintains ownership of such lands, Federal revenue sharing payments would be made to the County in lieu of taxes, as required by the Refuge Revenue Sharing Act. *Information on Refuge Revenue Sharing is provided in Section 3.25, ACQUISITION COSTS (see also Section 1.9.5, Refuge Revenue Sharing Act).*

3.22 MUNICIPAL SERVICES

As the populations of both Lyon and Churchill County continue to grow, it can be assumed that demand for municipal services will increase correspondingly. In particular, land use changes and additional residential development will probably increase burdens on local governments to provide public services such as additional fire protection, police protection, and water and sewer services.

One of the primary municipal services provided by communities in the affected area is police protection. All of the communities within the affected area rely on volunteer fire departments. The City of Fallon has a police department, the Fallon Paiute-Shoshone Tribes and Pyramid Lake Paiute Tribe have tribal police departments, and the remaining towns and areas rely on their respective county sheriff departments for protection. Water and sewer service varies throughout the affected area. There are community water purveyors in Fallon, Dayton, Silver Springs, and Fernley. The remaining areas use individual wells. Dayton, Fernley, and Fallon all have sewer service, and the other communities in the affected area rely on individual septic systems.

3.22.1 FIRE PROTECTION

Within the affected area there are fire stations in Dayton, Mark Twain, Moundhouse, Fernley, and Fallon. These fire stations are manned by volunteers. The Fallon station has two full-time personnel in addition to the volunteers.

The Dayton Station has 10 volunteers, the Mark Twain Station has 11 volunteers and Moundhouse is supported by 15 volunteers (Sierra Pacific Resources, 1993). *Information* was not available on the number of volunteer fire fighters in Fernley.

The Fallon-Churchill County Fire Department is maintained jointly by the City and the County. The department has two full-time staff, a fire chief and a maintenance person. In addition, there are 30 volunteers. The department maintains seven major pieces of fire-fighting equipment at its station on U.S. Highway 50 near the City center. The fire department has a mutual aid agreement with NAS-Fallon's fire department for fire protection services.

The Insurance Service Office (ISO), a national insurance industry agency, rates locales according to their level of fire fighting response capability. The higher the fire protection level, the lower the classification number. The ratings for Fallon and Churchill County are comparable to other communities in the affected area and are as follows: City of Fallon (which has fire hydrants) - Class 5; from the City limits to 5 miles from the fire station - Class 6; all areas beyond the 5-mile limit - Class 8B.

3.22.2 POLICE

Lyon County communities within the affected area are protected by the Lyon County Sheriff's Department, which provides substations, one each in Silver Springs, Dayton and Fernley. The main office of the Lyon County Sheriff's Department is located in Yerington.

The City of Fallon is under the jurisdiction of the Fallon Police Department. The department has 27 employees, of which 19 are sworn officers. One or two new officers are expected to be added to the department in the next five years. In addition, the Fallon Paiute-Shoshone Tribe has a four-member police department that has jurisdiction over tribal lands, and makes use of Churchill County detention facilities.

The unincorporated areas of Churchill County are served by the Churchill County Sheriff's Department headquartered in Fallon. The department has a staff of 36 employees, of which 29 are sworn officers. The department has asked the County Commission to add two more officer positions to its staff. The Churchill County Sheriff's Department maintains the detention facility (which is also used jointly by the City of Fallon and the Fallon Paiute-Shoshone tribal police) and the 911 emergency line.

3.22.3 WATER AND SEWER

The City of Fallon maintains a water supply system that serves about 7,000 people. Four municipal wells provide an average of 1.7 million gallons of water per day. Water supply for

domestic use in the affected area is discussed under GROUNDWATER, Section 3.3.3.2, Domestic Supply. The average volume of sewage effluent treated per day is about 500,000 gallons (1.5 AF). This effluent discharges into the New River Drain and ultimately into Stillwater wetland areas. There are plans to upgrade the capacity of the facility to 2 million gallons per day.

The Fallon Paiute-Shoshone Indian Tribe maintains a water system that supplies about 250 households. About 50 newer houses are on a centralized septic system, and the remainder use individual septic systems.

NAS-Fallon maintains three wells that supply 400,000-1,000,000 gallons of water per day to the airbase, depending on the season. A secondary waste water treatment plant discharges an average of 400,000 gallons (1.2 AF) of effluent per day into the lower Diagonal Drain which flows into the Stillwater NWR.

Residents of the unincorporated areas of Churchill County rely on domestic wells and septic systems for household water supply and disposal. Recent growth in the area, coinciding with 6 years of drought and heightened concerns about groundwater supplies, have revived interest in a County water supply system, which was initially proposed in 1977. An ordinance has been *adopted* to establish a water supply utility enterprise that could potentially use existing County water rights and acquire additional water rights. *However*, the County does not expect to have a water supply system in place before the year 2000.

3.23 SOCIAL VALUES

For the purpose of this document, Churchill County social values will be used as the baseline condition for the affected area. Because both Churchill and Lyon Counties have traditionally served as agricultural areas, and are experiencing similar changes as a result of growth, the Service expects that social values in the two areas are similar.

Social values are the values that a community or group of people hold as their own. Traditionally, Churchill County has been supported by farming and livestock operations, and many family-owned farms or agricultural businesses operate in the area. Population growth, industrial change and diversification have impacted the area's environment and attitudes about agriculture, which has been the social and economic foundation of the community for nearly a century (Mooney and Associates, 1994).

In June 1993, a coalition of Churchill County citizens concerned about water issues, Lahontan 2000, prepared a summary report on the values of the County's residents. The report categorized values in four areas: Family, Prosperity, Environment, and Security. In general, the report showed that the community highly valued its roots and heritage, rural environment with readily available

hunting and fishing opportunities, and low crime rate (Lahontan 2000, written communication, June, 1993).

As an outgrowth of Lahontan 2000, a second community group - the Lahontan Valley Environmental Alliance (LVEA) - was formed. LVEA commissioned a study on the quality of life in Churchill County in the fall of 1994 (Mooney and Associates, 1995). The main purpose of the study was to assess the attitudes of Churchill County residents with respect to their view of future development within the County. Objectives were to discern community values about water issues, the importance of agriculture, the willingness of respondents to pay for various services or objectives, and changes in public opinion on quality of life issues since a similar survey in 1988 (Western Nevada Development District, 1988, Mooney and Associates, 1995).

The Mooney and Associates survey (ibid) again showed that a low crime rate and rural environment were very important factors that influenced people's decision to live in Churchill County. Overall, more than half the residents surveyed strongly agreed that Churchill County is a good place to live and retire. The report made four conclusions:

- (1) there is strong support for agriculture in Churchill County and people are willing to pay to see an agricultural base retained;
- (2) residents are concerned about the availability and quality of the County's water supply;
- (3) residents see the need for economic diversification and are willing to pay for this purpose; and
- (4) although there are some differences between various groups of residents, in general there is agreement on the issues raised in the survey.

Social values linked to agriculture, growth and diversification, agriculture, and recreational opportunities will be addressed in this section. Water quality and domestic supply are discussed in Section 3.3.3.1.1, DESCRIPTION OF AQUIFERS, basalt aquifer, and 3.3.3.2, DOMESTIC SUPPLY, Fallon and Lahontan Valley. Social values related to other community issues are not expected to be affected by the Service's action of acquiring water rights for the Lahontan Valley wetlands, and are not discussed in detail.

3.23.1 AGRICULTURE

The 1994 survey (Mooney and Associates, 1995) found that about 57 percent of the people interviewed strongly agreed that agriculture should be retained in the community. Of that number, 44 percent agreed that retention of the farm belt should be emphasized in future development. When asked about factors that influence people's decision to live in Churchill County, 53 percent felt the rural environment was very important, and having green fields was very important to 38 percent of the residents.

In addition, about 35 percent of the respondents said they would consider moving if green fields in the area were reduced by 25 percent or less, and about 22 percent said they would move if acreage of green fields was reduced by 25-49 percent. However, another 30 percent said a reduction in green fields would have no influence on whether they would move from the area.

In questions regarding residents' willingness to pay for various projects in Churchill County, the survey (ibid) found that as many as 63 percent of the respondents were willing to pay an additional \$24-\$35 in property taxes to retain agriculture, while 33 percent said they would not be willing to pay to retain agriculture.

There is a contingent of area residents who want to preserve the City of Fallon as a small rural community surrounded by a verdant agricultural landscape. Many residents say they feel their origins or roots are in the area and state their desire to maintain an "as is" lifestyle (Lahontan 2000, written communication, 1993). Churchill County has a higher percentage of long-term resident, native Nevadans (29 percent versus 21.4 percent) as compared to statewide population totals (Meyer, 1993). The LVEA survey shows that 61 percent of the residents who have lived in the area 10 years or more strongly agree that the County should take actions to retain agriculture. Of residents who have lived in the area less than 10 years, 51 percent strongly agree that agriculture should be retained (Mooney and Associates, 1994).

Age was also a factor in attitudes about agriculture. More people aged 51 and over (67 percent) than people under age 51 (about 50 percent) strongly agreed that Churchill County should take steps to retain agriculture (ibid). As age increased, so did the number of respondents for whom green fields were an important influence in living in Churchill County.

3.23.2 GROWTH AND DIVERSIFICATION

Survey results (Mooney and Associates, 1994) reflect that a portion of Churchill County residents are willing to see some growth and diversification in the community. For instance, 72 percent of respondents agreed that more industrial economic diversity would benefit the community, and over two-thirds (70.2 percent) said they would be willing to pay between \$5-\$10 a year in additional property taxes to attract industry to Churchill County (ibid). Citizen responses reflected a willingness to have growth and diversification if service and shopping opportunities would result. For instance about 69 percent strongly disagreed that existing shopping facilities were adequate, and 75 percent said new retail shops and large discount stores would benefit the community (ibid).

However, support for growth of industry and manufacturing was slightly less than that for services and goods. About 63 percent considered manufacturing firms to be beneficial,

while 54 percent of respondents said small firms with 20-100 employees would be beneficial to the community (ibid). Support for agriculture and NAS-Fallon was somewhat stronger. Agricultural processing businesses were considered beneficial to 69 percent of residents, and expansion of NAS-Fallon was considered beneficial to nearly 65 percent of those surveyed (ibid).

In terms of population growth, 58 percent of the respondents said the ideal population for the area in 20 years would be in the 30,000-49,000 range (ibid), a figure that nearly doubles the current population.

From *these* data the Service estimates that between 50-70 percent of Churchill County residents acknowledge that growth is occurring in their community, and support some economic diversification, especially if it is associated with increased services and goods. Residents are slightly more supportive of enlarging known economic entities--such as NAS-Fallon or the local agricultural base. (The cumulative impacts are described in Section 4.26.12, CUMULATIVE EFFECTS, GROWTH AND DIVERSIFICATION.)

3.23.3 RECREATION

The 1988 Western Nevada Development District survey (WNDD, 1988) described Churchill County residents perceptions on a variety of quality of life issues. About 88 percent of the survey respondents said abundant outdoor recreation opportunities existed in Churchill County (ibid). The Lahontan 2000 group (written communication, 1993) stated that Churchill County residents highly valued the readily accessible hunting and fishing in the area.

About 70 percent of the residents surveyed agreed that outdoor recreational facilities are abundant near Churchill County (Mooney and Associates, 1995). This figure represents an 18 percent decrease from the 1988 WNDD survey, regarding abundance of recreational opportunity. The Service estimates that this perceived loss of recreational opportunity may be partly due to the drought's impact on many recreation areas in the affected area.

All of the recreational areas depicted in the survey (Mooney and Associates, 1995), were considered to be beneficial to the community. Lahontan Dam State Park was most highly valued by the respondents (ibid), followed by the Carson River, Stillwater NWR, Indian Lakes, and Carson Lake.

In the willingness to pay section, the LVEA survey showed that 83 percent of residents were willing to pay from \$3-\$5 per year in property taxes to improve cultural and recreational facilities. Of the portion not willing to pay property taxes, 1/3 said they would pay higher fees for facility use (ibid). Notwithstanding the portion of these responses that were

devoted to cultural or recreational values not associated with the wetlands, a base level of support for recreational use can be surmised.

3.24 INDIAN TRUST ASSETS AND CULTURAL RESOURCES

Indian trust assets are legal interests in property held in trust by the United States for Indian tribes or individuals. Trust assets of tribes in the study area include land, water rights, and fish and wildlife-related incomes derived from these assets. Several tribes hold land bases in the affected area: The Fallon Paiute-Shoshone Tribes in the lower Carson River Basin and the Pyramid Lake Paiute Tribe whose reservation includes Pyramid Lake.

Cultural resources refer to any sites, features, or artifacts that are important to a people or representative of a period of time either from a historical or prehistorical perspective. Prehistorical refers to the period of time prior to written records of events. Historical generally refers to the period of time for which there is a written record of events. Cultural resources include sites of dwellings, middens, and burials; landscape features such as mountain peaks and springs where events had occurred; structures such as old buildings; and artifacts such as arrowheads, stone tools, beads, and old bottles.

3.24.1 INDIAN TRUST ASSETS

Fallon Indian Reservation

The present-day Fallon Indian Reservation was created with the General Allotment Act of 1887, when members of the Paiute and Shoshone Tribes were allotted approximately 31,400 acres in a portion of the Lahontan Valley that would become part of the Carson Division. In 1906, an agreement was reached in which tribal members could exchange their original 160-acre allotments of non-water righted land for 10-acre parcels of irrigable land with paid up water rights. Most of the original allottees accepted the exchange.

Currently, the Fallon Indian Reservation consists of 8,180 acres of allotted and tribal trust lands in the lower Carson River Basin, and approximately 5,440 acres of that land is water righted. Public Law 101-618 currently limits annual use of water rights on the Reservation to a maximum of 10,587.5 acre-feet, a quantity sufficient to irrigate approximately 3,025 acres. At present, about 2,800 acres are actually in production.

Title I of Public Law 101-618, the Fallon Paiute-Shoshone Indian Tribes Water Rights Settlement Act of 1990, permits the Tribes to acquire up to approximately 2,400 acres of additional land and approximately 8,450 acre-feet of water rights to be used for irrigation, fish and wildlife, municipal and industrial, recreation, water quality, or other beneficial uses.

The Tribes recognize the importance of wetlands and wetland habitat to birds and other wildlife. They have dedicated 800 acres of tribal acreage to create wetlands on the reservation and are seeking to secure water rights for the wetlands.

Pyramid Lake Paiute Indian Reservation

Formal recognition of the trust relationship between the Pyramid Lake Paiute Tribe and the United States is based on an 1859 withdrawal of land in the northern portion of the Truckee River valley, including Pyramid Lake. The reservation presently covers approximately 475,000 acres. Public Law 101-618 affirmed all existing property rights and interests within the boundaries of the Pyramid Lake Indian Reservation and recognized tribal ownership of the Pyramid Lake lakebed, Anaho Island, and the beds and banks of the lower Truckee River. Whereas Anaho Island was recognized as part of the Pyramid Lake Indian Reservation in Public Law 101-618, it established that the island is to be managed and administered by the Service as a part of the National Wildlife Refuge System (Subsect. 210(b)(2)).

Water rights for the reservation were claimed by the Department in 1913 and when the Orr Ditch Decree was issued in 1944, the Tribe was given an appropriation date of 1859, senior to all other appropriations. Other than irrigation, no additional water was allocated for fish and fish habitat in Pyramid Lake or lower Truckee River.

Over the years, the Tribe has actively worked to increase inflow to the lake to raise the lake level and protect threatened and endangered fish species in the lake. Fishes in Pyramid Lake remain a cultural mainstay of the Tribe and, to help sustain the lake's fishery, the Tribe maintains two hatcheries. The hatcheries produce primarily Lahontan cutthroat trout (a Federal threatened species) to maintain the sport fishery, as well as endangered cui-ui. In addition to working to conserve these species, the Tribe manages and controls hunting and fishing rights on the reservation.

3.24.2 PREHISTORIC CULTURAL RESOURCES

Most of the prehistoric cultural resources in the affected area are associated with human occupation of riparian and wetland areas. The earliest evidence of man in Lahontan Valley dates back to a period between 11,000 and 8,000 years ago (Elston, 1986). These early sites are found in association with shoreline geologic features of a specific period when ancient Lake Lahontan was receding. Intensive use of the Lahontan Valley began around 3,300 years ago with most of the human occupation centered around the wetland areas (Fowler, 1992).

Accounts by early explorers and ethnographic studies (descriptive anthropology in this case based on the oral history of the culture) describe two groups of native people, one group

living around Carson Lake and the other at the Stillwater marshes. Prehistoric villages were known to exist on the west shore of Carson Lake, and the area was known as a productive wetland (DeQuille, 1963). In ethnography studies there is mention of the Alkali-Weed-Eater people of Carson Lake but little is known of this group.

The group of native people that inhabited the Stillwater marshes may or may not be related to the most recent Cattail-Eater Paiute people who lived at Stillwater and Carson Lake marshes until the late 1800s.

These native clans were attracted not only by the wildlife, but by the diverse and abundant food and other resources found in the desert marshes. The early inhabitants of the Lahontan Valley depended greatly on the marshes. They ate seeds, plants, fish, waterfowl and waterfowl eggs. Bulrushes, cattails and other marsh plants also were used as food sources and to make nets, baskets, boats and houses (Fowler, 1992). The arrival of settlers to the Lahontan Valley in the 1850s and 1860s displaced these native people from their traditional areas of occupation.

A number of Churchill County archaeological sites are included on the National Register of Historic Places. They include Grimes Point, Stillwater marsh, and Humboldt Cave. Of these, the Cold Springs and Sand Springs Pony Express Stations and Grimes Point are also included in the Nevada State Register of Historic Places (Kastens, oral communication, 1994).

The majority of the Lahontan Valley archaeological record and ethnographic work comes from the Stillwater NWR area. Typical cultural resources found in this area include skeletal remains, tool-making materials, seed- and grain-grinding tools, hunting materials, habitation sites, burial sites, and sites of religious significance. Cultural resources are identified in the ethnography of the Cattail-Eaters (Fowler, 1992), the archaeological record, and by the Service's Archaeological Predictive Model (Raven and Elston, 1989; Raven, 1990).

The Archaeological Site Predictive Model developed by Intermountain Research is a computer model that uses soil types and similar information to predict where archeological sites might be located. Habitat types derived from the model based on soil types and range sites are ranked by their usefulness to prehistoric people and their access to water. Using these habitat types, the model predicts the type and probability of prehistoric human occupation. Testing the predictions of the model has shown that the model can be quite accurate in identifying possible archaeological sites. Due to concerns about unauthorized archaeological digs, the Service has chosen not to describe the extent or locations of archaeological sites in this document.

While most data in the Archaeological Site Predictive Model relate to cultural resources associated with the Stillwater NWR, there is no reason to believe that similar cultural

resources do not extend to wetlands in the remainder of the affected area. Other wetland areas would have been important to native people inhabiting the valley as well as the riparian areas along Carson River.

3.24.3 HISTORICAL CULTURAL RESOURCES

Historic cultural resources of Lahontan Valley and the nearby affected area are related to the early Euro-American settlers who farmed, ranched, mined, and traveled through the area. The National Register of Historic Places lists a number of sites for Churchill County, including the old Churchill County Courthouse, Lahontan Dam Power Station, the Carson River Diversion Dam, and Harmon School and Oats Park Grammar School in Fallon (Kastens, oral communication, 1994). Harmon School is also included on the State Register of Historic Places. Fort Churchill is another important historical cultural resource located in the affected area.

More generally, evidence of salt mining at Soda Lakes, old buildings, old farm equipment, and various roads, canals and other infrastructure associated with the development of the Newlands Project, comprise the historic cultural resources in Lahontan Valley and the nearby affected area. The remains of this historical period or evidence of these historical actions may or may not be meaningful as cultural resources. Many of the historic artifacts associated with this period are documented or on display at the Churchill County Museum and other museums in the State. The importance of these remnants of the past is not fully known at this time.

Fort Churchill State Park in the Middle Carson River Corridor contains the ruins of an 1860s military outpost and provides a visitor's center, park headquarters, interpretive trails, and picnicking. Fort Churchill is an important historic artifact of the Civil War period, as it was the western-most outpost, and served to guard the Pony Express riders in the 1860s. The remains of this historical period at Fort Churchill are fairly well maintained and are a significant cultural resource for the area. About 70,000 visitors make use of Fort Churchill State Park each year.

The Buckland Station, a Pony Express stop in 1860-61, is another cultural resource that lies within the affected area. The Buckland Station was recently acquired by the State of Nevada and may be restored as a historic cultural site sometime in the near future. However the State has not yet determined the future uses for this site.

The Newlands Project infrastructure (canals, laterals, drains, etc.) have been nominated for eligibility for listing on the National Register of Historic Places.

3.25 ACQUISITION COSTS AND PROBABILITY OF MEETING THE SERVICE OBJECTIVE

The market value or sale price of water rights can be separated from the value or sale price of the appurtenant land because the water rights *can be severed from their existing place of use and transferred to another location*. Since water rights can be sold separately from land, their value can be determined separately. Section 3.20, LAND VALUES, describes the baseline land values for Churchill County and discusses the value of water-righted land.

Market values for water rights within the affected area are measured by sale prices of water rights in the region. *As stated above*, water rights have the potential to be transferred to other places of use, and also have the potential to change use (e.g., from agricultural to municipal use) upon transfer. Under baseline conditions, the market value of Newlands Project water rights is based on the manner and place of use *remaining the same*.

The Nevada Waterfowl Association purchased the first water rights acquired for the Lahontan Valley wetlands in 1988 and paid \$215/AF (water rights only). Water right values have increased since that time, and acquisitions completed in 1993 were transacted at a market value of approximately \$343/AF for water rights alone.

The price paid by the Service for water rights is based on market values. The market value in the appraisal process is based on previous sales of open-market (non-governmental) transactions. For this reason, the increased market value of water rights is not a function of governmental transactions but is a reflection of the increased values being placed on water rights and water-righted land by private parties.

The Service will purchase water rights for the wetlands from willing sellers, as authorized in Public Law 101-618. Many property owners may offer to sell their water rights to the Service with the appurtenant lands. The market value for Lahontan Valley land with water rights ranged from \$1,800 to \$2,000 per water-righted acre in 1993. The value of lands with water rights will vary depending on the location and acreage of the parcels involved and potential use.

In addition to the market value of water rights, there are also *operating costs* associated with the Service's acquisition of water rights. For the purpose of this document, capital costs are measured as one-time acquisition expenditures. Annual costs include operation and maintenance costs (O&M) associated with delivery of water which are paid to the Project operator. Revenue-sharing payments are also paid to local government.

Capital costs for water rights *have averaged* about \$1,200 per acre in the Carson Division of the Newlands Project (Service acquisition files, 1994). Based on market values for *water rights and* water-righted lands, and capital costs, the Service estimates that the total capital costs under baseline *conditions* will range from \$7.85 million to \$11.6 million. This range is affected by varying assumptions as to the mix of purchases involving water rights only, versus those involving water rights with the appurtenant lands.

Annual costs are expected to range from \$167,000 to \$201,000 under the baseline conditions. These costs are divided into O&M costs and revenue-sharing payments.

The total annual costs, including a weighted average for O&M costs, is calculated to be \$7.30 per acre-foot (\$25.53 per water-righted acre) for acquired water. Under the baseline conditions, O&M costs associated with the acquired water rights will be about \$150,000 annually.

Revenue-sharing payments are made *to local governments pursuant to Congressional directives prescribed in the Refuge Revenue Sharing Act (see Section 1.9.5). Under existing conditions, since the Service does not collect any receipts from the fee title lands it has acquired, revenue sharing payments are based on a percentage of the market value of the lands acquired as if they were still in private ownership. It is the Service's policy, relative to acquisitions in Lahontan Valley, that market value for revenue sharing payment calculations of lands acquired will be valued in the "before" state, as if for the highest and best use that would most probably prevail if the lands had remained in private ownership. Simply stated, this would be the market value of the subject lands with water rights as they existed when the Service purchased them.*

Refuge Revenue sharing payments would be about \$15/acre/year on fee title lands acquired with appurtenant lands. This value is based on application of the revenue sharing payment rate of three-fourths of 1 percent (0.0075) to an average per acre value of water-righted land (\$2,000/acre). While the values used in such sample calculations are based on general averages, they provide a representative figure to compare potential Refuge Revenue Sharing payments to property tax revenues.

Based on actual Refuge Revenue Sharing payments to Churchill County for 1995, the Service paid \$21,321 on the 1,254 acres of fee title lands it had acquired as of September 30, 1994. Both the sample value of \$15 per acre per year and the actual 1995 payment which equates to \$17 per acre are higher than the property tax revenues from cultivated agriculture lands (about \$2.75/acre/year) or vacant land (about \$4.80/acre/year) based on 1993 tax rates.

The Service assumes that only a portion of the 20,000 AF of water rights it acquires under baseline conditions will include appurtenant land. To calculate possible revenue-sharing payments, the Service set a 20 percent figure to represent the low end of land acquisitions and a 60 percent figure as its high end. Based on these assumptions, the Service calculates revenue-sharing payments to ultimately range from \$17,000 to \$51,000 a year under baseline conditions.

Probability of Meeting Service Objective

Two key factors determine the Service's ability to meet its objectives: availability of willing sellers and adequacy of funding. Based on current participation by willing sellers and current Congressional appropriations, the Service anticipates that it will meet its 20,000 AF acquisition objective by September 1996.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This chapter identifies and evaluates the environmental impacts of the action alternatives as they relate to the U.S. Fish and Wildlife Service's (Service) action of acquiring sufficient water to sustain a long-term average of 25,000 acres of primary wetland habitat in the designated Lahontan Valley wetlands. The No Action Alternative (Alternative 1) is a continuation of baseline conditions (discussed in Chapter 3), and is provided for comparative purposes. *Baseline conditions are those conditions that are calculated or otherwise estimated to occur when the 20,000 AF water rights acquisition program has been completed and the Newlands Project 1988 OCAP delivery efficiency targets have been fully achieved. The environmental impacts of the 20,000 AF water rights acquisition program were described in the Service's December 1991 environmental assessment, "Proposed Acquisition of Water Rights for Stillwater Wildlife Management Area and Stillwater National Wildlife Refuge" and finding of no significant impact (FONSI).*

Environmental consequences are direct and indirect impacts (both positive and negative) that would result from the action alternatives. Direct consequences are those that are caused by the action, and occur at the same time and place. Indirect consequences are also caused by the action, but occur later in time or are further removed from the action. For the purposes of estimating the magnitude and duration of impacts for this document, the Service set a 20-30 year time frame for implementation of the water rights acquisition program. The Service recognizes that actual implementation could take longer due to the willing seller component of the program.

In addition to using the No Action Alternative as the baseline for assessing environmental consequences of each of the action alternatives, no acquisition conditions are also used as a "baseline" to evaluate the overall impacts of the Preferred Alternative and the 20,000 AF water rights acquisition program, in total. No acquisition conditions are those conditions that are calculated (using the BLR and NSM models) or estimated to occur assuming that no water rights have been acquired for the primary wetlands and the Newlands Project 1988 OCAP delivery efficiency targets have been fully achieved.

Although none of the alternatives propose specific monitoring measures, the Service would monitor inflows to the wetlands as described in Section 2.7 to ensure that both quantity and quality of water entering the wetlands is sufficient. Once it is demonstrated that a long-term annual average

of 25,000 acres of primary wetland habitat can be sustained on acquired water and water rights, the Service will terminate water rights acquisitions. For the purpose of this document, a long-term average would be determined using a 10-year-running average of annual average wetland habitat acres.

Cumulative effects, and other impacts, including conflicts with local, State and Federal policies or plans, as well as unavoidable and irretrievable effects of the alternatives are also discussed in this chapter.

PHYSICAL RESOURCES

4.2 EFFECTS ON NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE

This section presents a comparison of the potential consequences of the action alternatives on various aspects of Newlands Irrigation Project (Newlands Project) operations and infrastructure. This comparison is based on a common set of assumptions and baseline conditions described in Section 3.2, NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE. The Service relied on calculations from both the Negotiated Settlement Model (NSM) and the Below Lahontan Reservoir (BLR) Model to make these analytical comparisons using a 92-year hydrologic simulation period to establish long-term averages.

4.2.1 NEWLANDS PROJECT IRRIGATED ACREAGE BASE

Analysis of the anticipated variations in irrigated acreage for each alternative is summarized in Table 4.2.A. Under **Alternative 1**, the No Action Alternative, baseline Newlands Project water-righted, irrigated acreage is 56,622 acres. *Potential impacts and mitigation related to the conversion of irrigated farmland is discussed in several subsections of Section 4.16, EFFECTS ON AGRICULTURE, FARMLAND, AND LOCAL ECONOMY.*

4.2.2 IRRIGATION DELIVERIES

Irrigation delivery and irrigation demand are based on acres of irrigated land, headgate entitlement, irrigation use-rates, and requests for irrigation water. The irrigation delivery pattern, as defined under baseline conditions (Section 3.2.2, IRRIGATION DELIVERIES), will continue under all alternatives. Under all alternatives, irrigation deliveries are lower than the entitlement/irrigation demand due to shortages resulting from changing hydrologic conditions, weather factors, and from water rights that go unused as described in the aforementioned section.

TABLE 4.2.A NEWLANDS PROJECT WATER-RIGHTED, IRRIGATED ACREAGE

	ALT. 1 Baseline	ALT. 2 Proposed Action	ALT. 3 Least Cost	ALT. 4 Maximum Acquisition	Alt. 5 Minimum Acquisition
Carson Division	52,767	52,767	52,767	52,767	52,767
Truckee Division	3,855	3,855	3,855	3,855	3,855
TOTAL	56,622	56,622	56,622	56,622	56,622
Acquired Acres For Wetlands					
Carson Division	5,670	34,800	28,500	38,100	21,000
Truckee Division	0	0	0	0	0
TOTAL	5,670	34,800	28,500	38,100	21,000
Remaining Farm Acres					
Carson Division	47,007	17,967	24,267	14,667	31,767
Truckee Division	3,855	3,855	3,855	3,855	3,855
TOTAL	50,862	21,822	28,122	18,522	35,622

Source: Irrigated, water righted acreage figures from U.S. Bureau of Reclamation (written communication, 1992) and adjusted BLR Model output data to calculate acres acquired.

KEY TO SCENARIOS-

- Alt. 1 No Action Alternative, baseline condition, acquire up to 20,000 AF for wetlands protection.
- Alt. 2 Proposed Action, acquire up to 122,000 AF *in the Carson Division* for wetlands protection (*includes the 20,000 AF acquisition program*).
- Alt. 3 Least Cost with Maximum Use-Rate, acquire up to 100,000 AF *in the Carson Division* for wetlands protection (*includes the 20,000 AF acquisition program*).
- Alt. 4 Maximum Acquisition, acquire up to 133,500 AF *in the Carson Division* for wetlands protection (*includes the 20,000 AF acquisition program*).
- Alt. 5 Preferred Alternative, purchase up to 75,000 AF in the Carson Division *and Middle Carson River corridor* for wetlands protection (*includes the 20,000 AF acquisition program*), plus additional water from other sources.

Under **Alternative 1**, Carson Division irrigation deliveries are calculated to be 170,100 AF/year (this includes hydrologic shortages). Irrigation deliveries can be separated for Carson Division farm irrigation (153,600 AF/year), and wetlands delivery (16,500 AF/year).

Under the action alternatives, Truckee Division demands and deliveries are calculated to remain unchanged from the No Action Alternative. (For Carson Division irrigation demand and delivery comparisons, see Table 4.2.B.)

TABLE 4.2.B CARSON DIVISION IRRIGATION DEMAND AND DELIVERIES (ACRE-FEET)

	ALT. 1	ALT. 2	ALT. 3	ALT.4	ALT. 5 ^A
Carson Division Farm Demand	157,900	59,400	80,700	48,100	88,200
Wetlands Demand	16,900	102,100	98,000	112,100	79,200
TOTAL	174,800	161,500	178,700	160,200	167,400
Carson Division Farm Delivery	153,600	58,600	78,700	47,800	86,400
Wetland Delivery	16,500	101,100	95,900	111,300	77,900
TOTAL	170,100	159,700	174,600	159,100	164,300
Percent Shortage	2.7%	1.1%	2.3%	0.7%	1.9%

Source: BLR Model (version 3.31) output data, based on Newlands Project acreage base, 1989.

^A The values in this column assume that water rights are leased from 6,020 acres of farmland per year on average.

Carson Division irrigation demand is an important factor because it is linked to many other variables, such as Lahontan Reservoir storage, releases, spills and drainwater. Most directly, Carson Division irrigation demand impacts the volume of water that must be diverted from the Truckee River for use in the Newlands Project. Reductions in Truckee River diversions benefit Pyramid Lake fish species (as more water remains in the river to increase lake inflows). However, reduced Carson Division irrigation demand also reduces Lahontan Reservoir releases, thereby adversely impacting hydropower generation. (Hydropower resources are discussed in Section 4.2.6.)

Average shortages due to hydrologic factors such as drought range from 0.7 percent (Alternative 4) to 2.3 percent (Alternative 3) and are incorporated into the long-term average annual irrigation delivery.

Alternative 2: Under this alternative to acquire water for the primary wetlands, water rights would be applied at a reduced use-rate (2.99 AF/acre/year). As a result, Carson Division irrigation demand in the Newlands Project would be reduced by about 7.6 percent as compared to the No Action Alternative.

Of the total calculated irrigation deliveries in the Carson Division (159,700 AF/year) under Alternative 2, about 63 percent would be for wetlands demand and the remainder would be

for farming and other uses. *Legitimate water rights in the Newlands Project would not be adversely impacted by this alternatives and would continue to be served at their full duty during normal and above normal years.*

Alternative 3: Under the Least Cost Alternative, water rights for wetlands protection would be applied at the full use-rate (3.5 AF/acre/year). This offers the most direct use of water. As a result, Carson Division irrigation delivery in the Newlands Project is calculated to increase by 2 percent over the No Action Alternative. Of the calculated total irrigation deliveries in the Carson Division under this alternative (about 174,600), about 55 percent would be for wetlands demand and the remainder would be for farming and other uses. *Legitimate water rights in the Newlands Project would not be adversely impacted by this alternatives and would continue to be served at their full duty during normal and above normal years.*

Alternative 4: Under the Maximum Acquisition Alternative, Carson Division irrigation deliveries are calculated to decrease 8 percent from the No Action Alternative. As with Alternative 2, the reduced irrigation demand results from the 2.99 AF/acre/year use-rate.

Of the calculated total irrigation deliveries in the Carson Division under this alternative (about 159,100 AF/year) about 70 percent would be for wetland deliveries and the remainder would be for farming and other uses. *Legitimate water rights in the Newlands Project would not be adversely impacted by this alternatives and would continue to be served at their full duty during normal and above normal years.*

Alternative 5: Under the Preferred Alternative, reductions in Carson Division irrigation deliveries would vary depending upon use of Fallon Naval Air Station (NAS-Fallon) water. If NAS-Fallon water were used, irrigation demand could be reduced by about 4 percent as compared to the No Action Alternative.

Of the calculated total irrigation deliveries in the Carson Division under the Preferred Alternative (about 164,300 AF/year), about 47 percent would be for wetlands demand and the remainder would be for farming and other uses. *Legitimate water rights in the Newlands Project would not be adversely impacted by this alternatives and would continue to be served at their full duty during normal and above normal years.*

Comparison with No Acquisition Conditions: *If NAS-Fallon water were used under Alternative 5, irrigation demand could be reduced by about 6 percent as compared to no acquisition conditions.*

Mitigation Measures

Mitigation measures to offset the adverse impacts associated with increased demand are discussed in Hydropower Resources and Surface Water Quantity.

4.2.3 WETLAND DELIVERIES AND INCIDENTAL INFLOW

4.2.3.1 Deliveries

Primary wetland deliveries are defined as scheduled irrigation deliveries during the irrigation season to the primary wetland areas at Stillwater National Wildlife Refuge (Stillwater NWR), Carson Lake and Pasture (Carson Lake), and the Fallon Paiute-Shoshone Indian Reservation wetlands (Tribal wetlands). Under **Alternative 1**, the No Action Alternative, irrigation deliveries amount to 16,500 AF/year, drainwater provides 30,000 AF/year, and spills provide 8,600 AF/year. Irrigation delivery and incidental inflow for each alternative is depicted below in Table 4.2.C.

Alternative 2: Irrigation deliveries to the primary wetlands would be increased by about 84,600 AF/year over the No Action Alternative. This volume of irrigation water, when combined with drainwater and spills, would provide sufficient water for the Service to meet the objective of sustaining 25,000 acres of primary wetland habitat over the long term.

TABLE 4.2.C WETLAND DELIVERIES AND INCIDENTAL INFLOW (ACRE-FEET)

	ALT 1	ALT. 2	ALT. 3	ALT.4	ALT.5
Irrigation Delivery ^A , Carson Div.	16,500	101,100	95,900	111,300	77,900 ^B
Other Sources ^C	0	0	0	0	16,500
Drainflows	30,000	13,000	18,600	0	19,700
Usable Spills	8,600	10,000	8,700	11,800	9,700
TOTAL ^D	55,100	124,100	123,200	123,100	123,800

Source: Adjusted BLR Model output data

^A Irrigation deliveries are generally lower than the irrigation demand (headgate entitlement) due to the effects of drought cycles in the natural hydrologic regime, these are factored into long term delivery averages as "shortages", see Table 4.2.B.

^B Irrigation delivery of Alternative 5 includes leased irrigation water in addition to acquisition of water rights through fee purchase. Irrigation water acquired through fee purchase alone would account for about 60,800 AF of wetland deliveries.

^C Other sources of wetland inflow include upstream Carson River irrigation water rights, groundwater, Navy conservation water, and treated sewage effluent.

^D The total wetland inflows are long-term averages with "shortages" factored into the expected irrigation deliveries. These long-term delivery averages equate to 125,000 AF of water obligated for wetland demand.

Under this alternative, water rights acquired in the Carson Division at the 3.5 AF/acre and 4.5 AF/acre entitlements, would be applied at the 2.99 AF/acre/year use-rate. The application of the 2.99 use-rate would entitle the Service to about 84 percent of the total volume of acquired water.

Alternative 3: Irrigation deliveries to the primary wetlands would be increased by about 79,400 AF/year over the No Action Alternative. This volume of irrigation water, when combined with drainwater and spills, would provide sufficient water for the Service to meet the objective of sustaining 25,000 acres of primary wetland habitat over the long term.

Under Alternative 3, water rights acquired in the Carson Division at the 3.5 AF/acre and 4.5 AF/acre entitlements, would be applied at the 3.5 AF/acre/year use-rate for the wetlands. The application of the 3.5 use-rate would entitle the Service to about 98 percent of the total volume of water acquired. (Acquisition of some 4.5/AF/acre water rights account for the 2 percent difference between acquisition and entitlement.)

Alternative 4: Irrigation deliveries to the primary wetlands would be increased by about 94,800 AF/year over the No Action Alternative. This volume of irrigation water, when combined with spills, would provide sufficient water for the Service to meet the objective of sustaining 25,000 acres of primary wetland habitat over the long term.

Similar to Alternative 2, the 2.99 AF/acre use-rate would be applied, thereby entitling the Service to about 84 percent of the total water acquired.

Alternative 5: Wetland irrigation deliveries would increase by 61,400 AF/year over the No Action Alternative. These wetland irrigation deliveries include not only water acquired through fee purchase in the Carson Division, but also incorporate water acquired by leasing, groundwater pumping, use of Navy water, and the fee purchase of water rights in the Middle Carson River corridor. The combined total volume of water from fee purchase, other sources, drains and spills, would sustain 25,000 acres of primary wetland habitat.

Similar to Alternatives 2 and 4, the 2.99 AF/acre use-rate would entitle the Service to about 83 percent of the water rights purchased in fee title.

Comparison with No Acquisition Conditions: The Preferred Alternative, including the 20,000 AF acquisition program, would result in a total of about

77,900 more AF/year of water being delivered to the primary wetlands than would occur under no acquisition conditions.

4.2.3.2 Drainwater

Primary wetland drainwater inflows (return flows) include seepage, tailwater, and other sources incidental to irrigation deliveries. All drainflow figures for analysis are calculated estimates based on BLR Model assumptions and are used for comparative purposes only. Baseline drainflows could change due to variables such as drainflow assurances or other changes in water management in the Carson Division of the Newlands Project. (For comparison of drainwater flows across alternatives see Table 4.2.C.)

Under **Alternative 1**, the No Action Alternative, 30,000 AF of drainwater is calculated to enter the wetlands, comprising about 54 percent of total wetlands inflow.

Alternative 2: Under this alternative, drainwater flows to primary wetlands would decrease by about 57 percent over the No Action Alternative. As agricultural lands are no longer irrigated, corresponding drainflows to the wetlands would be reduced. Because Newlands Project irrigation drainwater has been shown to adversely affect fish, wildlife, and wetland habitat, (Section 3.3.2, SURFACE WATER QUALITY, Drainwater Quality), reduced reliance on irrigation drainwater and increased use of higher quality irrigation water, would positively benefit primary wetland habitat and associated fish and wildlife.

Alternative 3: Drainwater flows to primary wetlands would decrease by about 38 percent from the No Action Alternative. Under Alternative 3, more agricultural irrigation is expected to continue than under Alternative 2; therefore, drainwater inflows constitute a greater portion of the total wetland inflow than Alternative 2.

Alternative 4: Under this alternative, drainwater flows are precluded from wetlands management and long-term habitat maintenance at Stillwater NWR, Carson Lake, and the Tribal wetlands.

Under the Maximum Acquisition Alternative, drainwater is eliminated in order to provide the highest quality water for wetland inflows. Due to this factor, this alternative would provide the most benefit to fish, wildlife and wetland habitat.

Alternative 5: Under this alternative, drainwater flows to primary wetlands would decrease 34 percent from the No Action Alternative and would include sewage

effluent as a component of drainwater inflows. The *Preferred Alternative* would retain a larger agricultural base in the Carson Division which would maintain higher irrigation drainflows than any of the other action alternatives.

Comparison with No Acquisition Conditions: Under the Preferred Alternative, drainwater flow into the primary wetlands would be about 41 percent lower than it would be under no acquisition conditions (calculated to be about 33,600 AF/year).

4.2.3.3 Spills

Spills, which incorporate accidental, operational and precautionary releases, are routed through Newlands Project canals and drains. Spills can cause downstream flooding if the volume of spills exceeds the capacity of the Newlands Project canals and the lower Carson River to route spills to the wetlands or to the Carson Sink. Flooding adversely impacts property owners along the Carson River or within its floodplain. Not all spills result in flooding, and most generally, spills are controlled.

If spills occur prior to the irrigation season, canal capacities generally can handle spill volumes, but if they occur during the irrigation season as most spills do, then *volumes tend to be greater and the amount of water which can be conveyed to the wetlands* may be limited by canal capacities. For this reason, the Service calculated "useable spills" for all of the alternatives. (For comparison of spills across alternatives see Table 4.2.C.)

Since spills occur on an infrequent or irregular basis, they are incorporated into the average annual wetland inflow volumes as "useable spills". The frequency and volume of calculated "useable spills" based on the 92-year hydrologic simulation period, are affected by reservoir storage levels and carryover (which are linked to diversion, irrigation demand and deliveries). The average annual "useable spills" to the wetlands under baseline conditions in **Alternative 1** amount to 8,600 AF/year over the long term. Spills are calculated to occur in 32 years out of the 92 year hydrologic period under baseline conditions..

Alternative 2: Under this alternative, the Service calculates that spills would increase in frequency and volume due to reduced Project demand and the propensity for more carryover storage. The volume of average annual "useable spills" is calculated to increase by about 20 percent over Alternative 1. In addition, the BLR Model calculates that the spills would occur in 37 years of the 92-year hydrologic simulation period, 5 more years than that calculated to occur under Alternative 1.

Alternative 3: Under this alternative, there is only a slight increase (about 1 percent) in the calculated volume of "useable spills" that would occur. The frequency of spills remains unchanged from Alternative 1.

Alternative 4: As with Alternative 2, the volume and frequency of spills are calculated to increase over Alternative 1. The BLR Model calculates that average annual "useable spills" would increase by about 37 percent over Alternative 1 and would occur in 40 years of the 92-year hydrologic simulation period, 8 more years than that calculated to occur under Alternative 1.

Alternative 5: Spill frequency and volumes are expected to increase under *the Preferred Alternative*, and would fall in a range between that depicted for Alternatives 2 and 3. The BLR Model calculates that average annual "useable spills" would increase by about 6 percent over Alternative 1 and would occur in 35 years of the 92-year hydrologic simulation, which is 3 more years than that calculated to occur under Alternative 1. Increased inflow to Lahontan Reservoir from the Middle Carson River corridor acquisitions could also affect spill volumes.

Comparison with No Acquisition Conditions: Average annual useable spill volumes could increase by as 8 percent over no acquisition conditions (estimated to be about 8,400 AF/year over the long term).

Mitigation Measures

Due to the interrelated nature of wetland irrigation deliveries, drainwater, and spills, it is extremely difficult to identify a mitigation strategy that would increase one component without adversely affecting another.

There are changes that could be incorporated into Newlands Project operations to increase drainwater and spill volumes over baseline conditions. Such changes would only be reasonable and feasible if they did not result in increased diversions from the Truckee River and would most likely require changing the Newlands Project OCAP.

Enlarging canal and drains would increase flow capacities, allowing for greater use of spills when they occur. Such actions would increase the volume of "useable spills" for wetlands protection thereby reducing acquisition or drainwater needs.

If Project drainwaters were dedicated to wetlands protection through a cooperative drainwater assurance plan (known as drainflow assurances), other uses of drainwater (such as irrigation of pasture lands at Carson Lake, stock watering, or recapture to supply irrigation demand) could be minimized. Such actions, if carried

out, would have to be initiated by the Project operator and would benefit the wetlands to the extent that additional wetland inflows would accrue and that drainwater would be of suitable quality for wetlands protection.

4.2.4 NEWLANDS PROJECT EFFICIENCY

The NSM/BLR Models calculate that Newlands Project efficiency would increase over the long run for all action alternatives. The Service expects that the retirement of large parcels of agricultural lands would present substantial opportunities for improving delivery system efficiencies, both directly (through consolidated wetland deliveries) and indirectly (through the retirement of low-efficiency parcels and laterals).

Changes in efficiency are a complex function of factors such as distance, timing, frequency, routing, and dispersal of water-righted deliveries relative to Lahontan Reservoir releases. They also vary as a function of the amount of water released. In general, as water rights acquisitions increase, acquired water would travel in larger delivery blocks through fewer canals and laterals. As a result, water losses due to evaporation, seepage, and wetting-up are expected to decline. The NSM/BLR Model results, which are based upon a systematic comparison of physical and hydrologic parameters, do not take into account behavioral or management influences.

The NSM/BLR Model results offer a long-term calculation of the end result and impacts of the various alternatives upon Newlands Project efficiency. The model results do not offer short-term impacts that may occur as the acquisition program is initiated and implemented. There are possible acquisition patterns that over the short run could adversely impact Project efficiency. Such acquisition patterns could include: retaining irrigated farmland at the end of irrigation canals and laterals; purchasing irrigated farmland in checkerboard patterns; or retaining small volume irrigation deliveries in outlying irrigation service districts that are furthest from Lahontan Reservoir.

Based on the Service's past experience, there are no indications that water right acquisitions would occur in the worst-case pattern relative to Newlands Project efficiencies (i.e., checkerboard patterns). The Service expects that lands acquired under the willing seller program would occur in a more blocked pattern, due to the lower productivity in certain areas and other competing land uses for some areas. In addition, the Service's acquisition strategies (see Section 2.6.4) related to location, indirect cost savings, and protection would act to prevent checkerboard or other inefficient acquisition patterns.

Under **Alternative 1**, the No Action Alternative, Newlands Project efficiency is calculated to be 67.8 percent over the 92-year hydrologic simulation period, with full irrigation year delivery efficiency rates of 68.1 percent, and a 59.3 percent efficiency rate in shortage years (*Table 4.2.D*).

TABLE 4.2.D NEWLANDS PROJECT EFFICIENCY CALCULATIONS

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5
92-Year Average	67.8%	71.8%	71.0%	77.1%	69.3%
Full Irrigation Year (Max)	68.1%	71.8%	71.1%	77.1%	69.9%
Shortage Year (Min)	59.3%	70.4%	68.7%	76.2%	65.1%

Source: NSM/BLR Model results and output data

Alternative 2: Under this alternative, large block deliveries of irrigation water to Stillwater NWR, Carson Lake, and the Tribal wetlands would increase Project delivery efficiency rates over the long term by an average of about 4 percent over the No Action Alternative. This figure is based on final program results calculating a long-term average. Consolidated deliveries allow for substantial efficiency gains relative to the baseline conditions, particularly during years of reduced supply. In shortage years, the BLR Model calculations show that Project delivery efficiency could improve as much as 11 percent over No Action Alternative.

Alternative 3: Similar to Alternative 2, large block deliveries of irrigation water to the primary wetland areas would increase Project delivery efficiency by about 3 percent over the No Action Alternative. Shortage year increases are calculated to be about 9 percent.

Alternative 4: Because this alternative excludes use of drainwater, its Project delivery efficiency rates are based on a modified baseline condition scenario under which baseline efficiency is first increased to approximately 74 percent. Accordingly, post-acquisition efficiency has the potential to increase an average of 9 percent over the No Action Alternative, and by as much as 17 percent in shortage years. This Maximum Acquisition Alternative represents the highest increase in efficiency potential as it excludes drainwater, and consolidates large blocks of irrigation water for wetlands delivery, thereby reducing seepage and other losses.

Alternative 5: Due to the Preferred Alternative's reliance on water sources other than those found in the Carson Division of the Newlands Project, this alternative would not measurably increase Newlands Project efficiency over baseline conditions. Annual average delivery efficiency rates would increase by about 1.5 percent over that of the No Action Alternative. *In shortage years, delivery efficiency could improve by about 6 percent over that of the No Action Alternative.* The Service assumes that any water transferred from the Middle Carson River corridor to the Lahontan Valley wetlands would be impacted by Project conveyance losses, but would not be subject to the annual OCAP efficiency calculations.

Comparison with No Acquisition Conditions: Compared to no acquisition conditions, average annual delivery efficiency rate (about 67.3 percent under no acquisition conditions) would increase by about 2 percent under the Preferred Alternative. In shortage years, delivery efficiency would increase by about 8 percent over that of no acquisition conditions (about 57.2 percent).

Mitigation Measures

Although the Service has identified no long-term adverse impacts to Project efficiency delivery rates as a result of the Preferred Alternative and other action alternatives, some short-term adverse impacts could potentially occur.

The Service's acquisition strategies (Section 2.6.4, ACQUISITION STRATEGIES) would act to minimize possible short-term adverse impacts by focusing acquisitions for a particular strategy, thereby creating a less random acquisition pattern. Targeting for less efficient lands, outlying and lateral areas, and along the N and T Canal systems, would focus acquisitions and increase efficiency. Actions to implement these more specific targeting strategies *could* be initiated by the Service, but would require further acquisition authorities (such as value-added payments, pricing incentives, or condemnation) in order to effectively mitigate short-term impacts to Newlands Project efficiency delivery rates. Under existing conditions, the willing seller and fair market value constraints would inhibit full implementation of these mitigation measures. Reclamation's Newlands Project Efficiency Study (U.S. Dept. of the Interior, 1993) provides more detailed accounts of specific canals, laterals, and service areas that experience higher seepage rates and are *less* efficient. If these areas were taken out of service by acquisition, Newlands Project delivery efficiency would be improved.

Newlands Project efficiency can be improved through a variety of actions, such as more accurate irrigation delivery monitoring, lining delivery canals, re-use of drainwater for irrigation delivery, and conservation. All of these actions are described in detail in Reclamation's Newlands Project Efficiency Study (ibid). Implementation of such actions could adversely affect the volume of drainwater that reaches the wetlands. In addition, the Service does not have the authority to implement such changes to the Newlands Project and therefore these actions may not be viable mitigation measures for the Service to pursue.

4.2.5 LAHONTAN RESERVOIR OPERATIONS

Lahontan Reservoir inflows, outflows, and storage are discussed separately below. Calculated results for each alternative are summarized in Table 4.2.E. to provide for comparative analysis.

TABLE 4.2.E LAHONTAN RESERVOIR INFLOW, RELEASES AND STORAGE

	ALT. 1	ALT. 2	ALT. 3	ALT.4	ALT.5
INFLOW (AF/year)					
Carson River	287,700	287,700	287,700	287,700	287,700
Truckee Canal	62,400	46,600	59,100	38,900	53,300
TOTAL	350,100	334,300	346,800	326,600	341,000
OUTFLOW (AF/year)					
Irrigation Releases	250,700	222,400	245,700	206,300	236,900
Losses	51,100	53,900	51,400	55,500	52,400
TOTAL^A	301,800	276,300	297,100	261,800	289,300
Average Shortage	2.3%	1.1%	2.2%	0.7%	1.8%
AVERAGE RESERVOIR STORAGE (AF) ON:					
June 1	255,300	263,200	254,200	268,200	unknown
Nov. 30	142,800	159,400	143,300	170,400	150,000
NUMBER OF YEARS (OUT OF 92) WHEN STORAGE IS LESS THAN 110,000 AF					
Memorial Day	2	2	2	2	unknown
Fourth of July	7	5	7	5	unknown
Labor Day	8	8	8	8	unknown

Source: NSM/BLR Model results and data output

^A Differences between outflow totals and inflow totals are primarily attributable to spills, which are not depicted in this table.

4.2.5.1 Inflow

Lahontan Reservoir inflow consists of Carson River runoff and Truckee River imports via the Truckee Canal. Under **Alternative 1**, Carson River inflow averages 287,700 AF/year based on the 92-year hydrologic simulation period. Truckee River imports (delivered) average 62,400 AF/year under baseline conditions. Calculated average total reservoir inflow amounts to about 350,000 AF/year.

Alternative 2: Truckee Canal inflows would decline by about 25 percent from the Alternative 1 due to the reduced irrigation demand and deliveries linked to the wetlands irrigation use-rate under Alternative 2. Carson River flow would remain constant, which would result in a calculated average total reservoir inflow of 334,300 AF/year.

Alternative 3: Under this alternative, Truckee Canal inflows would decline by 5 percent from the No Action Alternative. Carson River flow would remain constant and the total reservoir inflow is calculated to average 346,800 AF/year, which would be 3,300 AF/year less than the Alternative 1. The higher wetland irrigation use-rate and only slight decline in irrigation demand and deliveries account for the small change in reservoir inflow.

Alternative 4: Truckee Canal inflows would decline the most under this alternative due to the reduced irrigation demand and deliveries. Truckee Canal inflows are calculated to decrease 38 percent, and total reservoir inflow would drop to 326,600 AF/year on average based on the 92-year hydrologic simulation data. Carson River flow would remain constant under this alternative.

Alternative 5: Under this alternative, calculations for Truckee Canal inflow and Carson River flow are fairly speculative due to the different acquisition scenarios that may be implemented. Using the acquisition scenario that creates the greatest reduction in irrigation demand, Truckee Canal inflow would decrease by about 15 percent from Alternative 1. Carson River inflow to the reservoir could change under this alternative through the acquisition of water rights from the Middle Carson River corridor. These upstream water rights could be passed through the reservoir for wetland delivery, thereby increasing Carson River flows. There is insufficient information to determine how much average annual inflow volumes would be increased on the Carson River. The Service estimates that regardless of the mix of water sources utilized under this alternative, average annual total reservoir inflows would not increase over the No Action Alternative.

***Comparison with No Acquisition Conditions:** Compared to no acquisition conditions, Truckee Canal inflow (about 64,800 AF/year under NAC) would decrease by as much as 18 percent under the Preferred Alternative.*

4.2.5.2 Outflows and Losses

Reservoir outflows consist of controlled releases to satisfy headgate demands, plus associated reservoir losses (evaporation and seepage), and, in some years spills (in the form of accidental, precautionary, or operational releases not destined to meet

irrigation demand). Average annual outflow depicted in Table 4.2.E is only the sum of releases and losses and does not include spills. Evaporative and seepage losses would remain fairly constant for all of the action alternatives, but would increase slightly as reservoir storage increases.

Under **Alternative 1**, average annual reservoir outflows are calculated to be 301,800 AF/year based on the 92-year hydrologic simulation data. Reservoir releases for irrigation under the No Action Alternative average about 250,700 AF/year, and a 2.3 percent average shortage occurs each year.

Alternative 2: Lahontan Reservoir releases would decline by about 11 percent from Alternative 1 and shortages would average about 1.1 percent under the Proposed Action. Reduced headgate demand, reduced conveyance losses, and increased storage account for these reductions. Average annual reservoir outflow is calculated to be about 276,100 AF/year, 25,700 AF/year less than the No Action Alternative.

Alternative 3: Lahontan Reservoir outflows would be least affected by this alternative. Reservoir releases would decline on average by only 2 percent from the No Action Alternative. Under this alternative, increased headgate demands are more than offset by reduced conveyance losses. Annual average outflow is calculated to be 296,100 AF/year, 5,700 AF/year less than the No Action Alternative.

Alternative 4: The Maximum Acquisition Alternative would have the greatest effect on Lahontan Reservoir outflows due to reduced headgate demand and reduced conveyance losses. Reservoir releases are calculated to decline by about 18 percent from the No Action Alternative. Reduced irrigation demand and increased storage would result in shortages of less than 1 percent, the lowest of all action alternatives. Reservoir evaporative losses would increase slightly over the No Action Alternative due to increased reservoir storage. The annual average reservoir outflow is calculated to be about 261,800 AF/year, some 40,000 AF/year less than the No Action Alternative.

Alternative 5: The annual average reservoir outflow volumes for the *Preferred Alternative* would fall between that depicted for the Proposed Action and Alternative 3. Reservoir releases are calculated to decline by about 5 percent from the No Action Alternative, and shortages are estimated to be about 1.8 percent on average each year. Annual average reservoir outflows are calculated to be about 289,300 AF/year, 12,500 AF/year (4 percent) less than the No Action Alternative.

Comparison with No Acquisition Conditions: Compared to no acquisition conditions, Reservoir releases (about 254,800 AF/year under NAC) would

decline by about 7 percent under the Preferred Alternative. Annual average outflows would decline by about 3 percent.

4.2.5.3 Storage

Storage is defined as the volume of water held in Lahontan Reservoir at any particular time. The BLR/NSM calculations show that under **Alternative 1**, the No Action Alternative, a long-term average of 255,300 AF is available in Lahontan Reservoir storage on June 1 each year based on data from the 92-year hydrologic simulation period. As irrigation releases are made and Carson River runoff diminishes, Truckee River diversions decline and the reservoir storage volumes drop to a calculated annual average of 142,800 AF by the end of each irrigation season (November 30). The volume of water that remains in storage after this date is considered carryover storage and is the foundation for the next year's storage. Reservoir storage variations are summarized in Table 4.2.E. Storage volumes are the primary indicator of recreational quality at Lahontan Reservoir and are discussed further in Section 4.17, RECREATION.

Increases in Lahontan Reservoir storage, increased spills, and reduced shortages represent indirect effects of the water rights acquisition program upon Lahontan Reservoir operations.

All of the action alternatives could potentially increase the volume of spills, which would benefit the Lahontan Valley wetlands. However, increased spill volume is not generally a desirable objective for irrigation or for hydropower generation. Although these alternatives may increase the propensity for higher average volumes when spills do occur, they would not necessarily create flooding conditions or flood damage.

The Department of the Interior is currently considering revisions associated with an adjusted OCAP which may lower spring storage targets. Lower reservoir storage targets effect Truckee River diversions, and if reduced, would result in lower reservoir levels than identified for the Service's baseline conditions. No revisions have been made to the 1988 OCAP storage targets and there is no decision on an adjusted OCAP, therefore, the Service has not adjusted its baseline conditions.

Alternative 2: Under the Proposed Action, average storage volumes on June 1 and November 30 would increase over Alternative 1. June storage volumes are calculated to increase by about 3 percent over the No Action Alternative, and November calculations would increase almost 12 percent over the baseline. The Service assumes that the greater increase in November storage volumes is related to the decreased irrigation demand that occurs under this alternative.

Alternative 3: Average storage volumes calculated for this Alternative indicate a slight decline for the June 1 figures from the No Action Alternative. The November calculations show a slightly increase over the No Action Alternative.

Alternative 4: Under this alternative, average storage levels would offer the highest increase over the No Action Alternative. The BLR/NSM Model calculations indicate that June storage volumes would increase by about 5 percent over the No Action Alternative and November storage volumes would increase by about 19 percent over the No Action Alternative. The Service assumes the greater increase in November storage volumes is related to the decreased irrigation demand that occurs under this Alternative.

Alternative 5: Due to the various acquisition scenarios that could be implemented under the *Preferred Alternative*, there is insufficient data to specifically determine how June average storage levels would be impacted. The Service estimates that average storage volumes would fall between Alternatives 2 and 3. As such, June storage levels are calculated to range from slightly less than the baseline to 3 percent more than the baseline. However, these figures do not incorporate the acquisition of water rights from the Middle Carson River corridor. These waters could impact spring storage volumes, even though the Service plans to directly pass these waters through Lahontan Reservoir. November storage volumes would be unaffected by Middle Carson River acquisitions. The BLR/NSM calculations for November storage volumes show a 5 percent increase over the No Action Alternative, based on reduced irrigation demand in the Carson Division.

Comparison with No Acquisition Conditions: Under Alternative 5, November storage targets would increase by about 7 percent over no acquisition conditions (November storage of about 139,600 AF).

Mitigation Measures

The Service has determined there would be no adverse effects on Newlands Project operations resulting from the reduced inflow volumes associated with the Proposed Action and other action alternatives, and, therefore, no mitigation is identified.

4.2.6 HYDROPOWER RESOURCES

As stated in Section 3.2.6, HYDROPOWER RESOURCES, hydropower generation associated with the Newlands Project facilities is a function of Lahontan Reservoir releases, which are determined by irrigation demand. Under **Alternative 1**, the No Action Alternative, energy generation at the Old Lahontan, New Lahontan, and 26-Foot-Drop (V-Line canal) Power Plants averages about 22,700 mega-watt hours/year (MWh/year). Hydropower revenues

associated with the Old Lahontan and 26-Foot-Drop Power Plants are on fixed rates, that is they do not vary with Project releases. Therefore, these revenues would remain unchanged under the Proposed Action and other action alternatives. The revenues associated with the New Lahontan Power Plant correlate to reservoir releases and amount to about \$894,700 per year, on average under the No Action Alternative. (See Table 4.2.F.)

Money received from hydropower generation is used to offset Newlands Project Operation and Maintenance (O&M) costs. Reductions in hydropower revenues would adversely impact the Project operator. If such losses occurred, the Newlands Project operator could potentially increase Project water-user O&M fees to make up the shortfall. A portion of this increased cost would be passed on to the Service and the State of Nevada as Project water-users.

Alternative 2: Energy generation at the Old Lahontan, New Lahontan, and V-Line Canal power plants would average about 20,200 MWh/year, which amounts to an 11 percent reduction from the No Action Alternative. Reduced irrigation demand associated with acquiring water for the wetlands would decrease hydropower generation, and revenues linked to hydropower generation would decrease by about \$122,900/year on average.

Alternative 3: Energy generation would be least affected under this alternative. The Old Lahontan, New Lahontan, and V-Line Canal power plants generate an average of about 21,800 MWh/year, which amounts to a 4 percent reduction from the No Action Alternative. *Reduced irrigation demand associated with acquiring water for the wetlands would decrease hydropower generation, and revenues linked to hydropower generation would decrease by about \$14,100/year on average as compared to baseline conditions.*

TABLE 4.2.F NEWLANDS PROJECT HYDROPOWER GENERATION AND REVENUES

	ALT. 1	ALT. 2	ALT. 3	ALT.4	ALT.5
GENERATING FACILITY					
Old Lahontan (GWh)	8.56	8.58	8.55	8.60	8.59
V-Line Canal (GWh)	2.43	1.48	1.74	1.29	1.71
New Lahontan (GWh)	11.72	10.14	11.52	9.13	10.86
TOTAL	22.71	20.20	21.81	19.02	21.16
Revenue	\$894,700	\$771,800	\$880,600	\$690,300	\$828,600

Source: NSM/BLR Model results and output data

Alternative 4: This Alternative has the greatest effect on energy generation at the Old Lahontan, New Lahontan, and V-Line Canal power plants. These plants would average about 19,000 MWh/year, which amounts to about a 16 percent reduction from the No Action Alternative. *Reduced irrigation demand associated with acquiring water for the wetlands would decrease hydropower generation, and revenues linked to hydropower generation would decrease by about \$204,400/year on average from the baseline conditions under this Maximum Acquisition Alternative.*

Alternative 5: Predicting energy generation and hydropower revenues is speculative under this alternative due to the possible mix of water sources that could be chosen. The Service estimates that there would be reductions in both energy generation and hydropower revenues under this alternative, but use of Middle Carson River corridor water could alter the range of possible reductions. Under one possible scenario, where no Middle Carson River water is acquired, energy generation would be reduced by about 7 percent from the No Action Alternative. As a result, the Service calculates that as much as \$66,100/year in hydropower revenues could potentially be lost under this alternative.

Comparison with No Acquisition Conditions: Compared to no acquisition conditions, energy generation (about 23,000 mega-watt hours/year under NAC) would be reduced by about 8 percent and hydropower revenues (about \$911,500 per year under NAC) would be reduced by about \$82,900 per year, or by about 9 percent, under the Preferred Alternative.

Mitigation Measures

There are a number of mitigation measures that would minimize or compensate for the expected losses in energy generation and associated revenue. These mitigations are listed below by major headings that relate to Newlands Project operations, reimbursements, and new construction.

Newlands Project Operations

Generation priorities at the Old and New Lahontan Power Plants could be switched. This would entail making Lahontan Reservoir releases through the New Lahontan Plant first and then the Old Lahontan Plant secondarily. Since revenues from the New Lahontan Plant are correlated to energy generation (and are not fixed-rate revenues), they could be increased to offset the reduced release volumes. Such a change in priority would require changes in licensing by the Federal Energy Regulatory Commission for the two power plants. The 30-year agreement between Truckee-Carson Irrigation District (TCID) and the Sierra Pacific Power Company governing power generation at the Old Lahontan Plant expires in 1998 and

could provide an opportunity to renegotiate hydropower revenue payments that would offset the expected reductions associated with reduced Lahontan Reservoir releases.

Irrigation delivery patterns for the delivery of water rights acquired for wetlands protection can be changed from the existing agricultural irrigation pattern. Calling for larger percentages of wetland irrigation water in the spring or fall would increase Lahontan Reservoir releases during the periods when hydropower generation capabilities are under utilized. This has the potential to increase energy generation, and if routed through the New Lahontan Power Plant, could increase hydropower revenues. This action would be within the Service's authority, and could effectively mitigate for hydropower losses. Plans to address and evaluate different wetland delivery patterns would be included in the Comprehensive Management Plan for Stillwater NWR that would undergo separate National Environmental Policy Act (NEPA) review.

Refinancing Debt Service Obligations

One indirect effect of reduced energy generation and hydropower revenues is that Newlands Project O&M fees could be increased for Project water-users. One way for the Newlands Project operator to lower O&M costs would be to refinance or partially retire high-interest construction loans on the New Lahontan Plant. This would reduce annual debt-service obligations and payments by the Newlands Project operator that affect O&M costs. Such an action would reduce impacts to lost revenues associated with reduced hydropower, and thereby remove the need for increased O&M fees. However, this mitigation is outside the authority of the Service and would rely upon the decisions and priorities of the Newlands Project operator.

New Construction

Additional or expanded power plants could be built within the affected area or on Newlands Project facilities to increase energy generation. There is limited potential for power plants in different locations, except on the Truckee River at Derby Dam or on the Truckee Canal where water could be diverted, and then dropped back into the river through a power plant. The existing power plants could be rebuilt or expanded to provide more energy generating capacity as well. All of these new construction mitigations would require substantial capital investment in order to offset energy generation and hydropower revenue reductions associated with the Proposed Action and other action alternatives and would take a number of years before there would be net revenue increases. Such mitigations measures are outside of the Service's authority and would most likely require the Secretary of the Interior (Secretary) or an energy contractor (i.e., Sierra Pacific Power) to finance and construct power generating facilities. *Capital costs associated with this potential mitigation measure are expected to be high.*

4.2.7 DERBY DAM AND THE TRUCKEE CANAL

This section describes how Truckee Canal operations would be affected under each of the action alternatives. There are three components to Truckee Canal operations: Truckee Division irrigation diversions, canal losses, and Lahontan Reservoir inflow.

Reduced irrigation demand in the Carson Division under the Proposed Action and other action alternatives would reduce Truckee River diversions to the Newlands Project. However, irrigation deliveries to the Truckee Division would remain unchanged across the action alternatives. Reduced Truckee River diversions are consistent with the objectives of the 1988 OCAP, and would *increase flows to Pyramid Lake*.

Truckee Canal losses are directly linked to groundwater recharge in the Fernley area and other areas adjacent to the canal. Actions that would reduce these canal losses would adversely impact groundwater recharge. Although there is a correlation between canal volume and seepage loss, the Service has insufficient information to calculate such losses for the Proposed Action and the action alternatives. The Service recognizes that decreased flow volumes through the canal would reduce the wetted perimeter (the cross-sectional area of the canal where water makes contact with the canal bottom and banks) and reduce seepage losses. Wetted perimeter is one of the primary components in calculating seepage loss. However the Service has insufficient data to correlate flow volumes to wetted perimeter and seepage losses. Seepage losses are expected to decrease somewhat with reduced Truckee Canal flow volumes. The Service estimates that the wetted perimeter of the canals does not vary substantially with reduced flow volumes, and therefore, seepage losses would remain fairly constant across action alternatives.

Truckee River diversions vary from year to year depending upon Carson River flows. In years when Carson River flows are high, Truckee River diversions are reduced. Conversely, when Carson River flows are low, Truckee River diversions increase. Under **Alternative 1**, the No Action Alternative, the BLR/NSM calculations, using the 92-year hydrologic simulation data, shows that Truckee River diversions range from 32,400 AF/year to a maximum of 271,400 AF/year. Based on this range of diversions, Truckee River diversions are calculated to average about 102,200 AF/year over the long term under baseline conditions of the No Action alternative.

Truckee Division irrigation diversions from the Truckee Canal remain constant and average about 22,500 AF/year under baseline conditions. A comparison of Truckee River diversions for each alternative is depicted below in Table 4.2.G.

TABLE 4.2.G TRUCKEE CANAL DISTRIBUTION OF FLOW

	ALT. 1	ALT. 2	ALT. 3	ALT.4	ALT.5
Truckee River Flow @ Derby Dam (AF)	546,000	546,000	546,000	546,000	546,000
Derby Diversions to Truckee Canal (AF)	102,200	84,400	98,500	77,700	92,000
Truckee Division Irrigation Diversions off Truckee Canal (AF)	22,500	22,500	22,500	22,500	22,500
Inflow to Lahontan (Imports/delivery) (AF)	62,400	46,600	59,000	38,900	53,300

Source: NSM/BLR Model results and output data based on Reclamation (written communication, 1992) water-righted irrigation figures for the Truckee Division.

Alternative 2: Diversions at Derby Dam into the Truckee Canal would result in a long-term average of about 84,400 AF/year under Alternative 2, about 17 percent less than Alternative 1. The highest single-year diversion would be about 254,500 AF, while diversions to the Truckee Division would remain unchanged.

Alternative 3: Diversions at Derby Dam into the Truckee Canal would result in a long-term average of about 98,500 AF/year under Alternative 3, about 4 percent less than the No Action Alternative. The highest single-year diversion would be about 270,800 AF, while diversions to the Truckee Division would remain unchanged. This alternative provides the least benefit to Pyramid Lake fish species because it results in more Truckee River diversions than any of the action alternatives, including the Proposed Action.

Alternative 4: Diversions at Derby Dam into the Truckee Canal would result in a long-term average of about 77,700 AF/year under Alternative 4, about 24 percent less than Alternative 1. The highest single-year diversion would be about 236,800 AF, while diversions to the Truckee Division would remain unchanged. This alternative provides the most benefit to Pyramid Lake fish species because it results in less Truckee River diversions than any of the action alternatives, including the Proposed Action.

Alternative 5: *Under the Preferred Alternative*, Carson Division irrigation demands would be reduced and Truckee River diversions would decrease to about 92,000 AF/year, which amounts to a 10 percent decrease from Alternative 1. The highest single-year diversion is

calculated to be about 266,000 AF. Truckee Division irrigation diversions would remain unchanged under this alternative.

Comparison with No Acquisition Conditions: Compared to no acquisition conditions, Truckee River diversions (about 104,800 AF/year under NAC) would decline by about 12 percent under Alternative 5.

Mitigation Measures

No adverse impacts have been identified for this component of Newlands Project operations, and, therefore, no mitigation is identified.

4.3 EFFECTS ON WATER RESOURCES

4.3.1 SURFACE WATER QUANTITY

This section addresses the impacts of the Proposed Action and other action alternatives on surface water flow in the Lower Truckee River, Middle Carson River, and Carson Division of the Newlands Project. Quantities of water flowing into these areas are determined by upstream snowpack and precipitation, and would continue to be tied to these natural factors under all alternatives. Truckee River flows are controlled by upper watershed reservoir storage and releases that are not affected by the Proposed Action or other action alternatives.

Surface waters that would be impacted (either positively or negatively) by the Proposed Action and other action alternatives include: Lower Truckee River flow volumes, Pyramid Lake levels, Lower Carson River flow volumes, Lahontan Reservoir releases for irrigation in the Carson Division of the Newlands Project, and wetland inflows to the primary wetland habitats.

Surface water volumes and levels for the Proposed Action and alternatives are depicted in Table 4.3.A to show the comparative differences between alternatives and Alternative 1 baseline conditions.

The calculated, long-term average quantities of surface water in the affected area under Alternative 1, No Action baseline conditions are:

- ▶ flows of the Lower Truckee River into Pyramid Lake -- about 448,800 AF/year,
- ▶ pyramid Lake level associated with these calculated inflows would be maintained at an elevation of 3,830 feet above sea level,

- ▶ Carson River flow into Lahontan Reservoir -- about 287,700 AF/year,
- ▶ Lahontan Reservoir releases -- about 250,700 AF/year, and
- ▶ wetland inflows (actual deliveries) to the primary wetland habitat -- 55,100 AF/year (includes delivery of 16,500 AF/year of irrigation water (30 percent of total), 30,000 AF/year of drainwater (54 percent of total), and 8,600 AF/year of spills).

Table 4.3.A SURFACE WATER QUANTITIES

	ALT. 1 Baseline	ALT. 2	ALT. 3	ALT. 4	ALT. 5
Total Wetland Inflow (AF)	55,700	125,000	125,000	125,000	125,000
Irrigation Entitlement (AF)	17,100	102,100	97,700	113,200	62,000
Wetland Drainwater (AF)	30,000	13,000	18,600	0	19,700
Spill to Wetlands (AF)	8,600	10,000	8,700	11,800	9,700
Other Sources (AF)	0	0	0	0	33,600
Lahontan Reservoir Release (AF)	250,700	222,400	245,700	206,300	236,900
Carson River Flow @ Ft. Churchill (AF)	287,700	287,700	287,700	287,700	287,700-297,700
Lower Truckee River Flow (AF)	448,800	465,300	452,200	473,200	458,300
Pyramid Lake Elevation (feet) above sea-level	3,830	3,835	3,830	3,837	3,833

All values depicted in this table represent long-term averages, based on calculations for the 92-year hydrologic simulation and are not actual values. These calculations were developed using a common set of hydrologic and Newlands Project operation criteria. These calculations provide a baseline that allows for comparative analysis of the consequences of the Proposed Action and alternatives.

Alternative 2: Under the Proposed Action to acquire water for wetlands protection, wetland inflows would increase to 125,000 AF/year, comprised of 82 percent irrigation entitlement, 10 percent drainwater, and 8 percent spills. This represents a substantial increase in total wetlands inflow (127 percent increase) over baseline conditions. The acquisition of water rights associated with providing this volume of wetland inflow would decrease Lahontan Reservoir releases by 11 percent from the No Action Alternative. These reductions are associated with reduced irrigation demand due to the 2.99 AF/acre/year use-rate. Carson River inflows to Lahontan Reservoir would remain unchanged from the No Action Alternative. Under the Proposed Action, flow of the Lower Truckee River is calculated to increase by about 4 percent over Alternative 1. Pyramid Lake elevations associated with these calculated inflows would increase by about 5 feet over baseline conditions.

Alternative 3: As with the Proposed Action, this alternative would also increase wetland inflow to 125,000 AF/year on average. Under this alternative, wetland inflow components would change due to the 3.5 AF/acre use-rate for wetland irrigation entitlement. Irrigation entitlement would comprise 78 percent of total inflow, drainwater would account for almost 15 percent, and spills would make up 7 percent of the total wetlands inflow. Due to the higher wetland irrigation use-rate, Lahontan Reservoir releases would not be not affected as much as they would be under the Proposed Action; they would decrease by 2 percent from baseline conditions. Flow of the Lower Truckee River would be least affected by this alternative and is calculated to increase by less than one percent. Pyramid Lake elevations are not calculated to rise under this alternative.

Alternative 4: As with the other action alternatives, total wetland inflow would increase over the No Action Alternative. Unlike the other alternatives, drainwater would not be a component of wetland inflow, and irrigation entitlement would account for more than 90 percent of wetland inflow. The remainder of wetland inflow would come from spills. Because of the high percentage of irrigation water acquired for wetlands protection and application of the 2.99 AF/acre use-rate, Lahontan Reservoir releases would decline the most under this alternative. Calculations indicate that reservoir releases would be decreased by almost 18 percent from the No Action Alternative. The greatest effect on flow in the Lower Truckee River would occur under this alternative, and long-term flow volumes are calculated to increase by more than 5 percent from the No Action Alternative. This long-term increase would raise Pyramid Lake levels by 7 feet over the No Action Alternative.

Alternative 5: Under the *Preferred Alternative*, wetland inflow would be provided by irrigation deliveries, drainwater, and spills, but would also rely on other sources, such as groundwater pumping, sewage effluent, and water right acquisitions in the Middle Carson River corridor to meet the Service's 25,000-acre wetland objective. Due to the various acquisition scenarios that could be developed under this alternative, quantities of some water sources are approximations. *Under this alternative*, irrigation entitlements would

make up about 50 percent of the wetland inflow, drainwater would comprise about 16 percent, spills would provide about 8 percent, and a combination of other sources (leased water rights, groundwater pumping, sewage effluent and acquired water rights from the Middle Carson River corridor) would provide *approximately* 26 percent of wetlands inflows.

Under this alternative, Lahontan Reservoir releases would decline from Alternative 1, but due to the potential passage of acquired Middle Carson River water rights through the Newlands Project facilities, a range of Lahontan releases could result. Under this alternative, Carson River inflows to Lahontan Reservoir (measured at Fort Churchill gage) could increase, depending upon how many water rights were acquired in the Middle Carson River corridor. Under this alternative, flows in the Lower Truckee River would increase by about 2 percent over the No Action Alternative, depending upon which wetland irrigation use-rate was applied. Based on these calculated Truckee River flows, it is estimated that over the long term, average Pyramid Lake levels would be as much as 3 feet higher than the No Action Alternative.

Comparison with No Acquisition Conditions: Compared to no acquisition conditions, the extent of impacts would be similar to the extent of impacts as compared to the No Action Alternative, as described above.

Mitigation Measures

No adverse impacts to surface water quantity is identified, therefore no mitigation is assessed for this element.

4.3.2 SURFACE WATER QUALITY

With the exception of the primary wetland areas within Lahontan Valley, surface water quality within the affected area is expected to be unchanged as a result of the Proposed Action and other action alternatives. The Service has no indication that surface water quality in the affected area would be adversely impacted from its Proposed Action or action alternatives.

In the primary wetland areas, the infusion of higher proportions of irrigation water would improve water quality over existing and baseline conditions. The quality of spill water is generally higher or equal to irrigation water quality and therefore is not expected to cause adverse impacts to surface waters flowing into these areas.

Adverse water quality conditions associated with the flooding of playa wetlands such as the Carson Sink would not be affected by the Service's Proposed Action or other action alternatives. Since these conditions are not affected by the acquisition of water rights, this

environmental impact statement (EIS) does not address the water quality impacts associated with flooding, nor are any mitigation measures identified for this component.

Recent studies (Kerley and others, 1993) calculate that dissolved-solids concentrations in drainwater average about 1,170 mg/L. Total dissolved-solids concentrations in irrigation water averages about 240 mg/L (Lico, 1992). (See Section 3.3.2, SURFACE WATER QUALITY, Drainwater Quality.) Using these concentrations as **Alternative 1** baseline assumptions, the Service has calculated a weighted average for total dissolved-solids concentrations of surface water inflows for each of the alternatives. The weighted average is calculated using a ratio of irrigation water to drainwater for each of the alternatives. This information is used to provide a relative comparison of the each of the action alternatives to Alternative 1, the No Action baseline condition.

Alternative 2: Water quality in the primary wetland habitats would improve due to the delivery of acquired irrigation water that would be available for wetland management. Under the Proposed Action, irrigation deliveries would constitute about 82 percent of the total wetland inflow. Drainwater inflow would be reduced to 10 percent of the total inflow (as compared to 54 percent under the No Action Alternative). Based on the mix of irrigation and drainwater that would result from this alternative, total dissolved-solids concentration levels would be reduced by about 54 percent from baseline conditions. This reduction in total dissolved-solids concentrations would offer a high level of benefit to wetland water quality inflow over baseline conditions.

There is a known correlation between total dissolved-solids concentrations and concentrations of contaminants such as arsenic, boron, selenium, mercury, sodium, and chlorides (Hoffman, 1994, and Tuttle, written communication, 1994). Therefore, the Service believes that concentrations of these contaminants would be reduced as total dissolved-concentrations are reduced. However, there is insufficient information to determine the relative magnitude of the reductions in concentrations of the contaminants of concern (arsenic, boron, selenium, and mercury) for each of the action alternatives. The Service has insufficient data to determine whether mercury concentrations would be affected by the increase in irrigation water delivered under the Proposed Action.

Alternative 3: As with the Proposed Action, water quality in the primary wetland habitats would improve with increased volumes of irrigation water. Under this alternative, irrigation deliveries would constitute about 78 percent of the total wetland inflow. Drainwater inflow would be reduced to 15 percent of the total inflow (as compared to 54 percent under the No Action Alternative). Based on the mix of irrigation and drainwater that would result from this alternative, total dissolved-solids concentration levels would be reduced by about 47 percent from the No Action Alternative. This reduction in total dissolved-solids

concentrations would offer a high level of benefit to wetland water quality inflow over baseline conditions.

The effects on contaminant concentrations would be similar to that described under the Proposed Action.

Alternative 4: Under this alternative, drainwater would not be used for wetlands protection, and would be segregated from primary wetland habitats. Non-use of drainwater would greatly increase the quality of wetland surface water inflows. This alternative offers the highest quality wetland inflow of all the alternatives, which the Service believes would offer the most benefit to aquatic life and wetlands habitat in the designated Lahontan Valley wetlands. Irrigation deliveries would constitute about 90 percent of the total wetland inflow. Total dissolved-solids concentration levels would be reduced by about 64 percent from the No Action Alternative. This reduction in total dissolved-solids offers a very high level of benefit to wetland water quality inflow over baseline conditions.

The effects on contaminant concentrations are expected to be similar to that described under the Proposed Action.

Alternative 5: Under the *Preferred Alternative*, wetland inflow would be provided by irrigation deliveries, drainwater, and spills, but would also consist of other sources, such as groundwater pumping, and acquisition in the Middle Carson River corridor to meet the 25,000-acre wetland objective. *Groundwater could be used to the extent that it does not adversely impact the quality of wetland inflow as compared to baseline conditions.*

Groundwater in the Carson Lake and Stillwater NWR area where pumping may occur is of poor quality (Maurer and others, 1994). Groundwater total dissolved-solids concentrations from wells in Stillwater NWR area range from 4,000 mg/L to 8,000 mg/L (Maurer and others, 1994), which is four to eight times worse than drainwater inflow to the wetlands. A well site 2 miles north of Carson Lake showed total dissolved-solids concentrations of 1,000 mg/L (ibid).

Using these values, the Service incorporated groundwater quality into its total dissolved-solids weighted averages to determine the effects of groundwater on overall water quality of this alternative. For example, if groundwater pumping provides only 6 percent of the total wetland inflow, and irrigation water, Middle Carson River water rights, conserved Navy water, and leasing comprise 70 percent of the total wetland inflow, water quality would be comparable to the No Action Alternative. If an acquisition strategy is implemented in which groundwater comprises 10 percent of the total wetland inflow, water quality would be lower than that of the No Action Alternative based on relative comparisons of total dissolved-solids concentrations. *Because most of the inflow of water into the wetlands would be comprised of irrigation water (including leased water and water from the Middle Carson*

River), at least some groundwater could be used without adversely impacting water quality. However, to improve water quality over baseline conditions, use of groundwater would be minimized.

Under this alternative, adverse effects associated with contaminant concentrations are expected to be higher than those described for the Proposed Action, due to the use of groundwater. Groundwater in the Stillwater NWR area has been shown to have contaminant levels of arsenic that are comparable to, or higher than, drainwater (Hoffman, 1994).

Comparison to No Acquisition Conditions: *Similar comparisons can be made with no acquisition conditions to assess the overall impacts of the water-rights acquisition program under Alternative 5. If groundwater inflow averages less than 6,000 mg/L of total dissolved solids, it is estimated that water quality in the primary wetlands receiving up to 13,000 AF of groundwater in any given year (about 10 percent of wetland inflow) would approximate water quality under no acquisition conditions, assuming that the groundwater is mixed with about at least 92,000 AF of irrigation and spill water and about 19,700 AF of drainwater. If groundwater is limited to 6 percent of total wetland inflow as described in the previous paragraph, it is estimated that water quality anticipated to occur as a result of the Preferred Alternative would be better than that which would occur under no acquisition conditions.*

Measures to Improve Drainwater Quality

No adverse impacts from drainwater inflow above that which would occur under baseline conditions would be expected under any of the alternatives. Adverse impacts from drainwater would decline under all of the action alternatives. Nevertheless, due to water quality concerns, several measures were identified that would improve the quality of drainwater inflow into the primary wetlands. Improving drainwater quality over existing conditions would benefit the primary wetlands under Alternatives 1, 2, 3, and 5.

(Alternative 4 precludes use of drainwater for wetland management.) Eliminating or closing drains that are known to produce poor quality water, such as TJ Drain, would reduce the impacts associated with poor quality drainwater reaching the primary wetland habitats. Structural improvements could be made to prevent groundwater seepage, an identified source of contaminants, from entering the deeper drains. Drainwater could be diluted by adding better quality water, a process which occurs as a consequence of the Proposed Action and Alternatives 3 and 5.

Implementation of measures recommended by the Department of the Interior's National Irrigation Water Quality Program (U.S. Depart. of the Interior, 1985, Phases II and III, (Phase

IV in progress)) to improve drainwater quality would reduce the adverse effects associated with use of drainwater for wetlands protection. The Service, as a participant in the ongoing program, is committed to enacting those recommendations within its authority. Eliminating drains can be accomplished by retiring the irrigated lands adjacent to problem drains. One method to retire irrigated lands would be to enact an acquisition strategy that would focus wetland water right acquisitions in irrigated areas where poor quality drainwater occurs. Currently, there is insufficient data to identify those irrigated lands contributing to drainwater quality problems. The Service does not expect Phase IV of the NIWQP Drainwater Study to be completed before the Service begins its proposed acquisition program. For these reasons, this *action* is not expected to occur in the near future. Over the long term, however, it could be implemented.

Mitigation Measures

For Alternative 5, potential water quality impacts associated with use of groundwater for wetlands protection can be mitigated by reducing reliance on groundwater, or by locating wells in areas where better quality water *exists*. *If less than about 6 percent groundwater is used or if no use of groundwater is made to supplement wetland inflows, it is estimated that degradation of water quality of wetland inflow would not occur -- water quality of wells would be tested initially and monitored to ensure that water quality of wetland inflow would not be impacted by using groundwater.* In effect, this mitigation would constrain the scope of the alternative by limiting or eliminating groundwater use. This would avoid the possible adverse effects associated with greater reliance on groundwater for wetland protection. This mitigation can be implemented under the framework of Alternative 5 by placing more reliance on acquiring water from other sources, such as acquisition of Middle Carson River corridor water rights, or increased leasing.

Locating wells closer to the City of Fallon, or on the west side of the Carson Division of the Newlands Project could potentially provide better quality water for wetlands protection. The intermediate aquifer north and northwest of Fallon has total dissolved-solids concentrations that range from 100 mg/L to 1,000 mg/L, which is comparable to water quality that would result under the other action alternatives.

However, down-gradient groundwater-users would be adversely impacted by groundwater pumping in this area, which encompasses most Churchill County water-users. In addition, pumping in the recharge zones of the intermediate aquifer west and northwest of Fallon would most likely affect recharge of the basalt aquifer which provides water for the City of Fallon, the Fallon Naval Air Station (NAS-Fallon), and the Fallon Paiute-Shoshone Tribes. Because of the many potential adverse impacts associated with locating wells in these areas, it is unlikely that the Service would choose to implement such mitigation.

4.3.3 GROUNDWATER

The Service identified groundwater recharge and levels, and the corresponding domestic supply to be the elements of groundwater that could potentially be impacted by the Service's Proposed Action and other action alternatives. Because groundwater resources are in distinct hydrologic basins, the impacts associated with them are described separately below. **Alternative 1** baseline conditions for groundwater are presented in Chapter 3.

4.3.3.1 Groundwater Recharge and levels

Middle Carson River Area

Alternative 2,3, and 4: The Proposed Action and Alternatives 3 and 4 would not adversely affect groundwater resources in this area. Increased storage in Lahontan Reservoir may act to raise groundwater levels in the Silver Springs area, which would benefit groundwater resources. No adverse impacts to groundwater resources are expected under these alternatives as compared to baseline conditions.

Alternative 5: Under the *Preferred Alternative*, the Service expects to acquire and transfer some surface water rights from the Middle Carson River corridor between Lahontan Reservoir and Dayton. Groundwater levels and recharge in this area would not be affected by water rights acquisitions, as recharge in the area comes from nearby mountainous areas or upstream alluvial basins. No adverse impacts to groundwater resources or domestic supply were identified for this resource in this area.

Comparison to No Acquisition Conditions: No adverse impacts to groundwater resources or domestic supply, as compared to no acquisition conditions were identified.

Fernley and the Lower Truckee River Area

Groundwater levels and recharge of the Fernley basin aquifers is directly linked to Truckee Canal seepage losses, irrigation canal losses, and agricultural irrigation. Neither the Proposed Action nor the other action alternatives *would* result in a direct reduction in these recharge components.

Alternatives 2-5 *Although the volume of Truckee River water diverted into the Truckee Canal will be reduced under these alternatives, overall seepage losses are not expected to decline significantly because the wetted surface of the canal would remain relatively constant due to the water levels that would be necessary to make irrigation deliveries to head gates. Consequently, groundwater levels are not*

expected to be significantly adversely impacted, as compared to the No Action Alternative.

Comparison with No Acquisition Conditions: Groundwater levels are not expected to be significantly adversely impacted as compared to no acquisition conditions.

Fallon and Lahontan Valley

The most direct impacts on groundwater levels and recharge as a result of the Proposed Action and other alternatives are expected to occur in the shallow aquifer in this area. Shallow aquifer recharge could potentially be impacted by the *action alternatives*, and as a result, recharge of the intermediate and basalt aquifers could be affected. The Service does not expect that any of the alternatives would impact the deep volcanic aquifers, as recharge in the deeper aquifer does not appear to be directly linked to irrigation losses.

Taking farmland out of production under some of the action alternatives could cause the water level of the shallow aquifer to decline in affected areas. While the magnitude of the impacts cannot be determined given the available data on groundwater-irrigation relationships and because the pattern of water rights acquisitions are not known at this time, some generalizations can be made. Maurer and others (1994) was used as the basis for the following discussion (this paragraph and the following paragraph; see also Section 3.3.3.1.2). Assuming that all major canals would continue to be used to convey water, impacts to shallow aquifer recharge would result from changes in seepage from secondary canals and laterals, and changes in recharge below irrigated fields. In areas where laterals are no longer used to convey water, the shallow aquifer would likely decline due to the cessation of seepage losses in the local area where laterals are abandoned (assuming that the laterals are currently unlined). Quantitative information is unavailable to enumerate potential impacts. Impacts would not be as severe as those that would occur as a result of abandoning a major canal, which could result in a decline of the shallow aquifer to more than 10 feet below the land surface within 1-2 miles of the canal. It is not expected that the abandonment of laterals would approach this level of impact.

Changes in the water level of the shallow aquifer resulting from discontinuing the irrigation of farm fields (not including abandonment of laterals, which was described above) would depend on the difference between the amount of water applied to the fields and the consumptive use of the crop. If, under baseline conditions, the amount of water applied to irrigated fields equals the amount consumed by crops,

the net effect of removing land from production, in terms of losses from field irrigation, would be zero. Recognizing that seepage losses from laterals (for those that are unlined under baseline conditions) could be reduced or eliminated, water levels beneath vacated fields would likely decline. If, under baseline conditions, the amount of water applied to irrigated fields is less than the amount consumed by crops (i.e., the shallow aquifer is contributing to the consumptive use), the net effect of removing land from production would be a temporary rise in the shallow aquifer in the immediate area, assuming that laterals continued to convey water. Recognizing, however, that laterals would be abandoned in many situations as farmland is taken out of production, the hypothetical rise in the shallow aquifer would likely not occur. It appears that consumptive use by crops in the Lahontan Valley exceeds the amount of water applied to the crops, suggesting that the shallow aquifer supplies water to crops in the valley. If, under baseline conditions, the amount of water applied to fields exceeds the consumptive use of the crops, the shallow aquifer would decline. The decline in the shallow aquifer would be exacerbated under this scenario by laterals being abandoned in the same areas. The amount of decline under all of the above hypothetical situations would depend on the distance to other unlined supply canals that continue to convey irrigation water. As distance to major canals increase, impacts would be more pronounced, especially at distances over 1-2 miles.

Based on the relationship between drainwater outflow from the Carson Division and groundwater recharge (See Section 3.3.3.1.2, Groundwater Recharge) the Service estimates that total potential recharge volumes (conveyance losses plus on-farm losses) would have to drop below 70,000 AF/year before the shallow aquifer levels valley-wide would be impacted. The Service relied on BLR Model calculations to develop potential total recharge volumes for a long-term average. These calculations apply a common set of assumptions for Project operations to the 92-year hydrologic simulation data set. These calculations provide a comparison of the alternatives.

Under **Alternative 1**, total potential recharge (123,300 AF/year) is comprised of 80,600 AF of water from conveyance losses, and 42,700 AF/year results from on-farm losses. These figures represent long-term calculated averages that rely on the 92-year hydrologic simulation data. In 1992 (an extreme drought year, when irrigation deliveries amounted to 28 percent of full entitlement), the total potential recharge was estimated by the Service to range from 55,000 AF (Maurer and others, 1994) to about 68,500 AF. *As a result of the drought, median water levels in 10 shallow-aquifer wells in the valley declined by 1.35 feet between 1988 and 1992 (Seiler and Allander, 1993).*

Alternative 2: Under the Proposed Action, Carson Division irrigation delivery losses (canal seepage), irrigated acres and related on-farm losses would be reduced. These are key factors that affect groundwater recharge. *According to BLR Model output, it is estimated that, under this alternative, conveyance losses would be reduced by about 22 percent from that of the No Action Alternative, and on-farm losses would be reduced by as much as 62 percent.* Total potential recharge would be as much as 79,000 AF/year on average, based on these calculations. This volume constitutes about a 36 percent reduction in total recharge from the No Action Alternative. This recharge volume would most likely maintain groundwater levels in the shallow and intermediate aquifers near baseline conditions. The Service does not expect any widespread impacts to groundwater levels in the shallow and intermediate aquifers as a result of reduced recharge volumes, but some domestic water users could be affected.

The Service anticipates that as a result of transferring water rights from farmlands to wetlands, on-farm losses isolated areas would be eliminated. This has the potential to adversely impact adjacent water wells, particularly if the wells tap only the shallow aquifer. If the recharge in a specific area is linked solely to on-farm irrigation losses, then such wells would experience a drop in water levels. Some shallow wells that rely upon on-farm losses may go dry. These adverse impacts can and most likely would occur in some isolated cases, but there is no indication that such occurrences would be widespread or regional.

The reduced total recharge volume to the shallow aquifer has the potential to impact basalt aquifer recharge (see Section 3.3.3.1.2 Groundwater Recharge, Basalt Aquifer for information on recharge pathways). This potential would be highest in areas immediately above the basalt aquifer. For example, if the Service purchased water rights from farmland located above the basalt aquifer (Figure 3.3.F) and assuming that this land did not return to agricultural production in the near future, the purchase of water rights in this instance could potentially adversely impact basalt aquifer recharge. There is insufficient information to determine the extent or magnitude of the impacts of the Service's Proposed Action upon this resource. Some moderate impacts would most likely occur as the Service's action and other cumulative factors come into effect (see Section 4.26.12, CUMULATIVE EFFECTS, GROWTH AND DIVERSIFICATION).

Alternative 3: Under this alternative, Carson Division irrigation delivery losses (canal seepage), irrigated acres and related on-farm losses would decline as compared to the Proposed Action, but would remain key factors affecting groundwater recharge. Under this alternative, *it is estimated that* conveyance losses would be reduced by about 11 percent from the No Action Alternative, and on-farm losses would be

reduced by as much as 49 percent. Total potential recharge would be as high as 93,000 AF/year on average, based on these calculations. This volume constitutes about a 25 percent reduction in total recharge from the No Action Alternative. This volume of potential total recharge is considered to be sufficient to maintain baseline groundwater levels in the shallow and intermediate aquifers. The Service does not expect any widespread impacts to groundwater levels as a result of reduced recharge volumes, but a few isolated domestic water users could be affected.

Similar to the Proposed Action, reductions in on-farm losses and declining water levels in wells adjacent to acquisition areas would occur under this alternative. However, fewer wells are expected to be impacted as more irrigated acres of farmland are expected to remain under this alternative, and on-farm losses would not be reduced to the extent that would occur under the Proposed Action. As with the Proposed Action, some shallow wells that rely upon on-farm losses may go dry. These adverse impacts can and most likely would occur in some isolated cases, but there is no indication that such occurrences would be widespread or regional.

Impacts to the basalt aquifer are expected to be similar to that described for the Proposed Action. Because more total recharge potential is anticipated, the impacts are expected to be slightly less than the Proposed Action.

Alternative 4: Under this alternative, Carson Division irrigation delivery losses (canal seepage), irrigated acres and related on-farm losses are reduced to the greatest extent of all alternatives. *It is estimated* that conveyance losses would be reduced by about 41 percent from the No Action Alternative, and on-farm losses would be reduced by as much as 69 percent. Total potential recharge would be as high as 60,500 AF/year on average, based on these calculations. This volume constitutes about a 49 percent reduction in total recharge from the No Action alternative. This volume of potential total recharge would be decreased to the extent that groundwater levels in the shallow and intermediate aquifer could decline by 1-2 feet, *similar to the decline that occurred during a period of drought between 1988 and 1992 (see Section 3.3.3.1.2 Groundwater Recharge, Shallow Aquifer)*. Due to the duration of such reductions, groundwater impacts might occur on a more widespread basis and could be more severe than what would occur under Alternatives 2 and 3.

Reductions in on-farm losses would be greatest under this alternative, and therefore, there is the potential for more wells that rely upon on-farm losses to go dry. These adverse impacts would most likely occur in some isolated cases, and there is potential for such occurrences to become more widespread over the long term.

Impacts to the basalt aquifer would potentially be highest under this alternative, as total recharge potential would be lowest as compared to the other alternatives.

There is insufficient information to determine if this alternative alone would cause basalt aquifer levels to drop. However, the Service expects that some moderate impacts would probably occur as this alternative and other cumulative factors come into effect (see Section 4.26.12, CUMULATIVE IMPACTS, GROWTH AND DIVERSIFICATION).

Alternative 5: Under this alternative, Carson Division irrigation delivery losses (canal seepage); irrigated acres and related on-farm losses would be very similar to those that would occur under Alternative 3. *Based on BLR Model calculations, it is estimated that conveyance losses would be reduced by about 10 percent from the No Action Alternative, and on-farm losses would be reduced by as much as about 45 percent. Total potential recharge would be as high as 96,600 AF/year on average, based on BLR Model calculations. This represents a 22 percent reduction in total recharge volumes as compared to the baseline. This recharge volume would most likely not result in significant changes in groundwater levels in the shallow and intermediate aquifers as compared to baseline conditions. It is expected that all major canals would continue to convey water as well as most secondary canals, which should result in sufficient shallow aquifer recharge. The Service does not expect any widespread impacts to groundwater levels in the shallow and intermediate aquifers as a result of reduced recharge volumes, but some domestic water users could be affected.*

As compared to the other action alternatives, this alternative would result in the least reduction in on-farm losses, as agricultural water right acquisitions would be less than those of the other action alternatives. As a result, this alternative also would have the least potential to impact individual domestic wells. The Service expects that a few wells that rely on canal or on-farm losses for recharge would go dry or that these wells would have to be deepened. These adverse impacts would most likely occur in a few isolated cases, but there is no indication that such occurrences would be widespread or regional.

Impacts to the basalt aquifer are expected to be similar to those described for the Proposed Action and Alternative 3. *However, because the total recharge potential would be higher under this alternative as compared to the other action alternatives, the impacts are anticipated to be slightly less than what would occur under the Proposed Action. The potential to impact basalt aquifer recharge would be highest in areas immediately above the basalt aquifer. For example, if the Service purchased water rights (from willing sellers) from farmland located above the basalt aquifer (Figure 3.3.F) and assuming that this land did not return to agricultural production in*

the near future, the purchase of water rights in this instance could potentially adversely impact basalt aquifer recharge.

Because groundwater pumping would occur in wells located in the discharge zone of the shallow and intermediate aquifers (Figure 3.3.F) and to the east of the basalt aquifer outside of any potential recharge areas of the basalt aquifer, the Service expects there would be little or no impact to groundwater-users in western and west-central part of the Lahontan Valley (no impacts to the basalt aquifer would be expected due to groundwater pumping). Due to the cone of depression effect, groundwater pumping could cause water-level declines in the shallow and intermediate aquifers in the area where the pumping would occur.

***Comparison to No Acquisition Conditions:** As compared to no acquisition conditions, conveyance losses (about 82,000 AF/year under NAC) would be reduced by about 11 percent and on-farm losses (about 48,000 AF/year under NAC) would be reduced by as much as about 50 percent under the Preferred Alternative, including the 20,000 AF acquisition program. There would be an estimated 26 percent reduction in total recharge volumes as compared to the no acquisition conditions (about 130,000 AF/year). This recharge volume is not expected to result in significant changes in groundwater levels in the shallow and intermediate aquifers as compared to baseline conditions. The Service does not expect any widespread impacts to groundwater levels in the shallow and intermediate aquifers as a result of reduced recharge volumes, but some domestic water users could be affected. Adverse impacts due to groundwater pumping on the east side of the Lahontan Valley would not be expected to adversely impact groundwater users in other parts of the Lahontan Valley, except in the immediate vicinity of the pumping, as compared to no acquisition conditions.*

Mitigation Measures

Maintaining Newlands Project losses (i.e., keeping Newlands Project irrigation delivery efficiency rates at their current levels), including canal seepage and on-farm losses, would act to mitigate the impacts associated with reduced total potential recharge volumes that could potentially result from the Proposed Action and other action alternatives. By increasing Lahontan Reservoir releases, and eliminating OCAP irrigation delivery efficiency targets, a condition would result in which conveyance losses could be maintained at levels comparable to baseline conditions. As a result of such mitigation, total potential recharge volumes for Lahontan Valley aquifers would not be affected by the Service's actions. However, the Service considers this mitigation neither reasonable nor feasible because it fails to comply

with the Service's obligations to comply with the 1988 OCAP, various court decrees, and the Endangered Species Act (as it would probably increase Truckee River diversions over existing conditions, which would adversely impact Pyramid Lake fish species). These obligations are set forth in Public Law 101-618, relative to the Service's actions for wetlands protection.

Another measure that could be used to mitigate any adverse impacts to groundwater recharge would be to convey acquired water to the primary wetlands using the Carson River channel. Another potential mitigation measure to consider for protecting existing recharge pathways would be to restrict or prohibit water right acquisitions in the areas in Lahontan Valley where the shallow and intermediate aquifers are recharged by on-farm losses, especially in areas where there is evidence that basalt aquifer is recharged by shallow and intermediate aquifers; i.e., immediately above the basalt aquifer. Figure 3.3.F depicts the general area in Lahontan Valley where there is potential for downward flow from the shallow to the intermediate aquifer. Maintaining on-farm losses in this areas would minimize impacts in this "recharge zone." Protective restrictions or targeting of agricultural lands to keep such lands irrigated to protect this "recharge zone" can be implemented with traditional zoning or could be incorporated into the Service's acquisition strategy. A commitment by the Service to incorporate such targeting in its acquisition strategy may not mitigate impacts to groundwater recharge if no other actions are taken to prevent conversion of irrigated agricultural lands to other land uses. For instance, the loss of agricultural irrigation in the recharge zone due to residential, industrial and commercial development could continue to occur and adversely impact groundwater recharge regardless of the Service's self-imposed acquisition restrictions in the area. Therefore, this mitigation would be ineffective without compatible County zoning restrictions to parallel the Service's own acquisition restrictions. This mitigation cannot be fully implemented by the Service alone, and would require the cooperative involvement of Churchill County.

Please refer to the mitigation section under Section 4.3.3.2 Domestic Supply, below, for additional mitigation measures that pertain directly to potential impacts to domestic water supplies.

4.3.3.2 Domestic Supply

Within the affected area, domestic water supplies rely on groundwater resources. Groundwater levels, water quality and recharge are key factors that affect the use of groundwater resources for domestic supply.

Middle Carson River Area

Alternatives 2, 3, and 4: Groundwater resources are not expected to be adversely impacted under these alternatives. Therefore, domestic supply would not be affected.

Alternative 5: Under the *Preferred* Alternative, the Service expects to acquire and transfer some surface water rights from the Middle Carson River corridor between Lahontan Reservoir and Dayton. This action could potentially benefit domestic wells adjacent to the Carson River. Groundwater resources are not expected to be adversely impacted under this alternative. Therefore, the domestic supply would not be affected.

Comparison to No Acquisition Conditions: Groundwater resources are not expected to be adversely impacted under this alternative, and, therefore, domestic supply would not be affected.

Fernley and Lower Truckee River Area

As discussed above in Groundwater Resources, groundwater levels and recharge of the Fernley basin aquifer are directly linked to Truckee Canal seepage losses, irrigation canal losses, and agricultural irrigation. Similarly, domestic supply in the Fernley area relies on these losses for groundwater recharge.

Alternatives 2,3,4, and 5: Under these alternatives, the Service does not expect seepage losses would be reduced to the extent that groundwater levels would decline. While there would be reductions in seepage losses that recharge the Fernley basin aquifer, these reductions are not expected to be of sufficient volume so as to adversely affect domestic supply.

Comparison to No Acquisition Conditions: As compared to baseline conditions, no adverse impacts would be expected as compared to no acquisition conditions.

Fallon and Lahontan Valley

Most Churchill County residents rely on either the shallow or intermediate aquifers for their domestic water supplies. The recharge pathways for both aquifers are directly linked to Newlands Project canal seepage and on-farm irrigation losses. Residents in the City of Fallon, at NAS-Fallon, and the Fallon Paiute-Shoshone Reservation rely on groundwater pumped from the basalt aquifer.

The Proposed Action and other action alternatives would reduce the total potential groundwater recharge in Lahontan Valley by reducing canal seepage volumes and on-farm losses. While the Service has attempted to evaluate the relative impacts of reduced total potential recharge, there is little data or information to analytically define how these effects would ultimately impact groundwater levels and domestic supply in Lahontan Valley.

Alternative 2: The Service does not expect the shallow, intermediate, or basalt aquifer levels to decline valley wide as a result of the reduced total potential recharge. Because the shallow aquifer is discontinuous, uniform lateral recharge does not occur. There are pockets in the shallow aquifer that are recharged by localized sources, such as canals and irrigated farmland. Therefore, some individual wells in isolated pockets that are directly recharged by seepage losses would experience declining groundwater levels under this alternative.

Declining groundwater levels would not necessarily cause adverse impacts to the domestic water supply in Lahontan Valley. The Service expects that some individual wells (due to factors addressed above) may experience substantial declines in the shallow water table, causing wells to go dry. These impacts may be temporary, or they may be permanent. The Service does not anticipate that wells that permanently go dry would be prevalent and widespread under the Proposed Action.

Basalt aquifer recharge could be reduced under this alternative as a result of reduced shallow and intermediate aquifer recharge. Whether such reductions would be of a magnitude that would adversely impact the groundwater levels of the basalt aquifer or domestic supply is unknown. Under existing conditions, groundwater levels in the basalt aquifer are declining, and may be attributable to increased pumping (Maurer and others, 1994). The Service expects groundwater pumping to continue and probably increase in response to growth and expanded service by NAS-Fallon and the Fallon Paiute-Shoshone Tribe. These actions could induce basalt aquifer recharge (Figure 4.3 Basalt Aquifer Pumping and Recharge Relationships) from the shallow aquifer. For this reason, the Service does not expect that its actions alone would adversely impact domestic supply from the basalt aquifer.

Alternative 3: Under this alternative, total potential recharge would be least affected compared to the No Action Alternative. For this reason, the potential for adverse impacts to domestic supply would be less than the other action alternatives, but the effects on individual domestic supply wells is expected to be similar to those conditions described under the Proposed Action. As with the Proposed Action, some individual wells have the potential to go dry, either on a temporary basis or under the worst case, permanently.

Effects on domestic supply from the basalt aquifer are expected to be similar to those conditions described under the Proposed Action. The Service does not expect that its actions alone would adversely impact domestic supply from the basalt aquifer under this alternative.

Alternative 4: Under this alternative, total potential recharge is reduced to the greatest extent compared to the No Action Alternative. The Service estimates, that conditions associated with groundwater recharge under this alternative would result in valley-wide declines in the shallow and intermediate aquifer levels. Such declines are expected to be similar to conditions that occurred during the 1992 drought when shallow aquifer levels dropped by 1-2 feet in the majority of wells throughout the Lahontan Valley (Seiler and Allander, 1993). Declining aquifer levels may impact more individual wells providing domestic supply under this Alternative than what is expected under the Proposed Action and other action alternatives. Whether these expected impacts to the shallow and intermediate aquifers would cause substantial numbers of individual wells to dry up permanently is unknown. But to an individual whose well goes dry, such impacts, while not widespread, could be severe.

Effects on domestic supply from the basalt aquifer are expected to be similar to those conditions described under the Proposed Action. While there are greater reductions in total potential recharge under this alternative, the extent of these reductions alone may not adversely impact domestic supply from the basalt aquifer. This alternative would result in the greatest potential for adverse impacts to basalt aquifer recharge of all the action alternatives.

Alternative 5: Under this alternative, because the effects on total potential recharge and aquifer levels is very similar to conditions that would occur under Alternative 3, the Service expects the impacts to the shallow and intermediate aquifers would be very similar. Impacts to domestic supply would occur to individual wells in isolated cases where local recharge pathways were eliminated or severely reduced.

As with conditions affecting the shallow and intermediate aquifers, the basalt aquifer would be affected similarly to those conditions identified under alternative 3. The Service would not anticipate adverse impacts to basalt aquifer domestic supply under this alternative.

***Comparison to No Acquisition Conditions:** Potential impacts, as compared to no acquisition conditions, would be similar to those as compared to baseline conditions, above.*

Mitigation Measures

The Service has not identified potential adverse impacts related to domestic supply in the Middle Carson River Area or the Fernley and Lower Truckee Area as a result of the Proposed Action and other action alternatives. Therefore, the Service's *discussion of* mitigation measures is applicable specifically to the Lahontan Valley, where adverse impacts *could* potentially occur.

Injection

Groundwater recharge protection or preservation, as described in the mitigation component of Section 4.3.3.1, Groundwater Recharge and Levels, offers an indirect method to mitigate potential impacts to groundwater water resources that supply domestic water users. Another method to ensure that groundwater recharge would occur, would be to inject surface water into the aquifers where recharge is insufficient to meet domestic supply demands. Based on the Service's knowledge of the different Lahontan Valley aquifers, the basalt aquifer would be the most suitable aquifer for such action due to its confined, cone-like structure and relatively small lateral area. Water injection would be accomplished by drilling wells into the basalt aquifer and pumping surface water into the aquifer to ensure recharge. This would require permits and approval from the Nevada Department of Environmental Protection and State Engineer to prevent such actions from impacting other groundwater users and to protect groundwater quality.

Countywide municipal water system

Development of a countywide municipal water system would provide more direct mitigation, in that it would provide a reliable source of potable water directly to a majority of residents in Lahontan Valley. Such mitigation could eliminate the dependency of Churchill County residents on poorer quality, less reliable groundwater supplies for their domestic supply. This mitigation would compensate for any possible impacts to the groundwater levels and recharge that may potentially occur under any of the alternatives.

Development of a countywide municipal supply system was studied by Churchill County in 1977 and a revised feasibility study was developed in 1994. Based on current residential use-rates¹ and the present County population (19,850), the

¹ The City of Fallon has metered water use at 250 gallons/day (Lahontan Valley News, Jan. 7, 1994) for city residents. The Service calculated a maximum use rate for the entire county to be 600 gallons/day per person based on the maximum annual groundwater withdrawal (1,800 gallons/day or 2.0 AF/year) permitted by the Nevada State Engineer for domestic supply wells.

Service calculates the total County water demand *is* about 5,600 AF/year. Future water demand, using Churchill County's projected 2010 population of about 36,600 (including the City of Fallon, Fallon Paiute-Shoshone Indian Tribes, and the NAS-Fallon water-users), is calculated to be about 10,250 AF/year. The Service uses a total figure of 12,000 AF/year to provide some water for possible future industrial demand. These figures are based on per-capita water use where domestic water consumption is metered. Generally, water consumption in areas were use in unmetered, per-capita water use is higher. Another approach to minimize per-capita water use is to implement mandatory water conservation programs that install water-saving fixtures in houses, restrict landscape watering, or require xeriscape (drought resistant) landscaping.

In order for a municipal supply system to be feasible, the Service estimates that agreements and facilities would have to be developed to store or make available about 12,000 AF/year for municipal supply. This could be achieved by using water-banking and storing water in Lahontan Reservoir. Such storage could augment current groundwater pumping from the basalt aquifer. Water stored in Lahontan Reservoir could be delivered by gravity flow if the treatment and diversion facilities were constructed at or near Lahontan Dam. Such mitigation would require the acquisition of about 9,000 AF/year of water if basalt aquifer pumping continued at present rates or about 12,000 AF/year if existing water-users that rely on the basalt aquifer were converted to surface water domestic supply.

Additional water would be required in order to implement either of these mitigation measures (injection or countywide municipal water system). Water could be acquired by purchasing surface water rights from private owners in the Carson Division of the Newlands Project, the Middle Carson River segments, or by making improvements to the Newlands Project conveyance and delivery systems to conserve more water than is expected under the 1988 OCAP. However, the purchase of water rights from Newlands Project Carson Division water-right holders would exacerbate expected impacts to the local economy and agricultural production from the conversion of agricultural water rights to other uses.

Conservation

Water gained through conservation measures has the potential to positively impact groundwater recharge and domestic supply. Reclamation's Newlands Project Efficiency Study (U.S. Dept. of the Interior, 1993) identifies a number of water conservation methods that could increase storage in Lahontan Reservoir. One direct, but fairly costly, approach is lining canals. In particular, the Truckee Canal from Hazen to the Lahontan Reservoir outlet, and the T and N Canals are cited as

inefficient canals that would benefit from lining. Based upon preliminary estimates in the study (ibid), the Service estimates that lining any of these canals *could save sufficient water* to provide adequate volumes of water to meet current and future domestic supply needs in Lahontan Valley in conjunction with groundwater sources.

Injection recharge, municipal supply systems, and lining canals entails considerable construction costs, as well as annual O&M costs. The reasonableness of such mitigation measures lies in the ability of the implementing authority to fund such projects. Funds can be generated by levying mitigation fees on new development, hook-up fees, user fees, issuing improvement bonds, surcharges on water right transfers, State or Federal grants, Federal loan assurances, or Federal aid. In all likelihood, a combination of funding sources is the most realistic possibility for funding such mitigation. Generally, some form of governmental entity would need to become the implementing authority to construct and operate either of the facilities associated with these mitigation strategies. The costs of such mitigation could be very high, and the Service has insufficient information to determine whether community demand or interest would warrant a commitment from the community and county officials to such large-scale projects.

New wells

Drilling new or deeper wells would also provide less costly direct mitigation for those individual wells that may go dry as a result of reduced total recharge potential or reduced farm irrigation associated with the Proposed Action and other action alternatives. Information from individual well owners experiencing problems with domestic supply wells during the 1992 drought indicate that problems are often associated with older wells that may have not been developed or constructed to present-day standards and have problems with draw-down and recharge. New wells for those individuals affected by the Service's actions may *mitigate adverse impacts to specific wells that may have gone dry*. However, there is no guarantee that in some cases drilling new or deep wells would fully mitigate the problem because deeper wells may encounter water of poor quality, a potentially common problem with groundwater on the east side of Lahontan Valley adjacent to Stillwater NWR and Carson Lake.

4.4 EFFECTS ON VECTORS, EROSION, AND AGRICULTURAL PESTS

Under **Alternative 1**, vectors, erosion, and weeds occur naturally in the affected area and are controllable. Vectors (mosquitos) hatch in standing bodies of open water, and wetting and drying *and standing water* in the affected area are conducive conditions for vectors (Section 3.4.1, VECTOR CONTROL). Under baseline conditions major contributors to dust and erosion problems in

the affected area are wind, farming practices, and large expanses of sparsely vegetated desert landscape. Weeds are generally invasive and occur in areas where soils have been disturbed.

4.4.1 VECTORS

Alternative 1: Mosquitos would most likely create the same level of nuisance as occurred in 1989 when wetland and irrigated acreage were similar to those conditions anticipated under this No Action Alternative. Mosquito abatement and control would probably *be* similar to existing conditions.

Alternative 2, 3, 4, and 5: These alternatives would create substantially larger areas of wetland habitat than conditions under Alternative 1, the No Action Alternative.

Primary wetland habitat will increase by about 107 percent over baseline conditions. This will greatly increase the potential breeding habitat of several varieties of mosquitos (both standing-water mosquitos and floodwater mosquitos). On the other hand, maintaining more stable wetlands could provide better habitat for mosquito fish and other mosquito predators, which could contribute to reductions in mosquito populations. Also, reductions in those irrigated farmlands and other agricultural lands with standing water and mosquito breeding areas would also reduce floodwater mosquito species accordingly.

*Conservatively, it is expected that increased wetland habitat acreage would increase mosquito populations, but the extent to which this would happen is unknown and will depend on management of the wetlands, which will be addressed in an upcoming comprehensive management plan for Stillwater NWR. Increased wetland management options that arise from the acquisition of irrigation water under these alternatives could minimize potential adverse mosquito breeding conditions that could otherwise occur on the wetlands. The Service expects to coordinate with Churchill County Mosquito Abatement District in the development of its Stillwater NWR Comprehensive Management Plan *relative to mosquito control issues.**

Comparison to No Acquisition Conditions: *Primary wetland habitat (and thus potential mosquito-breeding habitat) would increase by about 158 percent over no acquisition conditions (from an estimated average of 9,700 acres to a long-term average of about 25,000 acres). Consequently, potential mosquito-breeding habitat would increase substantially in the valley.*

Mitigation Measures

Mosquito control and abatement occurs under existing and baseline conditions. *Based on written and oral communications with the Churchill County Mosquito Abatement District*

(including comments on the Draft EIS), the way in which water is managed in the primary wetland areas can have a substantial effect on the species of mosquitos that successfully reproduce and the extent to which they are successful. Given the amount of wetland inflow under the Preferred Alternative and other action alternatives, some water-management strategies would minimize the growth in mosquito populations while other strategies would enhance growth of mosquito populations. Water management will be addressed in the comprehensive management plan to be developed for Stillwater NWR. Mosquito control measures, possibly including water management and mosquito fish introductions, will be considered during the development of the comprehensive management plan, and will be implemented to the extent possible under wildlife management objectives and Service policy. The Service will solicit input by, and will consult with the Churchill County Mosquito Abatement District during the development of the comprehensive management plan.

4.4.2 EROSION

Under **Alternative 1**, No Action baseline conditions, wind erosion occurs on lands where the vegetative cover or surface cover has been removed. Construction and farming practices that leave bare, loose soils during the critical months for wind erosion will continue to have a significant effect on soil erosion. *Vacant* lands will be subject to wind erosion but the extent and severity of the erosion is dependent upon the location, size, and surrounding physical features of the subject lands.

The adverse impacts associated with wind erosion include increased potential for dust, reduced visibility associated with dust, loss of soil productivity, and the nuisance that the deposition of eroded soil can create for adjacent or downwind property owners. Adverse impacts associated with dust and reduced visibility are short-term impacts and often are eliminated due to natural atmosphere conditions.

Alternatives 2,3,4, and 5: Under all of the action alternatives, substantial acreages of irrigated farmland would potentially be retired. *Reductions in the number of irrigated, water-righted acres that would result from the action alternatives, as compared to baseline irrigated acres (approximately 47,000 acres), would range from 33 to 68 percent (Alternative 5 and Alternative 4, respectively). Whereas the potential for adverse soil erosion conditions is expected to increase as larger acreages of irrigated farmland are retired, the Service cannot reasonably quantitatively define the relative increases for each alternative because parcels that may be acquired are unknown at this time, as are the soil and vegetative characteristics of the properties, among other factors. It appears that the location, size, vegetative cover, and pattern of lands taken out of production has a greater influence on wind erosion potential than the retired acreage of farmland alone.*

There is no indication that wind erosion would be severe enough to render soils within the affected area unproductive due to soil loss from erosion. Generally, even under worst-case conditions, disturbed soils would form a crust that would prevent or reduce soil loss over time. For these reasons, the Service does not anticipate that increased wind erosion potential will result in soils becoming unproductive.

The Service expects that some percentage of the irrigated farmlands that are retired would be converted to other uses such as residential, commercial, or industrial development. If such conversions occur, the *vacant* lands could be subjected to wind erosion during construction when lands are disturbed, then stabilized when the properties are paved, graveled, landscaped, or otherwise covered.

The condition of farmlands at the time they are retired (as a result of water rights acquisitions) would have a major influence on wind erosion potential. If the farmlands were plowed and tilled in preparation for planting, a high erosion potential would result. However, if such lands left a standing crop of vegetation to provide cover, wind erosion potential would be greatly reduced.

Comparison to No Acquisition Conditions: Compared to no acquisition conditions (52,768 acres of irrigated, water-righted farmland in the Carson Division), irrigated, water-righted farmland would be reduced by 40 to 70 percent under the action alternatives (Alternative 5 and Alternative 4, respectively). Please see above discussion on the potential impacts associated with reduced irrigated acreage.

Mitigation Measures

Vegetative cover is the best and most cost effective method to protect and prevent soil erosion from occurring over the long term. Because of the extremely arid conditions in the affected area, once lands have been disturbed, re-establishing vegetative cover under natural precipitation patterns is very difficult. In many cases, revegetation and landscaping efforts would require some level of irrigation to establish plants. Many native or xeriscape plant species, once established, can be sustained on natural precipitation.

When appurtenant lands are acquired with water rights, the Service could take actions to reduce the potential for excessive wind erosion. Such actions may include land treatment (conservation tilling or plowing), revegetation with native plant species, or protecting the existing cover crop from disturbance. The appropriate management practice to reduce wind erosion would depend on the size and location of the lands. Where revegetation is planned, the Service could delay transfer of the water rights for one or two years to facilitate establishment of cover crops by irrigation. While revegetation is not the only way to

prevent wind erosion, it does offer a more positive visual impact than land treatment, and therefore may be a more desirable practice relative to the social values of the community.

When the appurtenant lands associated with water right acquisitions are retained in private ownership, the Service *would have* no authority to require or take actions to prevent wind erosion on those lands. In such cases, local governments are the appropriate authorities to enact requirements to prevent wind erosion. Ordinances *could* be passed to require that disturbed lands be stabilized. Currently, Churchill County has an ordinance (Bill No. 90-G, Ordinance 32) requiring the control of sand and dust, but it does not specifically address revegetation as a means to prevent wind erosion. A moratorium was placed on this ordinance soon after its inception, and it has not been implemented.

Without comparable requirements for wind erosion prevention on private lands, the Service's mitigation efforts under this element *could reduce* impacts associated with wind erosion but would not avoid or eliminate such adverse impacts.

Maintaining pasture grass or other *vegetation* that requires less water could enable property owners to sell only a portion of the water right entitlement they own. This splitting of water rights would keep lands vegetated, but is dependent on the owners' ability to obtain Nevada State Engineer's approval to transfer only a portion of a water right entitlement and finding a crop or pasture grass that can be successfully grown on less water in the affected area. While the Service would be amenable to acquiring split water rights, the ability to gain approval for such splits has not been tested. Although split water right acquisitions would minimize adverse wind erosion impacts, it is not clear whether such mitigation would be feasible.

4.4.3 AGRICULTURAL PESTS

Under **Alternative 1**, *noxious weeds and other agricultural pests such as pocket gophers, and jackrabbits, and ground squirrels* cause problems for farmers in the affected area. The potential for increased occurrence or distribution of weeds is directly attributable to the amount and location of vacant lands where the soil is disturbed and native vegetation is removed. There is insufficient information to quantify acres of weeds in the affected area.

Pocket gophers appear to be the most costly mammal pest to alfalfa producers in Nevada based on a Nevada-wide survey of alfalfa producers (Lewis, 1989). The survey revealed that pocket gophers are present on nearly 90 percent of alfalfa farms in Nevada, and that about 80 percent of farmers practice at least some level of control. Apparently, pocket gophers pose the biggest mammal pest problem in Churchill County (Nevada Cooperative Extension, oral communication, 1996). Alfalfa producers in Nevada generally rated rodent and rabbit damage and control costs as the second highest management cost (Lewis,

1989), with weeds rated third highest, meaning that substantial costs likely occur under baseline conditions.

Alternatives 2, 3, 4, and 5: Under all of these alternatives, there is the potential for large acreages of previously irrigated farmland to become *vacant*. There is a high probability that farmlands left *vacant* would be invaded by weed species. If the lands were tilled or cleared prior to the transfer of water rights, the potential for weed invasion would be higher than if lands were left untilled. In situations where the lands associated with the acquisition of water rights are converted to residential use, landscaping and development would most likely reduce the potential for weed invasion. Weeds do provide some benefit in that they can prevent erosion, and in some cases provide forage value. In addition they provide habitat for some small mammals, birds, and insects. Weeds are generally perceived as a nuisance by land owners and can impact farming operations or crop production if their presence increases. The Service expects all of these impacts to occur under the action alternatives. *Impacts would likely be proportional to the amount of irrigated farmland that would be converted to non-agricultural uses, which is addressed in Section 4.16.3, with Alternative 4 potentially resulting in the most impacts and Alternative 5 resulting in the least impacts.*

It is possible that increasing the number of vacant parcels adjacent to operational alfalfa producers could increase problems associated with pocket gopher control by providing source populations for this species. The extent to which pocket gopher problems would increase is unknown. Rodent problems, if they increase due to water rights being transferred off of formerly irrigated farmland, would be roughly proportional to the amount of irrigated farmland take out of production under each alternative.

To the extent that noxious weed and rodent problems increase as a consequence of transferring water rights off of irrigated farmland, these problems would be minimized in cases whereby the subsequent land-use (e.g., residential development) results in weeds and rodents being controlled.

Comparison with No Acquisition Conditions: *The potential adverse impacts, as compared to no acquisition conditions would not be substantially different from those described above.*

Mitigation Measures

Weeds can be controlled by burning, plowing, spraying and *revegetating with desirable vegetation*. All of these treatments would reduce adverse impacts associated with weeds. *To the extent possible, the Service would comply with pertinent Churchill County ordinances relative to noxious weeds for lands owned by the Service.*

Mitigation to control weeds with revegetation is described above in Section 4.4.2, EROSION, and would be applicable under this element.

One potential for mitigating any adverse impacts potentially caused by increased pocket gophers would be for the Service to develop pocket gopher control plans for areas in which pocket gopher problems have increased due to the Service's actions. Trapping appears to be the best control method for pocket gophers in alfalfa hay fields.

4.5 EFFECTS ON AIR QUALITY

Nevada air quality officials are mandated to identify those areas that do not meet air quality standards. Inhalable particulates (PM₁₀) is the only pollutant that State air quality officials have identified as a potential pollutant of concern in the affected area. PM₁₀ levels have been monitored in Fallon since May, 1993. Under **Alternative 1** (existing conditions), PM₁₀ monitoring shows an arithmetic mean of 35 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) and a maximum 24-hour measurement of 111 $\mu\text{g}/\text{m}^3$ at the Fallon monitoring site.

Dust, soot, ash, and chemicals given off by burning are key factors affecting PM₁₀ levels. The Service's Proposed Action and alternatives have the potential to increase dust associated with *vacant* farmland that result when water rights are acquired. *However, prevailing winds come from the west/southwest which could carry any dust from many vacant farmland away from the City of Fallon (based on current acquisition pattern).* Agricultural burning, which is a source of particulate emissions in the affected area would be reduced by the Service's actions, but other burning would continue at existing levels under all the alternatives.

While fugitive dust contributes to PM₁₀ levels, the major source of fugitive dust in the affected area is from the desert landscape (89 percent) and farmlands only contribute a small percentage (6 percent) of such dust (generally related to agricultural practices such as plowing and tilling of soils). (See Section 3.5, AIR QUALITY). Although acquisition of water rights from farmlands would increase acres of *vacant* land, and associated dust, it would also subsequently decrease seasonal plowing, tilling, and agricultural burning, which contribute to PM₁₀ levels.

Alternative 2: Under this alternative (including the 20,000 AF acquisition program), about 66 percent of the irrigated, water-righted farmland in the Carson Division of the Newlands Project would potentially be converted to other uses as a result of the water rights acquisition program. Those lands that are left *vacant* would potentially increase fugitive dust. The Service expects that fugitive dust could potentially increase over the short term until *vacant* lands are revegetated or become crusted over. Water right acquisitions would reduce farming within the affected area, and some benefits would occur as seasonal farming practices and agricultural burning that increase PM₁₀ levels also decline.

While short-term impacts associated with fugitive dust could potentially increase PM_{10} counts somewhat under the Proposed Action, it is not expected to cause PM_{10} levels to exceed either the 24-hour period ($150 \mu\text{g}/\text{m}^3$), or arithmetic mean ($50 \mu\text{g}/\text{m}^3$) State standards. *Furthermore, prevailing winds come from the west/southwest which could carry any dust from many vacant farmland away from the City of Fallon.*

Alternative 3: Under the Least Cost Alternative (including the 20,000 AF acquisition program), water rights acquisitions could potentially cause about 54 percent of the existing farmland in the Carson Division of the Newlands Project to be converted to other uses. The consequences of *vacant* lands and reductions in farming would be similar to conditions for the Proposed Action.

While short-term impacts associated with fugitive dust could potentially increase PM_{10} counts slightly under this alternative, it is not expected that the Service's action would cause PM_{10} levels to exceed either the 24-hour period, or arithmetic mean State standards. *Furthermore, prevailing winds come from the west/southwest which could carry any dust from many vacant farmland away from the City of Fallon.*

Alternative 4: Under the Maximum Acquisition Alternative (including the 20,000 AF acquisition program), water rights acquisitions could potentially cause about 72 percent of the existing farmland in the Carson Division of the Newlands Project to be converted to other uses. This alternative would have the greatest potential to increase fugitive dust from *vacant* lands. It also would have the greatest potential to reduce fugitive dust, smoke and ash associated with farming practices.

While short-term impacts associated with fugitive dust could potentially increase PM_{10} counts under this alternative, it is not expected that the Service's action would cause PM_{10} levels to exceed either the 24-hour period, or arithmetic mean State standards. *Furthermore, prevailing winds come from the west/southwest which could carry any dust from many vacant farmland away from the City of Fallon.*

Alternative 5: Under the *Preferred* Alternative (including the 20,000 AF acquisition program), water rights acquisitions could potentially cause up to 40 percent of the existing farmland in the Carson Division of the Newlands Project to be converted to other uses. *Of the action alternatives considered*, this alternative would have the least potential to increase fugitive dust from *vacant* lands. Under this alternative, farming would not be reduced to the extent that would occur under the Proposed Action. As a result, reductions in fugitive dust associated with plowing and tilling would not be as great as expected under the Proposed Action.

While short-term impacts associated with fugitive dust could potentially increase PM_{10} counts under this alternative, it is not expected that the Service's action would cause PM_{10} levels to exceed either the 24-hour period, or arithmetic mean State standards. *Furthermore, prevailing winds come from*

the west/southwest which could carry any dust from many vacant farmland away from the City of Fallon.

Comparison with No Acquisition Conditions: The potential adverse impacts that could occur as a consequence of Alternative 5, as compared to no acquisition conditions, would be similar to those described above for the impacts as compared to baseline conditions.

Mitigation Measures

Mitigation measures to minimize or reduce dust, are discussed above in Section 4.4.2, EROSION, and would be equally applicable to this section.

Controls or restrictions on open burning would act to further ensure that PM_{10} levels would not increase over baseline conditions and would most likely decrease. Such mitigation could potentially benefit air quality. This mitigation may be warranted because it offers extended health benefits to the community as a whole. However, this mitigation is beyond the authority of the Service.

BIOLOGICAL RESOURCES

4.6 EFFECTS ON WETLANDS

4.6.1 PRIMARY WETLAND HABITAT

Increased wetland inflows would greatly benefit the primary wetland habitat and species that make use of these areas. Under the Proposed Action and other action alternatives, an average of about 25,000 acres of primary wetland habitat would be sustained in Lahontan Valley over the long term. While this is considerably less than what historically occurred in the Lahontan Valley (an estimated 150,000 acres according to Kerley and others, 1993), it represents a significant increase compared to what has existed in recent years (less than 10,000 acres). Water quality would be improved under the Proposed Action and other alternatives, as the Service would increase reliance on irrigation water, which is better quality than drainwater.

The acquisition of additional water beyond that available under baseline conditions, would make it possible for the Service to manage and manipulate habitats more efficiently and flexibly. The Comprehensive Management Plan for Stillwater NWR will address the management of delivery patterns and water regimes that would be needed to create a desired mix of wetland habitats. The management planning process can be viewed as a fine-tuning process that will result in specific water regimes being outlined. The Comprehensive Management Plan is a separate and distinct action from water rights acquisition. The Service does not expect that actions taken as a result of the management

plan will increase adverse impacts associated with the Service's Proposed Action to acquire water rights for wetlands protection. If anything, the fine-tuning aspect of the management plan would decrease impacts associated with the acquisition of water rights for wetlands protection.

Under **Alternative 1**, the No Action Alternative, the Service expects that an average of 55,100 AF/year of water would reach the primary wetland habitat. As a result, 12,100 acres of wetland habitat would be sustained in the primary wetland areas.

Alternative 2: Under the Proposed Action, approximately 25,000 acres of primary wetland habitat would be sustained over the long term on Stillwater NWR, Carson Lake and the Tribal wetlands. This represents a 12,900 acre increase (*107 percent*) over the No Action Alternative. As a result of acquiring *an additional 102,000 AF of irrigation water beyond the 20,000 AF included in the baseline conditions (for a total of 122,000 AF)*, and making use of spill and drainwater, about 125,000 AF of water would reach the wetlands. Due to the high percentage of irrigation water delivered to the wetlands (82 percent), *wetland inflows would be of higher water quality than that of No Action Alternative*. Due to fluctuations in the natural hydrologic regime, the Service expects actual wetland acreage to vary from year-to-year. Over the long-term, however, these fluctuations would be expected to sustain an average of 25,000 acres of primary wetland habitat.

The increase in primary wetland habitat would provide positive benefit to those animal species that use or depend on the wetland habitat. There would be increased wetland vegetation and improved foraging opportunity for those species that rely on wetland habitat for their subsistence. More detailed analysis of the benefits afforded other biological resources as a result of increased primary wetland habitat acreage are described in the following sections of this Biological Resources portion of the document.

Alternative 3: Under the Least Cost Alternative, as with the Proposed Action, 25,000 acres of primary wetland habitat would be sustained in the designated Lahontan Valley wetlands. This represents a 12,900 acre increase over No Action baseline conditions. As a result of acquiring *an additional 80,000 AF of irrigation water beyond the 20,000 AF included in baseline conditions (for a total of 100,000 AF)*, and making use of spill and drainwater, about 125,000 AF of water would reach the wetlands. Due to the high percentage of irrigation water delivered to the wetlands (78 percent), *wetland inflows would be of higher water quality than that of No Action Alternative*. Similar to the Proposed Action, primary wetland habitat acreage would fluctuate from year-to-year, due to changing hydrologic regimes. Over the long-term, these fluctuations would be expected to sustain an average of 25,000 acres of primary wetland habitat.

Alternative 4: Under the Maximum Acquisition Alternative, as with the Proposed Action, 25,000 acres of primary wetland habitat would be sustained in the designated Lahontan Valley wetlands. This represents a 12,900 acre increase over No Action baseline conditions. As a result of acquiring *an additional 114,500 AF of irrigation water beyond the 20,000 AF included in baseline conditions (for a total of 134,500 AF), and making use of spills*, about 125,000 AF of water would reach the wetlands. Drainwater would be excluded from wetlands management, and consequently, this alternative offers the highest quality wetland inflows.

Any drainwater that did reach the primary wetland areas would be segregated and managed separately. As a result, sumps would be created that would require special protective management to prevent use by waterfowl, migratory birds, and other wildlife.

Similar to the Proposed Action, primary wetland habitat acreage would fluctuate from year-to-year, due to changing hydrologic regimes. Over the long-term, these fluctuations would be expected to sustain an average of 25,000 acres of primary wetland habitat.

Alternative 5: Under the *Preferred* Alternative, 25,000 acres of primary wetland habitat would be sustained in the designated Lahontan Valley wetlands. This represents a 12,900 acre increase over No Action baseline conditions. *As a result of acquiring an additional 55,000 AF of irrigation water beyond the 20,000 AF included in baseline conditions in the Carson Division (for a total of 75,000 AF), and making use of leased water, drainwater, spills, Middle Carson River irrigation water, Navy conserved water, sewage effluent, and groundwater about 125,000 AF of water would reach the wetlands. Water quality would at a minimum be equal to that of the No Action Alternative, but, to the extent that low quality groundwater is avoided, water quality would improve over that of the No Action Alternative. It is estimated that, if groundwater comprises less than 6 percent of the total wetland inflow objective (125,000 AF/year), water quality under this alternative would be better than conditions under the No Action baseline, assuming that the total dissolved concentration is 6,000 mg/L or less.* Similar to the Proposed Action, primary wetland habitat acreage would fluctuate from year-to-year, due to changing hydrologic regimes. Over the long-term, these fluctuations would be expected to sustain an average of 25,000 acres of primary wetland habitat.

Comparison with No Acquisition Conditions: *As compared to no acquisition conditions, primary wetland habitat acreage would increase from about 9,700 acres to about 25,000 acres under the Preferred Alternative and other action alternatives. Water quality would improve substantially if no groundwater is used under the Preferred Alternative. If approximately 10 percent of the 125,000 AF of water consists of groundwater of 6,000 mg/L total dissolved solids concentration, it is estimated that water quality would be similar to that of no acquisition conditions.*

Therefore, under most acquisition scenarios (all reasonable scenarios) under this alternative, water quality would improve over conditions that existed before water rights began to be purchased for the primary wetlands.

Mitigation Measures

Primary wetlands in the Lahontan Valley would benefit substantially from the Proposed Action and other action alternatives. Therefore, no mitigation is identified for this element.

Under Alternative 4, the Service would have to construct impoundments to capture and segregate drainwaters. If water quality in these sumps was found to be toxic to migratory birds and wildlife, further measures in adherence to state regulations may have to be implemented. Such mitigation could include fencing and netting to preclude wildlife access.

4.6.2 SECONDARY WETLANDS

The term "secondary" wetlands is not an indication of quality or importance of wetland habitat, but refers to the those wetlands in the affected area that are not designated as Lahontan Valley wetlands in Public Law 101-618.

Under **Alternative 1**, the No Action Alternative, the Service expects secondary wetlands in the affected area to sustain an average of 4,500 acres. This figure includes secondary wetlands associated with Fernley Wildlife Management Area (Fernley WMA), Massie and Mahala Sloughs, Soda Lakes, Old River Reservoir, Sheckler Reservoir, Sagouspe Dam, Harmon Reservoir, S-Line Reservoir, Indian Lakes and the Canvasback Gun Club.

Alternative 2: As a result of water rights acquisitions for primary the wetlands under the Proposed Action, irrigation demand in the Carson Division of the Newlands Project would decrease, potentially affecting drainflows and seepage losses that sustain many of these secondary wetlands. The Service expects that the Canvasback Gun Club, one of the secondary wetland areas, would be unaffected by this action because it has rights to water from both drains and the Newlands Project. While the magnitude of impacts to the non-water righted secondary wetlands cannot reasonably be quantified, *because the locations of acquired acreage cannot yet be determined nor can the changes in drainage patterns be ascertained*, the Service recognizes that, under the Proposed Action, acreage of non-water righted secondary wetlands will decline from baseline conditions due to reduced seepage losses and increased efficiency.

Alternative 3: As a result of water rights acquisitions for the primary wetlands under the Least Cost Alternative, irrigation demand in the Carson Division of the Newlands Project would not decline from Alternative 1, and drainflows and seepage losses to the secondary

wetlands would remain constant. Under Alternative 3, the Service expects the secondary wetlands would continue to sustain a long-term average of about 4,500 acres, and Canvasback Gun Club would remain unaffected by the action.

Alternative 4: As a result of water rights acquisitions for the primary wetlands under the Maximum Acquisition Alternative, irrigation demand in the Carson Division of the Newlands Project decreases the most. This would potentially affect drainflows and seepage losses that sustain many of the secondary wetlands. The Service expects that secondary wetlands at Canvasback Gun Club would be unaffected by this action, as the area has its own water rights. While the magnitude of impacts to the non-water righted secondary wetlands cannot reasonably be quantified given available information, the Service recognizes that, under the Proposed Action, acreage of non-water righted secondary wetlands will decline from baseline conditions.

Alternative 5: As a result of water rights acquisitions for the primary wetlands under this alternative, irrigation demand in the Carson Division of the Newlands Project would decrease and would be quite similar to the Proposed Action. Therefore, the Service expects the consequences to the secondary wetlands to be analogous to those described for the Proposed Action. *It is estimated that a long-term average of about 4,500 acres of secondary wetland habitat would be maintained under this alternative.*

***Comparison with No Acquisition Conditions:** The extent of consequences that would occur under this alternative when compared to no acquisition conditions would be similar to those when compared against baseline conditions.*

Mitigation measures

Adverse impacts to secondary wetlands, if any occur, would be more than offset by the substantial increase in primary wetland habitat. While changing Newlands Project efficiency targets could increase use of regulating reservoirs and maintain secondary wetlands, this action would violate the 1988 OCAP, and could adversely impact Pyramid Lake fish species as well. Therefore, the Service considers this mitigation to be neither reasonable nor feasible.

4.7 EFFECTS ON VEGETATIVE COMMUNITIES

4.7.1 WETLAND PLANT COMMUNITIES

The ability to schedule water deliveries to the primary wetland areas would enable wetland managers and biologists to better manipulate, manage, and sustain a variety of wetland plant communities. As a result of increased *supply of and* control over water deliveries to

wetlands, there would be *an increased ability to* manage wetland vegetation vigor, density, and *diversity* as compared to the No Action baseline condition.

Marsh plant communities are directly tied to the number of wetland acres during the growing season, and to a lesser degree, to the level of salinity of the water during this period. Marsh (emergent) plants have a wide range of salt tolerance, and can tolerate drying during the last months of the summer and still thrive. Submergent vegetation must be sufficiently inundated (more than 6 inches) during the entire growing season. The Comprehensive Management Plan for Stillwater NWR will ultimately determine what type of marsh communities, and the number of acres of each, will be maintained on the Refuge.

In the following discussion wetland plant communities refers to both submergent and emergent plant communities in the primary and secondary wetland habitats in the affected area. Under **Alternative 1**, about 16,600 acres of wetland plant communities would be sustained in the Lahontan Valley, including both primary and secondary wetlands.

Alternative 2: Under the Proposed Action, the Service expects that about 25,000 acres of wetland habitat would be sustained in the primary wetland areas. Secondary wetland areas could experience a small decline in wetland acreage and the associated wetland plant communities. Acreage of wetland plant communities could increase by about 75 percent over Alternative 1. The Proposed Action would offer higher proportions of good quality water, which would decrease concentrations of total dissolved-solids of primary wetland area inflows. Increased water volumes and higher water quality would potentially improve wetland vegetation vigor, density, and production in the primary wetland areas as compared to the No Action baseline condition. Wetland plant communities in secondary wetland areas would be comparable to baseline conditions under this alternative.

Alternative 3: Under this alternative, 25,000 acres of wetland habitat in the primary wetland areas would be sustained. Based on the Service's expectations regarding secondary wetland areas, about 4,500 acres of secondary wetland habitat would occur. Acreage of wetland plant communities would increase by as much as 78 percent over Alternative 1 in the affected area. As with the Proposed Action, primary wetland areas would receive more water of better quality than under the No Action Alternative and wetland vegetation would be improved. Wetland plant communities in secondary wetland areas would be comparable to baseline conditions under this alternative.

Alternative 4: Under this alternative, 25,000 acres of wetland habitat in the primary wetland areas would be sustained. Secondary wetland acres are expected to decline more under this alternative than the Proposed Action. Wetland plant communities associated with the secondary wetland areas would correspondingly decline. Overall acreage of wetland plant communities is expected to increase by about 72 to 75 percent over baseline

conditions. This alternative would offer the highest proportion of good quality water, which would decrease concentrations of total dissolved-solids in primary wetland area inflows. Increased water volumes and better water quality would potentially improve wetland vegetation vigor, density, and production in the primary wetland areas as compared to Alternative 1 baseline conditions.

Alternative 5: Impacts associated with this alternative are expected to be comparable to impacts for Alternative 3. Acreage of wetland plant communities would increase by about 78 percent over baseline conditions in the affected area. It is estimated that if groundwater would comprise more than 6 percent of the total wetland inflow, water quality would be lower than it would be under Alternative 1. Due to water quality influences, wetland plant vigor, density, and diversity may not be as high as conditions expected under the Proposed Action. Wetland plant communities in secondary wetland areas would be comparable to baseline conditions under this alternative.

Comparison with No Acquisition Conditions: As compared to no acquisition conditions, wetland plant communities in primary and secondary wetlands would increase from an average of about 14,200 acres to an average of about 29,500 acres (108 percent increase) under Alternative 5.

Mitigation Measures

Wetlands plant communities in the primary wetland habitats would benefit substantially from increased volumes of better quality water. No mitigation is needed for this element.

Mitigation measures applicable to impacts to secondary wetland plant communities would be the same as those described in Section 4.6.2, SECONDARY WETLAND AREAS.

4.7.2 RIPARIAN PLANT COMMUNITIES

Under **Alternative 1**, riparian plant communities occur within the affected area along the Lower Truckee River corridor and the Carson River corridor from Dayton to the Carson Sink.

Artificially created riparian habitat also exists along drains and canals of the Newlands Project. One key factor affecting riparian plant communities is the flow volume in the riparian corridor. As average annual flow volumes increase, riparian plant communities benefit, and as it decreases or ceases, riparian plant communities are adversely impacted.

Alternative 2: Under the Proposed Action, riparian plant communities along the Lower Truckee River *may* benefit slightly from increased flow volumes (almost 4 percent) over the No Action Alternative. Carson River riparian plant communities are expected to be unaffected by the Proposed Action. As agricultural water rights are acquired, an unknown

percentage of drains and canals in the Carson Division of the Newlands Project would go dry, adversely impacting the strips of associated riparian plant communities. *The extent of potential impacts would depend on many factors, including acquisition pattern, existing vegetation, and depth of the water table following acquisition water rights from surrounding farmlands.*

Alternative 3: Under this alternative, riparian plant communities along the Lower Truckee River and Lower Carson River are expected to be unaffected under this alternative (Truckee River flows would only increase by an estimated 1 percent). As with the Proposed Action, an unknown percentage of artificially-created riparian plant communities along Newlands Project drains and canals would be adversely impacted.

Alternative 4: Under this alternative, riparian plant communities along the Lower Truckee River *may* benefit slightly by increased flow volumes (more than 5 percent) over the baseline conditions. Carson River riparian plant communities are expected to be unaffected by this alternative. As with the Proposed Action, an unknown percentage of artificially-created riparian plant communities along Newlands Project drains and canals would be adversely impacted.

Alternative 5: As with Alternative 3, riparian plant communities along the Lower Truckee River and Lower Carson River are expected to be unaffected under this alternative. Truckee River flows would slightly increase by an estimated 2 percent *over baseline conditions*. Purchase of water rights in the Middle Carson River area, if this took place, would slightly increase Carson River flows *through the middle and lower reaches of the river*. If water rights currently used to irrigate lands adjacent to the delta area of Lahontan Reservoir were put to other uses, some adverse impacts to the cottonwood gallery could potentially occur. However, the Service does not expect its actions to cause adverse impacts to the cottonwood gallery under this alternative. As with the Proposed Action, an unknown percentage of artificially-created riparian plant communities along Newlands Project drains and canals would be adversely impacted.

Comparison with No Acquisition Conditions: Potential impacts that would occur under the Preferred Alternative when compared against the no acquisition conditions would be similar to the impacts as compared against baseline conditions, as described above. Truckee River flows would slightly increase by an estimated 3 percent over no acquisition conditions.

Mitigation Measures

Loss of some artificially-created riparian plant communities would be an unavoidable impact under all action alternatives (Section 4.28). *For some habitats provided by Newlands*

Project drains and canals (e.g., emergent marsh, shallow marsh), adverse impacts to the drains and canals would be lessened or offset by the substantial increase in marsh habitat in the primary wetland areas. Loss of artificially-created riparian plant communities could potentially be mitigated, in part, by reestablishing cottonwood and willow communities along the lower Carson River within the Stillwater WMA.

Alternative 5 was designed in part to minimize adverse impacts to irrigated farmland, which in turn would minimize, compared to the Proposed Action and other action alternatives, the adverse impacts to habitat provided by Newlands Project drains and canals. Also, adhering to a checkerboard pattern of acquisitions could possibly reduce impacts to artificially-created riparian habitat, but this strategy would likely not be implemented due to expected adverse effects on irrigation project efficiency. Adverse impacts to drain and canal habitat could also be reduced by adjusting delivery patterns (timing and routing) of water to the primary wetlands. Different delivery schedules will be identified and evaluated in the upcoming Comprehensive Management Plan for Stillwater NWR.

4.7.3 AGRICULTURAL VEGETATION

Agricultural vegetation in the affected area is dependent upon irrigation. Converting agricultural water rights to other uses would eliminate agricultural vegetation where water rights are removed. Under **Alternative 1**, *about 57,000 acres of agricultural vegetation (irrigated crops and grasses in the Carson and Truckee Divisions, and the Middle Carson River) is estimated to occur in the affected area.*

Alternative 2: *As much as 29,200 acres of agricultural vegetation would be eliminated in the Carson Division above that which is being eliminated under Alternative 1. This amounts to a reduction of about 51 percent of agricultural vegetation in the affected area as compared to baseline conditions (about 57,000 acres).*

Alternative 3: *As much as 22,900 acres of agricultural vegetation would be eliminated in the Carson Division above that which is being eliminated under Alternative 1. This amounts to a reduction of about 40 percent of agricultural vegetation in the affected area as compared to baseline conditions.*

Alternative 4: *As much as 32,400 acres of agricultural vegetation would be eliminated in the Carson Division above that which is being eliminated under Alternative 1. This amounts to a reduction of about 57 percent of agricultural vegetation in the affected area as compared to baseline conditions.*

Alternative 5: *As much as 15,400 acres of agricultural vegetation would be eliminated in the Carson Division above that which would be eliminated under Alternative 1, and as much*

as much as about 4,800 acres could be eliminated along the Middle Carson River as a consequence of this alternative . This amounts to a reduction of about 35 percent of agricultural vegetation in the affected area as compared to baseline conditions (about 57,000 acres).

***Comparison with No Acquisition Conditions:** Under Alternative 5, as much as 21,000 acres of agricultural vegetation would be eliminated from the Carson Division and as much as about 4,800 acres could be eliminated along the Middle Carson River, which would amount to about a 41 percent reduction in agricultural vegetation in the affected area as compared to no acquisition conditions.*

Mitigation Measures

Loss of agricultural plant communities would be an unavoidable adverse impact under all action alternatives (Section 4.28). *Alternative 5 was designed in part to minimize adverse impacts to irrigated farmland by reducing the reliance on purchased irrigation water rights, as compared to the Proposed Action and other action alternatives. Mitigation for adverse impacts to farmland are described in Sections 4.16.3 and 4.16.4.*

4.7.4 DESERT SHRUB PLANT COMMUNITIES

Desert Shrub plant communities are adversely impacted by agricultural development, and leveling for commercial and residential development. Under **Alternative 1** baseline conditions, urbanization, growth and development in Churchill County have the greatest effect on native desert plant communities.

Alternatives 2, 3, 4, and 5: Over the long run, there may be a slight increase in desert shrub plant communities within the affected area as *vacant* farmlands are naturalized. However, because there already is a vast amount of desert shrub habitat in the affected area, the relatively small increases brought about by these alternatives would be negligible. No adverse impacts to desert shrub plant communities resulting from any of the action alternatives were identified.

***Comparison to No Acquisition Conditions:** Potential impacts under Alternative 5, as compared to no acquisition conditions, would be similar as described above.*

Mitigation measures

No adverse impacts have been identified to desert plant communities as a result of any of the alternatives. Therefore, no mitigation is necessary for this element.

4.8 EFFECTS ON FISH

Fish populations in the affected area would generally benefit from the Service's action to acquire water for the wetlands, but non-game fish would be the primary beneficiaries. The wetland habitat objective calls for a substantial increase in wetland habitat acreage. The type of habitat that would be provided in the primary wetland areas would be most favorable to non-game fish, which inhabit shallower waters of higher salinity levels than do most species of game fish. In general, permanent supplies of higher quality water would benefit fish in the primary wetland areas. Under **Alternative 1**, the No Action Alternative, the status of fish populations would not change substantially from the existing conditions described in Section 3.8.

Alternatives 2, 3, 4, and 5: Under these alternatives, permanent supplies of better quality water would greatly benefit fish species in the primary wetlands. Increased storage volumes in Lahontan Reservoir would benefit fish species in that area. As Lower Truckee River flows increase, the Service anticipates that fish species inhabiting this portion of the river would benefit. Increased river flows and lake levels would also be beneficial to endangered and threatened Pyramid Lake fish. Some secondary wetland areas would receive decreased inflows as a result of these alternatives, and fish species could be adversely affected in these areas. Comparable to baseline conditions, regulating reservoirs would continue to be unable to provide reliable fish habitat. There is insufficient information to quantitatively evaluate fish populations under the various alternatives. *Of the action alternatives, Alternative 4 would provide the greatest benefit because it would result in the highest degree of water quality for the wetlands. Alternative 5 (Preferred Alternative) would greatly enhance fish populations, but it would provide the least benefits to fish of the action alternatives because, compared to the other action alternatives, it would rely on the highest amount of drainwater and could make use of groundwater with high levels of total dissolved solids.*

Comparison to No Acquisition Conditions: Potential impacts under Alternative 5, as compared to no acquisition conditions, would be similar as described above.

Mitigation Measures

Fish species would benefit as a result of the Service's action to acquire water for the wetlands. Therefore, no mitigation is identified for this element. *Groundwater would only be used to the extent that it does not adversely impact water quality of the wetland inflow, as compared to baseline conditions. Mitigation of potential groundwater use is presented under Section 4.3.2.*

4.9 EFFECTS ON BIRDS

4.9.1 WATERFOWL

Waterfowl populations benefit as wetland habitat acreage increases. Waterfowl are attracted to wetland habitats that provide food and cover. Most of the waterfowl use in the affected area occurs in the primary wetland habitats of Carson Lake and Stillwater NWR.

There is a direct link between waterfowl use and available acres of wetland habitat; consequently, the Service gauges potential waterfowl use by changes in wetland habitat acres. Under **Alternative 1**, peak waterfowl populations are estimated to total about 190,000 ducks, geese and swans. Waterfowl use of the Lahontan Valley would remain much as it was described for baseline conditions (Section 3.9.1). Wetland habitat acreage would average about 12,100 acres in the primary wetland areas over the long term under the No Action Alternative. Secondary wetlands provide about 4,500 acres of habitat over the long run.

Alternatives 2, 3, 4, and 5: All of the action alternatives would increase primary wetland habitat by 12,900 acres over the No Action Alternative. This 107 percent increase is expected to substantially increase waterfowl use and productivity in the primary wetland habitats. The Service's actions would provide greater expanses of marsh and open-water habitats with both emergent and submergent vegetation. This would greatly benefit all species of waterfowl that use the wetlands (for example, Canada geese, mallards, gadwall, pintail, cinnamon teal, gadwalls, redheads, and canvasbacks). Increased acres of alkali bulrush and more abundant pondweed would benefit swans, snow geese, and other waterfowl. Although non-water-righted secondary wetlands could decrease under some alternatives, these impacts would be more than offset by the substantial increases in primary wetland acreage.

Reduction in irrigated farmland could impact some species of waterfowl. Because the action alternatives would result in the conversion of a substantial amount of irrigated farmland to non-irrigated uses, especially Alternatives 2 and 4 (60 and 68 percent reductions, respectively, as compared to the No Action Alternative), they have the potential to affect Canada goose use of the Lahontan Valley. Alternatives 3 and 5 would result in an estimated 47 and 33 percent reductions in irrigated farmland, respectively, as compared to the No Action Alternative. Although the action alternatives would reduce available Canada goose foraging areas, Alternatives 3 and 5 are not expected to measurably reduce winter use of the Lahontan Valley by Canada geese. Mallards, pintail, and American wigeons also make use of Lahontan Valley farmland, but, because this use is minimal, these species would not be adversely impacted by reduced farmland acreage. Reduced amount of drain and canal habitat that could occur under the action alternatives could impact wood ducks to some degree, but the overall affect of the action alternatives, especially Alternatives 3 and 5, is not expected to have substantial adverse impacts. Reduced drain and canal habitat would also reduce the amount of use of these habitats by species such as mallards and cinnamon teal, but the increase in primary wetland habitat would more than offset this effect.

Of the 25 species of waterfowl that breed, winter, and/or use the Lahontan Valley as a migration stop-over, only 2 species (Canada geese and wood ducks) may be adversely

impacted by the increase in primary wetland habitat acreage and concurrent reduction in irrigated farmland and associated drains and canals, and these impacts are expected to be minimal (except possibly under Alternatives 2 and 4). All other species would benefit substantially from the increased amount of wetland habitat, and, therefore, overall benefits to waterfowl are very high.

Comparison with No Acquisition Conditions: *Compared to no acquisition conditions (an estimated 9,700 acres of primary wetland habitat), primary wetland habitat would increase by about 15,300 acres (158 percent) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Therefore, the water rights acquisition program, in total, would double the amount of wetland habitat available to waterfowl in the Lahontan Valley. In total, the Preferred Alternative and 20,000 AF acquisition program would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), which could possibly affect Canada geese and wood ducks.*

Mitigation Measures

Net impacts to waterfowl, as a group, would be very beneficial under all action alternatives. Alternative 5 was designed in part to minimize adverse impacts to irrigated farmland, which in turn would minimize possible adverse impacts to wintering Canada geese as compared to the Proposed Action and other action alternatives. A possible mitigation measure would be to grow food crops on Stillwater NWR specifically for Canada geese. One possible drawback to this approach, however, is that it would take away water that could otherwise be used to enhance the wetlands, and thus reduce benefits to other waterfowl species. For most waterfowl species using Newlands Project drains and canals, the increase in primary wetland habitat acreage would more than offset reductions in drain and canal habitat. Any adverse impacts to wood ducks could potentially be reduced by providing water to the Carson River in the Stillwater WMA and thereby enhancing habitat for wood ducks and other species in that area.

4.9.2 SHOREBIRDS

Shorebird use of primary wetland habitats for feeding and nesting would increase as a consequence of increased acreage of wetland habitat. Increases in shorebird use are difficult to determine because they are linked to both hydrologic regimes (depth of water) and wetland habitat acres. A variety of Great Basin marsh habitats are conducive to

shorebird use. Under **Alternative 1**, August populations of migratory shorebirds could amount to about 40,000, as discussed in Section 3.9.2.

Alternatives 2, 3, 4, and 5: All of the alternatives increase primary wetland habitat by 12,900 acres over the No Action Alternative. This 107 percent increase is expected to substantially increase shorebird use and productivity in the primary wetland habitats. The Service's actions would provide greater expanses of wetland habitats, some of which will be suitable for shorebird use. The acquisition of irrigation water rights would enable wetland managers to better control hydrologic regimes, which would increase the options for creating habitat conditions preferred by shorebirds.

As a result of the Service's actions under these alternatives, secondary wetlands could experience some small losses in wetland acreage and associated wetland habitat. These changes are not expected to impact shorebird use to any great extent over those conditions identified under baseline conditions, *and would be more than offset by the increase in primary wetland habitat.*

Comparison with No Acquisition: Compared to no acquisition conditions (an estimated 9,700 acres of primary wetland habitat), primary wetland habitat would increase by about 15,300 acres (158 percent) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Therefore, the water rights acquisition program, in total, would double the amount of wetland habitat available to shorebirds in the Lahontan Valley.

Mitigation Measures

The Service has not identified adverse impacts to shorebirds associated with the Proposed Action and other action alternatives. Possible impacts to secondary wetland habitats would be more than offset by the substantial increases in primary wetland acreage.

4.9.3 COLONY NESTING AND OTHER MARSH BIRDS

Alternative 1: Colony nesting and other marsh birds use the Lahontan Valley wetlands for nesting, brood rearing and summer forage. Key factors that affect these species include abundance of fish for fish-eating species, acreage of emergent marsh with bulrush and cattail, and acreage of open water habitat. Under baseline conditions, breeding pairs of some colony nesting species, such as gulls, terns, grebes and herons have declined over the past 25 years. Under Alternative 1, an estimated 6,000 pairs of breeding colony nesters

could potentially make use of the area. Other baseline conditions for colony nesting and other marsh birds are presented in Section 3.9.3.

Alternatives 2, 3, 4, and 5: *The Proposed Action and other action alternatives would positively benefit wetlands habitat for colony nesting and other marsh birds. By increasing primary wetland habitat by as much as 107 percent over the No Action Alternative, acreage of both emergent marsh and open water habitat would be substantially increased. Such actions would increase the potential for reproductive success of some colony nesters and marsh birds. The Service expects that some species that have declined under baseline conditions may re-establish use of the marshes as a result of the increased acreage of primary wetland habitat. The more permanent and reliable water regimes in the marshes would increase non-game fish populations, which would benefit fish-eating colonial nesters and other fish-eating marsh birds.*

Colony nesting species that utilize islands at Lahontan Reservoir and Pyramid Lake (such as pelicans, gulls, herons, and cormorants) would not be directly affected by the Proposed Action and other action alternatives, but improved primary wetland habitat would provide better foraging opportunities for birds in these nearby colonies.

Reductions in farm fields would reduce available foraging areas of white-faced ibis in the Lahontan Valley, but the amount of irrigated farmland does not appear to be limiting the white-faced ibis populations in Lahontan Valley. The amount of reductions in irrigated farmland that would occur under the Preferred Alternative and other action alternatives (with the possible exception of Alternative 4) are not expected to adversely impact white-faced ibis as compared to the No Action Alternative.

Under these alternatives the Service does not expect conditions in secondary wetland habitats at the Newlands Project regulating reservoirs to improve over baseline conditions. Prior actions, which have caused the loss of habitat in these areas, have resulted in declines in reproduction and use by colony nesting species within the last few years. The Service expects that its actions may offset these impacts by increasing preferred habitat for these species in the primary wetland areas.

Comparison with No Acquisition Conditions: *Compared to no acquisition conditions (an estimated 9,700 acres of primary wetland habitat), primary wetland habitat would increase by about 15,300 acres (158 percent) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Therefore, the water rights acquisition program, in total, under the Preferred Alternative would double the amount of wetland habitat available to colony nesting and other marsh*

birds in the Lahontan Valley. In total, the Preferred Alternative and 20,000 AF acquisition program would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), but this is not expected to adversely impact the white-faced ibis population.

Mitigation Measures

Net impacts to colonial nesting and other marsh birds, as a group, would be very beneficial under all action alternatives. Alternative 5 was designed in part to minimize adverse impacts to irrigated farmland, which in turn would minimize possible adverse impacts to white-faced ibis, as compared to the Proposed Action and other action alternatives

4.9.4 PASSERINES

Passerine species are found in marsh, upland, riparian, and agricultural habitats within the affected area. The greatest diversity of passerine species is associated with riparian habitats. Increases or reductions in acres of habitat for these passerine species would affect the use of the affected area by passerine birds. Baseline conditions, under **Alternative 1** for passerines are described in Section 3.9.4, however, there is little population data to quantify baseline conditions for these species.

Alternatives 2, 3, 4, and 5: Increased primary wetland areas would positively benefit marsh-dependent passerines under the Proposed Action and other action alternatives. Those passerines that rely on upland habitat would be unaffected by the Service's action. The major riparian corridors along the Carson River and Lower Truckee River would most likely be maintained at baseline conditions, with possible slight improvements. Passerines that rely on these major riparian areas would not be affected by the Service's actions. Those passerines that feed in agricultural lands and use artificially-created riparian habitat could be somewhat adversely impacted by the Service's actions, but the level of impact that would occur under each action alternative would be difficult to predict. However, it is assumed that adverse impacts to riparian-associated passerine species would be more severe as adverse impacts to artificially-created riparian habitat increase. The same would be true for farmland-associated passerine species relative to impacts to irrigated farmland (please refer to Sections 4.7.2 and 4.7.3 for discussions of impacts to riparian and agricultural habitats).

Comparison with No Acquisition Conditions: In total, primary wetland habitat would increase from an estimated 9,700 acres (no acquisition conditions) to about 15,300 acres (158 percent increase) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would

increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Consequently, wetland-associated passerine species would benefit substantially. In total, the Preferred Alternative and 20,000 AF acquisition program would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), which would adversely impact passerine species associated with irrigated farmland and associated drains and canals.

Mitigation Measures

Loss of some artificially-created riparian plant communities and a portion of agricultural habitats, and associated impacts to passerine birds using these habitats would be unavoidable impacts under all action alternatives. Please refer to Sections 4.7.2, 4.16.3, and 4.16.4 for discussions on possible mitigation measures for impacts to artificially-created riparian habitat and irrigated farmland.

For some species that could be adversely impacted by reductions in irrigated farmland and/or artificially-created riparian habitat, such as yellow-headed blackbirds and song sparrows, the increase in wetland habitat would offset some of the adverse impacts. Loss of artificially-created riparian habitat and possible impacts to passerine birds could potentially be mitigated, in part, by reestablishing cottonwood and willow communities along the lower Carson River within the Stillwater WMA.

4.9.5 RAPTORS

Alternative 1: *Raptors, as a group, use wetland, riparian, agricultural, and desert shrub habitats. Some raptors nest and hunt in wetland habitats. Other raptors are less wetland-associated but are opportunistic hunters that make use of the wetlands on occasion. Riparian areas are heavily used by a number of raptors, as they provide large trees, such as cottonwoods, that are used for nesting and perching. With the exception of bald eagles, very little raptor population data is available. (Bald eagles are discussed in Section 4.13, ENDANGERED, THREATENED AND SENSITIVE SPECIES.)*

Alternatives 2, 3, 4, and 5:

The Proposed Action and other action alternatives would increase primary wetland habitat by 107 percent over baseline conditions and would thereby positively benefit raptors that make use of wetland habitat. Raptor species that make extensive use of agricultural lands for hunting and associated artificially-created riparian habitat for perching, hunting, and/or nesting (e.g., sharp-shinned hawks, red-tailed hawks, American kestrels, great horned owls, screech owls) could be adversely impacted by the reduction in irrigated agricultural lands

and any reduction in drains and canals bordered by trees. However, some species of raptors that use irrigated farmland (for example, red-tailed hawks) may simply shift their use distribution to other habitats, such as those created by vacant fields. Also, the increased diversity in habitat brought about by conversion of farmland to non-irrigated land could benefit some species. The substantial reduction in irrigated farmland that would result from the action alternatives would have at least some impact to species that use farmland under baseline conditions, the adverse impacts being highest under Alternative 4 and least under Alternative 5 (Preferred Alternative). Habitat in the major riparian corridors would not be adversely affected by the Service's action.

Comparison with No Acquisition Conditions: *In total, primary wetland habitat would increase from an estimated 9,700 acres (no acquisition conditions) to about 15,300 acres (158 percent increase) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Consequently, wetland habitat available to wetland-associated raptors would double as a result of the water rights acquisition program. In total, the Preferred Alternative and 20,000 AF acquisition program would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), which would adversely impact raptor species associated with irrigated farmland and associated drains and canals.*

Mitigation Measures

Reductions in irrigated farmland habitat and artificially-created riparian habitat would largely be unavoidable impacts under all action alternatives. *Please refer to Sections 4.7.2, 4.16.3, and 4.16.4 for discussions on possible mitigation measures for impacts to artificially-created riparian habitat and irrigated farmland.*

4.9.6 OTHER BIRD SPECIES

Alternative 1: Many of the upland fowl species inhabiting the Lahontan Valley, such as California quail, ring-necked pheasant, and wild turkey are associated with agricultural areas. Chukar, another upland fowl species, inhabits dry, rocky slopes. Morning doves that inhabit the affected area also use agricultural areas. Riparian habitat, including artificially-created riparian habitat along Newlands Project drains and canals, are also used by some of these species. Ring-necked pheasant, wild turkeys, and Chukar are introduced species. Baseline conditions for other bird species are presented in Section 3.9.6.

Alternatives 2, 3, 4, and 5: The Service's action to acquire water for the wetlands would greatly reduce the extent of agricultural habitat available to California quail, ring-necked pheasant, and mourning doves. The Service expects that these and other species associated with agricultural areas would be adversely impacted by the Proposed Action and other action alternatives *as compared to baseline conditions*.

Because California quail and mourning doves make use of a broader range of habitats (including residential, fallow-field, and, to some extent, desert shrub habitat) compared to ring-necked pheasants and wild turkeys, the adverse impacts to these species would be proportionally less.

Comparison with No Acquisition Conditions: *In total, the Preferred Alternative, would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), which would adversely impact ring-necked pheasants, wild turkeys, and to some extent, California quail and mourning doves.*

Mitigation Measures

Reductions in irrigated farmland habitat and artificially-created riparian habitat would largely be unavoidable impacts under all action alternatives. *Please refer to Sections 4.7.2, 4.16.3, and 4.16.4 for discussions on possible mitigation measures for impacts to artificially-created riparian habitat and irrigated farmland. Alternative 5 was designed in part to minimize adverse impacts to irrigated farmland, which in turn would minimize, as compared to the Proposed Action and other action alternatives, the possible adverse impacts to ring-necked pheasants, wild turkeys, California quail, and mourning doves.*

4.10 EFFECTS ON MAMMALS

The highest diversity of mammals is associated with the upland desert shrub habitats in the affected area, and relatively few species are associated with primary wetland habitats. Under **Alternative 1**, mammal populations would not change substantially from baseline conditions, from the standpoint of Service actions.

Alternatives 2, 3, 4, and 5: Mammals associated with wetlands would benefit greatly under *all action alternatives, which would increase primary wetland acreage from about 12,100 acres (baseline conditions) to a long-term average of about 25,000 acres, a 107 percent increase.* Mammal species inhabiting desert shrub habitats *in the affected area* would largely be unaffected by the Proposed Action and other action alternatives, *but would benefit in localized areas in the Carson Division where irrigated farmland is converted to desert shrub habitat.* However, mammal species associated with irrigated farmland or artificially-created strips of riparian habitat along Newlands

Project drains and canals would be affected by the Proposed Action and other action alternatives, but the magnitude of impact would depend on the actual pattern of water rights acquisition and therefore cannot reasonably be predicted.

Comparison with No Acquisition Conditions: In total, primary wetland habitat would increase from an estimated 9,700 acres (no acquisition conditions) by about 15,300 acres (158 percent increase) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Consequently, the water rights acquisition program, in total, would substantially benefit mammals associated with wetland habitats in the Lahontan Valley. In total, the Preferred Alternative, would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), which would adversely impact mammal species associated with irrigated farmland and associated drains and canals.

Mitigation Measures

Reductions in irrigated farmland habitat and artificially-created riparian habitat would largely be unavoidable impacts under all action alternatives. *Please refer to Sections 4.7.2, 4.16.3, and 4.16.4 for discussions on possible mitigation measures for impacts to artificially-created riparian habitat and irrigated farmland.*

4.11 REPTILES AND AMPHIBIANS

Alternative 1: Many reptile species in the affected area are associated with the upland desert shrub habitat. Amphibians, due to their water dependency, are most closely linked to wetlands and riparian corridors in the affected area. Water quality is known to directly impact the reproductive potential and abundance of amphibians.

Alternatives 2, 3, 4, and 5: The Service does not expect any adverse impacts to reptiles inhabiting desert shrub habitat to occur as a result of its actions to acquire water for wetlands protection, and some may benefit in localized areas in the Carson Division as irrigated farmland is converted to non-irrigated uses. Amphibians are expected to benefit under the action alternatives, as primary wetland habitat acreage would increase by 107 percent, and water quality would be enhanced under Alternatives 2,3, and 4. The Service expects both reproduction and abundance of amphibians to increase as the wetlands receive increased volumes of better quality water.

Water quality under Alternative 5 would not increase to the extent that it would under Alternatives 2,3, and 4 due to the higher reliance on drainwater and potential use of groundwater. If substantial

use of groundwater of low quality is made, there is the potential to reduce water quality below that of the No Action Alternative. However, wells would be sited and water quality of wells would be monitored to ensure that water quality of total wetland inflow is not adversely affected (as compared to baseline conditions) by using groundwater. Under Alternative 5, conditions may not be as conducive to increasing populations and abundance of amphibians in the primary wetland areas, as compared to the other action alternatives.

Comparison with No Acquisition Conditions: *In total, primary wetland habitat would increase from an estimated 9,700 acres (no acquisition conditions) by about 15,300 acres (158 percent increase) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Therefore, wetland habitat in the Lahontan Valley potentially available to amphibians and wetland-associated reptiles would double as compared to no acquisition conditions.*

Mitigation Measures

Mitigation for impacts associated with poor quality groundwater under Alternative 5 would be to reduce reliance on this water source for wetland inflow and ensure that water quality is not adversely impacted if it is used. Possible mitigation measures related to groundwater are addressed in more detail in Section 4.3.2, SURFACE WATER QUALITY.

4.12 EFFECTS ON INVERTEBRATES

Alternative 1: There is little information on the abundance and occurrence of invertebrates in the affected area. Data shows that invertebrate diversity in aquatic environments is related to water quality.

Alternatives 2, 3, 4, and 5: The Service expects that the Proposed Action and other action alternatives would substantially increase the volume of better quality water reaching the primary wetland areas. Such increases would generally benefit invertebrates in these areas. With improved water quality, some fresh-water clams, mussels and snails might be reestablished in the primary wetland areas.

Water quality under Alternative 5 would not increase to the extent that it would under Alternatives 2,3, and 4 due to the higher reliance on drainwater and potential use of groundwater. If substantial use of groundwater of low quality is made, there would be the potential to reduce water quality below that of the No Action Alternative. However, wells would be sited and water quality of wells would be monitored to ensure that water quality of total wetland inflow is not adversely affected

(as compared to baseline conditions) by using groundwater. Under Alternative 5, conditions may not be as conducive to increasing aquatic invertebrate populations in the primary wetland areas, as compared to the other action alternatives.

Comparison with No Acquisition Conditions: In total, primary wetland habitat would increase from an estimated 9,700 acres (no acquisition conditions) by about 15,300 acres (158 percent increase) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative.

Mitigation Measures

Mitigation for impacts associated with poor quality groundwater under Alternative 5 would be to reduce reliance on this water source for wetland inflow and ensure that water quality is not adversely impacted if it is used. Possible mitigation measures related to groundwater are addressed in more detail in Section 4.3.2, SURFACE WATER QUALITY.

4.13 EFFECTS ON ENDANGERED, THREATENED, AND SENSITIVE SPECIES

Chapter 3 (Section 3.13) describes baseline conditions (No Action Alternative) for endangered and threatened species, candidate species, and species of concern. These species are in generally referred to as E-T-S species (endangered, threatened, and sensitive species). A Section 7 consultation was completed for the Preferred Alternative and is included as Appendix 9. It is summarized after "Alternative 5" below.

Alternative 1: E-T-S species make use of a variety of habitats within the affected area. These species are discussed in relation to the impact associated with their preferred habitats. Species that make dual use of habitats are also noted.

E-T-S species associated with wetlands are peregrine falcons, bald eagles, white-faced ibis, black terns, Western snowy plovers, long-billed curlews, Western least bitterns, trumpeter swans, Northwestern pond turtles, and Lahontan tui-chubs.

The E-T-S species associated with upland shrub habitats and agricultural areas include mountain plovers, ferruginous hawks, and loggerhead shrikes. White-faced ibis forage in agricultural areas *in addition to wetland habitats*. Bald eagles also use agricultural areas on occasion.

The E-T-S species that rely on riparian habitat include Nevada viceroy (a willow-dependent butterfly) and yellow-billed cuckoos. Bald eagle use riparian habitats in several areas for roost sites.

E-T-S species that inhabit rivers, reservoirs and lakes include Cui-ui, Lahontan Creek tui-chub and Lahontan cutthroat trout.

Alternative 2: Under this alternative, primary wetland habitat would increase 107 percent, thereby benefitting those E-T-S species associated with this habitat. Increased volumes of better quality water could increase fish populations, thereby benefitting fish-eating species such as bald eagles. White-faced ibis, black terns, Western snowy plovers, long-billed curlews, and Western least bitterns would benefit substantially as both nesting and foraging opportunities in the primary wetland areas increased. *Trumpeter swans would also benefit as a consequence of increased wetland habitat acreage. The large reduction in irrigated farmland would reduce available feeding areas for white-faced ibis, but the amount of irrigated farmland that would be taken out of production under Alternative 2 is not expected to adversely impact the white-faced ibis population.*

Wetland habitat utilized by wintering bald eagles would increase to about 25,000 acres in the primary wetland areas under this alternative, which would have positive effects on wintering bald eagles. There would continue to be adequate habitat and food supplies for the 30 or more bald eagles that traditionally inhabit the Lahontan Valley in the winter.

Under this alternative, there is expected to be approximately 10,200 acres of wetland habitat on Carson Lake, which is a traditional peregrine falcon hunting area. Because wetland-dependent birds are a primary food of peregrine falcons, a more reliable water supply at Carson Lake would benefit peregrine falcons. Increased acreage of wetland habitat at Stillwater NWR may provide enough suitable wetland habitat to attract additional peregrine falcons to the Lahontan Valley.

Even with a large reduction in irrigated farmland (including pastureland) that would occur under Alternative 2, impacts to E-T-S species such as mountain plovers, ferruginous hawks, and loggerhead shrikes, which use agricultural lands and other upland habitats, are expected to be minimal or non-existent.

The riparian corridor habitats along the Carson River and Lower Truckee River would be unaffected by the Service's Proposed Action. Yellow-billed cuckoos would be unaffected by this alternative. *Bald eagle use of these habitats would not be impacted.*

Habitat for the Nevada viceroy may diminish to a small degree if some drains are abandoned due to the purchase and transfer of water rights for the primary wetlands. However, the distribution of the Nevada viceroy is primarily limited to the Humboldt River drainage and few records exist for the Carson River drainage. The importance of the Lahontan Valley to this species is unknown, data on the extent of Nevada viceroy occurrence in existing willow-lined drains and other waterways is lacking, and it is not known which drains, if any, might be eliminated in the Carson Division.

Alternative 2 would not adversely impact willow habitat along the Lower Carson River and, therefore, is not expected to impact the Nevada viceroy, a willow-dependent butterfly.

E-T-S species that inhabit rivers, reservoirs, and lakes in the affected area would benefit under the Proposed Action. The Service's Proposed Action to acquire water for the wetlands would result in increased inflows to Pyramid Lake (almost 4 percent over the No Action Alternative). This would effectively increase Pyramid Lake elevations over the long-term, thereby benefitting cui-ui, Lahontan Cutthroat Trout and Lahontan tui-chub. The Service calculates that increased flows and lake elevations would result in a 38 percent increase to the cui-ui index over the No Action Alternative. The cui-ui index is a population index of reproductive females that simulates the reproductive response to different hydrologic factors.

Alternative 3: Under the Least Cost Alternative, primary wetland habitat would increase 107 percent over the No Action Alternative, thereby benefitting those E-T-S species associated with this habitat. Increased volumes of better quality water could increase foraging opportunities for bald eagles, and benefits would be similar to those described under *Alternative 2*. White-faced ibis, black terns, Western snowy plovers, long-billed curlews, and Western least bitterns would also benefit substantially as both nesting and foraging opportunities in the primary wetland areas increased. *Trumpeter swans would also benefit as a consequence of increased wetland habitat acreage. The large reduction in irrigated farmland would reduce available feeding areas for white-faced ibis, but the amount of irrigated farmland that would be taken out of production under Alternative 3 is not expected to adversely impact the white-faced ibis population.*

Even with a large reduction in irrigated farmland that would occur under Alternative 3, impacts to E-T-S species such as mountain plovers, ferruginous hawks, and loggerhead shrikes, which use agricultural lands and other upland habitats, are expected to be minimal or non-existent.

The riparian corridor habitats along the Carson River and Lower Truckee River would be unaffected by the Service's Proposed Action. Yellow-billed cuckoos would be unaffected by this alternative. *Bald eagle use of these habitats would not be impacted. Habitat for the Nevada viceroy may diminish to a small degree, but potential impacts would be less than those that could occur under Alternative 2.*

E-T-S species that inhabit rivers, reservoirs, and lakes in the affected area would benefit (albeit slightly) under the Alternative 3. Cui-ui would receive slight benefits (less than 1 percent increase in Pyramid Lake inflows) under this alternative. As a result of the slight increase in lake inflows, the cui-ui index, a reproductive response simulation for the species, shows a 3 percent increase over the No Action Alternative, which is 35 percent less than the conditions that would result under the Proposed Action.

Alternative 4: Under the Maximum Acquisition Alternative, primary wetland habitat would increase 107 percent over the No Action Alternative, thereby benefitting those E-T-S species associated with this habitat. Because this alternative excludes drainwater from wetlands management, the quality of wetland inflows would be highest under this alternative. The overall quality of primary wetland habitat would be highest under this alternative due to the water quality component.

Increased volumes of the highest quality water would increase forage opportunity for bald eagles and peregrine falcons, and benefits would be similar to that described under Alternative 2. White-faced ibis, black terns, Western snowy plovers, long-billed curlews, Western least bitterns, and trumpeter swans would also benefit substantially with increased nesting and foraging opportunities in the primary wetland areas. *Trumpeter swans would also benefit as a consequence of increased wetland habitat acreage. The large reduction in irrigated farmland would reduce available feeding areas for white-faced ibis, and this could potentially adversely impact white-faced ibis.*

Even with the large reduction in irrigated farmland that would occur under Alternative 4, impacts to E-T-S species such as mountain plovers, ferruginous hawks, and loggerhead shrikes, which use agricultural lands and other upland habitats, are expected to be minimal or non-existent.

The riparian corridor habitats along the Carson River and Lower Truckee River would be unaffected by the Service's Proposed Action. Yellow-billed cuckoos would be unaffected by this alternative. *Bald eagle use of these habitats would not be impacted. Habitat for the Nevada viceroy may diminish to a small degree (this alternative would have the most adverse impacts to artificially-created riparian habitat).*

E-T-S species that inhabit rivers, reservoirs, and lakes in the affected area would receive the greatest benefit under the Maximum Acquisition Alternative. Pyramid Lake inflows would increase over 5 percent over the No Action Alternative, thereby benefitting Lahontan tui-chub, Lahontan cutthroat trout and cui-ui. Under the Maximum Acquisition Alternative, the cui-ui index is calculated to increase by 70 percent over the No Action Alternative, about 38 percent more than the Proposed Action.

Alternative 5: Under the *Preferred Alternative*, primary wetland habitat would increase 107 percent, thereby benefitting those E-T-S species associated with this habitat. Increased volumes of water would increase fish, *waterfowl, and shorebird* populations, thereby benefitting E-T-S species (bald eagles and peregrine falcon) that feed on them. White-faced ibis, black terns, Western snowy plovers, long-billed curlews, and Western least bitterns would benefit as both nesting and foraging opportunities in the primary wetland areas increased. *Trumpeter swans would also benefit as a consequence of increased wetland habitat acreage. The reduction in irrigated farmland would reduce available feeding areas for white-faced ibis, but the extent to which this would occur under Alternative 5 would not adversely impact the white-faced ibis population.*

Water quality under Alternative 5 would not improve to the extent that it would under Alternatives 2, 3, and 4 due to the higher reliance on drainwater and potential use of groundwater. If substantial use of groundwater of low quality is made, there would be the potential to reduce water quality below that of the No Action Alternative. However, wells would be sited and water quality of wells would be monitored to ensure that water quality of total wetland inflow is not adversely affected (as compared to baseline conditions) by using groundwater.

Even with the reduction in irrigated farmland that would occur under Alternative 5, impacts to E-T-S species such as mountain plovers, ferruginous hawks, and loggerhead shrike, which make use of agricultural lands and other upland habitats, are expected to be minimal or non-existent. In comparison to the other action alternatives, Alternative 5 would result in the fewest acres of irrigated-farmland being converted to non-irrigated uses.

The riparian corridor habitats along the Carson River and Lower Truckee River would be unaffected by Alternative 5, and, therefore, yellow-billed cuckoos would be unaffected by this alternative and bald eagle use of these habitats would not be impacted. Habitat for the Nevada viceroy may diminish to a small degree, but the impacts would be less than those that would occur under Alternative 2.

E-T-S species that inhabit rivers, reservoirs, and lakes in the affected area would benefit slightly under Alternative 5. The Service's Proposed Action to acquire water for the wetlands would result in 1-2 percent increases in Pyramid Lake inflows over the No Action Alternative. This would offer slight benefits to Lahontan Cutthroat Trout, Lahontan tui-chub, and cui-ui. The Service calculates that the cui-ui index would increase 15 percent over the No Action Alternative.

Comparison with No Acquisition Conditions: As compared to no acquisition conditions, positive and negative impacts would be magnified somewhat. In total, primary wetland habitat would increase from an estimated 9,700 acres (no acquisition conditions) by about 15,300 acres (158 percent increase) under the Preferred Alternative. Although secondary wetlands may be slightly impacted, the long-term average amount of wetland habitat in the Lahontan Valley (primary and secondary wetland habitats combined) would increase from about 14,200 acres under no acquisition conditions to nearly 30,000 acres under the Preferred Alternative. Correspondingly, E-T-S species associated with or dependent on wetland habitat would benefit greatly from Alternative 5.

In total, the Preferred Alternative, would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), which could adversely impact E-T-S species associated with irrigated farmland and associated drains and canals.

Summary of Intra-Service Section 7 Evaluation

The following is the conclusion of the Service's Intra-Service Section 7 Evaluation, which was completed pursuant to Section 7 of the Endangered Species Act. The evaluation, which is included in full in Appendix 9, addressed only threatened, endangered, and candidate species.

Water rights acquisitions for the Lahontan Valley wetlands, under the Preferred Alternative, is not expected to adversely impact any of the potentially-affected endangered, threatened, and candidate

species. Moreover, the Preferred Alternative is expected to benefit all of these species, except possibly the mountain plover, which is not expected to be affected.

Increased wetland acreage and a more consistent supply of higher quality water resulting from implementation of the Preferred Alternative is expected to positively affect bald eagles and peregrine falcons. A greater amount of wetland habitat of higher quality would enhance populations of fish and wintering-waterfowl in the Lahontan Valley, which in turn would benefit bald eagles. Populations of resident, breeding, and migratory populations of waterfowl and shorebirds are expected to increase, which would have positive effects on peregrine falcons. It is not anticipated that mountain plover, which rarely occur in the Lahontan Valley, would be influenced by the Preferred Alternative.

Transferring water rights to Lahontan Valley wetlands under the Preferred Alternative, and exercising a use-rate of 2.99 AF/acre/year would not reduce Truckee River flows below that of baseline conditions. Moreover, Truckee River flows could slightly increase under the Preferred Alternative. Consequently, the Preferred Alternative is not likely to adversely affect cui-ui or Lahontan cutthroat trout. It is anticipated that implementation of the preferred alternative would have a slight benefit to these species.

Mitigation Measures

None of the alternatives are anticipated to adversely impact endangered and threatened species, and none of the alternatives would have significant impacts to populations of species of concern. The Service is committed to ensure that water rights acquisitions for primary wetlands do not increase Truckee River diversions at Derby Dam. Reductions in irrigated farmland habitat would largely be unavoidable impacts under all action alternatives. Please refer to Sections 4.16.3 and 4.16.4 for discussions on possible mitigation measures for impacts to irrigated farmland. Alternative 5 was designed in part to minimize adverse impacts to irrigated farmland, which in turn would minimize, as compared to the Proposed Action and other action alternatives, the possible adverse impacts to white-faced ibis. Please see section 4.3.2 for measures to mitigate potential adverse impacts associated with groundwater pumping.

4.14 EFFECTS ON TOXICITY AND AVIAN DISEASES

Under baseline conditions in **Alternative 1**, (No Action Alternative), poor quality wetland inflows and anaerobic conditions have caused toxicity and avian disease problems in Lahontan Valley wetlands.

Increased volumes of better quality water would offset these conditions in the primary wetland habitats at the onset, and would dilute total dissolved-solids concentrations over the long term. Additional flow volumes would increase oxygen levels and would also offer wetland managers

increased flexibility in management of hydrologic regimes. By varying hydrologic regimes, wetland managers could control outbreaks of avian *botulism* and cholera.

Alternative 2: This alternative would rely on a calculated average of about 13,000 AF/year of drainwater, which amounts to 10 percent of total wetland inflows. This represents a 44 percent decrease in drainflows as compared to the No Action baseline condition. Under Alternative 2, reduced drainflows and increased volumes of better quality water would decrease concentrations of total dissolved-solids in the primary wetland habitats by about 54 percent, thereby benefitting aquatic insects, invertebrates, fish, wildlife, and wetland habitat. Concentrations of contaminants associated with total dissolved-solids are also expected to decline, but there is insufficient information to determine the magnitude of change. As compared to the baseline, initial wetland inflow would be of higher quality, which is expected to slow the natural water quality degradation process that occurs in terminal wetlands.

Because mercury occurs in sediment in the Lahontan Valley, this contaminant would not be affected by the Service's action to acquire water for the wetlands. Comparable to the No Action Alternative, this contaminant would continue to be mobilized in flood years, but the Service does not expect increased acreage of wetlands to exacerbate this problem.

Under this alternative, wetland managers would have more flexibility to alter hydrologic regimes and thereby limit avian disease outbreaks such as avian botulism and cholera. If for instance, an infected area was identified, water to the area could be reduced or increased to alter conditions and discourage bird use in the area. Although cholera occurs more rarely in the Lahontan Valley wetlands, expanded wetland acreage would decrease the potential for crowding that can occur under baseline conditions, which is a key factor in cholera outbreaks.

Slight adverse impacts to water quality in the secondary wetlands could potentially occur under the Alternative 2, as those areas that rely on drainwater for sustenance would experience decreased flows as irrigated farmlands were retired.

Alternative 3: The Least Cost Alternative would rely on a calculated average of about 18,600 AF/year of drainwater, which amounts to 15 percent of total wetland inflows. This represents a 39.1 percent decrease in drainflows from the No Action baseline condition. Under this alternative, reduced drainflows and increased volumes of better quality water are expected to decrease concentrations of total dissolved-solids in the primary wetland habitats by about 47 percent from the No Action Alternative. This action would benefit aquatic insects, invertebrates, fish, wildlife, and wetland habitat. As compared to the baseline, initial wetland inflow would be of better quality, which is expected to slow the natural water quality degradation process that occurs in terminal wetlands.

Inorganic contaminants such as arsenic, boron, and selenium would correspond to decreased total dissolved-solids concentrations in the primary wetland habitats, and would probably show long-term declines under Alternative 3. There is insufficient information to determine the magnitude of this change. Because mercury occurs in sediment in the Lahontan Valley, this contaminant would not be affected by the Service's action to acquire water for the wetlands. Comparable to the No Action Alternative, this contaminant would continue to be mobilized in flood years, but the Service does not expect increased acreage of wetlands to exacerbate this problem.

Similar to *Alternative 2*, this alternative would offer wetland managers the flexibility to alter hydrologic regimes to limit avian disease outbreaks. Slight adverse impacts to water quality in the secondary wetlands could potentially occur under Alternative 3, as those areas that rely on drainwater for sustenance would experience decreased flows as irrigated farmlands were retired.

Alternative 4: The Maximum Acquisition Alternative would exclude drainwater from wetlands management and therefore would offer the most benefit to water quality for the primary wetland habitats. Under this alternative, increased volumes of relatively high quality water could potentially decrease concentrations of total dissolved-solids (and related inorganic contaminants) in the primary wetland habitats by 64 percent. *This alternative would result in the highest water quality of wetland inflows, and* thereby offer the greatest benefit to aquatic life, invertebrates, fish, wildlife, and wetland habitat. As compared to the baseline, initial wetland inflow would be of the highest quality, which is expected to slow the natural water quality degradation process that occurs in terminal wetlands.

Under Alternative 4, inorganic contaminants such as arsenic, boron, and selenium would correspond to decreased total dissolved-solids concentrations in the primary wetland habitats, and would probably decline substantially over the long term. There is insufficient information to determine the magnitude of this change. Because mercury occurs in sediment in the Lahontan Valley, this contaminant would not be affected by the Service's action to acquire water for the wetlands. Comparable to the No Action Alternative, this contaminant would continue to be mobilized in flood years, but the Service does not expect increased acreage of wetlands to exacerbate this problem.

Similar to Alternative 2, this alternative would offer wetland managers more flexibility for altering hydrologic regimes to limit avian disease outbreaks.

Slight adverse impacts to water quality in the secondary wetlands could potentially occur under the Alternative 4, as those areas that rely on drainwater for sustenance would experience decreased flows as irrigated farmlands were retired.

Alternative 5: The *Preferred* Alternative would rely on a calculated average of about 19,700 AF/year of drainwater, which amounts to about 16 percent of total wetland inflows. This represents a 38 percent decrease in drainflows from the No Action baseline condition. *Under this*

alternative, increased volumes of relatively high quality water could potentially decrease concentrations of total dissolved-solids (and related inorganic contaminants) in the primary wetland habitats, as compared to the No Action Alternative. However, the extent to which higher water quality would result from Alternative 5 would depend on the amount of groundwater used.

Due to this alternative's potential use of groundwater, the quality of wetland inflows to the primary wetlands could potentially decline from the No Action Alternative. *However, wells would be sited and water quality of wells would be monitored to ensure that water quality of total wetland inflow is not adversely affected (as compared to baseline conditions) by using groundwater.* If no groundwater was used, or a minimal amount was used under this alternative, water quality would be comparable to that described under Alternative 3. Impacts described below correlate to use of groundwater for this alternative.

Because groundwater in the pumping area is known to be toxic (Hoffman, 1994), *groundwater pumping would contribute to lower water quality of wetland inflows. If groundwater is used as a water source for primary wetlands during the initial stages of Alternative 5's acquisition program, water quality of wetland inflows could be comparable to or worse than the No Action baseline conditions as a consequence of the proportionally low amount of higher quality irrigation water being delivered to the wetlands. As more irrigation water rights are purchased or leased, the potential problems would decline.* Poorer quality water at the onset is expected to exacerbate the water quality degradation process that occurs in terminal wetlands.

Inorganic contaminants such as arsenic, boron, and selenium would correspond to increased dissolved-solids concentrations in the primary wetland habitats, and could potentially cause toxicity problems over the long-term if groundwater was used. Because mercury occurs in sediment in the Lahontan Valley, this contaminant would not be affected by the Service's action to acquire water for the wetlands. Comparable to baseline conditions, this contaminant would continue to be mobilized in flood years, but the Service does not expect increased acreage of wetlands to exacerbate this problem.

Those species that are sensitive to increased concentrations of total dissolved-solids (aquatic insects and invertebrates) could be adversely affected by this action. Similar to the Proposed Action, this alternative would offer wetland managers the flexibility to alter hydrologic regimes to limit avian disease outbreaks. Slight adverse impacts to water quality in the secondary wetlands could potentially occur under Alternative 5, as those areas that rely on drainwater for sustenance would experience decreased flows as irrigated farmlands were retired.

Similar to the other action alternatives, this alternative would offer wetland managers more flexibility for altering hydrologic regimes to limit avian disease outbreaks.

Comparison with No Acquisition Conditions: Impacts of Alternative 5, when compared against no acquisition conditions, would be similar to the impacts of the alternative when compared against baseline conditions, as described above.

Mitigation Measures

All of the alternatives provide for the acquisition of irrigation water rights which allow wetland managers to call for the delivery of water which could be used to mitigate or prevent toxicity problems or disease outbreaks. Irrigation water deliveries are limited to the irrigation season, but in most situations this would not be detrimental to wetland toxicity or avian disease control. *Specific to the potential use of groundwater in Alternative 5, please see mitigation measures in Section 4.3.2, Surface Water Quality.*

4.15 EFFECTS ON BIODIVERSITY

Under the No Action Alternative, native and overall biodiversity would not be expected to change substantially from the baseline conditions described in Section 3.15.

Alternatives 2, 3, 4, and 5:

Potential impacts to native and overall biodiversity essentially represents the total cumulation of impacts to the plant communities and wildlife described in the preceding sections (Sections 4.7 through 4.13). Therefore, any one aspect of the impacts to biodiversity can be found in the appropriate section.

All of the action alternatives would enhance native biodiversity, primarily as a consequence of increased acreage of wetland habitat over the No Action Alternative. The limited amount of information available precludes *definitive* judgements as to whether overall biodiversity in the affected area would increase or decrease as a result of these alternatives.

In wetland areas, both native and overall biodiversity would be enhanced by any of the action alternatives. Because all action alternatives would meet the Service's objective of 25,000 acres of primary wetland habitat, the main difference between the effects of alternatives on biodiversity in wetland areas would stem from their respective effects on water quality. Water flowing into the primary wetland areas would be of highest quality under Alternative 4 and potentially lowest under Alternative 5. This means that Alternative 4 would provide the greatest opportunity for native and overall biodiversity of wetland areas to be enhanced. The extent to which native and overall biodiversity are enhanced in primary wetland areas, regardless of action alternative, would depend in large part on management of water within those areas (to be addressed in an upcoming Comprehensive Management Plan for Stillwater NWR).

The number of animal species that currently exist in the Lahontan Valley (one aspect of biodiversity), compared to baseline conditions, is not expected to change under any of the action alternatives. However, use of wetland areas by some species is expected to change substantially. For example, increasing acres of primary wetland habitat to a long-term average of 25,000 acres is expected to greatly enhance waterfowl and shorebird use of wetlands in the affected area, possibly reaching levels that occurred in the early 1970s. Increased productivity of species using Lahontan Valley wetlands also would be expected under all of the action alternatives. To the extent that water quality negatively impacts productivity of waterfowl and other wildlife, Alternative 4 would provide the most benefits, while Alternative 5 would potentially provide the least benefits to productivity (of the action alternatives).

The abundance and biomass of most marsh plants would increase substantially as a result of increased and more dependable water supplies to the primary wetland areas. Because water deliveries to the wetlands would be made up of a higher proportion of irrigation water (in contrast to drainwater), marsh plant communities would be healthier, more productive, and more diverse than they were under conditions in 1989 when the wetlands were supplied solely by drainwater from the Newlands Project. Benefits to marsh plant communities were discussed under Section 4.7.1. On the other hand, abundance of plants associated with Newlands Project canals and drains could decline to the extent that canals and drains are abandoned.

Conversion of irrigated farmland and associated drains and canals to desert shrub habitat would add to native biodiversity in the Lahontan Valley. However, because of the vast amount of desert shrub habitat in the affected area and because lands converted to desert shrub habitat would be interspersed with other habitats (i.e., they would not be part of contiguous blocks of desert shrub habitat), benefits to native biodiversity would be negligible. Native biodiversity in upland areas and riparian areas is not expected to change appreciably compared to baseline conditions as a result of actions identified in the action alternatives.

Overall biodiversity in upland areas and riparian areas, however, would decline somewhat as more land is converted to non-agricultural uses and less water is conveyed through canals and drains. Under the action alternatives, species that depend on agricultural areas would be negatively impacted. Some species associated with riparian areas also may decline in abundance, but changes are not expected to be significant; substantial riparian habitat would remain under these alternatives. Effects generally would correspond to the amount of irrigated farmland taken out of production (Section 4.2.1) and impacts to drains and canals (Section 4.7.2) for each alternative. Negative impacts to overall biodiversity in uplands would be highest under Alternative 4, but the magnitude of differences in impacts among action alternatives is unclear.

Comparison with No Acquisition Conditions: *As compared to no acquisition conditions, positive and negative impacts would be magnified somewhat. In total, primary and secondary wetland habitat would increase from an estimated 14,200 acres (no acquisition*

conditions) to about 30,000 acres under the Preferred Alternative. Correspondingly, native and overall biodiversity associated with wetlands would benefit greatly from Alternative 5.

In total, the Preferred Alternative would result in about a 40 percent reduction in irrigated farmland as compared to no acquisition conditions (about 52,800 acres in the Carson Division), which would adversely impact biodiversity associated with irrigated farmland and associated drains and canals; would enhance biodiversity associated with desert shrub and other upland habitats; and would benefit native biodiversity.

Native biodiversity Lahontan Valley-wide would greatly benefit from the Preferred Alternative, as compared to no acquisition conditions. It is not clear whether overall biodiversity Lahontan Valley-wide would increase or decrease as a result of the two actions combined.

Mitigation Measures

There is no indication that native or overall biodiversity in the affected area would decrease as a result of any of the action alternatives. All action alternatives would substantially benefit native biodiversity. Adverse impacts to overall biodiversity associated with loss of irrigated farmlands would be unavoidable. Potential impacts to overall biodiversity associated with artificially-created riparian areas could be mitigated, in part, by adjusting delivery patterns of water to the primary wetlands. Potential delivery patterns will be identified and evaluated in the upcoming Comprehensive Management Plan for Stillwater NWR. In terms of overall biodiversity of the affected area as a whole, increased biodiversity associated with the Lahontan Valley wetlands should offset the reduced biodiversity in agricultural areas and artificially-created riparian habitats. *Please see mitigation section for vegetation communities and wildlife species groups.*

SOCIO-ECONOMIC RESOURCES

4.16 EFFECTS ON AGRICULTURE, FARMLAND, AND LOCAL ECONOMY

Effects on regional agriculture were analyzed by Meyer (1993) and Sunding (1994) (see Appendices 9 and 6). Impacts on Newlands Project farm acreage are taken directly from the Below Lahontan Reservoir (BLR) and Negotiated Settlement Model (NSM) Model results for each alternative (see Table 4.2.A). Impacts on agricultural production, employment, and income are derived from farm acreage impacts based on analyses that are driven by the following assumptions:

- ▶ alfalfa hay prices are assumed to average \$80/ton and \$100/ton for livestock- and dairy-grade alfalfa, respectively;

- ▶ alfalfa hay tonnage is based on the number of profitable cuttings of alfalfa per year for each of 30 different soil-type classes;
- ▶ production costs are adapted from Wheeler and Meyer (1990);
- ▶ direct impacts are based on the assumption that half of all locally produced alfalfa is consumed locally, and that transportation costs on imported (replacement) alfalfa will average \$15 per ton; and
- ▶ *the effects from* indirect impacts are derived from Churchill County income multipliers reported by the University of Nevada Reno (Harris and others, 1993) based on changes in alfalfa sector *income levels* (1.52 multiplier) and dairy/livestock sector *income levels* (1.68 multiplier).

4.16.1 EFFECTS ON AGRICULTURAL PRODUCTS AND RECEIPTS

For the purpose of this analysis, agricultural production focuses on alfalfa production and, to a lesser extent, its links to dairy and livestock economic activity. Production values and profit losses are determined by the productivity of irrigated lands in growing alfalfa hay. (*By focusing on alfalfa production*, this assumption ensures that economic impacts are not understated, as incorporation of other predominant crops, like barley and wheat, would tend to lower associated net income estimates.) Productivity is defined by total yield in tons per acre per year (tons/acre/year). Sunding (1994) uses an average production value of 6 tons/acre/year. This value is higher than the reported values of 4.32 tons/acre/year identified for alfalfa production in Churchill County in 1993 (Nevada Department of Agriculture, 1994). (This assumption ensures that economic impacts are not understated by using lower total yield values that may not take into account the value of "on-farm" use and non-market exchanges that play an important role in the farming economy. "On-farm" and non-market exchanges are farming transactions that incorporate crop production into livestock or dairy operations. For instance, a dairy operation that grows alfalfa will feed that crop "on-farm," and those crop values may not be reported as income.) Productivity of irrigated farmland varies due to a number of factors; soil quality and the number of cuttings made on a particular field each year are two factors that the Service analyzes. For example, in the Carson Division of the Newlands Project, soils vary tremendously and anywhere from 2 to 5 alfalfa cuttings are made each year. This yields from 2 to 8 tons of alfalfa per acre per year (*ibid*). In general, higher quality land will generate more cuttings per year than lower quality land.

One aspect of the willing seller provision in the Service's Proposed Action and other action alternatives is that, theoretically, the least productive farmlands would be retired, and the more productive farms would remain. The Service has calculated farm production impacts

based on a random acquisition pattern rather than one based on potential productivity linked to soil types. Once again this is done so as not to underestimate the adverse economic impacts that could be associated with a random acquisition pattern.

Based on the factors and assumptions identified above, the Service has calculated alfalfa production, sales, and profits; dairy and livestock profits linked to alfalfa production; total alfalfa generated income; total dairy- and livestock- generated income; and community income derived from alfalfa, dairy production, and livestock operations (Table 4.16.A). to define baseline conditions, and the relative differences between alternatives.

Alternative 1: Under this No Action Alternative, alfalfa production is calculated to be over 280,000 tons/year based on irrigated acreage figures identified in Section 3.2.1, NEWLANDS PROJECT IRRIGATED ACREAGE BASE. This amounts to an average annual yield of 6 tons/acre (Sunding, 1994). This value is substantially higher than the actual 1993 total of 134,000 tons which averaged 4.32 tons/acre/year. Using the higher production values also results in higher baseline conditions for alfalfa sales and alfalfa profits (Table 4.16.A) than those reported by MacDiarmid and others (1994b) in their economic description of agriculture in Churchill County (Table 3.16 A).

TABLE 4.16.A ALFALFA PRODUCTION, PROFIT, RELATED AGRICULTURAL PROFITS, AND ASSOCIATED INCOME IMPACTS

	(1) Alfalfa Output (tons/yr.)	(2) Alfalfa Sales (\$/year)	(3) Alfalfa Profits (Direct) (\$/year)	(4) Dairy and Livestock Profits (Indirect) (\$/year)	(5) Alfalfa Income (Direct + Linked) (\$/year)	(6) Dairy and Livestock Income (Indirect + Linked) (\$/year)	(7) <i>Estimated</i> Total Agricultural <i>Income</i> (\$/year)
ALT.1	283,122	25,172,665	3,517,526	1,866,085	5,346,639	3,135,023	8,481,662
ALT.2	88,088	7,832,010	1,094,414	403,333	1,663,509	677,600	2,341,109
ALT.3	123,258	10,958,972	1,531,363	667,103	2,327,671	1,120,733	3,448,404
ALT.4	68,105	6,055,295	846,143	253,461	1,286,137	425,815	1,711,952
ALT.5	163,225	14,512,419	2,027,906	966,849	3,082,417	1,624,306	4,709,723

Source: (1), (2), and (3) Sunding (1994), Table 2;(4) Sunding (1994), Table 3. (5) column (3) * 1.52 multiplier; (6) column (4) * 1.68 multiplier; and (7) column (5) + column (6).

The use of the higher baseline values is expected to reflect the "on-farm" value of alfalfa production rather than only addressing the more narrowly defined "sale" values. The Service's analysis may overstate or over estimate impacts from purely a market standpoint, but it is believed to reflect the overall economic importance of alfalfa production in the integrated farming operations that are fairly representative of conditions in Lahontan Valley.

These calculations assumed declines in high quality (dairy-grade) alfalfa would be offset by non-local purchases, while declines in lower quality (livestock-grade) alfalfa would be made up through reliance upon other readily available feeds of comparable value. In both situations, some dairy and livestock operators would incur additional expenses by importing alfalfa hay to maintain existing operations. Others would probably scale back operations to avoid reliance on imported feed as an indirect result of reduced alfalfa production. Therefore, the indirect effects of reduced alfalfa productions are calculated as profit losses for the dairy and livestock operators and incorporated into the total agricultural economic impact.

Most livestock (cattle) operations in the Lahontan Valley are integrated into an existing alfalfa farm. As such, it is possible that only those farmers willing to sell their water rights to the Service would experience adverse impacts to their livestock operations and that other livestock operators would be unaffected. This is not necessarily true for dairy operations, which may not be totally integrated farming operations and rely heavily on other alfalfa producers to support their operations. Therefore, dairy operations would be more adversely impacted by the Service's action than other livestock operations.

While the impacts associated with reduced crop production, particularly alfalfa, that result from the acquisition of agricultural water rights have been defined, the magnitude or community-wide effect takes on a different scale. MacDiarmid and others (1994b) show the total *industry output created by agriculture* in Churchill County to be about \$88 million, including economic linkages that exist between agriculture and other economic sectors (Table 3.16.C). *In total, the agricultural sector and its linked sectors contribute about 20 percent of the total economic activity* (\$442 million) in Churchill County. By using data developed by MacDiarmid and others (ibid) on the contribution alfalfa production makes to the agricultural sector (Table 3.16.A), it can be determined that crop production from irrigated farmlands accounts for about 4 percent of the \$442 million total economic activity in Churchill County. It is important to note that the data from which this comparative measure was derived does not include the contribution from State and Federal government sectors; hence, the estimated reductions in total economic activity shown in the following sections (in terms of industry output) are overstated.

Alternative 2: Under *this alternative*, alfalfa production and alfalfa sales would be reduced by about 69 percent from the No Action *Alternative* based on calculations by Sunding

(1994). Based on this percentage of reduction, there would be between \$6 and \$11 million lost in agricultural *income*.

Alternative 3: Under this alternative, alfalfa production and sales would decline by about 56 percent from the No Action Alternative. Using the same analysis described above, there would be between \$5 and \$9 million lost in agricultural economic *income* under this alternative.

Alternative 4: Under this Maximum Acquisition Alternative, alfalfa production and sales would be reduced by about 76 percent from the No Action Alternative. Using the same analysis described above, there would be between \$7 and \$12 million lost in agricultural *income* under this alternative.

Alternative 5: Under this alternative, the complete picture of potential losses to agricultural production and economic output are more difficult to assess. Because of the various water sources and acquisition methods that could be applied under this alternative, agricultural impact analysis can not focus solely on acres of irrigated land to be acquired. Some irrigated lands may only go out of production for a year or two at a time as a result of leasing. The Service can calculate (based on Sundings' analysis) the expected long-term declines in agricultural production and economic output for those agricultural water rights that would be acquired by fee purchase in the Carson Division of the Newlands Project. These fee purchase water right acquisitions (75,000 AF) would result in a 42 percent reduction in alfalfa production and sales from the No Action Alternative. When the impacts of leasing in the Carson Division are incorporated, alfalfa production and sales could be reduced by as much as 55 percent from the No Action Alternative. As a result, losses in agricultural *income* would range from \$3.8 million to \$8.8 million.

Comparison with No Acquisition Conditions: In total, the fee purchase of 75,000 AF of water rights would result in an estimated reduction in alfalfa production and sales (a calculated 315,100 tons/year and \$28,015,446/year, respectively, under no acquisition conditions) of about 48 percent from no acquisition conditions. When the impacts of leasing in the Carson Division are incorporated, alfalfa production and sales could decline by as much as 60 percent from no acquisition conditions.

Mitigation Measures

Water Right Splits

Agricultural production losses could be reduced by allowing the sale or lease of partial, or split water rights. Under this mitigation the Service would purchase or lease only a portion of a property owner's water right entitlement, thereby allowing a portion of the water right

to remain on the parcel. This would be accomplished by the irrigator splitting the water right entitlement on a per acre basis. For example, a farmer, by growing a crop that requires less water, could conserve part of the per acre water right entitlement. This conserved water right could be sold or leased to the Service for wetland protection. Such a measure would keep irrigated farmland in production, thereby minimizing the impacts of full fee purchase acquisition. However, implementation of this mitigation would be dependent upon water-right holders obtaining a favorable ruling from the Nevada State Engineer to split water right entitlements and may also require State and Federal enabling legislation.

A successful transition from traditional crops may require the need for additional training or education, installation of new irrigation systems (i.e. drip systems, sprinklers), and new equipment. There is insufficient information to determine whether marketing opportunities or profitability of such crops would be adequate to sustain the present level of agricultural economic output in Churchill County. It is likely that such a transition would only occur if there was an economic incentive. In addition, this mitigation may require technical and financial assistance from the Federal or State government to initiate pilot programs.

The Service believes such mitigation may keep lands in agricultural production but would not provide any mitigative benefit to economic losses experienced by dairies and livestock operators that rely on local alfalfa production. There is insufficient information to determine if the replacement of alfalfa with other less water demanding crops would provide the same or comparable economic return. For these reasons, the Service views water splitting as a mitigation measure that would not completely offset or avoid potential impacts, but as a measure to lessen the magnitude of the impact.

Production Value Acquisition Strategy

A "Production Value" acquisition strategy would reduce impacts to agricultural production and economic output losses in the economy. Such a strategy, which was hypothesized by Sunding (1994) illustrates the potential benefits of a program that limits the Service's water rights acquisitions to only the least productive parcels.

Declines in crop production could be reduced if the current program could be reconfigured to ensure that only the least-productive parcels are acquired. Under such reconfiguration, losses associated with the Proposed Action would be reduced by about 57 percent from the No Action Alternative as compared to the 69 percent reduction that occurs under the random acquisition assumption. Implementation of this "production value" acquisition scenario would also minimize the impacts associated with reduced production under Alternatives 3, 4, and 5 (Table 4.16.B).

Table 4.16.B "PRODUCTION VALUE" ACQUISITION ON ALFALFA PRODUCTION, PROFIT LOSSES, AND ECONOMIC IMPACTS

	(1) Alfalfa Output (tons/yr.)	(2) Alfalfa Sales (\$/year)	(3) Alfalfa Profits (Direct) (\$/year)	(4) Dairy and Livestock Profits (Indirect) (\$/year)	(5) Alfalfa Income (Direct + Linked) (\$/year)	(6) Dairy and Livestock Income (Indirect + Linked) (\$/year)	(7) Total Agricultural Income (\$/year)
No Action Baseline Condition							
ALT.1	283,122	25,172,665	3,517,526	1,892,197	5,346,639	3,178,891	8,525,530
Anticipated Conditions Under a "Production Value" Strategy							
ALT.2	122,133	11,026,776	1,911,050	684,215	2,904,795	1,149,481	4,054,276
ALT.3	162,097	14,623,529	2,472,761	1,020,494	3,758,597	1,714,430	5,473,027
ALT.4	98,791	8,925,984	1,563,316	539,739	2,376,240	906,762	3,283,002
ALT.5	202,386	18,254,000	2,943,807	1,286,678	4,474,587	2,161,619	6,636,206

Source: (1), (2), and (3) Sunding (1994), Table 2; (4) Sunding (1994), Table 3; (5) column (3) * 1.52 multiplier; (6) column (4) * 1.68 multiplier; and (7) column (5) plus column (6).

The mechanics of a "Production Value" acquisition mitigation strategy are more detailed and would entail case-by-case evaluation of soils and production records of each farm where the water rights are offered for sale. The Service, under this strategy, would refuse to pay anything more than the "production value" of the water rights. (This, in fact, is generally the basis of most farm-to-farm transactions for water-righted farmland.)

Targeting to Protect Productive Lands

Targeting to protect core productive areas could mitigate for losses to agricultural production and associated values. In addition to the above mitigation of acquiring only the least productive lands, the Service could target core areas to protect them from acquisition. Under this form of targeting, the Service and other authorities would seek to protect those productive farmlands by restricting acquisitions or zoning such lands to agricultural use only.

The mechanics of targeting acquisition strategies are complex and varied. In order to maintain the required willing seller component of the Service's water rights acquisition strategy, targeting programs would most likely need to include: evaluation criteria that are

supported by the community; opportunities for land exchange; and protection for property values of targeted water-righted lands.

Implementation of a targeting program to minimize the loss of agricultural production would not be feasible for the Service to implement without local governmental participation and community support. Without the support and participation of these groups, this mitigation could not reasonably be implemented. There are a number of ways to encourage willing participation by targeted water-right holders. Value added or premium payments would coax land owners to sell water rights from lower quality lands. Creation of land-exchange banks (under which high quality lands could be acquired for exchange with lower quality lands) would encourage participation of water-right holders under the willing seller concept.

The Service would have to seek authority from the Secretary or possibly Congress to implement such an acquisition strategy that offered value-added or premium payments. Because such actions are outside the authority of the Service, the implementation of such mitigation may not be reasonable under existing regulations and procedures for Federal acquisitions.

Targeting may be the most feasible mitigation measure to minimize loss of agricultural production and related economic impacts. Targeting may be implemented solely on a market driven approach or could be implemented by developing more elaborate and detailed procedures. The development of a more overt targeting strategy would take several years to fully develop and obtain the necessary participatory support.

4.16.2 EFFECTS ON INCOME AND EMPLOYMENT

This section separately addresses impacts to income losses, income gains, and employment. Income losses relate to losses associated with reducing agricultural activity in the affected area. Income gains addresses water right sales and generated income. The section on employment discusses impacts to local employment as a result of the Service's action.

INCOME LOSSES

In agriculture, the standard measure of producer (farmer) welfare is net income, defined as sales minus variable costs. (Just, Hueth, and Schmitz, 1982.) However, to facilitate comparisons against other measures of countywide income, the narrower measure of farm profits (defined as sales minus fixed as well as variable costs) is used.

It is important to note that recent studies have used estimates of industry output and sales (as well as net income) to assess agriculture's economic contribution to the local economy (Tables 3.16.A, 3.16.B and 3.16.C). Industry output is defined as the estimated value of commodities produced in any year; sales are defined as gross cash receipts. While all

TABLE 4.16.C LOST PROFIT AND COMMUNITY INCOME LOSSES

	(1) Lost Alfalfa Profits (direct) (\$/year)	(2) Increased Dairy and Livestock Costs (direct) (\$/year)	(3) Backward Linkages to Alfalfa (\$/year)	(4) Backward linkages to Dairy and Livestock (\$/year)	(5) Total Linked Losses (\$/year)	(6) Total Net Income Loss (\$/year)
ALT.2	2,423,112	1,462,752	3,675,619	3,066,519	8,204,890	10,628,002
ALT.3	1,986,163	1,198,982	3,012,811	2,513,551	6,725,344	8,711,507
ALT.4	2,671,383	1,612,624	4,052,221	3,380,711	9,045,556	11,716,939
ALT.5	1,489,620	899,236	2,259,605	1,885,162	5,044,003	6,533,623

Source: (1) and (2) Sunding (1994) Table 4.16.A; (3) column 1 * 1.5169 multiplier; (4) column 2 * income multipliers (dairy = 2.1965, livestock = 1.9789, unidentified source) provided by Harris and others, (written communication 1995,) as applied to respective dairy and livestock industry output (54% dairy, 46% livestock) in Churchill County; (5) sum of columns 2, 3, and 4; (6) column 1 plus column 5.

measures of economic activity are potentially relevant, the Service is concerned that the latter measures ignore the cost side of the equation. Thus, if alfalfa sales go up but production costs increase as well, growers would be better off only to the extent that increased income exceeds increased costs. (The same is true for all economic sectors.)

Focusing on changes in farm profits, the analysis takes into account both direct (forward) and indirect (backward) linkages to other sectors of the Churchill County economy. Forward linkages are impacts associated with the use of goods whose production would change as a direct consequence of the water rights acquisition program. For example, alfalfa hay is an input into the production of other locally-produced goods, like milk (dairy) and to a lesser extent beef (livestock). If less alfalfa is produced as a result of the water rights acquisition program, non-local substitutes (e.g., alfalfa hay from California or elsewhere in Nevada) would have to be found. The increase in alfalfa transportation costs would then lead to increased feed costs and reduced dairy profits. Higher dairy product prices at the consumer level are not anticipated due to the existence of Federal and State dairy price supports.

Backward linkages are indirect impacts associated with the purchase of products needed to produce a good. For example, growers, ranchers, and dairymen use chemicals, labor, seed and other goods and services to produce alfalfa, beef, and milk. A reduction in the scale of agriculture due to water rights acquisitions would therefore decrease demands for and sales of these products as well.

The forward (direct) impacts of reducing alfalfa production and sales are shown in Table 4.16.A. The linked impacts (direct) to dairy and livestock operations are depicted as dairy and livestock profits. Under the No Action Alternative, alfalfa profits (i.e., net income in the alfalfa hay sector) would average an estimated \$3.5 million per year, while total agriculture related income (including dairy and livestock profits related to alfalfa production) would average about \$8.5 million per year.

Alternative 1: The Service, in an effort to fully define the economic impacts in the affected area, has analyzed the backward (indirect) linkages associated with reduced crop production to determine losses to overall countywide income. These backward linkages are described above and are calculated by applying multipliers (Harris and others, 1993) to reduced alfalfa profits and to increased dairy and livestock operating costs. Multipliers analytically define the effect that occurs: total countywide income would decline by \$1.52 when income in the crop production sector declines by \$1.00. *According to data provided by Harris and others (written communication, 1995), impacts associated with dairy and livestock operations have a greater multiplier effect; for dairy the multiplier is 2.1965; for the livestock sector the multiplier is 1.9789. These backward linkages are portrayed in column 4 below, applying the multipliers to the respective percentage that livestock and dairy contribute to industry output in the County (54% dairy, 46 % livestock). The total effect on agricultural income from lost alfalfa profits is depicted in column 7 of Table 4.16.A; total net income loss for Churchill County is shown in Table 4.16.C (column 6).*

Alternative 2: Net farm revenues or profits from alfalfa sales would drop by approximately \$2.4 million per year, while related countywide agricultural income (including lost alfalfa profits, linked dairy and livestock profits) would drop by an average of \$8.2 million annually. The total net income loss for all sectors of the economy is calculated to be \$10.6 million under this alternative. This constitutes about a 6 percent decline from the countywide income total of \$176 million.

Alternative 3: Farm profits from alfalfa sales would drop by approximately \$1.99 million per year, while related countywide agricultural income (including lost alfalfa profits, linked dairy and livestock profits) would drop on average by about \$6.7 million annually. The total net income loss for all sectors of the economy are calculated to be \$8.7 million under this alternative. This constitutes about a 5 percent decline from the countywide income total of \$176 million.

Alternative 4: Farm profits from alfalfa sales would drop by approximately \$2.67 million per year, while related countywide agricultural income (including lost alfalfa profits, linked dairy and livestock profits) would drop by an average of \$9 million annually. The total net income loss for all sectors of the economy are calculated to be \$11.7 million under this Maximum

Acquisition Alternative. This constitutes about a 6.6 percent decline from the countywide income total of \$176 million.

Alternative 5: Farm profits from alfalfa sales would drop by approximately \$1.5 million per year, while related countywide agricultural income (including lost alfalfa profits, linked dairy and livestock profits) would drop by an average of \$5 million annually. Under this alternative, due to the reliance on leased water rights, year-to-year farm profits associated with alfalfa sales would drop more than is shown above, and countywide agricultural income would decline even more than shown. The Service expects that lease payments would offset the lost yearly profits associated with *agricultural crop production*; impacts to linked sectors of the agricultural industry is not known. The countywide total income loss for all sectors of the economy, recognizing *that leasing impacts are not included*, are calculated to be \$6.5 million under this alternative. This constitutes about a 3.7 percent decline from the countywide income total of \$176 million.

Comparison with No Acquisition Conditions: In total, the purchase of 75,000 AF of water rights would result in an estimated reduction in alfalfa sales of about \$1.9 million from no acquisition conditions, while related Countywide agricultural income (including lost alfalfa profits, linked dairy and livestock profits) would drop by an average of \$5.7 million annually, as compared to no acquisition conditions. Alfalfa sales would drop more than what is indicated above as a consequence of this alternative due to the leasing of water rights for primary wetlands. However, it is expected that lease payments would offset the lost profits associated with agricultural crop production; impacts to linked sectors of the agricultural industry are not known. The countywide total income loss for all sectors of the economy, as compared to no acquisition conditions and recognizing that leasing impacts are not included, would be about \$7.6 million under this alternative.

INCOME GAINS

The sale of water rights, with or without appurtenant lands, would directly generate income for those water-right holders who wished to sell. In addition, water-right sales would generate income in the community through the multiplier effect.

To calculate the potential increased income associated with the Service's Proposed Action and alternatives, three different scenarios of potential water sales prices were developed. The "time series" statistical model adapted from Meyer (1993) relates recent water sales prices to the amount of water actually acquired from 1989 to 1993. This method shows that water prices have increased steadily since the Service began purchasing water rights under the No Action baseline condition, and assumes that trend will continue. Under the

"time series" approach, incremental acquisition costs (assuming a purchase rate of approximately 10,000 AF/year) could eventually reach an out-year level of \$2,000/AF.

The "Production Value" scenario (See Section 4.16.1 AGRICULTURAL PRODUCTS AND RECEIPTS, Mitigation Measures), uses the 1992 time-series value (i.e., \$360/AF) for the first 10,000 AF of acquired rights. It then assumes that an average acquisition cost (estimated at \$258/AF) will prevail over the next 10,000 AF, and that grower "reservation prices" (i.e., the price at which a water-right holder would be indifferent between selling and farming) would then apply in successive 10,000 AF increments (Sunding, 1994). Reservation prices represent the minimum amount farmers might accept to sell their water rights (ibid). This figure is based on the capitalized value of the annual profits that farmers might otherwise earn by continuing to farm. Under this scenario, incremental acquisition costs could eventually reach an out-year level of almost \$700/AF.

This "Production Value" approach attempts to make use of the detailed assessment of farm costs, revenues, and soil types developed by Sunding (1994). It concedes, however, that existing acquisition prices are substantially greater than calculated grower reservation prices, and assumes that a similar premium will continue to be paid in the future.

Finally, the "proportional" model, also begins with the 1992 time-series value (\$360/AF) for the first 10,000 AF acquired. It then assumes that average acquisition costs (roughly \$511/AF) will be the "standard offer" for all subsequent purchases unless and until calculated grower reservation costs exceed this amount. At that point, about 120,000 AF and above, a new standard offer of \$610 per AF would apply. This method combines the reality of the existing acquisition program with a modified approach that attempts to bring acquisition costs and reservation prices into conformance over time.

The above three methods allow for many related factors that would affect growers' willingness to sell their water rights at calculated reservation prices. These include other marketing opportunities, speculation about future acquisition prices, or the value that growers implicitly place on the farming lifestyle.

The Service determined the proportional method that calculates marginal sale prices and average sale prices (Sunding, 1994, Table 11) provides the most reasonable estimation of water right sale prices for the Proposed Action and alternatives. Use of the proportional method offers a "middle-ground" evaluation process as compared to the Meyer (1993) "time-series" calculations which may over-state sale prices and the "Production Value" calculation presented by Sunding (1994) which uses an acquisition strategy that may not be feasible for the Service to implement.

The determinations of potential direct and indirect annual income gains for the Proposed Action and alternatives are depicted in Table 4.16.D. These determinations were calculated by first using one-time acquisition payments (which are assumed to be made at the rate of 10,000 AF per year during each year of the program) that are time-discounted and accumulated (Table 4.16.D, columns 2-4). Following Meyer (1993, Table 58), these payments are then discounted by 71 percent to account for expenditures and outlays (such as debt retirement, relocation costs, or reinvestment in other areas outside of Churchill County or Nevada) that would leave the affected area. The remaining 29 percent is assumed to be invested locally, with annual interest (estimated to be 4 percent) on accumulated investments spent each year as income (column 5). The investment income spent each year eventually creates additional countywide income through the multiplier effect described previously. For these investment income expenditures, an income multiplier of 1.68 was used by Sunding (1994) to determine the indirect income gains. The result (column 6) is the anticipated increase in indirect income gains. Total countywide income gains (column 7) associated with water right sales investment income are considered beneficial economic impacts.

Alternative 2: Under this alternative, the increased local investments resulting from water right purchases and associated economic linkages would yield a combined total of about \$2 million per year to the countywide income total.

TABLE 4.16.D INCOME GAINS RELATED TO WATER RIGHT SALES

	(1) Marginal Sale (Price/AF)	(2) Average Sale (Price/AF)	(3) Total Sales	(4) Increased Direct Income @ 29% (\$/yr)	(5) Increased Indirect Income @ 29% (\$/yr)	(6) Total Countywide Income Increases (\$/yr)
PROPORTIONAL METHOD VALUES						
ALT.2	\$528	\$514	\$62,708,000	\$752,333	\$1,263,700	\$2,016,033
ALT.3	\$528	\$511	\$51,100,000	\$613,200	\$1,030,000	\$1,643,200
ALT.4	\$528	\$516	\$69,402,000	\$824,620	\$1,385,300	\$2,209,920
ALT.5	\$528	\$506	\$37,764,000	\$453,200	\$761,785	\$1,214,985

Source: (1) and (2) Sunding (1994), Table 11; (3),(4), and (5) Sunding (1994), Table 12; and (6) sum of columns 4 and 5.

Alternative 3: Under this alternative, increased local investments and associated economic linkages resulting from water right purchases would yield a combined total of about \$1.6 million per year to the countywide income total.

Alternative 4: Under the Maximum Acquisition Alternative, the increased gain to countywide income is the largest. As a result of water right purchases, local investments and associated economic linkages would yield a combined total of slightly over \$2 million per year to the countywide income total.

Alternative 5: Under the *Preferred Alternative*, increased local investments and associated economic linkages resulting from water right purchases would yield a combined total of about \$1 million per year to the countywide income total.

The Service has calculated a range of leasing that may occur under this alternative. Based on calculations using the 92-year hydrologic simulation data, the Service anticipates that in one out of three years no leasing would be necessary, as there would be sufficient water from other sources. In the other years, leasing would make up from 2,500 AF/year to as much as 21,600 AF/year of the wetland water supply (See Section 2.5.5, ALTERNATIVE 5, Leasing). The Service would base lease prices on a determination of market value by appraisal methods. However, to evaluate the potential income gains associated with leasing under this alternative, the Service has relied on the economic analysis done by Sunding (1994) and Meyer (1993) relative to possible values for leased water rights. Meyer (ibid) speculates that the minimum fee farmers *would charge for leased water* (based on unavoidable costs and average revenue generated for irrigated farmland) in the Carson Division of the Newlands Project would range from \$70/AF to \$86/AF. Sunding (1994) took a slightly different approach in defining a lease price based on the value of foregone profits and reestablishment expenditures (costs to replant crops) and estimates that lease costs would be about \$51/AF.

Based on these figures, the Service estimates that in any given year, leasing under the *Preferred Alternative* would generate between \$1 million and \$2 million depending on lease fees. While leasing would create a temporary income gain, it may only offset the potential revenues lost by not growing alfalfa, therefore these gains are not shown to increase overall countywide income but essentially offer replacement income for short-term agricultural production losses. Leasing would be most advantageous to farmers in drought years when alfalfa production is reduced due to hydrologic conditions, or in crop rotation years when less profitable grains are grown. In all likelihood, these lease payments would probably act to compensate for lost crop production values in leasing years. The Service estimates that 100 percent of the lease payments would remain in the community as income because the payments would be made directly to resident farmers, who most likely would continue to do business in the community. Conversely, under fee purchase acquisitions, *nearly 70 percent*

of water sale payments is *assumed* to leave the local economy *due to debt retirement, relocation, etc.* (Meyer, 1993).

Mitigation Measures

The mitigation measures identified in Section 4.16.1, AGRICULTURE AND FARMLAND would be applicable under this section. The mitigation measures described in Section 4.16.1 would reduce or minimize the income losses associated with reduced crop production.

EMPLOYMENT

Alternative 1: The Service defined a baseline for Churchill County employment of approximately *9,133 jobs* (Table 3.16.D) by compiling data from two separate reports (MacDiarmid and others, 1994b and Harris and Stoddard, 1993) on Churchill County economics. *Information from Harris and others (written communication, 1995) regarding State and Federal employment has also been incorporated.* MacDiarmid and others (1994b) indicated that Churchill County agriculture directly accounts for an estimated 660 part-time and full-time jobs, and *indirectly creates* an additional *606 full and part-time jobs related to agricultural production.* Sunding (1994) developed a related estimate of approximately 381 "full time equivalent" (FTE) alfalfa sector jobs under the No Action baseline condition, based on an estimated average of 10 hours of total labor needed per acre of alfalfa produced annually, using 1,300 hours as a person-year.

The reported countywide alfalfa-sector labor multiplier of 2.69 (Harris and others, 1993) can be used to determine the total number of jobs lost (including alfalfa sector jobs) as a consequence of the water rights acquisition program. It should, however, be noted that this multiplier significantly overstates the linkages that are apparent from Table 4.14.B, perhaps due to differences between part-time, full-time, and full-time equivalent employment, and thus appears to overstate potential job losses. Results are shown in Table 4.16.E.

General employment figures are expected to increase as a result of income gains associated with the sale of water rights. While the impacts of reduced agricultural production are known to impact farming and agriculture related jobs, the potential for increased employment resulting from increased investment and investment income is not specifically tied to any one sector of the economy. However, based on the multipliers used to link direct impacts related to agricultural income (2.1965 for dairy and 1.9789 for livestock), and the multiplier used by Sunding (1994) for linked impacts related to investment income (1.68), it appears that agriculture-related employment would have greater earning potential than jobs linked to investment income increases. The Service expects that new jobs that

TABLE 4.16.E EMPLOYMENT LOSSES AND GAINS

	(1) Alfalfa Jobs (FTE)	(2) Related Jobs (FTE)	(3) Agricultural Sector Jobs (FTE)	(4) Jobs Created by Income Investment
BASELINE				
Alt.1 No Action	381	644	1,025	9
LOSSES				GAINS
ALT.2	254	429	682	339
ALT.3	205	347	552	224
ALT.4	282	476	757	424
ALT.5	150	254	404	168

Source: (1) Sunding (1994), Table 5a; (2) column (1) * 1.69 multiplier; (3) column (1) + col (2); and (4) Meyer, 1993, Table 58

are linked to increased investment income would most likely be in real estate, construction, or services, based on what has occurred under the No Action limited water rights acquisition program.

Meyer (1993) analyzed the potential employment effects utilizing an economic "input-output" model developed at the University of Nevada Reno. From these modelling calculations Meyer (1993) was able to determine potential employment increases associated with the income gains resulting from water rights sales for that portion of the income gain that was expected to remain in Churchill County.

Alternative 2: Countywide alfalfa related employment, both in terms of FTE jobs and related employment would decline by about 680 jobs (67 percent reduction from the No Action Alternative). General employment increases resulting from income gains associated with water right purchases under Alternative 2 would be equivalent to approximately 340 new jobs.

Alternative 3: Countywide alfalfa related employment, both in terms of FTE jobs and related employment would decline by about 550 jobs (54 percent reduction from the No Action Alternative). General employment increases resulting from income gains associated with

water right purchases under this Least Cost Alternative would be equivalent to 220 new jobs.

Alternative 4: Countywide alfalfa related employment, both in terms of FTE jobs and related employment would decline by about 750 jobs (74 percent reduction from the No Action Alternative). The employment analysis done by Meyer (1993) used a water rights acquisition value of 147,000 AF which is about 10 percent greater than what is expected under this alternative. Therefore, without new model calibrations available, the Service estimated new jobs created by reducing Meyer's figures by 10 percent. General employment increases resulting from income gains associated with water right purchases under Alternative 4 would be equivalent to 425 new jobs.

Alternative 5: *Under the Preferred Alternative*, countywide alfalfa-related employment, both in terms of FTE jobs and related employment would decline by about 400 jobs (39 percent reduction from the No Action Alternative). The leasing component of this alternative may actually result in greater declines in part-time alfalfa production jobs and related employment on a year-to-year basis, as some farms would forego crop production to lease water rights. The magnitude and extent of these anticipated year-to-year changes are not reflected in the Service's analysis due to a lack of information.

As with Alternative 4, employment analysis for the *Preferred Alternative* was not specifically modelled for 75,000 AF of water rights acquisition. Using similar methodology, the Service reduced employment figures for Alternative 3 by 25 percent. General employment increases resulting from income gains associated with water right purchases under Alternative 5 would be equivalent to 170 new jobs.

Mitigation Measures

The most direct and effective mitigation to offset employment losses associated with reduced crop production and income losses resulting from water rights acquisitions is to create new businesses that result in increased employment opportunities. Increased investment income associated with water right purchases works to compensate for some of the losses, but additional employment opportunities would be needed to fully compensate for jobs lost in the agricultural sector. Combined with the possibilities for an expanded industrial and service sector base, population growth, increased recreational opportunities, and NAS-Fallon expansions may provide increased employment opportunities but do not necessarily represent mitigation measures, as they are ongoing cumulative actions. Recreational economic impacts are discussed below in Section 4.17, RECREATIONAL EXPENDITURES. Changes relative to growth and NAS-Fallon expansions are discussed as cumulative effects in Sections 4.26.11, and 4.26.12.

The Service does not offer specific mitigation for employment losses associated with water rights acquisition, but has determined that mitigation measures identified in previous sections on crop production and income losses are applicable. These mitigation strategies are identified in Section 4.16.1, AGRICULTURAL PRODUCTS AND RECEIPTS.

4.16.3 FARMLAND

In this document, the Service has defined farm acreage as those agricultural lands within the affected area that are irrigated for crop production. Under **Alternative 1**, the No Action baseline, farm acreage for the affected area is based on irrigated and water-righted lands in the Newlands Project (Carson Division at 47,007 acres and Truckee Division at 3,855 acres) and Middle Carson River corridor (6,450 acres). This total of 57,312 acres of irrigated farmland in the affected area constitutes about 7 percent of Nevada's 778,977 acres of irrigated farmland (Nevada Division of Water Planning, 1992). Because the Service's Proposed Action and other action alternatives would only acquire water rights from these lands, they are the only farmlands addressed in this section. Impacts are measured in farmland acres lost or converted to other uses *as compared to baseline conditions and no acquisition conditions. Comparisons are made to no acquisition conditions, in addition to comparisons to baseline (No Action Alternative) conditions, to present the full impacts of acquiring water rights on irrigated farmland acreage. Irrigated farmland acreage base under no acquisition conditions is about 52,800 acres for the Carson Division.*

The impacts associated with reducing irrigated farm acreage are related to Newlands Project operations (reduced irrigation demand, increased storage, reduced Truckee Canal diversions, and reduced hydropower generation and resulting revenues). Additional impacts are associated with crop production, income, employment, and landscape. With the exception of landscape, each of these factors has been identified and evaluated in previous sections.

Reducing irrigated farmland would change the landscape character in specific areas where water rights are acquired. The loss of green agricultural fields would impact the verdant landscape character of the affected area that exists under the No Action Alternative. Those impacts are discussed under Section 4.23, EFFECTS ON SOCIAL VALUES, Agriculture.

Alternative 2: *Under this alternative, the Service would acquire the water rights from up to 29,200 acres of irrigated farmland to secure about 102,000 AF of water rights above those which are being acquired under baseline conditions. This acreage figure amounts to about 62 percent of the baseline irrigated farmland acreage in the Carson Division (about 47,000 acres), about 51 percent of the baseline irrigated acreage in the affected area (about 57,000 acres), and it constitutes about a 3.7 percent reduction in irrigated farmland statewide.*

Comparison with No Acquisition Conditions: Up to 122,000 AF of water rights would be acquired, under Alternative 2, from about 34,800 acres of irrigated farmland, or about 66 percent of the no acquisition irrigated acreage base in the Carson Division (about 52,800 acres). Truckee Division and Middle Carson River corridor acreage would remain unchanged as a result of the Proposed Action.

Alternative 3: Under this alternative, the Service would acquire the water rights from up to 22,900 acres of irrigated farmland to secure about 80,000 AF of water rights above those which are being acquired under baseline conditions. This acreage figure amounts to about 59 percent of the baseline irrigated farmland acreage in the Carson Division, about 40 percent of the baseline irrigated acreage in the affected area, and it constitutes about a 2.9 percent reduction in irrigated farmland statewide.

Comparison with No Acquisition Conditions: Up to 100,000 AF of water rights would be acquired, under Alternative 3, from about 28,500 acres of irrigated farmland, or about 54 percent of the no acquisition irrigated acreage base in the Carson Division. Truckee Division and Middle Carson River corridor acreage would remain unchanged as a result of the Proposed Action.

Alternative 4: Under the Maximum Acquisition Alternative, the Service would acquire the water rights from up to 32,500 acres of irrigated farmland to secure about 113,500 AF of water rights above those which are being acquired under baseline conditions. This acreage figure amounts to about 69 percent of the baseline irrigated farmland acreage in the Carson Division, about 57 percent of the baseline irrigated acreage in the affected area, and it constitutes about a 4.2 percent reduction in irrigated farmland statewide.

Comparison with No Acquisition Conditions: Up to 133,500 AF of water rights would be acquired, under Alternative 4, from about 38,100 acres of irrigated farmland, or about 72 percent of the no acquisition irrigated acreage base in the Carson Division. Truckee Division and Middle Carson River corridor acreage would remain unchanged as a result of the Proposed Action.

Alternative 5: Under the Preferred Alternative, the Service would acquire the water rights from up to 15,400 acres of irrigated farmland to secure about 55,000 AF of water rights above those which are being acquired under baseline conditions. This acreage figure amounts to about 34 percent of the baseline irrigated farmland acreage in the Carson Division (about 47,000 acres). The Service would also acquire water rights from the Middle Carson River corridor, and could impact up to about 4,800 acres of irrigated farmland in that area. Loss of irrigated farmland from these two areas would constitute about a 35 percent reduction in irrigated farmland in the affected area and about a 2.6 percent reduction in irrigated farmland statewide.

Comparison with No Acquisition Conditions: Up to 75,000 AF of water rights would be acquired, under the Preferred Alternative, from about 21,000 acres of irrigated farmland, or about 40 percent of the no acquisition irrigated acreage base in the Carson Division (about 52,800 acres). Up to about 4,800 acres of irrigated farmland along the Middle Carson River corridor could also be impacted. Together, this would account for about 3.25 percent of the statewide irrigated farmland acreage base. Alternative 5 would result in the least amount of irrigated acres being adversely impacted. Truckee Division acreage would remain unchanged as a result of the Service's water rights acquisitions for wetlands protection.

Mitigation Measures

Increased Farmland Acreage

Farm acreage could increase above assumed baseline levels by bringing more water-righted land into production. Indeed, the starting point for all BLR/NSM analyses is a 56,622-acre baseline of irrigated (and water-righted) farmland acres, versus a projected total of 64,850 irrigated acres under the 1988 OCAP and a 74,470 acre total of water righted acreage. However, for a number of reasons, such increases are considered unlikely. For example, substantially less acreage has been irrigated since 1988 than was assumed to occur under the 1988 OCAP; increases within the Fallon Indian Reservation have been limited by section 103 of Public Law 101-618; *litigation regarding* forfeiture, abandonment, or lack of perfection of more than 10,000 acres of Newlands Project water rights raise serious questions about *the validity of such water rights* (as do the potential impacts of recoupment on Project water supplies and farm income); and ongoing urbanization and expansion of the Lahontan Valley economy is already causing agricultural lands to be converted for subdivisions and other more intensive land uses. The Service does not consider the expansion of irrigated farmland to be a *likely* mitigative action for the reasons stated above.

Leases

Leasing water rights is a specific component of Alternative 5 and the consequences (both positive and negative impacts) of such an action are addressed throughout Chapter 4 under Alternative 5. Leasing offers mitigation in that it only temporarily reduces irrigated farmland. Over the long run, these temporary losses would maintain more irrigated farmland in the affected area while allowing the Service to meet its wetland water demand. This mitigation measure would allow for maintenance of a larger irrigated land base during average and above-average hydrologic years because leasing would most likely occur during drought years. Mitigation by increased reliance on leasing is feasible, but the substantial costs associated with leasing, and the absence of long-term assurances of an adequate

supply of leased water makes such mitigation unreasonable to consider beyond the scope described under Alternative 5.

Other Sources

Mitigation aimed at reducing the demand for irrigation water rights could be accomplished by securing water from other sources. While Alternative 5 seeks to supplement water right acquisitions by utilizing groundwater and sewage effluent, there are other sources of water that are not currently available, but could in the future, provide water suitable to meet the Service's objectives for wetland protection. *One potential mitigation measure would be to pump Carson Desert Basin groundwater, convey the waters to the Truckee Canal (if this is possible), and hold it in storage in Lahontan Reservoir for fall or winter delivery.* Other water sources, such as Eco-Vision, Reno-Sparks sewage effluent, and Dixie Valley (See Section 2.8.5, OTHER WATER SOURCES ELIMINATED FROM CONSIDERATION) may be too speculative to provide reasonable mitigation under this element.

Upper Carson River

Mitigating irrigated farmland losses in the affected area could be accomplished if the Service sought to acquire water rights from the Upper Carson River basin. While this action would minimize impacts to farmland in the affected area it would not decrease farmland losses at the regional or statewide level. Due to the transfer procedures and loss of water right priorities when water rights are transferred under the provisions of the Alpine Decree (*United States v. Alpine Land & Reservoir Co.*, 1980) from the Upper Carson River segments, more farmland would have to be acquired to provide equivalent water deliveries to the wetlands when compared to acquisitions within the Carson Division of the Newlands Project. *Acquisition from the Upper Carson River basin would spread impacts across a broader region, thereby reducing the magnitude of impacts in Lahontan Valley.*

Incorporating Regulating Reservoirs

Incorporating regulating reservoirs and the Canvasback Gun Club wetlands as primary wetland habitat could reduce the Service's need for irrigation water to meet its wetland objectives. Because these wetland areas have existing supplies of water, less water would be needed to sustain 25,000 acres of primary wetland habitat, *which could possibly reduce the amount of water rights to be purchased. This in turn could reduce the amount of irrigated farmland taken out of production.* Such mitigation is *potentially* feasible, but would require that the Service enter into agreements with the Newlands Project operator (TCID) regarding regulating reservoir operations, *and it would likely require Congressional approval.* The reliability and quality of wetland habitat provided by such actions, may not be commensurate with primary wetlands at Stillwater NWR and Carson Lake in respect to the

variety and quantity of wildlife values. *With respect to the Canvasback Gun Club*, this mitigation would require that the Service enter into an agreement with Canvasback Gun Club to determine marsh management techniques that would ensure that *quality* wetland habitat is maintained.

Split Water Rights

Mitigation for reducing loss of irrigated farmland could entail the practice of acquiring only portions of a property owner's water right entitlement. This would be accomplished by the irrigator splitting the water right entitlement on a per-acre basis. For example, a farmer, by growing a crop that requires less water, could conserve part of the per-acre water right entitlement. This conserved water right could be sold or leased to the Service (or others) for wetlands protection. Such a measure would keep farmland irrigated and productive, thereby minimizing the impacts of full fee purchase acquisition (see Section 4.16.1 AGRICULTURAL PRODUCTS AND RECEIPTS, Mitigation Measures, for more detailed analysis of this mitigation measure.)

Such mitigation could keep farmlands in production and help to maintain the verdant landscape. Split water rights could provide reasonable mitigation to reduce the irrigated farmland acreage anticipated to be lost under this element.

Increasing Drainwater

Increased drainwater inflow to the primary wetland areas *could* also provide mitigation under this element by reducing the Service's need for *water sources, possibly including irrigation water rights*. Increasing drainwater inflow could be accomplished in a number of ways including: relaxing OCAP delivery efficiency targets; eliminating use of drainwater for other purposes (i.e. pasture irrigation at Carson Lake and livestock watering); and eliminating drainwater pump backs. Relaxation (or modification) of OCAP delivery efficiency requirements would increase drainwater outflows and other incidental wetland inflows. This strategy would, however, require other modifications to the OCAP to offset any potential for increased Truckee River diversions. The Service does not have the authority to modify the OCAP and would not consider any action that could potentially increase Truckee River diversions as a feasible mitigation measure.

Increased drainwater inflow to the primary wetland areas through "drainwater assurances" from the Newlands Project operator (TCID) is feasible, but would require changes in TCID's existing grazing management within the Carson Division and particularly at Carson Lake. The Service would continue to monitor drainwater inflows and adjust water right acquisition targets if drainwater inflow proved to be greater than expected.

The implementation of the mitigation measures that involve incorporation of regulating reservoirs and Canvasback Gun Club wetlands as part of the primary wetland areas, splitting water rights, and "drainwater assurances" are potentially feasible actions.

4.16.4 PRIME FARMLAND AND FARMLAND OF STATEWIDE IMPORTANCE

Based on the Farmland Protection Policy Act (FPPA) and U.S. Department of Agriculture guidelines (7 CFR § 658), federal agencies must evaluate the adverse effects of federal programs on the protection of farmland that has been determined to be suitable for protection. This section describes the potential impacts of the alternatives on prime farmland and farmland of statewide importance.

As determined by NRCS, all irrigated farmland in the Carson Division and Middle Carson River is either prime farmland or farmland of statewide importance, meaning that they are subject to FPPA. A land evaluation and site assessment score calculated for farmland in the Carson Division and in the Middle Carson reinforced the determination that the farmland in these areas is subject to FPPA. Under no acquisition conditions, the Carson Division contains approximately 52,800 acres of water-righted, irrigated farmland, and the Middle Carson River contains approximately 6,450 acres of water-righted, irrigated farmland. Each of these areas received LESA scores greater than 160 points (Section 3.16.4, Appendix 10). Based on Geographic Information System data supplied by Reclamation, it is estimated that about 30,900 acres (or about 60 percent) of Carson Division water-righted, irrigated farmland qualifies as prime farmland. This would leave approximately 21,900 acres of farmland of statewide importance. Prime farmland generally is of higher quality than farmland of statewide importance, which comprises the remainder.

This FEIS presents and evaluates a range of alternatives with different program designs (as described in Sections 2.3.5 and 2.5), each of which would result in differing amounts of irrigated farmland that would be converted to non-irrigated uses. The potential adverse impacts to farmland protection are described below for each alternative.

Impacts of the action alternatives are estimated in terms of the number of acres of prime farmland and farmland of statewide importance that could be lost or converted to other uses as compared to baseline and no acquisition conditions, and in terms of the percent of prime farmlands that could be lost or converted, compared to baseline and no acquisition conditions in the Carson Division. The latter is presented as a range, based on the percent of prime farmland that comprises irrigated farmlands from which water rights have been purchased under the 20,000 AF acquisition program (low end) and on the percent of prime farmlands that exist throughout the Carson Division under no acquisition conditions (high end). Under the 20,000 AF acquisition program, an estimated 25 percent of the irrigated farmlands from which water rights have been purchased are prime farmland. Approximately

60 percent of the Carson Division irrigated farmlands have been classified as prime farmland under no acquisition conditions. (Note: the minimum percent of prime farmland comprising affected farmlands under Alternatives 2 and 4 would be higher than 25 percent due to the high amount of affected farmland -- i.e., the total amount of existing farmland of statewide importance would comprise more than 75 percent of the affected farmland under these alternatives). Comparisons are made to no acquisition conditions, in addition to No Action Conditions, to address the full impacts of acquiring water rights on prime farmland and farmland of statewide importance.

Alternative 1: Under this alternative (baseline conditions), the Carson Division contains about 47,000 acres of prime farmland and farmland of statewide importance that are water-righted and irrigated. Of the estimated 5,600 acres of irrigated farmland that is anticipated to be lost or converted to other uses under baseline conditions, an estimated 25 percent are prime farmland, based on the locations of properties from which water rights have been purchased under the 20,000 AF acquisition program. For the purpose of the evaluating impacts of the action alternatives relative to baseline conditions, therefore, it is assumed that 29,500 acres of prime farmland remain in the Carson Division under baseline conditions (30,900 acres minus 1,400 acres).

Alternative 2: Under this alternative, up to 29,200 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses. Based on the amount of prime farmland estimated to occur in the Carson Division, and assuming that prime farmland would comprise 25 to 60 percent of the farmlands from which water rights would be acquired, an estimated 39 to 59 percent of the baseline prime farmland acreage would be lost or converted to non-irrigated uses.

Comparison with No Acquisition Conditions: Compared to the no acquisition conditions, up to 34,800 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses under Alternative 2. Based on the same assumptions stated above, an estimated 42 to 67 percent of the prime farmland in the Carson Division could be lost or converted to other uses, as compared to no acquisition conditions (30,900 acres of prime farmland).

Alternative 3: Under this alternative, up to 22,900 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses. Based on the amount of prime farmland estimated to occur in the Carson Division, and assuming that prime farmland would comprise 25 to 60 percent of the farmlands from which water rights would be acquired, an estimated 19 to 47 percent of the baseline prime farmland acreage would be lost or converted to non-irrigated uses. Of Alternatives 2-4 (alternatives that rely on purchase of water rights in the Carson Division), this alternative

minimizes the conversion of prime farmland and farmland of statewide importance in the Carson Division by implementing a use-rate of 3.5 AF/acre/year.

Comparison with No Acquisition Conditions: *Compared to the no acquisition conditions, up to 28,500 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses under Alternative 3. Based on the same assumptions stated above, an estimated 23 to 55 percent of the prime farmland in the Carson Division could be lost or converted to other uses, as compared to no acquisition conditions (30,900 acres of prime farmland).*

Alternative 4: *Under this alternative, up to 32,500 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses. Based on the amount of prime farmland estimated to occur in the Carson Division, and assuming that prime farmland would comprise 25 to 60 percent of the farmlands from which water rights would be acquired, an estimated 50 to 66 percent of the baseline prime farmland acreage would be lost or converted to non-irrigated uses.*

Comparison with No Acquisition Conditions: *Compared to the no acquisition conditions, up to 38,100 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses under Alternative 4. Based on the same assumptions stated above, an estimated 52 to 74 percent of the prime farmland in the Carson Division could be lost or converted to other uses, as compared to no acquisition conditions (30,900 acres of prime farmland).*

Alternative 5: *This alternative would make use of a program design that would result in the fewest acres of prime farmland and farmland of statewide importance being converted to non-irrigated uses in the Carson Division while still allowing the Service to achieve its wetland objectives, as authorized by Public Law 101-618. This would be accomplished by leasing water from farmers, purchasing water rights from willing sellers along the Middle Carson River corridor, using sewage effluent as available, using conserved U.S. Navy water as available, and, possibly, pumping groundwater, in addition to purchasing water rights from willing sellers in the Carson Division. Up to 15,400 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses. Based on the amount of prime farmland estimated to occur in the Carson Division, and assuming that prime farmland would comprise 25 to 60 percent of the farmlands from which water rights would be acquired, an estimated 13 to 31 percent of the baseline prime farmland acreage would be lost or converted to non-irrigated uses under this alternative. Up to about 4,800 acres of prime farmland and farmland of statewide importance could be impacted along the Middle Carson River Corridor.*

Comparison with No Acquisition Conditions: Compared to no acquisition conditions, up to 21,000 acres of prime farmland and farmland of statewide importance in the Carson Division could potentially be converted to non-irrigated uses under the Preferred Alternative. Based on the same assumptions stated above, an estimated 17 to 41 percent of the prime farmland in the Carson Division could be lost or converted to other uses, as compared to no acquisition conditions (30,900 acres of prime farmland).

By purchasing water rights from irrigated farmlands along the Middle Carson River corridor, adverse impacts to farmland in the Carson Division would be reduced, but adverse impacts to farmland would be introduced to the Middle Carson River. Up to about 4,800 acres of prime farmland and farmland of statewide importance in the Middle Carson River could potentially be converted to non-irrigated uses under the Preferred Alternative. Combining acreages of potentially converted prime farmland and farmland of statewide importance in both areas would be the lowest of any of the action alternatives (up to 25,800 acres).

Mitigation Measures

The conversion of water-righted, irrigated prime farmland and farmland of statewide importance to non-irrigated uses would be an unavoidable adverse impact under all alternatives up to the extent estimated under each alternative. The program design of Alternative 5 (Preferred Alternative) would minimize adverse impacts to irrigated farmland in the Carson Division by minimizing the reliance on purchased water rights, as compared to the Proposed Action (Alternative 2) and other action alternatives.

To minimize the conversion of irrigated farmland of higher quality to non-irrigated uses beyond that which could be accomplished by measures identified under the alternatives, the Service could seek consultation with NRCS and use the local LESA system (if it is adopted by Churchill County and approved by NRCS's State Conservationist) in the following ways. When more water rights or water rights and land are being offered to the Service than the Service has available funds, LESA scores could be requested for each of the properties (contingent upon consent by the landowners). The Service could then consider these scores in determining which water rights or water rights and land to purchase. Although lower LESA scores would receive greater consideration for purchase based on this criteria, many other criteria (including those described in Section 2.6.4) will be considered in the decision process.

LESA scores could also be considered in the land-disposal process in cases where appurtenant lands were purchased with water rights outside of Stillwater NWR boundaries. In these cases, LESA scores could be used in conjunction with a program whereby water

rights from lower scoring farmland are transferred back to higher scoring farmland from which water rights were transferred to the wetlands. This assumes that higher scoring farmlands are more productive and valuable to the farming community. Implementation of such a program, which would involve land exchanges, may require special legislation to make it feasible. If such a program were instituted, a larger portion of higher scoring farmland would remain in production.

In a broader context, and as recommended by NRCS and the team that developed the local LESA system (LESA team), LESA scores could be requested for each property for which water rights or water rights and land are being offered for sale to the Service. The locally-derived LESA system would provide a standardized approach to indexing the farmland value of individual properties. Comparing LESA scores to threshold values identified by the LESA team, the Service could then use this as in deciding whether to purchase the particular water rights or water rights and land. The LESA team that developed the local LESA system identified a threshold value of 275 (of 400 points possible), meaning that if a property receives a score of more than 275 under the local LESA system, the team decided that it should be retained in agriculture. If a property receives a LESA score of less than 250, the LESA team would recommend that the property be considered for sale. For scores between 250 and 275, the LESA team would reevaluate the merits of the site. This type of an approach would limit the Service's acquisition of water rights from higher scoring farmland, but if it is not also used to limit conversion of agricultural lands to other land uses (e.g., residential development), the overall benefits to farmland protection in the Lahontan Valley may be limited. Furthermore, without determining LESA scores for all properties throughout the Carson Division, there is no way of knowing whether the Service could achieve its wetland objective by committing to such an approach.

The Mitigation section of Section 4.16.3, FARMLAND, identifies additional mitigation measures that could reduce impacts to prime farmland and farmland of statewide importance.

4.17 EFFECTS ON RECREATION

Structured recreational use in the affected area would benefit from the Proposed Action and other action alternatives to acquire water rights for wetlands protection. Unstructured recreational use at regulating reservoirs might be adversely impacted as drainflows decrease as a result of retiring irrigated lands. Expenditures, consumer surplus, and non-use values related to recreation would all increase as recreational opportunity for hunting, birdwatching, boating and other uses increased in the Affected area. *Fish populations would increase under the Proposed Action and other action alternatives, and recreational fishing would be enhanced.*

Both Meyer (1993) and Sunding (1994) developed statistical participation models for the Lahontan Valley wetlands which relate annual hunting and fishing visits at Stillwater NWR to reported marsh acreage for 1972-77 and 1986-92. The Service uses both Sunding's and Meyer's data for this resource analysis because Sunding (1994) compares both non-local and local participation, and Meyer (1993) correlates general recreational use to wetland acreage. (Non-local visits to the wetlands are used to calculate the net change in Churchill County recreation expenditures, because local visits are assumed to detract from other local recreational activities.)

Increased recreational use at the Lahontan Valley wetlands would directly affect recreational expenditures (hunting and general recreation). Recreational expenditure increases from non-local visitation to the wetlands, result in increased linked economic activity (indirect) in the community. Generally, increased economic activity within a community results in increased employment opportunity. The Service would expect that recreation-related increases in expenditures and linked economic activity would offer new employment opportunity within Churchill County, however there is insufficient data available to calculate such job increases.

Under **Alternative 1**, the No Action Alternative, total visitation to the Lahontan Valley wetlands is calculated to be about 28,300 visitor use-days per year (Table 4.17.A). Based on non-local visitation (with per/visit direct expenditures of \$44/day) and linked economic activity (indirect), the total recreational economic activity related to use of the Lahontan Valley for hunting and general recreation would amount to about \$170,600 (excluding fishing expenditures and consumer surplus) under the No Action Alternative.

Under Alternative 1, Lahontan Reservoir visitation fees are calculated to be about \$117,800/year based on a (volunteer) fee per visitor of about 0.35 cents, and an average of 323,800 visitor days/year. Under the No Action Alternative, storage levels are insufficient to provide boating access (110,000 AF or lower) in five years out of the 92-year hydrologic simulation period for Memorial Day; seven years for the Fourth of July; and eight times for the Labor Day holiday (see Table 4.2.E). These are key recreational use periods at Lahontan Reservoir.

Under the No Action Alternative, consumer surplus, or citizens' "willingness to pay" for general recreational use and opportunity (excluding fishing) at the wetlands amounts to about \$501,100/year. Although the Service considers consumer surplus to be a measure of the value of recreation opportunity in the area, the Service does not incorporate consumer surplus as an increase in economic activity in the affected area.

Non-use values associated with increased recreational opportunity are expected to increase and would be considered beneficial, but for reasons stated in Section 3.17.4, NON-USE VALUES, these increases are not analyzed under this element.

TABLE 4.17.A LAHONTAN VALLEY WETLANDS, RECREATION- RELATED BENEFITS

	ALT.1	ALT. 2 - ALT. 5	Increase from ALT. 1
Wetland Acres	12,100	25,000	12,900
(1) Total Visits (Annual User-Days)			
Hunting	3,627	8,470	4,843
Fishing	10,925	19,786	8,861
General	13,745	13,745	0
Subtotal	28,297	42,001	13,704
(2) Non-Local Spending (\$/year)			
Hunting	\$45,151	\$105,439	\$60,288
General	\$20,136	\$109,639	\$89,501
Subtotal	\$65,289	\$214,639	\$149,789
(3) Indirect Community Income (\$/year)			
Hunting	\$72,833	\$170,084	\$97,251
General	\$32,484	\$176,150	\$143,666
Subtotal	\$105,317	\$346,234	\$240,917
(4) Total Increases (\$/year)			
Hunting	\$117,984	\$275,523	\$157,539
General	\$52,622	\$285,789	\$233,167
Total	\$170,606	\$561,312	\$309,706

Source: (1) Lahontan Valley wetlands Visitation Model (Sunding, 1994)

(2) Expenditure outputs (Meyer, Table 28, 1993) as adjusted by Sunding (1994)

(3) Line (2) * 1.6131 multiplier

(4) Sum of line (2) and line (3) subtotals

TABLE 4.17.B CONSUMER SURPLUS FOR LAHONTAN VALLEY WETLANDS RECREATION

LOCAL CONSUMER SURPLUS (\$/yr)			
	ALT.1	ALT.2 - ALT.5	Increase From ALT.1
Hunting	\$97,501	\$211,263	\$113,762
Fishing	\$269,331	\$455,202	\$185,871
General	\$403,622	\$403,622	no change
TOTAL	\$770,454	\$1,070,087	\$299,633

Source: Sunding (1994)

Note: Sunding (1994) calculated that general recreational use of the wetlands did not change as the number of wetland acres increase from baseline conditions to the 25,000-acre objective. The Service and Meyer (1993) differ and expect general recreational use at the wetlands to increase as a result of increased wetland acreage, but Meyer (1993) did not calculate Consumer Surplus in his economic analysis and report.

Alternatives 2, 3, 4, and 5: These alternatives would more than double wetland acreage in the Lahontan Valley, providing permanent and reliable recreational opportunity for hunting and other general recreational use. Under these alternatives, Sunding estimates that hunting (annual user-days) would increase by about 133 percent over the No Action Alternative. Although Sunding (1994) anticipates no increase in general recreational use (or expenditures) as a result of the action alternatives, Meyer (1993) estimates that general recreation would increase. Meyer (ibid) calculates that general recreation accounts for expenditures of about \$9/day/visitor. Based on Sunding's increases in hunting use and Meyer's general recreation increases, the Service *estimates* that total non-local hunting and general recreational direct expenditures would amount to about \$214,600 annually. As a result, linked economic benefits to the community (indirect community income) from increased hunting and general recreational activity would amount to about \$346,200 annually. Total economic activity (excluding consumer surplus) related to recreational use of the Lahontan Valley wetlands is calculated to be about \$561,300 annually under these alternatives.

The Service expects that birdwatching and other general use would increase under these alternatives, as more permanent wetlands would attract more school groups, birdwatchers, and sight-seers. This would be particularly true at Carson Lake, where the expected change of management would allow for increased public access.

Recreational use at Stillwater NWR, Carson Lake, and Lahontan Reservoir would all increase under these alternatives. Recreational use at Fernley WMA would not change from baseline conditions, and recreational use at the regulating reservoirs would show slight adverse impacts as a result of the Service's actions. Fort Churchill State Park and Dayton State Park would not be affected by these alternatives to acquire water for the wetlands.

Under these alternatives, the Service expects recreational expenditures at Lahontan Reservoir to increase as a result of increased storage and recreational opportunity. Lahontan Reservoir storage levels for June 1 are calculated to range from 254,200 AF to 268,200 AF over the long term, and storage levels for Nov. 30 are calculated to range from 150,000 AF to 170,400 AF over the long term. In the past, user fees at the reservoir have generally profited with increased storage levels.

The range of storage levels under these alternatives would be comparable to the three-year average (1984, 1985, 1987) for actual storage levels and related user fees. Therefore, under these alternatives user fees are expected to be about \$168,600 per year. This constitutes a \$50,800 increase in Lahontan Reservoir recreational expenditures as compared to the No Action Alternative.

Reservoir storage levels on June 1 under these alternatives would offer optimum recreational quality and storage levels on November 30 would offer fair recreational quality. (See Table 3.17.B based on quality ratings developed by Nevada State Parks.)

Under these alternatives, insufficient storage levels for boating access (110,000 AF or below) for Memorial Day and Labor Day are unchanged from the No Action Alternative. For Alternatives 2 and 4, calculations show that insufficient storage levels for the Fourth of July holiday occurred in five years of the 92-year hydrologic simulation period, while Alternatives 3 and 5 show no change from the No Action Alternative (seven years of insufficient storage) for the Fourth of July holiday.

Comparison with No Acquisition Conditions: Sunding (1994) estimated that hunting would increase by about 189 percent over no acquisition conditions. Economic benefits of increased opportunities for hunting, fishing, and general recreation resulting from the action alternatives, as compared to no acquisition conditions, would be somewhat higher than described above.

Mitigation Measures

Recreational use in the affected area would benefit substantially as a result of the Service's action to acquire water for wetlands protection. Although some slight adverse impacts to regulating reservoirs is expected, the Service believes the overall increase in recreational opportunity compensates for these slight losses. Increased recreational use in the Lahontan Valley wetlands would result in a three-fold increase in *recreational* activity in the Affected area. Since no adverse impacts are identified for this element, no mitigation is needed.

4.18 EFFECTS ON POPULATION CHARACTERISTICS

Alternative 1: Population in the affected area is growing at a steady rate. Lyon County's population has increased 23 percent since 1990, and is forecasted to continue to grow at 5-6 percent. Churchill County is projected to continue to grow at 2-3 percent over the next five years.

It is expected that the mild climate, low-crime rate, and an absence of State personal income taxes, are the key factors influencing population growth and will continue to attract people to the affected area.

Churchill County Manager, B.J. Selinder, credits the growth of the County to the quality of life (Lahontan Valley News, Nov. 8, 1993). One major factor that could impact growth in Churchill County is the NAS-Fallon plan to relocate more training programs, including the TOPGUN training school, to NAS-Fallon. This action alone would probably increase population growth beyond the planned 3 percent growth rate anticipated in the Churchill County Master Plan (see Section 4.26.11). There are no indications that acquisition of water rights by the Service would directly affect that population growth in Churchill County or the affected area.

In Lyon County (and Fernley in particular) growth has occurred in communities that are relatively close to larger metropolitan areas. Manufacturing and industry in these areas has also attracted new business and in turn has caused increased growth.

Alternatives 2, 3, 4, and 5: Under the Proposed Action and other action alternatives, populations in the affected area are expected to continue to grow at rates comparable to the No Action Alternative. The Service's action to acquire water and water rights for wetlands protection is not expected to impact population growth in the affected area.

Comparison with No Acquisition Conditions: Potential impacts would be similar to those stated above.

Mitigation Measures

No adverse impacts to population growth were identified for this element. Therefore no mitigation is needed.

4.19 EFFECTS ON LAND USE

Alternative 1: Historically, the Lahontan Valley has supported a large agricultural base with some urban development. Recently, land use trends have shifted toward more urban development, as population growth has created increased housing demand. The Service expects this trend to continue and that growth and other related factors will play a dominant role in changing land use patterns within the affected area. (See Section 4.26.12, CUMULATIVE IMPACTS, GROWTH AND DIVERSIFICATION).

The acquisition of water rights from irrigated agricultural land would result in a change in land use. Without irrigation, the use of such lands for crop production is impossible. The ultimate use of such lands depends on whether the individual owner retains ownership of appurtenant lands or whether the Service acquires the appurtenant lands as part of the water rights purchase.

The Service expects some of the lands from which water rights have been acquired to be subdivided and developed for residential use. Under baseline conditions, about 28 percent of the lands involved in wetland water right acquisitions have been subdivided into residential sized parcels.

Some of these lands would remain as vacant lands and over time would revert back to more natural desert landscapes. Other lands would become open space surrounding a residence, or would be converted to more intensive industrial/commercial uses. To date, under the limited acquisition program associated with the No Action Alternative, no lands have shown a change of use to more intensive industrial/commercial use.

Alternative 2: Under the Proposed Action, the acquisition of water rights for wetland protection could potentially affect the status of *about 29,000 acres of irrigated and water-righted farmland above that which would occur under the No Action Alternative*. This has the potential to accelerate the process of land conversion to other non-agricultural uses. The propensity to subdivide larger blocks of former agricultural land into smaller residential parcels is market-driven. If the supply of vacant residential parcels exceeds the demand, prices would drop, and the propensity of property owners to convert agricultural land to residential uses would decrease until market conditions could again support such sales.

Alternative 3: Under this alternative, the acquisition of water rights for wetland protection could potentially affect the status of *about 22,900 acres of irrigated and water-righted farmland above that which would be affected under the No Action Alternative*. As with the Proposed Action, this has the potential to accelerate the process of land conversion to other non-agricultural uses. Market conditions would also affect the land use conversion process as described under the Proposed Action.

Alternative 4: Under this Maximum Acquisition Alternative, the Service's actions have the greatest potential to affect the status of irrigated farmland. Under this alternative, about *32,500 acres of irrigated farmland could potentially be affected above that which is expected to be affected under the No Action Alternative*. This would accelerate the process of land conversion within the affected area.

Alternative 5: Under this alternative, the Service would minimize the effects of water right acquisition on irrigated farmland. The Service would potentially affect the status of *about 15,400 acres of irrigated farmland in the Lahontan Valley, above that which would occur under the No Action Alternative*, as well as affect as much as *about 4,800 acres of water-righted land in the Middle Carson River corridor of Lyon County*. This alternative would have the potential to accelerate the process of land conversion from farmland to other non-agricultural uses.

Comparison with No Acquisition Conditions: *Under Alternative 5, the Service would potentially affect the status of up to about 21,000 acres of irrigated farmland in the Lahontan Valley, including the 5,600 acres that is expected to be affected under the No*

Action Alternative. Up to about 4,800 acres of irrigated acres of farmland could potentially be affected along the Middle Carson River corridor.

Mitigation Measures

Traditionally, local governments use zoning or some form of land use classification to restrict or control land use in order to avoid adverse conditions related to land use conversion. To prevent the conversion of vacant land (formerly irrigated farmland) to more intensive land uses, local government could impose zoning for various criteria. Altering land use designations or implementing more restrictive zoning is controversial and can sometimes trigger litigation, due to perceived down-zoning and/or antagonistic viewpoints. The Service would be unable to control the land use in areas that return to private ownership after the Service acquires water rights. Therefore, the Service can not commit to the implementation of such mitigation and believes that such changes in zoning are unlikely in the near future.

Agricultural lands acquired as part of the water rights acquisition program can be held for a specified amount of time before the Service disposes of the land back into the private sector or to other governmental agencies. During this period, the Service would be amenable to rezoning of the lands it has acquired if local government were to pursue zoning changes in an effort to prevent undesirable land use conversions, unmanageable growth patterns, or to encourage continued agricultural production on important agricultural areas.

Public Law 101-618 has provisions for targeting water right acquisitions, but implementation of a targeting strategy program that would preserve specific core areas or agricultural lands should include local governmental bodies and land owners. The NRCS's LESA system would provide local government and the Service with criteria to rank the desirability of agricultural land for possible preservation. For the Service to implement any targeting strategy to preserve agricultural land uses or prevent undesirable growth patterns associated with new subdivisions, there needs to be coordinated county and city zoning or land use restrictions in place to support targeting efforts. The Service considers such mitigation to be feasible but dependent on local action for effective implementation.

4.20 EFFECTS ON LAND VALUES

Alternative 1: Churchill County land values have been increasing at or above the inflation rate for the past 5 years. The Service's actions to acquire water rights should not increase the market price of land or water rights in Lahontan Valley. Acquisitions made by the Service are based on market prices of previous open market transactions (non-governmental) and reflect the increased values private parties place on water rights and water-righted land.

There are numerous other factors that would affect the value of lands and water rights within the affected area. Most of these factors (recoupment, OCAP revisions, and issues involving past water

rights transfers), are outside the scope of the Service's actions. Although growth and expansion of the community could create sufficient demand for good quality level land, developers and land speculators may increase purchases of water-righted land solely for the appurtenant lands.

Alternatives 2, 3, 4, and 5: Under the Proposed Action and the other action alternatives, the Service expects land values to be unaffected by the wetland water right acquisitions. The potential to accelerate the conversion of farmlands to other land uses would most likely keep pace with the demand by residential developers or land speculators. There is potential that the acquisition of water rights from irrigated farmland may create an oversupply of residential parcels if too many private owners subdivide their larger parcels. These are considered normal market fluctuations in a free enterprise system and would not necessarily be an impact of the water rights acquisition program.

Comparison with No Acquisition Conditions: Potential impacts would be similar to those stated above.

Mitigation Measures

If an oversupply of residential parcels were created, actions to prohibit or mitigate such adverse conditions would entail moratoriums on new subdivisions. Generally, such restrictions or controls on subdivision of lands are enacted at the county or municipal level of government. In Lahontan Valley, where there is the greatest potential for such adverse conditions to occur within the affected area, Churchill County would have to amend its master plan and enact new ordinances focused at subdivision rules and procedures. Such mitigation would control subdivision development and would maintain or possibly increase land values by controlling the supply of vacant residential parcels. This mitigation measure offers reasonable protection from the possible creation of an oversupply of residential parcels, but is outside of the Service's authority, and would require action by Churchill County. It is unknown whether the County would pursue such mitigative measures by amending its master plan and enacting growth control ordinances.

Targeting of water-righted land for wetland water right acquisition could focus purchases in areas where, if the appurtenant lands are subdivided, such actions would be compatible with planned growth patterns. This type of targeting may have little effect of land values, but would prevent the creation of new residential subdivisions in areas where there would be indirect impacts on other community services. The present Churchill County Master Plan does not specifically define areas that are more or less preferable for the subdivision of lands in the community. The Service does not consider such mitigation to be feasible under current conditions as it would require both community support and changes in the Master Plan before it could be implemented.

There is interest in targeting water right acquisitions to benefit other Federal programs such as: improved Newlands Project drainwater quality, improved delivery efficiency rates, or protecting

prime farmlands. Targeting programs that have dual purposes, or work to benefit other non-related actions often employ different pricing mechanisms (premiums) or value-added payments in the acquisition process. Such pricing structures or value-added mechanisms often increase the prices paid for specific properties due to their increased benefit, but conversely, targeting can also lower values in lands not targeted for acquisition, or lower the price private buyers are willing to pay. While such targeting strategies would benefit other Federal programs, the merit of such pricing mechanisms as a mitigation measure designed to protect land values is questionable. Before such increased pricing mechanisms could be implemented, the Service would have to be given specific authority to exceed fair-market purchases for water rights. For these reasons, the Service does not anticipate that such mitigation is either feasible under existing procedures nor authorized by Public Law 101-618.

4.21 EFFECTS ON PROPERTY TAXES

The Service's action would directly affect property taxes on irrigated farmlands. The tax revenues for agricultural land are the lowest tax rates in Churchill County (ranging from \$1.07 to \$2.76 per acre). Agricultural land impacted by the acquisition of water rights would be subject to different property tax rates depending on the land use that occurs after the water rights are removed. In all cases, the tax rate is higher than agricultural tax rates. The tax rate for vacant non-agricultural land ranges from \$3.19 to \$4.78 per acre and the rates for subdivided residential vacant land would increase to as much as \$103.65 to \$199.33 per acre.

In cases where the Service acquires the lands appurtenant to the water rights, the Service would not pay property taxes, but would make revenue sharing payments to the County. *Impacts to Federal revenue sharing are addressed in Section 4.25, ACQUISITION COSTS (please refer to Sections 1.9.5, Refuge Revenue Sharing Act and 3.25 ACQUISITION COSTS for further information).* The Service expects to permanently retain only those lands acquired within the boundaries of the Stillwater NWR. Other acquired lands would be disposed of through the regular Federal procedures for property disposal and would most likely be returned to private ownership. Revenue sharing payments would be paid on acquired lands for as long as the Federal Government holds title to them.

Alternative 2: Under the Proposed Action, the Service expects that the tax rate on up to 34,800 acres of irrigated farmland (*including 5,600 acres that would be affected under the No Action Alternative*) would change. Based on Churchill County 1993 tax rates, the maximum property tax revenue generated off such lands would be about \$96,048 per year. If those cultivated agricultural lands were all converted to the vacant, non-agricultural tax rate, tax revenues generated would range from \$111,012 to \$166,344 per year. This represents a 16 to 73 percent increase over cultivated agricultural tax revenues. These expected tax revenues represent the minimum increase that is expected to occur under the Proposed Action. If some of these affected lands were subdivided, the property tax revenues would be substantially higher.

If the Service purchased the lands, revenue sharing payments would be higher on a per acre basis than the tax revenue generated from vacant non-agricultural land, but would remain lower than the higher valued vacant residential land *(please refer to Section 4.25)*.

Alternative 3: Under this alternative, the Service expects that the tax rate on up to 28,500 acres of irrigated farmland *(including 5,600 acres that would be affected under the No Action Alternative)* would change. Based on Churchill County 1993 tax rates, the maximum property tax revenue generated off such lands would be about \$78,660 per year. If those cultivated agricultural lands were all converted to the vacant, non-agricultural tax rate, tax revenues generated would range from \$90,915 to \$136,230 per year. This represents a 16 to 73 percent increase over cultivated agricultural tax revenues. These expected tax revenues represent the minimum increase that is expected to occur under this alternative. If some of these affected lands were subdivided, the property tax revenues would be substantially higher.

If the Service purchased the lands, revenue sharing payments would be higher on a per acre basis than the tax revenue generated from vacant non-agricultural land, but would remain lower than the higher valued vacant residential land *(please refer to Section 4.25)*.

Alternative 4: Under this Maximum Acquisition alternative, the Service expects that the tax rate on up to 38,100 acres of irrigated farmland *(including 5,600 acres that would be affected under the No Action Alternative)* would change. Based on Churchill County 1993 tax rates, the maximum property tax revenue generated off such lands would be about \$105,156 per year. If those cultivated agricultural lands were all converted to the vacant, non-agricultural tax rate, tax revenues generated would range from \$121,539 to \$182,118 per year. This represents a 16 to 73 percent increase over cultivated agricultural tax revenues. These expected tax revenues represent the minimum increase that is expected to occur under this alternative. If some of these affected lands were subdivided, the property tax revenues would be substantially higher.

If the Service purchased the lands, revenue sharing payments would be higher on a per acre basis than the tax revenue generated from vacant non-agricultural land, but less than the higher valued vacant residential land *(please refer to Section 4.25)*.

Alternative 5: Under this alternative, the Service *would limit* acquisition to 21,000 acres of irrigated farmland within Churchill County *(including 5,600 acres of the No Action Alternative)*. Based on the potential to change the property tax rates on this acreage figure, using 1993 Churchill County tax rates, the maximum property tax revenue generated off these lands would be about \$57,960 per year. If those cultivated agricultural lands were all converted to the vacant, non-agricultural tax rate, tax revenues generated would range from \$66,990 to \$100,380 per year. These increases also represent a 16 to 73 percent increase over cultivated agricultural tax revenues. If some of these affected lands were subdivided, the property tax revenues would be substantially higher.

If the Service purchased the lands, revenue sharing payments would be higher on a per acre basis than the tax revenue generated from vacant non-agricultural land, but less than the higher valued vacant residential land (*please refer to Section 4.25*).

Under this alternative, the Service expects to acquire water rights from lands in the Middle Carson River corridor. While these lands are within Lyon County, the Service expects the impacts to property tax revenues would be similar to the situation described for Churchill County. Property tax revenues are expected to increase over the revenues generated off of agricultural land. Revenue sharing payments would be paid to Lyon County if the Service purchased any lands as part of its water rights acquisitions.

Comparison with No Acquisition Conditions: Potential impacts are compared to no acquisition conditions above.

Mitigation Measures

The net impacts on property tax revenues would be positive for the Proposed Action and alternatives, therefore no mitigation measures are needed for this element.

4.22 EFFECTS ON MUNICIPAL SERVICES

Alternative 1: As the populations of both Lyon and Churchill County grow, demand for municipal services such as fire protection, police protection, water services, and sewer services will increase correspondingly. The Service's actions and growth that is already occurring will cumulatively impact domestic water supply in Lahontan Valley. More detailed discussions on domestic water supplies are in Section 4.3.3.2, Domestic Supply, and Section 4.26.12, CUMULATIVE IMPACTS, GROWTH AND DIVERSIFICATION.

With the exception of domestic water supply, no other municipal services are expected to be impacted by the Proposed Action and alternatives. The Service's action is not expected to increase the need for fire, police, sewer or water services in Lyon County. Similarly, fire, police and sewer services in Churchill County are expected to be unaffected by the Service's actions to acquire water and water rights for wetlands protection.

As a result of the Service's action, visitor use at the designated Lahontan Valley wetlands would increase, and some increased police protection at Stillwater NWR, Carson Lake, and the Tribal wetlands could be warranted. The Service, Nevada Division of Wildlife (NDOW), and the Fallon Paiute-Shoshone tribes have law enforcement personnel on staff to provide for public protection and respond to emergency situations that may arise.

Alternatives 2, 3, 4, and 5: Municipal services in the affected area would not be adversely impacted by the Proposed Action and other action alternatives. The Service and NDOW law

enforcement personnel as well as Fallon Paiute-Shoshone tribal police would be responsible for incidents occurring within the designated wetland areas under their jurisdiction. Increased visitor use might affect these law enforcement personnel, but would not likely create increased law enforcement demands on Churchill County Sheriff Deputies or Fallon City Police.

Comparison with No Acquisition Conditions: Potential impacts would be similar to those stated above.

Mitigation Measures

Adverse impacts to municipal water supply and cumulative impacts to this resource are discussed in Section 4.3.3.2, DOMESTIC SUPPLY, and 4.26.12, CUMULATIVE EFFECTS (along with mitigation). No other municipal services would be adversely impacted by the Proposed Action or alternatives. Therefore no mitigation is identified for these other elements.

4.23 EFFECTS ON SOCIAL VALUES

There is insufficient data to determine social values for Lyon County residents, and for the purposes of this document, social values of Churchill County residents are considered to be representative of the affected area.

Various reports, studies, and surveys of Churchill County citizens (see Section 3.23, SOCIAL VALUES) reflect a community that values its agricultural roots and heritage, the verdant fields and rural lifestyle, low crime rate, and abundant recreation opportunities (especially hunting and fishing).

Surveys indicate that residents would like to see some growth and diversification in the community, and would be most willing to support increased services and goods, or enlargement of economic entities that are already influential in the community (i.e., NAS-Fallon or the local agricultural base).

Under **Alternative 1**, the advent of a water rights acquisition program for wetlands acquisition has been met with controversy in the community. Many people fear that the water rights acquisition program will alter the rural lifestyle of the community. Under the No Action Alternative, as much as 5,670 acres of irrigated farmland may be affected by the acquisition of water rights for wetlands. Under baseline conditions, farm preservation values do not appear to limit the availability water rights for sale or affect the willingness of water-right holders to sell their agricultural water rights to the Service. Abundant agricultural fields remain in Lahontan Valley (about 47,008 acres). The rural lifestyle has not been altered, the low crime rate has not been affected, and recreational opportunity has been slightly increased. The Service's prior acquisition has not altered growth and diversification in the community, two factors that in and of themselves affect the community's social values (see Section 4.26.12).

For those associated with the farming community in Churchill County, the advent of a water rights acquisition program may be viewed as a direct and negative impact to both livelihood and lifestyle. For many members of the community, "farm preservation values," reflect a prevalent attitude that the farming lifestyle should be protected, and that community members are willing to pay to protect this way of life. As such, "farm preservation values" in the community may be related to protection of verdant agricultural landscapes, maintaining the agricultural economy in the community, and resisting changes to the rural way of life. Under the No Action Alternative, "farm preservation values" have been slightly impacted by the Service's 20,000 AF water rights acquisition program. Other social values, associated with the low-crime rate and abundant recreational opportunity in the area, have not been affected under the baseline conditions, and are not expected to be impacted under any of the action alternatives.

Alternative 2: As a result of the Proposed Action, *up to 29,200 acres of irrigated farmland would be affected by a change of use. Accounting also for the 5,600 acres of irrigated farmland expected to be affected by the No Action Alternative,* about 18,000 acres of farmlands would remain, and the rural lifestyle would be altered by a decrease in agricultural activity in the area over the long term. Recreational opportunities related to hunting would be greatly increased with 25,000 acres of primary wetland habitat. Growth and diversification would continue at rates comparable to the baseline conditions, and would be unaffected by the Service's action. As acres of farmlands are taken out of production, those members of the community who hold "farm preservation values" would be adversely impacted. Due to the number of community members who hold "farm preservation values," this action would significantly impact social values of community members, and would accelerate the change in the character of the community over the long term.

The social values of those who use and appreciate the primary wetland areas for their recreational opportunity would benefit greatly under the Proposed Action.

Alternative 3: Conditions under this alternative are expected to be similar to the conditions described under the Proposed Action. *Up to 22,900 acres of irrigated farmland would be retired or show a change of use. Accounting also for the 5,600 acres of irrigated farmland expected to be affected by the No Action Alternative,* about 24,300 acres of farmlands would remain, and the rural lifestyle would be altered by a decrease in agricultural activity in the area over the long term. However, adverse impacts to social values would be somewhat less than the Proposed Action as fewer acres of irrigated farmlands would be retired. As acres of farmlands are taken out of production, those members of the community who hold "farm preservation values" would be adversely impacted. Due to the number of community members who hold "farm preservation values," this action would significantly impact social values of community members, and would accelerate the change in the character of the community over the long term.

As with the Proposed Action, members of the community who value the wetlands for their recreational opportunity would benefit greatly under this alternative.

Alternative 4: This alternative could potentially cause the greatest impact to social values of all the action alternatives. *Up to 32,500 acres of irrigated farmland would be retired or show a change of use. Accounting also for the 5,600 acres of irrigated farmland expected to be affected by the No Action Alternative,* about 14,700 acres of farmlands would remain, and the rural lifestyle would be altered to the greatest extent. Other conditions would be similar to the Proposed Action. Due to the number of community members who hold "farm preservation values," this action would significantly impact social values of community members, and would accelerate the change in the character of the community over the long term.

As with the Proposed Action, members of the community who use and appreciate the wetlands for their recreational opportunity would benefit greatly under this alternative.

Alternative 5: Of the action alternatives, Alternative 5 would result in the least impact to the agricultural community and its related social values. About 15,400 acres of irrigated farmland (Carson Division) would be retired or show a change of use. *Accounting also for the 5,600 acres of irrigated farmland expected to be affected by the No Action Alternative,* about 31,800 acres of farmlands would remain, and the rural lifestyle would be moderately altered by a decrease in agricultural activity in the area over the long term. However, impacts to social values are expected to be less than that of the Proposed Action and Alternative 4, as fewer acres of irrigated farmlands in the Carson Division of the Newlands Project would be affected. The leasing component of this alternative would only temporarily affect the agrarian landscape and related values, but would minimize the adverse impacts to the agricultural economy by maintaining more farming operations in business than the other alternatives. This alternative would moderately impact the social values of community members, but may accelerate the change in the character of the community over the long term.

As with the Proposed Action, members of the community that use and appreciate the wetlands for their recreational opportunity would benefit greatly under this alternative.

Comparison with No Acquisition Conditions: *Total impacts of Alternative 5 (including those of the 20,000 AF acquisition program) are identified above.*

Mitigation Measures

Impacts to social values as a result of the Service's action would be almost impossible to mitigate. The following mitigation measures would only minimize impacts to social values, which are an unavoidable adverse impact associated with the Service's action.

Zoning to protect core agricultural areas would mitigate for some impacts to social values as a result of the Service's action. For instance, many community members appreciate the verdant greenbelt in and around Fallon, and would like to keep it. Protection of core agricultural zones for

their landscape character would reduce visual impacts of community members that appreciate those values. Although this mitigation is reasonable and feasible, in the past there has been little support and often opposition to zoning or targeting of lands for any reason.

4.24 EFFECTS ON INDIAN TRUST ASSETS AND CULTURAL RESOURCES

4.24.1 INDIAN TRUST ASSETS

Fallon Paiute-Shoshone Indian Reservation

Under Alternative 1 conditions (baseline conditions), the Federal government would not acquire any water rights in trust for the Fallon Paiute-Shoshone Tribes for use on Tribal wetlands. As a result, the Tribes would be responsible for using their own resources to acquire water for any wetland habitat they may wish to sustain. If the Tribes do not secure a dependable water supply for delivery to Tribal wetlands, the quantity and quality of wetland habitat on the Reservation would remain at current levels. The acquisition of water rights and land for the Fallon Paiute-Shoshone Tribes' agricultural program (Section 102 of Public Law 101-618 and Section 1.8.1(1) of this EIS) would not be affected by this alternative.

Alternative 2: *Under this alternative, approximately 4,000 AF of water rights would be acquired in trust by the Federal government to create and sustain about 800 acres of wetland habitat on Fallon Paiute-Shoshone Indian Reservation. Wetland habitat sustained on the Reservation is considered primary wetland habitat and therefore would fulfill a portion of the 25,000-acre primary wetland habitat objective. Creating and sustaining 800 acres of wetland habitat on the Reservation would benefit waterfowl, shorebirds, other species of wetland wildlife, and wetland vegetation by providing habitat for these animals and plants. The biological impacts associated with sustaining 25,000 acres of primary wetland habitat are described in Sections 4.7 through 4.15.*

The acquisition of water rights for wetlands protection under Alternative 2 could decrease the availability of water rights for the Reservation agricultural program (see Sections 1.8.1(1) and 4.26.1). Aside from this potential adverse effect, this alternative is not expected to negatively affect land assets, water rights, or fish and wildlife resources of the Fallon Paiute-Shoshone Paiute Tribes.

Alternative 3: *Under this alternative, approximately 4,000 AF of water rights would be acquired in trust by the Federal government to create and sustain about 800 acres of wetland habitat on Fallon Paiute-Shoshone Indian Reservation. Wetland habitat sustained on the Reservation is considered primary wetland habitat and therefore would fulfill a portion of the 25,000-acre primary wetland habitat objective. Creating and sustaining 800*

acres of wetland habitat on the Reservation would benefit waterfowl, shorebirds, other species of wetland wildlife, and wetland vegetation by providing habitat for these animals and plants. The biological impacts associated with sustaining 25,000 acres of primary wetland habitat are described in Sections 4.7 through 4.15.

The acquisition of water rights for wetlands protection under Alternative 3 could decrease the availability of water rights for the Reservation agricultural program (see Sections 1.8.1(1) and 4.26.1). Aside from this potential adverse effect, this alternative is not expected to negatively affect land assets, water rights, or fish and wildlife resources of the Fallon Paiute-Shoshone Paiute Tribes.

Alternative 4: Under this alternative, approximately 4,000 AF of water rights would be acquired in trust by the Federal government to create and sustain about 800 acres of wetland habitat on Fallon Paiute-Shoshone Indian Reservation. Wetland habitat sustained on the Reservation is considered primary wetland habitat and therefore would fulfill a portion of the 25,000-acre primary wetland habitat objective. Creating and sustaining 800 acres of wetland habitat on the Reservation would benefit waterfowl, shorebirds, other species of wetland wildlife, and wetland vegetation by providing habitat for these animals and plants. The biological impacts associated with sustaining 25,000 acres of primary wetland habitat are described in Sections 4.7 through 4.15. Because it would not rely on any drainwater, this alternative would have the most benefits to wildlife.

The acquisition of water rights for wetlands protection under Alternative 4 could decrease the availability of water rights for the Reservation agricultural program (see Sections 1.8.1(1) and 4.26.1). Aside from this potential adverse effect, this alternative is not expected to negatively affect land assets, water rights, or fish and wildlife resources of the Fallon Paiute-Shoshone Paiute Tribes.

Alternative 5: Under the Preferred Alternative, approximately 4,000 AF of water rights would be acquired in trust by the Federal government to create and sustain about 800 acres of wetland habitat on Fallon Paiute-Shoshone Indian Reservation. Wetland habitat sustained on the Reservation is considered primary wetland habitat and therefore would fulfill a portion of the 25,000-acre primary wetland habitat objective. Creating and sustaining 800 acres of wetland habitat on the Reservation would benefit waterfowl, shorebirds, other species of wetland wildlife, and wetland vegetation by providing habitat for these animals and plants. The biological impacts associated with sustaining 25,000 acres of primary wetland habitat are described in Sections 4.7 through 4.15.

The acquisition of water rights for wetlands protection under the Preferred Alternative could decrease the availability of water rights for the Reservation agricultural program (see Sections 1.8.1(1) and 4.26.1). Aside from this potential adverse effect, this alternative is

not expected to negatively affect land assets, water rights, or fish and wildlife resources of the Fallon Paiute-Shoshone Paiute Tribes.

Comparison to No Acquisition Conditions: The potential impacts under the Preferred Alternative as compared to no acquisition conditions would be similar to the potential impacts described above (in comparison with baseline conditions). This is because no acquisition conditions for Tribal wetlands and the water rights acquisition program for the Fallon Indian Reservation are similar to baseline conditions.

Pyramid Lake

Alternative 1: Based on BLR model output, it is estimated that Truckee River flows are about 448,800 AF/year (Table 4.3.A) and the water level of Pyramid Lake is estimated to be 3,830 feet above sea level. No actions would be taken under Alternative 1 that would change Truckee River flows or the water level of Pyramid Lake. Implementation of Alternative 1 would have no adverse impacts to trust assets of the Pyramid Lake Paiute Tribe.

Alternative 2: Under this alternative, it is estimated, based on BLR model output, that Truckee River flows would increase by about 4 percent over baseline conditions and Pyramid Lake water level would rise about 5 feet (Table 4.3.A). Increased flow of the Truckee River into Pyramid Lake is expected to improve water quality in the river below Derby Dam and enhance habitat for fish and wildlife using the river (including cui-ui) and adjacent riparian habitat. A rise in the water level of Pyramid Lake would benefit fish inhabiting the lake (including cui-ui). Overall, this alternative is expected to have beneficial effects on Tribal assets. It is not expected that the alternative would have any negative affects on land assets, water rights, or fish and wildlife resources of the Pyramid Lake Paiute Tribe. The potential effects of water rights acquisition for wetlands on surface water resources are described in Section 4.3 and potential effects on biological resources are described in Sections 4.6 through 4.15.

Alternative 3: Under this alternative, it is estimated, based on BLR model output, that Truckee River flows may increase slightly over baseline conditions and that the level of Pyramid Lake would not rise (Table 4.3.A). No actions would be taken as part of Alternative 3 that would reduce Truckee River flows or the water level of Pyramid Lake. Therefore, implementation of Alternative 3 would not have any adverse impacts to land assets, water rights, or fish and wildlife resources of the Pyramid Lake Paiute Tribe.

Alternative 4: Under this alternative, it is estimated, based on BLR model output, that Truckee River flows would increase by more than 5 percent over baseline conditions and the

water level of Pyramid Lake would rise about 7 feet (Table 4.3.A). Increased flow of the Truckee River into Pyramid Lake is expected to improve water quality in the river below Derby Dam and enhance habitat for fish and wildlife using the river (including cui-ui) and adjacent riparian habitat. A rise in the water level of Pyramid Lake would benefit fish inhabiting the lake (including cui-ui). Overall, this alternative is expected to have beneficial effects on Tribal assets. It is not expected that the alternative would have any negative effects on land assets, water rights, or fish and wildlife resources of the Pyramid Lake Paiute Tribe. The potential effects of water rights acquisition for wetlands on surface water resources are described in Section 4.3 and potential effects on biological resources are described in Sections 4.6 through 4.15.

Alternative 5: Under the Preferred Alternative, it is estimated, based on BLR model output, that Truckee River flows would increase by about 2 percent over baseline conditions and Pyramid Lake water level would rise about 3 feet (Table 4.3.A). Increased flow of the Truckee River into Pyramid Lake is expected to improve water quality in the river below Derby Dam and enhance habitat for fish and wildlife using the river (including cui-ui) and adjacent riparian habitat. A rise in the water level of Pyramid Lake would benefit fish inhabiting the lake (including cui-ui). Overall, this alternative is expected to have beneficial effects on Tribal assets. It is not expected that the alternative would have any negative effects on land assets, water rights, or fish and wildlife resources of the Pyramid Lake Paiute Tribe. The potential effects of water rights acquisition for wetlands on surface water resources are described in Section 4.3 and potential effects on biological resources are described in Sections 4.6 through 4.15, and Appendix 9.

Comparison to No Acquisition Conditions: Compared to no acquisition conditions, the extent of impacts would be similar to the extent of impacts as compared to baseline conditions, as described above.

4.24.2 EFFECTS ON CULTURAL RESOURCES

The acquisition of water rights for the primary wetland areas would *enhance the preservation of* prehistoric cultural resources at Carson Lake and Stillwater NWR. Historical cultural resources would not be impacted by the Service's action. Due to concerns about unauthorized archaeological collection and excavations, locations and descriptions of archaeological sites are not discussed in this document.

Alternative 1: In general, applying water to wetland areas insulates archaeological sites from damage from both man-made and natural causes. With additional water, human access to wetland archaeological sites would be physically restricted. In addition, sites that are inundated would no longer be impacted by wind erosion. Acquiring water to increase wetland inflows and acres of inundated wetland habitat would also increase wetland

vegetation, which indirectly benefits cultural resources. Vegetation effectively stabilizes soils and hides surface displays of eroded artifacts.

Adverse effects could occur if water management techniques created flood-like conditions related to wetland inflows, but this is not likely to occur. Floods would continue to occur naturally and would not be affected by the Service's action to acquire water for wetlands protection. The upcoming Comprehensive Management Plan for Stillwater NWR will address water management and its relationship to cultural resource management in the wetland areas.

Under the No Action Alternative, about 12,100 wetland acres would be inundated as primary wetland habitat. These inundated areas would preclude public access to archaeological sites.

Alternative 2, 3, 4, and 5: The Proposed Action and alternatives would substantially benefit prehistoric cultural resources over the No Action Alternative. A total of 25,000 acres of wetlands would be inundated during many months of each year. *This is about a 107 percent increase over baseline conditions.* The areas where inundation would occur are also areas of known archaeological value. Archaeological sites with prehistoric cultural artifacts would be protected from discovery, thereby reducing the potential for unauthorized collection or excavation. Wetland vegetation would stabilize archaeological sites and prehistoric cultural resources would benefit under these alternatives.

Comparison to No Acquisition Conditions: *The amount of wetlands that would be inundated under Alternative 5 would be about 158 percent more than was inundated under no acquisition conditions. Consequently, archaeological sites will be better protected from discovery.*

Mitigation Measures

Indian trust assets and cultural resources would not be adversely impacted by the Proposed Action or action alternatives. Therefore, no mitigation is identified for this element.

4.25 EFFECTS ON ACQUISITION COSTS AND THE PROBABILITY OF MEETING THE SERVICE OBJECTIVE

The Service expects that its actions to acquire water rights would result in both capital (one-time acquisition) costs and annual (ongoing) costs. *Annual costs would include Operations and Maintenance costs (O & M), shared revenue payments (and under Alternative 5, anticipated annual leasing and groundwater pumping costs). Capital costs are defined as the cost to purchase water rights.* Under this impact analysis the Service assumes that capital costs could vary (Table 4.25.A),

TABLE 4.25.A SUMMARY OF WATER RIGHTS ACQUISITION COSTS

	ALT. 1	ALT. 2	ALT. 3	ALT. 4	Alt. 5
Water Rights Acquired (AF)	20,000	122,000	100,000	133,500	75,000
(1) CAPITAL COSTS					
Low	\$7,850,000	\$49,800,000	\$42,200,000	\$53,800,000	\$49,050,000
Median	\$8,500,000	\$62,700,000	\$51,100,000	\$69,400,000	\$55,250,000
High	\$11,600,000	\$100,300,000	\$77,100,000	\$112,400,000	\$75,425,000
ANNUAL COSTS					
(2) O&M Reimbursement	\$150,000	\$890,600	\$730,000	\$974,500	\$547,500
(3) USFWS Revenue Sharing					
Low	\$17,000	\$104,400	\$85,500	\$114,300	\$63,000
Median	\$34,000	\$208,800	\$171,000	\$228,600	\$126,000
High	\$51,000	\$313,200	\$256,500	\$342,900	\$189,000
(4) Total Annual Costs					
Low	\$167,000	\$995,000	\$815,500	\$1,088,800	\$2,794,500*
Median	\$184,000	\$1,099,400	\$901,000	\$1,203,100	\$2,987,000*
High	\$201,000	\$1,203,800	\$986,500	\$1,317,400	\$3,179,500*

Source: (1) Sunding, 1994 and Table 4.16.C;

(2) Based on \$7.30/AF, Section 3.25 ACQUISITION COSTS;

(3) Revenue sharing payments based on \$15.00/acre X acres affected X 20% (low) and 40% (median) and 60% (high); and

(4) sum of lines (2) and (3).

* --This alternative also includes annual leasing and groundwater pumping costs (see text).

and would include low, medium, and high costs. This range would include the cost for water rights at a production value pricing (low), the "proportional" value pricing (medium), and pricing that includes land as part of the water right acquisition price (high). Under the baseline conditions of **Alternative 1**, capital costs range from \$7.8 million (low) to \$11.6 million (high).

Annual costs (Table 4.25.A) are calculated based on expected O&M charges for the water rights acquired and revenue-sharing payments made *to local governments pursuant to Congressional*

directives prescribed in the Refuge Revenue Sharing Act (see Section 1.95 and Section 3.25, ACQUISITION COSTS).

Refuge revenue sharing payments for example would be about \$15/acre/year for fee title lands acquired with appurtenant lands. This value is based on application of the revenue sharing payment rate of three-fourths of 1 percent (0.0075) to an average per acre value of water-righted land (\$2,000/acre). While the values used in such sample calculations are based on general averages, they provide a representative figure to compare potential Refuge revenue sharing payments to property tax revenues.

In 1995, the Service paid Refuge revenue sharing payments to Churchill County in the amount of \$21,321 on the 1,254 acres of fee title lands it had acquired as of Sept. 30, 1994. Both the sample value of \$15 per acre per year and the actual 1995 payment, which equates to \$17 per acre, are higher than the property tax revenues from cultivated agriculture lands (about \$2.75/acre/year) or vacant lands (about \$4.80/acre/year) based on 1993 tax rates.

The Service assumes that only a portion of the 20,000 AF of water rights it acquires under baseline conditions will include appurtenant land. To calculate possible revenue-sharing payments, the Service set a 20 percent figure to represent the low end of land acquisitions and a 60 percent figure as its high end. Based on these assumptions, the Service calculates revenue-sharing payments to ultimately range from \$17,000 to \$51,000 a year under baseline conditions. Total annual costs are expected to range from \$167,000/year to \$201,000/year.

The implementation costs defined in this section are total costs for all of the water rights expected to be acquired through fee purchase. This includes the costs both the Service and the State of Nevada would incur. The State of Nevada would spend \$5 million - \$9 million for water right acquisitions for Lahontan Valley wetlands. *The State is expected to pay its proportional share of total O&M costs. The State of Nevada is exempt from paying property taxes on any lands they purchase incidental to their wetland water right acquisitions.*

Two key factors determine the probability of the Service meeting its wetlands objectives: availability of willing sellers and adequacy of funding. Under baseline conditions, the Service anticipates that it will meet its 20,000 AF water rights acquisition objective by August 1996. Based on the current rate of participation by willing sellers and the assumption that sufficient funding will be provided to purchase all the water rights that are available, the Service anticipates that completion of the water rights acquisition program would take from 20 years under Alternative 5 (which requires the least water right purchases) to 30 years under Alternative 4 (which requires the most water right purchases).

Alternative 2: *Under this alternative, capital costs are expected to range from \$49.8 million to \$100.3 million (including costs of the 20,000 AF acquisition program, or the No Action Alternative).*

The State of Nevada *could* account for *up to* \$9 million of this total and the Federal Government would incur the remainder of these costs. *Refuge Revenue Sharing payments would range from \$104,400 to \$313,200 under this alternative. Total annual costs are expected to range from \$995,000 to \$1.2 million each year for Alternative 2. These annual costs exclude any costs associated with leasing water rights, which could occur, but are not expected to comprise a substantial component of the water rights acquisition strategy under this alternative.*

Alternative 3: Under this alternative, capital costs are expected to range from \$42.2 million to \$77.1 million (*including costs of the 20,000 AF acquisition program*). The State of Nevada would account for *up to* \$9 million of this total and the Federal Government would incur the remainder of these costs. *Refuge Revenue Sharing payments would range from \$85,500 to \$256,500 under this alternative. Total annual costs are expected to range from \$815,500 to \$986,500 each year for this alternative. These annual figures exclude any costs associated with leasing water rights, which could occur, but are not expected to comprise a substantial component of the water rights acquisition strategy under this alternative.*

Alternative 4: Under this alternative, capital costs are expected to range from \$53.8 million to \$112.4 million (*including costs of the 20,000 AF acquisition program*). The State of Nevada would account for *up to* \$9 million of this total and the Federal Government would incur the remainder of these costs. *Refuge Revenue Sharing payments would range from \$114,300 to \$342,900 under this alternative. Annual costs are expected to range from \$1.1 million to \$1.3 million each year for this alternative. These annual figures exclude any costs associated with leasing water rights, which could occur, but are not expected to comprise a substantial component of the water rights acquisition strategy under this alternative.*

Alternative 5: Under *the Preferred Alternative* the capital costs include the acquisition costs for the 75,000 AF of water rights from the Carson Division, and would also include costs to purchase water rights from the Middle Carson River corridor, and drill groundwater wells in Lahontan Valley. These costs are estimated as follows: The cost of Carson Division water rights would range from \$32.15 million to \$58.5 million (*including costs of the 20,000 AF acquisition program*); Middle Carson River water rights would cost as much as \$16.9 million; and groundwater pumping in Lahontan Valley would cost about \$500,000 to \$700,000 to drill water wells. The range of total capital costs under this alternative is estimated to be from \$49 million to \$75.43 million. At its low end estimate, this alternative is comparable to *Alternative 2. Refuge Revenue Sharing payments would range from \$63,000 to \$189,000 under this alternative.*

Annual costs would include those yearly costs associated with purchasing Carson Division water rights but would also include leasing costs and operating costs for groundwater pumping. Those costs are estimated as follows: Carson Division annual costs would range from \$683,100 to \$788,500; groundwater pumping costs would range from \$244,000 to \$503,000; and leasing costs would range from zero in some years to as high as \$3.88 million. The broad range of leasing

costs assumes that no leasing occurs in some years. Full leasing would occur about 50 percent of the time. Therefore, it is likely that leasing costs would average about \$1.94 million annually. Based on this figure, *total* annual costs under this alternative are expected to range from about \$2.8 million to \$3.18 million. Because of the annual costs under this alternative, it is the most expensive water rights acquisition strategy for the Service to implement over the long term.

Mitigation Measures

Actions to reduce the amount of water rights needed by the Service would reduce or minimize acquisition costs. Such actions are described in Section 4.16.1, AGRICULTURAL PRODUCTS AND RECEIPTS under the mitigation measure heading titled "Production Value Acquisition Strategy". Another process to implement a "Production Value" acquisition strategy would be for the Service to use some form of limited-term auction, accepting all water rights offered at a specified threshold price. Upon closure of the auction period, no additional water rights would be acquired at any price, until the specified term had passed. Limited-term auctions provide a mechanism that would hold acquisition prices down and would minimize acquisition costs for specified periods of time, but inflation and private transactions would continue to be the key factors in the appraisal process to determine fair market prices for water right acquisitions.

The acquisition of a management easement for the Canvasback Gun Club wetlands to be integrated as part of the Stillwater NWR primary wetland habitat *could potentially* reduce the amount of water rights that need to be acquired to meet the Service's primary wetland habitat objective. Such an easement *could secure about* 2,300 acres of wetland habitat as part of the Lahontan Valley primary wetland habitat total. This could potentially reduce the total water rights acquisition demand by about 10 percent. The Service has been negotiating with the Canvasback Gun Club to obtain a management easement and believes such mitigation could feasibly occur in the future.

Measures that would increase drainwater inflow to the primary wetland areas are described in Section 4.16.3, FARM ACREAGES under mitigation measures. The Service will continue to monitor drainwater volumes reaching the primary wetland areas, if such monitoring shows that the initial baseline drainwater inflow volumes were calculated too low, this *could* reduce the volume of *water acquired from other sources, possibly including purchased water rights*. These mitigation measures would provide some reduction in acquisition costs, but there are few actions that can be taken to minimize annual costs.

Purchase has been shown to be the most cost-effective method of acquiring water rights. Other methods of acquisition (such as donation) could reduce implementation costs substantially, but the Service does not anticipate donations to play a major role in the water rights acquisition program. Methods such as leasing offer short-term flexibility and lower costs per acre-foot, but over the long term, administrative costs and annual lease payments would be higher than costs associated with outright purchase. Acquisition through exchange may present substantial opportunities to lower

capital costs, but will not reduce annual O&M costs. For these reasons, the Service does not anticipate these other methods of acquiring water to provide adequate mitigation or to be more effective than purchase and would not necessarily reduce implementation costs.

4.26 CUMULATIVE EFFECTS

The cumulative analysis considers possible impacts to the environment from past, present, and reasonably foreseeable future actions or activities. A number of interacting variables, *identified below, are expected to have cumulative impacts on environmental resources in the study area.*

4.26.1 ACQUISITION OF WATER RIGHTS FOR THE FALLON PAIUTE-SHOSHONE RESERVATION AGRICULTURAL LANDS

Section 102 of Public Law 101-618, establishes the Fallon Paiute-Shoshone Tribal Settlement Fund and authorizes the expenditure of funds for a number of purposes, including acquisition of lands, water rights, or related interests from willing sellers. *The law states that not more than 2,415.3 acres of land and not more than 8,453.55 AF/year of water rights shall be taken into "Trust" category by the United States for the benefit of the Fallon Tribes. Additional lands and waters could be acquired, but only the amounts and volumes described would be taken into "Trust." The Fallon Tribes have taken no action to implement this provision as of yet.*

Implementation of such a program has the potential to increase the total amount of water rights being acquired from private water-right holders *in the Carson Division of the Newlands Project and converted to federal ownership or Indian trust. It is anticipated that the lands taken into trust would be irrigated by the Tribe or Tribal members. The net effect of this action, if undertaken, is expected to be the re-location of irrigated land from private ownership to the Fallon Paiute Shoshone reservation.*

Water quality in individual drains may change as acquired water rights are transferred from various locations in the Newlands Project and applied to previously un-irrigated lands on the reservation. The concentration of potentially toxic heavy metals in the water of some drains could experience temporary increases as drainwater leaches naturally occurring heavy metals and minerals from the newly-irrigated fields. The concentration of metals in the drainwater would be dependent on the quantity of materials in the newly irrigated soils. Drainwater effluent from new fields would flow into Stillwater NWR and, therefore, could potentially reduce water quality on the refuge for several years. Metals flushed from the soil would accumulate in the refuge. Continued irrigation is expected to flush most of the metals from the soil. The concentration of metals in drainwater from newly irrigated fields is expected to decline to levels more comparable with existing drains within the area in about five to seven years.

Purchase and transfer of up to about 8,453 AF of water rights from the Carson Division to the Fallon Paiute-Shoshone Reservation would result in up to about 2,415 acres of irrigated farmland being taken out of production in the Carson Division. Subsequently, up to 2,415 acres of land in the Fallon Paiute-Shoshone Reservation would be converted from non-irrigated use to irrigated farmland. In effect, the pattern of groundwater recharge from canal losses and on-farm losses would be shifted from areas in the Carson Division to reservation lands. Although the net effect of groundwater recharge may be neutral in terms of volume, there is a potential that seepage losses in laterals and on-farm losses would be slightly reduced in primary recharge zones for the basalt aquifer. The extent to which this would happen would depend on the locations of water rights purchases in the area of aquifer recharge. Irrigation water that is delivered to Reservation lands would be delivered via canals that pass through primary recharge zones, and in some cases, the distance to headgates may be increased. Recharge of the shallow aquifer could be impacted in some areas.

The transfer of water rights from Newlands Project farmland to tribal farmland would contribute to temporary declines in the amount of farmland habitat and artificially-created riparian habitat associated with project canals and drains in the Carson Division. However, similar habitats are expected to become established over time on tribal lands. Even though some species may experience a temporary reduction in their numbers, the overall long-term change to the biological diversity in the affected area is expected to be non-detectable.

Because the water right acquisitions under this program would be used to expand agricultural areas of the Fallon Paiute-Shoshone Tribe and Indian allottees on the Reservation, the acquisition of water rights for the Fallon Paiute-Shoshone Tribe would not further reduce the amount of farmland in the Lahontan Valley. However, the amount of *privately-owned* farmland in the Carson Division could be reduced by as much as 2,415 acres.

It is assumed that water rights acquisition programs for the Fallon Tribes would be based on acquisitions at the market value as determined by past market sales, and there should be no adverse effects to land values. *However, the Service's action of acquiring water rights for wetlands protection could decrease availability of water rights for tribal acquisition, especially since the tribal acquisitions, if they occur, will most likely commence after the Service has implemented its acquisition program.* Privately held water-righted lands sold to the Tribes will be removed from county tax rolls. The acquisition of water rights for Indian trust, could take as much as 2,415 acres of water-righted land out of private ownership. Using 1993 tax rates and current property values, calculated tax revenue losses would be approximately \$2,580 - \$6,670. *All of the water rights acquired under Public Law 101-618 for the Fallon Tribes may not be transferred from the present place of use.*

4.26.2 CLOSURE OF TJ DRAIN

Section 106 of Public Law 101-618 calls for the closure of TJ Drain in recognition of the water quality problems associated with drainwater originating on Fallon Paiute-Shoshone Tribe Reservation lands. Waters *from the drain* enter the Stillwater NWR wetlands and have *adversely impacted wetlands* water quality in the past.

An inter-agency agreement between the Bureau of Indian Affairs and the Bureau of Reclamation was completed on September 11, 1992. *Under the agreement, Reclamation is responsible for providing technical assistance to the Bureau of Indian Affairs for the planning and closure of the TJ Drain system. The Fallon Tribes and Bureau of Indian Affairs are currently investigating the feasibility of blending TJ agriculture drain water with irrigation water to sprinkler irrigate tribal pastureland for livestock grazing purposes. A closure plan is expected by the fall of 1996.* The Service has indicated a willingness to make acquired lands available to the Fallon Tribes to transfer water rights from Reservation irrigated lands serviced by the TJ Drain onto these off-Reservation lands to eliminate the source of supply to the drain. *This potential strategy is being considered in the development of the TJ Drain closure plan.* If the irrigation use on *pertinent* Reservation lands is curtailed and relocated to other agricultural areas, this could provide a long term (and possibly permanent) alternative to physical closure or modification of the drain.

Initial actions have been taken to close a portion of the TJ Drain system known as the TJ Stub. The TJ Stub, a non-functional mile-long ditch on the Fallon Paiute-Shoshone Indian Reservation will be backfilled using previously excavated native soil from adjacent spoil banks. Operations to backfill the stub are expected to begin in the summer of 1996. According to an environmental assessment completed in August 1995 (U.S. Bureau of Indian Affairs, 1995), no significant adverse environmental impacts are expected as a result of this action.

Without closure of the drain or modification of the drain's water supply, the Service expects continued water quality problems in the Stillwater NWR wetlands attributable to the TJ Drain water. However, recent observations indicate that water quality in the TJ Drain has improved to the point that fish and other aquatic organisms have returned to waters in the drain. It is not clear whether this improvement is permanent.

Permanent closure of the TJ Drain would eliminate a substantive source of poor quality water entering Stillwater NWR. Water quality conditions in the refuge are expected to improve as a consequence. Improved water quality conditions are expected to enhance the refuge's biological diversity and productivity.

Few, if any, socio-economic impacts are expected to result from the closure of TJ Drain if tribal members elect to transfer water rights off lands near the TJ Drain and on to lands

served by other drains. The level of agricultural activities in the affected area is expected to remain constant, the only change would be that runoff from those activities would no longer flow to the TJ Drain.

4.26.3 TRUCKEE RIVER OPERATING AGREEMENT (TROA)

Subsection 205(a) of Public Law 101-618 authorizes the Secretary to negotiate an operating agreement for the Truckee River with the states of Nevada and California. The agreement is to provide criteria and procedures for operating Federal and selected private reservoirs on the Truckee River system. Such an agreement must ensure that the reservoirs would be operated to:

- (1) satisfy dam safety and flood control requirements,
- (2) enhance spawning flows in the lower Truckee River for endangered cui-ui and threatened Lahontan cutthroat trout,
- (3) carry out the terms and conditions of the Preliminary Settlement Agreement as modified by the Ratification Agreement, and
- (4) exercise water rights in conformance with applicable decrees.

Negotiations began in 1991 to develop a draft operating agreement for the Truckee River. The Secretary, representatives from Nevada and California, *Pyramid Lake Paiute Tribe*, *Sierra Pacific Power Company*, and other interested parties involved in the operations of Truckee River facilities, are working to complete a draft agreement, *but an agreed-upon text could be a year or more away*. Preparation of a draft EIS assessing the potential environmental effects of a Truckee River Operating Agreement is underway. Completion of a final EIS and Record of Decision are required before *the federal government can implement its TROA-related responsibilities*.

The TROA may allow excess privately owned water, surface waters allocated to the State of California, and the consumptive use portion of former Orr Ditch agricultural water rights that have been converted to municipal and industrial use, to be exchanged or *stored* in Federal reservoirs. *As of July 1996, the water management provisions of TROA were still being negotiated and it is premature to speculate on the specific potential impacts the agreement may have on Truckee River flows. Overall, TROA is not expected to adversely impact the Newlands Project because Section 205(a)(2)(D) of Public Law 101-618 states that the agreement will ensure that water is stored and released to satisfy the exercise of water rights in conformance with the Orr Ditch Decree.*

Acquisition of Carson Division water rights for transfer to the Lahontan Valley wetlands would not impact implementation or effectiveness of TROA because such actions would not increase Newlands Project demands nor change the priority of acquired water rights (which are junior to those that would be stored in upper Truckee River reservoirs).

4.26.4 COMPREHENSIVE MANAGEMENT PLAN FOR STILLWATER NWR

The Service anticipates preparing a comprehensive management plan for Stillwater NWR that will outline management objectives and strategies for achieving the purposes of the refuge, which are to (1) restore and maintain natural biological diversity on the refuge; (2) provide for the conservation and management of fish and wildlife and their habitats; (3) fulfill international treaty obligations with respect to fish and wildlife; and (4) provide opportunities for scientific research, environmental education, and fish and wildlife oriented recreation, as established in paragraph 206(b)(2) of Public Law 101-618. The comprehensive management plan will update the current Refuge Management Plan (Appendix 2) and will address in more detail issues such as public use, recreation, hunting, livestock grazing, and long-term habitat objectives. The comprehensive management plan is not being considered in this EIS because this EIS considers the acquisition of water rights under subsection 206(a) of Public Law 101-618, whereas the comprehensive management plan will address management of Stillwater NWR under new direction provided under subsection 206(b) of the Public Law.

There is a possibility that a more in-depth examination of water-management strategies during the comprehensive management planning process for Stillwater NWR and similar planning processes for Carson Lake and Tribal wetlands could potentially result in a reduced total water demand than identified in this FEIS (i.e., 125,000 AF/year). If it is determined that less water is needed to sustain 25,000 acres of primary wetland habitat, and the Service relies heavily on sources other than purchased water rights from the Carson Division (e.g., Middle Carson River water, groundwater, Navy conserved water), it is possible that fewer water rights would be purchased. Another possibility is that less water would be acquired from other sources, such as groundwater. If less groundwater is used, or groundwater is not used at all, adverse impacts to the quality of wetland inflow would be reduced from those described in Sections 4.3.2, 4.7.1, 4.11, 4.12, and 4.14.

If less water rights are purchased in the Carson Division than is outlined under the Preferred Alternative, adverse impacts to the agricultural community would be less than described earlier in this chapter (Section 4.16). Also, reductions in canal losses (from laterals) and on-farm losses would not be as high as estimated for the Preferred Alternative under the 1987 management plan. This could reduce any adverse impacts to groundwater recharge and impacts to wildlife associated with agricultural areas.

One component of the Comprehensive Management Plan will be the evaluation of alternative wetland irrigation delivery patterns (timing of deliveries) and routing scenarios (i.e. taking irrigation water through one delivery point versus another point of delivery). Such actions have the potential to impact Newlands Project operating conditions such as Lahontan Reservoir releases, storage levels, and irrigation delivery efficiency rates. While the timing

of deliveries are not anticipated to impact groundwater recharge, the routing of irrigation deliveries does have the potential to positively impact basalt aquifer recharge under certain conditions. These potential impacts and others will be evaluated in an EIS being prepared by the Department of the Interior for water management issues on the Truckee and Carson Rivers.

Over the long term, wetlands habitat, plants, and animals would benefit from the *updated management plan because the plan would outline long-range strategies for restoring and maintaining healthy wetland communities based on increased wetland inflow.*

4.26.5 NAS-FALLON STUDIES OF LAND MANAGEMENT OPTIONS TO REDUCE WATER USE FOR AIRCRAFT SAFETY PURPOSES

Paragraph 206(c)(3) of Public Law 101-618 states, "All water no longer used and water rights no longer exercised by the Secretary of the Navy as a result of the implementation of the modified land management plan or measures... shall be managed by the Secretary for the benefit of fish and wildlife resources..." *The Service and the Navy have signed a Memorandum of Agreement (MOA) that calls for the irrigation water saved or conserved at NAS-Fallon to be used by the Service for fish and wildlife purposes, primarily for cui-ui and secondarily for wetlands protection (see also Section 1.8.1(5)).*

NAS-Fallon has rights to approximately 10,230 AF of Newlands Project irrigation water. The Navy currently grows hundreds of acres of alfalfa near the runways *to control dust and foreign objects on the runways, and to suppress aircraft-caused fires in the surrounding area.* A report completed in July 1992 (U.S. Navy, 1992) proposed a management plan that would satisfy safety objectives and conserve as much as 5,000 AF of water. The NRCS is working with the Navy on a study *to examine* techniques for establishing and sustaining vegetation with reduced irrigation. The Navy completed an Environmental Assessment on its proposed water management plan in April 1994.

Implementation of the land management plan would reduce the volume of water previously used on NAS-Fallon to irrigate crops. *Conserved water will be used primarily for the Pyramid Lake fishery and may be available for Lahontan Valley wetlands protection. If the conserved water is not used for Lahontan Valley wetlands, the Service would have to rely more heavily on other water sources such as groundwater, Middle Carson River water, and leased water. A greater reliance on groundwater would adversely impact the quality of wetland inflows. Increased reliance on Middle Carson River water would increase impacts to agriculture in that area. Increased reliance on a leasing program would increase annual costs to the Service, but this would, in turn, positively affect economic conditions in the local community.*

Implementation of NAS-Fallon's land management plan would reduce the volume of water previously used on NAS-Fallon to irrigate crops for dust control and aircraft safety. Reducing the irrigation water use on NAS-Fallon farmland has the potential to reduce groundwater recharge by reducing seepage loss in laterals and possibly by reducing on-farm losses. The shallow water aquifer in particular could be adversely impacted in those areas where irrigation no longer occurs. Because NAS-Fallon lies outside of the primary recharge zone of the basalt aquifer, only slight, if any, adverse impacts could potentially occur to basalt aquifer recharge.

4.26.6 TRANSFER OF CARSON LAKE

Subsection 206(e) of Public Law 101-618 provided for the conveyance of Carson Lake and pasture to the State of Nevada for use as a wildlife refuge. The Nevada Department of Wildlife *is developing* a management plan for Carson Lake, describing the State's strategy for water and wetlands management, public recreation, livestock grazing, and planned public facilities development. *Carson Lake is one of the primary wetland areas in Lahontan Valley.*

Because water will be needed to sustain wetland habitat on Carson Lake whether it is owned by Nevada or the federal government, the transfer of the area to the State of Nevada will have few, if any, effects on the amount of water to be acquired for sustaining a long-term average of 25,000 acres of wetland habitat on the primary wetland areas.

The transfer of Carson Lake to the State of Nevada and the purchase of up to \$9 million of water rights by the State would reduce the amount of money that the Federal Government would have to spend to acquire water rights to sustain 25,000 acres of primary wetland habitat.

If transferred to and/or managed by the State of Nevada, the number of livestock that graze the area may be reduced. Increased control over livestock grazing, cumulative with increased wetland inflow, would likely result in higher quality wetlands habitat being produced and sustained on Carson Lake (than would exist with only increased wetland inflow) for waterfowl, shorebirds, and other wildlife associated with wet meadow and shallow-marsh habitats that are maintained by a certain level of livestock grazing.

4.26.7 RECOVERY PLANS FOR ENDANGERED AND THREATENED PYRAMID LAKE FISH

Subsection 207(a) of Public Law 101-618 requires the Secretary to expeditiously develop and implement a recovery plan for the endangered cui-ui and for the threatened Lahontan cutthroat trout.

Cui-ui

The Cui-ui Recovery Plan (USFWS 1992) identified three measures to increase the flow of water in the lower Truckee River, which is needed to secure cui-ui habitat in the lower Truckee River and Pyramid Lake: (1) developing and implementing an operating agreement for upper Truckee River reservoirs, (2) purchasing Truckee River water rights for delivery to the lower river and Pyramid Lake during the cui-ui spawning season, and (3) reducing Truckee River diversions.

The most direct approach to increasing lower Truckee River flows would be to purchase Truckee River water rights. The Service recently released a draft environmental assessment that considered and evaluated several alternatives for acquiring water rights for cui-ui under a pilot program. The proposed pilot program called for the acquisition of up to 3,500 AF of water rights. Finalization of the EA has been delayed pending completion of an eight-year study to assess the population status of cui-ui. Results of the study will be reviewed by the Cui-ui Recovery Team to determine the need for additional water rights acquisition.

Other actions, such as TROA (described in Section 4.26.3 above), the Truckee River Water Quality Settlement Agreement (Section 4.26.10 below), adjusted OCAP, and water rights acquisition for Lahontan Valley wetlands, could, if implemented, result in sufficient flows in the Truckee River such that other Truckee River water rights may not have to be acquired. TROA is expected to change the timing of flows in the Truckee River to provide more water during the cui-ui spawning season. Proposed adjustments to OCAP and the acquisition of water rights for Lahontan Valley wetlands (under the Preferred Alternative) could result in reduced Truckee River diversions, thereby increasing lower Truckee River flows and the water level of Pyramid Lake. Raising the water level of Pyramid Lake would improve river access for cui-ui during the spawning season and maintain rearing habitat year-round.

If the actions described in the above paragraph and other habitat improvement projects identified in the Cui-ui Recovery Plan (USFWS 1992) do not provide sufficient benefits or equivalent benefits, up to 110,000 AF of Truckee River water rights may have to be acquired for cui-ui recovery. This strategy, which would provide the most dependable method of recovering cui-ui, would be evaluated under the NEPA process. As non-acquisition benefits are secured, the acquisition target would be reduced accordingly.

Within the Newlands Project, the Service intends to follow a policy of segregating water right acquisitions for the wetlands and cui-ui by *Newlands Project divisions*. The Truckee Division has been identified as a water rights acquisition source for cui-ui recovery efforts and the Carson Division has been identified as the source of wetland water rights acquisitions. The Service is also investigating whether Truckee River water rights are available outside of the Newlands Project, Truckee Division.

Implementation of a cui-ui water rights acquisition program would positively impact flow volumes in the Truckee River and Pyramid Lake inflows. Water that had previously been diverted from the Truckee River for agricultural and industrial purposes would remain in the river and eventually flow to Pyramid Lake. Additionally, water quality in the Truckee is expected to improve as more water remains in the river, and agricultural runoff is expected to decline as the amount of land being irrigated is reduced. Further, the amplitude of river flow volumes may be moderated since some water acquired for cui-ui can be released in late summer when river flows are usually low. Increased stability of river flow rates would benefit biota in the river itself and throughout the watershed by providing more dependable aquatic and riparian habitats.

Potential adverse impacts of a water acquisition program for cui-ui are similar to those expected to occur as a result of the wetlands water acquisition program: agricultural lands would be taken out of production; the agrarian character of portions of the Truckee River basin would be changed as agricultural activities are reduced; and property tax revenues would change as taxable lands are removed from County tax rolls.

Water purchased from the Truckee Division for cui-ui recovery would no longer flow in the Truckee Canal. Reduced flow in the Truckee Canal and loss of irrigated farmland has the potential to adversely affect groundwater recharge in the Fernley area. Loss of irrigated farmland and reduced irrigation conveyance losses would further reduce drainwater volumes that now sustain the Fernley WMA wetlands. A decrease in the number of wetland acres at the Fernley WMA could affect the diversity and abundance of wetland-dependent species *in the immediate vicinity*. Overall, the long term maintenance of 25,000 acres of wetlands in Lahontan Valley is expected to offset the loss of wetlands habitat at Fernley WMA.

The acquisition of water rights from the Truckee Division of the Newlands Project for cui-ui recovery would not adversely impact Stillwater NWR, Carson Lake, or Tribal wetlands or the water rights acquisition proposed for the protection of those primary wetland areas.

Lahontan Cutthroat Trout

The Lahontan cutthroat trout Recovery Plan was accepted in January 1995 (U.S. Fish and Wildlife Service, 1995). At present, Pyramid Lake is not identified as one of the areas for recovery of Lahontan cutthroat trout. Since no conservation measures are planned for Pyramid Lake, no cumulative impacts to wetlands are expected.

4.26.8 NEWLANDS PROJECT RECOUPMENT

Subsection 209(j) of Public Law 101-618 directs the Secretary to pursue recoupment of any water diverted from the Truckee River in excess of the amounts permitted by applicable operating criteria and procedures during the period 1973 - 1987. *In January 1996, the*

federal government filed suit against TCID in the Federal District Court for Nevada, and seeks to have TCID repay 1,058,000 acre-feet of water over-diverted from the Truckee River. The exact quantity of water to be recouped, the method of recoupment, and the time allowed for recoupment will be determined by litigation or negotiation.

If the government prevails in this lawsuit, some combination of the following actions (in addition to others) could be implemented as part of the recoupment program.

- ▶ **Truckee River diversions through the Truckee Canal to Lahontan reservoir could be reduced.**
- ▶ **Deliveries from the Truckee Canal to the Truckee Division could be reduced.**
- ▶ **Diversions and deliveries from Lahontan Reservoir to the Carson Division could be reduced.**
- ▶ **Allowable storage levels in Lahontan Reservoir to the Carson Division could be reduced.**
- ▶ **A credit program for water conservation on the Newlands Project could be developed.**

Recoupment could affect the wetlands by reducing *the total volume of Truckee River water available to the Newlands Project. Less water available to the Project could mean a reduction in the volume of deliveries of acquired water, less drainwater, and fewer spills.* The reduction of *Project* irrigation deliveries to satisfy recoupment requirements would delay attainment of sustaining 25,000 acres of wetland habitat.

Recoupment would result in more water for the Truckee River, which would help facilitate better fish passage across the lower Truckee River delta at Pyramid Lake. Recoupment would also enhance cui-ui spawning and rearing habitat, increase frequency of cui-ui spawning opportunities, act to partially achieve cui-ui recovery objectives, and improve water quality in the lower Truckee River seasonally.

If the Newlands Project Recoupment lawsuit is decided in favor of the Federal government, and, as part of the decision, less Truckee River water is diverted to the Carson Division, adverse impacts to groundwater recharge could be incurred. Under this scenario, less water would be applied to irrigated fields and it is possible that fewer acres of farmland would be irrigated in any given year. Recoupment, under the above scenario, could contribute to any given farmer's decision to not farm in shortage years.

If irrigation delivery reductions are imposed as a method of recoupment, biological resources associated with the Lahontan Valley wetlands would be impacted in a manner similar to impacts associated with drought conditions. Water availability would be reduced, lakes and

ponds would lose water to evaporation and outflow that is not replaced, aquatic habitat would be reduced, and the diversity and abundance of wetland organisms would decline. In addition, water quality conditions in the wetlands would be degraded due to *reduced irrigation-water inflow*.

Prolonged constrained water supplies could have a much greater impact on biological resources of a wetland area than natural drought. Under natural conditions there is some *probability* that a drought would last for only a few years but would be followed by average or above-average water years. *Under recoupment conditions, there may be no opportunity for relief until recoupment has been completed. If recoupment occurs, achieving a long-term average of 25,000 acres of primary wetland habitat may be delayed because water rights purchased for primary wetland habitats would be subject to the same reductions as agriculture water rights. It would only be in those years when significant high-water spills occur from Lahontan Reservoir that wetland acres could be at or above the 25,000-acre level. The adverse effects on wetland habitat described above may be reduced if all or part of the water-rights use rate (3.5 AF/acre/year instead of 2.99 AF/acre/year) serves as part of the recoupment payment.*

The secondary wetlands in the Lahontan Valley do not have water rights and they would experience impacts from recoupment because they have no means of offsetting lost drainwater inflows. During the recoupment period, most of these secondary wetlands would experience declining water levels due to the reduced volume of drainwater available. Secondary wetlands are not expected to fully recover until the recoupment period is completed.

Wildlife resources associated with wetlands and agricultural habitats in Lahontan Valley could be negatively impacted by recoupment. Habitats in both areas would be reduced in size and *wetland habitat would be degraded in quality due to any loss of recouped water*.

Recoupment would also have adverse socio-economic impacts on the Newlands Project. A reduction in the availability of water would mean fewer acres of irrigated agricultural lands. Crop production would be less, reducing income to farmers and the business community. Recoupment could result in some of the marginally profitable farms going out of business due to their inability to sustain viable production with an increase in the number of years when shortage conditions occur.

4.26.9 ADJUSTMENTS TO OCAP

The current Operating Criteria and Procedures (OCAP), adopted by the Secretary in 1988, are to remain in effect through 1997 unless the Secretary decides that changes are necessary to comply with his obligations pursuant to paragraph 209(j)(2) of Public Law 101-618. To respond to changing conditions in the Truckee and Carson River Basins, *the*

Department of the Interior *is preparing a proposed rule making technical adjustments to the 1988 Newlands Project OCAP. An Environmental Assessment is also in preparation evaluating the potential environmental effects of the proposed rule. Because the outcome of that rule-making process has not yet been determined, cumulative impacts are speculative. The following discussion is intended to provide a general assessment of such cumulative impacts.*

Adjustments to OCAP could include mechanisms to account for lower irrigated acreage figures than used in the 1988 OCAP, higher percentage use of headgate deliveries, adjusted Lahontan Reservoir storage targets, and lower-than-previously-calculated irrigation delivery efficiencies (a factor of lower acreage estimates). These factors could reduce the maximum annual irrigation demand used in modelling and thereby reduce diversions from the Truckee River to the Newlands Project. In addition, drainwater inflows could be reduced, useable spills from Lahontan Reservoir could be decreased, Carson Division shortage years could be increased slightly, and the magnitude of shortages during shortage years could be increased. It is estimated that supply would be less than 75 percent of entitlement in 7 of 9 years, as compared to less than 75 percent of entitlement in 2 of 9 years under baseline conditions (Reclamation estimates, written communication, 1995).

The reduction in volume of spills and drainwater would reduce the amount of water flowing into the Lahontan Valley wetlands. Because the contribution of spills and drainwater to the wetlands annual water budget could be reduced by adjustments to OCAP, the Service may have to acquire slightly more water and/or water rights than is outlined under the Preferred Alternative in order to achieve the 25,000-acre wetland objective.

In the event the estimated maximum annual irrigation demand is reduced in the models as noted above, wetlands habitat, agricultural production, and the local economy could be affected by OCAP changes. It is estimated that OCAP adjustments would only increase the number of shortage years from eight to nine out of 94 years, but the magnitude of shortages is expected to increase during shortage years. This effect would be more noticeable during drought years. During drought periods, wetland habitat would be reduced and wetland-dependent species could experience slight declines in both diversity and abundance. More severe shortages would reduce irrigation allocations, possibly resulting in fewer acres of agricultural land in production during shortage years.

The proposed adjustments to OCAP could, as a consequence of reduced water availability to agriculture during shortage years, potentially reduce the amount of water that percolates to the shallow aquifer. However, these reductions are expected to be small and not easily measured.

Adjustments to OCAP are not expected to interfere with the exercise of valid Newlands Project water rights. Full headgate entitlement would be available to serve water rights in

average or above average water supply years. An adjusted OCAP could positively impact the Truckee River basin. Such impacts would be similar to the benefits identified for recoupment except they would represent a more permanent condition. There would most likely be increased Truckee River inflow to Pyramid Lake and resultant increase in lake elevation. Indirect impacts would include more water in the Truckee River to facilitate fish passage across the Truckee River delta at Pyramid Lake; enhanced cui-ui spawning and rearing habitat; increased frequency of cui-ui spawning opportunities; and seasonal improvement of water quality in the lower Truckee River.

4.26.10 TRUCKEE RIVER WATER QUALITY SETTLEMENT AGREEMENT

The proposed Truckee River Water Quality Settlement Agreement seeks to resolve litigation over approval and operation of the Reno-Sparks water treatment facility brought by the Pyramid Lake Paiute Tribe against the State of Nevada, and the U.S. Environmental Protection Agency. Water Quality Settlement negotiations included the cities of Reno and Sparks, Washoe County, Nevada Department of Environmental Protection, EPA, the Pyramid Lake Tribe, the Department of the Interior, and the U.S. Department of Justice. The proposed agreement establishes a joint program to improve water quality in the Truckee River through purchase and dedication of water rights to that purpose and use of treatment effluent for certain purposes in place of fresh water. The agreement calls for a total of \$24 million to be spent to acquire water rights in the Truckee River Basin from Truckee Meadows downstream to Pyramid Lake, including the Truckee Division of the Newlands Project. The joint program, funded by Reno, Sparks, Washoe County, and the Department of the Interior is expected to result in more water flowing in the Truckee River, particularly during the summer months. The agreement is also expected to improve water quality of the lower Truckee River, enhance inflows to Pyramid Lake, and improve conditions for Pyramid Lake fishes.

Potential impacts of the Truckee River Water Quality Settlement Agreement are expected to be examined in an EIS being prepared by the Department of the Interior that will address water resource issues of the Truckee and Carson Rivers. Implementation of the agreement is not expected to affect the acquisition of water rights for Lahontan Valley wetlands. Wetlands water rights will only be acquired in the Carson River Basin, while the Truckee River Water Quality Settlement Agreement will focus on the acquisition of Truckee River water rights and specifically excludes Carson Division water rights.

Most of the water rights acquired to satisfy the Water Quality Agreement are expected to be acquired from agricultural properties and transferred off of those properties. Once the water rights have been removed, most of these lands would be converted from agricultural use to other land uses, including residential or industrial development, or left vacant to eventually revert to desert habitat. Potential impacts to the physical environment include, reduced runoff from agricultural operations, substantially reduced groundwater recharge in

the Fernley area (including potential impacts to municipal supplies), enhanced flows in the lower Truckee River, improved water quality conditions in the lower river, and an increase in the level of Pyramid Lake. Discussions on developing long-term joint municipal water supplies for Fernley and Wadsworth and joint sewage facilities that could mitigate such effects are currently taking place.

Aquatic habitat and organisms living in the lower river and Pyramid Lake are expected to benefit from enhanced flows. Birds, mammals, and vegetation normally associated with agricultural activities will experience a reduction in available habitat as agricultural lands are converted to other land uses. This impact is expected to be offset by improved riparian habitat conditions along the Truckee River and a corresponding increase in populations of organisms adapted to riparian habitat that result from the overall increase of flow in the lower river.

Potential impacts to the local economy include reduction in the number of jobs in the agricultural sector, and reduction in the quantity and total value of locally produced agricultural products. The overall impact of these reductions is likely to be small when compared to similar impacts caused by increased population and development currently being experienced in the Truckee River corridor.

4.26.11 NAS-FALLON EXPANSIONS

The Navy has *relocated* their TOPGUN training operations from southern California to NAS-Fallon. There are a number of other smaller training and operational units that will be relocated to NAS-Fallon as other military bases are closed under the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510).

Employment, income, and taxable sales associated with NAS-Fallon accounts for the single largest segment of Churchill County's present economy. Changes in the level of operations at NAS-Fallon (either expansion or downsizing) has the potential to significantly affect conditions in Churchill County, ranging from, but not limited to, employment, income, taxable sales, housing, *land use*, municipal services, school enrollment, domestic water supplies, traffic, and social values.

Expansion of NAS-Fallon will result in more demands being placed on the basalt aquifer as well as shallow and intermediate aquifers in the Fallon area as the population of the area increases. Data from the USGS indicate that even at existing population and development levels, water is being extracted from the basalt aquifer faster than it is being replaced. Furthermore, farmland will continue to be taken out of production as urban expansion continues, which could reduce the amount of water that percolates into shallow and intermediate aquifers. At present, much of the growth in the Fallon area is within the primary recharge areas of the basalt aquifer. Continued growth in this area, therefore, could

potentially reduce recharge of the shallow and basalt aquifers. Increased pumping of the basalt aquifer and other groundwater sources as a result of additional growth and development, in combination with continued conversion of farmland to residential and other development, could result in further declines in groundwater volumes available for domestic use.

A draft environmental assessment (EA) document prepared for the Navy stated that the relocation activities will increase direct Fallon-NAS employment by 210 positions. Findings made by the Churchill County Prison Task Force anticipated that NAS-Fallon expansion could generate increased, indirect employment by as many as 284 jobs. Increasing employment in Churchill County by almost 500 new jobs has the potential to significantly increase total countywide income and taxable sales. These increases will have positive effects on the Churchill County economy but will also place additional demands on schools, *land use*, municipal services, and housing.

4.26.12 GROWTH AND DIVERSIFICATION OF CHURCHILL COUNTY

The affected area has shown increases in residential housing, subdivisions, and commercial development in the past few years. The Service expects this trend to continue throughout the affected area. There are several new tentative subdivisions filed with Churchill County that would convert agricultural land to residential parcels, but only about 10 percent of these proposed subdivisions involve lands where the Service or the State of Nevada have acquired the water rights for wetlands protection. Due to the population growth in the affected area, there is existing demand for increased housing, more retail businesses, and expanded services. The impacts associated with growth, such as increased demand for water, fire and police protection, sewer service, roads, and recreational facilities would exist regardless of the Service's actions to protect primary wetland habitat.

Under existing conditions, groundwater supplies and water quality are already at levels of concern for some individual well owners. Increased growth would create more demand on groundwater supplies, which in Churchill County may be insufficient in some areas. Continued growth within the City of Fallon could adversely impact basalt aquifer recharge as well as shallow and intermediate aquifer recharge to the east of Fallon. *Data from the USGS indicate that even at existing population and development levels, water is being extracted from the basalt aquifer faster than it is being replaced. Farmland will continue to be taken out of production as urban expansion continues, which could reduce the amount of water that percolates into shallow and intermediate aquifers. At present, much of the growth in the Fallon area is within the primary recharge areas of the shallow and basalt aquifers. Continued growth in this area, therefore, could potentially reduce recharge of the basalt aquifer.*

More demand will be placed on the shallow and intermediate aquifers as more houses are constructed and more wells tap into the aquifers outside of the city limits of Fallon. Farmland will continue to be taken out of production, which could reduce the amount of water that percolates into the shallow aquifer. Increased pumping of the basalt aquifer and other groundwater sources as a result of additional growth and development, in combination with continued conversion of farmland to residential and other development, could result in further declines in groundwater volumes available for domestic use. As described in Section 3.3.3.1.1, water use-rate of the basalt aquifer appear to be greater than recharge rates, which could indicate that the aquifer is being mined. If this is true, continued growth in the Fallon area could have a significant adverse impact on recharge of the basalt aquifer. Increased pumping of the basalt aquifer could also potentially adversely impact down-gradient shallow and intermediate aquifers (east of Fallon).

As more irrigated farmland is converted to residential and other development, less farmland and associated drains will be available to wildlife that use such lands. Remaining drains and farmland adjacent to residential areas will become less effective wildlife habitat due to increased predation by cats and dogs, and increased human disturbance. As residential areas spring-up throughout the agricultural areas of Churchill County, agricultural areas will become less attractive to some species of wildlife. However, some species of wildlife, such as house sparrows, will benefit from these conversions.

Reductions in irrigated farmland will reduce the agricultural contribution to the local economy and will reduce agriculture-related jobs.

Another aspect of growth, both in terms of population and development, is that there is an associated change in lifestyle. *Lifestyle changes can be experienced by residents as communities grow and diversify (new businesses, more housing, shifts in economic structure, new sources of income and employment). All of these aspects of diversification are currently occurring within the affected area. The Service's actions, in combination with anticipated growth and development in the local community, have the potential to accelerate or exacerbate the sense of change and diversification in the Fallon area.*

4.26.13 TRANSFER OF THE INDIAN LAKES AREA

Section 206(g) of Public Law 101-618 authorized the Secretary of the Department of the Interior to transfer the Indian Lakes area to Churchill County or the State of Nevada, pursuant to an agreement between the Secretary of the Department of the Interior and Churchill County or the State of Nevada, for the purposes of fish, wildlife, and recreation. The Indian Lakes area consists of approximately 9,355 acres of public land within what is now Stillwater Wildlife Management Area. If transferred to Churchill County, it is anticipated that the County will subsequently transfer the Indian Lakes area to the City of Fallon.

An environmental assessment that addressed the potential impacts of the transfer was completed by the Service and a Finding of No Significant Impact was issued in March 1996. The Service received written confirmation by Churchill County of the County's desire to acquire the Indian Lakes area and to subsequently convey the title of the area to the City of Fallon (letter dated July 10, 1996).

If the Indian Lakes area is transferred to Churchill County and the area is subsequently transferred to the City of Fallon, it is not expected that there would not be any noticeable impacts to the resource areas addressed in Chapter 4 of this FEIS. No significant adverse impacts were identified in the environmental assessment.

4.26.14 20,000 ACRE-FEET WATER RIGHTS ACQUISITION PROGRAM

The 20,000 AF water rights acquisition program is an integral part of all of the alternatives (Sections 2.4 and 2.5). The 20,000 AF sets the upper limit of water rights acquisitions in the No Action Alternative (Alternative 1) and it is included in the upper limits of water rights acquisitions in the action alternatives.

Compared to no acquisition conditions, the purchase and transfer of 20,000 AF of water rights in the Carson Division to the primary wetlands is expected to have slightly improved Newlands Project delivery efficiency, based on the BLR model (from and estimated 67.3 percent to 67.8 percent). Lahontan Reservoir storage could increase slightly (from 254,600 AF to 255,300 AF, June 1). However, no noticeable changes in Truckee River diversions at Derby Dam or lower Truckee River flows are expected.

Water quality in the primary wetland habitats is expected to improve as a consequence of irrigation water being delivered to the wetlands. Under no acquisition conditions, no irrigation water flows into the wetlands in most years. Over the long term, irrigation water comprises about 20 percent of the wetland inflow. Acquisition of 20,000 AF of water rights would result in this long term average increasing to about 45 percent.

Changes to groundwater or groundwater recharge are not anticipated to be measurable under the No Action Alternative as compared to no acquisition conditions. Adverse impacts to the shallow aquifer may occur in localized areas, but this is not expected to impact recharge of the basalt aquifer because most of the acquisitions are occurring outside of the primary recharge zone.

Primary wetland habitat is expected to increase by about 25 percent over no acquisition conditions (from an estimated long-term average of 9,700 acres to an estimated long-term average of about 12,100 acres). This will benefit wetland-dependent wildlife in the Lahontan Valley. Reductions in irrigated farmland could adversely impact some wildlife species in localized areas.

Irrigated, water-righted farmland is expected to decline by as much as about 5,600 acres in the Carson Division (from an estimated 52,800 acres to an estimated 47,100 acres). Accordingly, alfalfa production and sales would decline by about 10 percent (from about 315,100 tons/year and \$28 million to about 283,122 tons/year and \$25.2 million, respectively).

Outdoor recreational opportunities would increase somewhat.

4.26.15 AGRICULTURAL PRODUCTION

The Newlands Project and associated agricultural production in the Carson Division has resulted in a greatly expanded shallow aquifer in the Lahontan Valley (Maurer and others, 1994). The Newlands Project increased the amount of waterways in the Lahontan Valley from less than 100 miles (possibly as low as 30 miles) to about 380 miles. The shallow aquifer associated with pre-Newlands Project waterways (i.e., Carson River channels) is depicted in Figure 3.3.C and the shallow aquifer associated with Newlands Project waterways and associated irrigated lands is depicted in Figure 3.3.D.

The expansion and maintenance of the shallow aquifer in the Lahontan Valley is the result of surface water being more widely distributed throughout the valley as a consequence of the network of Newlands Project delivery canals and laterals. Assuming that on-farm losses are offset by use of groundwater by alfalfa (Maurer and others, 1994), the actual irrigated crops of alfalfa do not appear to contribute substantially to shallow aquifer recharge, as compared to the canals and laterals.

Irrigated farmland in the Lahontan Valley provides habitat for several wildlife species (Sections 3.9 - 3.15). Irrigated farmland is used as foraging areas for some species such as white-faced ibis and Canada geese.

Assuming no acquisitions of water rights for primary wetlands, alfalfa production contributes about \$16 million annually in economic activity in Churchill County (MacDiarmid and others, 1994b). Agricultural output is responsible for about 20 percent of the \$442 million in economic activity in Churchill County. About 8 percent of the jobs in Churchill County are directly related to agriculture.

Agricultural production in the Lahontan Valley has sustained an agrarian way of life for some people, and the irrigated fields are an important part of the Fallon-area environment for many other people. In a recent survey (Mooney and others, 1995), it was found that about 57 percent of the people in the Fallon area strongly agreed that agriculture should be retained in the community (see Section 3.23.1 for more detail).

4.26.16 SUMMARY OF CUMULATIVE IMPACTS WITHOUT THE PREFERRED ALTERNATIVE

In this section, the potential impacts of each of the above activities and actions are summarized, by resource area. The objective of this section is to present the impacts to major resources that are occurring or will occur without the Preferred Alternative. Mitigation is addressed to some extent in this section. The next section (Section 4.26.17) identifies the anticipated impacts of the Preferred Alternative as added to the effects of all other activities and actions that are addressed in this cumulative impact analysis (i.e., Sections 4.26.1 - 4.26.15).

Newlands Project Operations. *Several activities and actions, in combination, could potentially contribute to higher Newlands Project delivery efficiency rates: acquisition of water rights for the Fallon Reservation lands, adjusted OCAP, implementation of NAS-Fallon's modified land management plan, growth of Churchill County (including the NAS-Fallon expansion), and completion of the 20,000 AF water rights acquisition program. To the extent that conversion of farmland to residential and other urban developments occur in a blocked pattern, growth in Churchill County could improve Newlands Project delivery efficiency rates. To the extent that conversion of farmland to residential and other urban developments occur in a checkerboard pattern or along the major delivery canals, growth in Churchill County will contribute to decreased Newlands Project delivery efficiency rates. Residential development in Churchill County generally has concentrated around the City of Fallon, but some development is occurring outside of this growth pattern. Thus far, the acquisition of water rights for wetlands under the 20,000 AF acquisition program generally has occurred in a blocked pattern.*

As deliveries to farmland decline and total irrigation demand decreases, less water will be released from Lahontan Reservoir and less water will be diverted from the Truckee River at Derby Dam under average conditions.

Water Resources. *As more farmland is converted to non-irrigated uses, due to the implementation of NAS-Fallon's modified land management plan, continued residential and other urban development (a consequence of growth of Churchill County and NAS-Fallon expansion), and the acquisition of 20,000 AF of water rights, water quality of wetland inflows will improve. The closure of TJ drain also would contribute to improved quality of wetland inflow. Conversely, the acquisition of water rights for the Fallon Reservation lands and subsequent conversion of non-irrigated lands to irrigated farmland on the Reservation could increase drainwater inflow via the TJ Drain in the short term. This could result in degraded water quality during the period that TJ Drain remains open.*

Past, present, and potential-future activities and actions that have the potential to influence groundwater levels and recharge in the Lahontan Valley include the acquisition of water

rights for the Fallon Paiute Shoshone Reservation Agricultural Lands, Newlands Project Recoupment, OCAP adjustments, NAS-Fallon expansion, NAS-Fallon water conservation, population growth in the Fallon area, and the 20,000 AF water rights acquisition program for Lahontan Valley wetlands.

Purchase of up to about 8,453 AF of water rights from within the Carson Division to the Fallon Paiute-Shoshone Reservation could result in the relocation of up to about 2,415 acres of irrigated farmland. To the extent that the place of use of purchased water rights are changed to the Reservation, which is located east of the major groundwater recharge zone in the Lahontan Valley, shallow water recharge could be affected in localized areas where water rights are purchased and transferred to a different place of use. The purchase of up to an additional 20,000 AF of water rights for the Lahontan Valley wetlands could result in about 5,600 acres of irrigated farmland being taken out of production in the Carson Division. Most of the acquisitions for the 20,000 AF acquisition program have occurred outside of the primary recharge zone of the basalt aquifer. Lining of laterals and reduced volumes of water being applied to fields under NAS-Fallon's land management plan could result in lowered shallow aquifer recharge rates in localized areas. Combined, these actions are not expected to have significant, widespread adverse impacts to groundwater recharge. Lining of canals in other parts of the Carson Division would contribute to adverse impacts to shallow aquifer recharge.

Ongoing residential development has the potential to adversely impact shallow and intermediate aquifers. A growing number of domestic wells will continue to put more demand on this water supply and conversion of farmland and concurrent abandonment of laterals will serve to reduce recharge to the shallow aquifer, particularly if such development continues to occur west of Fallon. Additionally, conversion of farmland to residential and other urban developments is currently taking place within the recharge zone of the basalt aquifers, which could adversely affect the domestic supply for Fallon, NAS-Fallon, and the Fallon Paiute-Shoshone Indian Reservation. Much of the conversion of irrigated farmland to non-irrigated uses within the primary recharge zone of the basalt aquifer (Figure 3.3.F) is currently a consequence of urban expansion.

The effects of residential development and continued growth in the community (including NAS-Fallon expansion) combined with impacts from lining of irrigation canals and laterals, acquiring water rights for the Fallon Tribes, acquiring 20,000 AF of water rights for Lahontan Valley wetlands, adjusted OCAP, and recoupment are likely to adversely impact groundwater recharge in the Lahontan Valley. A municipal water system for Churchill County/Fallon that supplements groundwater pumping with other water sources (e.g., Newlands Project surface water) would offset impacts to groundwater recharge, and would provide Churchill County residents with a reliable source of domestic water. A municipal water system that relies less heavily on groundwater would provide an opportunity for improving the quality of the domestic water supply in Churchill County.

Vector, Erosion, Agricultural Pest Control, and Air Quality. Increasing primary wetland habitat acreage by about 25 percent (from an estimated long-term average of 9,700 acres to about 12,100 acres) would increase breeding grounds for mosquitos. Some of these impacts could potentially be reduced through strategic water management and ongoing mosquito abatement.

The conversion of irrigated farmland to non-irrigated uses in the Carson Division resulting from the acquisition of water rights for Fallon Reservation agricultural production and the acquisition of 20,000 AF of water rights for Lahontan Valley wetlands could potentially result in short term increases in wind erosion to the extent that vegetation cover on vacated farmland declines. This could result in short term impacts to air quality, although the prevailing winds out of the west and southwest would minimize any potential problems as the affected farmlands are primarily to the east and south of Fallon. The acquisition of irrigation water rights could potentially eliminate some agriculture-related dust impacts associated with plowing, disking, burning, and other agricultural activities. As urban expansion continues and more farmland is converted to residential and other developments in the Fallon area, degradation of air quality due to agricultural activities should decline in the immediate vicinity of Fallon, although urban-related air quality problems related to such things as trash burning, dust from roads, and combustion from vehicles and home-heating units, would increase.

Remaining farms in the Carson Division could potentially experience increased problems with weeds and vertebrate and invertebrate pests.

Vegetative Communities and Wildlife. Primary wetland habitat would increase from an estimated long-term average of 9,700 acres to an estimated long-term average of 12,100 acres as a consequence of acquiring 20,000 AF of water rights for the wetlands. Furthermore, the transfer of Carson Lake and preparation of wildlife-habitat management plans for the primary wetland areas would result in more effective management of primary wetland habitat for wildlife. Wetland-dependent wildlife would benefit. Conversely, wetland habitat could be adversely impacted by adjustments to OCAP and possibly by Recoupment.

The combination of acquiring water rights for the Fallon Reservation lands (depending on pattern), Recoupment, adjusted OCAP, converting agricultural areas to residential and other developments, and acquiring 20,000 AF of water rights for Lahontan Valley wetlands could potentially reduce the long-term average acreage of secondary wetland habitat in the Lahontan Valley. However, any losses would be more than offset by increased acreage of primary wetland habitat. Although it could also reduce the amount of artificially-created riparian habitat, the creation of new irrigated farmland and associated infrastructure on Fallon Reservation lands could offset these potential losses.

Acquiring 20,000 AF of water rights for Lahontan Valley wetlands is expected to reduce the amount of agricultural vegetative communities in the valley by about 5,700 acres.

Converting agricultural areas to residential and other developments would reduce this community type even further. Wildlife associated with agricultural areas would be adversely impacted. Acquisition of water rights for the Fallon Reservation lands would not reduce the amount of irrigated farmland because an equal number of acres irrigated farmland would be created on reservation lands.

Cui-ui and other Pyramid Lake/lower Truckee River resources could benefit slightly from increased Newlands Project delivery efficiency (see above discussion). Additionally, they would benefit from the implementation of TROA, the Truckee River Water Quality Settlement Agreement, adjusted OCAP, and actions to enhance cui-ui populations (especially the acquisition of Truckee River water rights).

Agriculture, Farmland, Local Economy, and Land Use. As a consequence of acquiring 20,000 AF of water rights for primary wetland areas, irrigated, water-righted farmland in the Lahontan Valley is expected to decline by about 5,700 acres. Reduced irrigation on NAS-Fallon lands and will cause more farmland to be converted to less profitable agriculture and possibly non-irrigated uses. Continued construction of new homes and other developments (due in part to NAS-Fallon expansion) will cause more farmland to be converted to residential areas, businesses and other services, and industry. Given the current population growth-rate in Churchill County (2-3 percent/year), the location of prime farmland in Churchill County, and the current growth pattern (occurring in areas containing prime farmland), adverse impacts to prime farmland could be substantial. As a consequence, agricultural production, agricultural sales, and agricultural-related jobs will decline in Churchill County. As residential developments encroach on agricultural areas in a checkerboarded or leap-frog pattern, remaining farmers could be adversely impacted by new residents complaining about normal farming activities. In addition, the Truckee River Water Quality Settlement Agreement could lead to several thousand acres of other agricultural lands in the region being taken out of production, further affecting the agriculture economy.

Some of the reductions in agricultural economic activity and jobs would be at least partially offset by increased economic activity (including new home construction) and jobs resulting from income gains associated with water rights purchases, NAS-Fallon expansion, construction, and economic diversification. A mitigation measure that could potentially be implemented to reduce adverse impacts to the agricultural community would be to establish one or more farmland protection zones in which parceling and subdivision would be prohibited, land use would be restricted to agriculture. Although the current Churchill County Master Plan has classified lands in Churchill County as agricultural lands, this does not appear to prevent parcelling and development of residential areas on these lands. In combination with a farmland protection zone, a conservation easement program could be established to purchase development rights.

Recreation. Increased acreage of primary wetland habitat is expected to increase outdoor recreational opportunities. However, these increases could be partially offset by lower average storage in Lahontan Reservoir resulting from adjustments to OCAP and possibly as a consequence of Recoupment. Recreation associated with open expanses of water (such as at Lahontan Reservoir) may be adversely impacted.

Population Growth. Churchill County is expected to continue growing at a rate of 2-3 percent per year during the next 5 years and possibly beyond. Population growth in Lyon County is expected to continue at a rate of about 5-6 percent. NAS-Fallon expansion, as described above, will result in further growth in the Fallon area. The other activities and actions described in this cumulative impact analysis are not expected to impact population growth in Churchill County above the anticipated growth rates described in the 1990 Churchill County Master Plan.

Land Values. It is not expected that acquisition of water rights for the Fallon Paiute-Shoshone Tribes and the primary wetlands will adversely impact land values. As the Fallon area continues to grow, land values are expected to increase in the Lahontan Valley. The magnitude of increase will likely be influenced by the NAS-Fallon expansion.

Individually, the activities and actions addressed in this cumulative impact analysis are not expected to impact the slow upward trend in agricultural land values. However, it is possible that the rate of increase in agricultural land values could be affected by the combination of these factors.

Property Taxes. Privately held water-righted lands acquired in trust for the Fallon Paiute-Shoshone Tribes would no longer be subject to county property taxes. Lands from which only water rights are sold and transferred to the Fallon Paiute-Shoshone Reservation and which are subsequently converted to non-agricultural uses could be subject to a slightly higher tax rate than they would be if they remained in agricultural production. This would also be true of water rights acquired for Lahontan Valley wetlands and the subsequent conversion of irrigated farmland to non-agricultural uses.

Municipal Services. Aside from water supply, none of the activities and actions addressed in this analysis, except NAS-Fallon expansion and growth and diversification, are expected to impact municipal services. As the population of Churchill and Lyon Counties grow, the demand for municipal services will increase correspondingly. Water supply is covered under the Water Resources section above.

Social Values. As the Fallon area continues to grow and continues to shift away from an agrarian community and toward a more diversified and suburban community, the change will be viewed by some people as negative and it will be viewed by other people as positive. The purchase of water rights for the primary wetlands, NAS expansion, and continued

growth in Churchill County will contribute to the shift away from an agrarian community, but will increase wetland-associated recreational opportunities for some members of the community and will provide a more diverse local culture.

Indian Trust Assets and Cultural Resources. *Pyramid Lake and lower Truckee River resources could benefit slightly from increased Newlands Project delivery efficiency (thus benefitting Pyramid Lake Paiute Tribe). These resources would also benefit from the implementation of TROA, the Truckee River Water Quality Settlement Agreement, adjusted OCAP, and actions to enhance cui-ui populations (especially the acquisition of Truckee River water rights). The acquisition of 20,000 AF of water rights for primary wetlands would not directly benefit wetlands on the Fallon Paiute-Shoshone Indian Reservation because water rights would not be purchased in trust for the reservation under the 20,000 AF acquisition program.*

The acquisition of water rights for primary wetlands (20,000 AF) would enhance the preservation of prehistoric cultural resources at Carson Lake and Stillwater NWR. This would occur as a consequence of more water covering cultural resource sites in the primary wetland areas. Population growth in Churchill County could adversely impact cultural resources in some areas as a consequence of land development in some areas and as a consequence of more people recreating in the area around Fallon.

Acquisition Costs. *Acquisition of water rights for the Fallon Paiute-Shoshone Tribes and purchase of water rights for primary wetlands could result in more competition for privately-owned water rights in the Lahontan Valley. The purchase of up to \$9 million of water rights by the State of Nevada would reduce the amount of money that the Federal government would have to spend on acquiring water rights to sustain 25,000 acres of primary wetland habitat.*

4.26.17 SUMMARY OF CUMULATIVE IMPACTS WITH THE PREFERRED ALTERNATIVE

This identifies the anticipated impacts of the Preferred Alternative as added to the effects of all other activities and actions that are addressed in this cumulative impact analysis (e.g., those covered in Sections 4.26.1 - 4.26.15, above). Mitigation relative to the Preferred Alternative (Alternative 5) is discussed in earlier sections of this chapter (Sections 4.2 - 4.25).

Newlands Project Operations. *The acquisition of 75,000 AF of water rights in the Carson Division under the Preferred Alternative (including the 20,000 AF acquisition program), couples with the acquisition of water rights for the Fallon Reservation lands, adjusted OCAP, implementation of NAS-Fallon's modified land management plan, and growth of Churchill County (including the NAS-Fallon expansion), would further improve Newlands Project delivery efficiency rates, reduce storage levels at Lahontan Reservoir, and reduce the*

average volume of water diversions from the Truckee River. (Please refer to Section 4.2 for more detail.) These actions in combination may require some canal enlargements and other improvement, and would most likely result in the abandonment of some existing canals and drains.

Water Resources. To the extent that poor-quality groundwater is not used to supplement wetland inflows, the Preferred Alternative would further enhance water quality of these inflows beyond which would occur under baseline conditions, including the acquisition of 20,000 AF of water rights for the wetlands, closure of TJ drain, implementation of NAS-Fallon's modified land management plan, and continued conversion of farmland to residential and other urban development. (Please refer to Section 4.3.2 for more detail.)

Although the Service's actions would not exacerbate impacts associated with basalt aquifer water-extraction rates, Alternative 5 has the potential to reduce basalt aquifer recharge to a limited extent. Acquisition and transfer of water rights under the Preferred Alternative would adversely impact shallow and intermediate aquifer recharge in localized areas, but the impacts are not expected to be widespread. If groundwater is pumped to supply wetlands with groundwater, this would occur near Stillwater NWR, located outside of the recharge zone of the shallow and intermediate aquifers, and would not adversely impacted groundwater users in the western and west-central parts of the Lahontan Valley.

Cumulatively, the effects of residential development and continued growth in the community (including NAS-Fallon expansion), lining of irrigation canals and laterals, acquisition of water rights for the Fallon Tribes, adjusted OCAP, recoupment, in addition to the Service's action of acquiring water rights for Lahontan Valley wetlands (under the Preferred Alternative), are likely to adversely impact groundwater recharge in the Lahontan Valley. As discussed above, a municipal water system for Churchill County/Fallon that makes combined use of Newlands Project (surface) water, as well as the shallow, intermediate, and basalt aquifers, would lessen impacts associated with groundwater recharge. A system that relies solely on surface water would eliminate these anticipated adverse impacts.

Existing and anticipated demands for domestic-supply from the basalt aquifer have the greatest potential to adversely impact water quality in the basalt aquifer, as well as altering recharge pathways and volumes. Groundwater in the Middle Carson River and Fernley areas would not be impacted. (Please refer to Section 4.3.3 for more detail.)

Vector, Erosion, Agricultural Pest Control, and Air Quality. Conversion of an additional 15,400 acres of irrigated farmland to non-irrigated uses under the Preferred Alternative would increase the amount of potential mosquito breeding grounds and could potentially exacerbate agricultural pest, wind erosion, and air quality problems in the Carson Division as well as along the Middle Carson River corridor. (Please sections 4.4 and 4.5 for more detail.)

Cumulatively, potential breeding areas for mosquitos will increase outside of the Fallon area (at the primary wetland areas) and could decline somewhat within the more urban areas of Fallon (as drains and associated secondary wetlands go dry). A significant amount of land will be converted from irrigated farmland, where agricultural pests are often controlled, to non-irrigated uses, where agricultural pests may persist unchecked unless the land is converted to a more intensive use such as residential areas. This could increase pest problems on some farmlands.

Vegetative Communities and Wildlife. *Implementation of the Preferred Alternative would further increase the amount of primary wetland habitat to a long-term average of about 25,000 acres. Any further reductions in secondary wetland habitat acreage would be more than offset by this increase in primary wetland habitat acreage.*

Further reductions in farmland habitat in the Carson Division and the Middle Carson River would occur under the Preferred Alternative, and further adverse impacts to wildlife associated with agricultural areas would occur.

Cui-ui and other Pyramid Lake/lower Truckee River resources would further benefit from the Preferred Alternative. If the Preferred Alternative, TROA, the Truckee River Water Quality Settlement Agreement, and adjusted OCAP are all implemented, the cumulative impacts could provide for cui-ui recovery and additional water rights may not have to be purchased for cui-ui recovery. (Please see Sections 4.6 - 4.15 for more detail.)

Cumulatively, wetland habitat and associated wildlife in the Lahontan Valley will benefit significantly in the long term from the Preferred Alternative, including the 20,000 AF acquisition program, and closure of TJ Drain, even with other actions and activities tending to adversely impact wetland habitat (e.g., adjusted OCAP and possibly Recoupment).

Agriculture, Farmland, Local Economy, and Land Use. *Acreage of irrigated farmland would decline in the Carson Division by another 15,400 acres and along the Middle Carson River by as much as 4,800 acres, which further impact the agricultural communities in Churchill and Lyon Counties beyond the impacts that would occur as a result of the activities and actions listed above. (Please see Sections 4.16 and 4.19 for more detail and for information on possible mitigation measures.) In combination with the other activities and actions addressed in this analysis (including the already occurring growth and diversification of Churchill County), agricultural production would be significantly adversely affected.*

Implementation of the Preferred Alternative, cumulative with TROA, the Truckee River Water Quality Settlement Agreement, and adjusted OCAP may result in fewer Truckee Division and Truckee River water rights having to be purchased. This could slightly reduce potential adverse impacts to the agricultural community along the Truckee River and Truckee Division

of the Newlands Project as compared to conditions without implementation of the Preferred Alternative (Section 4.26.16).

Recreation. Further increases in primary wetland habitat would further increase recreational opportunities associated with wetlands. (Please see Section 4.17 for more detail.) Cumulatively, recreational opportunities associated with wetlands would increase in Churchill County.

Population Growth. Implementation of the Preferred Alternative is not expected to adversely affect population growth in Churchill and Lyon Counties. (Please see Section 4.18 for more detail.)

Land Values. It is not expected that the Preferred Alternative would adversely impact land values. (Please see Section 4.20 for more detail.)

Property Taxes. The Preferred Alternative would further increase tax revenues to Churchill County, and could potentially increase revenues to Lyon County, through land conversion (and increased tax rate on these lands) and increased revenue sharing payments by the Service. (Please see Sections 4.21 and 4.25 for more detail.) Cumulatively, revenue paid to Churchill County and possibly Lyon County would increase.

Municipal Services. The Preferred Alternative is not expected to impact municipal services. (please see Section 4.22 for more detail), with the possible exception that cumulative effects of water rights acquisitions for Lahontan Valley wetlands, OCAP adjustments, and growth and diversification could potentially reduce basalt aquifer recharge.

Social Values. The continued purchase of water rights under the Preferred Alternative for the primary wetlands will contribute to the shift away from an agrarian community, but will increase recreational opportunities for some members of the growing community. (Please see Section 4.23 for more detail.) Cumulatively, "farmland preservation values" will be significantly affected as the Fallon area shifts further away from an agrarian community toward a more urban community and as more farmland is changed to other uses.

Indian Trust Assets and Cultural Resources. The acquisition of water rights for primary wetlands would enhance Indian Trust Assets (except for potential adverse impacts (i.e., competition) to the acquisition of water rights for agricultural purposes for the Fallon Paiute-Shoshone Reservation) and the preservation of prehistoric cultural resources at Carson Lake and Stillwater NWR. The latter would occur as a consequence of more water covering cultural resource sites in the primary wetland areas. (Please see Section 4.24 for more detail.)

Acquisition Costs. Acquisition of water rights for the primary wetlands under the Preferred Alternative could result in more competition for privately-owned water rights in the Lahontan Valley. (Please see Section 4.25 for more detail.)

4.27 POSSIBLE CONFLICTS WITH AGENCY, TRIBAL, COUNTY OR STATE PLANS OR POLICIES.

4.27.1 FARMLAND PROTECTION POLICY ACT (FPPA)

Under FPPA, federal agencies are to assure that their programs, to the extent practicable, are compatible with State, local government, and private programs and policies to protect farmland. The following addresses the extent to which the Service's Preferred Alternative would conflict with Nevada State, Churchill County, and private programs to protect farmland.

There currently are no Nevada State farmland protection programs or policies with which the acquisition of water rights for wetlands protection would conflict.

Although the 1990 Churchill County Master Plan did not identify any goals for protecting farmland in the county, the Service's Preferred Alternative appears to conflict with one of the fundamental concepts of the land use master plan, which is to retain farmland for agricultural use through the categorization of certain lands in Churchill County for agricultural use. It is estimated that just over half of the farmland in the Carson Division occurs in areas designated for agricultural use (based on Map #25 of the Churchill County 1990 Master Plan in conjunction with NRCS's 1980 Important Farmland map for Churchill County). As a result of acquiring water rights for Lahontan Valley wetlands protection, a portion of these lands would be converted to non-agricultural uses, such as non-agricultural open space. The Preferred Alternative would minimize these adverse impacts, as compared to the other action alternatives.

Although there has been discussion on the establishment of a farmland protection program for Churchill County (Lahontan Valley Environmental Alliance Land Use Working Group), no such program has been established.

4.27.2 CHURCHILL COUNTY MASTER PLAN

Aside from the potential conflict identified above, the water rights acquisition program is not in conflict with the 1990 Churchill County Master Plan. However, Churchill County's Master Plan is currently undergoing revision. Changes in the plan could provide mitigation for some of the impacts associated with land use, land values, and social values as identified in those sections of this document.

4.27.3 PYRAMID LAKE PAIUTE TRIBE

The Pyramid Lake Paiute Tribe has contested many water right transfers in the Newlands Project, and litigation regarding these rights is ongoing. In an effort to avoid possible conflicts with the Tribe and State law, the Service has agreed to transfer only eligible water rights (please refer to Section 2.6.2, ELIGIBILITY CRITERIA).

4.28 UNAVOIDABLE ADVERSE EFFECTS

Unavoidable adverse effects are those consequences or impacts that occur as a result of the actions and cannot be mitigated. In the previous sections of this chapter the Service has identified the effects of the Preferred Alternative on the various components of the Lahontan Valley environment, including the social and economic environment. Possible relevant and reasonable mitigation measures are described in general terms for each of the major affected resources. Many of the mitigation measures described are outside of the jurisdiction or purview of the Service but are included to encourage other agencies, individuals or affected parties to implement such mitigation measures when possible. Since the Service cannot ensure or determine that the identified mitigation measures will be fully implemented, there are likely to be situations where unavoidable effects will occur.

For the Lahontan Valley, the Preferred Alternative of acquiring water for the wetlands is expected to cause unavoidable adverse impacts to the agricultural economy, agriculture-dependent wildlife, and "farm preservation values" of community members. Agricultural jobs will be lost and the community will experience a shift in its economy as farmlands go out of production. As a result, the character of the community may be substantially altered *by the time the water rights acquisition program is completed*.

Change is occurring in the Fallon community and social values are being *noticeably* impacted by a variety of factors *unrelated to the proposed acquisition program*. Long-time residents are seeing the community change as growth rates, housing demands and job opportunities increase. At the same time, the community is shifting from an agrarian and agriculturally based lifestyle to one that is more urban and economically diverse. Some residents are resistant to such change and perceive that these changes are adversely impacting the community's social structure. It is difficult to prescribe *acceptable* mitigation for impacted social values; for this reason this is the major unavoidable adverse impact *anticipated to occur as a consequence of the Service's Preferred Alternative*.

Hydropower generation would be decreased and adversely impacted as a result of the Service's action. The loss of revenues associated with hydropower generation could be mitigated. New power generating facilities could be constructed, but this is highly unlikely because hydropower generation is not an authorized purpose for Newlands Project water *electric power generation is considered incidental to other water uses*. *Changing the timing of Lahontan Reservoir releases, which would increase monthly volumes in some months while reducing volumes in other months, could improve power generation and offset revenue losses*. It is unlikely that power loss could be mitigated under this action alone, and the Service is identifying hydropower generation as one of the unavoidable adverse effects caused by the Service's action.

As farmland is taken out of production, some drainage ditches in secondary wetland areas of the Lahontan Valley may dry up. Some of the wildlife values associated with the drains would be shifted to the permanent wetlands, while other wildlife uses would be lost. Some species such as wood ducks, yellow-head blackbirds, and other birds which are found along Newlands Project drains

would lose some habitat areas. Additionally, some secondary wetland habitat would be lost on Federal, State, and private lands as a result of this action. While most of the biological resources associated with these areas would shift to the four primary wetland areas, the other functions and values of these wetlands to the public and their owners would be lost.

With the reduction of agricultural lands would come reduced feeding areas for some species of wildlife, however there would continue to be adequate feeding areas on those lands which remain. The Service estimates that the remaining agricultural acreage under the *Preferred Alternative* and alternatives is *sufficient to maintain wildlife populations associated with farmland in the Lahontan Valley*.

4.29 IRREVERSIBLE AND IRRETRIEVABLE RESOURCE COMMITMENTS

Once the water rights are acquired by the Service for wetland use, Public Law 101-618 prohibits the sale, exchange or disposal of those rights for any use other than that which would benefit fish and wildlife within Lahontan Valley (Public Law 101-618 206(a)(1)(A)). Essentially, this constitutes an irretrievable commitment of the water resource once the water rights are acquired and transferred.

Once farmlands are converted to other, more intensive land uses such as residential subdivision, industrial, or commercial development, there is generally little economic incentive to *convert* such lands back into agriculture. The Service does not anticipate that lands will revert back to agricultural use after they are converted to more intensive land use. Changes in land use can result in an irreversible commitment of the resource in that farming or agricultural use of such lands would be eliminated. However, vacant lands that are not converted to a more intensive use could be re-water-righted and put back into production through a process of transferring existing agricultural water rights from less productive farmland to vacant lands of higher farmland quality.

4.30 RELATIONSHIP OF SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

Under the Service's Proposed Action and alternatives, short-term immediate negative impacts would be felt in the agricultural sector *during the entire period of water rights acquisition*. The acquisition and transfer of agricultural water rights would eliminate crop production from those lands, in most cases, by the next irrigation season. The loss of agricultural profits and income would occur in the short-term while the added benefits of increased recreational use at the wetland and the infusion of capital from the sale of water rights would take longer to be realized in the local economy. The acquisition of water rights for wetlands would occur over an unspecified period of time, therefore the full potential and benefits of sustaining 25,000 acres of wetland habitat would slowly accrue providing long-term biological and wildlife productivity.

CHAPTER 5

LIST OF PREPARERS

5.1 DOCUMENT PREPARATION

The following individuals participated in the formulation and analysis of the alternatives and the subsequent preparation of the environmental document.

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CHAPTER 6

DRAFT EIS COMMENTS and RESPONSES

6.1 INTRODUCTION

This chapter addresses specific comments that were submitted in response to the *Draft Environmental Impact Statement for Water Rights Acquisition for Lahontan Valley Wetlands* (DEIS) that was published in the spring of 1995. Appendix 11 includes copies of the comments by all commentors as they were submitted in their entirety complete with attached exhibits. In responding to comments on the DEIS, the Service also considered the complaints filed, respectively, by Churchill County and the City of Fallon in recent litigation against the Department of the Interior, in *Churchill County v. Bruce Babbitt et al.*, CV-N-95-00724-ECR (D. NEV.); and *City of Fallon v. Bruce Babbitt et al.*, CV-N-96-0146-ECR (D. NEV.).

Comments are addressed in two ways in this chapter. First, several issues that were brought up repeatedly by different groups were summarized and addressed by the Service under Section 6.2, GENERAL ISSUE COMMENTS AND RESPONSES. Secondly, specific comments raised by each commentor, listed in alphabetical order, are addressed individually in Section 6.3, SPECIFIC COMMENTS AND RESPONSES. Some comments were edited for length, with ellipsis noting where text (usually background statements or lengthy verbiage) was deleted. In addition, double quote marks denote commentor comments, while single quote marks indicate text quoted directly from the DEIS.

The following table of contents is provided help readers find general issue comments and comments by particular commentors.

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6.2 GENERAL ISSUE COMMENTS AND RESPONSES

I. Programmatic EIS

Eight commentors stated that the Service should complete a programmatic EIS before acquiring water and water rights for Lahontan Valley wetlands protection. The following is a compilation and summary of the comments.

General Issue Comment: This action, as well as any other Federal action with the potential to impact the Newlands Project, should be stopped until a comprehensive Environmental Impact Statement including all proposed, planned, and implemented Federal actions on the Carson-Truckee River Systems is finalized. Each and every action within Public Law 101-618 appears to have impacts tied to the other actions within the law. Decisions on the impacts of each action should not be made separately. The Department of the Interior, including the Service, should prepare a single EIS because of the immense cumulative effects of various Interior actions concerning control of water in western Nevada.

Public Law 101-618 authorizes or mandates the following Federal actions or programs that would affect water resources, water-users, and water management on the Truckee and Carson River systems: (1) Truckee River Operating Agreement, (2) Water Rights Acquisition for Lahontan Valley Wetlands Protection, (3) Transfer of Carson Lake to the State of Nevada for a Wildlife Management Area, (4) Cui-ui Recovery and the Acquisition of Water Rights for the Conservation and Recovery of Pyramid Lake Fisheries, (5) Expansion and Management of Stillwater NWR, (6) Conservation of NAS-Fallon Irrigation Water, (7) Water Right Acquisition for Expanding Fallon Indian Reservation Agriculture, (8) Newlands Project Efficiency Studies, (9) Compliance with OCAP, and (10) Recoupment of Excess Truckee River Diversions. Because all of these Federal actions or programs could impact water users in Lahontan Valley, the Service should complete a programmatic EIS so as to provide more information than what currently exists.

Response: While it is apparent that the many potential federal actions authorized or directed by P.L. 101-618 are geographically related, they are a collection of diverse, independent actions with independent time frames, and they will be administered by a variety of agencies. The Service has direct authority and responsibility (as the lead agency) for Lahontan Valley Wetlands Protection, Cui-ui Recovery, Management of Stillwater NWR, and, by agreement, the Transfer of Carson Lake. A programmatic EIS is not required because (a) there is no "program," (b) most of the activities authorized or directed by Public Law 101-618 do not depend on each other (i.e., they're independent), and therefore (3) they could not be adequately analyzed in a single EIS.

Given those circumstances, it was concluded that the various elements of P.L. 101-618 should not be combined and could not be adequately evaluated in a single Service environmental document. Therefore, no programmatic environmental impact statement encompassing all aspects of the law was prepared nor is planned by the Service. Potential impacts of the components of P.L. 101-618 will continue to be evaluated over time as the issues mature and individual agencies identify goals and alternative means for addressing those issues. Federal actions related to P.L. 101-618 and proposed in the future will be combined in environmental documents where it is appropriate to combine them. In all cases, current and future environmental documents will analyze potential cumulative effects in recognition of the fact that the provisions of P.L. 101-618 are far-reaching and will not be implemented without regard for actions proposed by other entities, including state or local governments and private developers. In addition, it should be noted that a programmatic EIS would not necessarily require additional studies, information or analysis than what is contained in single action EISs, and would provide a general overview of the multiple actions proposed and general impact analysis based upon existing information.

II. Alternatives

General Issue Comment: Two commentators expressed opposition to the Service's Proposed Action and alternatives.

Other commentors stated specific preference or support for one of the alternatives considered. They are:

Alternative 2 --Pyramid Lake Paiute Tribe, Lahontan Wetlands Coalition

Alternative 3--Nevada Waterfowl Association, Sierra Club, Nevada Division of Wildlife

Alternative 4--State of Nevada Division of Environmental Protection, EPA

Alternative 5--The Nature Conservancy

Response: The Service has identified Alternative 5 as its Preferred Alternative in this FEIS.

III. Concerns with 2.99 Consumptive Use-rate

Seven commentors stated they questioned the adherence to the 2.99 AF/acre/year use-rate or that they did not support any alternative that did not seek to transfer and use acquired irrigation water at a 3.5 AF/acre/year duty. The following is a compilation and summary of the comments.

General Issue Comment: The 2.99 AF/acre/year use-rate does not make full application of purchased water, and thus wastes federal money. The 2.99 AF/acre/year use-rate is contrary to the provisions of P.L. 101-618, subparagraphs 206(a)(1)(A) and (C) which stipulate that no water shall be purchased under this Section unless the Secretary of the Interior expects that the water rights can be transferred and applied to direct use to a substantial degree, and must be utilized to the maximum extent practicable for direct use on the wetlands.

The DEIS identifies only the Carson Division of the Newlands Project as a source of irrigation water to acquire while eliminating the Truckee Division as a source of water for wetlands protection, but has on numerous occasions identified Truckee Division water rights as a source of water for cui-ui recovery. We question such "segregation" of water sources when it appears that the only benefit of using the 2.99 AF/acre/year use-rate is to subsidize water acquisitions for cui-ui.

Alternative 3 is more desirable and defensible than the Proposed Action because it takes less agricultural land out of production, costs less both in terms of capital and annual costs, reduces impacts to agricultural production and profit. In addition, Alternative 3 reduces losses to secondary wetlands while protecting wetlands as specified in Section 206 of Public Law 101-618.

Response: The Service selected an alternative for its Preferred Alternative that would apply the accepted and approved 2.99 AF/acre/year use-rate as a matter of policy, but this would not preclude the Service from applying a higher use-rate if other related issues are resolved in the future. The 2.99 AF/acre/year use-rate is consistent with change-in-use provisions of the Alpine Decree. Furthermore, previous wetland water right transfers at the 2.99 AF/acre/year use-rate have been approved by the Nevada State Engineer. The Service believes that the 2.99 AF/acre/year use-rate does make substantial use of acquired water rights to the maximum extent practicable.

The 2.99 AF/acre/year use-rate reduces Newlands Project irrigation demand, which in turn has the potential to reduce Truckee River diversions and benefit Pyramid Lake resources (both long-term lake elevations and fisheries) as a consequence. This benefit is a byproduct of the Service's action to acquire water rights for wetland habitat in Lahontan Valley and is not a purpose for the Preferred Alternative.

As the Service disclosed in the FEIS, the higher use-rate of 3.5 AF/acre/year applied to water-right transfers for wetland habitat has not been tested in applications to the Nevada State Engineer or under the provisions of the Alpine Decree. Additionally, there are environmental and Indian trust concerns relating to the potential for increased Truckee River diversions that would need to be resolved before the Service would be able to proceed with possibly higher wetland irrigation use-rates.

It should also be noted that the Preferred Alternative will leave about 7,500 more acres of water-righted irrigated lands (see Table 4.2.A) in production than Alternative 3, therefore, more drainflows will continue to the secondary wetlands. The Preferred Alternative would therefore have less impact on secondary wetlands than Alternative 3. Section 4.6.2, EFFECTS ON SECONDARY WETLANDS has been reviewed and text changes have been made for Alternatives 3 and 5.

IV. Preferred Alternative and Environmentally Preferred Alternative Not Identified

General Issue Comment: A few commentors thought the Service's Proposed Action was the Preferred Alternative; another questioned why an Environmentally Preferred Alternative was not identified.

Response: Although the lead agency can identify a preferred alternative in its DEIS, it is not required to do so (see CEQ's Forty Most Asked Questions concerning NEPA Regulations). For the DEIS, the Service did not identify a Preferred Alternative. In that document, Alternative 2 was the Proposed Action, the action proposed for consideration by the Service. After consideration of a myriad of comments on the DEIS, and in consultation and review with other agencies, the Service has chosen Alternative 5, the Minimum Acquisition Alternative, as its Preferred Alternative. The Service has not, however, identified an environmentally preferred alternative, but will do so in the Record of Decision, as required in CEQ Regulations, Section 1505.2(b).

V. Incorporation of Farmland Protection Policy Act

Three commentors stated that additional compliance with the Farmland Protection Policy Act was required in the EIS.

General Issue Comment: The document has not adequately addressed the Farmland Protection Policy Act (FPPA). The Service must demonstrate that it has complied with provisions of FPPA because, as a Federal agency acquiring water rights predominately from agricultural uses, it has the potential to adversely impact prime farmland and farmland of statewide importance. The DEIS does not correctly address the provisions of FPPA and does not fully evaluate the impacts to prime farmland and farmland of statewide importance. What is the basis for why FPPA does not apply to the Service?

Response: Recognizing that the DEIS inadequately addressed FPPA, the Service substantially modified sections of the EIS dealing with FPPA (e.g., Sections 1.9.4, 3.16.4, 4.16.4) and added an FPPA appendix (Appendix 10), based on comments by NRCS and others. As part of this effort, the Service completed the site assessment part of the standard *Farmland Conversion Impact Rating* form per U.S. Department of Agriculture (USDA) guidelines and criteria (7 CFR §658), and submitted a requested to NRCS for them to complete the land evaluation portion of the form (request dated March 29, 1996). The two farming areas evaluated on the form were the Carson Division of the Newlands Project and the Middle Carson River corridor between Lahontan Reservoir and the Carson City gaging station. Of a possible combined score of 260, farmland in the Carson Division received a combined score of 176 and the farmland of the Middle Carson River received a combined score of

167 (Appendix 10). The locally-developed land evaluation and site assessment (LESA) system was not used because it had not been approved by Churchill County and the NRCS State Conservationist for use in Churchill County prior to farmlands in the Carson Division and the Middle Carson River being evaluated.

According to USDA guidelines, if the areas had received scores lower than 160 points on the evaluation form, the Service would not have had to give further consideration to protecting farmland on the site under FPPA (7 CFR §658.4(c)(2)). Because the scores were above 160 points, the Service is to consider alternative actions, as appropriate, that would serve the proposed purpose (i.e., sustaining a long-term average of 25,000 acres of primary wetland habitat), but would convert either fewer acres of farmland or other farmland that has a lower relative rating (7 CFR §658.4). Alternative actions include alternative sites, locations, and designs. This FEIS presents and evaluates a range of alternatives with different program designs, each of which would result in differing amounts of irrigated farmland that would be converted to non-irrigated uses. The Preferred Alternative (Alternative 5) would result in the fewest acres of farmland being converted of any of the action alternatives. The only sites from which water rights can reasonably be purchased for the primary wetlands are the Carson Division and the Middle Carson River corridor given current water policy and law. Furthermore, purchase of water rights from lands not designated as prime farmland or farmland of statewide importance (based on 7 CFR Part 4(c)(4)(i)) is not an option because lands having active water rights are, by definition, irrigated and all irrigated farmland in the Carson Division and Middle Carson River corridor has been designated by NRCS as either prime farmland or farmland of statewide importance (letter dated November 17, 1995). This is discussed further in section 2.3.5, a new section added to the FEIS.

Although FPPA was passed by Congress to protect farmlands nation-wide, Public Law 101-618, which was signed into law nearly 10 years after FPPA, was passed to protect wetland habitat in the Lahontan Valley, among other purposes. Public Law 101-618 specifically authorized and directed that water rights be acquired from willing sellers for wetlands protection.

VI. Quantity of water required to meet wetlands needs

Six commentors raised questions and expressed concerns regarding the Service's use of the 5 AF/acre water requirement associated with sustaining primary wetland habitat.

General Issue Comment: Why has the Service chosen 5 AF/acre/year as the wetland water demand for its calculations of water requirements for the Lahontan Valley wetlands under Public Law 101-618? The use of this annual water demand is contrary to previous Service reports that indicated wetland water demands were 9-10 AF/acre/year and other Service records that showed wetland water deliveries were about 3 AF/acre/year. It appears that the Service needs to develop a more comprehensive management plan for the wetlands in order to better define its water needs.

Response: The Service, as the lead agency preparing the environmental impact analysis of acquiring water and water rights necessary to sustain 25,000 acres of primary wetland habitat, has had to make some determinations regarding water requirements for wetland habitat. In order to develop a Proposed Action and reasonable alternatives, the Service had to define primary wetland habitat and the corresponding water requirements for such habitat. The Service, in coordination with NDOW, relied on their 30 years of experience managing wetland habitats on Stillwater WMA/NWR to develop representative average annual water use requirements for wetlands in order to define a conceptual water demand. The Service has found that 5 AF/acre/year is an approximate representative water requirement that averages the water requirements for the different primary wetland habitat types ranging from playa to perennial marsh (see Figure 3.6.A) in Lahontan Valley.

There are numerous factors (evaporation, transpiration, timing of water delivery, vegetation requirements, vegetation cover, and depth of water) that affect wetland water requirements. The greatest single factor is evaporative losses. In order to sustain standing water, a key component of wetland habitat, enough water must be available to offset evaporative losses. These evaporative losses average about 60.5 inches/year (Appendix 4) or 5 AF/acre/year in the Lahontan Valley wetlands and, therefore, an average of 5 AF/acre/year is needed just to offset evaporative losses. Because evaporative losses vary throughout the year, the timing of water delivery is another key factor in water requirements for wetland habitats. Under baseline conditions, the majority of wetland water supply comes from drainwater inflow (54 percent), which tends to peak late in the irrigation season (August, September, and October) when monthly evaporative losses are declining. As the Service acquires more water and the majority of the wetland inflow comes from irrigation deliveries (65 to 90 percent depending on the alternative considered) based on an agricultural water use pattern (see Figure 2.B), the wetlands will receive water at a time in which the evaporation rate is peaking (June, July, and August).

This shift in wetland water delivery patterns requires slightly more water on average than that required under baseline conditions (about 5.1 AF/acre/year) to make up for these evaporative losses.

In response to the questions regarding previous water demands that range from 9-10 AF/acre/year to as low as 3 AF/acre/year, those water requirements reflect conditions that have occurred in the past and are associated with the different types of wetland habitat (see Appendix 4). In the past when the wetlands received a large volume of water in the winter months as a result of Lahontan Reservoir releases for power generation, the Service was able to maintain open-water habitats in perennial (continuously wetted) wetlands, due in part to greater inflow volumes during winter when evaporative losses were relatively low. Some of these deep perennial wetlands received as much as 8-10 AF/acre of water per year. Records show that in the past, the Service has maintained wetland habitat in some areas (units) of the Stillwater Marsh on as little as 3 AF/acre/year. These wetland areas were managed as ephemeral (not continuously inundated with water) marshes that sustained emergent marsh vegetation.

For the purposes of this document, the Service has relied upon the 5 AF/acre/year wetland water requirement as a representative average water demand. The 5 AF/acre/year average water requirement figure reflects a possible range or mix of wetland habitat types representative of a Great Basin marsh ecosystem. Appendix 4 indicates that 5 AF/acre/year is a reasonable figure.

The Service has indicated in the EIS and continues to assume that the acquisition totals under the alternatives considered define the upper limits of water demand. The Comprehensive Management Plan soon to be developed for Stillwater NWR will further evaluate possible habitat and water delivery scenarios to fine-tune and adjust the annual average water requirements for sustaining wetland habitat. It is possible, that after setting long-range objectives for the refuge and reevaluating water demands for wetland habitats, that the overall water demand may be reduced.

VII. Willing seller defined

Three of the local commentators questioned whether property owners selling water rights in the Lahontan Valley are "willing sellers" as referenced by the Service in the DEIS.

General Issue Comment: The concept of willing seller is not defined within the DEIS and there are indications that the existing water right sales are not open market transactions. Sellers are uncertain of the future due to regulatory changes, litigation, and recoupment; all actions that have de-stabilized the market. For these reasons, sellers are motivated in the same sense that a pending

"condemnation blight" would affect a market. The willing seller concept must incorporate an open and competitive market value rather than the "monopolistic" market that the Service has created in Lahontan Valley.

Response: The term "willing seller" comes from the directives of Public Law 101-618, Section 206 (a)(2)(A) which the Service has used throughout the EIS to define sellers who have voluntarily chosen to participate in the Service's water rights acquisition program. Since about 1991, the Service, under previous acquisition authorities (addressed as the No Action Alternative), has been the most active and largest buyer of water rights on the open market in Lahontan Valley. These transactions and those transactions anticipated under the alternatives considered are open market purchases, and there has been no legal privilege or governmental control of prices. The Service has no authority or interest in condemnation acquisition for water right acquisitions related to preserving and sustaining Lahontan Valley wetlands.

The water rights market in Lahontan Valley, like all commodity markets, has elements of uncertainty. Often, people sell property (including water rights) in anticipation of, or in response to, pending market conditions. They may also sell property because of personal obligations or opportunities that require capital. Regulatory changes such as OCAP and TROA may influence the market, but they do not have the authority or ability to deny or take a valid privately owned water right. Based on information from past independent appraisals and Service appraisal data, neither regulatory change nor litigation has adversely affected the market value of water rights in Lahontan Valley. Recoupment is currently being pursued through a lawsuit seeking restitution of water that was diverted from the Truckee River in excess of authorized amounts. Such restitution could have the potential to impact water delivery in the future. Recoupment could have the ability to affect marketability of Lahontan Valley water rights because of possible repayment encumbrances. These encumbrances may be enforced by Interior pursuant to court decisions, but the decisions to divert excess water in the past were made by the Newlands Project water-users through the actions of TCID. TCID actions are directed by its board which is elected by the water-users to represent their interests.

The market value that the Service pays for water and water rights is based on market value as determined by qualified appraisers. The market value used in all Federal acquisitions is defined by the Uniform Appraisal Standards for Federal Land Acquisitions, 1992, and is similar to definitions used by all appraisers as required by the Uniform Standards of Professional Appraisal Practice. The Service does not have the option to pay less than market value in its purchase transactions, nor does it have the ability to set the price of water. Local open-market transactions (between individuals, private parties, or non-governmental transactions) are the determining factor for market value, and are derived by comparable sales of water rights and water rights with appurtenant land in the area. The Service does not evaluate the market value of Lahontan Valley water rights as if they were in some other area. In order to do so, the Service has to have evidence that there is some physical means to relocate or transfer the property to other locations. Lahontan Valley water rights are physically tied to the Newlands Project portion of the Carson River system and transferring that water to areas where there is a higher demand and higher market values, such as Reno, is physically and legally unrealistic.

The acquisition methods used by the Service determine market value and offer cash payments to property owners voluntarily placing their property on the market for sale. All normal free-market mechanisms are open and available to other individuals and private parties as well. For these reasons, the Service does not believe that its proposed water rights acquisition program is monopolistic nor is it backed by the threat of condemnation. The limited activity and lack of other water-right purchasers in the affected area is outside the control of the Service and may be related

more to the current price of water rights, which often exceeds the production values of many of the farms in Lahontan Valley (Sunding, 1994).

VIII. Impacts to Newlands Project Efficiency

Newlands Project water users can have penalties or restrictions placed on water deliveries if irrigation delivery efficiency targets are not met. For this reason there was concern expressed by a number of groups that wetland water right acquisitions and wetland deliveries could create conditions that would result in inefficient irrigation deliveries.

General Issue Comment: The conclusion in the DEIS that long-term Newlands Project delivery is anticipated to improve as a result of large block deliveries to the wetlands is questioned. There is no discussion of possible short-term impacts to irrigation delivery efficiency in the event that single property irrigation deliveries are required at the end of lateral canals where the majority of the other water rights along a specific canal have been transferred to the wetlands. The Service has not identified possible mitigation measures in the event that Newlands Project efficiency is adversely impacted as a result of wetland water right acquisitions. The recognition of Newlands Project drainwater inflow to the primary wetlands as part of the efficiency calculations would greatly improve Newlands Project irrigation delivery efficiency.

Response: No information has been obtained to date that suggests the Service's proposed acquisition of water rights would adversely impact long-term Newlands Project irrigation delivery efficiency. The Service does recognize that isolated irrigation deliveries at the end of lateral canals could cause adverse impacts to efficiency. The Service believes such conditions could be short term, meaning that over the course of the acquisition program (15-30 years) those isolated irrigation deliveries could be acquired through regular acquisition methods or by transfer methods. Under existing conditions there are a few isolated parcels that receive Newlands Project deliveries in spite of the inherent adverse impacts these deliveries have on overall Newlands Project efficiency. The processes or procedures used to resolve the existing inefficient isolated deliveries could serve as framework for the Service or other agencies to implement acquisition or delivery methods that would reduce the potential for irrigation delivery inefficiencies as a result of wetland water right acquisitions.

The Service believes that acquisition targeting and transfers would serve as possible mitigation measures to offset or eliminate inefficient irrigation deliveries. It should also be noted that it is within the authority of the Secretary of the Interior to impose penalties, in the form of irrigation delivery restrictions, upon Newlands Project water-users in the event that OCAP irrigation delivery efficiency targets are not met. The Service believes that as a possible mitigation measure, the Secretary could waive irrigation delivery restriction penalties, if the failure of the Newlands Project operator to meet OCAP irrigation delivery efficiency targets was proven to be directly related to the Service's wetland water right acquisitions. There are a number of issues that would have to be resolved regarding Pyramid Lake trust responsibilities, efficiency calculations, and documentation of adverse impacts before such mitigation could be implemented.

Changing the procedures to calculate Newlands Project irrigation delivery efficiency is outside the scope of this document and is not within the Service's authority. The Service has evaluated the consequences of including wetland drainwater inflow as part of the Newlands Project irrigation delivery calculations. It should be noted that a key objective of OCAP delivery efficiency targets is to establish a procedure to define necessary Lahontan Reservoir releases and storage with an emphasis on reducing Carson Division irrigators' dependence on Truckee River diversions. The Service has concluded that while changes in efficiency calculations to include wetland drainwater inflows looks good on paper, it does little to achieve the objectives of OCAP. Due to its trust

responsibilities for Pyramid Lake resources, the Service does not consider changes to OCAP that would permit greater diversion of Truckee River to the Newlands Project to be beneficial.

IX. Loss to secondary wetlands discounted

Three commentors were concerned that the document did not adequately describe the loss to secondary wetlands as a result of the water rights acquisition program. Those comments are compiled and summarized below.

General Issue Comment: The DEIS is about wetlands, but there is an inadequate evaluation of the impacts of Federal actions, both past and present on areas identified as "secondary" wetlands. Reduced drainwater will adversely impact regulating reservoirs and private wetland areas such as the Canvasback Gun Club, but the DEIS states that the regulating reservoirs no longer provide wetland habitat. The importance of the secondary wetlands has been overlooked or too generalized in the DEIS. In total, due to the adverse impacts to secondary wetlands, very little gain will be achieved by acquiring water for the primary wetlands.

Response: Many of the wetlands and regulating reservoirs of the Newlands Project within Lahontan Valley provide wetland habitat. (Specific portions of the text in Section 3.6.2 regarding use of the regulating reservoirs has been corrected to reflect this condition.) However, under baseline conditions, which includes full compliance with provisions of the 1988 OCAP, many of the wetlands that have in the past sustained perennial and ephemeral palustrine wetland habitats will not receive sufficient drainwater or spills to provide reliable, long-term wetland habitat. Implementation of many of the Newlands Project irrigation delivery efficiency measures outlined in the 1988 OCAP have, or will result in, decreased drainwater relative to past conditions and will result in reduced reliance on year-long use of regulating reservoirs. The impacts and consequences of implementing the 1988 OCAP were addressed by Bureau of Reclamation in the Final EIS for Newlands Project OCAP (1987). Since this action has occurred and the impacts associated with implementing OCAP have been addressed pursuant to NEPA, the Service has correctly considered those conditions as baseline conditions.

Adverse impacts to secondary wetlands as a result of improved irrigation delivery efficiency are not impacts of the Service's proposed action to acquire water and water rights for the primary wetland habitat areas. The Service has identified (Section 4.6.2 SECONDARY WETLANDS) the anticipated impacts to the secondary wetlands (under baseline conditions) due to reduced Newlands Project drainflows resulting from the acquisition and transfer of agricultural water rights for primary wetland habitat protection.

Other than Stillwater WMA/NWR and Carson Lake primary wetland areas, only the Canvasback Gun Club wetlands have rights to Newlands Project drainwater (Freeman Agreement), but those rights are subject to availability. These drainwater rights were issued recognizing that water volumes could change as a result of Newlands Project operational changes. Therefore, it is reasonable to portray reductions in Newlands Project drainwater as an anticipated consequence of relying on a water supply that is subservient to other uses and demands.

The Service disagrees with the idea that the proposed action to acquire water and water rights for the primary wetland habitat areas will, in the long run, result in little or no net gain in wetland acreage due to loss of secondary wetlands. The information available to the Service shows that prior to the 1988 OCAP, secondary wetland habitat accounted for about 14,000 acres (42 percent) of the total wetland habitat (see Table 3.6.A). Under baseline conditions and full compliance with provisions of the 1988 OCAP, these secondary wetlands account for about 4,500 acres (27 percent) of the total

wetland habitat (see Section 3.6.2 SECONDARY WETLANDS). While, there may be some slight reductions to secondary wetland habitat acreage under some of the alternatives considered, the total wetland habitat acreage (secondary and primary combined) will increase to about 29,500 acres, up from about 16,500 acres under baseline conditions. The contribution of secondary wetland habitat (15 percent) declines, but it is clear that there is a net gain in wetland habitat as a result of the proposed acquisition of water and water rights for primary wetland habitat.

It is clear that Congress, from its record related to Public Law 101-618 (Senate Reports 101-555 and 3084), recognized that some losses of wetland habitat would result from efforts to improve Newlands Project irrigation delivery efficiency and resolve long-standing Truckee-Carson River disputes. With the passage of Public Law 101-618, Congress showed its intent to compensate by providing long-term sustainable wetland habitat in Lahontan Valley. As a result, the Secretary of the Interior was given the authority and mandate to acquire water and water rights for Lahontan Valley wetlands.

X. Historical Wetland Acreage Questioned

A couple of the commentators questioned the origins and validity of the Service's references to historical wetland acreage within Lahontan Valley. These comments are compiled and summarized below.

General Issue Comment: The historical average figure of 150,000 (1846-1860) wetland acres is questionable because using the Service's own 5 AF/acre/year wetland water requirement, there are some 477,000 AF of Carson River flow that is unaccounted for. There is no assessment of the habitats that comprised the 150,000 acre wetlands, or the quality of those historical wetlands.

Response: The historical wetland acreage was included in the EIS for reference purposes only. It was included to place the current amount of wetland habitat in perspective relative to the wetlands acreage that existed in Lahontan Valley prior to development of the Newlands Project.

A U.S. Geological Survey report by Kerley and others (1993) was used as the basis of the estimated 150,000 acres of wetlands that occurred on average each year in the Lahontan Valley prior to 1860. Kerley and others (1993) estimated that these wetlands were a product of an average of about 410,000 AF/year of water that was estimated to have flowed into the wetlands via the Carson River. The estimated 150,000 acres of wetlands that historically existed in the Lahontan Valley assumes an average of about 42,000 acres of lake and marsh habitat (27,000 acres at Carson Lake and 15,000 acres at Stillwater Marsh) and an average of about 105,000 acres of temporary playa habitat in the Carson Sink. The amount of water consumed by the lake and marsh habitat was estimated by Kerley and others (1993) to be about 5 AF/acre/year and the amount of water consumed by the temporary playa habitat was estimated to be about 2 AF/acre/year. Therefore, it would be erroneous, within the context of the Kerley and others (1993) report, to apply the 5 AF/acre/year water-consumption rate to the entire 150,000 acres.

6.3 SPECIFIC COMMENTS AND RESPONSES

Alpine County

Comment 1: "While the comment at p. 2-45 essentially eliminates consideration of the Upper Carson River segments from consideration at this time, the D.E.I.S. should expressly state that if the Upper Carson River segment is ever to be considered (directly or indirectly) that a full E.I.S. shall be prepared."

Response: The Service has eliminated consideration of the Upper Carson River as part of its action in this document. The Service agrees that NEPA compliance would be required if a federal action proposes to acquire water in Upper Carson River segments (1-6).

Bureau of Indian Affairs-Phoenix Office

The Bureau of Indian Affairs provided comments from both the Phoenix Office and Carson City Office. The Carson City BIA comments on the executive summary were editorial in nature and were considered during final review of the document, but are not included here.

Comment 1: "The DEIS does not address the potential effects the proposed action would have on the acquisition of water rights for the Fallon Paiute-Shoshone Reservation and the Pyramid Lake Paiute Tribe under Section 102 of Public Law 101-618. For example, how will the proposed action affect the market values for purchasing water rights for the Tribe? Will there be enough willing sellers for Tribal purposes?"

Response: The Service has revised Section 4.26.1 of the Cumulative Effects section to address the anticipated impacts the acquisition of water rights for wetlands would have on the acquisition of water rights for agricultural proposes on the Fallon Paiute-Shoshone Reservation. The Service does not see that its actions to acquire water rights for wetlands would affect the acquisition of water rights for Pyramid Lake resources since the Service is not considering the acquisition of water rights from the Truckee Division or Truckee River.

The Service has shown in Section 4.20 EFFECTS ON LAND VALUES that it is not Service or Federal water right acquisitions that determine market values, but private party transactions of water rights and water-righted land that generally define market values.

Comment 2: "There is no documentation or statement of how or when (the Service) consulted with potentially affected tribes, Indian organizations, Bureau of Indian Affairs, and the Office of the Solicitor regarding any actions that might impact Indian trust assets."

Response: The Service has incorporated additional information regarding the consultation the Service has had with affected tribes, BIA, and the Office of the Solicitor in Section 1.9.3. INDIAN TRUST RESPONSIBILITIES. Indian trust assets are also discussed in Section 2.4 ASSUMPTIONS FOR ACTION ALTERNATIVES, Section 4.26.1 CUMULATIVE IMPACTS, subsections 4.26.7 and 4.26.10 and in the Scoping Report, Appendix 3.

Bureau of Reclamation

Comment 1: "Throughout the document the word 'groundwater' is spelled incorrectly ... the word 'data' is plural ... Webster's Dictionary lists 'head gate' as two words ... 'Acquisition' is misspelled [on binding]."

Response: Misspellings on the binding have been corrected, and incorrect use of the plural term data has been corrected. For compound words, the document editor determined the style used in the document according to U.S. Government Style Manual standards. An overall style list for local terms and agency acronyms was developed to encourage consistency in the document.

Comment 2: "It would be helpful to have a table of contents for the Appendix so readers know what is there."

Response: Change incorporated.

Comment 3: "Potential Impacts of the Proposed Action and Alternatives, Effects on Newlands Project Operations (p. xiii), last paragraph...(statement that) "...all of the action alternatives would result in reductions in Derby Dam Diversions from baseline conditions, which require the greatest amount of diversion of all the alternatives. This conflicts with a statement three paragraphs before the quoted sentences, which states, Alternative 3 would result in a slight increase in Carson Division irrigation demand" as a result of implementing the full use-rate of 3.5 AF/acre/year."

Response: The Service's assessment that all of the alternatives would result in reduced Derby Dam diversions yet show a slight increase in Carson Division irrigation demand has been re-evaluated and continues to be supported by BLR Model calculations. The Service believes that the increased irrigation demand on the Carson Division attributable to Alternative 3, as compared to baseline conditions (which includes 20,000 AF of water-right acquisitions at 2.99 AF/acre/year), would be met without increasing Truckee River diversions due to OCAP storage targets and long-term carry-over storage potential which would maintain higher average Lahontan Reservoir levels than baseline conditions (No Action Alternative).

Comment 4: "I agree that any alternative that implements a full use rate of 3.5 AF/acre/year would tend to increase Carson Division demand slightly, and therefore, tend to slightly increase diversions from the Truckee River. Newlands Project irrigators typically use less than 100 percent of their maximum entitlement. The Service is likely to use all their transferred water rights, so if the transferred right exceeds the amount typically used by the seller, there would likely be a net increase in diversion from Lahontan Reservoir and from the Truckee River at the 3.5 AF/acre transfer rate. This applies to Alternative 3 and possibly Alternative 5, so the baseline conditions DO NOT require the greatest diversion of all the alternatives. It seems reasonable that if only 2.99 acre-feet per acre of acquired water rights are transferred, then diversions would decrease because at least 0.51 acre-feet per acre annually of the water right would never be used. I suggest changing the sentence in question as follows: "Consequently, ~~all of the action alternatives 2, 4, and possibly 5~~ could result in reductions in Derby Dam diversions from baseline conditions, ~~which require the greatest amount of diversion of all the alternatives,~~ while alternatives 3 and possibly 5 could result in a slight increase in diversions." "

Response: The modelling conducted by the Service to analyze Newlands Project operations does not show that 3.5 AF/acre use-rates associated with alternatives 3 or 5 would cause a net increase from Lahontan Reservoir as you suggest. First, under all of the alternatives the Service expects to acquire some water rights in the Carson Division with 4.5 AF/acre/year benchland headgate entitlement. Transferring such water rights to the wetlands at a 3.5 AF/acre use-rate would reduce Carson Division demand. Since the Service can not predict the number of water-righted parcels it would potentially acquire with a benchland entitlement, a proportional percentage of the total Carson Division benchland water-righted land was considered to be acquired for wetlands in the BLR modelling for each of the alternatives. In addition, Service experience with the BLR Model has shown that due to the numerous and interrelated variables of project operations associated with OCAP such as storage targets, irrigation patterns, non-use of headgate entitlement, and hydrologic shortages, the long term averages calculated for reservoir release and Truckee River diversions do not always equate to a simplified analysis limited to only two variables.

Comment 5: "There is a related inconsistency on p. xvii in the middle of the first paragraph: "Lahontan Reservoir releases would only be slightly reduced...under Alternative 3, which proposes a use-rate of 3.5 AF/acre/year, and would only raise Lower Truckee River flows by less than 1

percent." Something is not right here; under Alternative 3, Lahontan Reservoir releases will slightly increase and Lower Truckee River flows will slightly decrease."

Response: The Service's modelling of Alternative 3 and the other alternatives does not support your conclusion. See response to Bureau of Reclamation comment #4 above.

Comment 6: p. xiv--Summary Table of Potential impacts of the Proposed Action and other Action Alternatives, Issues, Concerns, and Opportunities... "it would be informative to also include estimated ground-water recharge (in both AF/year and percent decline from the No Action Alternative) since you make such estimates in the document on pp 4-32 to 4-34."

Response: The term recharge has been added to the Groundwater section of the table. The more detailed quantifiable information on recharge is located in Section 4.3.3.1.

Comment 7: p. xvii, Potential Impacts of the Proposed Action and Alternatives... "The Service does not expect any of the action alternatives, except Alternative 4 to reduce the level of the shallow, intermediate or basalt aquifers valley-wide; Alternative 4 could result in a lowering of the shallow aquifer valley-wide? What is the rationale for this statement? The Service anticipates transferring 122,000 acre-feet of water rights under Alternative 2, the Proposed Action, versus 133,500 acre-feet under Alternative 4. These two numbers are within 10 percent of each other. It is difficult to believe that transferring 122,000 acre-feet of water would not have nearly the same effect as transferring 133,500 acre-feet."

Response: This explanation of potential impacts to the shallow aquifer is a brief summation for the Executive Summary, more detailed evaluations of groundwater recharge are provided in Sections 3.3.3.1.2 and 4.3.3.1. The difference between the Proposed Action and Alternative 4 have little to do with the volume of water to be acquired, but is directly related to the expected volume of losses from Newlands Project conveyance and irrigation. Based on available information, it is assumed that shallow aquifer recharge constitutes a "fixed loss" from the conveyance system and on-farm irrigation. Studies have shown that groundwater levels declined when conveyance and on-farm irrigation losses dropped below 70,000 AF/year. Above this amount, it is assumed that groundwater levels would not be adversely affected. Using this premise, only Alternative 4 would potentially have adverse impacts to groundwater recharge. Based on BLR model output, it is estimated that conveyance and on-farm losses for Alternative 4 would be about 60,500 AF/year, which is less than 70,000 AF/year figure identified above. Losses for Alternative 2 would be about 79,000 AF/year. Because conveyance and on-farm losses would be above 70,000 AF/year, adverse impacts to groundwater recharge would not be anticipated under this alternative (see Section 4.3.3 Groundwater). Alternative 4 is a scenario in which irrigation delivery efficiencies would be high, meaning that conveyance losses would be reduced. Since conveyance losses account for the largest percentage of potential groundwater recharge (see Section 3.3.3.1.2, Groundwater Recharge), the shallow aquifer levels are most likely impacted under this alternative. While there is only a 10 percent difference in acquisition totals between the Proposed Action and Alternative 4, the change in conveyance and on-farm losses which are directly linked to shallow aquifer recharge fall below the point of inflection that has, in the past, been shown to result in lower groundwater levels.

Comment 8: Change last sentence (p. xvii, Potential Impacts of the Proposed Action and Alternatives, second paragraph) to read: "These effects would most likely occur in areas that rely on canal seepage losses or irrigation water percolation for well recharge." Canal seepage is not the only source of well recharge. Percolation of water applied to irrigated lands also contributes to ground-water recharge and this needs to be mentioned. Page 85 of Doug Maurer's USGS Open File Report 93-463...states, "West of Fallon, losses from the surface-water system recharge the shallow,

intermediate, and basalt aquifers. Losses from irrigated lands west of Fallon probably also recharge these aquifers...Changes in irrigation practices that would decrease seepage losses or the area of irrigated land west of Fallon have the potential to decrease recharge to the shallow, intermediate, and basalt aquifers in that area."

Response: This section of the Executive Summary provides a brief description of factors affecting groundwater recharge and the anticipated impacts. The Service has identified a number of variables or factors that influence or affect groundwater recharge and have referenced Maurer and others (1994) and Glancy (1986) frequently in the detailed discussions on groundwater recharge in Section 3.3.3.1.2.

Comment 9: "You may want to include a sentence in the executive summary stating that Lahontan Reservoir recreation would increase. (p.xix, Potential Impacts of the Proposed Action and Alternatives, Effects on Regional Recreation.)

Response: There is insufficient information available to determine that recreational use would increase at Lahontan Reservoir as a result of the Service's action. While the Service expects average annual storage volumes to increase, such changes are not directly linked to recreational use. Recreational use appears to be associated with reservoir levels and weather conditions on key summer holidays.

Proposed changes to OCAP that lower storage targets in May and June may adversely impact recreational use and could alter the Service's calculations related to average annual reservoir storage volumes. The Bureau of Reclamation would most likely address those impacts in more detail in the NEPA documents associated with the adjusted OCAP.

Comment 10: "Please include a brief explanation of when and how you plan to take (the visible surface water) this measurement (p. 2-2, Proposed Action). Would it be in a certain month, regardless of whether the Service had called for the water? Or would it be after water was delivered to the wetlands in the spring? Or at the time you estimated the maximum visible surface water for the year was occurring? Would you measure the visible water surface a certain number of times per year? If so, how many? Would you measure it based on aerial photography, estimates from surveys from airplanes, or on-the-ground estimates?

Response: Details of how the Service would manage Stillwater NWR and be involved in the management or monitoring of the other primary wetland habitat areas has yet to be determined. The Service anticipates addressing those details in its future planning efforts (see Section 1.8.1 (4) Related Actions Under Public Law 101-618 and Cumulative Impacts Section 4.26.4 Comprehensive Management Plan for Stillwater NWR).

The Service plans to monitor primary wetland habitat acreage (visible surface water) each month, but adverse conditions and staffing constraints may limit its ability to do so. In those situations where monthly monitoring is not feasible, acreage would be monitored on a quarterly basis. Measurements of primary wetland habitat would be based on the best available information from aerial surveys, photography, and on-the-ground estimates. Since Carson Lake and the Fallon Tribal wetlands are not expected to be managed by the Service, it may not be appropriate for the Service to conduct monitoring in those areas, and the Service would request such information from the responsible authorities. The Service would then compile survey data from the managing entities of these other areas and prepare an annual Lahontan Valley report.

Comment 11: "Change delivery schedule sentence (p. 3-7, 3.2.2 Irrigation Deliveries) to say that the irrigation period can run from March 15 to November 15."

Response: Change incorporated.

Comment 12: "Delete or change sentence (p. 3-10, 3.2.4 Newlands Project Efficiency) to read..."This means a minimum of 68.4 percent of the water diverted to the project (from Lahontan reservoir and the Truckee Canal) is to be delivered to head gates for use by water-right holders."

Response: Change incorporated.

Comment 13: "p. 3-20, 3.3.1 Water Resources, Surface Water Quality, Truckee River. USGS Water Supply Reports show the lowest Pyramid Lake elevation (of 3,783.9) occurred in 1967, not 1966."

Response: Change incorporated.

Comment 14: "Insert the word average at the beginning of the sentence 'Shortages due to hydrologic factors such as drought range from 0.7 % (Alternative 4) to 2.3 % (Alternative 3) and are incorporated into the long-term average annual irrigation delivery.'"

Response: Change incorporated.

Comment 15: "p.4-8, 4.2.3.3 Spills, Par. 2, canal capacity sentence doesn't make sense; the canal capacities remain the same, no matter when the spills occur. Sentence could be changed to read: 'If spills occur prior to the irrigation season, canal capacities generally can handle spill volumes, but if they occur during the irrigation season as most spills do, then volumes tend to be greater and the amount of water which can be conveyed to the wetlands may be limited by canal capacities become a limiting factor.'

Response: Change incorporated.

Comment 16: "p.4-10, Newlands Project Efficiency, paragraphs 1,2,4...water which was transferred to the wetlands would likely be delivered much more efficiently than when it was going to farms, because it travels through main canals to reach the wetlands instead of the numerous laterals to reach farms. However, you don't address the efficiency of delivering the remaining water which is still going to farms. This efficiency is likely to decrease. Whether the decreased delivery efficiency for remaining farms will offset the efficiency gains for the wetlands deliveries is difficult to determine."

Response: The Service would agree that it is difficult to determine whether the overall efficiency gains expected for wetland deliveries would offset possible inefficient deliveries for remaining farms. The available analytical evaluation of irrigation delivery efficiency rates was done by the Service with the BLR Model. That delivery efficiency analysis indicates, that overall, long-term averages show improved Project irrigation delivery efficiency as a result of the Proposed Action and alternatives. The Service would speculate that inefficient deliveries to remaining farms that become isolated at the end of delivery system canals or laterals as a result of other water right acquisitions under the Proposed Action or alternatives may be short-term impacts. The range of possible mitigation measures that could resolve these short-term impacts are discussed in Section 4.2.4 Newlands Project Efficiency, Mitigation Measures.

Comment 17: " I question the validity of the conclusion (that water right acquisitions would occur in a blocked pattern due to the lower productivity in certain areas, and other competing land uses)....there

is a strong possibility the trend will not continue once water rights on marginal lands are acquired. The checkerboard pattern is not the only water-acquisition pattern that could be detrimental to Project efficiency....retaining a few acres at the end of a lateral will also make deliveries less efficient."

Response: The limited acquisitions that have occurred under baseline conditions have shown a blocked pattern. As the experience to date shows this pattern, it is reasonable that it will continue. However, even if the blocked pattern does not continue, it is unlikely that future acquisitions will occur in a completely checkerboard pattern (the "worst-case" scenario). If future acquisitions that would occur under the Preferred Alternative are somewhere between a blocked and checkerboard pattern, the increased efficiency from the blocked pattern acquisitions will likely offset the possible decreased efficiency due to any checkerboarding of acquisitions. Similarly, if a few isolated parcels were left, the remaining acquisitions would be that much more concentrated, and again, the increased efficiency of the blocked acquisitions would likely offset the decreased efficiency due to the lone parcels.

While one can question the validity of the Service's conclusion, there is insufficient information or evidence to suggest that it is incorrect. The limited acquisitions that have occurred under the No Action Alternative have shown a definite blocked pattern.

Comment 18: p. 4-12, par. 2, under Mitigation Measures. Reclamation's Newlands Project Efficiency Study...provides more detailed accounts of specific canals, laterals, and service areas that experience higher seepage rates and are inefficient less efficient. "Please change inefficient to less efficient."

Response: Change incorporated.

Comment 19: p. 4-21, par. 3, under Derby Dam and the Truckee Canal. "As a professional civil engineer, I disagree that there is any direct correlation between canal flow volume and seepage losses; I would delete any reference to flow volumes in this paragraph. I question whether decreased diversions to Lahontan through the Truckee Canal would have much of any negative impact on Fernley-area ground water compared to the No Action Alternative. The last two sentences quoted above seem to contradict each other: first you say that seepage losses will decrease as Truckee Canal flow volumes decrease (not necessarily so), but then you state that the wetted canal perimeter does not vary with reduced flow volumes (I agree). As you noted earlier in the paragraph, seepage is proportional to wetted perimeter. If you do not expect the wetted perimeter to decrease, then there should not be any seepage reduction either.

The District must maintain a certain Truckee Canal water surface elevation (and the corresponding wetted perimeter) to meet irrigation delivery demand in the Truckee Division. If they lowered the water surface, there would be a decreased diversion flow from the Truckee Canal turnouts to laterals. Irrigators count on a certain flow volume to irrigate efficiently, so the Truckee Canal water surface elevation is kept at a relatively constant level during the irrigation season, regardless of the flow volume...Recharge from the Truckee Canal depends on the wetted perimeter and how often the canal has water in it. The only decrease in recharge would occur if there were decreased diversions to Lahontan Reservoir during the non-irrigation season (November 15 to March 15), with a corresponding decrease in wetted perimeter and/or how often there is water in the canal."

(Second comment, same issue, change sentence on p. 4-31 to read something like this: "Truckee Canal seepage losses may be indirectly impacted by the Service's Proposed Action and other action

alternatives as a result of ~~reduced flow volumes in the canal~~ lower canal water levels or reduced frequency of using the canal for diversions during the non-irrigation season."

Response: The Service agrees with these statements and has revised the text as recommended. Although diversions from the Truckee River will be decreased as a result of the Proposed Action and Preferred Alternative, canal flow volumes will be maintained at such a level that wetted perimeter will not be greatly altered. Appropriate changes to the impact analysis are therefore incorporated.

Comment 20: "p. xvii, Effects on Water Resources and p. 4.30, 4.3.3. Effect on Water Resources, Groundwater. You discuss the effects on surface water quantity and quality, but only quantity is addressed under ground water. What effects do you expect to see on ground-water quality?"

Response: There is insufficient information to determine the effects the Proposed Action or Preferred Alternative would have on groundwater quality. Currently, serious water quality problems exist valley-wide, as the shallow aquifer is susceptible to pollution related to surface activities and land use (i.e. septic tank nitrification, pesticide residue, chemical spills, oil and gas pipeline leaks, or spills). There are few indications that transferring water rights from one point of use in Lahontan Valley to another has any direct impact on groundwater quality. The Service did reference water quality concerns related to increased pumping in the basalt aquifer (Section 3.3.3.1.2 Groundwater Recharge, Basalt Aquifer). Because potential impacts associated with basalt aquifer water quality are related to the effects of existing and possible increased domestic supply pumping, more detailed analysis was not conducted by the Service in its discussion of potential impacts associated with the acquisition of water rights.

Comment 21: "p. 4-32, Ground Water Recharge and levels, Fallon and Lahontan Valley. (Service) ...seems to imply that the impacts of reduced ground-water recharge are not significant unless they affect the entire valley. Also, how did the Service arrive at the 70,000 AF/year figure? (...total potential recharge volumes would have to drop below 70,000 AF/year before the shallow aquifer levels valley-wide would be impacted.)

Response: See the Service's response to Reclamation's comment #7 above. For additional information related to this assumption refer to p. 4-32, Alternative 1, No Action Alternative that describes conditions in 1992 (an extreme drought year). The total potential recharge was estimated by the Service to range from 55,000 AF to about 68,500 AF that year. As a result, median water levels in shallow aquifer wells in the valley were shown to decline by 1.35 feet (Seiler, 1993) from conditions in the late 1980s. This data suggests that a reduction in potential recharge of 50 % to 60 % would result in basin-wide groundwater level reductions.

The Service believes that impacts to isolated individual wells could be due to a number of variables such as well construction, adjacent groundwater pumping, climatic conditions, and changes in groundwater levels. For this reason, actions that could be determined to have an effect on the entire basin were considered to be of greater concern than impacts that may only affect a few isolated wells. Since those isolated individual well impacts could be caused by a number of variables, most of which are not associated with the Service's Proposed Action or alternatives.

The level of the impacts associated with lowered groundwater levels is quite localized. In some areas of southern Arizona groundwater levels drop as much as 50 feet per year and are considered commonplace. In Churchill County a change of as little as 1 foot could adversely affect individual wells. This is more likely a result of individual well construction and does not necessarily mean that an individual's water supply is lost, but may require updated or deeper construction of the well to make that well operable for a greater range of groundwater levels.

Comment 22: "p.4-32, Ground Water Recharge and Levels, Fallon and Lahontan Valley, Alternative 2 (Proposed Action) - 'This recharge volume [an estimated 39% decrease from baseline conditions] would most likely maintain groundwater levels in the shallow and intermediate aquifers near baseline conditions.'

Many estimated effects of water rights transfers on ground water in the Fallon area in this section are unsupported. Per USGS' Ralph Seiler, before the Newlands Project, the depth to water table was less than 5 feet near the Carson River, more than 10 feet 'at distances 1 to 2 miles from river channels,' and over '25 feet in large areas northwest and northeast of Fallon.' In 1992, 'the water table in much of the Fallon area was between 5 and 10 feet below land surface... Water levels have risen more than 15 feet in large areas northeast of Fallon.'

It makes sense that large applications of water to previously unirrigated land on a regular basis would raise the water table significantly, which is exactly what happened between 1904 and 1992. Yet the Proposed Alternative will reduce the ground-water recharge by nearly 40% and the summary table summarizes the effect as 'possible decline'; how did you arrive at this conclusion? I realize there are not enough data available to make a definitive quantitative analysis, but a general description of your reasoning would be helpful; without any explanation, your conclusion that there will be little effect seems to be complete conjecture."

A similar comment follows:

"p.4-32, Ground Water Recharge and Levels, Fallon and Lahontan Valley, Alternative 1 (No Action Alternative) - 'In 1992 (an extreme drought year, when irrigation deliveries amounted to 28 percent full entitlement), the total potential recharge was estimated by the Service to range from 55,000 AF ... to about 68,500 AF. As a result, median water levels in shallow aquifer wells in the valley were shown to decline by 1.35 feet ... from conditions in the late 1980's.'

The significant fact about 1992 was not the reduction in total deliveries, but that the irrigation season ended in July, a good 3 months earlier than ever before, so the canals and irrigated lands were providing no recharge for 3 months longer than in any previous year (the same volume versus wetted perimeter discussions as for the Truckee Canal, on the fourth page of these comments). This paragraph seems to be saying that a recharge reduction of 50% to 60% would only result in a shallow aquifer level decline of 1.35 feet. Is this the basis for asserting that the Proposed Alternative would not affect ground-water levels in the shallow and intermediate aquifers?

If the 1.35 foot figure is going to be used, you should also mention that it is based on only 10 wells, and that they are not located to be representative of the Carson Division; from what I could determine by reviewing the USGS report, most of the wells are located either at the eastern or western ends of the division, with only 2 wells in the southern end where most of the irrigated lands are. Also the 1.35-foot drop was recorded after a year with 3 months shorter recharge period than normal; we do not know how much more the levels might drop if the recharge were reduced every year."

Second comment, same issue, p. 4-38, Alt.4, "...any reference to 1992 conditions should point out that effects may be greater....because the irrigation season was shortened by 3 months for only that year. If recharge were reduced annually an equivalent amount on a continuing basis, the ground-water level decrease could well be more than that in 1992.

Response: The text in Sections 3.3.3.1.2 and 4.3.3.1 were revised to reflect that the 1.35-foot figure was based on a sample size of 10 wells. Additional information from Seiler and Allander's (1993)

report was added to Sections 3.3.3.1.1 and 3.3.3.1.2 to present a more complete picture of the water level fluctuations that have occurred in recent years as well as changes in water levels that resulted from the construction of the irrigation-water delivery system in the Lahontan Valley.

The median decline of 1.35 wells appears to have been the result of 4 years of drought conditions (i.e., measurements were taken in 1988 and again in 1992, this period of which was part of a longer drought), which, as the comment above points out, could have been excasserbated by the irrigation season being shortened by 3 months in 1992.

Please refer to the Service's response to Reclamation comment #7 for the part of the comment addressing the magnitude of the estimated water level decline under Alternative 2.

Comment 23: p. 4-117, Recovery Plans for Endangered and Threatened Pyramid Lake Fishes, Cui-ui, par.3. "Implementation of a Cui-ui water right acquisition program would positively impact flow volumes in the Truckee River and Pyramid Lake inflows. Water that had previously been diverted from the Truckee River for agricultural purposes would remain in the river and eventually flow to Pyramid Lake. The water level of Pyramid Lake is expected to stabilize or at least exhibit a slower rate of decline."

Delete the last sentence. As written, the reader is led to believe that the level of Pyramid Lake is declining, due to diversions from the Truckee River, which is not true. On September 6, 1995, the Pyramid Lake elevation was 3796.60 feet. Even though we are just coming out of an 8-year drought period, the most severe on record, the current level is more than 10 feet higher than the lake's lowest level of 3783.9 feet in 1967, the year the cui-ui were listed as endangered, and the year that restrictions were placed on the amount of water which could be diverted from the Truckee River. The long-term lake level is already rising, and the more stringent diversion restrictions in the 1988 Operating Criteria and Procedures (OCAP), which have already barely had any effect yet because of the drought, will further increase the lake level. Although the lake level has dropped during the past 8-year drought, it would have dropped even if there had been NO diversions from the Truckee River. As you note on p. 3-20, "... calculations show that over the long-term, Pyramid Lake levels would stabilize at an elevation of about 3,830 feet under baseline conditions.

Also, add 'Some' at the beginning of the second sentence quoted above; not *all* water previously diverted from the Truckee River for agricultural purposes would remain in the river."

Response: The suggested changes were incorporated.

Churchill County Administration Office

Comment 1: "There is no clearly defined proposed action in the Environmental Impact Statement. The proposed action needs to be stated clearly and described in detail for all the elements of the action. There are elements throughout the document which are either components of or help to define the proposed action. We recommend that such elements be moved to Section 2.2 to ensure that the proposed action is thoroughly define and clarified."

Response: The Proposed Action is clearly defined on pages viii and ix, page 1-2, and page 2-2. The commentor does not define which elements should be incorporated into the Proposed Action so as to more clearly define and clarify the Proposed Action.

Comment 2: "The Scope of this EIS is poorly defined and in inconsistent with the requirements of 40 CFR Part 1508.25. The Scope consists of the range of actions including cumulative actions,

alternatives, and impacts to be considered in an environmental impact statement. USFWS continues to limit the scope of this document to water acquisition and actions which are directly related to the acquisition process. For example, the wetlands management plan is being treated as a separate action. We strongly recommend that the scope (action and alternatives) of the EIS be reassessed and adequately defined through consultation with cooperating agencies and adequate review of comments received during the scoping process. "

Response: According to 40 CFR Part 1508.25, scope consists of the range of actions, alternatives, and impacts to be considered in an environmental impact statement. The scope of an individual statement may depend on its relationships to other statements. To determine the scope of environmental impact statements, agencies shall consider 3 types of actions, 3 types of alternatives, and 3 types of impacts. They include: (a) Actions other than unconnected single actions) which may be: (1) Connected actions, which means that they are closely related and therefore should be discussed in the same impact statement. Actions are connected if they: (i) Automatically trigger other actions which may require environmental impact statements. (ii) Cannot or will not proceed unless other actions are taken previously or simultaneously. (iii) Are interdependent parts of a larger action and depend on the larger action for their justification. (2) Cumulative actions, which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement. (3) Similar actions, which when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography. An agency may wish to analyze these actions in the same impact statement. It should do so when the best way to assess adequately the combined impacts of similar actions or reasonable alternatives to such actions is to treat them in a single impact statement. (b) Alternatives, which include: (1) No action alternative. (2) Other reasonable courses of actions. (3) Mitigation measures (not in the proposed action). (c) Impacts, which may be: (1) Direct; (2) indirect; (3) cumulative.

The Water Rights Acquisition EIS for the Lahontan Valley Wetlands does not automatically trigger the Comprehensive Management Plan or any of the other actions authorized or mandated in P.L. 101-618. The Service's Comprehensive Management Plan for Stillwater NWR is simply a fine-tuning device, that may, if anything, slightly reduce the amount of water required to sustain 25,000 acres of primary wetland habitat. Although the Comprehensive Management Plan would occur in the same geographic area as the water rights acquisition program, the timing of the plan (sometime in the future) is such that the Service does not wish to analyze its action in this document.

The scope of the document was assessed and defined through nearly five years of consultation with cooperating agencies and tribes. Churchill County representatives participated in a Service sponsored Cooperators' and technical advisors' scoping meeting (November 16, 1992), at which the range and scope of the alternatives and significant issues were tentatively agreed upon by the parties in attendance. A draft version of chapters 1 and 2, which address scope and alternatives, were reviewed by Churchill County in the fall of 1993, and no substantive changes in scope or alternatives were recommended at that time. Later, the county was given a copy of the provisional copy of the Draft EIS (August 16, 1994). Churchill County indicated support for the development of Alternative 5 and, in an August 16, 1994 meeting, agreed to provide the Service with its version of an alternative to be evaluated in the Draft EIS by September 20, 1994 (summary of meeting in a letter from R. Anglin, U.S. Fish and Wildlife Service, to B. Selinder, Churchill County, dated August 17, 1994). Churchill County did not provide the Service with an additional alternative to be considered or specific language to be added to the Service's Alternative 5.

Churchill County agreed to participate as a Cooperating Agency (May 18, 1992) in the preparation of the EIS. Pursuant to that agreement, the Service requested (letter dated, December 14, 1993, to

Churchill County Manager, Bjorn P. Selinder) specific information and technical assistance for sections of the Draft EIS pertaining to population, tax base, land values, public services, subdivisions, farmland, landscape, zoning, and social values. Churchill County's response to the request was that the County lacked the manpower and time to provide the Service with such information. To quote CEQ Forty Most Asked Questions 14.d., "How is the lead agency to treat the comments of another agency with jurisdiction by law or special expertise which has failed or refused to cooperate or participate in scoping or EIS preparation?...cooperating agencies are generally under an obligation to raise issues or otherwise participate in the EIS process during scoping and EIS preparation if they reasonably can do so. In practical terms, if a cooperating agency fails to cooperate at the outset, such as during scoping, it will find that its comments at a later stage will not be as persuasive to the lead agency."

In spite of the county's lack of participation in preparation of the document, county comments were twice incorporated prior to release of the draft document, once during development of chapters one and two (scope and alternatives) and again after a provisional draft revision, which although not required, was offered to cooperators as a good-faith effort on the part of the Service. It should be noted that extensive comments and changes were incorporated after the provisional draft, including the following changes that the County recommended: the purpose and need were expanded, the affected area was expanded, past water resource data was added, and sections on air quality, avian virus and contaminants were added. In addition, a fifth alternative (Alt.5) was developed, and mitigation measures were defined in more detail. The Service met with county representatives at least twice in the fall of 1994 to discuss these issues. Necessary changes and comments were incorporated by the Service, which as the lead agency has the ultimate responsibility for the content of an EIS (see CEQ, 40 CFR, Forty Most Asked Questions, 14b.)

Comment 3: "USFWS makes a consistent effort to narrowly define their role in Public Law 101-618 and the scope of this EIS. NEPA does not allow an agency to narrow the scope of an EIS, the analysis of impacts, nor the mitigation solely to the authority of the Lead Agency. USFWS repeatedly attempts to assign mitigation to parties not responsible for impacts. The CEQ Forty Most Asked Questions Concerning National Environmental Protection Act Regulations clearly indicates, for example, that an alternative outside the jurisdiction or capability of the lead agency must still be analyzed in the EIS if it is reasonable. A potential conflict with local or federal law does not necessarily render an alternative unreasonable, although such conflicts must be considered."

Response: The scope of the action the Service proposes in this document is constrained to the extent that the Secretary of the Interior is directed by Congress and mandated by law (P.L. 101-618) as to the amount of wetland habitat (25,000 acres) to be maintained and the physical locations of that habitat (Stillwater NWR, Stillwater WMA, Carson Lake, and Fallon Tribal wetlands). Given those "sideboards", the Service's Proposed Action and alternatives provide a range of possible scenarios related to the acquisition (purchase, lease, exchange, and donation) of water rights and sources of water (Newlands Project irrigation water rights, drainwater, spills, Middle Carson River water rights, groundwater, water conservation at NAS-Fallon, and sewage effluent) to meet the objectives set forth by Congress in P.L. 101-618.

As a cooperating agency, Churchill County had opportunity throughout the planning process to provide the Service with what they believed to be a reasonable alternative. For instance, in a meeting on August 16, 1994, Churchill County agreed to provide the Service with its version of an alternative to be evaluated in the Draft EIS by September 20, 1994 (summary of meeting in a letter from R. Anglin, U.S. Fish and Wildlife Service, to B. Selinder, Churchill County, dated August 17, 1994). Churchill County, however, did not provide the Service with an alternative nor did they provide any language to be added to any of the alternatives developed by the Service.

The impact analysis covered the consequences of acquiring water and water rights. This is consistent with the scope of the Proposed Action and alternatives.

Comment 4: "The three alternatives listed in this EIS are different scenarios for the projected level of water to be acquired by USFWS. The alternatives are simply the proposed action with different assumptions which affect the amount of water to be acquired. USFWS has not adequately defined a range of reasonable alternatives as required by NEPA (See 40 CFR 1502.14)..."

Response: Given the "sideboards" identified in the response to Churchill County Comment #3, the range of alternatives evaluated in the EIS are considered to be reasonable range of alternatives. Five alternatives, including one that was added after completion of the internal provisional draft document and was supported by the county's own consultants are vigorously explored in this document. Neither the county nor any other of the Cooperating Agencies has offered any other reasonable alternatives for consideration (refer to November 16, 1992 Cooperator's scoping meeting in response to Churchill County Comment #2 above; and see also response to Churchill County Comment #3).

Comment 5: "The Service has not identified the agencies environmentally preferred alternative or a proposed action."

Response: The lead agency is not required to identify an environmentally preferred alternative in the Draft, or Final, EIS. This will be done in the Record of Decision as required in CFR 1505.2(b). The Proposed Action was identified in the Draft EIS in the table of contents (under section 2.5.2, page ii), in the executive summary (pages viii, xi, xiv, and xv-xx), in the title of Alternative 2, which is the Proposed Action, and throughout its description (Chapter 2, Section 2.5.2, pages 2-20 to 2-22), in the comparison of alternatives table (Table 2.A, page 2-34), Table 2.E (pages 2-46 to 2-48), and it was repeatedly identified throughout Chapter 4 in the discussion of the impacts of the Proposed Action and other alternatives.

Comment 6: "The EIS is part of a "piecemeal" process used to evaluate environmental consequences in Lahontan Valley. The original EA completed for the 20,000 AF acquisition should have been part of an EIS and not included as part of the baseline."

Response: The Service's evaluation of environmental consequences associated with the acquisition of water rights in Lahontan Valley is, and has been, consistent with Service and NEPA policy. The process has been evolutionary in nature starting with water rights acquisitions beginning in fiscal year (FY) 1989 when Congress appropriated \$1.2 million (P.L. 100-446) for the lease or purchase of water rights, from willing sellers, for the benefit of Stillwater WMA. The Service prepared an Environmental Assessment (EA) and Finding of No Significant Impacts (FONSI) for that limited action. Again in 1989 (FY 90) Congress appropriated \$1.5 million (P.L. 101-122) for the acquisition of water rights for Stillwater WMA. The Service prepared another EA analyzing the consequences of that action and issued a FONSI for the action in March, 1990. In the fall of 1990, Congress again appropriated money (\$4 million) for the acquisition of water rights for Stillwater WMA. Later that fall in 1990, Congress passed P.L. 101-618 directing the Secretary of the Interior to acquire by purchase water or water rights to sustain 25,000 acres of primary wetland habitat in Lahontan Valley at the newly created Stillwater NWR, Stillwater WMA, Carson Lake, and Fallon Tribal wetlands.

The Service, recognizing it now had two distinct yet supportive directives from Congress, chose to prepare another EA addressing the action of acquiring water rights for Stillwater WMA or Carson Lake as authorized by Congress under P.L. 101-512. In this third EA the Service limited the total volume of water to be acquired by the Service and other parties involved with wetlands protection

(i.e. State of Nevada, The Nature Conservancy, and Nevada Waterfowl Association) to no more than 20,000 acre-feet (AF) of water rights. This December 1991, EA (and FONSI) provided an assessment of the impacts associated with water rights acquisition authorized under FY 91 Congressional appropriations and potentially other annual appropriations in the future until the Lahontan Valley water right acquisitions totalled 20,000 AF or an EIS was completed on the consequences of the larger more specific acquisition program authorized in P.L. 101-618. The Service's EA specifically stated "This proposal does not address funding and water acquisition related to Public Law 101-618."

In the scoping and preparation of the Draft EIS, the Service included the initial 20,000 AF of water rights acquisition as part of the complete or total water rights acquisition program. The impacts associated with the initial 20,000 AF of water rights purchase are defined in Chapter 3 in the evaluations of baseline conditions. In this document, baseline conditions represent a change from what has occurred or existed in the recent past to what will be the situation when the 20,000 AF is acquired. The Draft EIS does evaluate all of the consequences for the EIS study area related to the total water rights acquisition program necessary to comply with P.L. 101-618. This assessment includes those actions previously authorized by Congress and addressed by the Service in the other NEPA documents identified above.

The prior acquisition EAs cover separate and distinct actions, initially authorized under separate congressional authorities. These separate actions are also separated by time. Public Law 101-618 broadened the scope and mandates of the acquisition program.

After the passage of P.L. 101-618, the Service began the process of preparing an EIS related to the directives and objectives of the law recognizing the previous authorizations and actions would be evaluated in a larger, more comprehensive EIS.

Comment 7: "Due to the limited scope of this document, too much emphasis is still given to the water rights acquisition. Acquisition of water rights is authorized as only one of the means to sustain 25,000 acres of wetlands in the Lahontan Valley."

Response: All reasonable and feasible water sources were considered in the document. The term acquisition refers to water acquired through leasing, agreement, donation, and fee title purchase. Refer to the response to Churchill County comment #3 above for discussion related to the scope of the Draft EIS.

Comment 8: "Impacts described in this document are vague and in many instances unquantifiable, and represent subjective unqualified opinions of the Service."

Response: Although there are impacts that are not quantifiable, the Service has attempted to define impacts to the greatest extent possible using available information. When impacts could not be assessed quantitatively, the Service used qualitative terms to express the consequences, but for most resources the Service was able to disclose impacts with quantifiable values.

Comment 9: "Nature Conservancy/EDF prepared sections for the EIS. What is the role of Nature Conservancy in this EIS and the water acquisition program in general? Is Nature Conservancy involved in any financial transactions either directly or indirectly as part of the wetlands program in Lahontan Valley?"

Response: Neither The Nature Conservancy nor EDF prepared sections of the Draft EIS. Both organizations were consulted for their technical expertise related to acquisition, water rights,

conservation, and analytical modelling. Throughout the document references are noted where the Service relied on the expertise of other agencies, organizations, or individuals in the preparation of the document. Chapter 5 also lists technical consultants used in the preparation of the document. Appendix 5 on the use and development of the BLR Model was written by Service employee Gary Shellhorn in cooperation with David Yardas (EDF) and Dave Robertson (Robertson Software, Inc.).

The Service and The Nature Conservancy have maintained a cooperative agreement over the past few years within this region of the Service to cover reimbursement to The Nature Conservancy for services they have provided related to actions, studies, or work they have completed for the Service. The Service also maintains other similar cooperative agreements with other State and Federal agencies for similar services. Such arrangements are common in the Service with most Regional Offices maintaining specific agreements with The Nature Conservancy for services in their areas.

The nature of The Nature Conservancy's actions related to the acquisition of water rights are not within the scope of this document, in that they are a private organization not subject to NEPA. The consequences of possible water rights acquisitions they may make, where the water is transferred to the primary wetland habitat areas, is covered by this document and is assumed to go towards meeting the objectives set forth in Chapter 1 of the Draft EIS.

Comment 10: "With respect to the BLR model developed by Nature Conservancy/EDF, did USFWS make any attempt to validate the model? If yes, what procedures were used and who was responsible for such a review? Why did USFWS choose to use Nature Conservancy/EDF to model baseline conditions instead of an appropriate government agency such as the U.S. Geologic Survey? Was USGS consulted during model development? Did USGS validate the model?"

Response: Information on the BLR Model is in Section 2.3.4 of the document, and in Appendix 5. The chronological history of the BLR Model review, revisions, and development detailed in Appendix show that the modelling results are representative of Newlands Project operations and provide valid analytical comparisons between the baseline conditions, Proposed Action and alternatives.

The Service did not choose The Nature Conservancy/EDF to prepare an analytical model of Newlands Project operations, rather those organizations built on an unfinished water accounting model prototype developed by the Bureau of Reclamation. In the early stages of the scoping process, the Service determined the need for a model that would provide an analytical analysis of Newlands Project operations based on possible water right acquisition scenarios. Based on this identified need for quantitative information, the Service worked directly with David Yardas (EDF), Dave Robertson, and the Nevada Division of Water Planning on development, calibration, and validation of the BLR Model for use in this EIS.

Appendix 5 discloses that USGS, Reclamation, Nevada Division of Water Planning, Churchill County, and private consultants attended modelling workshops and that they were called upon to review the BLR Model during its initial calibration efforts. Specifically, USGS reviewed the model and their comments and recommendations were incorporated into the model as appropriate. Additionally, Bookman-Edmonston (an independent consultant) working under a Bureau of Reclamation contract to provide technical assistance to the Service (under the direction of the Truckee-Carson Irrigation District personnel) reviewed the model and made suggestions to improve the results of the model in shortage years. These suggestions and other comments were incorporated into the version of the BLR Model referenced in the Draft EIS.

Comment 11: "Responsibilities for preparation of the EIS is not clearly defined in the list of preparers."

Response: Comment so noted, changes in the document are incorporated in this final document. See Chapter 5.

Comment 12: "...separate sections for air quality, soils, livestock grazing, and visual resources, vegetation, groundwater quality need to be included in this document. There is no section 7 for T & E. The less than comprehensive nature of this EIS is contrary to the NEPA process."

Response: Based on comments the Service received from Churchill County on the provisional draft EIS, the Service added an air quality section prior to releasing the Draft EIS (see Section 3.5). Soils and livestock grazing, as resources, will not be specifically affected by the Service's action and are therefore not discussed. Dust and wind erosion associated with the Proposed Action and alternatives are specifically addressed in Section 3.4.2, Erosion Control. The importance of visual resources, such as green fields are discussed under Social Values, Section 3.23.1. Vegetation is addressed in Section 3.7, Vegetative Communities. Groundwater is discussed extensively in Section 3.3.3.1.1, Description of Aquifers. These sections are identified in the table of contents and most subjects are listed in the index.

The Service has prepared a Section 7 consultation, and a copy of that document is included in this Final EIS in Appendix 9.

Comment 13: "Conversion of agricultural lands to eventual native upland vegetation would decrease the biological diversity in the EIS study area. Some species are dependent on riparian areas, secondary wetlands, and agricultural fields for cover, forage and or breeding areas (i.e., woodducks, ibis and geese). Lands taken out of irrigation which currently support valuable wildlife habitat including T&E will not be replaced by the creation of additional wetlands at Stillwater and Carson Lake."

Response: As disclosed in Section 4.15, biodiversity associated with irrigated farmlands would likely decline as a consequence of these lands being converted to non-irrigated use. There would be a net benefit to white-faced ibis and Canada geese as a consequence of increasing the amount of wetland habitat in the Lahontan Valley under the Preferred Alternative, albeit at the expense of reducing the amount of irrigated farmland. Other species, such as ring-necked pheasants, would be adversely impacted. Irrigated farmland in the Lahontan Valley is not necessary for any threatened or endangered species that inhabit the area. Impacts to wildlife is discussed in more detail in Chapter 4, Sections 4.8 through 4.15. In general, the transfer of water rights from irrigated farmland to Lahontan Valley wetlands would sustain additional wetland habitat (over baseline conditions) at the expense of losing a portion of farmland habitat.

Comment 14: "It would be a more appropriate and credible description of baseline conditions, particularly where estimations or projections are made to use boundary conditions. The current alternatives serve as excellent examples of the use of boundary conditions or scenario analysis."

Response: Comment noted. As the lead agency, the Service, along with other involved parties, determined baseline conditions for the document early in the scoping process.

Comment 15: "...USFWS has failed to adequately address the cumulative impacts to wetlands associated with OCAP. A comprehensive cumulative assessment needs to be completed for this document."

Response: OCAP is in place and is an existing condition, therefore there is no assessment made of an existing condition. The action was implemented in 1988 and covered by an EIS prepared by the Bureau of Reclamation, the federal agency responsible for the action.

The consequences of OCAP and its impacts to wetlands were described in the Final EIS for the Newlands Project Proposed OCAP, (1987). The cumulative aspects of OCAP, as it relates to wetlands, was described in Section 1.3 (Need for the Proposed Action) and 3.6.2 (Secondary Wetlands). The existing wetland conditions (see Section 3.1) in the EIS study area are a result of the 1988 provisions of OCAP and are incorporated as a baseline condition.

The consequences of the proposed adjusted OCAP are addressed in the Final EIS where applicable as well as in Cumulative Impacts Section 4.26.9 (OCAP Modifications).

Comment 16: "The EIS does a very poor job of making assumptions, anticipating future actions, and evaluating resource areas that have not been extensively studied. Frequently the Service uses the rationale that because information is lacking that some issues will not be evaluated. This type of rationale is not sufficient for a NEPA document."

Response: CEQ regulations §1502.22 addresses the issue of incomplete or unavailable information and specifies that the lead agency shall provide evaluations of the effects on the human environment based on information available. When there is insufficient information or data is lacking, the lead agency shall clearly state the situation. The Service has identified the impacts associated with the Proposed Action and alternatives based on information available and disclosed when it was determined that information was lacking to make quantitative assessments. The comment does not specify the portions of the document that are believed to be inadequate.

Comment 17: "A new Chapter 5 should be added to address mitigation and monitoring...Water quality monitoring for instance should include items such as sampling frequency, station locations, parameters of concern, responsible parties, and the means to provide mitigation should monitoring document problems. Suggest topics for the mitigation and monitoring plan are enclosed."

Response: The general format of EIS documents (see CEQ regulations §1502.10-18) include mitigation as part of the environmental consequences section and discussion of alternatives. The Service has incorporated mitigation under Alternatives 5, and has also covered mitigation in the environmental consequences section (Chapter 4) as suggested by CEQ in the Forty Most Asked Questions. Section 2.7, which addresses monitoring, was revised. Monitoring is also addressed briefly in Section 4.1. Consequently, a new chapter on mitigation and monitoring was not added.

Water quality monitoring recommendations submitted by Churchill County are included in the Final EIS by reference in Section 2.7, MONITORING REQUIREMENTS, and are included in full in the County's comments in Appendix 11.

Comment 18: "There are numerous subjective and qualitative judgements throughout the document...The qualitative and subjective nature of this document questions the reliability, professionalism, and credibility of this impact assessment."

Response: Comment noted.

Comment 19: "The Service needs to conduct Section 7 consultation and probably Biological 10 Evaluations for at least the four T & E species present in the Valley-bald eagle, peregrine falcon, cui-

ui, and Lahontan cutthroat trout. This is required since the proposed action would impact some existing wetland areas, the Truckee River and Pyramid Lake."

Response: See the response to Churchill County comment #12 above. A Section 7 consultation is included in this final document in Appendix 9.

Comment 20: Riparian habitat in general and the Truckee River riparian areas in particular, are not addressed in the impact section.

Response: Riparian habitat is addressed in Sections 3.7.2 (Riparian Plant Communities) and 4.72 (Impacts to Riparian Plant Communities). Truckee River riparian areas are included in that discussion.

Comment 21: "The print quality of many of the figures has improved. All figures need to be able to stand alone, with a title, legend, north arrow, and a scale. The fonts of some tables are too small to be legible. The graphs shown in the EIS...have units which are usually shown upside down when the document is oriented to read the text. Sources should be shown on all tables and figures."

Response: Comment noted.

Comment 22: "Data sources in the text are still missing."

Response: Comment noted. Where sources of data were not referenced in text of the DEIS, they were added.

Comment 23: "The frequent misuse of the word "significant" is very disturbing in this document."

Response: The term significant was used five times in the Draft EIS, all in Chapter 4. The term substantial has replaced significant where necessary.

Comment 24: "The initial water rights purchase is not included as part of the Chapter 4. The initial acquisition is part of the same action and needs to be included in the analysis..."

Response: The consequences of the initial water rights purchases were evaluated in a previous environmental assessment (*Acquisition of Water Rights for Stillwater National Wildlife Refuge*). In Chapter 4 of this EIS, the 20,000 AF acquisition program is included as the baseline, No Action Alternative (Alternative 1). Please refer to the Service's response to Churchill County's comments #6, 122, and 123.

Comment 25: "Discussion of environmental consequences must include a discussion of significance per 40 CFR 1502.16. USFWS has failed to discuss or define significance."

Response: 40 CFR 1502.16 states that the lead agency "shall include discussions of: (a) Direct effects and their significance (b) Indirect effects and their significance." The Service has discussed effects and their ramifications and has addressed both the context and intensity of effects, as prescribed in CFR 1508.27.

Comment 26: "The overall tone of the document is misleading and biased due to the scope and analysis of potential impacts."

Response: Comment noted.

Comment 27: The entire socioeconomic evaluation needs to be completely revised. Individual studies completed by outside parties are not well integrated in the analysis and are confusing...For example the Service uses expenditures as a measure of economic contribution of the wetlands, but ignores expenditures of the agricultural economy in its analysis."

Response: Expenditures in the agricultural economy are not ignored, in fact such information is addressed in Section 3.16.1 under economic activity and in Section 4.16.1 under indirect and linked income.

Comment 28: "Much of the economic valuation for primary wetlands including recreation, consumer surplus and non-use valuation is misleading. The document fails to recognize the potential loss of 'secondary wetlands' in the calculation of value. In reality, very little gain for Lahontan Valley wetlands will be achieved when the loss to other wetlands is considered. The analysis needs to reflect this condition."

Response: Impacts or losses to secondary wetlands are generally related to existing conditions. Therefore, the Service did not calculate recreational values, consumer surplus, or non-use value for that particular component of the wetland resource. As stated in the Service's response to Churchill County comment #15 above, secondary wetland conditions are not a result of the Service's Proposed Action or alternative.

The purpose of the Service's water rights acquisition program is to sustain 25,000 acres of primary wetland habitat. The consequences of OCAP were addressed by Reclamation in its Final EIS for OCAP. Primary wetland habitat in Lahontan Valley will more than double in size and will provide wetland-dependent wildlife with valuable habitat sustained by a reliable source of good quality water. The Service considers this to be a substantial gain over existing conditions for the Lahontan Valley wetlands.

Comment 29: "Discussion of other federal actions and their potential effects are inconsistently applied throughout this document as mitigation and or analysis of the proposed action. Inappropriate use of mitigation needs to be corrected."

Response: Comment noted. The Service has responded to Churchill County's concerns about mitigation in comment #3 above.

Comment 30: "Cumulative impacts are those impacts arising from similar actions and other actions having similar impacts. The subsections under this (Cumulative Effects) section must be expanded to show (to quantify) the site specific impacts expected to be caused by each of these actions. Develop a summary table for each section previously discussed in this chapter showing the specific level of impact, both direct and indirect (considerable effort will be required to quantify the impacts since more direct and indirect impacts are vaguely discussed and are not specific). Include an summary impact table for this cumulative impact section indicating also the level of cumulative effects expected to be caused by the twelve actions contained herein. Cumulative impacts (See 40 CFR 1508.7) identified and used throughout this document are part of the scope (1508.25) and must be identified. The current discussion of cumulative impacts is not in compliance with NEPA. On numerous occasions cumulative impacts are inappropriately used as mitigation measures."

Response: The Service agrees with the definition of cumulative impacts, but does not concur that it is responsible for analyzing site specific impacts of other related but independent actions. Those other actions, if carried out by a Federal agency, will be subject to NEPA and will be accompanied by an environmental impact assessment. When assessing cumulative impacts, the Service used

available information to identify past, present, and reasonably foreseeable projects and possible impacts associated with those projects. The Service then described the incremental impacts expected when the Preferred Alternative was added. Sections 4.26.16 and 4.26.17 were added to more clearly identify cumulative impacts to each resource area without the Preferred Alternative and with the Preferred Alternative.

Comment 31: "The current review indicates a lack of commitment by the Service to any mitigation measures and no attempt is made by the Service to follow its own guidelines..."

Response: The Service has offered reasonable mitigation related to the impacts of the Proposed Action and alternatives as required by NEPA. The Service, in its assessment of the possible mitigation has identified the feasibility of the mitigation. In order to assess feasibility, disclosure of what agencies or governmental entities would have the authority to implement such mitigation was necessary. CEQ Forty Most Asked Questions (19b) states that "All relevant, reasonable mitigation measures that could improve the project are to be identified, even if they are outside the jurisdiction of the lead agency or the cooperating agencies, and thus would not be committed as part of the RODs of these agencies." Throughout the document the Service has analyzed actions, impacts, and mitigation, that may be outside the Service's authority but are associated with the Proposed Action and alternatives. A prime example of such analysis, is Alternative 3, which due the irrigation use-rate issue, is outside the authority of the Service and may conflict with State law, P.L. 101-618, and the Endangered Species Act. In the Service's Record of Decision, the mitigation that the Service will ultimately be committed to will be defined and addressed.

Comment 32: "A cost benefit analysis should be prepared for current as well as potential new alternatives."

Response: The Service does not agree that a cost-benefit analysis is needed. CEQ regulations, §1502.23 state, "... the weighing of the merits and drawbacks of the various alternatives need not be displayed in a monetary cost-benefit analysis and should not be when there are important qualitative considerations." Because many of the benefits of the Service's water rights acquisition program are related to wildlife and wetland habitat, resources that traditionally are valued in non-monetary or in qualitative terms, a cost-benefit analysis was considered inappropriate for this document. The Service has disclosed the anticipated monetary costs of the Proposed Action and alternatives (see Sections 3.25 and 4.25) and related economic impacts (refer to the entire Socio-Economic Resources portion of Chapter 3 and Chapter 4 of the EIS).

Comment 33: "The Service proposes to acquire water rights on approximately 70 percent of the Carson Division, including the appropriate share of Truckee River Waters, and yet this will only produce 19 % of the wetlands that occurred prior to the Newlands Project and only 55% of the wetlands occurring on the Newlands Project from 1972-75. Please explain how this can possible be? Taking out 70 percent of the project's irrigated lands should result in maintaining/re-establishing some 100,000 acres of wetland if only the project is directly responsible for the decline. Apparently, one of more of the following, which is not clearly indicated in this EIS, must be or has occurred:

- a. On the average, there is a considerable reduction in total precipitation between 1845-60 and now, resulting in lower runoff.
- b. More water is spilled from Lahontan Dam and is utilized, than has been measured.
- c. Users other than the Newlands project are utilizing a considerable amount of Carson River water upstream from Lahontan Dam.
- d. The 150,000 acres of wetland habitat that is estimated to have existed between 1845-60 is an over-estimate.
- e. Or, it now takes a lot more water to maintain an acre of wetland.

Response: The Service's Proposed Action anticipated the acquisition of up to 66 percent of the Carson Division (see Section 2.5.2 Alternative 2 - Proposed Action), not 70 percent. Under the Service's Preferred Alternative (Alternative 5) about 40 percent of the water rights in the Carson Division would be acquired.

The inference that 66 percent of the Carson Division headgate entitlements directly equates to 66 percent of the water that historically flowed into Lahontan Valley wetlands is incorrect. The total amount of water rights held in the Carson Division of the Newlands Project is approximately 185,000 AF/year, which, due to the many factors discussed in Section 3.2 of the EIS, is substantially lower than the 410,000 AF/year estimated to have flowed into the Lahontan Valley via the Carson River. Sixty-six percent of 185,000 AF/year is about 122,000 AF/year, and only about 85 percent of this would be available to the wetlands under the Proposed Action because of the 2.99 AF/acre/year use rate that would be implemented under this alternative.

Please refer to General Issue Response X. for an explanation of the historical wetland acreage.

Comment 34: "...Visible Surface Water is not appropriate methodology to wetlands delineation. PL101-618 does not specifically identify 25,000 acres of palustrine wetland habitat as the wetlands objective. The Service needs to follow the COE wetlands delineation process as required in their MOA, to count wetland acres."

Response: Visible surface water was not used to delineate wetlands. Rather, visible surface water was used, for the purposes of the EIS, as one criteria for delineating wetland habitat. Wetlands and wetland habitat, as used in this EIS, are not synonymous. Wetlands, as defined in the EPA wetlands manual "...are the areas on the landscape where land and water meet. In general, they are lands that are either inundated with surface water or saturated with groundwater long enough during the growing season to make it necessary for the vegetation to adapt to growing in saturated soil conditions." A wetland, and the boundaries of such, is a more-or-less permanent feature of the landscape.

Conversely, wetland habitat is defined, for the purposes of this EIS, as a wetland or a portion of a wetland that has visible surface water. As such, the size and shape of "wetland habitat" will fluctuate from season to season and year to year while the size and shape of the "wetland" within which wetland habitat occurs will remain constant from season to season and from year to year. Wetlands only provide habitat for waterfowl, shorebirds, muskrats, aquatic insects, and other wetland-dependent wildlife when they contain surface water (i.e., when they provide wetland habitat).

Congress clearly differentiated between wetlands and wetland habitats in P.L. 101-618. Congress specified that the acquisition of water rights was for the purpose of sustaining wetland habitat (Section 206(a)(1)).

Comment 35: "There appears to be no attempt to discuss or define direct and indirect impacts."

Response: Direct and indirect impacts are defined in Section 4.1.

Comment 36: "The historical average figure of 150,000 (1846 - 1860) wetland acres is highly questionable. By the Service's own assumption, we would have some 477,000 AF of flows unaccounted for."

Response: Please refer to General Issue Response X.

Comment 37: "Under the proposed action, the Service would acquire 122,000 AF of water rights and transfer some 101,000 AF to the wetlands. Please explain in detail where the other 21,000 AF will go and what are the impacts of this action, such as, to the lower Truckee River and Pyramid Lake and from Lahontan Reservoir, agriculture, Lahontan Valley groundwater and the wetlands. An example is listed in the Newlands Project Efficiency Study which states: 'The 2.99 transfer rate is likely to have a negative effect on project efficiency unless acquisitions are grouped, but it provides benefits to cui-ui recovery.'"

Response: The EIS explains in detail the consequences associated with the undelivered 21,000 AF of water. That information is addressed under the discussion of impacts for the Proposed Action (Alternative 2) in Chapter 4 under each resource category.

The statement that the 2.99 AF/acre irrigation use-rate is likely to have a negative effect on project efficiency unless acquisitions are grouped is not supported by our analysis. Irrigation delivery efficiency is expected to improve under Alternative 2, and would be further enhanced if the Service were to group or target specific irrigation areas for acquisition. The Service evaluated the effects of Alternative 2 and other action alternatives on Project efficiency in Section 4.2.4, Newlands Project Efficiency.

Comment 38: "There were 17 significant issues and concerns listed in the Scoping Report...which has now been reduced by the Service to eight issues, concerns and opportunity. Please identify those significant issues and concerns that have been deleted and explain why they are no longer considered to be issues."

Response: The Scoping Report (Appendix 3) describes the issues and concerns carried forward for preliminary analysis (page 21), listing six major resource issues. The Scoping Report shows how the 17 significant issues and concerns were categorized into six major issues to be addressed in the Draft EIS. After the public release of the Scoping Report, the Service conducted a (November 16, 1992) workshop with the Cooperating Agencies and technical consultants to facilitate consensus on the issues to be analyzed, scope of the analysis, and range of alternatives to be considered in the Draft EIS. Churchill County representatives received the Scoping Report and participated in the workshop and were fully aware of the Service's intentions regarding what major issues would be analyzed in the EIS. In fact, one significant issue, recreational impacts, was added to the Draft EIS as a result of the November workshop.

The EIS does address all of the significant issues under the major resource headings of Chapter 3 and 4.

Comment 39: "The Service needs to explain that the Bureau of Reclamation is currently in the process of modifying the 1988 OCAP and proposes to make further changes to the 1988 OCAP in the near future, all of which have a potential to significantly change the baseline conditions that this report utilizes."

Response: The Service agrees with this statement. Potential actions for modifying OCAP have been identified under relevant resource sections in Chapter 3 and in 4 and in Section 4.26.9, OCAP MODIFICATIONS.

Comment 40: "Please explain how the Service can approve a FONSI for a part of an action, when the action as a whole has significant impacts and the Service acknowledged at the time that an environmental impact statement would have to be prepared on the action."

Response: The FONSI was approved for a earlier water rights acquisition action, authorized and funded by separate congressional actions prior to and separate from Public Law 101-618. While the actions appear similar, the timing and purpose of the action addressed in the prior FONSI make it dissimilar and unconnected to the action described in this document. Those previous actions can and do stand on their own and are not dependent on P.L. 101-618 or the Proposed Action or Preferred Alternative in this EIS. The Service responded to a similar Churchill County comment #6 above.

Comment 41: "Does OCAP play a role in Newlands Project operations? It appears that USFWS is attempting not to mention OCAP as a important component in recent reductions in Lahontan Valley Wetlands."

Response: OCAP, which is the abbreviation for operating criteria and procedures, is integral to Newlands Project operations. The Service discussed in detail OCAP and the role they have had in bringing about existing conditions. See Sections 1.3, 1.9.2, 3.2, 3.2.4, and 4.26.9. The Service has also indexed OCAP so that the reader may more easily locate discussions related to this topic.

Comment 42: "It is important to note that the all time low for wetlands acreage is primarily due to extreme hydrological conditions (drought) and OCAP. The paragraph is misleading to the reader and does not accurately portray baseline conditions."

Response: Whereas the Service agrees that extreme hydrological conditions and OCAP have influenced wetlands acreage, the storage and diversion of Carson River water for agriculture, municipal, mining, and other uses have had the most substantial influence on wetland habitat acreage over the long term. The Service has been very clear in its discussions of how drought and the improved irrigation delivery efficiency rates of OCAP have affected wetland acreage.

Comment 43: "There seems to be little validity for a wetland figure of 150,000, mid-1800's, since the same individuals quoted estimated the Carson River flows at some 410,000 AF. At your computed wetland water requirements, this would only account for some 82,000 acres of wetlands, or perhaps did a historical, non-diked wetland only utilize less than 3 AF of water?"

Response: Please refer to General Issue Response X.

Comment 44: "The proposed Comprehensive Management Plan would identify wetland needs in the Lahontan Valley and refine the amount of water needed. This EIS is premature until the Comprehensive Management Plan is prepared."

Response: The Service disagrees. The Proposed Action and Preferred Alternative are actions that can stand alone and be implemented with or without the completion of a Comprehensive Management Plan. The Comprehensive Management Plan would only fine-tune water requirements relative to the water rights acquisition program, and if anything, would most likely decrease the amount of water required. See Churchill County comment #2 above.

Comment 45: "The Act, P.L. 101-618, authorizes and directs the Secretary of the Interior to acquire water and water rights by purchase or other means."

Response: Change incorporated, see Section 1.3.

Comment 46: To meet efficiencies under the 1988 OCAP, the Bureau of Reclamation is requiring that drainwater be pumped into the canals and mixed with irrigation water for additional use. After

acquiring most of the water rights in the Carson Division, does the Service intend to continue the requirements of OCAP?"

Response: The Service is not responsible for, nor does it have the authority to manage, the Newlands Project. Irrigation practices and Project operations are the responsibility of TCID as the Project operator, and are under the supervision of the Bureau of Reclamation. Such decisions would have to be made by the appropriate management agency.

Comment 47: "Terminal marsh (shrink and swell) vs. palustrine marsh habitat. How can Stillwater function as a great basin terminal wetland when the Service intends to deliver water in the fall? Please explain."

Response: For the purposes of this EIS, it is assumed that the Service would use the current irrigation pattern as the basis for impact analysis. Under this scenario, wetland habitat would swell and shrink on an annual basis. The purpose of this EIS is to assess the consequences of acquiring water and water rights, not to assess particular management strategies of Stillwater NWR. Issues related to the actual management of the Stillwater NWR will be evaluated and analyzed in future Refuge management planning.

Comment 48: "The main purpose of the ROD is to decide if the proposed action has the potential to significantly affect the human environment."

"How to implement PL101-618 is the decision required. Revise this section to include how to sustain 25,000 acres of wetlands."

Response: The Service does not concur with the County's assessment of the purpose for the ROD. CEQ Regulations, §1505.2 clearly state that the ROD shall include: (a) statement of the decision, (b) identification of all alternatives considered, a determination of which alternative is considered to be environmentally preferable, and a discussion of all factors which were balanced by the agency in making its decision, and (c) statement regarding mitigation and monitoring and whether they have been adopted, and if not, why not. The Proposed Action and alternatives identify various methods to sustain 25,000 acres of wetland habitat in the Lahontan Valley.

Comment 49: "Since water rights purchased and transferred at a rate of 2.99, then there will be a benefit to Pyramid laketherefore, the Lake should be included in the affected area, along with an analysis of all impacts...The Upper Carson River should also be included in the affected area, since water uses within that area has lead to the reduction of wetlands in the Lahontan Valley.

Response: Based on comments received by Churchill County and others on a provisional draft of the EIS, the Service included Pyramid Lake and the Middle Carson River as part of the affected area prior to release of the Draft EIS. Impacts to the Carson River and lower Truckee River are addressed in the EIS. Anticipated consequences of the Proposed Action and alternatives on the lower Truckee River and Pyramid Lake are defined in Section 4.3.1, Surface Water Quantity. The Proposed Action and alternatives would not affect the Upper Carson River area, and therefore, that region is not included as part of the Affected Area.

Comment 50: "The Service indicates that, 'targeting is considered to be a mitigation measure to offset anticipated impacts of the Service's action,' yet there is no mention of targeting in the proposed action or alternatives."

Response: Mitigation measures are identified relative to the expected impacts in Chapter 4. Actions that the Service is certain it can implement within the scope of its existing authority that may reduce or eliminate adverse impacts are incorporated into the Preferred Alternative (see end of Section 2.5.5) in this document. In addition, the Service (pursuant to CEQ regulations § 1505.2) will identify mitigation measures it plans to adopt as part the action in the ROD. (See Churchill County comment #48 response above.)

Comment 51: "Need to mention change in cui-ui status and the fact that a new recovery plan is being prepared."

Response: Although those changes are possible and are being considered, neither action have been completed or implemented.

Comment 52: "In Section 1.9 the Service needs to discuss the Refuge Revenue Sharing Act and its applicability to this action, if any."

Response: The Refuge Revenue Sharing Act has been incorporated into Section 1.9.5.

Comment 53: "Section 1.10 needs to include the Clean Air Act, the National Environmental Policy Act, and Executive Order 12898."

Response: Section 1.10 was modified accordingly.

Comment 54: "Section 1.10.2 Why is the US Army COE omitted, since they have the regulatory authority for wetlands and waters of the United States?"

Response: The Army Corps of Engineers (COE) was not omitted, the Service did not see that the COE has any regulatory authority relative to the Proposed Action which is the acquisition of water rights. The Service does concur with the County that in some way the COE may have some operational or jurisdictional interest in the Service's Proposed Action, their name has been included under Section 1.10.2.

Comment 55: "Some confusion in the two paragraphs under 1.9.7, in that the first paragraph says water rights acquired will meet eligibility requirements and the second paragraph says that approximately 24 percent of the water acquired would not be transferred because they are ineligible under the requirements. Please clarify."

Response: Eligibility is further defined in Section 2.4, ASSUMPTIONS FOR ACTION ALTERNATIVES, and Section 2.6.2, ELIGIBILITY CRITERIA. Section 1.9.7 was modified.

Comment 56: The Service needs to commit to part of all of these (mitigation) measures and incorporate these into the proposed action and alternatives."

Response: See response to Churchill County comments #31 and #50 above.

Comment 57: "Mitigation measures are the result of potential impacts identified in the EIS. Mitigation measures are not studied or dismissed based on the subjective evaluation of the Service. On what basis did you dismiss mitigation measures? Please explain. Section 1.15 should be eliminated from this document."

Response: The Service stated in Section 1.15 that many of the public comments received at the Scoping meetings were in fact suggested mitigation measures rather than resource issues. The Service agrees that the EIS must and does identify mitigation measures based on potential impacts. The Service states that many of the public comments received during the Scoping process that were not issues of concern but statements that could be considered mitigation measures were ideas that were infeasible, unrealistic, or ineffective and were not addressed beyond scoping.

Comments 58: "Please indicate the process by which technical consultants were selected. Were any of the technical consultants principal authors of the EIS?"

Response: Technical consultants were selected by the Service based on expertise and availability. None of the technical consultants were principal authors, with the exception of Kelly Clark, technical editor of the document, who was involved with the preparation of the text in the document from a grammatical, style, and composition standpoint.

Comment 59: Re: PL101-618 Sec. 206(a)(3)(A) which gives the Secretary the authority to utilize system facilities to provide water to the Fernley WMA and P.L. 101-618 Sec. 209(i), which gives the Secretary the authority to manage the system regulating reservoirs for fish and wildlife purposes. Does the Service exclude regulating reservoirs? If not, why not?"

Response: Section 209 of P.L. 101-618 addresses and directs Newlands Project improvement. The Secretary of the Interior has delegated the responsibilities under this section to the Bureau of Reclamation, the Interior agency responsible for Newlands Project operations. Regulating Reservoirs have been eliminated from further discussion as a water source because they are located outside the Lahontan Valley wetlands designated in Public Law 101-618. (See Section 2.8.4 Newlands Project Regulating Reservoirs.)

CHAPTER 2

Comment 60: "The no action alternative may provide sufficient water for the Wetlands. Much of the analysis is based upon assumptions about OCAP, return flows, and spills. There is considerable uncertainty with these assumptions and the BLR model used to predict wetlands flows. Water is not to be acquired to meet the 'Services Objective' but rather the intent of PL101-618. The last sentence should say: The no action alternative may not provide sufficient water to meet the intent of Public Law 101-618."

Response: Available information indicates that there would not be sufficient water available under baseline conditions to meet the intent of P.L. 101-618 or the Service's identified needs. Under the no action alternative, water rights would provide about 17,000 AF/year. Based on the average annual primary wetland habitat demand of 5 AF/acre/year, the wetlands would require about 125,000 AF/year. This would mean that the remaining 108,000 AF/year would have to come from drainwater and spills. It is improbable that, over the long-term, the average inflow to the primary wetland areas from these sources will ever reach 108,000 AF/year. The Service's calculations for long-term average annual drainwater inflow to the primary wetlands is about 30,000 AF/year under existing conditions related to the No Action Alternative. The Service understands that certain aspects of Newlands Project operations could change and more drainwater may be available for wetland habitat (See Section 2.3.1.1 Factors Affecting the Volume of Water to be Acquired), but even under the most optimistic of circumstances it is improbable that drainwater or average spill volumes would ever approach 108,000 AF/year.

Comment 61: "Assumptions on the amount of drain water and spills are considered speculative and highly conservative. And with the proposed modifications and future changes in OCAP by the Bureau of Reclamation, these assumptions will be less viable. The DEIS lacks a viable range of alternatives, since the alternatives considered are all on the high end of water right purchases, while considering only a portion of the available drain water and spills. The April 1994 Newlands Project Efficiency Study by the Bureau of Reclamation shows over a 10 year average of 119,000 AF of drain water and spills prior to the 1988 OCAP. A more reasonable, implementable alternative must be considered which includes purchase of some _____ AF of water rights along with a higher level of spills, drain water and other measures.

Response: The range of alternatives considered is reasonable and Churchill County has been given every opportunity to participate in alternative development. In meetings, Churchill County supported formation of Alternative 5, which does consider a lower volume of water acquired through fee purchases and depends on other sources (Middle Carson River Corridor, increased leasing, spills and drainflow) for wetlands protection.

While the Bureau of Reclamation study shows an average of 119,000 AF of drainwater and spills for the 10 years prior to the 1988 OCAP, it must be pointed out that spills during that period were a record high due to the high runoff in 1982, 1983, and 1986; there was substantial over-diversion from the Truckee River in violation of applicable OCAP; and the Reclamation study did not specify where the drainwater was ultimately put to use. During that period, more than half of all drainwater reaching the Carson Lake area was used to irrigate pasture land rather than being used to create wetland habitat. In addition, much of the drainwater from the northeast portion of the Newlands Project went to the Canvasback Gun Club (under the Freeman Agreement) and the Indian Lakes area. Based on these factors, it does not appear that the Reclamation figure of 119,000 AF/year of drainwater and spill water is representative of long-term conditions, nor does it appear that this volume would reach the wetlands under existing conditions.

Comment 62: "pg. 2-1, Para. 3: Please identify those estimates that are higher than the Service's baseline estimates."

Response: See Section 2.3.1.1 Factors Affecting the Volume of Water to be Acquired and the Service's response to Churchill County comment #61 above.

Comment 63: " The appropriate way to deal with uncertainty is through boundary analysis rather than selecting one set of assumptions. A high and low range of drains and spills needs to be incorporated into the analysis."

Response: The Service has provided ranges for some resources and impacts when appropriate and when detailed information is unavailable. In regard to drainwater and spill volumes, the Service believes additional ranges would obfuscate analysis and confuse the reader. The Service contends that the more direct analysis, when the technical and analytic information is available, is better than the more vague boundary analysis approach.

Comment 64: "...The analysis of impacts occurs for the affected area and its resources. This sentence needs to be changed to...underestimate impacts to the affected area.

Response: Change incorporated.

Comment 65: "As part of the proposed action, USFWS must clearly indicate process used to measure a long-term average of return flows and spills, and indicate under what conditions water right acquisitions would be ended.

Response: The Service has identified the plans and agencies responsible for long-term measurements of drainwater, spill, and irrigation delivery in Section 2.7 Monitoring. For the purpose of monitoring, the Service will make calculations using the 10-year-running average of the annual average compilation of palustrine wetland habitat acres. Based on those calculations, the Proposed Action will be complete once 25,000 acres of primary wetland habitat have been attained.

Comment 66: "The Service does not need 122,000 acre feet of water rights given the availability of drains and spills. This sentence needs to be revised.

Response: The Service does not agree. See the Service's response to Churchill County comments #60 and #61 above.

Comment 67: The proposed action is not clearly defined. The Service needs to prepare a management plan to accompany this EIS or provide sufficient detail in the EIS about how the water will be used.

Response: The Proposed Action is defined in Sections 2.2, PROPOSED ACTION and the rationale behind the alternative are discussed in Section 2.3, PROCESS USED TO FORMULATE THE PROPOSED ACTION AND ALTERNATIVES. The detail of these discussions is sufficient given the scope of the EIS. There is an existing management plan for the Stillwater WMA which includes the Stillwater NWR. While there are future plans by the Service to prepare a new Refuge plan, the Proposed Action and alternatives are not dependent upon such planning. Acquisition of water rights and management of wetland habitat are separate and distinct actions. The Service has responded to a similarly worded comment by Churchill County (See Churchill County comment #2 above).

Comment 68: The Service should eliminate discussion of benefits or adverse impacts in the description of the proposed action-all of page 2-3.

Response: Most of this section has been deleted in the FEIS.

Comment 69: The entire section is difficult to read and understand and lacks appropriate detail.

Response: Comment is so noted.

Comment 70: Great Basin Terminal wetlands fluctuate dramatically in size from Spring to fall. When does the Service intend to count visible surface water? Wetlands can occur without visible surface water. Please explain the difference between terminal wetlands and palustrine wetland habitat.

Response: In reference to the comment on when and how the Service will measure visible surface water see the response to Bureau of Reclamation comment #10 and Churchill County #17. The Service responded to a similar Churchill County comment regarding the difference between wetlands and wetland habitat in its response to Churchill County comment # 34 above.

Comment 71: If the proposed action would double the amount of primary wetland habitat, are you suggesting then the baseline primary wetland habitat is 12,500 acres? If the baseline is 12,500 acres, approximately 60,000 acre feet of additional water is required for a total of 80,000 acre feet of irrigation water. Please explain the inconsistency within the proposed action.

Response: Review of Table 2.A Comparisons of Alternatives will show that as more agricultural water rights are taken out of production, drainwater inflow to the primary wetland habitat areas declines. To offset these declining drainwater volumes, more water rights need to be acquired.

Comment 72: The acquisition and use of water are not separate actions. The Service needs to prepare a wetlands management plan for this EIS. This draft EIS should be withdrawn until a management plan has been completed.

Response: The Service has responded to a similarly worded comments by Churchill County. (See the responses to Churchill County comment #2 and #44 above.)

Comment 73: Water is not being acquired to meet management targets but rather the proposed action. If management targets are part of the proposed action, they need to be described in this document.

Response: The Service has previously responded to similarly worded comments by Churchill County regarding the scope and purpose of this document. The Proposed Action and alternatives evaluate the consequences of acquiring sufficient water or water rights to sustain 25,000 acres of primary wetland habitat within the identified Lahontan Valley wetlands. This purpose is consistent with the intent and direction of Congress in P.L. 101-618.

Comment 74: "Although there may be some prime farm lands offered for sale, the Service is not obligated to buy such lands. The Service could commit, as up-front mitigation, that no prime farmlands would be purchased or that prime farm lands purchased would be traded for non-prime farm lands, therefore leaving these prime farm lands in production."

Response: Although the Service is not obligated to purchase water rights associated with prime farmlands when they are offered for sale, the Service would consider such purchases under the Preferred Alternative and other alternatives. Given the high percentage of farms that contain at least some prime farmland in the Carson Division, it does not appear feasible for the Service to limit water-rights acquisitions to farms that do not contain prime farmland. One mitigation measure, as pointed out in the comment, would be for a transfer program to be cooperatively developed whereby water rights from an area of marginal farmland could be transferred, on a willing participant basis, to prime farmland from which water rights were purchased and transferred by the Service. Other possible mitigation measures are described in Section 4.16.4. As disclosed in Section 4.16.4, some level of adverse impacts to prime farmland and farmland of statewide importance will be unavoidable and will not be mitigated.

Even if the Service were to avoid the purchase of water rights from prime farmland, there is no assurance that those lands would remain in agricultural production. There is no assurance that lands bypassed by the Service would remain in production. To date, Churchill County has not taken steps to prevent the conversion of farmland to other uses such as residential development.

Comment 75: "The effect/impact of recoupment on the Lahontan wetlands must be analyzed in at least one alternative."

Response: The Service has defined the possible consequences of recoupment in Section 2.3.1.2 and has disclosed the legal background supporting that action in Section 1.8.1 (10). The recoupment action is directed in P.L. 101-618 giving the Secretary of the Interior the responsibility to resolve recoupment through agreement or judicial proceedings. This action is not linked to the purpose and need identified for the Service's Proposed Action and alternatives. The action is before the courts

, and therefore it was not specifically analyzed within alternatives in this document. Recoupment is appropriately addressed as a foreseeable future action in Section 4.26.8, NEWLANDS PROJECT RECOUPMENT.

Comment 76: "Development of a drainwater assurance plan should be described in more detail and included in one of the alternatives. What are your requirements for drainwater assurances?"

Response: The concept of drainwater assurances or drainwater guarantees were discussed in the Second Settlement negotiations in spring 1995. The Service attempts to recognize such an arrangement may be relevant to the Proposed Action and alternatives but lacks the details of how such assurances would be implemented. It is our understanding that the drainwater assurance concept was initiated by Churchill County local interests at the negotiations. If Churchill County supports the need for drainwater assurance plans due to the possible benefit or protection they could provide to County citizens, the Service would work with the Churchill County representatives to develop such plans. The Service requirements would generally focus on some reasonable commitment from local irrigators and TCID as project operator to provide a block or assured volume of drainwater each year under average hydrologic conditions, and, if the drainwater was not available, to substitute the short-coming with irrigation water.

Comment 77: "Section 2.3.1.1: PL101-618 makes no mention of wetland habitat objectives. Please identify wetlands habitat objectives other than the need to sustain 25,000 acres. If none, the sentence needs to be revised."

Response: Section 206(a)(1) of P.L. 101-618 clearly speaks to wetland habitat objectives with language that authorizes and directs the Secretary of the Interior to sustain approximately 25,000 acres of primary wetland habitat within Lahontan Valley wetlands. No change in the text is necessary.

Comment 78: "Please identify pasture lands which receive drainwater and specify the approximate acreage and amount of deliveries."

Response: Carson Lake pasture lands receive about 50 percent of the drainwater leaving the water-righted lands in the Newlands Project pursuant to the 1980 Fleischmann Agreement between TCID, NDOW, and Greenhead Hunting Club. This amounts to about 26,800 AF/year that is used to sustain approximately 14,700 acres of pasture grass. Prior to 1980, flooding of the pasture lands adjacent to the wildlife area used about 70 percent of the Carson Lake and pasture drainwater. From 1975 to 1980 the pasture lands received about 42,500 AF/year on average. These figures are based on USGS, TCID, and NDOW gaging station data.

Comment 79: "Pg. 2-6 Last Para. Paragraph appears contradictory to PL101-618. Please clarify. Will all drainwater regardless of quality be considered as part of the 25,000 acres of wetlands? What will the Service do with the drainwater? The Service needs to include in any changes in drainwater use in the proposed action."

Response: The language in the referenced paragraph was based on Section 206(b)(4) of P.L. 101-618. The Service does not commit to the use of Newlands Project drainwater regardless of quality to sustain the primary wetland habitat. The Service does recognize, as did P.L. 101-618, that because of the geographic locations of the primary wetland habitat areas, drainwater will flow down gradient to these areas. For the Service to preclude use of drainwater, special areas or sumps would have to be built or designated to store and eventually evaporate poor quality drainwater.

Comment 80: "The Service needs to consider purchase of conservation easements on other private lands to maintain wetland habitat."

Response: Conservation easements are discussed in Section 2.3.1.1, Factors Affecting the Volume of Water to be Acquired, Easements. The Canvasback Gun Club wetlands were identified as private lands that could potentially meet the Service's needs and objectives. These privately owned and managed wetlands, located within the boundaries of the Stillwater NWR, are the only private lands with wetland habitat potential that meet the definition within P.L. 101-618 of the areas within Lahontan Valley where the 25,000 acres of primary wetland habitat is to be sustained. The Service would entertain proposals for conservation easements on other private lands for the conservation of wetland habitat. While such easements could protect valuable wetland habitat, they would not, at this point in time, contribute to the target of sustaining 25,000 acres of primary wetland habitat as set forth in P.L. 101-618.

Comment 81: "Pg. 2-7 (Spills) There is limited discussion on the effect of canal capacity for carrying spill water to the wetlands. Explain the amount of spill waters that can be conveyed to the wetlands over a spring spill period. Discuss the effect on wetlands and cost of increasing canal capacity to effectively handle most or all spills. Discuss where excess spills currently go to and the effect this has on wetlands. Are these areas not also termed wetlands? If not, why not?"

Response: Spills are discussed further in Chapter 3 under Section 3.2.3.3 Spills. The volume of spill water that can be conveyed to the wetlands during the spring is highly variable, depending on a number of factors, such as: agricultural irrigation deliveries during that period, level of storage in project regulating reservoirs, duration of spill, and canal capacities. For the purposes of this document, spills can only be addressed in a general nature due to a lack of specific data to determine actual spill conveyance in any given month.

Increased canal capacity could permit the Service to convey increased volumes of spill water to the primary wetland habitat areas. The canals that currently restrict or limit spill water conveyance to the wetlands are the major delivery canals within the agricultural portions of the Newlands Project. Enlarging existing canals could potentially affect adjacent farmlands, residential property, and public roads, and may require new or larger control devices (gates, drop structures, etc.). Routing of spill water to the primary wetland habitat areas during the past year (1995) was generally not restricted due to the capacity of those canals entering the wetland areas but associated with restrictions or constraints further up gradient in the Newlands Project.

Much of the spill water that cannot be conveyed to the primary wetland habitat areas flows into the Carson Sink. During this past year (1995) some spill water was delivered "free" to agricultural users (not charged against the irrigator's headgate entitlement), some was routed to the primary wetland habitat areas and the remainder went to the Carson Sink (about 90,000 AF). Based on preliminary Reclamation spill volume data (Overvold, written communication, February 1, 1996) and Service inflow data, the primary wetland habitat areas captured about 28,000 AF of spill water (20,000 AF @ Stillwater NWR and 8,000 AF @ Carson Lake) out of the estimated 195,000 AF of Lahontan Reservoir spills in 1995.

The Carson Sink and many of the low lying lands adjacent to the Carson River (downstream of Tarzan Road bridge) that were inundated as a result of spill water, are wetlands. However, only portions of these wetlands that are within the boundaries of Stillwater NWR and Stillwater Wildlife Management Area are considered primary wetlands based on Public Law 101-618.

Comment 82: "Page 2-7--(Easements) The Canvasback Gun Club maintains an average of 2,500/2,600 acres of wetland with a water right of 5,465 AF. Please explain how it is possible to maintain an acre of wetland here with about 2 AF of water while the Service estimates that 5.1 AF of water per surface acre of wetlands is necessary. Section 209i of P.L 101-618 directs the Secretary of the Interior to manage the Newlands Project re-regulating reservoirs for the purpose of fish and wildlife, i.e. "The Secretary shall"/ Therefor the alternatives should be rewritten to include these areas along with the primary wetlands."

Response: The 2 AF/year of water to which the above comment refers only accounts for water right deliveries -- it does not include drainflows. Drainwater inflows to the Canvasback Gun Club have averaged about 14,500 AF/year for the period 1975-1991. Based on the combined volumes of drainwater inflow and Canvasback Gun Club water rights (an average of about 20,000 AF/year) and assuming an average of 2,600 acres of wetland habitat, the water demand for Canvasback Gun Club wetlands is about 7.7 AF/acre/year. This average annual wetland water demand of 7.7 AF/acre/year is consistent with wetland water requirements identified in Appendix 4 for perennial marsh habitats (about 7.1 AF/acre/year) in Lahontan Valley.

Please refer to the Service response to Churchill County comment number 113 for the portion of the comment addressing Section 209(i) of Public Law 101-618.

Comment 83: "Section 2.3.1.2 (Recoupment) this discussion is better suited for Chap.4 or the cumulative impact section."

Response: Recoupment was discussed further in Chapter 4 as the County suggests, see Section 4.26.8 NEWLANDS PROJECT RECOUPMENT.

Comment 84: "Section 2.3.3.6: Need to include land exchange acquisition methods in the proposed action and alternatives."

Response: Land exchange is addressed in Section 2.3.3 ACQUISITION METHODS CONSIDERED IN FORMULATING THE ALTERNATIVES. The proposed action and alternatives each include wording about land exchange, basically stating that land exchanges would occur when possible.

Comment 85: "Pg. 2-12, Section 2.3.4: If Bookman-Edmonston Engineering reviewed the BLR Model and made suggestions to further refine baseline assumptions, why then does the Service indicate on pg. 2-6 that the B-E analysis has insufficient documentation for adjusting BLR Model assumptions or calculations? This statements seems contradictory."

Response: Bookman-Edmonston had two levels of involvement and review of information relative to the BLR Model. First, Bookman-Edmonston reviewed the BLR Model as a consulting firm working for the Bureau of Reclamation during the scoping period. As noted in Section 2.3.4, their suggestions were incorporated into the model calculations. The second Bookman-Edmonston analysis was offered during the spring 1995 negotiations, when Bookman-Edmonston was working for LVEA, Churchill County, NWPA, and TCID. As noted in Section 2.3.1.1, Drainwater, the Service has insufficient documentation of the second Bookman-Edmonston analysis to warrant adjusting BLR model assumptions or calculations.

Comment 86: "Pg. 2-13, Section 2.4: Does the Service intend to use water acquired under this action directed under PL 101-618 to be used for Tribal wetlands? If yes, the management plan needs to be included as part of the proposed action."

Response: The purpose of this document is to assess the consequences and impacts associated with the acquisition of water and water rights. How the Fallon Paiute-Shoshone Tribe manages the water acquired for the purpose of sustaining primary wetland habitat on reservation lands is not within the scope of this EIS. The Service's action to acquire water or water rights is not dependent upon the completion of such planning.

Comment 87: "The assumption that the Newlands Project will continue to operate within the framework and objectives of the 1988 OCAP may be invalid since the Bureau of Reclamation is in the process of adjusting OCAP and plans to make changes which may require an EIS. What changes will the Service make to the Wetlands EIS in response to proposed changes to OCAP."

Response: The 1988 OCAP was used in defining baseline conditions, these baseline conditions of which were used in evaluating potential impacts of the alternatives. As yet, no decisions have been made on possible adjustments to OCAP, and, therefore, analyses must be based on the OCAP currently in place. Nevertheless, the FEIS recognizes that the Department of the Interior is in the process of adjusting OCAP to better reflect current conditions, and has discussed possible effects on various resources in Chapter 3 and 4. This issue is also addressed in Sections 2.3 PROCESS USED TO FORMULATE THE PROPOSED ACTION AND ALTERNATIVES, 3.2 NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE, and as a foreseeable future action in 4.26.9 OCAP MODIFICATIONS. Because this action has not been completed or implemented, and there is as yet no quantitative data on its outcome, the 1988 OCAP are retained as a baseline condition for the FEIS.

Comment 88: "Page 2-14, Assumption 8: Needs to included as part of the proposed action. Construction projects could affect the quality and quantity of water reaching the wetlands."

Response: As explained in the introduction of Section 2.4, ASSUMPTIONS FOR ACTION ALTERNATIVES, all assumptions, including assumption (8), are applicable to the Proposed Action and other action alternatives. Regarding construction projects, assumption (8) specifies that deliveries of acquired irrigation water would be made through the *existing* Newlands Project delivery system. The assumption further states that, if additional delivery points or increased delivery capacity are required in the future, potential impacts of new construction projects (e.g., effects on quality and quantity of water reaching wetlands) would be reviewed under the National Environmental Policy Act (NEPA).

Comment 89: Figure 2.A--Column identified as township, should be township/range.

Response: The "TOWNSHIP" column refers to township-range as can be inferred from the map legend. Apparently, township-range was abbreviated for the purposes of the data table. The legend of the map correctly identifies it as "Township-Range."

Comment 90: "Section 2.5: The no action alternative could meet wetland acreage amounts if changes to OCAP were made. One of the alternatives needs to include suggested changes to OCAP which may benefit the wetlands."

Response: Modifying OCAP is beyond the scope of this EIS. The Service is aware of the Department of the Interior's proposal to amend or modify OCAP, but the focus of such adjustments are to improve irrigation delivery efficiency and decrease reliance on Truckee River diversions. These adjustments would not increase drainwater or spill volumes to the primary wetland habitat areas.

Comment 91: "Pg 2-17--Alternatives--The 20,000 AF water rights acquisition program has been inappropriately applied, since this constitutes piecemealing of the overall action. This action was recognized as a part of a larger action in the 1991 EA. Therefore, the 20,000 AF acquisition is inappropriate for incorporation into the no-action alternative."

Response: The Service does not agree that the current acquisition program constitutes piecemealing. The Service has responded to a similarly worded comment by Churchill County in comment #6 above.

Comment 92: "The assumption throughout the alternatives is that the amount of spills available to the wetlands seem quite arbitrary in-so-much-as the assumed annual average spills would vary from 8,600 AF to 11,800 AF depending on the alternative considered. Since spills are a function of occasional excess flows and management of Lahontan Reservoir, both of which are not subject to change under the proposal, it seems there should be one level of spills."

Response: Newlands Project irrigation demand directly affects spill volumes in that spills are influenced by carry over storage in Lahontan Reservoir. As irrigation demand changes, particularly when it is decreased, the potential for spills increases given a set of common hydrologic conditions. Since each of the alternatives result in differing irrigation demands, so too, the potential spill volumes change with each alternative.

Comment 93: "We believe that the service has under-estimated the drainwater flow to the wetlands by a significant amount and should use the Bookmen-Edmonston Engineering estimate of some 60,000 AF/yr. as the baseline."

Response: There is insufficient information to warrant use of the recommended estimate of drainwater in the calculation of baseline conditions. The Service recognizes that changes in irrigated acreage base and percent-of-use have the ability to affect drainwater inflow to the primary wetland habitat areas and has addressed what might constitute a reasonable change in drainwater inflow volumes in Section 2.3.1.1, Factors Affecting the Volume of Water to be Acquired and Section 3.2.3.2, Drainwater.

Comment 94: "Pg. 2-18, Last sentence: PL101-618 directs water right acquisitions for wetlands only. Does the Service intend to use the .51 AF/ac. for wetlands? If not, why not?"

Response: The Service does not intend to use the 0.51 AF/acre of water rights for the primary wetlands at this time. However, as noted in the sentence to which the comment refers, the Service has reserved the remaining 0.51 AF/acre for possible future use for the wetlands.

Comment 95: "Is the Service again suggesting they would not use drainwater to achieve the 25,000 acre wetland goal?"

Response: This section merely describes the adverse impacts associated with applying drainwater to wetlands and the consequences of an alternative that does not use drainwater as a source of water for wetland habitat.

Comment 96: "Pg. 2-20 Alt. #2--Assuming that the change in the amount of drainwater between alternatives would be on a reverse relationship to the amount of irrigation water purchased and farm land retired, it makes little sense that an increase of 4,300 AF of irrigation waters acquired between Alternative 3 to Alternative 2 would result in a decrease of 5,600 A.F of drainwater. The Bureau of Reclamation estimates that 1 A.F. of return flows to drainwater results for each 6 A.F. of water

applied to the farm land, therefore the change in drainwater would be approximately 715 A.F. and not 5,600 A.F."

Response: The Service has reviewed and modified its calculations regarding drainwater volumes and inflow potentials over the past two years. Based on this evaluation process, the Service believes that its calculations represent actual conditions and are representative of conditions that can be expected to occur in the future. Drainwater return flows vary between irrigation subdistricts within the Carson Division and drainwater from some of the subdistricts never reaches the primary wetland areas.

Comment 97: "Pg. 2-21, Para. 2: Why does the Service preclude the acquisition of pasture land rights?

Response: The referenced paragraph does not state that the Service would preclude the acquisition of water rights from pasture lands, only that acquisition of such water rights are not anticipated.

Comment 98: "Pg. 2-21, Para. 2 & 3: Why does the Service propose to retire the transfer rate in Alternative 2 and have it reserved in Alternative 1? Retirement of water rights is contradictory to PL101-618 which stipulates purchase for wetlands use only. If the Service uses the transfer rate for the wetlands, retirement should not be an alternative."

Response: The Service's actions under the No Action Alternative (Alternative 1) are based on a previous authority and reflect the concepts of water right transfers and agreements at that time (December 1991). The Service's reservation of the 0.51 AF/acre was based on a concept that those reserved rights may, at a later date, be transferred to the wetlands.

Comment 99: "Pg. 2-21, Para. 3: This paragraph indicates that reduced diversions would benefit Pyramid Lake. Did the Service evaluate impacts to Pyramid Lake fish? Please indicate to what extent fish benefit."

Response: Yes, the Service evaluated the consequences of its actions on Pyramid Lake fish. That information is included in Section 4.8, EFFECTS ON FISH, and Section 4.13, EFFECTS ON ENDANGERED, THREATENED, AND SENSITIVE SPECIES.

Comment 100: "A Revegetation Plan should be coordinated with the Natural Resource Conservation Service who is a cooperating agency. Has the Service consulted with NRCS on the requirements of a revegetation plan? What criteria will be used to decide whether or not revegetation was successful?"

Response: While developing methods for revegetating previously irrigated farmlands, the Service consulted extensively with NRCS. The success of ensuing revegetation efforts has been favorable. In fact, those revegetation efforts on Service acquired lands in the Stillwater area have been reviewed as model examples of revegetation on a number of NRCS sponsored tours. No success-criteria have been developed to date.

Comment 101: "Pg. 2-23, Para. 3: The Service needs to indicate whether it intends to pursue the full 3.5 AF/acre/yr entitlement. Since you have not studied potential impacts to fish, the Service has no basis for decisions."

Response: The identification of Alternative 2 as the Proposed Action in the DEIS and Alternative 5 as the Preferred Alternative in the FEIS indicates the Service's proposed position relative to the 3.5

AF/acre/year use-rate. The Service has fully evaluated the potential impacts to fish relative to the 3.5 AF/acre/year use-rate under Alternative 3 in Chapter 4 of the EIS (see Sections 4.8 EFFECTS ON FISH, 4.13 EFFECTS ON ENDANGERED, THREATENED, AND SENSITIVE SPECIES, and 4.26.7 RECOVERY PLANS FOR ENDANGERED AND THREATENED PYRAMID LAKE FISHES).

Comment 102: "Pg. 2-25, Para. 2: Does PL 101-618 require the use of drainwater for wetlands? Is 100,000 AF of irrigation water sufficient to dilute less than 20,000 AF of drainwater? Is this alternative realistic?"

Response: P.L. 101-618(b)(4) does not require the use of drainwater for wetlands in the event that drainwater is nonexistent, as would be expected under Alternative 4. This subsection only stipulates that the use of Stillwater NWR for Newlands Project drainage purposes would not be precluded in preventing, correcting, or mitigating for adverse water quality (see also the response to Churchill County comment #79 above regarding the use of drainwater relative to P.L. 101-618). The Service evaluated dilution effects of increased irrigation water delivery to the wetlands in Section 4.3.2 SURFACE WATER QUALITY. The Service considers this alternative realistic but not preferable.

Comment 103: "...If the service is going to continue this alternative without drainwater, then the Service must detail out where the drainwater will be disposed of...."

Response: The Service has, for the purposes of this EIS, identified in sufficient detail how drainwater will be managed; this was done in Section 2.5.4 ALTERNATIVE 4.

Comment 104: "...What benefit will be derived by the Fish when total inflows are increased by 2 to 6 percent?..."

Response: Increased flow volumes will benefit fish by improving habitat. The impacts associated with the Service's actions are described in Sections 4.8 and 4.13.

Comment 105: "Please define what is meant by wetlands protection?"

Response: As used in this context, wetlands protection refers to sustaining, on a long-term average, 25,000 acres of wetland habitat in the Lahontan Valley.

Comment 106: "Pg. 2-27, Para. 3: What is meant by the term :some benefit". Please define this term.

Response: Chapter 4 impacts section show that under Alt. 5, Pyramid Lake inflows are expected to increase 1-2 percent over the No Action Alternative.

Comment 107: "Pg. 2-28, Para. 5: The Service should refrain from making statements about most costly alternative, since the cost of mitigation measures have not been included."

Response: The Service disagrees. Cost clearly relates to monetary values. This paragraph refers to the monetary costs the Service would incur relative to leasing. Leasing is an annual expenditure and when incurred over the long-term, as would be necessary to meet the Service's needs and objectives, is one of the most costly methods of acquiring water that is considered in this document. The public, taxpayers, and decision-makers need to know the consequences of such acquisition methods.

Comment 108: "Of all the water alternatives, regulating reservoirs and use of other secondary wetlands appears to be as valid as water sources currently considered in Alternative 5."

Response: The Service has noted Churchill County's opinion. However, neither regulating reservoirs or secondary wetlands are of themselves, water sources. Please see response to Churchill County comment #59 above.

Comment 109: "Language written in this paragraph appears to be contradictory. Please clarify."

Response: These sections relating to water right transfer procedures and eligibility criteria draw heavily from court documents and decrees. Such language may be difficult to comprehend but is legally correct.

Comment 110: "Pg. 2-35--What is the estimated total annual O&M cost for each alternative? Is there an O&M cost for the delivery of drainwater and spills water, and if there is, then what would be the cost per alternative?"

Response: Estimated annual O&M costs for Service acquisitions are defined in Section 3.25 ACQUISITION COSTS and Section 4.25 EFFECTS ON ACQUISITION COSTS. There are no O&M costs charged for delivery of drainwater and spill water.

Comment 111: "Pg. 2-37--Specify what these different targeting strategies are and reference the appropriate mitigation section where they are covered."

Response: The Service has identified numerous specific targeting goals and objectives in Chapter 4 depending on the impact that such strategies could help to reduce or minimize. Resources that may benefit from targeting strategies include, groundwater recharge, prime farmland, drainwater quality, and land use.

Comment 112: "Pg. 2-39--Need to add the 4th reason for eliminating consideration of the Truckee Division for wetland water rights purchase, that being: (4) The Service has its own plans, the Cui-ui Recovery Plan, for purchase of the Truckee Division water rights, for waters in excess of all water rights in the Truckee Division.

Response: The recommended reason was not added as it is incorrect. For additional information see the response to LVEA question 5 below.

Comment 113: "Pg. 2-42--209i of P.L. 101-618 requires the Secretary of the Interior to manage the regulating reservoirs for fish and wildlife purposes. Such uses for fish and wildlife should be evaluated in the document."

Response: Section 209(i) of Public Law 101-618 states that "The Secretary shall, *insofar as is consistent with the project irrigation purposes and applicable operating criteria and procedures* (emphasis added) manage existing Newlands Project regulatory reservoirs for the purpose of fish and wildlife. In an attempt to meet established OCAP efficiency targets, under existing conditions, the regulating reservoirs are not filled except in high water years. The Service anticipates that the future of regulating reservoirs will be determined by project irrigation purposes. Management of fish and wildlife is definitely a secondary purpose. In the FEIS, Section 2.8.4, NEWLANDS PROJECT REGULATING RESERVOIRS, the Service evaluated the potential of regulating reservoirs relative to the Service's objective of sustaining 25,000 acres of primary wetland habitat. Additional information on regulating reservoirs is included in the Service's response to Comment 59 above.

Comment 114: "Section 2.8.4: Regulating Reservoirs should be included as part of an alternative. PL101-618 directs regulating reservoirs to be managed for wildlife. Furthermore, even Stillwater does not function entirely as a Great Basin terminal wetland. Has the Service discussed any type of management agreement with TCID with respect to the regulating reservoirs? If not, why not?"

Response: The Service has responded to similarly worded comments from Churchill County regarding P.L. 101-618 directives for regulating reservoirs (see response to Churchill County comments #59, #108 and #113 above). The Service and the Department of the Interior attempted to come to some agreement regarding regulating reservoirs during the Second Negotiated Settlement meetings in 1994-95, but in the end, the parties at the negotiations (one of which represented Churchill County) could not reach agreement on this and many other larger issues. The Service has not discussed a management agreement with TCID with respect to the regulating reservoirs. Regulating reservoirs are not within the designated Lahontan Valley Wetland areas prescribed by P.L. 101-618.

Comment 115: "Pg. 2-44, Has the Service considered conjunctive uses for Dixie Valley water to offset the cost of acquisition and O & M charges?"

Response: The Service has insufficient information to determine what the County means by "conjunctive use", but assumes that what is meant is that Dixie Valley water would provide some portion of the total water needed to meet the Service's objectives. Since there is insufficient groundwater volumes available in Dixie Valley to meet the needs identified by the Service, our evaluation of this source was as a supplementary water supply to be use conjunctively with other surface water right acquisitions. As stated in the document, construction costs to convey Dixie Valley water into Lahontan Valley are high (\$117.5 to 131.3 million) and the annual operating costs are about 28 to 68 times higher than Newlands Project O&M costs on a per acre-foot basis.

Comment 116: "Pg. 2-45--The Service needs to determine what impact the water use throughout the upper Carson River has had on the Lahontan Valley Wetlands and whether the Service should reconsider the use of Upper Carson River waters..."

Response: Water use throughout the upper Carson River (segments 1-7) represent existing conditions. The Service has identified the existing conditions relative to Carson River flow in Section 3.2.5.1 Inflow and Section 3.3.1 SURFACE WATER QUANTITY. The Service's rationale for eliminating other segments of the Carson River (segments 1-6) from further consideration are clearly defined in Section 2.8.5.3 UPPER CARSON RIVER, but the Service notes Churchill County's opinion.

Comment 117: "...Please identify the Congressional authorization for this action (20,000 AF acquisition)...."

Response: P.L. 100-446, P.L. 101-122, and P.L. 101-512 are Congressional appropriation acts that specifically fund the acquisition of water and water rights for Stillwater WMA and Stillwater NWR. The 20,000 AF limitation was an agreed upon limit set by the Service in its last ROD relative to these Congressional appropriation acts. The Service has a number of underlying Congressional authorizations to acquire water and water rights for the protection or enhancement of wetlands.

Comment 118: "...What is the proportional relationship which exists between water rights acquisition and reduction in drainwater-a point of diminishing returns?"

Response: Due to variability in drainage flows from irrigated lands in the Newlands Project the Service's analysis has not been able to define such "a point of diminishing returns". Identification of such a value may not be possible given the number of variables that affect drainwater.

Comment 119: "Please reference other sections of the EIS or describe under what conditions and water quality standards that USFWS would not rely upon drainwater for the wetlands. USFWS must indicate its intent to either use drainwater or not to use drainwater in this EIS."

Response: The Service's identification of Alternative 5 as its Preferred Alternative is a clear indication of its intention to use drainwater as part of the water supply for sustaining 25,000 acres of primary wetland habitat within the Lahontan Valley wetlands. There are State and Federal regulations and standards that apply to these drainwaters, and the Newlands Project operations are subject to those requirements.

Comment 120: "...it is imperative that the Service, as representing the Secretary, include recoupment in this analysis, since recoupment will significantly affect this analysis."

Response: The Service has responded to similarly worded comments by Churchill County. (See response to Churchill County comments #75 and #83 above.)

Comment 121: "Water Delivery Patterns are part of the proposed action and could be incorporated into all alternatives. The environmental impacts of water delivery patterns will need to be analyzed in this document."

Response: Water delivery patterns are an existing condition. The conditions that occur as a result of these patterns are defined in the existing conditions for Newlands Project operations. See Section 3.2 NEWLANDS PROJECT OPERATIONS AND INFRASTRUCTURE for the complete assessment of existing conditions relative to delivery patterns.

Chapter 3

Comment 122: 3-1. Pg. 3-1, Para. 2: "If the first 20,000 is included as part of the baseline, then the Service must evaluate its impact in the cumulative impact section."

Response: From the standpoint that the 20,000 AF acquisition program is a baseline condition, any impacts of the program are correctly characterized as cumulative. However, to take into account and evaluate the impacts of the total amount of water rights that would comprise the water rights acquisition program under each of the alternatives, the initial 20,000 AF of water right acquisition is included as part of all of the action alternatives. Chapter 4 was modified to better differentiate between the impacts of the acquisition programs without the 20,000 AF acquisition program (i.e., impacts being addressed in this EIS) and the impacts of the total water rights acquisition programs, including the 20,000 AF acquisition program. In Chapter 4, the action alternatives are (1) compared against the No Action Alternative (baseline conditions) and (2) conditions that would exist if no water rights had been purchased for wetlands protection.

Comment 123: 3-2. Why has the Service continued to use the total amount of water required (125,000 af.) in the evaluation of the proposed action and alternatives, if the 20,000 af. is part of the baseline?

Response: See Service response to Churchill County comment #122 above.

Comment 124: 3-4. "The Service needs to strongly consider the organization of this section and what it uses for baseline conditions."

Response: The County's opinion is so noted.

Comment 125: 3-5. "Figure out a plan to utilize spills better. Late in the EIS much higher percentages of spills are used to benefit wetlands."

Response: There is no discussion of spills on this page in the Draft EIS. There is insufficient information to respond to this comment. Spills are discussed in Sections 2.3.1.1 Factors Affecting the Volume of Water to be Acquired, 3.2.3.3 Spills, and 4.2.3.3 Spills, and 4.3.1 SURFACE WATER QUANTITY. Churchill County comment #81 above also responds to the County's concerns about spills..

Comment 126: 3-6. "Chapter 3 figures such as 3.3.c and 3.3.d need titles, north arrows, and sometimes scales."

Response: The Service has noted Churchill County's opinions relative to these figures.

Comment 127: 3-8: Page 3-4, Para.1. "Stating that the BLR model is the only analytic tool available is not sufficient reason to use it, particularly when the model has never been validated. The use of this model is unacceptable as presently described in the DEIS to address impacts related to the proposed action."

Response: The Service disagrees. The model has been reviewed, calibrated, and revised to make its calculations representative of existing conditions. This calibration process and oversight review by several technically qualified individuals and agencies has in fact validated the BLR Model. The use of a analytic process that can quantify changes that may result as a consequence of the alternatives considered that is based on a common set of parameters is an extremely useful tool. Such results provide the decision maker and the public with a more comprehensive impact analysis.

The County offers no data to support its reasoning that the model is unacceptable and since there are no other methods or tools available that better describe or quantify impacts based on comparative analysis, the Service will continue to use the NSM and BLR Model to assist in the disclosure of potential impacts of alternatives in relation to Newlands Project operations and Truckee River conditions. More information on the BLR Model is provided in the response to Churchill County comment #10., above.

Comment 128: Page 3-6, para. 3: "Irrigated acreage changes from year to year. As a result the irrigation demand varies and the outflow to the wetlands varies. According to Maurer (1994, page 84) the Bureau of Reclamation stated that there are only 51,000 acres of water-righted land, not 74,000 as stated above. The actual numbers used in the BLR model need to be identified along with a sensitivity analysis to evaluate how this value affects model output. If 1989 is the only year detailed irrigation delivery information is available, it is unclear why the 92 year simulation period is referred to, implying model calibration is available for 92 years."

Response: It should be noted that Reclamation provides data on irrigated acreage, water-righted acreage, and irrigated water-righted acreage to a number of agencies, organizations, and individuals. Depending on the nature of such requests and the purpose of the data, there are often reports citing

different acreage for the Newlands Project. The Service recognized and has provided Reclamation data in Table 3.2.A that reflects such variation. There are about 74,000 acres of water-righted land in the Newlands Project. Not all of that land is irrigated, and some land that has been irrigated during the years represented in Table 3.2.A did not have water rights appurtenant to them. The Service continues to rely on the data in Table 3.2.A and more recent irrigated acreage figures supplied by Reclamation.

Regarding the reference to the 92-year simulation period, the EIS does not address the acreage base in the context of the hydrologic simulation period.

Comment 129: 3-10 Page 3-7, par. 2. "What are these numbers (on irrigated acreage, monthly irrigation deliveries for each of the subdistricts in the Newlands Project, and actual irrigation use by farmers) and how are they substantiated?...Without data on the farm irrigation use BLR model output is unreliable."

Response: All of this data is substantiated and referenced. Without specific citations within the text, the Service is unable to respond in a more detailed manner.

Comment 130: 3-11 Page 3-9, para. 2. "How is this (drainwater inflow) number obtained?...The BLR Model estimated drainflow of 30,000 AF/year is unsupported and can not be used to evaluate impacts."

Response: The BLR Model output data for drainwater is calibrated and supported by actual drainwater inflow data from previous years. The Service believes the BLR Model provides a reliable and representative value and information on drainflow volumes, but does recognize there is variability as other factors or conditions change.

Comment 131: 3-12, Page 3-12, para. 3: "The estimates used are not supported or explained in the text...Even if this is not incorporating OCAP it is not clear how the estimates are obtained using the BLR model, if the model results are valid and the sensitivity of the model to spills."

Response: The values obtained by BLR modelling outputs are supported by actual data and are calculated using a long-term hydrologic simulation period (92-years). The model user's manual (Appendix 5), which addresses the core assumptions used in the modelling and summary explanations of the model calculation output data used in the EIS, provides further information on this subject.

Comment 132: 3-13: Pg. 3-10: "Public Law 101-618, Part 206(a)(3)(A) authorizes the Secretary of the Interior to use, modify or extend conveyance systems to deliver water to the wetlands, therefore there should be no restrictions placed on delivery of spill water."

Response: The restrictions that affect the delivery of spill water are related more directly to physical conditions such as the timing of spills and acts of nature rather than the size of the conveyance system. These restrictions represent existing conditions, the baseline for assessment of impact analysis. While P.L. 101-618 does authorize modification of conveyance systems, such hypothetical future conditions are not reasonable to assess as part of the impact analysis related to the acquisition of water rights. Additional information on spills is addressed in response to the County's comment #81 above.

Comment 133: 3-14, Pg. 3-10, Sec. 3.2.3.3. "Has the Service considered options to improve the ability to capture spills? If not, why not? What are the available options?"

Response: The Service has responded to other similarly worded comments by Churchill County (see response to Churchill County comments #81 and #132 above).

Comment 134: 3-15: "How did the Service define "useable spills?"

Response: Those spill volumes that could effectively be conveyed to the primary wetland habitat areas given the existing canal capacities, expected timing of spills relative to irrigation demand, and average volumes of spills.

Comment 135: 3-16: Pg. 3-11, Section 3.2.5.1, "This section talks about historic inflows to Lahontan Reservoir. The Service should not use the projected (after OCAP) diversions when describing historic conditions. Please adjust."

Response: The term "92-year hydrologic simulation period" was replaced with "92-year hydrologic simulation" in Section 3.2.5.1 to clarify the meaning of this section. The 92-year hydrologic simulation was not used, in the context of the discussion in Section 3.2.5.1, to characterize historic inflows under actual conditions. Rather, the 92-year hydrologic simulation was used to estimate the average inflow into Lahontan Reservoir that would have occurred during the 92-year period if OCAP was in place during the entire period. This was used to establish baseline conditions.

Comment 136: 3-17: "Average annual Truckee River diversion have been approximately 194,000 acre feet. Projected diversion under OCAP are expected to be 102,000 acre feet. Please revise this section."

Response: Please refer to the response to comment 135 above. Furthermore, as stated in Section 3.2.5.1, Truckee River imports into Lahontan Reservoir were calculated to be 62,400 AF/year (assuming Truckee River diversions at Derby Dam at 102,000 AF/year under OCAP) in the 92-year hydrologic simulation, which is lower than the average of 194,000 AF of water that was actually diverted from the Truckee River per year during a recent 25-year period.

Comment 137: 3-18 "Why does the Service use 287,700 acre feet per year as the long-term average-350,000 is the historic average, please explain."

Response: The last sentence of the second paragraph of Section 3.2.5.1 was revised to clarify that the 287,700 AF/year refers only to Carson River inflows into Lahontan Reservoir, not total inflows. Truckee River inflows must be added to this amount to derive total inflows into Lahontan Reservoir. In other words, adding 62,400 AF/year of Truckee River inflows to 287,700 AF/year of Carson River inflows brings the total inflow to about 350,000 AF/year. As such, the total amount of water that flowed into Lahontan Reservoir under simulated conditions (92-year hydrologic simulation) was 350,000 AF/year. This does not represent the actual historic average.

Comment 138: 3-19: A table showing the historic average inflows and OCAP adjusted average inflows (BLR model) would help clarify this section.

Response: Section 3.2.5.1 was revised to clarify the difference between actual conditions and simulated conditions (see also responses to comments 135 and 137 above). A table was not added.

Comment 139: 3-20: page 3-12, last sentence: How can actual annual average Lahontan Reservoir outflows be greater than average actual inflows cited on page 3-11: On average, more water was released than flowed into the reservoir. Please clarify.

Response: Lahontan Reservoir inflows cited in Section 3.2.5.1 represent average conditions. These numbers do not reflect extreme or high runoff years when Carson River inflow can be as high as 804,300 AF (1983), but rather reflect an average based on 287,700 AF. When compared to actual flow data for reservoir releases, which include spills, the discrepancy noted by Churchill County exists. Comparison of average total inflow to average Lahontan Reservoir releases, excluding spills, will show releases to be less.

Comment 140: 3-21, Pg. 3-20--"It should be noted that according to the Services' Cui-ui recovery plan that passage of the adult cui-ui over the Truckee River Delta during spawning migration is feasible at a Pyramid Lake elevation level at or about 3,812 ft. above sea level or lower."

Response: Comment noted. The subject of this section is Pyramid Lake elevations and is not the appropriate place in the document to discuss the Cui-ui Recovery Plan or cui-ui spawning requirements. Cui-ui are addressed in Sections 3.13 and 4.13.

Comment 141: 3-22: Pg. 3-21--"What is the cause of the loss of 122,300 to 146,800 AF/year of flows in the Carson River between the 1860's and the 1900's (92-year simulation period.)"

Response: The difference between the 410,000 AF of water that is estimated to have flowed down the Carson River and the 263,200 AF/year that flowed into Lahontan Reservoir during 1912-1992 and the calculated 287,700 AF/year that flowed into the reservoir under simulated conditions is accounted for by diversions upstream from the reservoir (e.g., for agriculture, mining, municipal, and other purposes).

Comment 142: 3-23, Pg. 3-21, "It would seem prudent that an alternative should be developed using between 60,000 and 62,000 AF/year of drainwater as reflected in this section."

Response: As explained in Section 3.3.1 under the discussion of Drainwater Inflow to Primary Wetlands, drainwater inflows to the primary wetlands is expected to drop from 62,000 AF/year (actual 1989 value) to a long-term average of about 30,000 AF/year under baseline conditions, which assumes that 1988 OCAP efficiency targets have been met. Modifications to OCAP are beyond the scope of this EIS.

Comment 143: 3-24, Pg. 3-38, Para. 1: "Has the Service made any attempt to understand or investigate the deep aquifer? If yes, please list studies. If not, why not?"

Response: The Service has reviewed and evaluated the available information relative to the deep aquifer. The Service contracted for two separate studies, Seiler and Allander, 1993, and Maurer and others, 1994, to determine conditions in the aquifers in the affected area. Those and other studies cited within Section 3.3.3, GROUNDWATER, represent the available material and studies that the Service has relied upon for its description of existing conditions.

Comment 144: 3-25, Pg. 3-38, Last Para.: "The Service has indicated that water use rates appear to be greater than recharge, which indicates the aquifer is being mined. What data supports this conclusion?"

Response: Water levels in the basalt aquifer have shown a continued decline while aquifer pumping data from the major commercial and industrial wells has shown a steady increase for the same period. The data that shows the declines in basalt aquifer levels are included in the document (Figure 3.3.G) and the source of basalt aquifer pumping is referenced in the document (Maurer and others, 1994).

Comment 145: 3-26, Pg. 3-41, "If the hydrologic system in Lahontan Valley is still poorly understood, then why is the Service proposing to manipulate hydrology?"

Response: The sentence to which this comment refers was revised to more specifically state that "Groundwater hydrology in the Lahontan Valley..." The Service is not proposing to manipulate underground hydrology. Rather, the Service is proposing to acquire water rights and transfer the application of that water from one location in Lahontan Valley to the primary wetland habitat areas. As required by NEPA, impacts to groundwater recharge were evaluated in the EIS using the best available information.

Comment 146: 3-27, Pg. 3-42, "How did the Service estimate on-farm losses under baseline conditions? What studies or calculations were made to project 48,000 af/yr? Please identify studies."

Response: On farm losses were calculated by subtracting total consumptive use (assumed to be about 2.99 AF/acre/year based on the Alpine Decree) from total farm irrigation headgate entitlement. The remainder represents the volume of water not consumed by crops that has the potential to percolate down as groundwater recharge. The studies that were used are referenced in the text (Maurer and others, 1994).

Comment 147: 3-28, Pg. 3-49, "...why doesn't the Service consider revegetation of fallow lands converted from agriculture?"

Response: The Service has considered revegetation of fallow lands converted from agriculture -- this subject is addressed under Sections 4.4.2, EROSION, 4.4.3, WEEDS, and 4.4.4, EFFECTS ON AIR QUALITY.

Comment 148: 3-29, Pg. "Show erosion C-factor Map."

Response: The Service has revised this section of the EIS and no longer references the wind erosion C-factor map.

Comment 149: 3-30, Pg. 3-50. p 2, Since when is whitetop a native? Please explain."

Response: Hoary cress (whitetop) came from Europe and therefore is not native. The text of Section 3.4.3 was revised to reflect this correction.

Comment 150: 3-31, Pg. 3-50. "The discussion on reclamation success in arid environments is taken out of context. For each story like Bullfrog Mine, there are 40 failures with precipitation under 5 inches. See Bullfrog Mine comments."

Response: Comment noted. Bullfrog mine was used as an example to depict the different extremes that have been demonstrated for revegetation efforts on arid lands. These extremes are represented by NRCS personnel assessments that estimate as long as 100 years and Bullfrog mine revegetation success within four years. The Service assumes that the 100-year-period relates to a climax vegetative community, not to a plant community that would effectively stabilize lands and reduce wind erosion. Regardless, there is no definitive data quantifying the average number of years required for revegetating vacant lands with the goal of stabilizing the land and reducing soil erosion.

Comment 151: 3-32, Pg. 3-50, bottom, "Just because the Service may not be obligated by law to revegetate fallow lands, what about the ethical, moral, and management issues involved? The Service is in the habitat manipulation business and should not try to improve waterfowl habitat at the

expense of secondary wetlands, riparian areas, agricultural lands, and wildlife dependent upon agriculture areas such as upland game birds and deer."

Response: The purpose of Chapter 3 is to describe the existing conditions. Lack of regulations requiring revegetation is an existing condition. Debate and questions regarding ethical, moral issues are not addressed in this section. Revegetation of vacant lands is addressed in the mitigation sections of Sections 1.15, MITIGATION MEASURES IDENTIFIED FOR CONSIDERATION, 4.4.2, EROSION, and mitigation is incorporated as alternatives in Sections 2.5.2 and 2.5.5).

P.L. 101-618 directs that a long-term average of 25,000 acres of primary wetland habitat be sustained over the long term in the Lahontan Valley, which will, as disclosed in the EIS, result in adverse impacts to agricultural lands and some associated wildlife species.

Comment 152: 3-33, Pg. 3-51. Congratulations on an air quality section. Now develop an air quality model. If the Service believes that the desert landscape contributes a lot of particulates, fallow lands and spring winds will provide additional particulate emissions."

Response: Based on the information available, there does not appear to be a connection between air quality problems within Churchill County and the Service's actions to acquire water and water rights for primary wetland habitat. The Service added the air quality section based on comments by Churchill County during an earlier review. Without substantiated information that indicates significant adverse impacts to air quality as a result of the Service's actions, we question the need for our agency to develop an air quality model for Churchill County.

Comment 153: 3-34, Pg. 3-52 top. "Value judgements regarding vegetation types are not appropriate. Low cover is much different than "poor" cover. Define significant.

Response: The term "poor" was replaced with "low percentage" Poor in the context used may be misleading, the more appropriate description should be "low percentage of vegetative cover". The term "significant" was deleted.

Comment 154: 3-35, Pg. 3-52, Para. 3: "The Service has indicated that open burning is a major source of particulates. What studies or evidence do you have that would indicate their contribution to particulate emissions? Where is the supporting data?"

Response: Information related to air quality and assessments of particulate sources came from oral and written communications with Robert Smith, Supervisor, Nevada Bureau of Air Quality.

Comment 155: 3-36, Pg. 3-52, p 5, "Isn't it reasonable that if the major source of fugitive dust in the affected area is from lands with disturbed vegetation and that mitigation needs to be considered for retired ag lands? Please explain."

Response: The sentence to which the comment refers stated that "The major source of fugitive dust will continue to come from the naturally sparse desert areas and disturbed lands where vegetation is removed or destroyed," not just from disturbed lands. As noted earlier in the section, the majority of fugitive dust (89%) comes from the large expanse of naturally sparse desert lands that surround Fallon. Disturbed lands could, by deduction, account for much of the remaining 11 percent of the fugitive dust. The Service does not propose nor anticipate that its actions will result in the disking, tilling, plowing, or leveling (forms of surface disturbance) of farmlands that are acquired as part of its water and water right acquisition alternatives. Surface disturbance of lands within Churchill County

are directly attributable to such practices as farming and the construction phase of development. The mitigation measures identified for disturbed lands are identified in Chapter 4.

Comment 156: 3-37, Pg. 3-52 "How did the Service reach the conclusion that air quality conditions are comparable between the true baseline and the initial 20,000 af purchase? Where is the analysis? Where is the data? Did the Service prepare an air quality analysis in their initial EA? If not why not?"

Response: The Service stated that the conclusions reached relative to baseline conditions for air quality were estimates. There is insufficient information available to complete a more quantitative assessment. The air monitoring station in Fallon has only been in operation for three years, and, therefore, there is no information for air quality prior to implementation of the 20,000 AF acquisition program.

Comment 157: 3-38, Pg. 3-53, Figure 3.6.A, "This figure may represent primary wetland habitat; (palustrine march) in the Great Basin, but it hardly represents all wetlands. Standing water is not a requirement for wetlands. Please review the US Army Corps 1987 Manual, and provide some perspective for the reader regarding the types of wetland habitat manipulations proposed in the DEIS as compared to typical wetlands in the Great Basin. This is a major point that needs to be addressed in the hydrology section and also other section as appropriate."

Response: Figure 3.6.A is a schematic drawing the purpose of which is to portray the main wetland habitats of Great Basin wetlands. It is not sufficiently detailed to cover all wetland habitats in the Great Basin. Wetland habitat manipulations are not within the scope of this EIS; a comprehensive management plan to be developed by the Service will address this issue. Please refer to Churchill County comment #34 for a response to the comment that "standing water is not a requirement of wetlands."

Comment 158: 3-39, Pg. 3-54. "The Service measures wetlands as standing water only? Please provide some background on the monitoring conducted in the past, and that planned for the future to meet the 25,000 acre requirement. The Service admits that some wetlands in the affected area are manmade."

Response: The Service responded to a similar comment from Reclamation regarding the measurement of primary wetland habitat (see response to Reclamation comment #10 above, and to a similar question from Churchill County, #34 above).

Comment 159: 3-40, Pg. 3-55. "Definition of primary wetland habitat needs to be presented more than once because it has such strong connotations and ramifications throughout the EIS process."

Response: In response to this comment, the definition of primary wetland habitat was added to the beginning of Chapter 2 and Chapter 3 to supplement the three times that it was defined in the DEIS (Section 1.2 PURPOSE OF THE PROPOSED ACTION, Section 3.6.1 PRIMARY WETLAND HABITAT, and in the Glossary).

Comment 160: 3-41, Pg. 3-55. "Aerial surveys are appropriate as long as USACOE 1987 Manual protocol are followed. Reluctance to even contact the Corps on the part of the Service provides evidence that the whole wetland hydrology accounting used in the EIS is artificial."

Response: Comment noted. As explained in the response to Churchill County's comment #34, there is a distinct difference between jurisdictional wetland delineation (Army Corps of Engineers) and the delineation of wetland habitat.

Comment 161: 3-42.Pg. 3-55. "What are the level of contaminants found in the primary and secondary wetland habitat, including water, sediment and biota? It must be determined that before additional waters are placed in these habitat areas, that they be determined to be safe for wildlife."

Response: One of the purposes of this document is to assess the potential impacts associated with the acquisition of water and water rights for primary wetlands in the Lahontan Valley. The existing levels of contaminants within the Newlands Project and the primary wetland habitat areas are not the focus nor the purpose of the alternatives. Information relative to contaminants and the available studies and references on water quality within Lahontan Valley were documented in several sections including Sections 3.3.2., 3.14.1, 4.14. Based on available information, the primary wetland areas are suitable for wildlife.

Comment 162: 3-43. Pg. 3-56. Last Para: "In 1992 primary wetland habitat had dropped to 845 acres due to severe drought and changing conditions in the Newlands Project. Please describe what are changing conditions."

Response: Drainwater inflows to the primary wetland habitat areas have decreased as a result of improved irrigation delivery efficiency.

Comment 163: 3-44, Pg. 3-56, top, "...Is the baseline condition in the present or the future?..."

Response: The baseline condition represents conditions that are estimated to exist when the 20,000 AF acquisition program has been completed and the 1988 OCAP delivery efficiency targets have been fully achieved. As such, use of the term "would" is necessary in some cases.

Comment 164: 3-45, Pg 3-56. "Refuge Management plan should be summarized or at least referenced better as being in the Appendices."

Response: Such information is provided in Section 3.6.1 PRIMARY WETLAND HABITAT, and the plan is reproduced in Appendix 2. Appendix 2 is referenced in this section.

Comment 165: 3-46, Pg. 3-57. "Why do these figures include Sheckler Res., Sagouspe Dam, and the Old River Reservoirs? If secondary wetlands don't count, why describe them?"

Response: Secondary wetlands are discussed in Sections 3.6.2 and 4.6.2. The document does not state that secondary wetlands don't count, and addresses impacts to them. However, secondary wetlands are not designated as Lahontan Valley wetlands in Public Law 101-618, and will not benefit from water rights acquisition.

Comment 166: 3-47. "Where is the legend?"

Response: Comment noted.

Comment 167: 3-48. Pg. 3-57, Table 3.6.A "How did the Service determine wetland acreage in this table? Please explain."

Response: These acreage figures were determined based on aerial surveys and mapping of the wetland habitat.

Comment 168: 3-49. Pg 3-58, Para 4. "How did the Service estimate the long-term wetland acreage from Fernley WMA?"

Response: Based on aerial surveys of wetland habitat acreage.

Comment 169: 3-50, Pg. 3-58. "How is it that the Canvasback Gun Club is able to maintain wetland habitat with slightly over 2 AF of water rights per acre of wetland? Are they able to use available spills and return flows?"

Response: Canvasback Gun Club wetlands are maintained on about 7.7 AF/acre/year as explained in more detail in the response to Churchill County comment #82 above.

Comment 170: 3-51, Pg. 3-61. "Provide acreage estimates by vegetation type. Show map for all types of vegetation in the affected area."

Response: Acreage data for all vegetation types in the Affected Area have not been tabulated nor have they been delineated for mapping purposes, and are therefore unavailable to the Service for the affected area.

Comment 171: 3-52, Pg. 3-62, bottom. "If 12,100 acres of primary wetland habitat can be sustained by the baseline condition, then only 12,900 more acres need to be accounted for. That amounts to only about 65,000 AF. Why is the Service proposing to acquire more?"

Response: The Service responded to this under Churchill County comment # 71, above.

Comment 172: 3-53, Pg. 3-63, p.3, "What is a riparian scrub?"

Response: As explained in Section 3.7.2 RIPARIAN PLANT COMMUNITIES, to which this comment refers, "Riparian scrub includes broadleaved, deciduous willow thickets, with abundant narrow-leaved willow, yellow and shining willows."

Comment 173: 3-54, Pg. 3-63, last p. Middle Carson River is not unique. What is a complete habitat? Does the author mean undisturbed?"

Response: A unique habitat, in this context, refers to a habitat that is found on few other sites within a certain geographic location. A complete habitat, in this context, refers to a habitat that encompasses a full range of ecological components and processes necessary for it to be considered functional.

Comment 174: 3-56, Pg. 3-65, top. "Alfalfa and pasture grasses survive without any irrigation in areas with about 8-10 inches of precipitation or more. Consumptive use is not applicable. Please explain."

Response: The County's statement that alfalfa and pasture grasses survive without irrigation in areas with low precipitation rates appears to be correct. The soils in those areas would most likely be saturated by shallow groundwater and the key to such vegetative survival can be traced to the plants' ability to draw from shallow groundwater to meet its consumptive use demand.

Comment 175: 3-57, Pg. 3-66--Should note that it is the "lower" Carson River that the fishery is seasonal."

Response: This suggested change was incorporated.

Comment 176: 3-58. Pg. 3-67. "Since impacts are expected to occur in the lower Truckee River, Pyramid Lake and their associated fisheries there needs to be a more comprehensive discussion incorporated in this document."

Response: Pyramid Lake fisheries are discussed in sections 3.8, 3.13, 4.8, 4.13, and 4.26.7.

Comment 177: 3-59. Pg. 3-68. "Spell out what has caused the changes in the lower Truckee River riparian environment."

Response: These factors that have affected the Lower Truckee River riparian habitat are discussed in Section 3.7.2, RIPARIAN PLANT COMMUNITIES, which has been slightly revised.

Comment 178: 3-60. Pg. 3-69. "Should note that the decrease in waterfowl between the early 1970's and 1989 are reflective of decreases throughout the Pacific flyway and most of North America and not just due to factors in the Lahontan Valley. This section should be revised to reflect that these population trends are consistent with that of the Pacific flyway for that same period because generally speaking, poor conditions exist all over."

Response: The Service agrees that waterfowl use of the Lahontan Valley is influenced by factors existing in the Lahontan Valley as well as factors that influence the Pacific Flyway waterfowl populations as a whole.

Comment 179: 3-61, Pg. 3-71. "It is obvious for the first time in this EIS that the FWS manages for waterfowl habitat not for wetlands. The 10-16 inch water depth and emergent vegetation managed for, are much different than the criteria used for wetland delineation and management."

Response: Comment noted.

Comment 180: 3-62. Pg. 3-71, para. 2: "Ag lands are not credited elsewhere in the document with providing forage and diversity for some species."

Response: This statement is incorrect. Sections 3.9.4, PASSERINES, 3.9.5, RAPTORS, 3.9.6, OTHER BIRD SPECIES, 3.10, MAMMALS, and 3.15, BIODIVERSITY also discuss the use of farmlands by wildlife.

Comment 181: 3-63. Table 3.9.A "Do these waterfowl production figures for 1972-77 for the Stillwater NWR include the area which was then known as the Stillwater wildlife management area?"

Response: Yes.

Comment 182: 3-64. Pg. 3-75. "The long-billed curlew is an upland nested as stated on page. 3-88."

Response: Long-billed curlews nest in the drier areas of the wetland marsh habitat, as well as in upland areas.

Comment 183: 3-65, Table 3.13 A. "This table is incorrectly labeled as candidate species make up the majority of those species listed in the table. The Mountain Plover, long-billed curlew, and yellow billed cuckoo have been omitted from the table."

Response: The table has been revised accordingly. Note that Category 2 Candidate and Category 3 species were dropped from the Service's list of candidate species after the DEIS was distributed.

Species listed as Category 2 Candidate species in the DEIS are called species of concern in the FEIS.

Comment 184: 3-66, Pg. 3-80, bottom. "American kestrel is a good example of a species that would lose habitat from the proposed project. Only beneficial impacts to fish and wildlife are presented."

Response: The discussion on this page identifies conditions that exist whether the Service takes action or not (i.e., baseline conditions). The impacts to biological resources associated with the proposed Service's alternatives are appropriately discussed in Chapter 4.

Comment 185: 3-67, Pg. 3-85. "Describe the rationale for including species in the Truckee River and Pyramid Lake."

Response: The Truckee River and the river's mouth to Pyramid Lake is considered part of the affected area. Inclusion of this area into our environmental assessment was requested by Churchill County during discussion of the provisional draft document.

Comment 186: 3-68, Pg. 3-86. "Table 3.13.A. Five bird species listed as threatened and endangered by the FWS rely at least partly on ag. lands and riparian areas. The FWS needs to provide a Biological Evaluation for each species that could be potentially affected by the proposed action and/or its alternatives. Describe impacts to these species in Chapter 4."

Response: A Biological Evaluation has been completed for the Preferred Alternative in the final EIS and is included as Appendix 9. Other impacts to these species are discussed in Section 4.13.

Comment 187: 3-69, Pg. 3-90, para 2. "Is this level of TDS average, maximum, or what. Provide data for trace metals, and compare to standards."

Response: Whether TDS levels are average, high, low, or maximum depend on the standard against which comparisons are made (e.g., historic levels, shorebird management). The differences between historical averages (170-270 mg/L) are substantial when compared to existing conditions (1,170 mg/L) (Kerley and others, 1993). Trace metal data is provided in Section 3.3.2 SURFACE WATER QUALITY and is referenced in this section.

Comment 188: 3-70, pg. 3-90-91. "Need to show the level of toxicity in the wetlands, preferably in table form, by element, with the associated standards."

Response: Based on the potential level of impacts to toxicity and disease from the Proposed Action and alternatives, the three page section, as written, adequately documents and discloses toxicity and disease.

Comment 189: 3-80, para. 3. "Last sentence refutes FWS arguments regarding the effects of toxics. Please clarify."

Response: Whereas the results of studies have suggested there may be a cause-and-effect relationship between deformities and contaminants, there is no conclusive evidence that contaminants have caused deformities in the Lahontan Valley.

Comment 190: 3-91. "No discussion of Lyon County or Truckee River Agriculture Products or receipts. Discussion needs to be included in this baseline."

Response: Truckee River Agriculture Products or receipts will not be affected by the Service's action to acquire water and water rights for Lahontan Valley wetlands.

The Service included discussion of Lyon County agricultural products, receipts, and production based on the limited data for that portion of Lyon County that is within the affected area. While there is countywide data for Lyon County, the Service's ability to describe the resources or products that pertain to the small portion of Lyon County affected by the Service's Preferred Alternative is limited. The discussion of Lyon County economic factors is included in the text of Section 3.16.1, AGRICULTURAL PRODUCTS AND RECEIPTS and in Section 3.16.2, EMPLOYMENT AND INCOME.

Comment 191: 3-92, Pg. 3-96, 4 para. "Cattle and calves inventory for Churchill County ranged from a high of 78,000 in 1983 to low of 40,000 in 1993. Suggest using an average since market and hydrologic conditions have impacted livestock numbers. Avg. 60,000 1980 to 1993-Nevada AG. Statistics."

Response: The Service chose the 1994 livestock data as a representative of existing and baseline conditions (20,000 AF of water acquired) because it represents the most current data. The County's comment that this inventory varies from year to year is noted, but the Service will continue to use the 1994 value as a baseline condition to assess possible impacts or changes that may result in that inventory as a result of the acquisition of water and water rights.

Comment 192: 3-93. "Include a date on Table 3.16.A."

Response: A date has been added.

Comment 193: 3-94. "Need to discuss affects of drought conditions on agriculture in the region in terms of agricultural output."

Response: The Service's Proposed Action will not impact drought conditions. Drought conditions occur naturally and regardless of the Service's actions. The impacts of such naturally occurring conditions have no relevance to the assessment of potential impacts associated with water and water right acquisition.

Comment 194: 3-95. Pg. 3-98, Para 1: "How much alfalfa is shipped from Churchill County to out-of-state regions? Is is approximately 20 percent?"

Response: Sunding's report, Appendix 6, assumes that about half the alfalfa produced in Churchill County is consumed locally. About half the alfalfa produced is assumed to be shipped out of state.

Comment 195: 3-96. Table 3.16.c. "Need to define industry output-gross sales?"

Response: Industry output is defined in Section 3.16.1 AGRICULTURAL PRODUCTS AND RECEIPTS. Gross sales can be defined citing Webster's Dictionary as "whole; entire; total; of earnings, as opposed to net" pertaining to sales in this context. The term "industry output-gross sales" was not used in Table 3.16.C.

Comment 196: 3-97. Table 3.16.D. "Need to estimate agricultural related income. What is the date on this table? Need to show the estimated number of indirect jobs generated due to agriculture."

Response: Agricultural related income is discussed in Sections 3.16, 3.16.1, and 3.16.2. Jobs created indirectly by agriculture are addressed in Section 3.16.2. A date was added to the table.

Comment 197: 3-98. "There is no discussion of farm income for Lyon Co. and the Truckee River. Please provide."

Response: Truckee River farm income will not be impacted by this action. Lyon County farm income (\$13,727,000 annually) is stated in Section 3.16.2 EMPLOYMENT AND INCOME.

Comment 198: 3-99. Pg. 3-105. "Section 3.16.3 should be moved to the soils section."

Response: Moving parts of Section 3.16.3 to a soils section is one of several possible ways of presenting the information. It was decided, for the purposes of this document to discuss the material under a section entitled Farmlands.

Comment 199: 3-100. Pg. 3-105, Para.3. "The Service needs to demonstrate compliance with the prime farmlands protection act rather than simply consider these "values". Please rewrite this sentence."

Response: Section 3.16.4 has been revised. Please also refer to General Comment V.

Comment 200: 3-101. Pg. 3-106. "Please define what is meant by use-days. Need discussion between use-days and hydrologic conditions. It appears that a strong correlation exists."

Response: Simply stated, one use-day refers to the use of a recreation area for one day; two use-days refers to the use of a recreation area by one person for two days or by two persons for one day; etc. The Service concurs that there appears to be a strong correlation between hunting and fishing use with full wetland conditions. Such a relationship further supports the Service's estimates that recreational users will benefit from the more permanent primary wetland habitat areas that will result from any of the action alternatives.

Comment 201: 3-102.Pg. 3-107, Para. 4: "Last sentence move to chapter 4."

Response: The sentence was moved to Section 4.26.6, TRANSFER OF CARSON LAKE.

Comment 202: 3-103. Pg 3-107, Para 1: "Please reference data or other information which would allow you to conclude that half of visits to the wetlands were for general recreation."

Response: This conclusion is based on Meyer's recreational survey data for the area (Meyer, 1993), results of which were summarized on page 3-106 in Table 3.17.A. A reference to this table was provided on the paragraph preceding the one to which the comment referred.

Comment 203: 3-104. Pg. 3-107, Regulating Reservoirs. "What constitutes a "secondary" recreation use? Change this sentence."

Response: The sentence to which this comment refers addresses recreation as a secondary use not secondary recreation uses. A secondary use is a use that is subordinate to the primary use of an area. For instance, in regard to regulating reservoirs, recreational use is secondary to the primary use of the reservoirs for storing irrigation water.

Comment 204: 3-105, Pg. 3-111 Table 3.17.C: "Averages are confusing-don't correspond to reported expenditures. Please explain or adjust."

Response: An explanation of the figures in Table 3.17.C is included in the accompanying text. The Service recognizes that the information in this section is complicated, but based on the concerns of the public and specifically Churchill County regarding anticipated economic benefits associated with improved recreational opportunities, the Service chose to present a relatively thorough disclosure of the economic information rather than present a more simplistic assessment.

Comment 205: 3-106. "Please define the type of hunting in the USFWS national survey for --is it big game or wetland related? It is hard to imagine that local users would spend \$77 per day hunting at wetlands. Use only figures applicable to wetlands and not the entire State.

Response: The Service and the economic consultants it referenced agreed with the County's assertion that \$77 per day was high for Lahontan Valley wetlands. Those figures were adjusted to \$27.30 per day based on weighted averages using other sources of data that were based on waterfowl hunting only.

Comment 206: 3-107. "Please identify the type of game-fish which are available at Stillwater. In Section 3.17.1, the Service did not identify fishing as a recreational use of the wetlands. Please clarify."

Response: The type (species) of fish found in Stillwater NWR were identified in Section 3.8, FISH. In the past, bass, crappie, catfish, and sunfish were all found in the Stillwater NWR wetlands, but since the drought of 1990-92 the populations of these sport fishes have declined. However, with increased water inflows during 1995 and 1996, fish populations likely will rebound. Fishing was identified as a recreational use of the wetlands at the beginning of Section 3.17.1. The sentence was revised to clarify that some fishing occurs when water conditions are conducive to sustaining game fish populations.

Comment 207: 3-108. Pg. 3-112. "Does Stillwater generate users fees? If so, how much?"

Response: No, the Stillwater NWR and Stillwater WMA are open to the public and no user fees are charged for recreational use.

Comment 208: 3-109. Pg. 3-112: What are the use related expenditures for Lahontan Reservoir? Are the national Survey numbers appropriate for Lahontan Reservoir? What are the expenditures for water sports users at Lahontan Reservoir.?"

Response: The recreational use expenditure data available on Lahontan Reservoir is discussed in Section 3.17.2. National survey numbers are not applied to Lahontan Reservoir.

Comment 209: 3-110, Pg. 3-112, Table 3.17.D: "This table is intentionally used to underestimate Lahontan Reservoir economic contribution. Need to include recreational expenditures for Lahontan in this table."

Response: The last sentence of the Lahontan Reservoir Expenditures was modified to reflect that user fees account for only a portion of recreational expenditures associated with Lahontan Reservoir.

Comment 210: 3-111. "Total use at Lahontan is 10 to 15 times greater than reported for the Wetlands. Total expenditures are probably at least 10 to 15 times that reported for the wetlands."

Response: Comment noted. Please see the response to Churchill County comment #209 above.

Comment 211: 3-112. Pg. 3-113, para.4. "Does cultural and recreational facilities refer to wetlands?"

Response: Although "facility" may not refer to wetlands directly, the facilities to which the Mooney and Associates' survey referred could potentially include facilities associated with the wetlands as they provide recreation opportunities.

Comment 212: 3-113. Section 3.17.4. Non-use values should be excluded from this section unless a more balanced approach is shown.

Response: Comment so noted. Please refer to the last paragraph in this section that explains the Service's position on non-use values in this document.

Comment 213: 3-114. "A map showing different land use patterns needs to be included in this section. Also include a map of developed/urbanized areas. Need to discuss zoning of parcels acquired and development densities."

Response: The Service requested such information from Churchill County in a letter dated December 14, 1993. County administrators responded, in a letter dated December 21, 1993, that they would be unable to provide such information by the timeline identified by the Service, but would attempt to provide as much of the requested information to the Service at a later date. This information has not yet been received.

Comment 214: 3-115. Pg 3-120. last Para. "What is the total acreage of the 100 new parcels and what is the current land use zoning for each parcel?"

Response: The Service contacted the Churchill County assessor's office (5/19/96) and found that it was impossible to extract information that would correlate changes in agricultural use to residential use. The assessor records can give the number of new parcels, however there is no way to track the past use of these parcels, i.e., whether they were previously agricultural lands or vacant lands. According to a study on Residential Land Use in Churchill County, by Mary Reid and Kevin Kesler, (See LVEA comments, Appendix 11, Exhibit F. Part II.) total residential units in Churchill County increased from 6,142 in 1989 to 7,914 in 1995, a 20 percent increase in six years. The number of units in the City of Fallon increased 23 percent, from 2,605 to 3,193. The number of units outside Fallon increased 33 percent, from 3,537 to 4,721 units. This information has been incorporated into Section 3.19, LAND USE. The LVEA study also shows that total privately owned, taxable irrigated acreage classified as cultivated and pasture in Churchill County was reduced by 17.5 percent from 1987 to 1995.

Comment 215: 3-116. "Please describe Lyon County land use in the affected areas as well as lands along the Truckee River."

Response: Section 3.19 was revised to include information on land use in Lyon County along the Middle Carson River corridor. The Service does not anticipate that land use along the Truckee River will be affected by any of the alternatives.

Comment 216: 3-117. Pg. 3-121. "Land values need to be updated due to changing market conditions."

Response: The Service specified the date of the values. Market conditions change continually and the Service will attempt to update figures when information is available and is germane to the decisions to be made by the Service.

Comment 217: 3-118. Pg. 3-122. Table 3.20.A: "Need to indicate that these are non-water righted parcels. Recent data indicates that vacant agricultural lands have sold for \$3,500/ac. to \$5,500/ac."

Response: Values shown for vacant agricultural land are for water-righted parcels as disclosed in the text of Section 3.20, LAND VALUES.

Comment 218: 3-119. Pg. 3-123. "Need to show budget for municipal services provided."

Response: It does not appear that the budget of municipal services is needed for assessing the impacts of the alternatives presented in this EIS. See also the response to Churchill County comment # 213 above.

Comment 219: 3-120, Pg. 3-124. "Section 3.22.3. need to show population and sewage use projections."

Response: Projections for "sewage use" are not relevant to this EIS because Churchill County does not have a sewer system. Nearly all Churchill County residents rely on private septic systems. Population projections are included in Section 3.18, POPULATION CHARACTERISTICS.

Comment 220: 3-121. "Need to include well drilling costs per foot. Also need to describe costs of surface water treatment and distribution system."

Response: Drilling costs are not relevant to descriptions of baseline conditions nor are they relevant to decisions related to the acquisition of water and water rights in general. The Service disclosed the anticipated costs of developing water wells to supply water for wetland protection in Alternative 5. Those costs included the expected costs the Service would have to incur to drill water wells.

Costs of a surface water treatment and distribution system is not relevant to describing baseline conditions. Churchill County has, within the past year, commissioned a feasibility study for a possible water treatment and distribution system for Lahontan Valley.

Comment 221: 3-129. Pg. 3-129--Cold Springs and Sand Springs Pony Express Stations are not archaeological sites, however they should be listed as historical sites. The document lacks data on the paleontological resource existence and its significance. If there is none, it should be so stated here.

Response: Cold Springs and Sand Springs Pony Express have been deleted from the list of archaeological sites and appropriately listed as historical sites. There is no data to suggest the existence of paleontological resources in the affected area.

CHAPTER 4

Comment 222: 4-1. "General Comment. The Service's analysis assumes that agricultural operations will continue as water is removed from lands. It is true that some dairy operations could continue without significant amounts of water righted lands. But once farms and ranches are purchased and water rights moved to wetlands, lands will no longer be productive."

Response: The Service assumes that some agricultural operations will continue, i.e., cattle and dairy. It also assumes that some productive lands may be brought back into production as a result of farmers transferring eligible water rights from less productive lands to more productive lands. While there is no information or data to determine how often or readily private individuals would opt to do so, it is technically feasible.

Comment 223: 4-2. "How many parcels currently acquired by the Service, continue to produce agricultural product?"

Response: One.

Comment 224: 4-3. Pg. 4-2--"having Table 4.2.A in this section is meaningless when you have to go 68 pages to read the discussion related to the table. Move the table to Section 4.16."

Response: Your comment is noted, but Table 4.2.A also addresses Newlands Project irrigated acreage base, a physical resource that is evaluated in this section.

Comment 225: 4-4. Pg. 4-3. Reduction in irrigation deliveries in alternatives 2 through 4 will result in significant reductions to inflow into the Lahontan Valley aquifer. Significant impacts would result in lowering the water table, a decrease in water quality and decreased groundwater availability for the Valley's 5,000 wells. A reduction in farm delivery, applied to the land, will reduce the amount of drain water available to the primary and secondary wetlands, thereby reducing the secondary wetlands and requiring additional water purchases for the primary wetlands. These impacts need to be described here."

Response: The Service indicated, in Section 4.3.3, that there may be impacts to shallow aquifer recharge as a result of the Proposed Action and alternatives. However, the Service is unaware of any data to indicate that "significant" reductions to inflow into the Lahontan Valley aquifers would occur. Recharge to the deeper basalt aquifer does not appear to be directly linked to irrigation losses. There is insufficient information to analytically define how changes in irrigation delivery would ultimately impact groundwater levels and domestic supply in Lahontan Valley. Impacts to Water Quality are discussed in Section 4.3.2, impacts to recharge and groundwater levels are discussed in Sections 4.3.3, and impacts to secondary wetlands are addressed in Section 4.6.2.

Comment 226: 4-5. Pg. 4-4, p.3, "There is no logic in the concept of reduced irrigation demand under the proposed action. The Service needs to be more sensitive to the lost livelihood of some farmers as a result of the proposed action. Some irrigation demand would be eliminated by purchases."

Response: Impacts related to the livelihood of farmers is described in Section 4.23, EFFECTS ON SOCIAL VALUES. The farmers that would sell their water rights to the Service under any of the alternatives considered are willing sellers. They have chosen, for whatever the reason, to sell their private property.

Comment 227: 4-6. 4.2.3.1--"This is not an impact analysis, but a summary of the existing environment."

Response: Correct. The No Action Alternative is provided to allow easy comparison of the baseline condition and the Proposed Action and action alternatives.

Comment 228: 4-7, Pg. 4-5. "The Service's perspective as to mitigation is well understood, however mitigation of real impacts must be addressed in this document. Mitigation to replace loss of available groundwater and decreased water quality must be included in this document."

Response: Later sections of the EIS (Section 4.3.3 GROUNDWATER) focus specifically on impacts to groundwater and mitigation measures for such impacts. Bureau of Reclamation Response #20, above addresses water quality.

Comment 229: 4-8, Pg. 4-7--4.2.3.2. "This is not impact analysis, but just a reiteration of the existing analysis."

Response: The Service responded to the same comment above (See response to Churchill County comment #227).

Comment 230: 4-9, Pg. 4-7--Alternative 2. Studies have been enumerated, drainwater quality has been detailed as to the adverse effect on fish, wildlife and wetland habitat however there is no data contained in section 3.3.2 that shows such an effect. It is inferred that data quoted would show these impacts, however the data needs to be included that shows such impacts are occurring or are likely to occur. It may be that periodic flushing as would occur in a terminal wetland is on-going and such impacts are not occurring.

Response: Information discussing the effects of existing drainwater conditions are covered in Section 3.3.2, SURFACE WATER QUALITY, Drainwater Quality, but the reader may also want to refer to Section 3.14.1 TOXICITY for other information on contaminants. It is questionable whether altered surface hydrology throughout the Lahontan Valley under existing conditions would effectively flush the wetlands and reduce the accumulation of contaminants.

Comment 231: 4-10. Section 4.2.3: "What are the consequences of the deliveries and flows? Reduced farm demand, and a whole host of other socio-economic impacts that should be referenced."

Response: The influence of the Newlands Project is often linked to other resources as the County suggests. The impacts associated with the Proposed Action and alternatives are addressed in the document, resource by resource.

Comment 232: 4-11. Pg 4.8--4.2.3.3. "Here again there is no impact analysis as to spills. If an analysis had been completed it would not be so difficult to identify a mitigation strategy. The operator has stated that there is a larger capacity for conveyance of spills, however this has been ignored by the Service. How would drainflow assurances provide for suitable quality of drainwater for wetland protection. If such can be accomplished, it should have been the subject of an alternative, rather than de-emphasizing the use of drainwater and relying on a water purchase strategy that will never be realized."

Response: The Service has responded to similarly worded comments by Churchill County regarding spills (see response to Churchill County comments #81 and 134, above).

Drainwater assurances, as the Service envisions such a concept, would be a plan developed by local irrigator representatives (i.e. TCID, NWPA, and Churchill County) to provide the Service with a guaranteed volume of drainwater, based on average hydrologic conditions. If implemented, such a strategy could reduce the amount of water rights converted from farm irrigation to wetland irrigation in order to meet the Service's wetlands protection objectives. Drainwater inflows to the primary wetland

habitat areas could be increased by curtailing or altering some of the following existing uses of drainwater: support for grazing at Carson Lake and Pasture; drainwater pumpbacks; and pump permits for construction and dust control. In addition, water routing within the Carson Division could be modified to insure more drainwater reaches the primary wetland habitat areas. Assurances or guarantees to provide drainwater volumes to the primary wetland habitat areas in excess of baseline conditions identified in this document would reduce the demand the Service has for acquiring irrigation water rights.

Comment 233: 4-12. Pg. 4-8, p 5. "Last sentence contradicts statements in Chapter 3 regarding the use of spills for wetlands."

Response: Although most spills are contained for use in the wetlands, canal capacities often limit their use, as stated in the paragraph that followed. A portion of the sentence has been deleted.

Comment 234: 4-13. Page 4-9. "Where do spill calculations come from?"

Response: The BLR Model coupled with the Truckee River model (NSM) was used to calculate average, total, and frequency of spills. The logic and mathematical equations are offered in Appendix 5 in the BLR Model Documentation and User Guide. The Service also responded to County concerns about spills on comments #81 and #134 above.

Comment 235: 4-14. Page 4-9 "Mitigation section is a total cop out. Of course it is difficult."

Response: Comment noted.

Comment 236: 4-15. Pg. 4-12 "What is the basis for concluding no increase in OCAP efficiency?"

Response: The BLR Model results reflect conditions, including calculated irrigation delivery efficiency, associated with shifting irrigation deliveries from farmlands to wetlands for baseline conditions and each of the alternatives. The results of those analytical calculations are presented in this section along with an explanation of why efficiency rates are anticipated to improve.

Comment 237: 4-16. Pg. 4-11—"The Services' acquisition strategies listed in Section 2 consist only as to a willing seller at the lowest cost. Nothing else in that section is committed to that would act to prevent checkerboarding and leading to impacts as to decrease efficiency."

Response: The Service disagrees. Location, Indirect Cost Savings, and Protection, as described in Section 2.6.4, Acquisition Strategy, could all act to prevent checkerboarding and decreases in efficiency. Each acquisition is evaluated on a case-by-case basis with consideration for these acquisition strategy objectives.

Comment 238: 4-17. Pg. 4-12—"Mitigation for project efficiency is being carried out outside this proposal and many of those proposals have already been carried out by the Bureau of Reclamation and the project manager. Project efficiency is a farce, since a considerable amount of the waters lost in the system flow to the wetlands as returnflows, ie-that amount that is lost from the canals and regulating reservoirs, is counted against "efficiency" yet if that same amount of purchased irrigation water is delivered to the primary wetlands it is beneficial and not charged against the wetlands. Authority to implement changes in the Newlands Project lies with the project manager who works under agreement for the BOR. If the Service were to become the majority user of waters in the Newlands Project, would not the Service become the loudest voice on the Newlands Project District Board and be able to implement change?"

Response: It is the policy of the Secretary of the Interior and the Service that Federal representatives **do not** sit on local boards (such as TCID), commissions, or in the place of elected officials. The Federal Government's authority over Newlands Project operations is vested with Reclamation and carried out under OCAP. Changes relative to Newlands Project operations would occur through Reclamation as modifications or revisions to OCAP.

Comment 239: 4-19. Page 4-17: "The last sentence suggests that no mitigation is required... Then why describe it for a whole page previous. Mitigation is only meaningful if implemented and committed to in the document. Rarely does the Service commit to any mitigation. This is important and unacceptable."

Response: The County's point is well taken. The Service addressed Lahontan Reservoir storage concerns at the request of Churchill County after the County reviewed the provisional draft document, but that section of text was accidentally included as mitigation rather than in the more appropriate impact analysis section. Text has been moved, and unnecessary verbiage deleted.

Comment 240: 4-20. page 4-21: "Insufficient information is not a suitable reason to not calculate losses from the Truckee Canal. Find reasonably accurate information."

Response: The Service has calculated the expected Truckee Canal losses (see Section 3.2.7, DERBY DAM AND THE TRUCKEE CANAL), but it is the percentage of those losses that recharge groundwater that is lacking documented information. The Service has also evaluated potential changes in Truckee Canal flow volumes as a result of the alternatives considered in this document and found those changes to be small and unlikely to result in any adverse impacts. Regarding the County's assertion that insufficient information is not a suitable reason for not calculating losses, §1502.22 of CEQ Regulations that state; "When an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and there is incomplete or unavailable information, the agency shall always make it clear that such information is lacking."

Comment 241: 4-21. page 4-21: "Here again there is no impact analysis. What are the beneficial impacts to the Pyramid Lake fishes? Would not reduced flows in the Truckee Canal result in reduced water losses? How about the impact to the aquifer in the Fernley area and the Bench/Hazen area? Would not a reduced flow in the Truckee Canal result in overall reduction in storage in Lahontan reservoir, rather than larger storage figures, thereby reducing the overall level of recreational uses? Would not a smaller reservoir pool during the winter result in reduced fisheries production? Rather than reiterate the existing environmental figures from Chapter 3, there needs to be analysis of impacts."

Response: The Service does not find sufficient hydrologic information to support the County's conjecture that all of the water related resources on the Lower Truckee River, Fernley, Hazen, and Lahontan Reservoir are directly linked to Truckee Canal flow volumes. The Service has evaluated the consequences of the alternatives considered and found there to be no adverse environmental impacts. Truckee River, Pyramid Lake, and impacts to lake fishes are discussed in later sections under those headings (See Sections 4.3.1, SURFACE WATER QUANTITY, 4.8, EFFECTS ON FISH, and 4.13, EFFECTS ON ENDANGERED, THREATENED, AND SENSITIVE SPECIES.) Anticipated impacts to Fernley area aquifers, Lahontan Reservoir storage, and recreation are described respectively in Sections 4.3.3.1, Groundwater Recharge and Levels, 4.2.5, LAHONTAN RESERVOIR OPERATIONS, and 4.17, EFFECTS ON RECREATION.

Please also refer to comments made by Reclamation comment #19, where Carol Grenier, professional Engineer, discusses the relationship of canal flow volumes and seepage losses, which support the Service's conclusions.

Comment 242: 4-21. "4.3.2 Surface Water, Show some data beyond TDS."

Response: The most complete and reliable data set available relative to water quality are TDS values. The Service believes this to be a technically sound measure of general water quality.

Comment 243: 4-22, Churchill County again has commented on its objection to the use of the BLR Model by the Service in estimating values and that the use of the model to make comparisons of alternatives is inappropriate.

Response: The Service does not agree with Churchill County regarding the use of the BLR Model and Negotiated Settlement Model (NSM) to provide comparative analysis. The Service has responded to similarly worded Churchill County comments (see response to Churchill County comments #10 and #127 above).

Comment 244: 4-23. page 4-26--"What is the impact of not using drainwater in alternative 4? Where will this water go? What impacts will it create? Would this be an annual source of waterfowl diseases? Will a new conveyance system need to be constructed? What will be the impacts of such a system? No impact analysis has been conducted, therefore it is predictable that the Service would find no need for mitigation.

Response: There are both beneficial and adverse impacts of not using drainwater. Not using drainwater requires the acquisition of about 6 percent more of the agricultural water-righted farmland than the Proposed Action and about 32 percent more than the Preferred Alternative (an adverse impact). The benefit of this alternative is that water quality of those waters used to sustain primary wetland habitat is anticipated to be better than any of the other alternatives.

As stated in Section 2.5.4, ALTERNATIVE 4, if drainwater did reach the primary wetland habitat areas, it would be separated and disposed of in sumps. The Service would have concerns regarding possible contamination of waterfowl and other marsh dependent species. Section 4.6.1, PRIMARY WETLAND HABITAT, states that protective management would be required under this alternative to prevent use of sumps by waterfowl and other wildlife. At Carson Lake, Stillwater NWR and at the Fallon Tribal wetlands, existing structures and drains provide sumps for disposal of drainwaters. The Service expects that these existing facilities would be put to use and operated as sumps, therefore no new construction has been identified under this alternative. If Alternative 4 was implemented and it was deemed necessary to construct new conveyance systems, the Service would prepare the appropriate environmental assessment documents consistent with NEPA before taking action.

Comment 245: 4-24. page 2-27--"What will be the water quality in the wetland areas by alternatives?"

Response: As noted in Section 4.3.2, SURFACE WATER QUALITY, water quality within the primary wetland areas will improve under Alternatives 1,2,3, and 4. There are variations of Alternative 5 in which water quality can be expected to improve over baseline conditions, but this cannot universally be said of the alternative. There is insufficient data, studies, or techniques to reasonably calculate TDS values that would occur in the wetlands under each of the alternatives.

Comment 246: 4-25, page 4-27, paragraph 1: "The Service has no indication that the surface water quality in the affected area would be adversely impacted from its Proposed Action or alternatives." -- Churchill County comment -- "As part of the proposed action lands that were previously irrigated, causing downward percolation of water and leaching of salts in soils, will no longer be irrigated. As the salts in soils are thought to be naturally occurring, if irrigation stops salts in the soils could build up impacting surface water in contact with it. Maurer (1994) discusses the potential impact which needs to be addressed. Maurer states on page 58 that "Higher concentrations prior to widespread irrigation imply that sulfate and dissolved solids in the lateral flow zone decreased in response to irrigation practices". He also states on page 88 that "Water quality data indicate that irrigation has resulted in decreased concentrations of sulfate, chloride, and dissolved solids beneath irrigated lands. Thus removing land from irrigation could cause a change in the concentration of these constituents".

Response: Maurer's discussion of water quality is related to groundwater. This section of the document identifies anticipated impacts to surface water. Maurer's findings, while most likely to be true for groundwater, do not translate to conditions or anticipated impacts to surface water.

The Service concurs with Churchill County's speculation that salts could build up on the surface if irrigation is stopped.

Regarding the runoff potential and overland flow potential of leveled farm fields in the Lahontan Valley, there is insufficient precipitation (4-5 inches per year) with January averaging about 0.60 inches/month at the high end) to promote widespread surface runoff. Only in rare instances when there is localized intense rainfall, could such surface salts be eroded off site. The more likely hydrologic response would be for rainfall to percolate into the soil, moving the dissolved salts downward again. These are conjectural and hypothetical conditions, and, therefore, the general statements regarding surface water quality impacts were not amended.

Comment 247: 4-26, page 4-27, paragraph 2: "The quality of spill water is generally higher or equal to irrigation water quality and therefore is not expected to cause adverse impacts to surface waters flowing into these areas. Earlier in the DEIS the tendency for sediment transport to increase in spills is mentioned. Also the tendency for mercury to be transported downstream in sediment. Could sediment and mercury increase in Lahontan Valley due to increased spills predicted under Alternative 2, the proposed action? Please address."

Response: Mercury was deposited in the area through flooding prior to the construction of Lahontan Dam, see Section 3.3.2. Spill water is generally of comparable quality to irrigation water, it is only when spills become voluminous and flooding occurs that water quality can be degraded (same section). Voluminous spills could occur under any of the alternatives because natural hydrologic conditions that cause flooding and voluminous spills are unaffected by the acquisition of water rights. The Service does not expect its actions to affect flooding or the movement of sediment and mercury.

Comment 248: 4-27, Paragraph 3. "According to the DEIS Chapter 4, page 4-9, paragraph 2, the proposed action will increase spills in frequency and volume due to reduced project demand. The volume of annual usable spills is calculated to increase by about 20 percent over baseline conditions. If this is correct then flooding potential is increased in Lahontan Valley which could impact surface water quality by increasing the sediment load and potentially mercury, not to mention potential physical impacts to residents in the valley. Please address."

Response: Spills do not necessarily result in floods. If spills are voluminous, they can cause flooding in some areas. An increase, even 20 percent, in average spill volumes would not necessarily lead to increased flooding. Flooding will continue to occur regardless of the Service's

actions, and there is no indication that the consequences of acquiring water rights would affect the natural hydrologic conditions that cause flooding. See also the response to Churchill County comment #247 above.

Comment 249: 4-28. Pg. 4-27, paragraph 5. "The estimates of irrigation deliveries and drainflow reduction are based on the unsubstantiated, invalidated BLR Model and therefore unreliable. The conclusion that the water quality will be improved without an analysis of how the individual contaminants of concern will be affected is insufficient. As stated previously mercury levels could increase due to increased sediment load which may not correlate to decreased total dissolved solids. Water quality impacts have therefore not been adequately addressed in a quantitative manner. If the data is not available it should be obtained and an analysis performed."

Response: The Service has responded to similarly worded comments by Churchill County with regard to the BLR Model, water quality, and unavailable information. (See response to Churchill County comments #10, #127, #240, and #245.)

Comment 250: 4-29, paragraph 3 and 4. "Under Mitigation Measures the discussion seems to be centered around improving water quality to the wetlands when the section should address mitigation directed towards addressing the identified impacts of the proposed action throughout the Lahontan Valley. For example, reduction of irrigation may result in a decrease in salt flushing from the soils and a degradation of surface water, reduced water quality and soil fertility. Increased spills may result in flooding, increased sediment transport and mercury levels. Decommissioning drains which convey water with poor quality, as suggested in paragraph 4 of page 4-29, could result in the poor water quality remaining in areas of agricultural production, impacting crops and water quality in these areas. These potential problems need to be addressed and if found to be significant, mitigated."

Response: Please refer to the responses to Churchill County comments #246 and #248 above. If decommissioned drains results in poor water quality in the shallow aquifer, the source of such pollution is most likely attributable to irrigation and the leaching of naturally occurring salts, fertilizers, and pesticides used in farming.

Comment 251: 4-30. Pg 4-29. "What are the measures recommended by the Department of the Interior's National Irrigation Water Quality Program and how will these measures reduce the adverse effects associated with drainwater use? It has not been noted that one of the Bureau of Reclamation's efficiency measures is the pumping of drainwater to the canals, therefore mixing the drainwater with irrigation waters. The wetland areas are likely to be the recipient of this mixed water."

Response: The Department of the Interior's NIWQP has not resulted in any recommendations to date. There is insufficient information available regarding that study for the Service to respond to this comment.

Comment 252: 4-31. Pg 4-30. "Pumping of large volumes of groundwater for wetland or other purposes has been recently precluded by the Nevada State Engineer's order."

Response: The Service noted that one of the issues connected with the feasibility of groundwater pumping (Section 2.5.4 ALTERNATIVE 5, Groundwater Pumping) was the closure of the basin to new appropriations. This would not preclude the Service from acquiring existing commercial or industrial groundwater permits and using them for wetlands.

Comment 253: 4-32: Pg. 4-30, para. 4. "...Without a clear conceptual understanding of the groundwater system environmental impacts from the proposed action and alternatives can not be

evaluated. ...Changing major recharge patterns may well impact water quantity, levels and quality...To provide a meaningful analysis of the potential groundwater impacts more data must be collected to develop a conceptual model of the valley and a quantitative analysis of the influence of the proposed action must be made."

Response: The two USGS reports (Glancy, 1986, and Maurer and others, 1994) provide a clear conceptual description of the groundwater aquifers and recharge. While the collection of more data and development of a quantitative analysis (modelling) would provide more information on groundwater impacts, quantitative analysis is not necessarily required to complete the assessment of potential impacts and consequences related to the acquisition of water and water rights for wetlands. Citing and summarizing existing information and scientific studies is an acceptable level of analysis for "reasonably foreseeable significant impacts" (see CEQ Regulations §1502.22(b)).

Comment 254: 4-33, para. 6. "...There is no support for the statement that the deep aquifer will not be affected as the interaction between the aquifers is poorly understood. More data must be collected and analyses made before this conclusion can be reached."

Response: The interaction between aquifers is fairly well understood and discussed by Glancy (1986) and Maurer and others (1994), the reports of which were referenced in the EIS. The Service evaluated the information in those reports and, as described in Section 4.3.3 of the EIS, concluded that potential impacts to the shallow aquifer recharge would have little direct effect on the deep volcanic aquifers.

Comment 255: 4-34, page 4-31. "Fernley groundwater levels will be impacted by the reduced flows from Truckee River diversions. Quantify these impacts and provide mitigation."

Response: There is insufficient information available to quantify such impacts nor is there information to support the argument that Fernley groundwater levels will be impacted. The acquisition of water and water rights for primary wetland habitat would alter Truckee Canal flow volumes, but irrigated acreage, irrigation conveyance losses, and on-farm losses in the Fernley area would be unaffected.

According to Reclamation engineers, there is no direct correlation between Truckee Canal flow volume and seepage losses (see Bureau of Reclamation comment #19 above). Seepage is proportional to the wetted perimeter of the canal. The wetted perimeter of the canal will not be measurably reduced as a result of the Preferred Alternative because the District must maintain a certain Truckee Canal water surface elevation (and wetted perimeter) to meet irrigation delivery demand in the Truckee Division.

Comment 256: 4-35, page 4-32, para.2. "The conclusion that recharge volumes would have to drop below 70,000 AF/yr before impacts to the shallow aquifer would occur is totally unsupported speculation..."

Response: The conclusion regarding a 70,000 AF/year threshold is supported by Maurer and others (1994) on pages 29-30 where they discussed the volume of Lahontan Reservoir releases and the implication those releases have on total outflow (drainwater). Maurer and others (1994) went on to state that "The value of 70,000 acre-ft/yr could represent the amount of seepage required to saturate the distribution system, and thus, represent the potential recharge to the shallow aquifer at the start of the irrigation season." Consequently, when conveyance losses (seepage) fall below 70,000 AF/year there is not enough water being lost from the irrigation delivery system to fully recharge the shallow aquifer, which would result in lower groundwater levels in that aquifer.

Comment 257: 4-36. Pg. 4-32, para.3. "...The estimates of percent total recharge reduction are based on the BLR model and are unsupported. The conclusion, based on no analysis, that widespread impacts to well users are not expected and that groundwater levels will remain near baseline conditions, is completely without merit and unsupported speculation. Historical data from before and after irrigation indicates that the irrigation recharge system has significantly altered the depth of water in the valley. Any large scale change in that system, as proposed in the DEIS, would be expected to have a significant impact on water quantity and potentially quality. Virtually no analysis has been done to address this very important impact."

Response: The estimates of percent recharge reduction are based on calculations of percentage using average reservoir release and irrigation use values for each alternative. Such calculations do not require the use of the BLR Model. Please refer to the Service's responses to Reclamation comments #7 and #22.

The Service concurs that the depth to groundwater declined in much of the Lahontan Valley after the irrigation-water delivery system was constructed and put to use in the Lahontan Valley and water began to be imported from the Truckee River (see Figures 3.3.C and 3.3.D). Review of information provided in both USGS groundwater study reports (Maurer and others, 1994, and Seiler and Allander, 1993) show that even before the spreading out of water in the Lahontan Valley and importation of Truckee River water, the depth to groundwater in much of Lahontan Valley was quite shallow (less than 25 feet). There is no quantitative analysis that indicates that the acquisition of water rights would appreciably alter the irrigation delivery system. Under all of the alternatives, except possibly Alternative 4, major canals and most secondary canals would continue to convey irrigation water.

The Preferred Alternative would result in only an 11.5 percent reduction in potential recharge. Therefore, it is difficult to portray such reductions as resulting in significant adverse impacts. The Service considered that the 40 percent reduction in farmland acreage associated with the Preferred Alternative would reduce shallow aquifer losses attributable to crops proportionally. Based on the conceptual water budget of Maurer and others (1994; figure 4 on page 20), a 40 percent reduction in consumptive losses could reduce groundwater losses by about 20,000 AF/year. These potential reductions in groundwater losses associated with consumptive use by crops would lessen the impacts of the calculated 33,400 AF/year reduction in potential recharge.

Additional information was added to Sections 3.3.3.1.1, 3.3.3.1.2, and 4.3.3.1 to better reflect recent and long-term fluctuations in groundwater levels.

Comment 258: 4-37. Pg. 4-33. "There is no indication of impact because there is no analysis. This comment applies to at least half of the sections in Chapter 4."

Response: The Service analyzed impacts using the most recent and relevant data and studies available. Based on the information available, the Service identified the potential impacts to groundwater recharge and groundwater levels. None of those impacts were shown to be significant. Churchill County has not supplied any additional information, studies, reports, or data to suggest the Service's analysis was in error.

Comment 259: 4-38. Pg. 4-33 para. 4. "Some shallow wells may dry is not a sufficient level of analysis. How many wells, how deep, when?"

Response: Such impact analysis is very site specific and there is insufficient data available to make such conclusions. The scope of the impact analysis under the alternatives is made for the entire

Lahontan Valley. This level of analysis is based on the assumption that water right acquisitions could occur throughout the valley depending on which irrigators are willing to sell their water rights.

Comment 260: 4-39. 4.3.3.2 "See previous comments regarding quantifying impacts and committing to mitigation."

Response: These comments have been addressed.

Comment 261: 4-40. Pg. 4-33, para.2. "If there is insufficient information to determine the impact to the basalt aquifer...this information should be obtained and a meaningful analysis performed..."

Response: The Service responded to a similar comment regarding the deep volcanic aquifers. That response is applicable to this comment (see response to Churchill County comment #253 above).

Comment 262: 4-41. Pg. 4-35, para. 2 and 3."The mitigation section has no specific actions outlined that will address potential impacts to water quantity or quality due to the proposed action. Specific actions that could be included are items such as deepening domestic wells that go dry, supplying water to impacted users and designating specific amounts of water and locations that would be available for recharging the system. First, a meaningful analysis of the impacts must be made, followed by specific mitigation measures to address those impacts."

Response: The Service identified the specific mitigation measures recommended by Churchill County in the next section of the document (Section 4.3.3.2 Domestic Supply). Such mitigation would offset or lessen the impacts relating to water supply rather than providing mitigation to groundwater recharge.

Comment 263: 4-42. Pg. 4-37, para.1. "This statement contradicts the statement of page 4-32, para.3, where the Service concludes that there will not be widespread impacts to groundwater levels."

Response: The Service has reviewed both statements referenced and did not ascertain the contradiction stated by the County. Both paragraphs include the following statements. "The Service does not expect any widespread impacts to groundwater levels in the shallow and intermediate aquifers as a result of reduced recharge volumes, but some isolated domestic water users could be affected (section on groundwater recharge in Fallon and Lahontan Valley) ...and "there is little data or information to analytically define how these impacts would ultimately impact groundwater levels and domestic supply in Lahontan Valley."(Section on domestic supply in Fallon and Lahontan Valley.)

Comment 264: 4-43. Pg. 4-37, para.2. "This paragraph directly follows the paragraph where the Service states that there is little data to define how groundwater will be impacted, but then they proceed to freely conclude that there will be no widespread reduction in valley water levels. This conclusion is inconsistent with their own document and unsupported. Recharge from historical irrigation has clearly increased groundwater levels uniformly in the valley and not in discontinuous pockets as stated in the text. Groundwater levels may therefore decrease uniformly as well. **This needs to be quantitatively evaluated.**"

Response: The Service stated there was little data to quantitatively define how groundwater would be effected. The Service then proceeded to qualitatively assess potential impacts to groundwater based on the available studies and conceptual groundwater models.

The Service does not concur with Churchill County's statement that the shallow aquifer should not be characterized as discontinuous. That the shallow aquifer is discontinuous is supported by Glancy (1986, page 58) "Hydraulic properties of the basin-fill aquifers (shallow aquifer) are quite variable over short distances as a result of complex stratigraphic relations and rapidly changing sedimentary facies" and Maurer and others (1994, page 37) "The aquifer (shallow aquifer) is characterized by abrupt changes in lithology and water quality, both horizontally and vertically". The Service chose to summarize these fairly technical descriptions using the term "discontinuous" to describe the shallow aquifer. Seiler and Allander (1993) show in their report that groundwater level declines are not uniform throughout Lahontan Valley, citing that wells in one area recorded declines of as much as 7.63 feet while other wells recorded a median decline of 2.49 feet over the same period of time.

Additional information was added to Sections 3.3.3.1.1, 3.3.3.1.2, and 4.3.3.1 to better reflect recent and long-term fluctuations in groundwater levels.

Comment 265: 4-44.Pg.4-37. para.3. "The Service does not anticipate that wells that permanently go dry would be prevalent and widespread under the Proposed Action. Completely unsupported speculation, see previous comments."

Response: The Service has responded to similarly worded comments by Churchill County. (See responses to Churchill County comments #253, 254, 256, 257, 258, and 259.)

Comment 266: 4-45. Pg. 4-37. "If this potentially significant impact is unknown then data must be collected and an analysis made to determine the significance of the impact. The basalt aquifer represents an important water supply source to the Lahontan Valley and impacts from the proposed action must be addressed."

Response: The Service has evaluated the available information relative to this resource and assessed the anticipated impacts. The Service's analysis does not indicate that there is a potential for significant impacts as a result of the Preferred Alternative. Churchill County has not supplied any additional information, studies, reports, or data to suggest the Service's analysis was in error or did not take into account other pertinent data. The Service cites CEQ Regulations § 1502.22 regarding the responsibilities of an agency evaluating reasonably foreseeable adverse impacts when there is incomplete or unavailable information.

Comment 267: 4-46. Pg. 4-39, para.1. "A general discussion is included under the mitigation section describing a possible program to mitigate groundwater level decline by recharging the basalt aquifer. At this time insufficient information is known about the groundwater system to evaluate whether this is feasible. Baseline groundwater information must be obtained to evaluate this potential mitigation measure...."

Response: The Service agrees that further analysis is needed before such mitigation could be implemented. The Service does not agree that such information is necessary to evaluate the potential mitigative effects of such actions. The Service believes that the mitigation measures referenced are technically feasible, reasonable, and common in many other areas in the west. While no feasibility studies have been done relative to the mitigation measures identified, that level of detail is not necessarily needed to evaluate the potential of the mitigation measure to offset, reduce, or eliminate the potential impacts.

Comment 268: 4-47:"For minor impact, non-significant is used. For large scale impacts significant is not used. What about indirect impacts? Long-term?"

Response: The Service has been clear in its assessment of potential impacts whether there is an indirect or direct level of impact and as to whether such impacts are short-term or long-term in nature when such determinations can be made.

Comment 269: 4-48. "Use different headings under mitigation sections."

Response: Comment noted.

Comment 270: 4-49: Pg. 4-41. "What is the estimated cost of a new water system?"

Response: Such information was unavailable to the Service. Churchill County has commissioned a recent feasibility study that addresses anticipated costs of a domestic water system for County residents. The County has not released the findings of that study to the Service to date.

Comment 271: 4-50: Pg. 4-42. "Argument is weak for no change in mosquito breeding."

Response: This section has been changed to reflect new data from the Churchill County Mosquito Abatement District. Additionally, a copy of the Mosquito Abatement District's comments are included in Appendix 11, within the LVEA's Exhibit A.

Comment 272: 4-51:Pg. 4-42 Erosion: "The Service has ignored potential health problems from Particulates. Particulates can lead to an increase in risk of chronic respiratory illness with long exposure, altered lung functions in children, acute illness in the presence of sulfur dioxide, and increased respiratory problems for children and elderly persons. Please include health problems."

Response: Health concerns due to particulates are an existing condition in the affected area. The Service has not identified that its actions to acquire water and water rights would significantly increase particulates above existing conditions. In fact, inhalable particulates may actually decrease as agricultural land is taken out of production and fewer acres of agricultural land are burned. Comments submitted by LVEA (Appendix 11, Exhibit D) include a letter from Nevada Bureau of Air Quality supervisor, Robert E. Smith that generally support the findings of the Service under this section. The Service has not received any additional information supporting or quantifying that the Service's actions to acquire water and water rights would directly or indirectly create health problems related to respiratory illness.

Comment 273: 4-52. Pag. 4-43, alt 2-5. "Use WEQ from NRCS to quantify soil erosion in tons per acre per year by land type."

Response: Such information was unavailable for the Lahontan Valley on a valley-wide basis. As stated in the DEIS, use of WEQ is suited to evaluations of individual parcels due to the number of variables affecting wind erosion (soil type, land forms, vegetative cover, etc.). Since the Service does not know which property owners may be participants in the voluntary acquisition program, it would be infeasible to develop project or county-wide total ton/acre/year soil loss values using WEQ.

Comment 274: 4-53. Pg. 4-43. "Re-establishing vegetation is very difficult. This is true but contradicts Chapter 3, i.e. Bullfrog Mine."

Response: This comment was responded to above, Churchill County comment # 150.

Comment 275: 4-54. Pg. 4-43, Alternatives. "How did the Service reach their conclusions listed under Alternatives 2,3,4,& 5. Where is the supporting data and analysis.? The Service needs to conduct an appropriate analysis and not rely upon unqualified subjective and bias opinions. "

Response: The Service made its analysis based on available data and knowledge of the principles of erosion and soil loss. The Service's team leader on the EIS is a Natural Resource Planner with more than 14 years experience in erosion control, soil loss evaluations, and soil loss calculations. As explained in the Service's response to Churchill County comment #273, analytical quantification of soil loss and potential erosion is best suited to individual or specific parcels of land and generally would not be technically feasible for the scope of this impact analysis.

Comment 276: 4-55. Pg. 4-44. Quantify what constitutes excessive soil erosion. Talk to NRCS.

Response: The Service has coordinated with NRCS in the preparation of this document. NRCS as a cooperating agency has provided the Service with the information that was used in making the impact analysis. The Service considered excessive erosion to be erosion of such a magnitude as to render the soils unproductive (unable to sustain vegetation). Linking soil loss to productivity in defining the impacts of erosion is consistent with and quite similar to the NRCS T-values which define soil loss thresholds relating soil loss and productivity.

Comment 277: 4-56. Pg. 4-44, Para 1. The Service needs to develop a monitoring program for proposed revegetation. NRCS needs to be consulted.

Response: The Service has no formal obligation to revegetate agricultural lands left vacant as a result of the wetlands water rights acquisition program. However, the Service is aware that revegetation of these lands could help reduce wind erosion and minimize potentially adverse air quality conditions. Revegetation has been identified as a possible mitigation measure that could be employed by the Service as part of the water rights acquisition program on lands that remain within the Refuge boundary or are disturbed at the time of acquisition (please see mitigation at end of Section 2.5.5). The Service intends to work closely with NRCS to identify those plant species and lands that are appropriate for revegetation efforts.

Comment 278: 4-57. Pg. 4-44. "The Service has an obligation on many different grounds to revegetate fallow ag. lands."

Response: Please see response to Churchill County comment 277, above.

Comment 279: 4-58. Pg. 4-44. Weed section. Get information to quantify acres affected, biomass, species, etc.

Response: Due to the lack of site specific information related to the lands that could be potentially affected by water rights acquisitions, it was not possible to make such quantitative determinations. The Service has identified the number of acres of cultivated land that may be affected and the vegetative species classified as "weeds" that may grow on those affected lands.

Comment 280: 4-59. Pg. 4-44, Para. 4. "This is not mitigation."

Response: The comment refers to maintaining a vegetative cover on farmlands by splitting a water right entitlement. There is ample information to show that pasture grasses can be sustained on 1.5 AF/acre/year of irrigation and, therefore, it would be feasible for a water right holder to sustain a productive vegetative cover and still have some portion of the water right available for other uses.

Service has stated in Section 4.16.1, AGRICULTURAL PRODUCTS AND RECEIPTS, Mitigation Measures, that implementation of the transfer of a split water right would ultimately require a favorable ruling from the Nevada State Engineer. The split water rights concept was discussed during the Second Settlement Negotiations (1994-95) and it is the Service's understanding that the Nevada State Engineer believed that he had the authority to make a ruling regarding the splitting of water rights in the Newlands Project relative to the Alpine Decree. Based on these factors, the Service believes splitting water rights as a form of mitigation to maintain vegetative cover is possible.

Comment 281: 4-60. Pg. 4-45. Mitigation Measures. "The Service needs to provide funding for weed control. Does the service intend to provide any mitigation?"

Response: The Service has identified a number of measures that can control weeds and the Service would commit to implementing such measures on the lands it has acquired as a result of wetland water right acquisitions. There is no rationale or precedent that would suggest the Service use Federal funds to pay for weed control on private property unless such a program exists as a requirement of a Federal law or nationwide program. Weeds are an existing problem and would continue to burden farmers whether the Service takes any action to acquire water rights or not. Under existing State and local laws, private owners of fallow lands are under no obligation to control or remove weeds except within the City of Fallon. The Service will not be acquiring any water rights from lands within the City of Fallon.

Comment 282: 4-61. Pg. 4-46. Describe the timeframe of the impacts, quantify per acre. Where is the air quality analysis and modeling?"

Response: There is insufficient information to analytically quantify dust volumes on a per acre basis. Due to a lack of information about which parcels will be affected by the Service's action, it is infeasible to define the impacts as the County suggests. The Service has stated that the air quality analysis was based on available information related to actual monitoring data rather than modelled data.

Comment 283: 4-62. Pg. 4-47. Develop an air quality mitigation plan in cooperation with Churchill County and NDEP.

Response: The Service's action is not expected to significantly impact air quality in the affected area.

Comment 284: 4-63, Pg. 4-47. "The fact the Service will manipulate habitats is a telling phrase."

Response: Comment noted.

Comment 285: 4-65. Pg. 4-45-47. "With revegetation possibly requiring 100 years, production of dust from fallowed fields could not possibly be classified as short term. The Service needs to engage the services of a qualified air quality specialist, develop a baseline, and model the impacts to air quality."

Response: Although it may take up to 100 years for a climax desert shrub community to develop on vacated land, early succession plant communities would establish soon after farming operations have ceased. There is no indication that previously-cultivated fields no longer in production, but with some vegetative cover, would produce adverse dust conditions. The Service has consulted with the Nevada Bureau of Air Quality personnel in evaluating the impacts of the Proposed Action and other alternatives on air quality. An evaluation of the DEIS by the Nevada Bureau of Air Quality is

provided in Appendix 11 (Exhibit D of Lahontan Valley Environmental Alliance's comments on the DEIS).

Comment 286: 4-66. Pg. 4-47-49. "What are the actions related to the Management Plan? Here again there is no impact analysis."

Response: All actions related to the existing management plan were considered to be within the scope of baseline conditions. As such, impacts associated with the comprehensive management plan, yet to be prepared, are beyond the scope of this analysis. However, potential cumulative impacts of the comprehensive management plan are addressed in Section 4.26.4.

Comment 287: 4-67. Page 4-49. "How about mitigation for secondary wetlands and riparian areas which affect T & E species?"

Response: The Service has identified that the majority of the impacts to secondary wetland areas have already occurred and constitute existing conditions. The consequences of improved Newlands Project irrigation delivery efficiency related to OCAP have the greatest long-term effect on the secondary wetlands. Conditions related to OCAP are considered existing conditions and, therefore, the impacts associated with OCAP are outside the scope of this analysis.

Comment 288: 4-68. Page 4-50. "Quantify affects to secondary wetlands; this is a wetlands EIS!"

Response: The purpose of this EIS is to address the consequences of acquiring water and water rights for primary wetland areas. The effects of such actions on the biological resources, in both primary and secondary wetland habitats, are covered in Section 4.6, EFFECTS ON WETLANDS, and Section 4.7.1, WETLAND PLANT COMMUNITIES.

Comment 289: 4-69. Page 4-51. "How about off-site mitigation? Ag. land enhancement? Riparian areas?"

Response: Secondary wetlands that are addressed in Section 4.6.2 are comprised of marsh habitat. Habitat associated with riparian areas and agricultural lands are addressed in Sections 4.7.2 and 4.7.3, respectively. An overall increase in marsh habitat acreage in the valley would more than offset the loss in secondary wetland habitat acreage, and therefore no mitigation is necessary.

Comment 290: 4-70. Pg. 4-51. "For measures of quantifying vegetation, how about cover, diversity, and ecological stability?"

Response: Many attributes of wetland vegetation can be influenced through water management, some of which are vigor, density, cover, and diversity. Ecological stability is a function of vegetative conditions and many other ecological factors. The sentence to which the above comment referred was modified.

Comment 291: 4-71. Pg. 4-51. "The Service is required by P.L. 101-618 to manage the regulating reservoirs for fish and wildlife purposed. The Service needs to figure out how this can be done since if they do not they will be violating an Act of Congress. See section 209.(i).

Response: Please see similarly worded comment #113, above.

Comment 292: 4-72, Pg. 4-53."Show acreage for riparian vegetation, species affected, and mitigation."

Response: The general composition of riparian communities is in Chapter 3, Section 3.7.2 RIPARIAN PLANT COMMUNITIES. More information was added to this section on estimated miles of the different types of riparian habitat in the Lahontan Valley. Linear measures are more appropriate for describing riparian habitats than areal measures due to the linear nature of riparian communities.

The Service has not identified adverse impacts to the naturally occurring areas of riparian habitat as a result of the acquisition of water or water rights. The only areas where this plant community would be adversely affected are in the artificially created areas along irrigation drains and canals. No mitigation was identified for adverse impacts to artificially created riparian habitat. Loss of a portion of this habitat would be an unavoidable adverse impact under all action alternatives.

Comment 293: 4-73. Pg. 4-54. "Desert shrub section is inadequate. Fallow lands would be inundated by weeds, spreading to undisturbed areas, ag. lands."

Response: The level of detail and description of the desert shrub plant community is adequate relative to the level of anticipated impacts associated with that vegetative community resulting from the acquisition of water and water rights. Weeds are addressed in Section 4.4.3, WEEDS.

Comment 294: 4-74. Pg. 4-55--While Lahontan Reservoir storage volumes during the irrigation season may benefit fisheries, the lower reservoir levels during the winter months will adversely affect the fisheries.

Response: The Service's actions to acquire water and water rights for wetlands would not lower average storage volumes in Lahontan Reservoir. Under all of the alternatives considered, average storage volumes would increase as a result of reduced irrigation demand associated with the transfer of agricultural water rights to wetlands.

Comment 295: 4-75. Pg. 4-57. A mitigation measure not considered by the Service would be to restore the Stillwater wetland area to pre-development conditions by opening or removing all the dikes, levees and reservoirs that restrict water movement and create artificial levels. Although this would result in shallower depths, it would create a natural condition and provide more acres of terminal wetland.

Response: Water management on Stillwater NWR is beyond the scope of this EIS. Given sufficient interest and biological-support for such an idea, it could be evaluated as a potential management strategy in the comprehensive management plan to be developed for the refuge.

Comment 296: 4-76. Pg. 4-58. "How many acres of each type of passerine habitat will be impacted and what are the number of species and population levels under each alternative?"

Response: The level of detail of available information precludes answering this question. Impacts to passerine species were evaluated based on available information for the area. Impacts to wetland and agricultural vegetation, in terms of acres, is addressed under the respective discussions of these habitats (Sections 4.7.1 and 4.7.3). Impacts to the amount of naturally occurring riparian habitat and desert shrub habitat is not expected to change substantially under any alternative, and the impacts to artificially created riparian habitat remain unknown, although the amount of this habitat is expected to decline somewhat under the action alternatives as explained in Section 4.7.2. The number of species inhabiting the affected area is not expected to change as a consequence of acquiring water rights for Lahontan Valley wetlands. Population levels of each species are unavailable.

Comment 297: 4-77. Pg. 4-59. "Quantify losses to raptors. Species, numbers, % loss of habitats, how long. "At least some impact" is not appropriate in an EIS. Develop a BE for each species."

Response: Sufficient data is not available to quantify losses to raptors. However, sufficient information is available on habitat relationships of raptor species to conclude that adverse impacts to some species of raptors (e.g., red-tailed hawks, American kestrels, great horned owl) would likely occur.

Comment 298: 4-78. Pg. 4-59. "How much riparian habitat is expected to be lost? What species of raptors would be affected and what are the expected population losses?"

Response: While it is recognized that riparian habitat associated with drains and some canals will likely be lost as a result of Alternatives 2-5, quantifying those losses would be speculative given the many complex relationships involved. For instance, the extent to which drains and canals are abandoned will depend on the pattern of water-rights acquisitions. Because water-rights acquisitions would be on a willing seller basis, the pattern of acquisitions would depend on many factors. Another factor, relative to raptor habitat, is the effects of cessation of surface flows on riparian trees. In areas where cottonwoods and other trees are established, cessation of surface flows in drains and canals may not result in trees dying so long as their roots continue to have access to a water table.

The raptor species that would be affected by reductions in wooded habitat along drains and canals, to the extent this occurs, primarily include red-tailed hawks, sharp-shinned hawks, Cooper's hawks, American kestrels, barn owls, great horned owls, and Western screech owls. As population levels of each species of raptors is unknown, population losses due to changes in habitat are unknown. However, due to the relatively small reductions in wooded habitat along drains and canals that would result from the Preferred Alternative, riparian-related impacts to raptor populations would be relatively small.

Comment 299: 4-79. Pg. 4-59. "What is the expected loss in acreage of habitat for the California quail, ring-necked pheasant, wild turkey and mourning dove?"

Response: Loss of habitat for California quail, ring-necked pheasant, wild turkey, and mourning doves is expected to be roughly proportional to the amount of irrigated farmland converted to non-irrigated use under each alternative. Because California quail and mourning doves occur in a broader range of habitats (including a greater use of residential, fallow-field, and native habitats) compared to ring-necked pheasant and wild turkeys, the adverse impacts to these species would be proportionally less.

Comment 300: 4-80. Pg. 4-59. "It is expected that since impacts, both beneficial and adverse may occur to listed and candidate species, that the Service would prepare the appropriate level of biological assessments and biological opinions under the requirements of the Endangered Species Act."

Response: This documentation has been completed. Please see Appendix 9.

Comment 301: 4-81. Pg. 4-60. "Quantify impacts to mammals. Acres of lost habitat, % in Valley. Make assumptions and provide analysis."

Response: Impacts to mammal species were evaluated based on available information for the area. Impacts to wetland and agricultural vegetation, in terms of acres, is addressed under the respective discussions of these habitats (Sections 4.7.1 and 4.7.3). Impacts to the amount of naturally

occurring riparian habitat and desert shrub habitat is not expected to change substantially under any alternative, and the impacts to artificially created riparian habitat remain unknown, although the amount of this habitat is expected to decline somewhat under the action alternatives as explained in Section 4.7.2.

Comment 302: 4-82. Pg. 4-62 bottom. "No impact to ferruginous hawks is contrary to previous sections."

Response: The FEIS was revised to ensure that statements regarding ferruginous hawks were not contradictory.

Comment 303: 4-83. Pg. 4-67. "Need to discuss the impact of disposing of drainwater, where it will be placed and if this would cause any toxicity or avian disease problems. If impacts do occur, how would they be mitigated?"

Response: The Service has adequately defined probable disposal methods for drainwater under Alternative 4. Evaporative sumps are a common method of disposal. Concentration of contaminants and pooling of poorer quality drainwater in sumps would increase the toxicity levels of those waters. The Service does not anticipate implementation of Alternative 4 since it has chosen Alternative 5 as its Preferred Alternative and as a policy decision will continue to use drainwater as a water source to sustain primary wetland habitat. The Record of Decision will specify details and rationale as to why Alternative 5 and the use of drainwater for wetland habitat is preferred over the conditions that would occur under Alternative 4.

Comment 304: 4-84. Pg. 4-68 to 70. "The effects to biodiversity have not been determined in this document since the Service lacks data related to the entire study area. The only data presented by the Service is related to the primary wetlands, while there is no data where the impacts are expected to occur, these being the secondary wetlands, riparian areas and irrigated farmlands. The service has been negligent in their lack of effort in acquiring information within these areas. CEQ regulations require an assessment be made of such data gaps, and a determination made as to the time and cost of acquiring such data. If the cost is not unreasonable, the service must acquire the necessary data and this has not been done. It is now five years since P.L. 101-618 was passed, so there has definately been time to acquire necessary data to complete impact analysis for this document. It has not been done. Certainly an investment of up to \$100,000,000 would justify an expenditure of some thousands of dollars to properly assess impacts to biodiversity and the various resources expected to be impacted. It has not been done!"

Response: Impacts to biodiversity are addressed in Sections 4.6 through 4.13. Each of these sections address the impacts of the alternatives on different components of biodiversity, which includes wetland and other plant communities, waterfowl and other classes of birds, mammals, reptiles and amphibians, invertebrates, and endangered species. The biodiversity section (Section 4.15) summarizes the impacts addressed in these other sections. Section 1502.22 of CEQ regulations addressed the question of incomplete or unavailable information. The guidance provided in Paragraph (b) of the Section was followed in preparing those portions of the EIS where the analysts determined there was incomplete or unavailable information.

Comment 305: 4-85. Pg. 4-69, top. "Rationale is a cop out for not addressing overall biodiversity."

Response: The statement that "The limited amount of information available precludes judgements as to whether overall biodiversity in the affected area would increase or decrease as a result of these alternatives" is an honest evaluation of the situation. Biodiversity encompasses the number of all

species (of birds, mammals, fish, insects, microorganisms, plants, etc.) and the relative abundance of each species, and it encompasses the horizontal and vertical structural diversity of plant communities. Overall biodiversity would increase in some habitats and decline in others, as explained in Section 4.15. Increases in one type of habitat would, at least in part, offset decreases in another type of habitat, but the extent to which changes in one habitat would counteract changes in another habitat is unknown given available information. Although sufficient information is not available to determine whether overall biodiversity would increase or decrease throughout the affected area as a consequence of the alternatives, Section 4.15 addresses the impacts to overall biodiversity in specific habitats.

Comment 306: 4-86. Pg. 4-70. "Show acreage of impact."

Response: Acreage figures are discussed in Section 4.16.3, FARMLANDS.

Comment 307: 4-87. Pg. 4-74. "Mitigation statement regarding increased ag land under irrigation is misleading."

Response: This section states that "...for a number of reasons, increasing crop production by creating new irrigated lands is an unlikely mitigation..." and "Therefore, the Service does not consider the creation of new irrigated farmland to be a reasonable mitigation measure and would oppose such expansion." The Service does contend that it is technically possible for private water right holders to bring existing water-righted lands into production, but that such actions may not be economically sound nor would such actions go unchallenged by the Service or Pyramid Lake Tribe.

The Service has followed CEQ Forty Most Asked Questions (question 19b.) which recommends that mitigation measures outside the jurisdiction of the lead or cooperating agencies be addressed. The Service has also assessed the probability of the mitigation measures being implemented. Although this mitigation is not likely, it is technically feasible, and relevant.

Comment 308: 4-88. Pg. 4-70. "You indicated that 20 percent of the alfalfa was shipped to California, where is the remaining product shipped?"

Response: There is no additional information available to determine an answer to your question. The Service can speculate that the majority of the remaining alfalfa is consumed within Lahontan Valley or in Western Nevada as part of integrated farming operations.

Comment 309: 4-89. Pg. 4-71. "Production values and profit losses are not solely determined by the productivity of irrigated lands and alfalfa production. Revise this sentence to include livestock production and value of rotation crops."

Response: The Service has evaluated the economic consequences of reducing alfalfa production since that is directly impacted by the sale of water rights and is the predominant crop (both in acreage and profit) in Churchill County. The two other major components of the agricultural sector in Churchill County are livestock and dairy operations, for which the Service has shown the anticipated indirect and linked impacts to those components as a result of reduced alfalfa production.

Comment 310: 4-90. Pg. 4-73, Para. 2: "As much as 70 percent of irrigated lands could be taken out of production. Again the Service is assuming that agricultural production will continue without water. Your assumptions are simply wrong."

Response: The Service assumes that other forms of agricultural production (livestock feeding and dairying) could occur on those lands where water rights have been acquired and transferred to the wetlands. Available information indicates that dairy operations rely more on outside sources of alfalfa (as compared to livestock operations) but that the importation of alfalfa would increase the cost of dairy and livestock operations. It is not inconceivable that alfalfa would be brought into the area from other areas and, therefore, the Service assumes that there is the potential for some agricultural production to continue in the affected area.

Comment 311: 4-91. "Table 4.16.A is wrong. Agricultural output is the value of agricultural production which includes cost of sales, and profit/income. Yet in Table 4.16A profit or income is subtracted from output ignoring the cost of sales. Alfalfa sales is a component of agricultural output. The analysis must subtract the entire component from agricultural output. For example, compare alt.1 with alt.2 there is a \$17,340.00 reduction in alfalfa sales. The total output (approx. \$50 million) is reduced by \$17 million. The Service can estimate reduction in profit or income which is a subcomponent of output. Linked to alfalfa sales is direct and indirect dairy and livestock sales. The conclusions in table 4.16.A are incorrect, and leads the reader to the wrong conclusions. A decline in profit/income is not the total reduction in agricultural output. Income/profit does not equal output. The economic impact analysis is not balanced. For the agriculture sector the Service goes to great lengths to analyze profit/income and ignores expenditures. However, in the analysis of wetlands only expenditures are analyzed to demonstrate economic contributions. How much income and profit does the wetlands generate?"

Response: Please see the Service's response to Lahontan Valley Environmental Alliance comment #16.

Comment 312: 4-92. Pg. 4-73.Para.1. "What would the numbers in Table 4.16.A be if declines in high quality alfalfa were not offset by non-local purchases?"

Response: If high quality alfalfa were not offset by non-local alfalfa purchases, reductions in dairy sector income levels would be a probable result as the supply of local high-quality alfalfa dropped due to reductions in irrigated farmland.

Comment 313: 4-93. Pg. 4-73.Para.2:"What source or other information is used to conclude that most livestock operations are integrated into existing alfalfa farms? How many Lahontan Valley livestock operators will continue after there lands and water are acquired? How will the acquisitions affect livestock operations?"

Response: The Service has referenced a paper by Schank and Matley (1994), two prominent local farmer/ranchers, that stated many Lahontan Valley alfalfa farms are integrated with livestock or dairy operations. Local Service personnel also verified, based on personal knowledge, that many of the local farming operations are integrated with livestock operations as well. It is infeasible to determine the exact number of livestock operators that will continue to raise cattle if they elect to sell their water rights to the Service. The Service is aware that some of the farmer/ranchers that have sold water rights to the Service under the existing water rights acquisition program have continued their livestock operations in Churchill County. Table 4.16.A depicts the Service's anticipated economic impacts to livestock and dairy operations, both as indirect profit losses as well as indirect and linked income losses.

Comment 314: 4-94. Pg. 4-73. Alternatives: "Why has the Service discussed and evaluated only the impacts from reduced alfalfa production and not the agricultural sector in general...?"

Response: See the Service's response to a similarly worded comment by Churchill County (Comment #309 above).

Comment 315: 4-95. Pg. 4-74, Alternative 5: "How did the service estimate losses to agricultural economic output? If alfalfa sales are reduced by half, approx. \$12.5 million. Alfalfa sales and output are the same. Please explain your calculations. Please include direct and indirect reductions in your analysis."

Response: Losses were estimated using information provided by separate studies completed by Dr. David Sunding (Appendix 6) and Meyer Resources, Inc. (Appendix 7). The footnotes in Tables 4.16.A and 4.16.B as well as the two studies show the computations used to derive the impacts. Direct and Indirect effects from various water rights acquisition alternatives are shown in the text and relevant tables in the environmental consequences section.

Comment 316: 4-96. Pg. 4-74. "Mitigation measures. Is the Service proposing to bring more water righted lands into production as a mitigation measures?"

Response: No, the Service does not propose to bring non-irrigated water-righted land into production. The Service responded in more detail to a similarly worded comment by Churchill County (see response to Churchill County comment #307 above).

Comment 317: 4-97. Pg.4-75. "What impact would water right splits have on OCAP efficiency measures? Water right splits should be part of the proposed action. Would water right splits reduce the amount of water required for wetlands? If not, then how would water right splits offset any potential losses since most of the Service evaluation is based on alfalfa production only. Please explain."

Response: The splitting of water rights, while technically feasible, is an action that is too uncertain to be included as part of the Proposed Action or Preferred Alternative. There is insufficient information available to determine what impact water right splits would have on the project operator's ability to meet OCAP delivery efficiency targets. Splitting irrigation deliveries could, based on location, make it more difficult to efficiently deliver small volumes of water, while on other parcels, such delivery might have little effect on delivery efficiency calculations.

Splitting water rights is one possible measure that would potentially reduce the acres of agricultural land taken out of production. While the production values (profit, tons of alfalfa, etc.) would most likely be reduced for lands receiving less irrigation because alfalfa would not be grown, it affords property owners another option relative to the long-term use of their land and therefore is a reasonable mitigation measure to be considered.

Comment 318: 4-98. Pg. 4-75. "Production Value Acquisition and Targeting to Protect Productive Lands. What specific actions is the Service willing to commit to in order to mitigate agricultural losses? Please discuss."

Response: The Service could potentially commit to this mitigation if there was community support and if local government implemented enabling ordinances and zoning. A more definitive targeting strategy has not been developed and would require cooperative planning by the Service, Churchill County, and local farming interests.

Comment 319: 4-99. Pg. 4-77. "What are considered core "areas" to be protected by the Service? Please identify this area and what criteria was used to designate it?"

Response: To date, there is no consensus as to where such lands might be located. No criteria or definitions for such lands have been developed or approved for agricultural lands within the affected area. The draft LESA criteria developed by NRCS could be used to make such delineations, but to date the criteria have not been approved or adopted by Churchill County or NRCS. The Service further stated that the ability to define such areas would require development of evaluation criteria, community support, and most likely some defining local ordinances or zoning.

Comment 320: 4-100. "Voluntary targeting needs to be part of the proposed action and or alternatives."

Response: The Service has developed an internal acquisition strategy to help define its policies regarding targeting. The Service incorporated a "voluntary" targeting strategy for all of the alternatives considered in Section 2.6.4, ACQUISITION PROCESS AND STRATEGY. If such a targeting strategy is deemed feasible and necessary, the Record of Decision will define and commit the Service to the appropriate strategy.

Comment 321: 4-101. Pg. 4-77. last para. "What is the difference between industry output and sales? When the analysis focuses on profit as a measure of a growers well being you ignore the impact to the community at large. The analysis should be based or at least discuss reduction in total output or gross cash receipts. Applying this analysis to government for example would be misleading because government does not produce profits."

Response: Industry output is defined as the estimated value of commodities produced in any year, whereas sales are defined as gross cash receipts.

Comment 322: 4-102. Pg. 4-83. Employment: What is the estimated amount of indirect employment created by agricultural sector? What impact will the Service's action have on indirect employment?

Response: That information is included in Section 4.16.2 INCOME AND EMPLOYMENT and is depicted quantitatively in Table 4.16.E.

Comment 323: 4-103. Pg. 4-84, Para.3: "How did the Service estimate investment and investment income: How many financial institutions in Lahontan Valley invest directly in the area?"

Response: The Service defined its assumptions related to estimating investment and investment income and the references used in developing those assumptions in Section 4.16.2, INCOME AND EMPLOYMENT, Income Gains. The number of financial institutions that invest in Lahontan Valley either directly or indirectly has no relevance to the assessment of impacts associated with the acquisition of water and water rights for wetlands. The Service is uncertain that such information is available or even exists.

Comment 324: 4-104. "Employment general comment: Again the Service appears to only concentrate on alfalfa based employment, and ignores other aspects of the local economy."

Response: The Service identified impacts to alfalfa related employment, both directly and indirectly related to crop production because this sector of the agricultural community will be directly impacted by the acquisition of water rights for wetlands. The Service did not ignore the aspects of employment in the community and has provided estimates of employment, income, and economic activity for the major components of the local economy in Section 3.16.1, AGRICULTURAL PRODUCTS RECEIPTS and Section 3.16.2, EMPLOYMENT AND INCOME. Tables 3.16.C and 3.16.D clearly depict the economic aspects of the other components of the local economy. The Service has identified the

anticipated indirect or linked impacts to these other component of the local economy in figures related to income.

Comment 325: 4-105.Pg. 4-86 Farmlands: "What percentage of statewide prime farmlands would be lost to the acquisition?"

Response: This is appropriately addressed in Section 4.16.4, PRIME FARMLANDS, the section heading of which was revised to PRIME FARMLAND AND FARMLAND OF STATEWIDE IMPORTANCE.

Comment 326: 4-106.Pg.4-88 Para 1.: If the Service does not consider increased farmland acreage to be reasonable mitigation why is it included in this section?"

Response: The Service has revised its evaluation of this mitigation measure and has changed the description of the mitigation measure from one that is not considered "reasonable" to one that is not considered "likely".

Comment 327: 4-107.Pg. 4-88. Mitigation Measures. "The other mitigation measures listed in this section are discussions of acquisition alternatives and not mitigation measures."

Response: The Service disagrees. Modifications in acquisition methods can offset or reduce impacts to farmland acreage potentially taken out of production as a result of water right acquisition.

Comment 328: 4-108. Pg. 4-90, para 5. "Mitigation may to occur to some degree is weak. Commit to it or it doesn't count."

Response: CEQ Regulations 1502.16(h) state that the environmental consequences section of an EIS shall include *discussions* of a means to mitigate adverse environmental impacts (emphasis added). Additional guidance provided by CEQ in the Federal Register (Vol. 48, No. 55, March 23, 1981) notes that all reasonable mitigation measures that could improve the project are to be *identified* (emphasis added). One purpose of an EIS is to lay out the full range of potential environmental impacts and appropriate mitigation measures so that decision makers can make a fully informed decision. Implementation of mitigation measures is not required.

Comment 329: 4-109.Pg. 4-91, Para.2. "Provide basis for why Farmland Protection Policy Act does not apply."

Response: The statement that "the Farmland Protection Policy Act does not apply to the sale of prime farmland water rights by individuals in a willing seller program" has been deleted.

Comment 330: 4-110. Pg. 4-91, Para.3. "Prime farmland and lands of statewide significance include most of the lands in Lahontan Valley."

Response: According to the Natural Resources Conservation Service (NRCS Comment #8), all irrigated farmland in the Carson Division of the Newlands Project is classified as either prime farmland or farmland of statewide importance.

Comment 331: 4-111. Pg. 4-93. Effects on Recreation: "The proposed action or alternatives does not provide additional benefits to Lahontan Valley recreation since the total wetland acreage will be less than historical acreage number of approximately 43,000 acres. Expenditures, consumer surplus, and non-use values would not increase over and above historic levels-there is no net increase."

Response: The impact assessment is based on the comparison of anticipated impacts (changes) associated with the action alternatives to the existing baseline conditions associated with the No Action Alternative.

Comment 332: 4-112. Pg. 4-94. Alternative 1. "Why does the service use expenditures to calculate economic impacts for the wetlands and does not use the same methodology for Lahontan Reservoir use? Many of the recreational expenditures applicable to the wetlands are also applicable to Lahontan Reservoir as well. Expenditure analysis as an economic contribution for Lahontan Reservoir need to be included."

Response: There is no indication that the Service's proposed action or alternatives to acquire water and water rights will directly or indirectly impact Lahontan Reservoir recreational expenditures.

Comment 333: 4-113. Table 4.17A. What fishing takes place at Stillwater or Carson Lake? Why is fishing use part of this analysis since fishing was not identified as a use in Chapter 3. Please clarify this inconsistency and adjust analysis."

Response: Fishing was identified as a use in section 3.17.1.

Comment 334: 4-114. "Since 80 percent of the historic use has come from the local area, only 20 percent of the visitation provides any net economic benefit to the local economy. The Service needs to adjust analysis accordingly."

Response: The assessment and analysis of economic benefit take those ratios into account in the economic analysis.

Comment 335: 4-115. Pg. 4-96, Para.1: "Please explain how birdwatching would increase over historic levels?"

Response: The statement to which this comment refers does not compare expected levels of birdwatching (under the alternatives) to historical levels. Rather, it compares them to baseline conditions.

Comment 336: 4-116. Pg. 4-97. Effects on population. "Would acquisition of water and change of landscape detract for the area as a place to live? There is some indication throughout this document that this situation could occur. Please explain if this situation could occur and what are the impacts?"

Response: The Service identified the anticipated impacts to social values related to the landscape as a place to live in Section 4.23, EFFECTS ON SOCIAL VALUES.

Comment 337: 4-117. Pg. 4-98 Effects on Land Use. "Please describe what the Service plans to do with acquired lands."

Response: The Service addresses this topic in Section 2.3.3.2, Purchase of Water Rights with Land.

Comment 338: 4-11 8. Pg. 4-98. Effects on Land Use: "The Service needs to describe and analyze potential effect to land valuations and prices as a result of the acquisition program."

Response: The Service defined the anticipated effects that the Service's water rights acquisition efforts would have on land values in Section 4.20, EFFECTS ON LAND VALUES.

Comment 339: 4-119. Pg. 4-98, Para 5: "Please indicate approximately how many acres of land which has been subdivided and what is the current zoning such lands use."

Response: The Service has included all of the information that was available regarding acres of land subdivided in Section 3.19, LAND USE. The Service requested information on subdivisions, zoning, and similar topics from Churchill County in a letter dated December 14, 1993 (See response to Churchill County comment #2 above), but, although Churchill County indicated they would attempt to gather as much information as possible (letter dated December 21, 1993) the information was not received from the County. A current land use analysis submitted by LVEA (included in Appendix 11, Exhibit F of the FEIS) may provide readers with more data related to changing land use patterns and zoning.

Comment 340: 4-120. Page 4-98, Para. 6. "Lands acquired have not been changed to more intensive industrial/commercial use because they are not zone as such. Where is proof that such zone changes would entice development?"

Response: The discussion to which the comment refers is of a general nature and presents potential land use changes that could occur under Alternative 1. Changes in zoning was not addressed in this discussion.

Comment 341: 4-121. Page 4- 99. Mitigation Measures. "The Service can commit to a voluntary targeting program of its own."

Response: The Service has responded to a similar comment about targeting in its responses to Churchill County comments #319 and #320 above.

Comment 342: 4-122. Section 4.19. "The Service needs to analyze impacts to land price fluctuations. The Service also needs to project development scenarios for disposed lands based upon current zoning of acquired parcels."

Response: Land price fluctuations will probably occur whether the Service acquires water rights or not. Acquiring water rights from willing sellers at market value should reflect current land prices; other factors related to market conditions, such as supply, demand, and interest rates, are more likely to cause land prices to fluctuate.

The Service would dispose of lands pursuant to the existing standard Federal procedures and processes administered by GSA. The Federal Government would not have the authority to alter or circumvent the current zoning criteria for lands that are identified for disposal. The ultimate development and use of lands that the Federal Government has disposed of are subject to the authority of Churchill County through zoning and land use ordinances. The projected development scenarios for such lands is ultimately a local governmental decision.

Comment 343: 4-123. Pg. 4-98, p.6, "Quantify acreage of converted land use, show table."

Response: Such information on existing conditions is addressed in Section 3.19 LAND USE.

Comment 344: 4-124. Pg. 4-100, Alternative 1: "The Service concludes that their actions will not affect the price of land. What analysis was prepared to allow the Service to make any conclusions about land valuations under any alternative? Conclusions reached in this section are purely speculative with no basis."

Response: The Service referenced sources of information on land values in Section 3.20, LAND VALUES. These sources reference existing and comparable sales. This information has shown that the Service's water right acquisitions (20,000 AF) under No Action (Alternative 1) conditions have not affected the price of land. Simply stated, it is other private sales and buyers (non-governmental) that determine price. The Service agrees that determining future land or water right prices would be highly speculative. The Service has not attempted to provide or identify future land prices, but has provided an assessment of potential impacts to land values based on the information available.

Comment 345: 4-125. Pg. 4-100, Para.3: "The Service indicates that there are numerous factors which would affect value of lands and water rights, including recoupment, OCAP...These are cumulative actions which must be analyzed in the cumulative section."

Response: The Service agrees (please see CUMULATIVE EFFECTS, Sections 4.26.1 ACQUISITION OF WATER RIGHTS FOR THE FALLON PAIUTE-SHOSHONE RESERVATION AGRICULTURAL LANDS, 4.26.8 RECOUPMENT, 4.26.9 OCAP MODIFICATIONS, 4.26.11 NAS-FALLON EXPANSION, and 4.26.12 GROWTH AND DIVERSIFICATION).

Comment 346: 4-126. Pg. 4-100 Mitigation Measures. "The discussion of mitigation measures in this section are again a blatant attempt to ignore the Service's responsibility for mitigation for adverse impacts. Churchill County is not responsible to pursue mitigation measures for impacts created by the Service."

Response: Please refer to the Service's response to Churchill County comment #328 above.

Comment 347: 4-127. Page 101. "Where is the analysis of impacts for other tax revenues particularly sales and use tax which makes up the majority of local government tax revenues and which is linked to agricultural production expenditures and personal income?"

Response: During the scoping process, impacts to sales and use tax revenues was not identified as an issue or area of concern. Churchill County and others clearly stated a concern regarding property tax revenues. The Service has shown that there is a direct effect on property tax revenues as a result of acquiring water rights for wetlands.

The Service's economic analysis has utilized the multiplier theory in defining linked or indirect impacts to other sectors of the local economy that are affected by reduced agricultural crop production. The Service is unclear of the linkage or connection to sales tax revenues since crop, livestock, and dairy products sold by producers are generally considered wholesale transactions and are not subject to sales tax. Therefore the acquisition of water rights and the resulting loss of agricultural production would not have a direct affect on sales tax revenues.

There is insufficient information submitted by Churchill County to define any correlation between linked economic activity and income impacts to sales or use tax revenues. The Service does not have sufficient information to warrant expanding the impact analysis to include sales or use tax revenues for the FEIS.

Comment 348: 4-128. "If Churchill County did pursue such measures, the Service would be responsible for providing adequate funding for the County to review, analyze and develop appropriate land use policies."

Response: Comment noted. The ROD will identify the Service's commitments regarding implementation of mitigation measures.

Comment 349: 4-129. Pg. 4-101, Para. 1 & 2. "The Service is fully capable of implementing a voluntary targeting program which would help minimize adverse impacts."

Response: The Service has responded to similarly worded comments by Churchill County (see response to Churchill County comment #319 above).

Comment 350: 4-130. Pg. 4-101, Effects on Property Taxes: "Please show a table of tax revenues for each land use or zoning classification."

Response: It is unclear as to what additional information the County is requesting. The Service has clearly identified the anticipated impacts associated with the property tax revenues for lands that would be affected by its actions to acquire water rights. The Service addressed Refuge revenue sharing payments in Section 4.25, EFFECTS ON ACQUISITION COSTS AND PROBABILITY OF MEETING SERVICE OBJECTIVE.

Comment 351: 4-131, Pg. 4-101, "Why the assumption that converted ag land will be residential?"

Response: The Service did not assume that agricultural lands affected by the acquisition of water rights would be converted to residential land use. The Service depicted representative property tax revenues for water-righted agricultural lands to compare with anticipated property tax revenues for vacant and residential land use.

Comment 352: 4-132. Pg. 4-107 "What are the effects on the paleontological resources in the study area, if any? It would be appropriate for the Service to develop a programmatic Memorandum of Agreement with the State of Nevada Historical Preservation Officer and the Presidents Advisory Council on Historical Preservation for the management and preservation of cultural resources."

Response: The Service has not identified any adverse impacts to cultural resources, either prehistoric, historic, archaeological, or paleontological as a result of acquiring water rights. Stillwater NWR does have an existing cooperative agreement with the State of Nevada Historical Preservation Officer regarding preservation and management of cultural resources.

Comment 353: 4-134. Pg. 4-108, "Substantiate table 4.25.a."

Response: The sources for the information depicted in Table 4.25.A is listed at the foot of the table and is referenced in the accompanying text. Please also refer to Section 3.25 for a more detailed discussion of baseline assumptions related to capital and annual costs as well as revenue sharing payments. Purchase prices (capital costs) are based on representative values paid by the Service for water rights and water-righted land under existing conditions (No Action Alternative).

Comment 354: 4-135. Pg. 4-111 to 122--"There is no cumulative impact analysis contained in these twelve pages. This is merely a discussion of some of the related actions that are occurring, but by no means is there any impact analysis as required by the CEQ regulations. Past actions have been left out, along with foreseeable future actions such as water quality and minimum flow of the Truckee River, possible new water quality standards for the lower Truckee River and Pyramid Lake, water right purchases to off-set utilization of effluent waters on the Truckee River, etc."

Response: Section 4.26, CUMULATIVE IMPACTS has been revised. The most current information related to a possible "adjusted" OCAP is included in the FEIS and the Truckee River water quality agreement has been added as Churchill County suggested. The Truckee River water quality

settlement agreement was not addressed in the DEIS because it did not exist at the time the DEIS was prepared.

Comment 355: 4-136. Pg. 4-124. "Quantify unavoidable effects."

Response: The Service has quantified those unavoidable impacts related to agricultural jobs, economic activity, and farmland (Section 4.16, EFFECTS ON AGRICULTURE, FARMLAND, AND LOCAL ECONOMY), secondary wetlands (Section 4.6.2, SECONDARY WETLANDS), wildlife values (Sections 4.9, EFFECTS ON BIRDS, 4.10, EFFECTS ON MAMMALS, and 4.11, EFFECTS ON REPTILES), and hydropower generation (Section 4.2.6, HYDROPOWER RESOURCES). There is insufficient information available to quantify impacts to social values nor does the Service believe that such impacts can be quantified as Churchill County suggests. The Service, as the lead agency, chose not to repeat the full impact analysis of these previous sections under the Section 4.28, UNAVOIDABLE ADVERSE EFFECTS in an effort to avoid verbosity and repetition.

Comment 356: 4-137. Pg. 4-125. "Expand irreversible and irretrievable sections."

Response: The Service believes that the sections are sufficiently detailed given the nature of the analysis.

VOLUME 2 - CONCEPT PAPER (Appendix 4).

Comment 357: "Figures throughout the document appear to be incorrect. Table 1 figures do not add up."

Response: The figures throughout Appendix 4 were reviewed and the pan evaporation total in Table 1 was corrected.

Churchill County Mosquito Abatement District (CCMAD)

Comment 1: Pgs 3-48, 3-49, 4-42. "The Churchill County Mosquito Abatement District (CCMAD) was formed in 1985 to provide public health protection to the citizens and visitors of Churchill County from the annoyance and potential disease transmitting mosquitoes occurring in this county. We attempt to keep these insects within reasonable and tolerable levels. The use of the term "eradicate" implies complete and immediate extinction by killing off all individuals. For mosquitoes, eradication is impossible with any means currently available."

Response: Description of CCMAD incorporated in the text.

Comment 2: "CCMAD uses a number of non-chemical and chemical techniques to maintain mosquito populations within tolerable levels. Our philosophy is to use those techniques, which will least adversely impact the environment while providing the highest level of mosquito control:

- a. We introduce the mosquito-fish, Gambusia affinis, into long-term water holding habitats. In the Lahontan Valley, they are found in the Carson River, irrigation ditches, drainage ditches, Carson Lake and Stillwater Refuges and many other natural and artificial water holding locations. While these fish produce good results, they are not a panacea for mosquito control. They are subject to many factors affecting their effectiveness such as water quality and quantity, predation by birds, fish, amphibians and animals, cannibalism, and weather conditions.

- b. We apply narrow spectrum, bio-rational pesticides for mosquito larval control which do not affect other organisms such as predaceous diving beetles, backswimmers, dragonflies, fish, birds, etc. This allows mosquito predators to establish populations to help maintain lower mosquito larval populations. Several examples of bio-rational pesticides are Bacillus thuringiensis israelensis (Bti) and methoprene (Altosid).
- c. We apply Golden Bear 1111, a larval/pupal control oil, in those situations where there are late fourth instar and/or pupae in high numbers. This compound is used only when it is too late to use Bti and methoprene.
- d. When large numbers of adult mosquitoes have emerged, we then have to use compounds such as Dibrom Concentrate, Malathion or Pyrocidate to stop their flight. This is used as our last resort when other techniques do not work or the timing for other chemicals is wrong.

Response: Portions of this comment and a reference to the techniques used for mosquito control were included in Section 3.4.1

Comment 3: "Mosquitoes require water to successfully complete their life cycle. Within Churchill County there are 11 mosquito species in 4 different genera. They can be separated into those that can lay their eggs on soil, debris etc. and those that lay their eggs on the water surface..." [the remainder of the comment described the natural history of the different mosquito species].

Response: Comment noted. This information was incorporated into Section 3.4.1.

Comments 4 and 5: "The fluctuation of water levels in natural or artificial pond/wetlands or field can be conducive for Aedes species, which lay their eggs on soil. They can develop from egg to adult in 3 to 4 days during the summer. By keeping the water level at a particular level for several weeks or longer, Aedes mosquitos do not develop succeeding generations. By keeping the water level constant, Culex, Culiseta, and Anopheles species will develop succeeding generations. Since Culex tarsalis is the most abundant species and a proven vector of encephalitis, control of these mosquitoes is important."

Response: This information was incorporated into 3.4.1.

Comments 6-10: "The irrigated fields of alfalfa, sudan grass, and grain crops rarely produce a mosquito population. These fields have been laser leveled, irrigation water is carefully applied and excess water is drained away. An amount of water capable of producing a population of mosquitoes is detrimental to these crops. CCMAD staff does not normally find mosquito production in these carefully irrigated fields. Irrigated pastures of cattle/and or horses can cause an Aedes population if the water remains over 3 days in a particular spot or an area of the field. A reduction in irrigated cropland such as alfalfa fields will not reduce mosquito production."

Response: The comment is noted. The text of Section 3.4.1 was revised accordingly.

Comment 11: "An increase in wetlands will result in greater mosquito production since there will be a substantial increase in constantly wetted acreage."

Response: Comment noted. However, it should be noted that the Service will only increase wetland acreage over baseline conditions, not over historical (1860s) or recent past (1970s) conditions. Overall, the Service's proposed actions to maintain 25,000 acres of wetland habitat in Lahontan Valley will constitute a portion of the wetland habitat that previously existed within the service area of CCMAD. Mosquito populations may be comparable to those that occurred in the early 1970s.

However, complaints from area residents could increase due to the larger human population base, as compared to the 1970s.

Comment 12: "Over fifty percent of all mosquito control performed by CCMAD is the result of mosquitoes being produced on wetlands and their movement away from wetlands to other properties."

Response: According to M. Wargo (District Manager, Churchill County Mosquito Abatement District, personal communication), this estimate was based on professional observations in conjunction with the results of research conducted in other parts of the United States. As such, the estimate is very approximate. Primary wetland habitat under Alternatives 2-5 would account for only part of the habitat available for mosquito reproduction. Other areas suitable for mosquito production include irrigation drains, secondary wetlands, flooded pastures, etc.

Comment 13: "Mitigation of mosquito production should be approached carefully because many complex factors influence which mosquito species will be reduced or increased, the potential for mosquito-borne diseases will be increased and which agency will be responsible for the control of mosquitoes on and from the wetlands."

Response: Service responses to specific recommendations by CCMAD concerning mosquito-production mitigation are provided under the response to CCMAD comment #14.

Comment 14: "CCMAD has offered the following mitigation measures...":

1. "Lands where the water rights have been purchased should not be sold for later residential development..."

Response: It is unclear how this action would lessen the production of mosquitoes. Restrictions on residential development is addressed in Churchill County's 1990 Master Plan.

2. Stillwater NWR should establish a line item in their annual budget for the control of mosquitoes...and provide for larval control by performing the work themselves or contracting with CCMAD.

Response: The Stillwater NWR budget does not necessarily have the ability to line item expenditures, but the Service does recognize the need to coordinate and integrate mosquito control as a component of its wetland management. The Service has in the past and will continue to work with CCMAD on mosquito control.

3. "Stillwater NWR should establish an emergency fund to provide for emergency mosquito control in the case of encephalitis outbreak/epidemic or if conditions indicate a substantial increase of Culex species populations or an increased number of sentinel chicken conversions to encephalitis."

Response: The Service cannot commit to the establishment of such a fund nor is it the appropriate Federal agency to be involved in disease control. The Federal Government has agencies and departments that handle emergency situations such as disease outbreaks/epidemics. These agencies are already funded and staffed to respond to such anticipated conditions.

4. "A committee of affected agencies can be established to help advise Stillwater NWR on how and when to control mosquitoes and prevent disease outbreaks."

Response: The Service will continue to coordinate with CCMAD on mosquito control and will be open to CCMAD's advise on controlling mosquitos during the development of Stillwater NWR's comprehensive management plan.

5. "Since Stillwater NWR wants to be a good neighbor and responsible part of the Lahontan Valley community, their sharing of the financial burden for mosquito control and disease prevention resulting from their wetlands project will help improve conditions in the valley."

Response: The Service will continue to coordinate and work with CCMAD where necessary. The Service encourages CCMAD to participate in the development of the comprehensive management plan for Stillwater NWR -- the plan will specifically address water management on the refuge, water management of which will influence mosquito production on the refuge.

6. "CCMAD would be happy to work cooperatively with the Stillwater NWR to develop a reasonable mosquito control plan."

Response: The comment is noted, and the Service in turn encourages ongoing coordination of mosquito control.

City of Fallon

Comment 1: "...the City of Fallon disagrees that the DEIS comports with NEPA and finds this statement to be clearly erroneously, and as such not identifying a document sufficient to lawfully implement any of the proposed federal actions. The National Environmental Policy Act ("NEPA") (42 U.S.C. (43332 (2) (C) requires environmental impact statements ("EIS") by federal agencies which consider environmental effects of and any alternatives to, all proposals for major federal actions that significantly affect the quality of the environment. NEPA's "action-forcing" provision, Section 102 (2) (c) is the linchpin of this law which requires an EIS to describe: (1) the environmental impacts of the proposed action: (ii) any adverse environmental impacts which cannot be avoided should the proposal be implemented: (iii) the reasonable alternatives to the proposed action: (iv) the relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity; and (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. Additionally "Cumulative" impacts must be addressed in an EIS which mandates analysis of the "incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" 40 C.F.R. S 1508.7 (1991).

Response: The Service believes the document is in compliance with NEPA. Environmental consequences of the action are described in Chapter 4, Sections 4.1 through 4.26.; cumulative impacts are addressed in Section 4.26; unavoidable adverse effects are described in Section 4.28; alternatives to the Proposed Action are described in Chapter 2; the relationship between local short term uses of man's environment and the maintenance and enhancement of long term productivity are described in Section 4.30; and irreversible and irretrievable commitments of resources are addressed in Section 4.29.

Comment 2: "NEPA can require "a comprehensive impact statement in certain situations where several proposed actions are pending at the same time" Kleppe v. Sierra Club 427 U.S. 390, 409 (1976). The DEIS purports to describe and evaluate strategies for acquiring necessary water and water rights to sustain 25,000 acres of primary wetland within the Lahontan Valley under the Truckee-Carson Pyramid Lake Water Rights Settlement Act Title II (Sec. 206) of Public Law 101-618 ("The Settlement Act"). Section 206 of The Settlement Act is a subset of at least six other major

federal actions incorporated in The Settlement Act relating to the Truckee and Carson Rivers outlined as follows:

1. Sec 204 Interstate Allocation
2. Sec.205 Truckee River water Supply Management
3. Sec. 206 Wetland Protection
4. Sec. 207 Cui-Vi and Lahontan Cutthroat Trout Recovery and Enhancement Program
5. Sec. 208 Pyramid Lake Fishing and Development Funds
6. Sec. 209 Newlands Project Improvement
7. Sec. 210 Miscellaneous Provisions

The Settlement Act has been described and heralded as resolving decades of water litigation in northern Nevada and must logically and legally be viewed and subject to environmental review as a single major federal action...Undeniably any of The Settlement Act's provisions, all of which are 'major federal actions,' are inherently interwoven in the others and must be considered in a 'comprehensive' or 'programmatic' manner in a single 'Programmatic EIS' consistent with NEPA requirements."

Response: Please see General Issue Response I., Programmatic EIS.

Comment 3: "The DEIS lists and summarily describes twelve (12) individual "cumulative effects" and rather incredibly in four of these categories states that individual EA's of EIS's are being prepared. See: DEIS Sec. 4.26. This approach is simply not adequate or acceptable under NEPA."

Response: A similarly worded comment was offered in Churchill County comment # 30. Please see response to that comment.

Comment 4: "The City of Fallon operates a municipal water system which serves as the sole source of domestic and industrial water for its 7,000 citizens. The DEIS taken along - that is, without the benefit of the information that a Programmatic DEIS would confer, plainly states that the adverse effects (effects which are considered in fact but debated in terms of degree within the DEIS and its proposed action) upon the basalt aquifer which is the source of the City's water supply is unknown. See: DEIS. 4-36/4-37. It is inconceivable to the City of Fallon that the action proposed could be considered for adoption before the impact of reduced recharge is known and the municipal water supply permitted by the State of Nevada is absolutely assured, in fact The Settlement Act requires nothing less, not to mention NEPA, Nevada State Water Law and applicable decisional law."

Response: Please see responses to Churchill County comments #253-257.

Comment 5: Economic Impacts. "The DEIS acknowledges that the acquisition of farms for their water out of the private sector will affect the local economy. The consequence of this is a net negative economic impact on the community which is not offset by "income gains associated with water right purchases." An action which was directed toward acquiring water without withdrawing land from the private sector would be a better alternative. An example of this would be to target the acquisition of waters from agricultural lands which are being converted to another use, such as subdivisions, in the natural course of the market in which the DEIS described....""Mitigation in the context of the NEPA process assumes that the party responsible for the impact will undertake the burden and expense of rectifying so that the burden of the proposed action is shared by the larger public which benefits from the proposed action."

Response: The Service expects that developers in the affected area may offer portions of their block water rights to the Service for purchase. The Service could acquire such water rights, and nothing in this document would preclude the Service from doing so. However, the Service does not have an estimation of the amount of water that could potentially be acquired in this way.

Comment 6: "The concept of willing seller is not defined within the DEIS and it is submitted that the sales that are ongoing are not market driven. There is one buyer and the market is destabilized because of regulatory uncertainty, litigation, recoupment, changing OCAP and similar influences which problematize the agricultural enterprises and alter the motivation of a potential seller in the same sense that "condemnation blight" can affect a market."

Response: Please see General Issue Response VII., Willing Seller Defined.

Comment 7: "The agricultural community and the wetlands have existed through the community's history in relative harmony and as a consequence thereof the community has always benefited culturally and economically from their combined presence. The net gains to the wetlands qualitatively and quantitatively appear negligible from the data generated by the DEIS."

Response: Comment noted.

Comment 8: "The discussion of mitigation is defective in at least two general respects. Unavoidable adverse impacts are acknowledged and discussed such as the conclusion that ground water levels will decline. However the mitigation section "to rectify the impact by repairing, rehabilitating or restoring the affected environment" is not addressed, which is specifically required by The Settlement Act."

Response: The Settlement Act does not require mitigation. However, the National Environmental Policy Act, (NEPA) does require that mitigation measures be identified to cover the range of impacts that would result from the action, and this question will be answered in relation to NEPA. According to CEQ's "Forty Most Asked Questions," mitigation measures must include things such as design alternative to lessen impacts. In comparison to the other action alternatives, the Service's Preferred Alternative would pose less impacts to social values, farmland, and agricultural economics in the affected area. Mitigation measures are to be developed where it is feasible to do so, and all relevant, reasonable mitigation measures are to be identified, even if they are outside the jurisdiction of the lead agency. The Service believes it has identified most all the reasonable, feasible mitigation measures available in relation to the Service's action. However, in some instances, no feasible mitigation is available.

Comment 9: Consultants. "No one among the technical consultants is a person with local knowledge in the area of water rights, conservation, economics, nor do any have any affiliation with any offices of the City of Fallon or the County of Churchill."

Response: The Service disagrees. All of the technical consultants have local knowledge about water rights, and each is individually expert in other important areas as well. Although they are not locals, and do not have affiliation with the City of Fallon or Churchill County, they are reliably knowledgeable about the Newlands Project and the water rights acquisition program.

Environmental Protection Agency:

Comment 1: "We have assigned a rating of EC-2 (environmental concerns, insufficient impact documentation) to alternatives 2-4 and EO-2 (environmental objections, insufficient documentation) to

Alternative 5...We believe Alternative 4, if feasible, provides the most assurance of a reliable supply of good quality water, but we note that it is also the most expensive and has the greatest impact to the farming community. Because of anticipated adverse water quality impacts associated with use of groundwater and drainwater, we have environmental objections to Alternative 5, which we understand is now being considered in preference to Alternative 2 (DEIS proposed action). We note that, in contrast with alternatives which would improve wetlands water quality relative to "no action," Alternative 5 could result in poorer quality water.

Response: Language of Alternative 5 was revised to reflect that groundwater would only be used to the extent that it does not degrade water quality of wetland inflows as compared to baseline conditions. Additional groundwater sources could be used if existing wells with suitable quality water were made available.

Comment 2: "We are also concerned that various implementation elements of Alternative 5 seem tenuous... or are insufficiently researched. This alternative would need substantial refinement if it becomes the preferred course of action. It is especially important that the action selected combine water source flexibility, such as contemplated in Alternative 5, with reasonable assurances of wetlands water supplies which are both reliable and of suitable quality."

Response: EPA's comment is noted. The Service has revised and broadened the scope of Alternative 5 and has identified this alternative as its Preferred Alternative in the FEIS.

Comment 3: "Please send three copies of the Final EIS to our San Francisco office at the time it is filed with the EPA office in Washington, D.C."

Response: Comment so noted.

Comment 4: "The DEIS makes the assumptions that the timing of water deliveries would follow the current Newlands irrigation pattern, a season between March 15 and November 15...(page 2-14). The Final EIS should clarify the rationale for this assumption and explain whether it will be reexamined in the future, in the context of optimizing timing of deliveries for wetlands resources. The Final EIS should briefly explain which inflow periods are the most critical for the wetlands. With this information in mind, do some of the alternatives offer better opportunities than others to control the timing of inflows? What options are available for managing drainwater inflows?"

Response: EPA's comments are focused on issues related to the management of water resources on the Refuge and other primary wetland areas. The scope of this EIS is to evaluate the consequences of acquiring water and water rights. The Service will re-evaluate the irrigation delivery schedule to optimize wetland management objectives as a component of the comprehensive management plan to be developed for the Refuge.

Comment 5: "While the DEIS has mentioned several related programs which could contribute to reduction of contaminated drainwater--for instance the Newlands Project Efficiency Study and the national Irrigation Water Quality Program Phases IV and V--we are concerned that there appears to be no specific connection between these programs and the wetlands water supply acquisition planning. We ask that the FEIS address this question."

Response: The Service agrees that these programs are not specifically linked to the acquisition of water and water rights. The status of these programs does not depend upon the Service's water rights acquisition program nor does the Service's Proposed Action and Alternatives require the completion or implementation of these other programs. Once the NIWQP programs are complete,

the Service expects that the Service will receive recommendations for implementing procedures to increase water quality on the Refuge.

Comment 6: "...The DEIS should explain more specifically how, in turning drainwater away from selected habitat areas, "separate management" of the drainwater could prevent exposure of biota to contaminants. In the context of cumulative habitat effects, the DEIS should also clarify the extent to which there are non-primary wetland areas which would continue to receive drainwater in the future."

Response: Please see response to Churchill County #244, a similarly worded comment. The Service has not chosen Alternative 4, which would require separate management of drainwater, as its Preferred Alternative. Although there are water quality concerns about drainwater, the increased volume of prime agricultural water applied to the wetlands under the Preferred Alternative would greatly benefit the wetlands as compared to baseline conditions. In regards to the secondary wetlands, the Service has addressed impacts from OCAP to these areas as a baseline condition in Sections 3.6.2 and impacts of the Service's action is described in 4.6.2.

Comment 7: "The DEIS should clarify what assumptions are made in the alternatives regarding use of the TJ drain. Are there significant consequences for primary wetlands water quality if the intended TJ drain closure does not occur?"

Response: The Service has stated, pursuant to P.L. 101-618, that TJ is to be closed or its water quality problems mitigated. The exact details and procedures that constitute "closure" are not fully known and are pending final decisions by BIA and Reclamation regarding implementation of that project. Closure of the TJ Drain is a core assumption in the impact analysis related to the acquisition of water and water rights for wetlands. The Service believes, as did Congress, that there are long-term water quality consequences for the primary wetlands if TJ Drain is not closed, or if its water quality problems are not mitigated.

Comment 8: "The DEIS should provide more detail on conveyance of acquired water to the wetlands. In particular, explain whether water would only be delivered via drainwater channels...or also through the Carson River and/or water supply canals. Is there potential for instream flow changes in the Carson River, and if so, would there be effects on channel morphology and habitat over time?"

Response: The Service has assumed as one of the core assumptions in the EIS (Section 2.4 number (8)), that irrigation deliveries will be conveyed via the existing canals. As irrigation delivery volumes approach the anticipated targets, some portion of the irrigation deliveries will be diverted from main delivery canals to the major drains that currently supply water to the primary wetland areas. Decisions regarding the routing of irrigation water within the Newlands Project are the responsibility of TCID under the authority of Reclamation. Actions to restore lower Carson River flows and habitat are the focus of other local interest groups and the Service has cooperated in those restoration planning efforts.

It should be noted that routing of water in the Carson River channel downstream of Lahontan Dam could change instream flows to more natural or historical conditions. Prior to 1902, the average annual instream flows in the lower reaches of the Carson River in Lahontan Valley were much greater than what could currently be accommodated if all of the Stillwater NWR irrigation water was routed via the river.

Comment 9: "Acknowledging that there is evidence that polluted drainwater inflows are damaging to wetlands biota (see pp.3-90-91; p. 4-65 ff), the DEIS refers several times to the expectation that

water must be of "suitable" quality for the primary wetlands habitat areas (eg. pp.1-5 and 2-2). However, the document is very unclear (and in the case of discussion of applicable standards, inaccurate) regarding what quality water is needed and what management actions would be taken by the Service, and could be taken by other responsible parties, to assure suitable water quality. Ecological risks associated with drainwater contaminants are all the more a concern if there is a possibility that baseline inflows of drainwater may be understated (3-9)."

Response: Applicable water quality standards have been revised in response to the EPA's comments. Management actions by the Service and other responsible parties to ensure suitable quality water will be addressed in the Service's comprehensive management plan for Stillwater NWR which will be incorporated into an EIS being prepared by the Department of the Interior for Truckee and Carson River water management issues. This document is now in its initial development phase.

There are two main issues regarding drainwater quality. One issue relates to the level of water quality that is necessary to meet wetland habitat objectives, and the other relates to applicable standards for irrigation drainwater. The Service plans to address water quality requirements as part of its management planning process, but it is the Service's understanding that decisions regarding applicable drainwater standards and irrigation drainwater discharge would be determined by the State of Nevada under the authority of EPA and the Clean Water Act. In its comments on the DEIS, the State Division of Environmental Protection cites beneficial use standards for protection of municipal or domestic supply, aquatic life, irrigation, propagation of wildlife, and watering of livestock, but does not list standards relative to propagation of wildlife.

Comment 10: "...it would be helpful to provide additional information (to the Stillwater Refuge Management Plan, Appendix 2) on the water quality requirements of the various habitat types as well, and to explain briefly how water is managed and reused within the refuge. Discuss whether differences in the inflow of water quality anticipated under the alternatives could affect attainment of objectives for different habitat types, seasonal wildlife uses, and public uses."

Response: Details of water management on the Refuge or on the other primary wetland areas is beyond the scope of this EIS. The Service has determined that the acquisition of irrigation water under all the alternatives considered would be beneficial in attaining the goals and objectives of the existing Stillwater Management Plan.

Comment 11: "The DEIS lacks site-specific information regarding the water quality of the drains that would be used to supply water to the wetlands. General statements of toxicity to aquatic life are not linked back to specific drains. Overall, information in the DEIS is insufficient to support a conclusion that the alternatives would in fact assure wetlands supplies of appropriate quality water. Based on this lack of information EPA could only support alternative number four (the alternative with the least amount of drain water going to the wetlands)."

Response: The Service concurs that the document does not address site-specific information regarding drainwater quality. The scope and purpose of the EIS is to address the consequences of acquiring water and water rights. There are separate and distinct projects and programs that are focused on irrigation drainwater, Newlands Project operations, and water quality standards. The Service has provided general information regarding drainwater quality and irrigation water quality to provide the decision-maker and the reader with background information on the relative value of acquiring irrigation water and delivering it to the wetlands. The Service notes EPA's preference for Alternative 4 based on its concerns regarding drainwater quality.

Comment 12: "We recommend that the FEIS provide site-specific, parameter-specific data (for those instances that exceed the appropriate standards) in a map format that corresponds in scale to a map that outlines drain and/or canal conveyance routes for each of the different alternatives..."

Response: The Service believes such detailed water quality information is not relevant in a document that analyzes the consequences of acquiring water and water rights. Such information has no relationship to decisions to be made regarding water and water right acquisitions. While such information is directly linked to wetland habitat and management decisions, those decisions are not within the scope of this water rights acquisition EIS.

Comment 13: "We recommend that the FEIS reference and discuss a paper on "An Overview of Irrigation Drainwater Techniques, Impacts on Fish and Wildlife Resources, and Management Options," prepared in 1992..."

Response: The Service has reviewed the document and made reference to it in Section 3.3.2, SURFACE WATER QUALITY.

Comment 14: "You should consider providing a discussion in the FEIS of ecosystem risks associated with drainwater. A model of "Ecosystem Risk: Risk-Based Irrigation Drainwater Spatial Tracking Effort (RIDWASTE)" was jointly proposed by the EPA and FWS to the National Biological Service, Midcontinent Ecological Science Center (MESC). MESC concluded that a watershed-based modelling approach for drainwater tracking was feasible, suggesting a coarse-grained model for site specific risk estimates. Both models are available in the "RIDWASTE" program.

Response: The purpose of this document is to address the consequences of acquiring water and water rights. Risk analysis and water management issues related to the use of drainwater are more appropriately addressed in documents analyzing Newlands Project OCAP and wetlands management.

Comment 15: Page 1-2. "The third paragraph defines "primary wetland habitat" but the DEIS does not provide a map or figure which identifies more specifically the location of targeted wetlands. This information should be provided in the FEIS."

Response: The text was revised in this paragraph in an attempt to make the definition of primary wetland habitat more clear to readers. The definition was revised to refer to Figures 1.C and 1.D, which identify the locations of primary wetland areas (Stillwater NWR, Stillwater WMA, Carson Lake, and Fallon Indian Tribe) in which primary wetland habitat is located.

Comment 16: Page 3-24. "The second paragraph makes an inaccurate assertion that: Because the water is acquired from Newlands Project water users, the project operator is only required to continue to meet agricultural water quality standards set by the State of Nevada.(emphasis added). On the contrary, the Clean Water Act and implementing regulations (Clean Water Act Section 303(c)(2)(A) require that applicable water quality standards be based on the designated uses of the water involved, with the intent of protecting these uses, including the most sensitive use. Therefore, the applicable water quality standards for the inflow of water entering the wetlands habitat refer to the beneficial uses of the wetlands, i.e., aquatic life and fish and wildlife, not irrigation. The standards applicable to the wetlands are contained in the Nevada Administrative Code (NAC) at 445.124 and 445.1339. In addition, federal standards for priority toxic pollutants are constrained in 40 CFR Sections 131.36(a), (b) (1), (c), and (d) (11). Similar assertions throughout page 3-24.

Response: The Service appreciates EPA's interpretation of the Clean Water Act and the Nevada Administrative Code. The Service believes that such interpretation of these laws assumes that the purposes of the Newlands Project have changed to include aquatic life, fish and wildlife propagation. While P.L. 101-618 authorizes the use of Newlands Project irrigation water for other purposes, it is not clear that the primary purpose of the project has changed from irrigation supply. The Service would anticipate that EPA or the State of Nevada under its authority would enforce compliance with those standards on the Newlands Project if they believe such standards are applicable.

Comment 17: Page 3-28. "The second paragraph indicates that high dissolved-solids concentrations in groundwater negatively affect small fish species and some aquatic organisms. Does this water currently enter the wetlands? If so, the FEIS should document quantities and locations where groundwater enters the wetlands, and should explain how the different alternatives would affect the existing distribution pattern."

Response: The Service, Reclamation, and USGS have been working for years to document where this poor quality groundwater enters the wetlands. Such investigations are the focus of a number of reports referenced in various sections of the EIS that relate to water quality. There is insufficient information to explain whether the different alternatives would affect existing groundwater seepage and drainwater quality.

Comment 18: Page 3-28. "The third paragraph states that increased concentrations in wetlands waters of dissolved-solids and trace elements (such as arsenic, boron, sodium, and chloride) are suspect in the loss of emergent and submergent wetland vegetation in Lahontan Valley. The FEIS should provide more detail on the habitat losses associated with these conditions."

Response: The Service would provide such information if it was available. The known sources or references on this subject are included in the text.

Comment 19: Page 3-28. "Table 3.3.B provides information on only two drains; the "Standard of Biological Effect level" column inaccurately portrays the appropriate water quality standards; and other contaminants such as chromium, copper, zinc, and un-ionized ammonia are not included in the table. In particular, the chronic exposure standard for selenium is 5 ppb, not 260 ppb."

Response: The available information was depicted in Table 3.3.B. Other water quality data specific drains were point-in-time samples and did not provide long-term representative average conditions of drainwater quality. The Service will revise the column in the table to reflect EPA's effect levels for contaminants listed.

Fallon Paiute-Shoshone Tribes

Comment 1: "...the Tribes strongly believe that Water Rights in the area to the west and southwest of the Basalt Aquifer should not be acquired by the U.S. Fish and Wildlife Service in order to protect this valuable and necessary Tribal and regional underground M & I water resource. We further believe that observance of our request will, in part, fulfill the "Trust Responsibility Policy" of the Interior Department, as issued by the Secretary to protect and enhance "Trust and Tribal Assets."

Response: The Tribe's concern is so noted and the Service has identified protective targeting as a mitigation measure to be considered for the protection of groundwater recharge. The Service has also identified conveyance of water via the lower Carson River as a measure that could further enhance basalt aquifer recharge. Decisions regarding mitigation measures to be implemented in conjunction with the Service's action to acquire water rights will be contained in the ROD.

Comment 2: "...the discussion in "Acquisition of Water rights for the Fallon Paiute Shoshone Reservation Agricultural Lands," 4.26.1 on page 4-111 should be corrected to indicate that the land and water rights acquisitions of 2,415.3 acres of land and 8,453.55 acre-feet per year of water rights shall be taken into "Trust" category by the United States for the benefit of the Fallon Tribes."

Response: Change incorporated.

Comment 3: "You should note that Public Law 101-618 does not prevent the Tribes from acquiring additional land and/or water rights, if they desire, in excess of the amounts indicated above, it merely indicates that "up to these amounts" must be taken into trust, if purchased by the Tribes in Lyon and Churchill Counties."

Response: The Tribe's comment is so noted and necessary changes incorporated.

Robert T. Forest

Comment 1: "I would like to express my opposition to the proposal for the federal government to purchase up to 125,000 acre feet of water for wetlands. Following are some of the reasons for my opposition...the federal government needs to reduce expenditures..."

Response: The Service notes this opposition, but also recognizes that Congress, as the legislative representative of the people of the United States, passed legislation (Public Law 101-618) that directs the Secretary of the Interior to restore and sustain the Lahontan Valley wetlands after years of degradation.

Comment 2: "The purchase of existing water rights would be detrimental to the agricultural interests."

Response: The Service agrees and has identified those adverse impacts in the document (please refer to Sections 4.2.1, 4.2.2, 4.16, 4.16.1, 4.16.2, 4.16.3, 4.16.4, 4.19, and 4.23).

Comment 3: "If the federal government purchased existing water rights the U.S. Fish and Wildlife Service would claim first rights to the water available in dry years to the detriment of other users."

Response: The Nevada water right statutes and the Alpine Decree define priorities for water use. Under the existing statutes, laws, and operating procedures, the Service would not be allowed to exercise their acquired water rights as the comment suggests. The Service would exercise their water rights the same as any other water-right holder in the Newlands Project.

Comment 4: "In normal and wet years there is plenty of water for both the farmers and the wetlands, with the wetlands receiving runoff from the irrigated farms. In those years there is no need for the federal government to own water rights."

Response: The Service concurs that in some "wet" years there is sufficient water to meet both agricultural and wetland requirements under existing conditions. The Service's objectives as well as the Congressional mandate are to provide sufficient water and water rights to sustain an average of about 25,000 acres of primary wetland habitat over the long-term. Water is an over-allocated resource in Nevada, and drought years are as common as "wet" years. The Service could not meet the long-term wetland habitat objectives in Lahontan Valley if they are left to subsist on drainwater and spills.

Comment 5: "We already have too much government and too much government control. Let's not add to it."

Response: Comment noted.

Lahontan Conservation District

Comment 1: "It is also our position that a comprehensive EIS should be completed for all proposed and previously implemented federal actions in the Lahontan Valley to adequately address the cumulative impacts of the actions."

Response: Please see General Issue Response I., Programmatic EIS.

Comment 2: Section 3.7.2, Riparian Plant Communities. "In the discussion of the alteration of the plant community along the lower Carson River, a major impact has not been addressed. The cottonwood forest has been severely impacted by the beaver population. The riparian areas would not be declining in condition as quickly if the beaver were controlled. The invasion by exotic species would not be as successful if the cottonwood forest were in better condition."

Response: Beaver populations and exotic species are an existing condition that will not be impacted by the proposed action or alternatives to acquire water and water rights. Therefore, such impacts are not addressed in this EIS. This issue, however, will be addressed in the Service's comprehensive management plan.

Comment 3: Section 4.3.3, Groundwater. "According to the DEIS, there is insufficient data to analytically determine the impacts of the proposals on the groundwater in the Lahontan Valley. According to the U.S. Geological Survey document entitled *Hydrogeology and Potential Effects of Changes in Water Use, Carson Desert Agricultural Area, Churchill County, Nevada*, "Changes in irrigation practices that would decrease seepage losses or the area of irrigated land west of Fallon have the potential to decrease recharge to the shallow, intermediate, and basalt aquifers in that area." Lowering the water table has the potential to effect farmlands still in production, desert shrub plant communities, domestic wells, and the wells which supply the City of Fallon and NAS Fallon. There is inadequate concern for the impact to the entire groundwater system of the valley which is dependent upon Newlands Project recharge. Further studies need to be completed to fully understand the complexities of the aquifers."

Response: The Service described, in Section 4.3.3, GROUNDWATER, the anticipated impacts to the shallow aquifer. The concerns that the Conservation District has described are identified in that section. An EIS document is required to describe, based on the best available information, the impacts associated with the action and alternatives. The Service, USGS, and Reclamation have funded the existing groundwater studies in Lahontan Valley, these studies have enabled the Service to define the anticipated impacts and present the existing available information on the groundwater resources.

The Service concurs that the existing groundwater reports do identify a need for further study of the groundwater resources, and would encourage local interests to support funding such studies as proposed by USGS. Based on the information available, one of the major impacts to the basalt aquifer is increased pumping by the existing users (i.e. City of Fallon, NAS-Fallon, and Fallon Paiute-Shoshone Tribe). USGS and NAS-Fallon may be conducting a study of the basalt aquifer in the near future to better determine the condition of the groundwater resources in Lahontan Valley.

The Conservation District's comment points out an interesting aspect of the shallow aquifer, that it is a source of water necessary to sustain existing agricultural crops. If these crops are partly sustained by the shallow aquifer, meaning that they require more water than is provided by surface irrigation, then there would in effect be no net recharge of the shallow aquifer from on-farm irrigation. Based on such a premise, the reduction in the number of farmland acres that are flood-irrigated (a consequence of converting agricultural water rights to wetland water rights), would have little or no effect on shallow aquifer recharge.

Another aspect of water demand by agricultural crops is that they utilize (consumptive use) as much as 50,000 AF/year (Maurer and others, 1994) from the shallow aquifer. Based on the existing groundwater reports and irrigation drainwater studies referenced in the EIS, a large percentage of the drainwater that reaches the primary wetland areas comes from groundwater discharge to the drains. Therefore, it is possible that reducing the acreage of agricultural crops would reduce the consumptive use of groundwater, which would in turn increase drainwater flows to the wetlands. If this proves to be true, then wetland water right acquisitions may be reduced due to greater drainwater inflow.

Comment 4: Section 4.4.1, Vectors. "...The workload of the Mosquito Abatement District will be impacted, and compensation should be made by the Service to help finance the additional control measures that will be needed."

Response: The Service has responded to Churchill County Mosquito Abatement District recommendations for mitigation above -- please see the response to CCMAD comment #14 above.

Comment 5: "Mosquitoes are not the only pest that should be considered when discussing vectors, or disease-carrying organisms. It is possible that the rodent population will increase due to lack of control on abandoned farmland, and mitigation should be considered."

Response: Potential impacts of rodents was added to Section 4.4.3 and the section title was renamed to "AGRICULTURAL PESTS". As vegetative communities change in areas from which water rights are purchased and transferred to the primary wetlands, small mammal populations likely will change. Furthermore, according to T. King (Lahontan Conservation District, personal communication), it is possible that removal of water rights from some farmland could increase pocket gopher problems on adjacent farmland.

Comment 6: Section 4.4.2 Erosion. "The Service has failed to recognize potential impacts of wind erosion such as damage to neighboring crops and buildings, increased health problems, weed seed dissemination, and loss of soil productivity. The Service has a moral obligation to minimize erosion on lands that are left bare by their actions. Natural re-establishment of native species takes time, especially in disturbed areas. Lands that are no longer farmed due to the purchase of water rights by the Service should be revegetated to minimize erosion."

Response: The Service responded to similarly worded comments by Churchill County (see response to Churchill County comments #272, #273, and #278 above).

Comment 7 Section 4.4.3 Weeds. "The Service has again underestimated the impact of their proposed actions. Abandoned farmlands (especially if it is not immediately revegetated) will greatly increase the weed problem in Churchill county. Neighboring fields will be impacted, causing additional weed control expense for landowners whose fields are still in production."

Response: The Conservation District's comment that adverse impacts are underestimated is noted. Mitigation for weed control is discussed in a response to Churchill County comment # 281.

To date, none of the lands associated with wetland water right acquisitions were in a disturbed state (i.e. disked, tilled, or graded) when the water rights were acquired. A mitigation measure identified in Chapter 4 would be for the Service to revegetate and apply water for one year to any lands acquired for water-right transfers that are disturbed (i.e., disked, tilled or graded). Disturbed lands are most susceptible to weed invasion and would account for the greatest potential adverse impact relative to weeds. However, it should be noted that weeds do provide vegetative cover and prevent wind erosion (another of the District's concerns, see Conservation District comment #6 above).

Comment 8: Section 4.5 Effects on Air Quality. "The effect on air quality of abandoned farmland has not been adequately addressed. There is potential for a substantial increase in dust if fields are not immediately and successfully revegetated. This also poses a health risk to the community. Agricultural burning will not be reduced, as indicated, due to the increase in necessary weed control."

Response: Air Quality is addressed in Sections 3.5 and 4.5. Please see response to a similarly worded comment # 272, from Churchill County. The Service does not anticipate that fields no longer irrigated as a result of water right acquisition would necessarily contribute more dust than they do under existing conditions when actions to till, plow and grade occur regularly. Due to residual crop cover and soil crusting, these vacant lands would be susceptible to only short-term wind erosion impacts.

Comment 9: "The DEIS indicates that the sale of water rights will generate income. This is true, in the short term. However, farming generates income annually. The sale of water rights is a one-time source of income. Without employment opportunities, the person who sells their water rights will be forced to move."

Response: The income related to the sale of water rights has two impacts, the short-term gain and the long-term annual investment income. The person who sells their water rights may invest in community business, industry or other enterprises in the affected area. When farmers sell their water rights, for whatever reason, re-employment may or may not be a factor in their decision. Under a willing seller program, these are voluntary choices made by the farmer and it would be incorrect to characterize these as "forced" changes. In addition, the area is growing and it appears that retail business is also expanding to provide other investment or employment opportunities. A farmer who sells a parcel of farmland because it is less productive or unprofitable may be able to invest in more productive farmland in Lahontan Valley or elsewhere. There is no indication that those who sell water rights for wetlands protection will be "forced" to move. However, there is inadequate data to determine how many people would leave the area for employment opportunities elsewhere.

Comment 10: Section 4.17 Effects on Recreation. "Two models were used to determine impacts on recreation. Sunding concluded that there would be no increase in general recreational use, while estimates that general recreation would increase. Conclusions are drawn based on Sunding's increase in hunting use and Meyer's increase in general recreation use. It is unacceptable to combine studies, choosing only the preferred conclusions from each and disregarding the results that the Service finds undesirable. One study or the other should be used, not a combination of the two."

Response: The Service disagrees. If the Service had wished to use only "preferred" conclusions (interpreted as meaning that the water rights acquisition program would enhance recreational uses to the greatest extent), as stated in the comment, then only the Meyer's report would have been used -- this report overestimated recreational use and expenditures in the wetlands to a certain extent. However, the Meyer data did include local surveys, which showed that general recreation use occurred at the wetlands. Sunding was contracted to re-evaluate the Meyer's data using a lower expenditure per day for use in the area. The combination of the two studies offers the most realistic

synthesis of recreational conditions anticipated to occur as a result of the proposed actions and alternatives. The Service also compares Kay's data to provide a correlation to the expenditures/day estimated by the combination of Sunding and Meyer. Kay estimated expenditures/day hunting use at \$39, the combined Meyer/Sunding studies equal an estimated average of \$44/day for all uses.

Comment 11: Section 4.26.4 Comprehensive Management Plan. "Why wasn't the plan done prior to the DEIS? How can the Service know how much water they need if they have no plan? ...It would seem that asking for less water would greatly improve the Service's position and reputation in the community and would help to lessen the pessimistic outlook many have for the future of agriculture in the valley."

Response: The Service, as a policy decision, began planning efforts associated with P.L. 101-618 and accompanying NEPA evaluation, focusing on the acquisition of water rights based on the availability of data, clearly defined objectives in P.L. 101-618, Congressional funding appropriations, and an existing management plan for Stillwater wetlands. The Service and NDOW have decades of data and experience managing wetland habitat in Lahontan Valley and felt there was sufficient information to adequately determine long-term average water demands (5 AF/acre/year, see Appendix 4) for Great Basin wetland habitat.

The Service, in conjunction with Interior's Truckee-Carson Coordination Office, is beginning the initial planning stages of revising the existing wetland management plan as one component of a larger Comprehensive Planning effort (and EIS) that will address changes to OCAP, Cui-ui Recovery, and Stillwater NWR management. While other priorities and planning schedules could have been chosen, the original policy decision regarding preparation of the water rights acquisition EIS as a top priority was a reasonable and sound approach.

Comment 12: Section 4.26.6. Transfer of Carson Lake. "This section indicates there are negative impacts to the wetlands from livestock grazing, including erosion, poor water quality, and lack of biodiversity. However, there is no data to support this claim. Resource managers must use long-term range/pasture condition and trend data to verify the need for changes in use. There is also a lack of water quality test data showing degradation of the water supply. The statement that diversity of wetland plant species will be enhanced is not necessarily true. Plant diversity may not be enhanced unless seeding or other improvements are done due to a lack of seed source. Also, there may not be any other plants that are suited to the area. Soils, salinity, climate and other factors must be taken into consideration before assuming that the number of plant species will automatically increase once livestock is removed."

Response: The portion of Section 4.26.6 that addressed livestock grazing was revised.

Comment 13: Addendum. An addendum to the original comments is a letter dated Oct. 3, 1995, from Gary Brackley, State Range Conservationist, to Terri King, Lahontan Conservation District.

"The first consideration to make in attempts to predict responses to livestock/grazing management actions (which include removal of livestock and the elimination of grazing) is the soil potential to produce the desired plant communities. Secondly, information on the present plant composition over the Carson Lake Pasture is needed. With this baseline resource information, knowledgeable predictions of management impacts on productivity and plant diversity can be made. The elimination of livestock grazing will certainly increase the aboveground, standing, plant biomass over the Carson Lake Pasture in the short term. But after several years of litter accumulation, system productivity and plant species diversity would be expected to significantly decline due to shading and other effects of the litter mat....You should also be aware that the Nevada Cooperative Extension has recently

received grant money to identify and study livestock production systems compatible with wetlands and water bird management objectives on the Carson Lake Pasture."

Response: Please see the response to the Lahontan Conservation District # 12, above.

Lahontan Wetlands Coalition

The Lahontan Wetlands Coalition provided three pages of comments. The following are comments that required response or change to the document. The remainder of comments were in the form of observations about the program, and other Service actions that are outside the scope of this action. These observations concerned Newlands Project efficiency, recoupment, and the cost of water.

Comment 1: "The Lahontan Wetlands Coalition reluctantly supports Alternative 2, as a start in the direction of achieving 25,000 acres of wetlands in Lahontan Valley but recognizes that Alternative 3 with a 3.5 transfer rate and Alternative 4 with a maximum purchase rate are the best deal for the wetlands and migrating birds."

Response: The Lahontan Wetlands Coalition's reluctant preference for Alternative 2 is noted. The Service has identified a revised Alternative 5 as its Preferred Alternative in the FEIS.

Comment 2: "The wetlands objective established in PL 101-618 represents approximately 25% of the wetlands which once existed in Lahontan Valley. It is estimated that less than 15% of the wetlands remain in northern Nevada. Since the survival of migrating shorebirds and waterfowl is directly attributable to the investment that our nation, states, and local governments make in retaining wetlands, every effort must be made to achieve the wetland objective as part of Nevada's contribution to wetland dependent species preservation."

Response: Comment noted.

Comment 3: TRANSFER RATE. "Water for the wetlands is being purchased at 3.5 (AF) per ft. but can be transferred at only 2.9 per acre ft. Therefore, the wetlands are losing .51 or 15% from each purchase. However, TCID charges the wildlife agencies, i.e. Division of Wildlife and USF&WS the full 3.5 per acre ft."

Response: The Service has initially agreed to the arrangement as described by the Lahontan Wetlands Coalition. However, as part of the Preferred Alternative, the Service would implement a transfer procedure, in accordance with Nevada State Statutes, that would retain the ability to consider higher irrigation use-rates for wetlands in the future provided other concerns and issues can be resolved. (See Section 2.5.5, paragraph 6.)

Comment 4: "The LWC has been concerned about the relationship of agriculture to the "quality of life," select avian populations, and Fallon's water supply since 1989 when the Coalition developed a comprehensive position paper as part of its interest in pending legislation. Irrigation created a high water table that enabled residents to sink shallow wells. However, there is no indication at this point that purchases of water effect the water table. The County has placed no constraints on sale of farm land based on its impact on a shallow aquifer system."

Response: The Service agrees that the artificially high water table has allowed the construction of shallow wells and that there is no indication that purchases of water would directly affect the water table. However, impact analysis (Domestic Supply, Section 4.3.3.2, Fallon and Lahontan Valley) for

Alternative 5 shows that some individual wells in isolated cases where local recharge pathways were eliminated or severely reduced could be impacted.

Comment 5: "Because of the high cost of water and burdens (on farmers due to recoupment and efficiency) described above, the government is frequently the only buyer and may be paying more than the land and water are worth. Today the government is an avenue for sale of agricultural land that otherwise is not available to the landowner who wants to leave farming."

Response: Comment noted. The Service does not pay more than the land and water are worth, as the appraised market value is paid.

Comment 6: "Too much emphasis has been placed on the economics of farming. LWC supports the concepts of greenbelt and retention of farming. However, without a program in place to assure such a greenbelt, the discussion on economics is fruitless. Too little emphasis has been placed on the in-lieu payments paid by USF&FW which exceed the tax rate on farm land. Taxes paid by USF&WS are cost free i.e. no services must be provided in return. In fact USF&WS provides some law enforcement."

Response: It is agreed that a substantial portion of the document deals with impacts to farming and economics in the affected area. Greenbelt and protective targeting were addressed in the EIS, with the anticipation that local governmental and community support for such actions could potentially develop into specific ordinances and targeting strategies. To date, that support and legislation has not been forthcoming, and it is outside the Service's authority to implement such strategies. Discussion on in-lieu of taxes was added to Sections 3.21 and 4.21.

Comment 7: "It is our recommendation that the USF&WS recognize, because of the long-term associated costs, it is working off two wildlife budgets and not try to achieve fisheries goals under wetlands purchases. The USF&WS should purchase and transfer Carson River water at 3.5 under the wetlands budget thus minimizing its purchase for wetlands and its operating and in-lieu costs."

Response: The purpose of the Preferred Alternative and that of the other action alternatives is to acquire sufficient water rights to sustain a long-term average of about 25,000 acres of primary wetland habitat, not to achieve fisheries goals. The use-rate of 3.5 AF/acre is considered under Alternative 3.

Lahontan Valley Environmental Alliance

The LVEA provided 20 pages of comments, plus seven pages of comments from its M & I working group (Exhibit K). Due to the nature of this group, which represents five community working groups, some of the comments offered were identical to those provided by other groups or agencies. In these cases, identical comments were responded to under the comment made by the lead agency, i.e., revegetation comments are responded to under the Natural Resource and Conservation Service response section. In addition, the LVEA provided exhibits from the Churchill County Mosquito Abatement District, the Division of Agriculture, Barrick Bullfrog Mine, NDEP, University Center for Economic Development, a land use fact sheet by Mary E. Reid and Kevin Kesler, a CEDA work plan on industrial park development, letters from InterWest Bank and First Interstate Bank, notes and thoughts from Churchill County Assessor William S. Bartlett, a study on vacant sales and splits from the same office, a tally of 1994 Federal Land Payments to Nevada, a Table of U.S. Fish and Wildlife Service 1994 Refuge Revenue Sharing payments to Nevada Counties, and a Federal Payments in Lieu of Taxes to Nevada by County for fiscal year 1994. Response to comments are provided in this section. The exhibits were considered in conjunction with the comments and are provided in full in

Appendix 11 at the end of the LVEA comment section. Some of the exhibits are also referenced within the text of the FEIS. Exhibit K (M&I working group) is addressed as a stand-alone set of comments, and follows the LVEA comments here.

Comment 1: "The LVEA requests that this action, as well as any other Federal action with the potential to impact the Newlands Project, be stopped until such time as a complete and comprehensive Environmental Impact Statement including all proposed, planned, and implemented federal actions on the Carson/Truckee River Systems is finalized. We also believe that in order for the federal government to successfully plan and implement a complete and comprehensive EIS program for the river systems, a comprehensive wetlands management plan must also be undertaken and completed."

Response: Please see response to General Issue I., Programmatic EIS. The Department of the Interior's Truckee-Carson Coordinating Office has begun initial work on a comprehensive EIS for the lower Truckee and Carson Rivers that will consider revisions to OCAP and revisions to the Stillwater WMA Refuge Management Plan.

Comment 2: "The LVEA feels strongly that we must also address the issue of "willing seller." P.L. 101-618 expressly conditions and mandates water right acquisitions and purchases from willing sellers, which incorporate "willing seller - willing buyer" standards to establish market value. By definition, market value is the most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale - the buyer and seller each acting prudently, knowledgeably, and assuming the price is not affected by undue stimulus."

Response: Please see General Issue Response VII, Willing Seller Defined.

Comment 3: 1.3 Need for the Proposed Action. "Size and quality of wetlands indicated in the EIS may be misleading. The document indicates an average of 150,000 acres wetlands existed between 1845-1860. The document does not contain any information on the estimated amount of wetland or the quality of wetlands that would exist today under natural conditions."

Response: Please see General Issues Response X., Historical Wetlands Acreage Questioned. Because total Carson River flows (assuming no diversions for any purposes) do not appear to be substantially different than what they had been prior to 1860, the acreage of wetland habitat produced would be similar to that produced prior to 1860. These "natural conditions" are not expected to return under any reasonable scenarios, and, therefore, are not addressed in the EIS. If "natural conditions" was meant to refer to the flow of water to the wetlands under present-day conditions, but without any purchase of any water rights, there would be an estimated 14,300 acres of wetland habitat in the Lahontan Valley primarily being maintained by agricultural drainwater. A sentence was added to the end of the introduction to Section 3.6 depicting the latter information.

Comment 4: "Based on oral conversations with F&WS and NDOW officials, current management practices greatly enhance the ability to produce significantly greater numbers of wildlife on a per acre basis. In addition, the ability of the wildlife agencies to control water resources enables the agencies to prepare a greater diversity and much more effectively control avian disease than under historical conditions. The EIS should provide data on the estimated amount of wildlife production under natural conditions versus the proposed managed conditions."

Response: The Service does not have at this time sufficient information to quantify wildlife production for Lahontan Valley wetlands under natural conditions (i.e., pre-Newlands Project conditions).

Comment 5: 2.2. Proposed Action. "The purchase of water-rights at a 3.5 acre feet with an exercise rate of 2.99 acre feet is a waste of federal funds. More rights are intended to be acquired, than are necessary using the legal rates. The statement that the exercise rate of 2.99 acre feet is a commitment by the F&WS to "conserve" listed species in accordance with the Endangered Species Act (ESA) is outside the scope of the draft EIS which is for water-rights acquisition for Lahontan Valley Wetlands. By not using the legal transfer rate, the Draft EIS is being used to acquire water-rights for cui-ui recovery. We request you delete any reference to a use rate of 2.99."

Response: The Service has addressed the issue of transfer rates as a General Issue comment (see General Issue Response III). The Service does not concur that exercising a use-rate that is consistent with the Alpine Decree and has been approved by the Nevada State Engineer is in fact using an illegal transfer rate as LVEA suggests. Use of an accepted and approved irrigation use-rate for wetlands irrigation should not be characterized as a waste of Federal funds. The statement that the 2.99 AF/acre use-rate is a commitment by the Service to "conserve" listed species was deleted.

Comment 6: 2.3.1.1 Factors Affecting the Volume of Water to Be Acquired. "F&WS and NDOW both make extensive and valuable use of drainwater. Both agencies have claims on these resources, yet the BOR fails to recognize or give credit for return flows when calculating efficiencies within the Project based on these deliveries. The objectives of the BOR should be coordinated with those of the F&WS so both agencies' objectives can be met with the least cost to the federal government and impact to the community."

Response: The Service does not have the authority to rule or make decisions regarding Newlands Project OCAP irrigation delivery efficiency calculation procedures. The Service did coordinate and comment on the 1988 OCAP and continues to maintain working coordination with Reclamation on possible changes or revisions to Newlands Project OCAP due to its responsibilities for ESA, migratory bird, and wetlands. Whether Newlands Project drainwater inflow to the primary wetland areas is recognized as a project delivery or not, has little to do with the one of the key objectives of OCAP; that is to reduce the use of Truckee River diversions in favor of greater reliance on Carson River supply.

Comment 7: 3.4.1 and 4.4.1, Vector Control and Effects on Vector Control. "Mike Wargo of the Churchill County Mosquito Abatement District has prepared an extensive and technical explanation of the problem."

Response: The Service has responded to comments by Churchill County Mosquito Abatement District under that heading above and made appropriate revisions to the FEIS.

Comment 8: 3.4.2 Erosion Control. "Wind erosion is a much more complex process than has been addressed in this EIS...The use of the word "fallow" is questionable...The NRCS annual wind erosion C-factor map does not identify the most erosive lands. ..The map cannot be used to conclude that the most erodible lands are generally to the west, southwest and northeast..The statement that the Carson Sink playa is extremely susceptible to wind erosion is not true." 4.4.2 Erosion. "The erosion and severity of wind erosion is most dependent upon factors such as wind speed, soil moisture, surface roughness, vegetative cover, unsheltered distances, and the soil erodibility index. These factors are being ignored in the F&WS's assessment. The adverse impacts listed do not address crop damage from detached particles and property damage to buildings and vehicles due to detached particles. The health risks associated with both high velocity single storm events and long-term increased particulate matter have not been addressed. These include, but are not limited to, respiratory and visual discomforts. Increased dissemination of weed seeds and other non-desirable

impacts have not been addressed. The impacts mentioned above will have severe economic effects which have not been addressed..."

Response: In deference to concerns expressed by LVEA and NRCS regarding our use of the word "fallow" to describe farmlands no longer being farmed, the Service has replaced the word "fallow" with the term "vacant."

The Service agrees that the C-factor map does not identify erosive lands (that reference has been deleted in the FEIS), that map is one of the tools or references used to make site-specific wind erosion evaluations using the NRCS WEQ. LVEA contends that the Service's assessment of wind erosion is inadequate, but has not submitted additional information to support its assumptions that impacts would be greater than that identified in Section 4.4.2 EROSION. The Service does not have information or evidence that suggests wind erosion impacts would increase substantially over existing conditions as a result of the Service's action or alternatives. The Service has not identified wind erosion as a significant adverse impact.

Health related impacts associated with dust are addressed in Sections 3.5, AIR QUALITY, and 4.5, EFFECTS ON AIR QUALITY. As stated in the DEIS, dust particles generated from the sandy soils indicative of Lahontan Valley are generally too large to be measured by PM₁₀ samplers, and therefore would not be considered inhalable. They generally do not pose a health hazard.

The Service has not addressed possible impacts such as the "sandblasting" of blowing dust on homes, cars, etc. Sandblasting effects occur under existing conditions when natural wind velocities create such problems. There is no available information, nor has LVEA submitted any supporting data to substantiate its assumptions, to determine that the Service's proposed water right acquisitions would increase the potential for greater wind velocities or sandblasting effects over existing conditions.

Comment 9: (The following are subsets of one large comment provided by LVEA) 3.4.3 Weed Control. "Weeds are any plants which are not desired within an area...(Exhibit B) The F&WS implies that because Churchill County has no regulations concerning weed control, that F&WS will not have any responsibility for weed control."

Response: The Service believes LVEA is confusing the Service's disclosure that there is no legal or regulatory obligation to control weeds within in Churchill County with that of "good land management" responsibilities. For lands acquired by the Service that are disturbed (disked, tilled or graded), the Service could, as mitigation to reduce wind erosion (and possibly weed impacts), revegetate and irrigate the land for one year.

Comment 9b: "The F&WS has not addressed the economic impact of weed control on acquired property or private property that remains once water rights are removed. The combination of abandoned land and wind will only exacerbate the weed control problem..."

Response: The costs of weed control on lands under Service ownership or control were not addressed, since those costs or economic impacts would be one component of the Service management obligations for the Stillwater NWR.

Individuals who retain the ownership of the lands after the water rights are acquired, would generally take into consideration those new costs or expenses such as weed control in the sale price they were willing to accept. Those economic considerations or factors that affect continued use of the land are all part of the decision an owner should make when determining an acceptable sale price.

Those considerations or allowances that are essentially combined in the sale price were not addressed as economic impacts, nor should they, since those costs are part of the larger decision associated with the selling of water rights.

Comment 9c: "The impacts of revegetation have not been addressed. Irrigation water will be required to initiate plant growth. A number of other impacts are associated with weed problems such as fire hazards, health and safety hazards, poor aesthetics, and high maintenance costs."

Response: The Service did not ascertain that revegetation would create any adverse impacts and has identified steps that could be taken, such as delayed water right transfers, to help initiate and establish revegetation in disturbed areas and inside Refuge boundaries. Fire hazards, health and safety hazards, and high maintenance costs associated with weeds were not identified as significant issues during scoping, and were not evaluated in this document (see Appendix 3, Scoping Report, page 21, ISSUES AND CONCERNS CARRIED FORWARD FOR PRELIMINARY ANALYSIS). Social values associated with the aesthetics of the farming greenbelt are described in Section 3.23.1.

Comment 9d: "Weed problems will impact TCID operations and facilities. NAS Fallon concerns due to weeds have not been addressed or mitigated. These issues all need to be addressed and mitigation effects considered. Increased weed problems will have significant impacts on landholders within the Valley. Besides increased costs of maintaining boundary areas, canals and delivery ditches, increased weeds will reduce hay quality and thus have severe economic impacts on agricultural land."

Response: The Service has addressed the potential impacts associated with weeds that could result from the acquisition of water rights for wetlands (See Sections 3.4.3, WEED CONTROL, and 4.4.3, WEEDS). Weeds and weed control are an existing condition that currently impact TCID operations and facilities, farmers, NAS-Fallon, and other landowners in the affected area. There was no evidence or additional information submitted by LVEA to warrant changing this section.

Comment 9e: "The F&WS states 'There is insufficient information to quantify acres of weeds in the affected area.' The F&WS can certainly assess the acreage and associated weed problems on the property they own. In addition, there are a number of other federal, state, and county offices which can provide information. The F&WS has not taken the time or responsibility to address this issue."

Response: Section 3.4 and 4.4, address Vector, Erosion, and Weed Control, and impacts to those resources. No other information has been obtained from which to quantify acres of weeds under baseline conditions. Any lands acquired for water rights that are not needed for wildlife and wetland habitat objectives, will be offered for disposal. The Service expects to own some properties for only a short time. The Service would not have the authority to demand or require that private property owners control weeds, such a role generally lies with local governmental bodies.

Comment 10: 4.5 Effects on Air Quality: "The F&WS states their proposed action and alternative actions will increase dust. The F&WS does not address the magnitude to which this will affect the area. The F&WS does not offer any analysis of the air quality issue concerning either PM-10 or larger particles. The statement "Agricultural burning...the alternatives" is not true...According to Exhibit D, the third paragraph of this section is wrong...The statement "increases acres of fallow land,...decreases seasonal plowing, tilling, and agricultural burning, which contribute to PM-10 levels" is questionable."

Response: The Service describes the short-term effect of increasing fugitive dust from those disturbed lands that are acquired. The Service has no data to determine what portion of water-

righted lands will be offered for sale that are disturbed. Due to the cost, planning, and other factors associated with disking, grading, and tilling, the Service does not anticipate that many acres of disturbed land will be offered by willing sellers. Although the Service cannot specifically quantify air quality impacts, the alternatives are compared in relation to the acreage of farmland retired, and the potential for air quality impacts to occur. There is insufficient data to provide estimates of PM_{10} levels. There are no monitoring devices in the affected area for larger dust particles. The Service expects that as acres of farmland are reduced, burning will be reduced correspondingly. It is unclear what part of paragraph 3 is incorrect. The major source of fugitive dust in the affected area is from the desert landscape, due to the large expanse of desert that surrounds the community of Fallon.

According to Exhibit D, provided by Robert Smith in the State Bureau of Air Quality, desert areas provide significantly lower levels of particulates than more rural areas near Fallon, where human-related sources and agricultural emissions are thought to contribute to higher particulate emissions. Smith states that "It is possible that particulates from agricultural land that is not irrigated could be reduced if measures are taken to stabilize the fields with native vegetation before the irrigation is stopped and disturbance of the area is prevented so the natural "desert pavement" is established. Emissions from "desert pavement" are usually quite low. The particulate emissions from abandoned agricultural land could be significant for a certain period after the abandonment but, with proper management, it could be reduced after the land is stabilized."

The Service assumes that Smith is discussing disturbed agricultural lands; i.e., lands that have been disked, tilled or graded. The Service does not expect to acquire many acres of lands such as this, and if it does, a possible mitigation would be for the Service to revegetate and apply water for one year. The Service expects that most lands acquired will have some remnant crop, or will be already stabilized with desert pavement crusting. As Smith noted, particulate emissions from such lands are quite low. Smith also notes agricultural emissions contribute to the higher particulate emissions in the area. This supports the Service analysis that actions that increase the acreage of fallow (vacant) land will "decreases seasonal plowing, tilling, and agricultural burning, which contribute to PM_{10} levels."

Comment 11: 3.5 Air Quality. "The data provided in the EIS concerning the 1975 emissions study appears to be taken out of context....Although PM_{10} is the standard for air quality concerning health, particulate matter larger than 10 microns is very important...What is the basis for the assumption "that the particle-sized dust associated with the desert landscape is too large to be measured as a suspended particulate...?"

Response: The Service used the available data to describe air quality conditions in the affected area. The PM_{10} (particles smaller than 10 microns) data was in tabular form and the 1975 emissions study was a draft paper containing a series of tables and spread sheets. This data was summarized using standard mathematical calculations. The Fallon sampling station only measures PM_{10} , larger particles are too large to remain in the sampling container. Based on this information and oral communications with the staff of the Nevada Bureau of Air Quality, the Service concluded that dust particles associated with desert landscapes are generally too large (greater than 10 microns) to be inhalable particles which are measured by PM_{10} samplers. Although these larger particulates may be of concern, currently no sampling stations in the area measure such particulates.

Comment 12: 3.6.2 Secondary Wetlands. "The statement that under existing conditions, Sheckler, Sagouspe Dam, Old River and S-Line Reservoirs no longer provide wetland habitat is false. Oral conversations with both F&WS and NDOW biologists indicate, while certainly not as good as primary wetlands, these reservoirs still provide valuable habitat...Throughout the EIS, secondary wetland habitat is identified as significant acres. These include private hunting clubs, reservoirs, drains and

canals. More concentrated efforts should be made to develop these secondary wetlands to enhance wildlife production and potentially reduce the amount of federal and state expenditures necessary to preserve wetlands. Section 3.7.2 states detailed information is lacking on the benefit of drains. Additional studies of such secondary wetland benefits is warranted."

Response: Section 3.6.2 was changed to reflect that Sheckler and Old River Reservoirs do not provide wetland habitat during drought.

Comment 13: 3.7.2 Riparian Plant Community. "The EIS addresses the Lower Truckee River riparian community which is beyond the scope of the EIS water-rights acquisitions for the wetlands...In addition, the statement regarding the reduction of cottonwood-willow riparian forest fails to mention the devastating effects the channeling done by the U.S. Corp of Engineers had on the Lower Truckee corridor. Additionally, no mention is made of the destruction by beaver. This is an example of why a coordinated comprehensive study of all federal actions on the river system is needed. We request that additional studies be done on the impact any of the F&WS actions would have on the riparian habitat and plant community throughout the Lahontan Valley."

Response: The lower Truckee River riparian community is included as part of the affected area because it could potentially be affected by the alternatives being considered in the EIS. Impacts that have resulted from previous Federal channelization projects and the impacts beaver have had on the riparian corridor are existing conditions, the consequences of these actions have already occurred and are not within the scope of an EIS evaluating the consequences of acquiring water rights for wetlands.

The Service does not anticipate that its actions to acquire water rights for wetlands would have adverse impacts on the natural riparian habitat associated with the lower Carson River in the Lahontan Valley. Information was not submitted that would support or suggest that more detailed analysis of the riparian plant communities is warranted in this EIS.

Comment 14: 3.7.3 Agricultural Vegetation. "It is stated that approximately 50,000 af/yr is drawn from groundwater resources as consumptive use for crop production. As the agencies purchase additional water-rights it is likely that groundwater levels will be affected. This could reduce the ability of plants to make use of groundwater, thus adversely impacting agricultural practices. Potentially lands now classified as bottom could be reclassified to bench as water tables drop. This could potentially have the effect of increasing water demands on the Project. We request the EIS address the impacts on the water table potentially causing a need for reclassification of lands under existing guidelines."

Response: The 50,000 AF/year consumptive use referenced (Maurer and others, 1994) includes all vegetation, not just crop production. Reducing consumptive demand could actually cause groundwater levels in some areas to rise, or offset the anticipated declines that could occur as on-farm irrigation is eliminated. The Service has responded to a similar Lahontan Conservation District comment #3 (paragraphs 3 & 4) above addressing the relationship between on-farm irrigation, consumptive use, and groundwater recharge. Please refer to the response to Natural Resources Conservation Service's comment #42 relative bench and bottom lands.

Comment 15: 3.11 Reptiles and Amphibians. "The statement is made that insufficient data exists to quantify baseline conditions; yet a conclusion is still drawn, that the affected area is probably adversely impacting amphibian species...We request that more studies be done or that this statement be deleted from the document."

Response: Text has been modified slightly in response to your comment. The Service knows, based on other studies, information, and generally accepted biological requirements for amphibians that poor water quality and concentrations of certain trace elements adversely impact amphibians. Despite a lack of baseline population data for these species, it is still reasonable to infer that amphibian species in the area are impacted by poor quality water currently entering the wetlands from Newlands Project drains. The drainwater has shown to have both high concentrations of trace elements and high levels of total dissolved solids.

Comment 16: 3.16 & 4.16 Agriculture, Farmland and Local Economy. "We have attached a memo from Tom Harris, of the University Center for Economic Development, and comments developed by Tom MacDiarmid. He and Dr. Harris prepared the Economic Description of the Agriculture Sector in Churchill County, and we feel they are best equipped to address this section. These comments are attached as Exhibit E.

Response: Exhibit E is included in LVEA's full comments in Appendix 11. The responses provided below correlate to the various comments made by Tom Harris in Exhibit E.

Economic Analysis: Comment noted.

Farm Income: The reference has been changed to the Nevada Department of Conservation and Natural Resources, Division of Water Planning. The reference pertains to the Churchill County, Nevada, County Graph and Data Book, 1992.

Alfalfa Hay Yields and Prices: Comment noted.

Hay Prices: An examination of the model specifications used by Dr. Sunding's optimization model shows that indeed, the relationship between hay prices and hay quality has been properly specified. Dr. Sunding's discussion about the optimization model states clearly:

"The price of alfalfa was set at \$80/ton for livestock-grade alfalfa and \$100/ton for dairy-grade alfalfa. Based on information provided by local producers, alfalfa produced on lands with a USSCS productivity index of 50 or below is assumed to be lower-grade, and alfalfa produced on higher-quality lands is assumed to be a mix of higher- and lower-grade."

Alfalfa Hay Sales: The information you provide properly appears in the document (Table 3.16.A and Table 3.16.B)

Agricultural Receipts and Gross Crop Value: The figures provided for the total Newlands Project Gross Crop Value were taken from a report compiled by TCID for the Bureau of Reclamation.

Export Sector: An explanation of the export sector has been added to Section 3.16.1. Change incorporated.

State and Federal Government Sector: Comment noted. The Service has provided additional information which shows that NAS-Fallon contributes significantly to the local community, despite the fact that the State and Federal government sector originates from outside the county.

Employment and Income: The 1991 employment and personal income for the State and Federal Government sector has been changed based on your comment. State and Federal Government sector employment has been changed to 1,722 jobs and State and Federal Government sector personal income has been adjusted to \$39,744,000 in Table 3.16.D. The data source referenced is the written communication provided to L.V.E.A., cited as Harris and others, 1995, written communication. It should be noted, however, that NAS-Fallon reports (June 1996) employment for active duty military and civilians at 2,516, plus an additional visitation of 6,000 personnel for airstation training. NAS-Fallon cites an annual payroll of \$53.7 million, plus \$40 million in airstation purchases and contracts. According to this information, the State and Federal Government sector is much larger than that cited by various reports by UCED.

Recreation Expenditures: Comment noted.

Consumer Surplus Values: Comment noted.

Property Tax: Federal Revenue Sharing text has been revised in the FEIS.

Market Situation: Please see General Issue Response VII., Willing Seller Defined..

O & M: O & M costs are discussed in Section 3.25.

Economic Impacts: While it appears that the impacts to the agricultural and recreation sectors are inconsistent, in fact, the recreation impacts are appropriately measured to maintain consistency with the baseline recreation sector conditions. The impact assessment relies on a multiplier to account for the indirect effects from changes in recreation-based expenditures.

Multipliers: The comment suggests that the Service would need to know with certainty the rate at which acquisitions would occur, on an annual basis. This information is unknown because of the dependency on Congressional appropriations and the rate at which willing sellers offer to sell their water rights to the Service.

Further, as hay production decreases due to commercial or residential development of agricultural lands or water rights acquisitions, fewer tons of hay will be available for either export or local use. Livestock and dairy operations will likely continue to rely on local hay purchases for some time. However, if a truly competitive alfalfa hay market exists, then the market price received for exported hay as compared to that received for local alfalfa sales will be the likely determinant as to the final disposition.

Dairy and Livestock Profits: Tables 4.16.A and 4.16.B are correct as shown. In Table 4.16.A the "lost" dairy and livestock profits have been subtracted from the baseline numbers to show the impacts to each subsector under various water rights acquisition alternatives. A footnote has been added to the table to clarify this information.

Agricultural Output: Column (7) of Table 4.16.A has been changed to Total Effect on Agricultural Income, and alternatives in Section 4.16.1 now address the percentage of Churchill County income that will be lost through reductions in agricultural income.

Backward Linkages: Your multipliers for backward linkages to dairy (2.1965) and livestock (1.9789) have been incorporated into Table 4.16.C, and referenced to Harris and others,

1995. Additional footnotes and changes in the text corresponding to the multipliers have also been incorporated.

Recreation Participation Model: Comment noted.

Water Right Leasing Program: Comment noted.

Comment 17: 3.17 Recreation. "The table on page 3-111 is not specific to the Stillwater Wetlands. We request that more specific information be gathered to address more fully any positive economic impacts the wetlands will have on the Lahontan Valley economy."

Response: The table portrays recreation use-days for Stillwater NWR and WMA and Churchill County to describe baseline conditions for a major portion of the affected area, not just the Stillwater wetlands.

Comment 18: 3.19 and 4.19. Land Use and Effects on Land Use. "See Exhibit F, a three part series of reports from Mary Reid and Kevin Kesler of the University of Nevada Reno Cooperative Extension Office, entitled, Land Use in Churchill County, Commercial, Industrial and Unimproved Land. This report makes mention of the retroactive taxes that are due when an agriculture parcel is converted from agriculture to a non-agriculture use...We request that the F&WS include this information in the EIS, as well as how it applies to the F&WS, and address appropriate mitigation measures for what is surely an impact created by artificial market forces."

Response: Exhibit F is included in its entirety in Appendix 11 and is also referenced in the main body of the document, Section 3.19, LAND USE. Additional text on retroactive taxes has been added to Section 3.21, PROPERTY TAXES. The provisions of Nevada Revised Statutes, Chapter 361A, create an exemption for the collection of deferred taxes if the property is sold to the Federal Government. Therefore, property owners who sell their entire property to the Service are exempt from the recapture of deferred taxes. Property owners who sell their water rights but keep their land may lose their eligibility to continue being assessed at the agricultural rate, but are not subject to the recapture of deferred taxes until they convert the land to a higher use. No mitigation discussion is necessary.

Comment 19: 3.20 and 4.20. Land Values and Effects on Land Values. "Churchill County Assessor William S. Bartlett concludes a 1991 report on land values with the following: "The information I have suggests that the removal of large amounts of water rights and the resulting land splits from residential parcels could have a negative impact on the values of all residential and smaller dry parcels in Churchill County." See Exhibit I.

Response: Mr. Bartlett's conclusions are noted. However, at the time of his writing (Thoughts on the Removal of Water Rights From the Lahontan Valley Area, dated Jan. 22, 1991) only a few parcels of land had been affected by the acquisition of water rights for wetlands. Market analysis has shown that vacant 10 acre parcels then (1991) selling for \$14,000 are now selling for \$30,000, which does not indicate that market values have been reduced. Review of small residential parcel sales (1 acre) show corresponding increases in sale prices when comparing 1991 sales to current sales.

Comment 20: 3.21 & 4.21. Property Taxes and Effects on Property Taxes. "See attached statement from Churchill County Assessor, William S. Bartlett, (Exhibit I)."

Response: The Service has included Exhibit I in its entirety in LVEA's comments in Appendix 11 and made reference to it in the text. Mr. Bartlett's reference to a study done by the American Farmland

Trust regarding tax revenues in three Massachusetts towns is somewhat misleading when applied to conditions in Churchill County. In those eastern communities it is common that local government service expenses include police, fire, schools, sewer, water, trash, and sometimes electricity. Based on the level of services provided in most eastern towns and cities as compared to Churchill County where local governmental services only cover police, fire, and schools it is easy to see why service expenditures out-strip tax revenue increases when farmlands are converted to residential development. It is reasonable to assume that the increased residential tax rates in Churchill County would generate sufficient revenues to cover existing levels of public service expenditures. Mr. Bartlett's revenue sharing comment (revenue sharing occurs on a permanent basis only on lands within the Refuge boundary) has been incorporated.

Comment 21: 3.21. Property Taxes. The calculation of the federal revenue sharing payments stated does not follow the provisions in the Refuge Revenue Sharing Act and the Payment in Lieu of Taxes Act. Information in the report by the University of Nevada, Reno, Department of Agricultural Economics, September 1995, shows that Nevada received \$134,454 in Refuge Revenue Sharing in Fiscal Year 1994. Of that total, Churchill County received \$21,321. It must be noted that this money is received only on parcels that are purchased directly by the F&WS, and do not include any third party purchases such as those completed through the Nature Conservancy. This same report shows that Churchill County received the capped amount of Payment in Lieu of Taxes of \$532,000 in 1994. (Exhibit J). We request that this information be included in the EIS."

Response: The Service has revised Sections 3.25 and 4.25 relative to the information on Refuge Revenue Sharing payments to reflect the most current information. The Service did not follow the provisions of the Payment in Lieu of Taxes Act since it is not applicable to Service lands acquired for Refuge purposes. Churchill County received \$21,321 for the 1,254 acres of land the Service has acquired (as of September, 1994) in fee title within the County. That payment calculates to be \$17/acre which is more than 5 times higher than the tax revenues paid on a per acre basis for private agricultural land. Refuge Revenue Sharing payments are a separate program from Payments in Lieu of Taxes, and restrictions on PILT payments would not apply to Refuge Revenue Sharing payments, which are congressionally appropriated.

Comment 22: 3.25 Acquisition Costs. "The following is a list of concerns with section 3.25. The price of water rights reflect prices in the affected area and not prices in the region. Factors that affect the transfer and use as well as price of water rights are not given. The price of water rights in the affected area reflect a monopolistic market whereas the price of water rights in the region reflect a more competitive market. The annual O&M cost is a per acre assessment that does not vary with the number of acre-feet delivered to the farm."

Response: The price of water rights in the region, simply stated, is driven by demand. That is essentially the same market factor that drives prices in the affected area. The Service determines the value of water rights by comparing similar sales. The costs or sale prices depicted in Section 3.25 are representative for prices in the affected area since the Service anticipates acquiring only water rights within the affected area. Discussions of prices elsewhere would have little relevance to the costs that the Service anticipates the Federal Government would incur under the alternatives considered in this EIS.

The Service and NDOW have been the most active and largest buyers of water rights on the open market from willing sellers in Lahontan Valley since about 1991, but the Service questions the use of the term "monopolistic" in reference to water right prices. Webster's Third New International Dictionary defines monopoly as "ownership or control that permits domination of the means of production or the market in a business or occupation, usually for controlling prices and that is

achieved through an exclusive legal privilege..." The Service proposes to acquire water rights from private individuals volunteering to sell their personal property at an agreed-upon price. The purchase price offered by the Service is based on market values calculated from comparable sales between private parties (non-governmental transactions). These acquisition processes are normal free-market mechanisms open and available to other individuals and private parties. The Service is not in a position to control prices, nor is it able to control the means of production or the market in the affected area. Therefore, it does not appear that the water rights acquisition program meets the definition of monopolistic as LVEA suggests.

Comment 23a: 4.16 Effects on Agriculture, Farmland, and Local Economy. "There is no mention in the EIS about the negative impacts water rights purchases by the F&WS have had or will have on the economic development efforts in Churchill County. See Exhibit G."

Response: Comment noted. Some of these impacts are addressed in Section 4.26.12, CUMULATIVE IMPACTS, GROWTH AND DIVERSIFICATION OF CHURCHILL COUNTY.

Comment 23b: 4.16. Effects on Agriculture, Farmland, and Local Economy. "The production value for the agricultural sector for all commodities is twice as high as the production value for the agricultural sector determined by the productivity of irrigated lands in growing alfalfa hay."

Response: The Service agrees.

Comment 23c: "Economic impacts should be derived from industry output and not from alfalfa hay crop profits based on a crop budget and dairy and livestock profits based on transportation costs for imported alfalfa hay."

Response: The economic sector directly impacted is alfalfa crop production, and, therefore, an assessment of profits from crop production is appropriate. There is limited information available on the linkages between alfalfa crop production and livestock and dairy profits, and without additional information, the Service has evaluated the anticipated impacts to these linked activities based on available information.

Comment 23d: "The yield for alfalfa hay, based on Sundings work, is an average of 6 tons per acre per year depending on the soil type and number of cuttings. This yield is higher than the yield reported by NASS. The inferences made must consider soil types and timing of water deliveries when addressing quality of alfalfa."

Response: The inclusion of Sunding's average of 6 tons/acre for alfalfa yield may be high, but by utilizing his value the Service may have only overestimated adverse agricultural impacts. Impact analysis using a lower average production value would reduce the estimated level of adverse impacts associated with agricultural production, profit, jobs, and linked economic activity. A fact sheet prepared by G. Wheeler and G. Meyer (University of Nevada Cooperative Extension Fact Sheet 90-36) used an average production rate of 6.5 tons per acre for a 320 acre alfalfa farm (higher than the Service figure) in analyzing typical costs and returns for alfalfa production in Fallon, Nevada.

Comment 23e: "A calculation for dairy and livestock profits is given without an explanation."

Response: The calculation for dairy and livestock profits is shown on Page 4 of Appendix 6, under the heading entitled, "B. Forward Impacts." The calculation is stated as, "Table 3 gives the change in Churchill County dairy and livestock profits....., which is simply the change in operating cost."

Comment 23f: "The total effects on agricultural output and the total agricultural impacts for alternatives 1 through 5 are miscalculated because dairy and livestock profits in column 4 are transportation costs for imported alfalfa hay and should be negative."

Response: See Dairy and Livestock component of response to LVEA comment 16 above.

Comment 23g: "The total effects on agricultural output for alternatives 1 through 5 are income impacts and should not be compared to total economic activity stated in the UCED report by MacDiarmid."

Response: Please see Agricultural Output component of response to LVEA comment #16 above.

Comment 23h: "Abandoned farmlands and particularly remaining alfalfa plants harbor insects and rodents that can cause significant economic loss to neighboring farmers."

Response: The text and title of Section 3.4.3, has been changed from "Weed Control" to "Agricultural Pests, and text has been added to address this concern. Please see response to Lahontan Conservation District #5 above.

Comment 23i: "Studies that use industry output to assess agriculture's economic contribution to the local economy do not ignore the cost side of the equation."

Response: Comment noted.

Comment 23j: "The income multiplier of 2.1768 for livestock and dairy operators is not taken from the UCED report by Harris. The total net income loss for alternatives 2-5 are miscalculated because the multiplier is not consistent with the 1.68 multiplier."

Response: This section of the document has been revised. Please see backward linkages component of response to LVEA comment #16 above.

Comment 23k: "The total net income loss for alternatives 2 through 5 are miscalculated because the multiplier is not consistent with the 1.68 multiplier."

Response: This section of the document has been revised.

Comment 23l: The total net income loss for alternatives 2-5 should not be compared to total personal income developed by combining the personal income in the UCED report by MacDiarmid with the personal income in the UCED report by Harris."

Response: It is an appropriate comparison and provides the reader with an comparative measure of the effects on countywide income from the various alternatives.

Comment 23m: "The portion of water right total sales that stay in the county for alternatives 2-5 are not shown."

Response: Sunding assumes, following Meyer (1993) that 30 percent of the proceeds from water right sales will remain in Churchill County. However, data from the Service's realty division, shows that only about one-fifth of people who have sold water rights to the Service have subsequently left the area. This data, does not, of course, determine how much of the proceeds of the water-right sales left the community for debt retirement, reinvestment, purchases, etc.

Comment 23n: The employment is in terms of full-time equivalents.

Response: The Service clearly stated in Employment part of Section 4.16.2 INCOME AND EMPLOYMENT that employment is measured in terms of full-time equivalents (FTE).

Comment 24: 4.2.4 Newlands Project Efficiency and Modeling Calculations Used to Formulate. "The F&WS maintains that the Project efficiencies will increase over the long run of the acquisition alternatives. The F&WS does not present any calculations to prove this except to refer to the models"

Response: The BLR model calculations are the only analytical information available that provides any quantitative analysis of irrigation delivery efficiency. Bureau of Reclamation supports the Service's findings that Project efficiencies will increase over the long term.

Comment 24a: "If efficiencies are negatively impacted to the extent that the Department of Interior requires a debit, the F&WS, as a member agency of the DOI, must mitigate its own actions to avoid a penalty on other users."

Response: Comment noted. However, it should also be noted that Project efficiency is affected by many factors including weather, spring precautionary drawdowns of Lahontan Reservoir, regulating carryover storage, TCID operation and practices, etc. If efficiency falls short of efficiency targets in any given year, it will be extremely difficult to determine what portion of the shortfall, if any, is due to wetlands water right acquisitions.

Comment 24b: "The F&WS should maintain close communication with TCID during purchases to minimize any adverse impacts. LVEA also requests that the F&WS consult with the NRCS and use the Land Evaluation and Site Assessment (LESA) program which was developed for the water right acquisitions in the Valley."

Response: The Service does consult with TCID and other Federal and State agencies before the close of any water right acquisition transaction. The LESA program offers a form of land classification that could be useful in targeting programs to protect or preserve the more productive or valuable farmland. The LESA program does not have the necessary local support or approval to incorporate such a classification system into the Service's proposed water rights acquisition program.

Comment 25: 4.3.3 Groundwater. "After careful study of your conclusions we feel strongly that the EIS study does not render the true picture of our underground or near surface water availability and how it will affect municipal and industrial water uses in our valley..."

Response: LVEA's comment is noted. Without additional information or other data to support LVEA's conclusion there is insufficient information to revise or change the impact evaluation in Section 4.3.3 GROUNDWATER.

Comment 26: 4.2.3 Effects on Social Values. "If the F&WS is contemplating actions that they admit will cause unavoidable adverse impacts that cannot be mitigated, then they should not complete those actions. The EIS process exists to avoid making adverse impacts to an environment, and this includes the customs and cultures of a community. We strongly urge the F&WS to chose alternatives that will have as little negative impact as possible on the social and economic environment of the Lahontan Valley....The LVEA suggest that the F&WS offer mitigation to the Lahontan Valley communities in such area as: federally funded vocational retraining, development of alternate industry, and/or relocation of farmer to another ag community."

Response: One of the intentions of the NEPA process is for Federal agencies to communicate to the public and decision-makers the possible impacts of actions being considered for implementation, and, if those impacts are significant, to identify mitigation measures that may offset, reduce, or eliminate the impacts or the severity of the impact. NEPA does not prevent a Federal agency from taking an action that would have adverse impacts that cannot be mitigated. NEPA does not suggest or require an agency to take No Action due to adverse or unavoidable impacts, it does require that such impacts be evaluated and disclosed. Alternative 5, the Preferred Alternative, causes the least impact to social values and the agricultural economy in the affected area of all the action alternatives.

Comment 27: 4.29 Irreversible and Irretrievable Resource Commitments. "The elimination of agricultural lands and farming is a serious and permanent decision. It involves actions that should not be implemented until further studies and mitigation are completed. Proper adherence to the NEPA guidelines, and coordination with all federal programs is strongly suggested before irreversible impacts are completed."

Response: Comment noted.

Comment 28: Appendix 7 Socio-Economic Effects of the Water Rights Acquisition Program Authorized for Lahontan Valley Wetlands.

--The Newlands Project: "The Carson Division of the Newlands Project needs to be described in more detail with regard to developing the scenarios for the water right acquisition program. The water right acreage numbers presented in Table 1 may have to be re-examined. TCID land maps may have to be used instead of BOR land maps for acreage calculations.

--Churchill County Demographic and Economic Profile: The demographic and economic profile for Churchill County needs to be described in more detail. Table 3 is missing age characteristics for ages 20-64. Statement regarding Table 8 is inaccurate and fluctuations in taxable sales may not be related to the size of the Naval Air Station. During this period of time there was also a reporting mistake in which a portion of Clark County taxable sales were not added in with the Churchill County taxable sales. Also inflation could attribute to the fluctuations. Table 9 is missing personal social insurance contributions, residence/commuting adjustments, and net earnings of residents. The source for Table 10 is incorrect and instead should refer to Table 9. Table 11 is missing final demand multipliers."

--Agriculture in Churchill County: The agriculture sector needs to be described in terms of its contribution to the local economy. The agriculture impact on the local economy is misinterpreted by farm income being stated in relative terms. Farm expenses, as opposed to farm income, is a more important measures. Also farm income should be checked for 1974 and 1975. Tables 13-23 are not described and no interpretation of data is given. Table 22 contains farm income and expenses which are different from reported Bureau of Economic Analysis data.

--Recreation and Tourism in Churchill County: Expenditures for recreation are inaccurately measured if market expenditures and non-market values are added together. The market expenditure is the expenditure to the local economy. The non-market value is the value accruing to the recreationist. the total willingness to pay is the sum of the market expenditure and non-market value. Information on expenditures for fishing can be made available from UNR.

--Data and Calculations Underlying our Impact Assessment: Given the features of the Carson Division, there are problems with the scenario development. The project efficiency has never been 67.9 percent. Observed over 1982 through 1991, the highest level of efficiency has been 61 percent,

the lowest was 53 percent, and the mean was 57 percent. The Carson Division efficiency is more likely to be lower than the overall project efficiency. Instead of using BOR water righted acreage numbers, it may be more correct to use TCID numbers. There is no calculation to show how the Carson Division would operate with larger amounts of water being delivered to Stillwater. Information on the operation of the Carson Division can be made available from UNR. Method used to calculate water right price per acre-foot does not conform to economic theory and the analysis that followed as well as results obtained are questionable. The discounting procedure for calculating water acquisition payments to farmers is not sufficiently described and therefore difficult to understand. Farm commodities grown in the Carson Division are livestock, dairy, alfalfa hay, other hay, barley, and wheat commodities. Agriculture production decreases should reflect all of these commodities and not just alfalfa hay. Information on the farm commodities can be made available from UNR. Use of the report done for the Indian Reservation does not apply to the water acquisition program. The Indian Reservation is not part of the Carson Division and possibly not part of the water acquisition program.

--Economic Impacts Associated with the Four Water Acquisition Scenarios: The direct impacts are presented and do not match the numbers provided to UNR for analysis through the input-output model.

--Economic Impacts Associated with Mitigative Leasing: No specific analysis is done for water right leasing.

--Impacts Upon Churchill County: No judgement can be made on the impacts upon Churchill County since the direct impact numbers shown in the report differ substantially from the values provided to UNR for analysis through the input-output model. The overall countywide economic impacts from the input-output model were provided by UNR, but appear to be missing from the report. These include impacts for water acquisition payments to farmers, impacts on farmers, and impacts on business servicing recreationists. Interpretation of annual and cumulative impacts is confusing.

Response: The Service does not have the authority to change this report. It was completed by Meyers Resources Inc., out of Davis, California. We recommend that you contact the authors to take issue with the data presented.

LVEA Municipal & Industrial Working Group

Comment 1: "After careful study of your conclusions we feel strongly that the EIS study is not a programmatic rendering of the true picture of our underground or near surface water availability and how it will affect municipal and industrial water uses in our valley."

Response: Please see response to a similarly worded comment, Lahontan Conservation District #3, above.

Comment 2: "The study does not take into account the number of septic tanks that are in the valley that are contaminating some of the wells in the valley."

Response: Comment noted. Additional Information about water quality concerns are addressed to Bureau of Reclamation comment #20.

Comment 3: "Bookman-Edmonston Engineering Inc. has proposed that a comprehensive underground water study would cost an estimated \$2.9 million. During recent second generation P.L. 101-618 negotiations Senator Reid's office had offered to see that funding would be appropriated for a study. Although this effort seems to have died with the negotiations. It would appear that the EIS

study does not address the necessity of preserving underground water resources and the cost of implementing a county wide water system. With the diversions of irrigation water from productive farmlands to the Stillwater National Wildlife Refuge, it now becomes imperative that we implement a county wide water system."

Response: Comment noted. Cumulative impacts and concerns about groundwater resources are described in Section 4.26.12, Growth and Diversification of Churchill County. Additional information on groundwater studies is described in the response to Lahontan Conservation District comment #3, above.

Comment 4: "On page 3-125, 3rd. paragraph the EIS states that residents of the unincorporated areas of Churchill county rely on domestic wells and septic systems for household water supply and disposal. Recent growth in the area coinciding with 8 years of drought and heightened concerns about groundwater supplies, have revived the need for scientific and engineering data for a County water supply system, which was initially proposed in 1977. A county ordinance was drafted and adopted by Churchill County to establish a water supply utility enterprise that could potentially use existing County water rights and acquire additional water rights, but the County does not expect to have a water supply system in place before the year 2000....The ordinance has been adopted and the water supply system will begin implementation before year 2000. Again, this is another reason for a complete underground water study to determine where the source of underground water originates and how much of the irrigation water that flows through the valley contributes to the underground water supply as well as the domestic wells through the county."

Response: Section 3.22.3 was revised to indicate that the ordinance was adopted.

Comment 5: "On page 4-23, Under Mitigation Measures, paragraph 2, mitigation is not addressed in section 4.3.3.1."

Response: The reference to Section 4.3.3.1 was deleted.

Comment 6: "On page 4-30, 4.3.3.1 Groundwater Recharge and Levels, Middle Carson River area, Alternative 2,3, and 4: It gives no scientific study that guarantees that adverse impacts to groundwater are expected."

Response: Limited scientific studies on groundwater recharge have been conducted in this area. From our data from local water purveyors (see Section 3.3.3.1) it appears that recharge in this area is from the deeper consolidated aquifers and from Lahontan Reservoir levels. Neither recharge source would be affected under Alternatives 2,3, and 4.

Comment 7: "Again on Alternative 5: Under the Minimal Acquisition Alternative, the Service states no adverse impacts to groundwater resources or domestic supply were identified for this resource in this area. Again it would appear that this observation is not founded on scientific research."

Response: From available data it does not appear that recharge from the deeper consolidated aquifers would be affected under Alternative 5. Although storage targets for Lahontan Reservoir may be slightly lower (under adjusted OCAP) this volume is expected to be well within the range of average storage levels that has occurred in the past. Therefore, no impact to groundwater in the Middle Carson River area is anticipated.

Comment 8: "Alternatives 2 and 5: on page 4-31 under Fernley and the Lower Truckee River Area Alternates 2 and 5; state under these alternatives, there would be insufficient data to determine the

magnitude of seepage losses that could occur, but the Service does not expect seepage losses to be reduced to the extent that groundwater levels would decline. Again this is based on expectations but not on documented knowledge...Alternative 3:...Alternative 4...You are stating that it could, but there are no indications but do we know for sure."

Response: These sections have been revised based on information from the Bureau of Reclamation (Bureau of Reclamation comment #19) stating that seepage losses would not be reduced because the wetted surface area of the canal would remain constant due to the water levels in the canal that would be needed to make irrigation deliveries possible.

Comment 9: "Under Fallon and Lahontan Valley page 4-31...There have been studies throughout the years by D.K. Maurer, George Ball, Seiler and Allander, USGS and others, all of which are inconclusive."

Response: Comment noted.

Comment 10: "Under Alternative 2: the EIS statesThe Service does not expect any widespread impacts to groundwater levels in the shallow and intermediate aquifers as a result of reduced recharge volumes, but some isolated domestic water users could be affected. This sentence is ambiguous and very inconclusive...The last paragraph on page 4-32...on-farm losses in isolated areas would be eliminated. This has the potential to adversely impact adjacent water wells. (The Lahontan Valley residents have experienced wells going dry throughout the area due to the recent drought. The drought has demonstrated what happens when irrigation water is not flowing throughout Lahontan Valley.)"

Response: Comment noted. Because the shallow aquifer is discontinuous, and the Service does not know exactly where water rights will be acquired, it is impossible to define impacts more specifically.

Comment 11: "Productions in agriculture and agriculture-related industries is projected to be far more than the \$6 to \$11 million dollars that have been calculated by your study on page 2.3 of the study. 3rd paragraph; and the last paragraph on page 2.3. The phrase 'may be somewhat offset by income generated in the community through water right sales' is not conclusive and leaves us to believe these figures are a guess at best. Please refer to An Economic Description of the Agriculture Sector in Churchill County,(UCED 93-05)...Nevada Department of Taxation Combined Sales/Use Tax Statistical Report published monthly by the Nevada State Taxation Department, and the 1994 Nevada Statistical Abstract prepared by the State of Nevada Department of Administration."

Response: The UCED 93-05 report has been referenced extensively in this EIS.

Comment 12: "On page 2.4, paragraph 1 states that the estimated loss to the Fallon Community will be 8.5 million. This figure does not include the positive economic impacts associated with other growth and industry occurring in the area. This cannot be really be assessed without a comprehensive study."

Response: Analysis is based on all available data.

Comment 13: "The State Engineer has limited pumping from commercial and industrial wells to a maximum of 4,000 gallons per day. This is restrictive for economic development...Without guarantees of a stable water supply, in the community, it is very difficult to attract industry to our community that will replace the dollars and jobs created by taking agricultural lands out of production...."

Response: The area has had an uncertain water supply for a number of years and the County first proposed a municipal water supply system in 1977 due to water quality concerns. The State Engineer limited pumping from commercial and industrial wells before the Service's action occurred. The community's lack of a stable water supply is an existing condition. However, the community appears to be growing despite these concerns, and some industry (service and retail) also appears to be thriving.

Comment 14: "The EIS admits that there is insufficient information, again calling for a comprehensive study."

Response: Please see General Issue Response I., Programmatic EIS. Insufficient information does not automatically trigger a comprehensive study. Where there appears to be a lack of information, NEPA requires: a statement that some information is incomplete or unavailable; a statement of the relevance of the incomplete or unavailable information to evaluating reasonably foreseeable impacts; a summary of existing information relevant to evaluating reasonably foreseeable impacts; and the agency's evaluation of such impacts using methods generally accepted in the scientific community. The Final EIS has complied with these criteria.

Comment 15: Page 4-38. "Alternative 4: has phrases throughout the page that state: groundwater recharge under this alternative would result in valley-wide declines in the shallow and intermediate aquifer; another statement, declining aquifer levels may impact more individual wells providing domestic supply..."

Response: Comment noted.

Comment 16: "On page 4-104, 4.23 Effects on Social Values, the EIS states there is insufficient data to determine social values for Lyon County residents, and for the purposes of this document, social values of Churchill County residents are considered to be representative of the affected area."

Response: Comment noted.

Comment 17: "Again on page 4-105...How would the above (impacts to farm preservation values) be mitigated and how do we know for sure that the aquifers will not be affected."

Response: No mitigation measures were directly identified for potential adverse impacts to farm preservation values. However, mitigation measures were identified for adverse impacts to irrigated farmland (Sections 4.16.3 and 4.16.4). The Preferred Alternative would reduce impacts to the farming community and farm preservation values in Lahontan Valley compared to the other action alternatives. Under the Preferred Alternative, the Service would purchase least volume of water and water rights of all the action alternatives.

Comment 18: "The people of this valley and future generations cannot build lives on suppositions. We must know for sure what the impacts will be. They may be negligible, but this community must know beyond a doubt....In the final analysis due to the suppositions and uncertainty that is evidenced throughout the study, we would hope you seriously consider doing a comprehensive scientific study for the community. We would further contend that a Scientific Comprehensive Water Study of Underground Water Resources would alleviate the concerns of this community, and perhaps yours as well."

Response: The Service agrees that additional groundwater studies would be valuable to the community, especially in light of the growth that is now occurring. NAS-Fallon is in the initial phase

of developing such a study. Additional information on groundwater studies is addressed in response to Lahontan Conservation District comment #3.

Lou McDonald

Comment 1: "I very strongly oppose any acquisition of additional land by the U.S. Government for the following reasons and yes I do feel the action will have an impact on me in many ways."

Response: Comment noted.

Comment 2: "The Government should not be buying any more land. They are broke and farther in debt than I can count."

Response: Congress has decided that protection of wetlands is an issue of national importance and has provided funding for this action.

Comment 3: "They should use the money programmed to buy this land to put against the national debt."

Response: Comment noted.

John McMullen

Comment 1: "...the cui-ui is a genetically altered fish and not a natural population. Therefore, the status of this population as a threatened or endangered species should be re-evaluated and it should cease to be used as a reason why Truckee River waters are apportioned in the manner than they are."

Response: This issue is outside the scope of this document.

Comment 2: "Consideration for the maintenance of the Pyramid Lake cui-ui should center on expanded or improved hatchery facilities rather than guaranteed annual volumes of Truckee River water. Diversions from the Truckee River to the Carson River District (Lahontan Valley) should not be placed off limits by planners, policy, or law. The subject EIS is faulted because of the exclusion of Truckee River water from the alternatives used in rejuvenating the Stillwater Refuge."

Response: Comment noted. Cui-ui recovery is outside the scope of this document. Exclusion of Truckee River water is addressed in Section 2.3.2, SOURCES CONSIDERED IN FORMULATING ALTERNATIVES, and 2.8.3, WATER AND WATER RIGHT ACQUISITION SOURCES AND METHODS ELIMINATED FROM DETAILED CONSIDERATION.

Comment 3: "The subject EIS contains the concept of "recoupment", which deals with repayment of water which was diverted from the Truckee River to the Newlands Project nine to twenty years in the past. Perhaps "recoupment" is intended to be only a bargaining chip. Regardless, it is so blatantly political that it should be excised from the EIS without further consideration."

Response: Recoupment is a separate and distinct action from the acquisition of water and water rights for the Lahontan Valley wetlands. However, recoupment is a related, future, and foreseeable action that is in litigation. Therefore it is discussed as a related action (Section 1.8.1 (10)) and as a cumulative impact (Section 4.26.8, NEWLANDS PROJECT RECOUPMENT).

Comment 4: "The Lahontan Valley is gaining human inhabitants. We draw our domestic water from a shallow aquifer which is replenished through irrigation of surrounding farm lands. Domestic water users should not be disadvantaged by the plan which is accepted for water acquisition for the Stillwater Refuge."

Response: Comment noted. The Preferred Alternative would cause the least impact to domestic water users of all the action alternatives considered in this document.

The Nature Conservancy

Comment 1: "In the coming months there will be detailed objections to this document and broader challenges to the acquisition of water rights as a tool for restoring the Lahontan Valley wetlands. While both are legitimate expressions of concern, it is important to remember that the U.S. Congress recognized the international significance of the Lahontan Valley wetlands and established the goal of restoring an average 25,000 acres of wetlands as a national priority. Further, the majority of Nevadans supported the Question 5 bond issue that included specific funding to acquire water rights for the Lahontan Valley wetlands. The challenge is to identify the alternative that meets the wetlands restoration goal in a manner that recognizes important community concerns about the potential impact of the acquisition program."

Response: Comment noted. The Preferred Alternative meets wetlands restoration goals and causes the least impact in the affected area to agriculture, social values, and domestic water-users of all the action alternatives.

Comment 2: "With this in mind, The Nature Conservancy supports a modified Fifth Alternative. This alternative is very close to the position taken by the Conservation Caucus during the recent "Second Generation" Truckee-Carson negotiations...Once modified this alternative has the ability to meet the wetlands restoration goal while also minimizing the impacts on the local community."

Response: Comment noted in General Issues Response II., Alternatives.

Comment 3: "To date the acquisition program has been successful both in delivering a dependable supply of water to the wetlands and having relatively minor impacts on the local community. This is because the water rights acquired have come primarily from lands on the outer edge of the Newlands Project. While acquiring an additional 55,000 acre-feet of water rights will have greater impacts, these impacts will be minimized by the very fact that it will take at least 15 years to acquire a total of 75,000 acre-feet of water rights."

Response: Comment noted.

Comment 4: "Further the entities acquiring water rights should be open to pursuing avenues that will reduce impacts. For example, an active effort to purchase water rights from lands that have been developed with the approval of local government would reduce the amount of agricultural acreage retired by the acquisition program. This source of water rights is significant: since the start of the acquisition program in 1989, parcel splits or subdivisions have been approved on approximately 4,000 acres off land within Churchill County. This is just one example, but others, including NRCS' LESA or a similar land rating mechanism should be explored among other ideas."

Response: Comment noted. The Service expects to pursue acquisition of water rights from developers if they are offered for sale.

Natural Resources Conservation Service

Comment 1: "Reference cited--The NRCS would like to have the reference currently cited throughout the document under Hughes, Peggy A. to be changed as a reference to USDA, Natural Resources Conservation Service since the document was prepared by the agency."

Response: Change incorporated.

Comment 2: "NRCS provided 7 pages of information as a cooperating agency and 14 pages of comments to the original predraft of this document. It is to be noted that input or technical matter used from our response has been used out of context or misinterpreted within the document. We will comment on this material in the appropriate sections."

Response: Comment noted.

Comment 3: "A complete and comprehensive Environmental Impact Statement which includes all proposed, planned and implemented federal actions on the Carson and Truckee River systems should be completed before this individual action is approved. NEPA procedures are to be followed which insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken. The requirements of P.L. 101-618 are many. Each and every action appears to have impacts tied to the other actions within the law. Decisions on the impacts of each action should not be made separately."

Response: Please see General Issue I., Programmatic EIS.

Comment 4: "The EIS currently appears to have only one true alternative. That alternative is to obtain sufficient water to sustain 25,000 acres of "primary" wetlands. The alternatives, as listed in the EIS, are only scenarios or options for obtaining the same amount of water. As required by NEPA, a range of reasonable alternatives has not been defined in the DEIS, which should include alternatives outside its jurisdiction. Such alternatives could serve as a basis for modifying the law, approval of the action and its funding."

Response: Please see response to Churchill County comment #4.

Comment 5: "There is a clear and distinct need for an updated, "comprehensive wetlands management plan" for both the Stillwater Wildlife Management Area, Stillwater Wildlife Refuge and the Carson Lake Pasture area before this action can proceed. Has the Service adequately defined its water requirement needs and uses for the management proposed on 25,000 acres of "primary" wetlands" ? Are there "true" alternatives for sustaining 25,000 acres of "primary" and "secondary" wetlands or can higher quality wetlands be achieved through different water regimes and management schemes with fewer areas and/or less water? The need for development of a management plan is made evident in Appendix

Response: Please see response to similarly worded comments, Churchill County comment #2, and Lahontan Conservation District comment #11.

Comment 6: "The importance of all other Lahontan Valley wetlands has been overlooked or generalized within the document. The Service states that its objective to sustain a Great Basin wetland ecosystem requires a diversity of wetland habitats be represented. The document defines both the "primary" and "secondary" wetlands to be palustrine wetland habitats. The only difference is that the "secondary" wetlands are not under the management of the Fish and Wildlife Service. These

"secondary" wetlands and others, such as the desert riverine wetland (Carson River), should be considered as part of alternatives based upon the NEPA Handbook and CEQ regulations which require that reasonable alternatives not within the jurisdiction of the agency be considered. There is a general lack of concern over the potential loss of up to 4500 acres of "secondary" wetlands. A better impact analysis of the loss of these "secondary" wetlands is needed. Impacts to these wetland areas could be lessened through enhancements and coordinated management opportunities. None are mentioned as mitigation methods. How can "primary" wetlands be restored at the expense of "secondary" wetlands without adequate mitigation when it has been stated that the "secondary" wetlands have the same quality as the "primary" wetlands?"

Response: Public Law 101-618 specifies that water and water rights were to be acquired to sustain wetland habitat in the following areas: Stillwater NWR, Stillwater WMA, Carson Lake, and the Fallon Indian Reservation. Please see General Issue Responses IX., Loss to Secondary Wetlands Discounted.

Comment 7: "Throughout the document, references of impact are made to Pyramid Lake, Truckee River and Cui-ui recovery. Why are these references made if the purpose is to acquire water rights for Stillwater NWR and WMA, Carson Lake and Tribal wetlands. The DEIS purpose does not state these other issues. If the document is written to include these impacts, why then are other issues and impacts associated with the implementation of the other subsections of PL 101-618 omitted?"

Response: The purpose of the action is to acquire water rights for Stillwater NWR, WMA, Carson Lake and the Tribal wetlands; cui-ui recovery is outside the scope of this action. Use of the approved 2.99 AF/acre use-rate will allow some benefit to Pyramid Lake resources, therefore, some assessment of impacts to the Pyramid Lake resources and fisheries is required. Other related actions under Public Law 101-618 are discussed in Section 1.8, Related Actions, or in Cumulative Impacts, Section 4.26.

Comment 8: "The document has not adequately addressed the Farmland Protection Policy Act (FPPA). there is a general misunderstanding of FPPA and how FPPA is applied to prime farmland and other lands designated as of statewide importance. In this document, FPPA applies not only to prime farmlands within the Project area, but to all the remaining "irrigated" lands within the TCID project. These remaining lands were designated by the Governor of the State of Nevada to be of statewide importance. Any reference within the entire DEIS to prime farmlands should include a reference to those of statewide importance."

Response: The FEIS was revised to indicate that all irrigated farmland of the Carson Division and Middle Carson River are covered by FPPA and that these farmlands are classified as either prime farmland or farmland of statewide importance (Sections 1.9.4, 3.16.4, 4.16.4, and Appendix 10). Please see General Issue Response V for further discussion of concerns raised in this comment.

Comment 9: "The DEIS generalizes the effects of the water purchase program on agriculture. It has over-simplified agriculture, agricultural processes and the related management. It appears that relative potential effects on the 1) Newlands Project operations and infrastructure; 2) water resources; 3) biological resources; 4) the City of Fallon and Churchill County and 8) the Carson River have not been fully evaluated. The document lacks adequate impact analysis and mitigation alternatives throughout."

Response: The document provides 35 pages of impacts to Newlands Project operations and infrastructure in Section 4.2; 18 pages of impacts to water resources in Section 4.3; 22 pages of impacts to Biological Resources in Sections 4.6 through 4.15, and 41 pages of socio-economic

impacts (to the City of Fallon and Churchill County) in Sections 4.16 through 4.26. Carson River is discussed in Sections 3.3 Water Resources, Carson River; 3.7.2, Riparian Plant Communities; 4.3 Water Resources; and 4.7.2, Riparian Communities.

Comment 10: Section 1.8.1 (5) Water Use within Fallon Air Station. "The DEIS states....that can be totally retired from the station."

Response: Conservation of NAS-Fallon irrigation water would not necessarily provide water directly to the wetlands for protection of primary wetland habitat, but the possibility of converting Navy water rights to a broader Federal water right for conjunctive use may provide 2,000-5,870 AF/year for cul-iv or wetlands protection. Relevant sections of the document (1.8.1 (5) and 2.5.5, Preferred Alternative, Navy Water) have been revised to reflect these figures.

Comment 11: "Section 1.9.4 Farmland Protection Policy Act. The wording in this section needs to be clarified to be consistent with the information that we provided in our original pre-draft comments and to correctly define the Act. The first paragraph should be changed to read:

The Farmland Protection Policy Act was passed by Congress in December 1981. The 1984 final FPPA rules were combined with 1994 amendments on June 17, 1994. The Act requires that, before taking or approving any action that would result in conversion of farmland as defined by the FPPA, the federal agency examine the total effect of that action using the criteria which the Department of Agriculture has supplied, and if there are adverse effects, to consider alternatives to lessen those effects. The Act does not expressly require a federal agency to modify any project solely to avoid or minimize the effects of the conversion of farmland to non-agricultural uses. Once the agency has completed this examination, it may proceed with a project that would convert farmland to non-agricultural uses.

The following statement needs to be corrected: Based on review of the FPPA...identified prime farmland.. covered by the Act. This should read: Based on review of the FPPA...prime farmland and farmland of statewide importance are covered by the Act with the exceptions of areas noted in the 1994 FPPA final rule. Those exceptions are those areas shown as "important farmland" or "urban" on the following maps: Census Bureau map, USGS Topo Map, and USDA Important Farmland Map.

The following paragraph needs to be corrected: The NRCS is also developing...were not finalized. This should read:

Based upon a request from the State of Nevada, the Nature Conservancy and affected parties, NRCS helped a local team of agencies, groups and individuals to develop a Land Evaluation and Site Assessment (LESA) system for the wetland water acquisition program. This LESA system is designed to determine the quality of land for agricultural uses and to evaluate the potential impacts that the water purchase has on agriculture, Newlands Project operations, community infrastructure, and the cultural, physical and natural environment of the community. The LESA system will allow the Service and the State of Nevada to evaluate whether their actions adversely affect prime farmlands and farmlands of statewide importance and the above mentioned items. As of February 1995, the LESA criteria for the wetland water purchase program have been finalized. Approval by NRCS's State Conservationist is currently pending."

Response: The text of Sections 1.9.4, 3.16.4, and 4.16.4 were modified based on these comments. Please see also General Issue Response V and Appendix 10.

Comment 12: Section 1.10.2 Government and Agencies in the Affected Area. "Reference to Farmers Home Administration should be changed to Rural Economic Community Development Services and Farm Services Agency should be added.

Response: This change was made to the FEIS.

Comment 13a: Section 2.2 Proposed Action. "Page 2 paragraph 2 states that due to the variable nature of certain factors, such as drain flow amounts and spill usage, the actual amount of water rights acquired could be less. Could it also be assumed that considering the same factors and any current or future actions that might affect them, that the actual amount of water rights acquired could be more? For example, future laws governing drain water discharge and water quality could result in reduced drain flow amounts thus requiring that additional water be purchased. The Service has not fully addressed this issue."

Response: No. The Service has identified the maximum amount of water rights that could be acquired under the Proposed Action or any other action alternative. If in the future there is a need to go beyond this amount, the Service would have to complete appropriate NEPA documentation. Cooperative agreements and inter-governmental actions may make drainflows and spills more accessible for wetlands use. If this is done, less impact to some resources would be expected.

Comment 13b: "Page 2-2, paragraph 3 states that the Service will exercise only 2.99 AF/acre/year of the agricultural water rights acquired. Less water rights would be required if the Service would pursue the transfer of the entire 3.5 or 4.5 AF/acre entitlement. such action will decrease the impacts to the Newlands irrigation project and the local communities and reduce overall funding requirements. The Proposed Action of transferring the 2.99 AF is being used to acquire water for the recovery of the Cui-ui which is outside the purpose of the draft EIS. The cumulative effects of exercising this action and its impacts have not be adequately addressed.

Response: Please see similarly worded comment, LVEA #5 and General Issues Response III.

Comment 13c: "Page 2-2 paragraph 4 states that the Service will assess its progress toward achieving the 25,000 acre wetland habitat objective by measuring on a regular basis, the number of acres showing "visible surface water" at the Lahontan Valley wetlands.....The Service needs to be able to monitor its progress in achieving the 25,000 acres through acceptable methods of assessment...Vegetation is a key component to a diverse wetland habitat and surface water may or may not identify vegetated areas and doesn't differentiate vegetation classes or types. Other considerations must be given: (1) surface water depth during the growing season, (2) degree of water level fluctuations; and (3) dominant life forms of vegetation are critical to delineating wetland classes...Wildlife diversity must also be recognized in the monitoring of any wetland values..."

Response: The Service recognizes that water depth, water fluctuations, life forms of vegetation, and cover and structure of vegetation influence the quality of wetland habitat. However, for the purposes of monitoring the progress in achieving and sustaining a long-term average of 25,000 acres of primary wetland habitat, which can include a wide array of wetland habitat types, visible surface water (the main indication of the presence of wetland habitat) will be used as the primary criteria. The comprehensive management plan for Stillwater NWR will provide more detailed information on the mix of wetland habitat types to be sustained on the refuge and will include monitoring programs that take into account water and vegetation variables. Please also see the response to BOR comment #10.

Comment 14: "Page 2-3, paragraph 3, states that taking lands out of production could potentially increase erosion and dust from fallow fields in Lahontan Valley. Had an adequate impact analysis been completed using the soils information provided by the NRCS, the Service would have found that there will be increased erosion, dust and other associated environmental impacts from fields that are abandoned, not fallowed. Fallowed is an inappropriate term for the condition that will exist after the water rights are transferred. By definition, fallowed land is a condition where cropland is left idle in order to restore productivity, mainly through accumulation of water nutrients, or both. The soil is kept free of weeds and other vegetation and may be mechanically treated in order to conserve nutrients and water for the next year's crop."

Response: The term "fallow" was replaced with "vacant" in the FEIS. It should be recognized, however, that the purchase of water rights from a given parcel does not necessarily result in that parcel being permanently taken out of agricultural production.

Comment 15a: "Page 2-3, paragraph 5 states that there is also the potential for some prime farmland to be sold and converted to other uses as a result of the Proposed Action. This statement is incorrect. All water purchases will cause either prime farmland or farmland of statewide importance to be sold and converted to other uses as a result of the proposed action. This will increase the overall negative impact to agriculture."

Response: Discussions of prime farmland were modified to recognize farmland of statewide importance.

Comment 15b: "It is further stated that the loss of agriculture and prime farmland is expected to adversely effect local citizens. However, the Proposed Action will positively effect...wildlife and recreational values. This statement fails to recognize the total negative impact that the action will have on the agricultural community and local citizens by saying it is "expected to adversely affect." The Service has failed to properly analyze the impact to prime farmland and farmland of statewide importance. What percentage of prime farmland that could potentially be converted through the water purchase program? What areas within the community will be most affected? NRCS previously supplied information for an impact analysis to be completed."

Response: Comment noted. Section 4.16.4 was revised.

Comment 16: Page 2-3, paragraph 6 states that the impacts to local agriculture may be somewhat offset by income generated in the community through water right sales. What does "somewhat" mean? This information needs to be better defined and related to more exact dollar amounts. The Service further states that sales of water rights will generate increased income and investment revenues for willing sellers and that conservative estimates show that a total of \$2.0 million will remain in the community, to benefit the local economy through investments and new employment opportunities. What is the basis for these assumptions? What is the total estimate of income and investment revenue for the willing sellers? Does that data consider the financial condition of the water right owners prior to sales? Not much money will become income or investment revenue if a person is only able to pay off his/her loan debt on the property. How much money will remain in the community, since many agricultural producers have indicated that they intend to leave the area if and when they sell their water rights...If this income is only a one-time occurrence, to state that it will offset agricultural income losses is in error."

Response: This portion of text related to impact assessment for Alternative 2 has been deleted. Benefits from Acquisition Payments are discussed on page 11 of Sunding's report in the Appendix. Sunding and Meyers assume that 70 percent of the proceeds from water right sales immediately

leaves Churchill county either to retire debt or to consume outside goods; the remaining 30 percent is expected to be annualized using a 4 percent interest rate. Other agricultural impact assumptions are discussed in Sunding's report in the Appendix and are also addressed in Section 4.16. Under existing conditions, Churchill County farmers spend 80 percent of their money in the county (Nevada Division of Water Planning, Churchill County Agricultural Analysis (1992). The Service agrees that payment for water right sales is a one-time payment, but also recognizes that this payment can be used to invest in or purchase other long-term revenue producing endeavors.

Comment 17: "Page 2-4 states that the Service's decision on the timing and use of acquired water can all change the amount of water that must be acquired to meet wetland objectives. If this is the case, why is this action allowed to proceed without a "Comprehensive Management Plan" in place."

Response: Please see response to Churchill County comment # 2 and Lahontan Conservation District #11.

Comment 18: "Section 2.3.3.1 -- Purchase of Water Rights. The Service states that the Federal Government does not have the option to set the price of water; the local market is the determining factor. This appears to over simplify the local water market. The water purchase program and P.L. 101-618 have disrupted local agriculture to the point that government actions have eliminated the remainder of the market. This creates an atmosphere of forced sellers instead of willing sellers...This area has not been adequately addressed by the Service."

Response: Please see General Issue Response VII., "Willing Seller" Defined.

Comment 19: "Section 2.3.3.3 -- Lease of Water Rights. The DEIS indicates that the Service has considered leasing of water either on a year-to-year basis or dry year options that could run for 10 years or more. The DEIS states that there are currently no state statutes that specifically relate to water rights transfers by lease. Applications could be filed as temporary transfers as provided for under Nevada State law. This statement doesn't quantify what the Nevada State law requires or potential problems areas that might arise. Indications from various meetings held with the State Engineer's Office have indicated that the transfer of water from the same location over a two year period could constitute or be an indication of intent to permanently transfer water. This area of concern needs to be further analyzed to determine the impact of such action."

Response: The Service is aware of such statements by the State Engineer in reference to temporary transfers, however the State Engineer's Office has not addressed leasing relative to temporary transfers. The Service believes these are two separate issues.

Comment 20: "Section 2.5.2 Alternative 2--Proposed Action. Page 2-21. The following conditions are anticipated under the proposed action: This section is understated. The conditions list in this section do not include important conditions that are stated in Section 2.2 Proposed Action..."

Response: In the DEIS, an overview of the major impacts of the Proposed Action was offered early in the chapter, i.e., Section 2.2. In order to avoid repetition, this same information was not stated later in the chapter, where the goal was to compare alternative applications and their impacts to specific resources (water, transfer rate, agricultural acreage, and both capital and annual costs). In this Final EIS, a Preferred Alternative (Alternative 5) has been chosen and the Proposed Action impact overview has been deleted from Section 2.2. Overall impacts are addressed by resource in Chapter 4.

Comment 21: "Page 2-22 --The following mitigation measures would be implemented as part of the Proposed Action. This section is understated. The mitigation indicated only deals with short term revegetation on lands purchased by the Service and held in their ownership. The plans for revegetation have not been adequately described. No mitigation is offered for those conditions that will occur that are listed in the paragraph above or those areas shown as having substantial decreases in Table 2.E of the DEIS."

Response: Comment noted.

Comment 22: "Section 3.2.1 --Newlands Project Irrigated Acreage Base. Par. 2 states that under baseline condition, irrigated wetlands encompass 5,670 acres of water righted lands in the Carson Division of the Newlands Project...Are all of these wetlands actually irrigated? Where do they occur within the project? Are they all actual delineated wetlands or wetlands and associated uplands and irrigated fields as can be found at Canvasback Gun Club?"

Response: The text in Section 3.2.1 was revised to clarify the reference to 5,670 acres of irrigated farmland. Under baseline conditions, the acquisition of 20,000 AF of water rights has the potential to impact about 5,670 acres of irrigated farmland. Therefore, the delivery of that volume of irrigation water for wetland habitat would relate to a 5,670 acre equivalent of irrigated farmland. Because it takes an average of 5 AF/year of water to sustain one acre of wetland habitat in the Lahontan Valley, the amount of wetland habitat (located on Stillwater NWR and Carson Lake) that can actually be sustained with the 20,000 AF of acquired water would be less than 5,670 acres.

Comment 23: "Section 3.2.3.3 -- Spills. This section indicates that the spills are routed through existing canal and drain systems for the benefit of sustaining primary wetland habitats. Why is there no consideration given to the Carson River as a conveyance for that water as well? Spills currently travel through the river system to downstream of Sagouspe Dam. The Service has indicated that they could take wetland water through the river to the northern most areas of the "primary" wetlands."

Response: As a baseline assumption (see Section 2.4(8)) the Service determined that all deliveries of acquired irrigation water would be made through the existing Newlands Project delivery system. Portions of the Carson River channel are used for Newlands Project irrigation water conveyance, and, therefore, the river is considered. Details such as specific year-to-year delivery decisions are beyond the scope of this EIS. Use of the Carson River channel has been incorporated into this document as mitigation for impacts to recharge of the basalt aquifer (Section 4.3.3.1 Groundwater Recharge and levels. Mitigation Measures).

Comment 24: "Section 4.3.3.1 Groundwater Recharge and Levels --Fallon and Lahontan Valley--The DEIS states that the shallow aquifer recharge could potentially be impacted by this action...The potential impact of the proposed action appears to be understated. The DEIS states on page 3-33 that the delivery of irrigation water and construction of canals and drain network for the Newlands Project have changed the water levels in the shallow aquifer. On page 3-41, the DEIS states that the recharge of the shallow groundwater aquifer is dominated by the Lahontan Valley surface-water system. It appears that the groundwater system is complex at best. In the DEIS, the Service indicates that total potential recharge would have to drop below 70,000 AF/year before the shallow aquifer levels valley-wide would be impacted. The total potential recharge would be as much as 79,000 AF/year with the proposed action. What effect will less than full water entitlement have on the potential recharge. The DEIS indicates under base line conditions that a 28 percent entitlement had a total potential recharge of 55,000 AF. What would the impacts be under a similar allocation or with back to back drought years under this proposed action? An adequate impact analysis has not been done to determine this.

Response: The Service has addressed impacts based on available data. There is insufficient information to determine the specific future impacts you describe due to the number of variables affecting the results, including the location of water right transfers, and the time frame over which water right acquisitions will occur. NAS-Fallon may study groundwater aquifers in the near future.

Comments 25 a-e: "Section 3.4.2 -- Erosion Control. Wind erosion is a very complex process and has been greatly understated in this DEIS. Site specific information can not be applied to the entire Lahontan Valley. Several technical errors are contained within the statements in this section. References are from the national Agronomy Manual, Part 502 unless otherwise stated...Wind erosion poses the most critical erosion problem in the DEIS area. Winds are erosive at 13 miles per hour at one foot above the surface, or 18 miles per hour at 30 feet above the ground surface. The text concerning the Wind Erosion Equation (WEQ) needs to be modified...Page 3-49, paragraph 2 states that disturbed lands that leave bare, loose soil...and farming practices such as new plantings or crops rotations that till the land add to the serious wind erosion problems in Lahontan Valley...It is stated that vegetative cover has been cited as the most important aspect of controlling or reducing wind erosion. This should read that *vegetative cover or crop residue* are the most important aspects of controlling or reducing wind erosion...The C-Factor map does not identify the most erosive lands...Lands in themselves are not erosive, they are erodible...The statement that the Carson Sink is extremely susceptible to wind erosion is not true..."

Response: Specific inaccuracies cited have been corrected in the FEIS. Recommended text changes have been incorporated.

Comment 26: "4.4 Effects on Vectors, Erosion and Weed Control. The statement is made that major contributors to dust and erosion problems in the affected area are wind, farming practices, and large expanses of sparsely vegetated desert landscape. This statement is incorrect. Winds, not farming practices or the desert landscape, are the major contributor to dust and erosion problems in the area. Farming practices in themselves do not contribute to the problem. The large expanses of sparsely vegetated desert landscape should not be considered to be major contributor. The erosion that takes place on playas is more a function of one-time high velocity events and is naturally occurring. As for other desert lands, the potential wind erosion that occurs is less than the potential wind erosion that might occur on leveled fields that are bare or have sparse vegetation. Desert soils generally have greater surface roughness, surface crusting, shorter slope lengths and widths."

Response: The Service believes this section is correct. We would agree that wind is a factor affecting erosion, but farming practices and large expanses of desert contribute to erosion problems. According to a letter provided to LVEA (Exhibit D in LVEA comments found in Appendix 11) from the Department of Conservation and Natural Resources, Bureau of Air Quality, reviewing the DEIS, agricultural emissions could contribute to particulate problems in the Fallon area, and the large expanse of desert landscape also contributes to the particulate conditions found in the area. Robert E. Smith states, "It is interesting to note that the 1993 PM₁₀ data for the Lake Lahontan sites, which are very rural with desert areas as sources of particulate, are significantly lower than for the same sampling days at the Fallon site. This is another indication that anthropogenic sources of particulates could contribute significantly to the particulate in Fallon. Agricultural emissions could contribute to the Fallon data since agricultural land lies in close proximity to the sampling site..."

Comment 27: "The DEIS has failed to adequately address the impact that abandoned lands will have on rodent populations in Lahontan Valley and the associated impacts that could occur. As lands are abandoned, the potential exists for gopher populations to increase. Gophers will invade adjacent properties and canals and laterals. The result could be increased erosion (i.e. ditch washouts) and

maintenance costs. Additional impact analysis is needed in this area to determine extent of population increases, impacts and mitigation proposals."

Response: Please see the Service's response to Lahontan Conservation District comment #5. The section entitled "Weed Control" was changed to "Agricultural Pests," and discussions on pocket gophers were added.

Comment 28 a-c: "The DEIS fails to adequately assess the extent and severity of wind erosion and to address all areas of impact. ...The DEIS ignores the fact that wind speed, soil moisture, surface roughness, vegetative cover, unsheltered distance and soil erodibility index all affect wind erosion...the DEIS fails to adequately address the relationship of abandoned farmland to the potential increase in wind erosion...Based upon the change of land use that will occur with the water right transfer, soils may be negatively impacted or may become unproductive for other land use."

Response: Section 3.5 was revised to reflect some of the concerns expressed in this comment. The magnitude of soil loss that is acceptable before lands become unproductive (in terms of T-values or the latest equivalent) is higher than the anticipated wind erosion losses associated with bare ground.

Comment 29: "Page 4-43, Mitigation Measures. Mitigation measures have not been adequately addressed in the DEIS. No alternatives have been developed that would address erosion with the exception of a minimal proposal for the lands that will be held by the Service..."

Response: As part of Alternative 2 and the Preferred Alternative, the Service has identified mitigation that would reduce wind erosion. The mitigation section cited has been rewritten to incorporate those references in addition to revegetation of lands within Refuge boundaries. This mitigation states that the Service could, as a mitigation measure, reseed and irrigate (for one year) lands bought by the Service as part of the water rights acquisition program if such lands are disturbed (disked, plowed, or graded) at the time of purchase. In order to accomplish this, the Service would have to delay transfer of water rights from these lands to the wetlands for one season to provide irrigation for revegetation. If undertaken, these actions are expected to reduce erosion and dust problems associated with disturbed lands.

Comment 30: "The Service states that vegetative cover is the best and most cost effective method...over the long term. What is the basis for this statement? What exactly are those costs? NRCS has indicated that there is very limited work on revegetation of farmland where the mean annual precipitation is 4-6". That research is primarily focused on establishing grasses rather than shrubs and irrigation water is continually supplied to maintain the plant species. It is further stated by the Service that studies have shown that establishment of native species on natural precipitation can take from four years to 100 years. What is the basis for the 4-100 year time frame? NRCS indicated in the information that it provided that natural revegetation of abandoned sites could take from 30-100 years or more... The situation which will result when irrigation water is removed in no shape or form resembles the "native" concept portrayed in this DEIS"

Response: The Service has not estimated the costs of revegetating vacant farmland in the affected area, but studies conducted throughout the west have shown revegetation to be a cost effective method of erosion control. The four-year time frame was offered to provide comparison of production times for native shrubs and other native species. If the four year span is inconclusive, which we agree it may be, so too, might the NRCS 100-year span for natural revegetation, which it seems would reflect climax communities. The NRCS studies on drought-tolerant species have been

inconclusive to date. The Bullfrog Mine information was provided simply to show data on native species.

Comment 31: "Page 4-44, para.1. The Service has stated that it would take actions to ensure that wind erosion is not excessive. Since wind erosion is a natural process, the Service can only take measures that will reduce the potential for wind erosion."

Response: Comment noted.

Comment 32: "The statement by the Service that it has no authority to require or take actions to prevent wind erosion on private lands is not acceptable...Because a private individual or organization chooses not to follow an ordinance doesn't preclude the Service from adhering to the law nor from developing mitigation measures that would off-set the impact of their action."

Response: Comment noted.

Comment 33: "Para.4. Splitting of water rights is not a viable option. The consumptive use rates of most viable agricultural crops are similar and relatively high which would result in not enough water being made through this option."

Response: The term "agricultural crop" was replaced with "other vegetation". The goal would not be to develop a viable agricultural crop, but to maintain vegetation cover and reduce erosion. Any use of a split water right to maintain vegetative coverage of any type would work to mitigate erosion impacts.

Comment 34: "3.4.3. Weed Control. Weeds are defined by the Service as plants that invade an area, are undesirable, or have low forage value for livestock. Weeds are better defined as any plants which are not desired within a given area."

Response: Comment noted.

Comment 34a: "page 3-50, paragraph 3 states that the conservation district encourages the vegetation of lands if they are left fallow....The DEIS implies that since Churchill County has no regulations concerning weed control, the Service doesn't have any responsibility for weed control as a result of its proposed action...The Service has not addressed the extent or cost of controlling weeds either on its own property or those properties left in private ownership after their purchase of water rights. The combination of abandoned land and wind will only exacerbate the weed control problem."

Response: Comment noted. The Service has committed to control weeds with vegetation in those instances in which it purchases lands that are disked, tilled, or graded. See NRCS comment #29, above.

Comment 34b: "Paragraph 4 states that NRCS has studied abandoned farmland (fallow land) in Lahontan Valley and initial ...take from 30-100 years. This statement is in error. NRCS is currently conducting a revegetation plant materials study on abandoned farmlands not fallow lands. Abandoned farmland has not been studied, however, based upon observations of previously abandoned farmlands and from known research, natural revegetation of abandoned sites could take from 30-100+ years."

Response: The text modified based on this comment. Note that the discussion of revegetation was moved to Section 3.4.2, EROSION CONTROL.

Comment 34c: "Paragraph 5 makes reference to revegetation works done in other parts of Nevada providing only a single example at a mine site...NRCS plant materials trials indicate that natural revegetation will be not likely to succeed. Observations of previously abandoned farmlands and known research indicate that natural revegetation of abandoned sites could take from 30-100+ years."

Response: Please see response to Churchill County #150.

Comment 34d: "The DEIS fails to recognize that the amount of land taken out of production by its action will far exceed the amount converted to residential or industrial use. The need for revegetation on these areas far exceeds the need on small one to five acre home plots. The impact of revegetation has not been adequately addressed...These issues all need to be further addressed and mitigation effects considered."

Response: Please see response to Churchill County comment #151.

Comment 35: "The environmental consequences have been understates and the DEIS fails to adequately address mitigation efforts for controlling weeds. The DEIS states there is insufficient information to quantify acres of weeds in the affected area. An acceptable impact analysis has not been completed for the alternatives. The Service should be able to assess the weed problems on the property they own and those purchased by the State of Nevada. Additional information could be collected from farmers and other agencies who can provide supporting information. Costs of controlling weeds have not been addressed."

Response: Please see response to Churchill County #281.

Comment 36: "Air Quality. An assumption is made in the DEIS that particle-sized dust associated with the desert landscape or with agriculture is too large to be measured as a suspended particulate...What is the basis for this assumption? Within the particulate matter generated in the wind erosion process, there are significant percentages of (less than) 10 micron-sized particles. Unless the material collected has been specifically identified to a source, soil particles can not be discounted as a source of PM-10."

Response: The air monitoring station in Fallon is designed to measure inhalable particulates, nothing larger. Data provided is from Robert E. Smith from the Nevada Division of Environmental Protection, Bureau of Air Quality. Additional information from Smith is included as Appendix D in LVEA's comments in full in Appendix 11.

Comment 36a: "The DEIS states that desert lands, which by nature have poor vegetative cover, contribute most significantly to dust problems. This statement is incorrect. Desert lands are susceptible to less wind erosion than leveled fields which are bare or have sparse vegetation, unless they are disturbed. Specific desert lands, such as the playa areas, may contribute to dust problems as a result of one-time high velocity type storm events. These occurrences are naturally occurring phenomenon."

Response: Please see response to comment 26 above. It appears that it is the large expanse of desert lands that contributes most significantly to dust problems.

Comment 36b: "The DEIS further states that the extent...and the vegetative cover of the fallow land. This statement is not correct. Other characteristics are necessary to contribute to the erosion and dust problems. Refer to comments under Section 3.4.2."

Response: The terms "wind velocity, ridge roughness, climate, unsheltered distance and soil erodibility" have been added to the sentence and NRCS has been referenced.

Comment 37: "4.5 Effects on Air Quality. The DEIS fails to address the magnitude to which its proposed action and alternatives will increase dust. No analysis of the air quality issue concerning either PM-10 or larger particles has not been offered. The statement that agricultural burning...would be reduced by the Service's actions is not true. The Service's actions will cause an increase in weed populations which will cause an increased need for weed control. Weed control will probably be best handled through burning which will increase smoke and dust particulates and potentially increase chemical containments due to increased need for chemical controls as well."

Response: Air quality impacts are addressed in Section 4.5. There is no indication that weed control will increase over baseline conditions. Agricultural burning will be reduced as lands are taken out of production. Although the Service will control weeds on lands it owns, there isn't a county ordinance to ensure that private landowners would control weeds. The long time-frame for water rights acquisitions will spread impacts out over a considerable period, thereby reducing the magnitude of impact.

Comment 38: "Page 4-45, paragraph 3 appears to have been taken out of context. the 1975 study which identified 89% of the fugitive dust as coming from the desert was based on all of Churchill County and not solely from the affected areas. In addition, these numbers were based on "total suspended particulates", not PM-10. This is also true for the 6% and 4.5% figures."

Response: Comment noted.

Comment 39: "The statement that acquisition of water rights...would increase acres of fallow land and associated dust, it would..decrease seasonal plowing, tilling and agricultural burning which contribute to PM10 levels is questionable...The logic behind the impacts in alternatives 2-5 are confusing. Each alternative discusses short-term effects associated with fugitive dust. What is meant by short-term in terms of years. The Service assumes that the abandoned farmland areas will revegetate or become crusted over. NRCS has indicated that this may take 30-100+ years, however the DEIS fails to adequately address the revegetation issue. To assume that there may be little impact is not correct. Additional impact analysis is needed along with adequate mitigation measures."

Response: The Service anticipates that short-term impacts from dust may occur in the immediate vicinity of acquired vacant lands, but that crusting over would begin to occur within the first year. The Service expects water right acquisitions to occur for 25-30 years. The Service expects that most of the lands acquired will retain remnants of the last crop, and will be less susceptible to erosion and dust impacts than disturbed lands. Mitigation would be implemented on acquired, disturbed lands.

Comment 40: "3.7.2 Riparian Plant Communities. The DEIS fails to fully define the importance of riparian habitat of the Carson River corridor and its historical significance. In paragraph 4, the DEIS fails to indicate the causes for the degradation of this resource. This desert riverine system is a vital link in the overall diversity of the affected area. The DEIS further fails to recognize the importance of the Carson River as a highly significant wetland historically. An NDOW official has indicated that the area known as the "Battlegrounds" was once the most productive wetland area in Lahontan Valley."

Response: Please see the response to Natural Resources Conservation Service comment #23. We agree that the Carson River once contributed significantly to both riparian and wetlands habitat in the affected area. However, changes in objectives regarding Project efficiency have made use of the river channel a low priority due to conveyance losses. Any use of the Carson River channel under existing conditions could effect Newlands Project efficiency due to conveyance losses.

Comment 41: "4.7.2 Riparian Plant Communities. An adequate impact analysis of the entire riparian plant community has not been completed. Based upon the mitigation proposals, the only excepted impact is on the artificially-created communities. The DEIS states in alternatives 2-5 that the Carson River riparian plant communities are expected to be unaffected by these proposed actions. What is the basis for this statement? The Service has indicated that they intend to call for their water deliveries through the TCID canal and lateral systems. No provisions exist to call for Service water through the Carson River. Under current operating conditions, only the middle section of the River receives sufficient irrigation flows to protect the riparian plant communities. How will the removal of 66% of the agricultural base affect TCID's use of the river? Will there be a need to continue to use the river for water deliveries if the majority of flows is directed to the "primary" wetlands? No plans have been developed to indicate how and where water deliveries will be made to the wetlands and those areas that will remain in production. The potential exists that flows in the river could be further reduced because of OCAP demands and the fact that 66% of the Carson River water deliveries will go to the wetlands. Without an adequate delivery plan or mitigation, the river could be severely impacted. Continued non-use will cause other adverse effects on resources, such as decreased basalt aquifer recharge and reduced flood capacity. These issues need to be further addressed."

Response: Carson River flows would not be impacted, because the Service expects to call for water deliveries through the TCID system. Low flow volumes in the Carson River are an existing condition associated with the operation of the Newlands Project. The Service has identified use of the Carson River as one possible measure to mitigate decreased basalt aquifer recharge (see Section 4.3.3.1, Mitigation Measures).

Comment 42: "The DEIS states that grasses and forbs (native and introduced) have survived due to the higher groundwater table and frequent surface watering. What are these grasses and forbs and where are they located in the affected area? What is the importance of this reference? It is further stated that Maurer and others (1994) indicated that 50,000 AF/year is drawn from groundwater as consumptive use for crop production. What is the basis for these predictions? The Service has assumed that the ground water makes up the difference between total consumptive use and irrigation delivery. What is the basis of this assumption? All crops grown in the affected area can not take advantage of this 50,000+ acres of groundwater. This numbers appears to be extremely high. the ability of crops to utilize this water is based upon the depth to groundwater (which is extremely variable in the affected area), soil texture and the rooting structure of those crops. According to NRCS data, 90% of alfalfa water uptake occurs in the top 75% of the root zone. The average rooting depth of alfalfa is 5 feet. This translates to 90% of the water uptake within 45 inches of the soil surface. If this is the case, then the consumptive drawn from the ground water is closer to 23,500 AF/year. As water rights are removed from the area, it is highly likely that the groundwater level will be negatively impacted. As groundwater levels drop, agricultural vegetation will not be able to utilize this water resource to meet their consumptive use needs. Based upon the court findings in bench bottom reclassifications, lands now classified as bottom could potentially be reclassified as bench, thus increasing the water demands in the affected area. Additional analysis is needed in this area and mitigation measures need to be considered."

Response: The general statement relative to the presence of grasses and forbs in some agricultural vegetation communities is based on observations of existing farmlands in the Lahontan Valley. It is

common for grasses and forbs to grow adjacent to irrigated farm fields planted in alfalfa or other crop in the valley.

Regarding the basis of information obtained from the report by Maurer and others (1994) relative to the consumptive use by crops and vegetation, the Service refers NRCS to the report itself. The report devotes about 18 pages to discussing background information, studies, and conclusions relative to the Lahontan Valley water budget.

There is a range of values presented in various reports relative to representative consumptive use rates for alfalfa in the Lahontan Valley (Maurer and others 1994). Review of the information indicates that NRCS is one of several qualified experts that have defined average annual consumptive use rates for alfalfa in the Lahontan Valley. Based on the above comment, the average consumptive use rate for alfalfa would be 3.6 AF/acre/year assuming that 3.15 AF/acre/year is supplied by irrigation (i.e., 90 percent of water uptake occurs within 45 inches of the surface). This value is within the range presented by Maurer and others (1994), which referenced Guitjens and Mahannah's (1976) figure of 4.0 AF/acre/year and Lyford and Townsend's (1985) figure of 3.25 AF/acre/year used in the Alpine Decree hearings. Maurer and others used 3.2 AF/acre/year for alfalfa consumptive use in their water budget calculations, which resulted in the estimate of 50,000 AF/year of water being taken up by alfalfa from the groundwater. This means that about 30 percent of alfalfa consumptive use is from groundwater and about 70 percent is supplied by irrigation. These figures differ from those presented by NRCS in the above comment (10 percent and 90 percent respectively).

NRCS's information regarding root zone depth and alfalfa water uptake is noted, but the comment does not cite any supportive documentation for the assumption that it is highly unlikely that the groundwater level will be negatively impacted. The Service estimates that groundwater levels may be lowered in some isolated areas, but that such impacts would not be widespread under the Preferred Alternative.

Bench bottom reclassification is beyond the scope of this EIS. Court rulings on bench bottom classifications are not relevant to the Service's water rights acquisition program.

Comment 43: "3.15 Biodiversity. This section states that native biodiversity in Lahontan Valley has been adversely impacted by agriculture and urban development. This statement implies that agriculture and urban development are solely responsible for this decline. This is not totally correct. The DEIS needs to recognize that government actions and programs such as the develop of the Newlands Project, NAS Fallon, P.L. 101-618, and OCAP have influenced this decline as well."

Response: The statement was revised to indicate that agriculture, including the Newlands Project, and urban development and other developments have adversely impacted native biodiversity.

Comment 44: "3.16 Agriculture, Farmland and Local Economy. The DEIS states that cattle ranching and dairy production are the primary agricultural activities in the area. Why has alfalfa production been omitted from this statement since it represents 31% of the industry output. ...Production figures for a single year, may not account for varying market conditions over long periods of time."

Response: The second sentence in the section cited states that "Alfalfa is the dominant crop with some small grains (wheat and barley) also grown in the area." All economic impacts are based on impacts to alfalfa production and related agricultural industry. Impacts to alfalfa make up four pages in Chapter 3 (Section 3.16.1 AGRICULTURAL PRODUCTS AND RECEIPTS) and seven pages of impact analysis in Chapter 4 (Section 4.16.1, IMPACTS TO AGRICULTURAL PRODUCTS AND

RECEIPTS). There is no data to determine the number of ranching or dairy operations in Lyon County that might be affected by the Service's action.

Comment 45: "3.16.4 Prime Farmland. Reference to this resource needs to be prime farmland and farmlands of statewide importance. This is necessary to meet the requirements of FPPA. The DEIS states that due to the purposes stated...the Service will attempt to consider these values...in the acquisition process. This statement is incorrect. According to FPPA, the Service is required to consider these values. The statement that the final determination of what is considered prime farmland should be changed to read prime farmland and farmland of statewide importance. The Service should reference in the DEIS that it has agreed to develop a procedure with NRCS for completing the requirements of FPPA. The Service has failed to recognize the importance of the 30,900 acres of prime farmlands and those of statewide importance. An adequate impact analysis has not been completed to determine where water purchases would impact prime farmland and in what amounts, nor are the overall economic losses associated with these lands adequately addressed. Of these 30,900 acres, how many of these prime farmland acres are in the Carson Division or the area of impact? The largest percentage of prime farmlands are located within the Carson Division according to information provided to the Service by NRCS. Figure 3.16A needs to be corrected. this map needs to be referenced correctly as being from the NRCS and dated. A disclaimer needs to be placed on the map to indicate that all of the prime farmland areas may not be accurately delineated since the map was prepared and published prior to the most recent prime farmland update. It is also important to note that all prime farmland delineations may be subject to on-site evaluations."

Response: References to "prime farmland" have been changed to "prime farmland and farmland of statewide importance." Section 3.16.4 has been revised based on this and other comments by NRCS. Please also see General Issue Response V.

Comment 46: "4.16.4 Prime Farmlands. The title of the section should be prime farmlands and farmlands of statewide importance. Page 4-91, paragraph 2 needs to be changed to indicate that the Service now agrees that the FPPA does apply to the sale of prime farmland and farmlands of statewide importance despite the fact that the action is a willing seller program. In Alternative 1, the DEIS states that the NRCS is in the process of developing revisions or adjustments to its criteria that would identify prime farmlands in the Newlands Project. It further states that there is insufficient information for the Service to determine on a Project-wide basis where the prime farmlands are physically located under NRCS's new criteria. These statements are incorrect. NRCS is not developing revisions or adjustments to its prime farmland criteria. The criteria for prime farmland are standardized NRCS nationwide. As stated in NRCS's information provided to the Service, final determinations of prime farmland should be site specific. An on-site evaluation may be necessary where slightly saline maps units occur since some of these units may not have been sufficiently reclaimed to be considered prime. NRCS has evaluated some of these slightly saline units in an effort to verify areas where changes might be necessary. Sufficient information is available for the Service to determine where prime farmlands are physically located. NRCS has provided the Service with a list of prime farmland soil maps units, acres, and has provided an additional list of prime farmland acreage within TCID irrigation subdistricts. Using this information and the information from BOR's Geographic Information System data which has more adequately located irrigate and water right acres, an impact analysis could have been prepared. How many acres of prime farmland have been converted to non-agricultural use under this baseline condition? In alternative 2, the DEIS states that 55 percent of irrigated, water righted lands...considered "prime farmlands" thereby leaving 45 percent...farmlands. It is further stated that 21 percent...would...be considered prime farmland. How were these figures derived?"

Response: References to "prime farmland" have been changed to "prime farmland and farmland of statewide importance." Section 4.16.4 has been revised based on this and other comments by NRCS and recent correspondence between the Service and NRCS. Additional analyses were conducted and further explanation of methods used to derive numbers was included in the introduction to the section. Please also see General Issue Response V.

Comment 47: "3.24.2 Historical Cultural Resources. The DEIS notes that certain locations within Newlands Project are on the National Register of Historic Places. It should be noted that the entire Newlands Irrigation Project infrastructure (canals, laterals, drains, etc) have been nominated for eligibility for listing on the National Register. Of equal importance is the fact that many on-farm irrigation systems can also be consider eligible for listing on the National Register."

Response: Comment noted. Section 3.24.2 was modified to indicate that the Newlands Irrigation Project infrastructure has been nominated for eligibility for listing on the National Register.

Comment 48: "4.24 Effects on Cultural Resources. The DEIS states that the historical cultural resources would not be impacted by the Service's action. An adequate impact analysis of these resources has not been completed. The proposed action may result in a number of the TCID facilities to be abandoned and potential converted to other uses. The same holds true for those systems that occur on lands purchased by the Service. The Service has not indicated what it intends to do with those systems or provide mitigation for their loss if they are to be converted. Impacts to losses that might occur on private lands where the proposed action results in a conversion also needs to be addressed."

Response: Although the Newlands Project has been nominated for eligibility for listing on the National Register of Historic Places, it is not now on the National Register of Historic Places. The Service maintains that there would be no significant impact to historical cultural resources as a result of the Service's action.

Naval Air Station - Fallon, Public Works Department

Comment 1: "The Department of Interior is involved in a large number of actions affecting ownership and use of water rights for Truckee River and Carson River waters. It appears that the various actions will require more water to meet just the DOI requirements than is available from these systems. It also appears that these actions, to acquire control of the water and future use of the water will have many detrimental effects on performance of Navy missions, productivity of Navy owned lands, quality of life of Navy personnel, the Navy's dependence on water pumped from the Basalt Aquifer, and a number of other Navy interests. An Environmental Impact Statement assessing the cumulative effects of all water acquisitions and regulation should be prepared; planned actions, expenditures, mitigation etc., should be coordinated and adjusted accordingly among the various representatives of the Secretary of Interior."

Response: Please see General Issue Response I., Programmatic EIS.

Comment 2: "Your analysis of the amount of water you need to produce 25,000 acres of specific wetland types indicates that F&WS can accomplish your goal by applying 5 acre-feet per acre (acft/ac) to the area each year and you intend to acquire control of 125,000 acre feet of water rights to accomplish this. Your document states that about 9 acft/ac of water delivery or more may be needed each year to sustain the wetlands but you chose to use the 5 acft/ac figure with the qualification that more water will be obtained if needed. Since previous Stillwater NWR reports indicate that you use 9 to 10 acft/ac for your customary level of management it would seem that 10

acre-feet per acre of water delivery would be a much more realistic goal. If the goal for the quantity of water is not realistic then the actual effects of water acquisition are not likely to have been accurately predicted. Please prepare an evaluation of establishing 25,000 acres of marshes by acquiring 250,000 acre-feet of water rights (at 10acft/ac) or more, especially in view of the fact that water deliveries to Newlands area farms total 174,800 acre-feet per year."

Response: The commentor may be referring to Section 2.3.1, VOLUME OF WATER REQUIRED TO MEET MANAGEMENT TARGET, which states that "an annual average of 5 AF/acre is needed to sustain one acre of primary wetland habitat" and that "Water demand associated with the different habitats ranges from 8-9 AF/acre/year for open water perennial habitat, to as *little as 1.5 AF/acre/year for intermittent, shallow mud-flat habitat*" (emphasis added). More information on the range of habitats and their water requirements is addressed in Appendix 4. Also see General Issue Response VI., Quantity of Water Required to Meet Wetlands Needs.

Comment 3: "Several comments in this EIS describe boundaries of Navy lands, vegetation, crops, and water rights inaccurately. Please feel free to contact NAS Fallon Public Works personnel to bring your statistics up to date concerning quantities of water, irrigation practices and efficiencies, ongoing studies by Navy for use of sewage effluent and irrigation tailwater, actual crops planned for each field in the Natural Resources Plan, etc."

Response: The Service contacted NAS-Fallon for updated information on sewage effluent, employment, and income in the area. The Navy's updated feasibility study is due out in the summer of 1996.

Comment 4: "The Potential for Bird Air Strike Hazard (BASH) needs to be analyzed in this document as it pertains to air operations at NAS Fallon. The ingress and egress to NAS Fallon's airfields are from the Southeast which overlies the Carson Lake wetland area. For a detailed discussion on BASH, see the Environmental Assessment for the Management of the Greehbelt Area at NAS Fallon, Nevada, or contact NAS Fallon for additional information."

Response: The Service has reviewed this information and does not believe that an increased potential for BASH will result from either the Proposed Action or alternatives. Under existing conditions, there are 1-2 BASH incidents each year. There is no quantifiable data to ascertain where such incidents occur, what species are usually involved, what season of the year such incidents occur, and whether they are associated with existing wetland areas. The Service's action to sustain and protect 25,000 acres of wetlands will not increase BASH incidents over recent historical conditions (1970s), when wetland acreage was close to 25,000 acres.

Comment 5: "Page vii states that "historically, the Carson River sustained about 150,00 wetland acres..." and wetland acreage in 1992 was less than 2000 acres. Please describe the type(s) of wetlands, types of wetland plant communities, and the relative proportions that made up this 150,000 average. Does this acreage indicate that historic flows in the Carson river delivered 750,000 acre feet of water to the Lahontan Valley each year plus additional water used for irrigation? A total of 2000 acres in 1992 is understandable in view of the seven preceding years of drought. However, either the historical measurements are wrong (written history of this area includes about the last 150 years) or your 150,000 acres includes types of wetlands which are not included in the 25,000 acre goal. Please explain the source and your use of this statistic."

Response: Please see General Issue Response X.

Comment 6: "Page xi first paragraph fails to describe recharge of the basalt aquifer as a function of seepage from irrigation flows. Description of each alternative fails to specify the contribution of Navy water rights; a matter of 2,297 to 5,867 acre-feet per year, depending on the water available."

Response: The Executive Summary provides only a summary of the existing resources and potential impacts and alternatives. Recharge of the basalt aquifer is described in detail in Sections 3.3.3.1 and 3.3.3.1.2, alternatives are described in Chapter 2. Navy water is expected to contribute from 2,300 AF- to 5,867 AF of water each year under Alternative 5.

Comment 7: "Page xii, alternative 5 should included a discussion of current Navy feasibility studies which will determine potential use of tailwater, drainwater, and sewage effluent to supplement primary water needs."

Response: The Navy's updated feasibility study is not yet out. A publication may be released by summer 1996.

Comment 8: "Page xix third paragraph and additional parts of text refer to increasing irrigation efficiency with drip irrigation, sprinklers, etc. This does not seem to be a feasible form of mitigation, and it doesn't seem to be mitigation that F&WS could provide. Area irrigation systems and crops have constantly been upgraded as technology and economic returns warrant so these techniques would have already been initiated if feasible. Navy irrigation stems are based on a system of graded border irrigation which is much more efficient than sprinkler irrigation and much more effective than drip irrigation for the crops which can be produced at this elevation. In response to obligations under PL 101-618, Navy has initiated capitol improvements of irrigation ditches and laser controlled land leveling to assure efficiency of irrigation by Navy lessees."

Response: The mitigation is feasible, but you are correct in stating that it may be outside the Service's authority. In line with Forty Most Asked Questions, the Service has explored mitigation measures that may be outside of the lead agency's authority but that may be implemented by other agencies.

Comment 9: "Page xix there is no substantiation for the statement that the water acquisition would provide "permanent" recreation opportunity if that means something beyond what exists now, especially since drought can eliminate the marshes. Furthermore, hunting as a recreational past-time was nearly eliminated from all F&WS refuges during the past year and remains in jeopardy. Navy personnel are among the recreational public at Stillwater NWR so we would be interested in your description of how the water acquisition could eliminate effects of drought and upstream diversion of water and preserve hunting as a recreational activity. "

Response: The term "permanent" was replaced with "more reliable."

Comment 10: "Page xix description of effects on land use include a wistful reference to fallow lands reverting to desert shrub habitat. This implies that there will be lengthy periods of uncontrollable soil erosion by wind while we wait for plant successions to be successful. Please discuss the potential damage to Navy aircraft and facilities that would be caused by lands left fallow near the Naval Air Station, your mitigation of air pollution, and what steps you intend to take to reduce or eliminate this hazard."

Response: There is no evidence that Navy aircraft will be damaged by wind erosion from lands acquired for water right transfers to the wetlands. This was not identified as a significant issue during scoping, and was therefore not addressed as such in the EIS. The Service has identified that some

short-term wind erosion impacts will occur (see Section 4.4.2). Mitigation is also described in that section.

Comment 11: "Page 2-43 Table 2.C Navy has completed a new sewage treatment plant. Please contact NAS-Fallon for updated effluent discharge rates."

Response: The Service contacted NAS-Fallon and confirmed that sewage effluent numbers were correct in the document (Cottle, written communication, May 1996).

Comment 12: "Page 2-44 Please correct the first paragraph to read that: "Most lands in Dixie Valley are owned by the Department of the Navy or are the management responsibility of the Department of the Interior's Bureau of Land Management. The Navy owns a large percentage of the water rights in the valley."

Response: This suggested change was incorporated.

Comment 13: "Page 2-46 footnote "c" refers to Navy effluent and water conserved by the Navy. Please refer to above comments on this topic.

Response: See comments above.

Comment 14: "Page 3-48 Existing "primary wetlands" already are uncontrolled sources of mosquitoes and other disease vectors, parasite intermediate and primary hosts, and other risks to human health and well being and the health of domestic animals. Huge populations of insects produced on F&WS wetlands infest Lahontan Valley areas, including NAS-Fallon. At this time NAS-Fallon and other Lahontan Valley residents pay for and perform mosquito control on the areas they are responsible for, but there is no comparable effort to our knowledge, on "primary wetlands". Your EIS does not include the techniques you will use or expenses you will incur as you own more wetlands and previously farmed lands. Please include descriptions and evaluations of F&WS plans for vector control and your expected effects. Suggest you contact Churchill County Mosquito Abatement District for additional technical information to adequately analyze this issue...."

Response: CCMAD provided substantial comments on this issue, and portions of those comments have been incorporated into the document. CCMAD states that mosquito control does occur on the primary wetlands. The Service will be coordinating mosquito abatement activities with CCMAD.

Comment 15: "Page 4-122 Please correct the statement that the Navy EA for relocation of TOP Gun and other operations did not identify any significant impacts. A number of significant impacts were identified as being both likely to occur and mitigable. Please contact NAS Fallon for details."

Response: This statement has been deleted.

Newlands Water Protective Association

The Newlands Water Protective Association submitted eight pages of comments. The first 1 1/2 pages were a general overview of the organization and its position statement. The following are specific comments and corrections provided by the NWPA.

Comment 1: "As indicated in written comments submitted during scoping sessions held on the "comprehensive" Environmental Impact Statement, it is the position of the Newlands Water Protective Association that an EIS should be prepared that encompasses all federal actions affecting land and

water rights within the Newlands Reclamation Project, and in the spirit of the national Environmental Policy Act, while such EIS is being prepared, all further federal actions should be held in abeyance."

Response: Please see General Issue Response I., Programmatic EIS.

Comment 2: "First, if, as indicated on page 'x' of the Executive Summary, the Carson Division consists of approximately 47,000 acres, then to acquire 101,000 acre feet, at a duty of 2.99 A.f. per acre, would require some 33,779 acres. This constitutes a significantly higher percentage than the 66% to which you refer on page ix of the Executive Summary."

Response: The 47,000-acre figure represents the amount of irrigated, water-righted farmland in the Carson Division (about 52,768 acres in 1989, considered a representative year) minus 5,670 acres that are estimated to be impacted through the acquisition of 20,000 AF of water rights.

In calculating the total impact to irrigated, water-righted farmland that would result from implementing Alternative 2, the Service assumed that the delivery of 102,000 AF of water to the wetlands would entail the acquisition of 122,000 AF of water rights. This is because water rights having entitlement of 3.5 AF/acre/year (and possibly 4.5 AF/acre/year) would be purchased, but they would be used by the Service at a 2.99 AF/acre/year use rate. Restated, 122,000 AF of water rights having entitlements of 3.5 AF/acre/year (and possibly some at 4.5 AF/acre/year) would have to be acquired to make 102,000 AF of water rights available because water rights for the wetlands would be exercised at the 2.99 AF/acre/year use rate, not at a 3.5 AF/acre/year use rate.

Acquiring 122,000 AF of water rights (which includes the 20,000 AF acquisition program) would result in about 34,800 acres of water-righted, irrigated farmland being affected by the program. Comparing this to the amount of farmland that existed prior to the 20,000 AF acquisition program (52,768 acres), the Service estimated that about 66 percent of the water rights in the Carson Division would be acquired under Alternative 2 (34,800 acres divided by 52,768 acres = 0.66, or 66 percent).

Please see Sections 2.5.2 (DEIS Proposed Action) and 2.5.5 (Preferred Alternative) and Table 2.A. for more detailed information on the alternatives.

Comment 3: Additionally, according to the EIS, it will take the initial 20,000 acre feet of water to sustain 12,100 acres of primary wetland habitat over the long-term, yet the proposed action indicates a need to purchase FIVE (5) times that amount, or an additional 101,000 acre feet, to sustain the additional 12,900 acres of wetlands necessary to meet the 25,000 acre goal. Even considering decreased return flows, these seems excessive."

Response: Please see responses to Churchill County comments #71 and #96.

Comment 4: "Heavy reliance is placed on the approval of the bond issue within the State of Nevada in 1990, wherein the majority of voters in this State did, in fact, approve of the expenditure of \$9 million on water right acquisitions for the wetlands. It should be noted, however, that the people most affected by that bond issue, those who live, work and play within the Newlands Project and rely most heavily on the continued delivery of irrigation water throughout the area for their continued survival, voted against that bond."

Response: Comment noted.

Comment 5: "The EIS does not adequately address the concerns most adamantly expressed by people who live in the communities of Fallon and Fernley, including, but not limited to, the protection of property rights, the protection of the quality and quantity of groundwater, the protection of the

agrarian lifestyle, protection of the economic base of the communities, and protection of the tax base of the counties and municipalities involved, in that the EIS contains too many "unknowns".

Response: The Service has contracted for one groundwater study and two socio-economic studies to provide data on the existing conditions in Lahontan Valley. In addition, Reclamation has funded a companion groundwater report relative to the Service's proposed water rights acquisition program. In spite of the data collected, many "unknowns" do remain. Analysis was made using the most credible and the most current data available relevant to evaluating the reasonably foreseeable impacts.

Comment 6: "Throughout the EIS, references to the water rights being the personal property of the individuals who own them are absent or omitted. In fact, in discussions in the EIS regarding the Canvasback Gun Club, the report leads the reader to believe that the owners of that Gun Club are totally uncooperative. The fact is, the Gun Club owners own that ground and the water right appurtenant thereto."

Response: Comment noted, and changes in connotation in regard to Canvasback Gun Club were made to reflect the comment.

Comment 7: "The EIS seems to place greater emphasis on the importance of wildlife and animals, than the importance of the people, their families, their property rights, and their livelihoods. Even in section 1.7, in discussing the purpose of the Newlands Project, no reference is made to the very basic purpose for the Project, that is, for the irrigation and agricultural production of homesteaded lands. The Project was designed to feed people."

Response: The phrase "and agricultural production" was added to the following sentence in Section 1.7.1: "The Newlands Project was designed to provide for the irrigation [and agricultural production] of federally withdrawn homestead lands in the vicinities of Fernley and Fallon, Nevada."

Comment 8: "The EIS fails to point out the affects the OCAP are having on the wetlands and that the baseline conditions upon which these proposals rely are in the process of being changed. The wetlands were doing just fine prior to the implementation of the 1988 OCAP. Actions are now being taken to escalate the already harsh affects of the prior OCAP by further reducing water right deliveries to water right owners and by limiting the ability of the water right owners to store water over for the next irrigation season. If storing water was not the purpose of the Reservoir, someone should have said so long ago. Millions of dollars could have been saved by not building Lahontan Dam to begin with..."

Response: The FEIS has addressed changes to OCAP under Sections 2.3.1, the introduction to Chapter 3, and in Cumulative Impacts, Section 4.26.9, OCAP MODIFICATIONS. The Service has stated that it will reconsider spill or drainflow volumes applied in this document if monitoring proves that actual flow for these water sources are higher than that depicted. As a result, acquisition through purchase or other means would be reduced accordingly.

Nevada State Department of Conservation and Natural Resources, Division of Environmental Protection

Comment 1: "The statement in the first paragraph of section 3.3.2 (p.3-24) "Because the water is acquired from Newlands Project agricultural users, the project operator is only required to continue to meet agricultural water quality standards set by the State" is not accurate. The applicable water quality standards for the inflow of water entering the wetlands habitat are based on the beneficial

uses of the wetlands, i.e. aquatic life and wildlife. These standards are contained in Nevada Administrative Code (NAC) 445.1339 and 445.124."

Response: There has been no change in the standard for the Newlands Project. Please see EPA comment #9 above.

Comment 2: "The statement in the last paragraph on page 3-24 "Nevada water quality standards for toxic materials applicable to waters beneficially used for wildlife are nearly identical to irrigation water standards (NAC 445.1339)" needs clarification. NAC 445.1339 does not contain any standards for the beneficial use category "wildlife." NAC 445.1339 does contain standards for the protection of municipal or domestic supply, aquatic life, irrigation and watering of livestock. Which of these existing use categories most closely reflects protection of wildlife is not known."

Response: This text has been revised. Please see EPA comment #9 above.

Comment 3: "The comments in #2 above also apply to the statement in the second paragraph on page 3-27 "The standards for drainwater that flows into the wetlands are much less stringent than those set for acquired irrigation water." I have enclosed a copy of Nevada's current water quality standards for toxic materials. Please note that the NACs have been renumbered. NAC 445.1339 is now NAC 445A.144 and NAC 445.124 is now NAC 445A.126..."

Response: Production and delivery of drainwater is not a specific purpose of the Newlands Project. It is a by-product of irrigation. The State of Nevada has set water quality standards for irrigation water delivery by the Newlands Project. There are more general and less stringent water quality standards for Class 3 waters (which appear to be applicable to drainwater) in Churchill County. Whereas propagation of wildlife is considered a beneficial use of Class 3 water, there are no specific, set standards for such use. Therefore, the statement in the DEIS, while general in nature, is essentially correct. Please also see the response to Environmental Protection Agency comment #9.

Nevada State Department of Conservation and Natural Resources, Division of State Lands

Comment 1: "On page 1-28, the document lists other agencies with jurisdiction in the area. The list is out of date for some Nevada agencies. "State of Nevada, Conservation and Natural Resources" should be "State of Nevada, Department of Conservation and Natural Resources". The Division of Historic Preservation and Archeology is no longer in DCNR; it is now called the State Historic Preservation Office and is in the Department of Museums, Library and Arts. The Department of Agriculture is now the Division of Agriculture in the Department of Business and Industry."

Response: Section 1.10.2 was modified based on these comments.

Comment 2: "When discussing the State's acquisition of water for Lahontan Valley wetlands, the document sometimes speaks of acquisition by the Division of Wildlife (NDOW). (For example, on p. 2-20, last paragraph.) This is technically incorrect. NRS 321.001 says that all interests in land are to be acquired by the Division of State Lands in the name of the State of Nevada. The lands or water rights are then assigned to specific agencies for administration and use (NRS 321.003). (Copies of statutes attached.) Please correct the document to show that acquisition of rights is always by the State; when discussing management, it is correct to say that NDOW manages the water rights. Similarly in the discussion of acquisition of the three Carson River ranches above Lahontan Reservoir (p.2-30, first paragraph), acquisition was by the State, and management by the Division of State Parks."

Response: The text of the FEIS was changed accordingly.

Comment 3: "The document states in at least two places that there is an agreement between the State and the Secretary committing the state to spend \$9 million for wetland water right acquisitions. We are aware of no formal written agreement to this effect. State officials, including this administrator, have stated orally that the State has funds available for this purpose, as follows. The State has already made \$5 million in Question 5 bond funds available for water right acquisitions, as described in the document. More than half of those funds have been expended to date for that purpose. The document also mentions an additional \$4 million potentially available for this purpose. This additional bonding authority cannot be exercised by the State unless and until the State enters into an agreement or agreements regarding allocation of the water associated with the Truckee and Carson Rivers, the Lahontan Valley wetlands and the Newlands Project (as provided in Chapter 478, Statutes of Nevada 1983 as amended by Chapter 785, Statutes of Nevada 1989, attached).

Response: The text of the FEIS was changed accordingly.

Comment 4: "The document projects (p. 1-27, first paragraph) that if the State spends \$9 million it will acquire about 23,000 AF of water rights. Based on costs to date, the state would probably acquire about 21,000 AF. (We have expended \$2,982,295 for 6,951 AF.) We note that costs may be expected to rise in the future. We also note that not all of that water would actually get to the wetlands; actual yield to the wetlands would be considerably less, depending on amounts transferred and amounts called for use."

Response: The Service has provided a range for State acquisitions in the FEIS, stating that from 12,800 - 23,000 AF will be acquired by the State based on existing water-right purchase prices.

Comment 5: "The preferred alternative proposed that the Service would transfer water rights at full headgate entitlement, but only apply the 2.99 AF/acre/year consumptive use rate (p. 2-21). The State has made no such commitment. In fact, we have stated that we intend to pursue the transfer and use of more than 2.99 AF on a case-by-case basis, where it can be justified."

Response: Comment noted. The State is not bound to the policies and constraints of this document. The Service has addressed the impacts of the 3.5 AF/acre use-rate in Alternative 3.

Comment 6: "Where less than full headgate entitlement can be transferred/used, the remainder should be credited against any recoupment requirement (discussed on pp. 4-118-119) to prevent wetlands losing this water twice."

Response: Comment noted. This action would be outside the Service's authority.

Comment 7: "We read with interest the section on loss of farmland. We were surprised that your discussion of the potential of utilizing water from the upper Carson River area to decrease impacts on the Newlands Project (4-89) was so negative. This option was discussed at length and with great interest during the recent negotiated settlement meetings, and may deserve greater consideration."

Response: Upper Carson River is considered to be those areas upstream of the Carson City gaging station. Upper Carson River waters are eliminated from discussion. Please see response to Churchill County comment #116. However, the Preferred Alternative does make use of Middle Carson River waters.

Comment 8: "This agency strongly supports Alternative 3. It has by far the best benefit/cost return to the government and the least impact on the community and on secondary wetlands. The major difference between Alternative 2 (the preferred alternative) and Alternative 3 is the transfer/use rate for acquired water. As stated above, the State intends to seek the transfer/use of acquired water at amounts above the agricultural consumptive use rate and only Alternative 3 covers such action. Alternative 3 allows flexibility to explore such options to provide optimal benefit to the wetlands, as both the Service and the State are mandated by our respective laws. We find your designation of Alternative 2 as the preferred alternative to be puzzling. This DEIS is written to assist in the decisions that will implement Sec. 206 of PL 101-618. This section of the law is written specifically to protect the wetlands. Alternative 3 yields the most wetland protection with the lowest expenditure of government funds and the least amount of negative impact. The only advantages of Alternative 2 are rather small increases in Truckee River flows and corresponding benefits to the Truckee River/Pyramid Lake fishery. The protection and enhancement of these fishery resources are covered in other sections of the law. We do not think it is appropriate to "second guess" Congress by re-interpreting Sec. 206 to provide additional benefits to the fishery at the expense of the wetlands."

Response: Alternative support noted in General Issue Response II., Alternatives. Please see General Issues Response III., Concerns with 2.99 Consumptive Use-Rate.

Nevada State Department of Conservation and Natural Resources, Division of Water Resources

Comment 1: "The report establishes the baseline condition to exist when the 20,000 acre-feet acquisition program is completed and calculates that program as a direct diversion to the primary wetlands of 13% of the Carson River Diversion. At the rate of 2.99 AF/AC, 20,000 AF is 15% of the Carson Diversion and of course greater if a higher rate is utilized."

Response: The 20,000 AF program applies a 2.99 AF/acre use-rate. Based on an average representative demand of 3.51 AF/acre entitlement for the Carson Division (which includes benchlands entitled at 4.5 AF/acre lands and accounts for shortages) the total volume of water held in the Carson Division is calculated to be about 185,000 AF (52,768 acres X 3.51 AF/acre = 185,215). The 20,000 AF program amounts to about 11 percent of the total volume of water held in the Carson Division. This figure has been changed in Section 2.5.1.

Comment 2: "The 1988 OCAP efficiency targets are possibly unattainable and have not been realized to date. The EIS should contain provisions to address realistic efficiency targets."

Response: This document is based on the assumption that the 1988 OCAP will be fully achieved, because it is an existing regulation of the Department of the Interior.

Comment 3: "The drainwater figures show a decrease from 34% (Alt. 5) to elimination (Alt.4). How is this determined? In addition, the June 1st storage targets may change under current negotiations."

Response: Alt. 4 would purchase water rights from 72 percent of the irrigated farmlands in the Carson Division. Such an action would diminish agricultural drainflows to the extent that they would be nearly absent. Adjusted OCAP may change June 1st storage targets. However those changes have not yet been implemented, and results of that action are currently unknown.

Comment 4: "The effect of the acquisition program on domestic wells is not adequately analyzed and the mitigation, while possibly accurate, has no plan of action."

Response: Please see response to Churchill County Comment #262 and Lahontan Conservation District #3.

Comment 5: "Conveyance losses should be analyzed in each alternative."

Response: There is inadequate information to determine conveyance losses by alternative. Conveyance losses vary greatly from canal to canal, and there is no way for the Service to determine what lands will be acquired, or which drains will show a reduction in use as a result of the Service's action.

Comment 6: "The mitigation measure on page 4-75 concerning water right splits is very speculative and currently is not the practice in Nevada."

Response: We agree that water right splits are not currently the practice in Nevada. Although this mitigation may be somewhat speculative, it is not unreasonable. However, it would require a favorable ruling by the State Engineer to be implemented.

Comment 7: "The unavoidable adverse effects of the project are noted but not much emphasis is placed on mitigation."

Response: For some impacted resources, no feasible mitigation could be determined; these were considered to be unavoidable adverse effects, and are addressed as such in Section 4.28.
UNAVOIDABLE ADVERSE EFFECTS.

Comment 8: "The analysis of the possible mitigation by acquisition of water rights in the Upper Carson River is extremely poor. This alternative needs much more discussion and analysis and should not be eliminated as a possible mitigation measure."

Response: Please see response to Churchill County comment #116 and Nevada Division of State Lands comment #7, above. There are a number of concerns associated with the transfer of Upper Carson River water rights that make it a fairly unreasonable alternative water source.

Comment 9: "Pg. 2-2 paragraph 4 - for the long-term average, the service will use the 10 year running average of primary wetlands. In 1931 the Fallon National Wildlife Refuge was created. In 1935 163,000 AC became the Stillwater Wildlife Management Area. In 1991 77,520 acres of the SWMA became the Stillwater National Wildlife Refuge. Due to this area being designated for wildlife, is there information available on the number of acres of palustrine wetland habitat that has existed within each area respectively and a comparison of the actual farm deliveries and wetland deliveries?"

Response: Most of the palustrine wetland habitat in the area of Stillwater NWR, Stillwater WMA, and Fallon NWR have existed within what is now Stillwater NWR. Under baseline conditions, Fallon NWR only receives water during spill years. In most years, less than 100 acres of wetland habitat exist in Fallon NWR and less than 700 acres exist in Stillwater WMA.

Comment 10: "Pg. 2-4 2.3.1.1- the service calculates an average of 125,000 AF of water will be required. What is the expected range of quantities to determine this average or is it solely based on 25,000 acres at 5AF/AC? Does the service propose to instigate a more efficient delivery of waters to the wetlands?"

Response: Please see General Issue Response VI., Quantity of Water Required to Meet Wetlands needs.

Comment 11: "Pg. 2-32-Sewage Effluent-the 800-900 AFA is included in alternative 5 only and the likelihood that this figure is going to increase over time is excluded and the existing quantity of the discharge could be monitored when it enters the Newlands Project drains. See Sect. 2-7 pg. 2-38 monitoring requirements. Why is the effluent not included in all alternatives due to the effluent currently being discharged to the wetlands."

Response: The use of sewage effluent is not precluded under any alternative, but reliance on this source of water is specifically identified in Alternative 5 in all alternatives.

Comment 12: "Pg. 3-42 Sec. 3.3.3.1.2 - Groundwater Recharge - how is the groundwater flow from the shallow aquifer into the drains quantified and not just a suggestion."

Response: This number is an estimate based on Maurer and others' (1993) conceptual water budget, Figure 4, page 20. There is no specific monitoring data available.

Comment 13: "Sec. 4.3.3.-Groundwater- Pg. 4-40 paragraph 2 - storing water in Lahontan. Does the service have the right to do so? Who would pay for a treatment plant?"

Response: The Service expects that agreements to store water in Lahontan Reservoir could be made, despite a number of issues that would have to be resolved.

Comment 14: "Is the USDI BOR's Wetlands Reconnaissance/Inventory Mid-Pacific Region September 1993 Report incorporated into the current status of all wetlands within the Newlands Project?"

Response: No.

Nevada State Department of Conservation and Natural Resources, Division of Wildlife

Comment 1: "NDOW supports Alternative 3 as its preferred alternative for implementation of water right acquisitions within Lahontan Valley for wetland maintenance and enhancement due to its lesser impacts to the agricultural community, groundwater recharge to domestic aquifers of Fernley and Fallon, and the lowest capital cost of all the acquisition alternatives. Alternatives 2 and 3 appear to be the most reasonable methods of preserving 25,000 acres of wetlands in Lahontan Valley, however, when comparing the two alternatives number 3 ranks the highest in almost all cases, except to the benefit of the Pyramid Lake fishery, for which separate provisions of Public Law 101-618 are in place to address this issue without impacting wetlands water right purchases. We feel that issues which make Alternative 3 more desirable and defensible than Alternative 2 are as follows: --6,300 acres of agriculture land less to purchase (22%) to meet same objective;--The high end capital costs are 23 million dollars or 23% less; --The average estimated annual costs are \$192,250 or 22% less, which in 20 years amounts to a savings of over \$3,800,000 to achieve the same purpose;--Decreases the annual water delivery costs, at current rates, to both the State of Nevada and Federal Government by \$160,600 which charges could double or triple if the government takes over the Newlands Project (Project);--Annual alfalfa related lost income is \$1.1 million dollars less and total agricultural impacts are \$1.42 million dollars less annually; --Losses related to power generation from Project facilities are over \$108,000 less; --Losses to secondary wetlands in Lahontan Valley will be much less. The 2.99 use-rate proposed under Alt 2 is contrary to the provisions under P.L 101-618206(a)(1)(A) and (C) which stipulates that no water shall be purchased under this Section unless the Secretary of the Interior expects that the water rights can be transferred and applied to direct use to a substantial degree, and must be utilized to the maximum extent practicable for direct use on the wetlands. This action was not intended to subsidize fishery water acquisition. The

Service is in its cover letter for this Draft EIS, signed by John Doebel of your Portland office, states the Service has no preferred alternative, however, the document throughout its text states Alternative 2 as the proposed action. We wonder why the Service chose Alternative 2 rather than what we believe to be the better alternative, Alternative 3."

Response: Your comment is noted in General Issue Response II., Alternatives. Please note that Alternative 2 was the Service's Proposed Action, not the Preferred Alternative, in the draft EIS. The Service has now chosen Alternative 5 as its Preferred Alternative. Regarding use-rates, the Service may, in the future, negotiate to make use of up to 3.5 AF/acre/year of the water purchased, depending upon negotiations with other agencies and tribal partners. Other comments are addressed under General Issue Response III., Concerns with 2.99 Consumptive Use-Rate.

Comment 2: "NDOW is concerned about where water rights for the Carson Lake and Stillwater wetlands are purchased. If water for one wetland is purchased from the drainage of the other wetland, then drainwater inflows will be reduced. In the Environmental Assessment for the first 20,000 AF of wetland water purchases, this problem was recognized and addressed by delineating the drainage areas for the Stillwater and Carson Lake wetlands. Purchases from within these delineated areas were required to go to their respective or impacted wetland. This same procedure should be utilized for all water purchases covered by this EIS. If this procedure is not continued then another should be implemented which stipulates that all water, both prime and drain water (after the first 20,000 AF, Alt 1) would be split 60% to Stillwater and 40% to Carson Lake. If one area received a higher percentage of drainwater, then it would receive less prime water in order to maintain a 60/40 split on all wetland inflows. The procedure should also incorporate a provision that the ration could be adjusted annually based upon a mutual agreement by NDOW and the Service. In the absence of an annual agreement, the 60/40 percent split would remain in affect for the year. These agreed to water delivery procedures for purchased wetlands water needs to be in place to protect primarily the Carson Lake drainwater inflows before the final EIS is signed."

Response: Suggestions noted. The Service's impact analysis considers the ramifications of buying water rights for the Carson Lake, Stillwater marshes and Tribal wetland areas. The conditions identified in the EA were in response to NDOW's concerns. The Service has reviewed the water rights acquisition program for the entire Lahontan Valley and its commitment to the Lahontan Valley wetlands (for all three designated areas) and has determined that specific drainwater implementation plans are not relevant to the overall program. The Service will deal with such specific drainwater implementation plans with NDOW at a later date in coordination with Nevada Division of State Lands for the Lahontan Valley water right acquisition program.

Comment 3: "Page ix, 1st para., 2nd sentence: Delete the word be before exercise."

Response: This correction was made to the text.

Comment 4: "Page x, para.7 The stated baseline farm gate delivery of 157,800 AF (174,800 AF/yr farm gate delivery - 17,000 AF wetland delivery) does not equal the farm gate AF figure of 153,600 AF as shown on page xiv of the Summary Table baseline. Page x, last para., The baseline figure of 57,312 acres as depicted for irrigated farm lands conflicts with that as shown in Table 2.A, page 2-24, Table 3.2.A page 3-7 and Table 4.2.A page 4-2. Should not all tables state the same baseline number? This is very confusing to the reader as presently shown."

Response: The figures on page x have been altered due to errors. Actual water delivery to Carson Division headgates amounts to about 170,100 AF/year, including an average of 16,500 AF/year

delivered to the primary wetland habitat areas. Correspondingly, the figure for farm deliveries in the Summary Table has been changed to 157,800 AF.

Comment 5: "Page x, last para. Why has the 6,450 farm acres in the Middle Carson River corridor upstream from the Newlands Project been included in the affected area (1.6 page 1-8 and Fig. 1.B. map) when possible purchase and transfer of these water rights to Lahontan Valley wetlands has been deemed by the Service as being inappropriate (pages 2-29, 2-30, 2-46) due to river segmentation and cost of acquisition? It seems more appropriate that the farmland irrigated acres and farm headgate deliveries referred to in the baseline conditions text and Summary Table be specific to the Carson and Truckee Divisions within the boundaries of the Newlands Project."

Response: The affected area was enlarged to include both the Middle Carson River area and the Truckee River to the Pyramid Lake delta due to cooperators' comments on the Provisional Draft EIS. Section 2.5.5. (Alternative 5) has been rewritten in response to DEIS comments that criticized the negative tone concerning the viability of making use of these Middle Carson River waters. The footnote on Table 2.E. concerning "upstream Carson River water" has been changed to "Middle Carson River water". Middle Carson River is the area between Lahontan Reservoir and the Carson City gaging station. Upper Carson River is considered to be the area upstream of the Carson City gaging station. The Upper Carson River waters are precluded for use under this action. Use of Middle Carson River waters are incorporated as a source in the Service's Preferred Alternative, however, the Service continues to maintain that a number of issues must be resolved before these waters could be used on the wetlands.

Comment 6: "Page xv: The baseline figures of 152,100 and 32 are depicted in Summary Table for Cui-ui and Bald Eagles, respectively. What do these numbers stand for, total adult spawners, total breeding pairs or total population? This information is not stated in chapter 4."

Response: The baseline figure provided for cui-ui in the Summary Table (152,100) is an index to cui-ui population status (cui-ui index) under baseline condition, based on the cui-ui model developed by the Service. The cui-ui model is used, as it was used in this case, to assess possible effects of various water management strategies on cui-ui population dynamics. Under different water management scenarios (e.g., baseline conditions, Alternative 2, Alternative 3, etc.), the model provides a different cui-ui index. The baseline figure provided for bald eagles (32) refers to the average wintering population of bald eagles estimated to exist in the Lahontan Valley under baseline conditions. This number was derived from the number of bald eagles estimated to have wintered in the Lahontan Valley in 1989, when the wetland acreage was comparable to what is calculated to exist under baseline conditions. The table was modified to clarify these points.

Comment 7: "Page 1-28. State of Nevada, Department of Conservation and Natural Resources. is the correct name that should be in the text."

Response: The text of the FEIS was modified accordingly.

Comment 8: "Page 2-3: Fails to mention the loss of habitat and wildlife use on secondary wetlands which will occur."

Response: Comment noted. Only Newlands Project resource impacts are addressed in this comparison of alternatives. Impacts to Secondary Wetlands are described as an existing condition in Section 3.6.2, and in Chapter 4, Section 4.6.2, Effects on Secondary Wetlands.

Comment 9: "Page 2-4, para. 3: A demand of 8-9 AF/acre has never been documented for open water wetlands. The five AF/acre figure is based upon years of experience in this area. The write up in the Appendix, while not completely accurate, makes a reasonable effort at quantifying the amount of water needed to maintain an acre of wetland."

Response: Comment noted. The 8-9 AF/acre wetland demand was changed to 7-8 AF/acre to correspond to figures provided in Appendix 4. Please also see General Issue Response VI., Quantity of Water Required to Meet Wetlands Needs.

Comment 10: "Page 2-5, para. 6: All the water rights held by the wetlands have not been used to calculate true Project efficiency which gives a biased view of what is the actual efficiency. If the water delivered to meet these current water rights was credited to the Project, then the efficiency would be much higher than is being portrayed. The calculation of other reclamation projects is based upon outflows which go to meet downstream water rights. Why is it not used on this project?"

Response: Please see General Issue Response VIII., Impacts to Newlands Project Efficiency.

Comment 11: "Pg. 2-7, para.1: Another factor in the use of spills, is the ability of wetland units to store large volumes of spilled water. In many cases when spills occur, most units are already full and the spilled water cannot be used."

Response: Comment noted. This section of the EIS discusses factors that affect spill volumes.

Comment 12: "Page 2-8, 2.3.1.2- Recoupment: If recoupment becomes a future reality, credit should be given to wetland water rights purchased and transferred at 2.99AF. The recoupment credit should be at .51 AF or 1.51 AF per 3.5 AF or 4.5 AF purchased wetland water rights, respectively."

Response: Recoupment is outside the Service's authority.

Comment 13: "Page 2-13, para. 6: We are not aware of any existing management plan for Carson Lake."

Response: This section of the document has been revised.

Comment 14: "Page 2-14, para. 2. and other places: It is very doubtful that the \$9 million of state money will purchase 23,000 AF of water. The actual figure will probably be closer to 17-18,000 AF with escalating costs."

Response: The FEIS was revised to reflect this.

Comment 15: "Page 2-15, Map: Why are the agricultural lands associated with the Truckee Division shown as qualifying for transfer to the wetlands?"

Response: Although these lands may qualify for transfer to the wetlands, as a matter of policy, the Service has chosen to preclude use of these surface water rights for wetlands protection. The map has not been corrected due to the prohibitive costs.

Comment 16: "Page 2-23, 3rd para., 1 sentence: What is the lesser rate? Needs to be stated in text of this sentence as it is not found in reference of Section 2.4 Assumptions for Action Alternatives."

Response: In the DEIS, the Service was referring to Baseline Assumption (10) in Section 2.4, which states that the Service will take steps to reduce its irrigation demand so as not to increase Truckee

River diversions over existing conditions. This is meant to imply that the Service would adopt a use-rate lower than 3.5 if it was shown that the Service's acquisition program was increasing Truckee River diversions over existing conditions. The Service discusses the possibility of applying a use-rate between 2.99 and 3.5 in the FEIS, Section 2.5.5.

Comment 17: "Page 2-25, para. 1. "Water quality would not be as high as portrayed because the operator of the Project has the capability to reuse most drain water and would undoubtedly need to blend drain water with prime water to meet required efficiency requirements. As is common with Alt 2-4, wetlands will be paying for considerable amounts of drainwater which they had been receiving for free in the past."

Response: Comment noted. Alternative 4 offers the highest quality water of all action alternatives, and is most beneficial to fish and wildlife resources in the wetlands.

Comment: 18. "Pages 2-36 and 2-37, Acquisition Strategy: In compliance with Subparagraph 206(a)(2)(A) PL 101-618, the Service should state in the text as a high priority, the purchase of water rights/land from irrigated farm lands that are known to contain high contaminate levels, and that are presently spilling their contaminants to primary Lahontan Valley wetlands."

Response: Comment noted. All of the alternatives in the EIS would rely only on willing sellers.

Comment: 19. "Page 2-37, Location: Properties close to the wetlands are probably not as desirable as those farther away, because of the impacts on drainwater inflows. By purchasing land close to the wetlands, there is a direct loss of free drainwater entering the wetlands. This does not occur if water purchases are made from areas far away from the wetlands which do not provide direct drainwater inflows."

Response: Comment noted. The Service agrees that water rights acquired from farmland closer to the wetlands would have a greater impact on drainwater flows as compared to farmland located further away from the wetlands, but farmlands in the western portion of the Carson Division contribute to groundwater recharge. Focusing on those lands could potentially impact groundwater recharge.

Comment: 20. "Page 2-42: The words "shorebird die-offs" regarding regulating reservoirs is a poor choice of language and needs to be eliminated. Possibly what was meant was nest abandonment of colony-nesting birds. No shorebird die-off ("shorebird" defined in the Glossary as a member of the otherwise healthy, self-supporting birds) has ever been documented on any of regulating reservoirs."

Response: The text was revised to indicate that sporadic water regimes in the regulating reservoirs can adversely impact nesting shorebirds and other wetland-nesting birds.

Comment: 21. "Page 3-6, 3.2.1: 1st sentence is incorrect as to reference of Section 2.5.2 containing acreage of irrigated bench, bottom and pasture land. Where is this information located in the text?"

Response: Reference to Section 2.5.2 has been removed. Information concerning the general percentage of irrigated bench, bottom and pasture land in the Newlands Project is discussed in Section 3.16.3.

Comment: 22. "Page 3-18, para. 3: Is the 194,500 figure for the diversion into the Truckee Canal at Derby Dam, and if so what provision is made to provide a credit for the water that is spilled from the Truckee Canal back to the Truckee River from the two drops upstream from Fernley?"

Response: This figure represent Truckee Canal flow at a point downstream of the two Truckee Canal drops cited. Therefore they do not include diversions that are returned to the Truckee River.

Comment: 23. "Page 3-28, para. 1: What data supports the statement that high volumes of spills will degrade water quality. We don't believe this has been observed in the primary wetlands."

Response: The text states that voluminous spills that result in flooding can degrade water quality due to increased sediment load.

Comment: 24. "Page 3-28, para. 3: Reduced water quantity has been more of a factor in the loss of emergent and submergent vegetation than is the quality of the drainwater. Experience has shown that water quality is degraded faster within the various wetland units than it is in the drainwater supply. Given sufficient amounts of drainwater, almost all emergent and submergent vegetation stands would be reestablished. Page 3-28, para. 5: "It has never been the objective to meet water quality standards for aquatic life. Wildlife reproduction has been the standard that has been used."

Response: The statement that drainwater is suspect in the loss of emergent and submergent wetland vegetation is attributed to Hoffman, 1994. The Service agrees that overall reductions in wetland inflow have been a major factor in losses of emergent and submergent vegetation. The Service agrees that wildlife production, not aquatic life standards, is the objective of the existing water quality standards for Newlands Project irrigation water.

Comment: 25. "Page 3-53, para. 2: Reference to there being as much as 400,000 acres of wetlands in the valley 4,000 years ago. These are not wetlands as we are using the term, since much of the water would have been over 50 feet deep. This would have been a deep lake not a shallow wetland. Even Carson Lake as recently as 100 years ago was a relatively deep lake."

Response: Comment noted. Please see General Issue Response X., Historical Wetlands Acreage Questioned.

Comment: 26. "Page 3-54, para. 3: The runoff from the Sierra Nevada mountains, via the Carson River did not historically augment inflows to the Lahontan Valley wetlands. The runoff was the source of the inflow to the wetlands."

Response: The text was revised accordingly.

Comment: 27. "Page 3-54, para.4: What is meant by the term "seepage losses" and how do they differ from drainwater flows from the Project? To our knowledge all inflows are either in canals or through the drains."

Response: Seepage loss is the water lost during conveyance or irrigation delivery that moves downward into the shallow aquifer then flows toward the Carson Lake and Stillwater marsh groundwater discharge area and may move upward toward the surface. For further discussion of the conceptual movement of groundwater, see Maurer and others, 1994.

Comment: 28. "Page 3-58, para.3: Check the spelling of "Sagouspe" here and throughout much of the document."

Response: The spelling of Sagouspe was corrected.

Comment: 29. "Page 3-58, para.1: The statement regarding regulating reservoirs "no longer in use" is technically incorrect. The south bay of S-Line Reservoir is still regularly used for irrigation storage."

Response: This oversight was corrected.

Comment: 30. "Page 3-58. There needs to be some mention under "Secondary Wetlands" about other small wetlands in the Valley which are not listed in paragraph two. There are hundreds of acres which have been classified as wetlands under the Service's National Wetland Inventory which will be impacted by varying degrees under each alternative."

Response: Please see General Issue Response IX.

Comment: 31. "Page 3-61, 3.7 Vegetative Communities: the impression given here and in other places are that wetland vegetation was much more extensive in the 1800's, than after the Project was built. This may not be the case since Carson Lake was over 14 feet deep, parts of the historic marsh at Stillwater may have been dry for extensive periods, and the portion of the Stillwater area now known as the Refuge did not exist prior to the Project. In other areas of the Valley the losses have been almost complete ie. the Fallon NWR."

Response: the statement in Section 3.7 is that "Stillwater NWR biologists have shown that diversity of both emergent and submergent vegetation in the Carson lake and Stillwater marshes has substantially declined over the past 20 years (Kerley and others, 1993.)" Other information is provided in General Issue Response X., Historical Wetland Acreage Questioned.

Comment: 32. "Page 3-62, para.3. Need to correct figure for water consumption of cattail and bulrush."

Response: This correction was incorporated.

Comment: 33. "Page 3-63, para. 3. Some of the greatest revegetation of cottonwood on the lower Truckee River occurred during the low river flows in the 1990's. Many times high flows in this area will remove young cottonwood trees."

Response: Comment noted.

Comment: 34. "Page 3-68. The statement that Alcorn's "Birds of Nevada" documents the disappearance of three riparian-associated species, common yellowthroat, willow flycatcher, and yellow-breasted chat from Lahontan Valley is mostly false. Alcorn (1988) only mentions specifically the loss of the yellow-breasted chat from Lahontan Valley. The common yellowthroat is still present in the valley as a breeding species in what are assumed to be healthy, viable populations. The status of the willow flycatcher in Lahontan Valley is unknown; Alcorn makes no mention of its status in his book."

Response: Section 3.9 of the FEIS was revised to correct this error.

Comment: 35. "Page 3-69, para.1. Mallards and gadwalls need to be added to the list of major species which use the wetlands and the number of trumpeter swans documented on the area is so insignificant that they should be removed from the paragraph. There are probably more scoters and old squaw ducks in the area than trumpeter swans."

Response: Mallards and gadwalls were added to the list of the major waterfowl species that use the wetlands.

Comment: 36. "Table 3.9.A, Round off the average figure for Fernley WMA to 734 acres."

Response: The figure 734.33 was rounded to 734 in Table 3.9.A.

Comment: 37. "Page 3-71, para. 1. Quality feeding habitat for waterfowl is between 3-18 inches. As water depths approach 18 inches, it starts to become too deep for dabbling species of ducks and there is a noticeable reduction in duck use by most species."

Response: The range of water depths from 10-18 inches was changed to read "less than 18 inches."

Comment: 38. Page 3-74. "The totals in the August Shorebird table are incorrect. The sum have inadvertently included the "Year" row at the top of the column into the totals. In other words, the 1989 total is 1,989 birds higher than the actual observed total."

Response: The totals in the August Shorebird table (Table 3.9.B) were corrected.

Comment: 39. Page 3-79. "The supposition that loss of cottonwoods might especially impact yellow-billed cuckoos needs to be modified to state that the loss of cottonwoods in the middle Carson sector above Lahontan Reservoir could negatively impact yellow-billed cuckoos. Loss of cottonwoods in general (i.e. isolated ag land trees) would have no impact on yellow-billed cuckoos. The statement is misleading."

Response: This part of Section 3.9.4 was modified in hopes of preventing any possible miscommunication identified in the above comment.

Comment: 40. Page 3-84, para. 4. "What was previously thought to be a freshwater mussel bed in the upper end of Stillwater Point Reservoir, in reality turns out to be only shells. this sentence needs to be deleted entirely."

Response: Commented noted.

Comment: 41. Page 3-88. "The statement concerning nesting black terns is misleading because it leads a reader to believe that black terns had not been observed at all in the valley since 1986. In fact, black terns have been observed every year since 1986; there was just no nesting between 1986 and 1994. Nesting reinitiated in 1994 and continued in 1995.

Response: The paragraph on black terns was modified to reflect the information presented in this comment.

Comment: 42. Page 3-88, para. 2. "The nesting failure of ibis in 1991 was probably more a lack of water in the nesting area. There was adequate vegetation at Carson Lake, but the area went dry in the middle of the summer."

Response: The paragraph on black terns was modified to reflect the information presented in this comment.

Comment: 43. Page 3-92, para.2. "The outbreak of botulism in 1987 on the Six-Man club was not the result of receding water levels from the 1986 flood, because this area did not receive any of that

flood water. It was caused by an interrupted delivery period when the Project was shut down in September because of reduced water allocations."

Response: The text of Section 3.14.2 was modified to correct this error.

Comment: 44. Page 3-92, para.3: "Do you have any records of DVE outbreaks occurring in Lahontan Valley? We know of none."

Response: The reference to duck virus enteritis was deleted.

Comment: 45. Page 3-94, para. 2. "Long-billed curlews and American bitterns are fairly common at Carson Lake and Franklin's gulls nested there in 1995.

Response: The nesting record of Franklin's gulls was added to Section 3.15.

Comment: 46. Page 3-94. "The statements concerning "overall biodiversity" are contradictory. One says introduced game fish increased overall biodiversity, but then through impacts to native biodiversity, the net effect was to decrease overall biodiversity. Which way is it?"

Response: It was not the introduction of non-native fish alone that reduced overall biodiversity, but the introduction of non-native fish in conjunction with declines in water availability. This part of the discussion was modified to clarify any misunderstandings. The introduction of non-native fish added to overall biodiversity (more species were added to the biological community of Lahontan Valley), but as these species became established, populations of native fish and other wildlife were adversely impacted. The net result of introductions to overall biodiversity is unclear.

Comment: 47. Table 3.17.A: "In 1992, it doesn't seem reasonable that hunting at Stillwater would be greater than the hunting use-days for Churchill County. We suspect that the Churchill County figure is missing a number.

Response: We agree. Upon reviewing Meyer's data, it was found that data for 1992 was extrapolated from an average of three previous years.

Comment: 48. Page 3-107, para.4. "The public has always been allowed on Carson Lake and access is controlled by TCID. The Greenhead Club and NDOW make recommendations, but TCID has the final say."

Response: A statement was added to this paragraph to reflect that the Greenhead Club and NDOW make recommendations, but that TCID makes the final decisions.

Comment: 49. Page 4-2, 2nd sentence. "Reference that Section 4.16 Effects on Agriculture, etc. contains the information on topic, however, is absent from named text."

Response: The sentence was clarified.

Comment: 50. Page 4-6, Table 4.2.C. "Alternatives 2-5 are all below the 5 AF requirement to maintain 25,000 surface acres as identified by PL 101-618. If these figures are the true irrigation deliveries under the alternatives, then they do not meet the intent of the law."

Response: Please see footnote C on the table. The total wetland inflows are long-term averages with "shortages" factored into the expected irrigation deliveries. These long-term delivery averages equate to 125,000 Af of water obligated for wetland demand.

Comment: 51. Page 4-8, Alternative 4. "There will always be some irrigation drainwater flowing to the wetlands unless it is treated on site- is this the intention?- if so, it should be stated in text or referenced elsewhere in text. If drain water is going to be received separately, impounded, and excluded from wildlife use, then Alternative 4 is unrealistic and is not really an alternative."

Response: Comment noted. Please see response to Churchill County # 244.

Comment: 52. Page 4-25, para 1. "Alternative 2 states that the level of Pyramid Lake will increase by five(5) feet over baseline. Over what period will the five foot rise take place, or is this when the Lake will reach equilibrium?"

Response: All values represent long-term averages based on the 92-year hydrologic simulation. The actual amount of time that it will take for Pyramid Lake to increase an average of 5 feet under Alternative 2 is unknown.

Comment: 53. Page 4-27, para. 1: "There appears to be a conflict between this paragraph and paragraph 1 page 3-28 which says that spills will degrade water quality."

Response: Section 3-28 states that the quality of spill water is generally comparable to irrigation water, but that voluminous spills that cause flooding can cause sediment-laden waters and degraded water quality. Alternative 2 is not expected to increase flooding over baseline conditions.

Comment: 54. Page 4-50, paragraphs 2, 3, & 4. "The wetlands on the Canvasback Gun Club will be significantly impacted by Alt. 2-4. While this area has water rights, they are currently insufficient to maintain the wetland habitat on their property and drain water rights will be reduced in their values as more upstream water-righted land is taken out of production. The least impact to the Club wetlands will come from Alt 3 which takes less land out of production. Almost all secondary wetlands, including those small wetlands not mentioned in the report which exist in Lahontan Valley, will be impacted or eliminated by these actions. There will be no need for regulating reservoirs in the Valley once wetland water rights exceed 70,000 AF or less. The Fernley WMA and Massie and Mahala Sloughs may be the only secondary wetlands which are not significantly impacted by these alternatives."

Response: Please see General Issue Response IX., Loss to Secondary Wetlands.

Comment: 55. Page 4-53, para.2. "In reality, with only a four (4) percent increase flow in the Lower Truckee River, there will be no change or benefit in the plant communities. Benefits would be the same for both Alt 2-3 because the differences are so small in flow rates."

Response: Text has been changed in Sections 4.7.2 and 4.13 to state that riparian plant communities "may" benefit slightly under alternatives 2 and 4. The Service agrees that the percentage difference in Lower Truckee River flow volumes may be so slight that changes in riparian plant communities are not noticeable. However, slight benefits may accrue over time, and the terminology used is applicable to that potential change.

Comment: 56. Page 4-54, para. 1, 3rd sentence. "The figure of 60,000-62,000 irrigated acres does not correspond to the 56,622 irrigated acres in Newlands Project as stated in Table 4.2.A, page 4-2. Which figure is correct?"

Response: The affected area includes the 56,622 from Table 4.2A, plus irrigated acreage in the Middle Carson River area, and irrigated land without water rights in the Newlands Project. Because the Service is not sure that all the lands in the Middle Carson River are irrigated, a range is portrayed for this value.

Comment: 57. Page 4-56, para. 1. "The word peak should be inserted before the word waterfowl, since we never know what the total waterfowl population for any given year might be. These numbers are used to relate the peak population on a given area."

Response: The recommended change was incorporated.

Comment: 58. Page 4-66, para. 4. "Because of the manner the wetlands operate, oxygenation will not be noticeably increased and this is not a factor in control of botulism. One windy day would put more oxygen in the water than all the water deliveries in a month."

Response: The statement to which this comment refers was deleted.

Comment: 59. Page 4-113, para. 3, 1st sentence. "The statement that "If the TJ Drain was not closed," is not an option under PL101-618 which requires closure of the TJ Drain. this paragraph is in error and should be deleted in the final EIS."

Response: The paragraph was deleted.

Comment: 60. Page 116, para. 6. "Reduction of livestock on Carson Lake would not reduce siltation or turbidity on open water areas. Livestock are essential to vegetation control and habitat diversity on this area by use of prescribed grazing."

Response: This discussion was modified.

Comment: 61. Page 4-117, para.2: "The Service states that it plans to "segregate water right acquisitions for the wetlands and cui-ui by Project districts", yet it has chosen a proposed action whose only benefit is to use wetlands water right purchases to subsidize water acquisitions for cui-ui. Alt 3 has no definable impacts on the Truckee river over what is allowed under the 1988 OCAP, and has a better cost benefit ratio to achieve the goal of 25,000 acres of wetlands. Alt 2 has greater costs and more negative impacts on other Project resources, including secondary wetlands. If it is the intent of the Service to segregate water right purchases, then why did it chose Alt. 2?"

Response: Please see General Issue Response III. Concern with 2.99 Consumptive Use-rate.

Comment: 62. Page 4-117, para.3. "The comment is made that the cui-ui water right purchases would provide more dependable aquatic and wetland habitats. The water right purchases will not provide any benefit to wetlands along the Truckee River and will result in the loss of wetlands associated with the Fernley WMA, small wetlands on the Truckee Division, and Massie and Mahala Sloughs if water is acquired from the Truckee Division."

Response: the word "wetland" has been changed to "riparian".

Nevada Waterfowl Association

Comment 1: "...Those who worked on the DEIS have done a tremendous job of assimilating information concerning water rights, wetlands, social and economic impacts, agricultural interests and fisheries. All too often in the current political climate fringe groups who oppose certain federal policies vent their frustrations against individuals who are merely attempting to do their jobs implementing the will of the majority of the people acting through the Congress. Whether one agrees or disagrees with the DEIS, the Water Rights Acquisition Team deserves the appreciation of each of the competing user water groups."

Response: Comment noted.

Comment 2: "Alternative 3 Should be the Preferred Alternative. The Service's choice of Alternative 2 as the preferred alternative causes us great concern. Of all the alternatives, numbers 2 and 3 are the most reasonable methods of obtaining the target of 25,000 acres of primary wetlands as mandated in Public Law 101-618. As between alternatives two and three, alternative three will come closer to obtaining that mandate given the political reality that there will be limited funds available to implement the legislation. It appears to us that Alternative 2 is driven by a desire to benefit the Pyramid Lake Fishery at the expense of the limited funding available for wetlands water right purchases. While the Nevada Waterfowl Association does not oppose the efforts to restore the fisheries, other provisions of Public Law 101-618 address that issue. Wetlands water right purchases should not be used to subsidize the fishery restoration. Moreover, Alternative 2 will require the purchase of more agricultural lands, increase capital costs and annual operation and water delivery costs, as well as significantly increase the impact on secondary wetlands in Lahontan Valley. Yet, we can perceive no positive benefit to the fishery by implementing Alternative 2 instead of 3. The reduced transfer rate of 2.99 proposed under Alternative 2 may be contrary to those provisions of Public Law 101-618 which restricts the Secretary of Interior's purchase of water rights to those that are transferred and applied to the wetlands."

Response: Comment noted under General Issue Response II, Alternatives. Please see General Issue Response III., Concerns with 2.99 Consumptive Use-rate.

Comment 3: "We believe that the concern expressed about the State Engineer having to find that downstream water users would not be injured by a 3.5 transfer rate, is overstated. The wetlands are the last water user on the system so there are no lower downstream users to be impacted. Moreover, the wetlands water is being used to raise a crop just like any other crop. The only difference is that the wetlands water is irrigating natural habitat instead of commercial crops or pasture which is irrigated by a rancher to raise forage for livestock. There is no substantive difference between wetland irrigation and pasture irrigation. The argument that there is a "change in use" between the two appears to be an excuse for inaction on the 3.5 transfer rate."

Response: Newlands Project would have priority use of upstream waters. Please see General Issue Response III, Concern with 2.99 Use-rate, and the Service's response to NDOW Comment 1., above.

Comment 4: "We are also very concerned about the statement in Alternative 2 that the remaining 1.15 or 0.15 AF/acre/year would be "retired." What does that mean and who will reimburse the funds allocated for water rights purchases that are spent to buy such "retired" water rights? If the reduced transfer rate is designed to benefit the fisheries, then the wetlands' money should be reimbursed for the "retired" water from money allocated to Pyramid Lake Fisheries."

Response: The water remaining from use would be 1.51 or .51 AF/acre/year, not 1.15 or 0.15 as written in the comment. For the Preferred Alternative, the Service has determined that the remaining 1.51 or 0.51 AF/acre/year may not be retired. Under Alt. 5, the Service may, in the future, negotiate to make use of up to 3.5 AF/acre/year of the water purchased, depending upon negotiations with other agencies and tribal partners.

Comment 5: "An issue closely related to the 3.5 transfer rate issue (which is central to Alternative 3), is the efficiency measurement. All the wetland water rights are not being used to calculate the Project efficiency. If the water delivered to meet the current wetland water rights is credited to the Project, then the efficiency would be much higher than currently portrayed. We understand that in most other Reclamation projects outflows which are used to meet downstream water-user rights are used in efficiency calculations. The DEIS is deficient because it does not even attempt to explain why outflows from the Newlands Project which meet wetlands water rights are not used to calculate the Project's efficiency."

Response: Please see Service response to NDOW Comment 10 above.

Comment 6: "Refuge Management Plan. We believe that there is a need for a set master plan for management of the refuge and wildlife management area that allows annual input by organizations such as Nevada Waterfowl Association. For example, as a result of the recent drought, there was a period of time when there were no federal employees at Stillwater who have ever seen the marsh full of water. Members of our organization attempted to advise the refuge staff as to how the water would move among the different units and which units would provide the most productive habitat. We believe that a formal process should be established to provide the opportunity for such local input on a regular on-going basis."

Response: There will be opportunity for such community input during development of the Comprehensive Management Plan.

Comment 7: "We are also concerned that the DEIS in general under counted the economic value of the wetlands. Aside from their recreational, historical and esthetic contributions to the local community, once the wetlands are restored and properly managed, people will travel from around the country and even around the world to see and experience these unique desert wetlands. That influx of visitors will generate more economic value than is reflected in the DEIS. Further study should be made of how much money will be spent in the local community by all wetland use groups. Future non-consumptive users should be included as well as waterfowl hunters and fishermen."

Response: The Service agrees that this resource may be under-valued in the DEIS. However there was no definitive data that showed what type of visitor increase could be anticipated.

Comment 8: "On the other hand, we believe that the DEIS has overstated the adverse impacts on agricultural interests. The simple fact is that the Fallon community is becoming a suburb of Reno. With or without the water rights purchase program for the wetlands, social and economic forces will continue to reduce the amount of agriculture in Lahontan Valley. For example, approximately 8,000 acres of irrigated farmland has gone out of production. However, only 4,200 of those acres were acquired as part of the water rights purchase program. The local community cannot blame the water rights purchase program for the conversion of those 3,800 acres of prime farmland. This example shows the need to continue targeting acquisitions as the Nature Conservancy has attempted to do. We believe the Nature Conservancy deserves credit for its efforts to target acquisitions so as to minimize impacts on the local community."

Response: The Service agrees that agricultural impacts may be overstated in the document so as not to undervalue impacts upon the Lahontan Valley community.

Comment 9: " We also believe that the DEIS fails to recognize the full beneficial impact to the local economy of the inflow of money being used to pay for water rights acquired for the wetlands. While a farmer who sells his water rights may not purchase any more farm equipment, he does other things with the money he is paid for this water rights. For example, he can pay off his existing debt to creditors in the community, he can invest the money which helps create other business activity, or he can spend part of it which creates additional demand for goods and services. We believe there should be further study on the beneficial effect of the money paid for water rights on the local community. It should be noted that there are willing sellers lining up to sell their water rights to help the wetlands. Those members of the community should not be blocked from selling their water rights by those who want to continue farming."

Response: Comment noted. A description of the existing availability of willing sellers is now included in Section 3.25, ACQUISITION COSTS AND PROBABILITY OF MEETING THE SERVICE OBJECTIVE.

Comment 10: "Finally, although the DEIS addresses the wetlands water rights purchase program, we note that there is a discussion of the cui-ui water right purchase program at pages 4-116 through 4-118. We doubt that any acquisition of fishery water rights as currently proposed will benefit wetland habitat. To the contrary, such acquisitions from the Truckee Division could lead to the loss of wetlands at Fernley Wildlife Management Area, Massie and Makala Sloughs and other small wetlands on the Truckee Division. We believe there are mitigation strategies that can protect those wetlands, but that discussion is for another time."

Response: As a matter of policy, the Service is not pursuing water rights acquisitions in the Truckee Division of the Newlands Project for wetlands protection.

Pyramid Lake Paiute Tribe

Comment 1: "Of the alternatives considered in the DEIS, the Tribe generally supports the proposed action, Alternative 2, subject to the comments set forth in this letter. The Tribe believes that the transfer-use-rate of 2.99 acre-feet per acres is mandated by the Alpine Decree, the Endangered Species Act, the cui-ui recovery plan and the Secretary's trust responsibility to the Tribe. It is also strongly supported by environmental, endangered species and Indian policy considerations.

Response: Comment noted in General Issue Response II., Alternatives.

Comment 2: "The same legal mandates and policy considerations as well as the requirements of P.L. 101-618 also support the limitation relating to the acquisition of only those water rights which are appurtenant to actively irrigated lands as shown on the composite map (Figure 2.A). The Final EIS should explicitly address the question of reirrigating the land to which the acquired water rights were appurtenant. To insure that the wetlands water rights acquisition program does not result in the unintended consequence of reducing Truckee River inflows to Pyramid Lake, the Final EIS should expressly state that the deeds conveying the water rights will include covenants providing that the only water rights which may be exercised on the appurtenant lands are those shown on the composite map.

Response: The Service is committed to using covenants to preclude the application of water rights that would increase diversions from the Truckee River.

Comment 3: "The Fish and Wildlife Service must design and implement a continuing monitoring program to enforce this covenant. If the lands to which the water rights were appurtenant are reirrigated with inactive water rights, the wetlands water rights acquisition program would violate P.L. 101-618, the Endangered Species Act, the Secretary's trust responsibility to the Tribe and the cui-ui recovery plan...In connection with the monitoring, the Service should install appropriate gages to measure the drain water flows and direct deliveries to the wetlands. Some of the drain water that flows to the wetlands has been treated by the TCID as direct deliveries. The Service should determine annually the actual quantities of drain water flow and direct delivery to the wetlands. Under the present OCAP the increase in the project efficiency attributed to the treatment of a portion of drain water flow as a direct delivery should be discounted, or the future of efficiency should be increased above 68.4 for drain water deliveries."

Response: The Service is working with the Tribe to develop a monitoring program and shares the Tribe's concerns that these covenants must be monitored and enforced.

Comment 4: Page 1-11. "In reference to the history of OCAP summarized on Pages 1-10 and 1-11, the DEIS does not mention the 1973 OCAP and the associated environmental document prepared by the Department of Interior entitled "Draft Environmental Statement for the Proposed Operating Criteria for the Lower Truckee-Lower Carson River Basins."

Response: The statement "Further legal controversy over water use was followed by several court decisions affecting OCAP and the Newlands Project" in Section 1.7.1 is meant to encompass the 1973 OCAP. Additional text would require description and explanation which would add verbiage without greatly benefitting the document.

Comment 5: Page 2-2. "Water right acquisitions of 122,000 acre-feet may not yield an annual average of about 102,000 acre-feet of irrigation water. Based on acquisition of bottom land rights, exercise of 2.99 acre-feet per acre, and an average annual shortage of 2.0 percent, it would result in a supply of 102,000 acre-feet ($2.99 + 3.5 \times 122,000 \times 0.98 = 102,000$). However, the average annual shortage using the demand under the Record of Decision (1988 OCAP) would be higher than 2.0 percent. It should be noted with the reduced demand in Carson Division, the Lahontan targets should be adjusted to maintain the same level of water supply. It also should be noted that the Lahontan storage targets may be further modified in the future as part of a more comprehensive OCAP revision.... Under the Proposed Action, the average annual amount of spill from the Lahontan Reservoir is anticipated to increase compared to the No Action Alternative. The Tribe expects that the target storage levels in the Lahontan Reservoir will be adjusted downward with reduced demand in the future...Correspondingly the spills should not be anticipated to increase."

Response: The Service agrees. The 1988 OCAP ROD estimated an average annual shortage of 4 percent. The BLR Model, using 1989 acreage base demand applied to a 92-year simulated water history, calculated an average annual shortage of 2.3 percent. OCAP adjustments may modify Lahontan Reservoir storage targets, and changes in both spills and drainflows could potentially result. Those sections of the FEIS have been rewritten to offer the generalized change that could result. However, because an adjusted OCAP has not been implemented, the FEIS baseline continues to adhere to the current law, the 1988 OCAP.

Comment 6: Page 2-14. "The common assumption used for evaluating the proposed alternatives do not specify the bench and bottom land classification. The bench and bottom land classification approved by the Alpine Court in 1994 for the Newlands Project should be the basis for water acquisition."

Response: The Service agrees. Bench and bottom land classifications are approved by the Alpine Court as discussed in Section 1.9.1.

Comment 7: Page 2-18. "It is indicated that the Service and NDOW have reserved the remaining 0.51 acre-feet per acre ($3.5 - 2.99 = 0.51$) of the unexercised water rights for possible future use. The Tribe objects to use of such water other than reducing diversions at the Derby Dam. The Final EIS should state that the transfer rate will be 2.99 acre-feet per acre. (See Comment No. 8 below). Anything more would be contrary to the Alpine Decree, the Endangered Species Act and the Federal government's trust responsibility to the Pyramid Lake Paiute Tribe.

Response: Please see General Issue Response III., Concerns with 2.99 Use-rate.

Comment 8: "The Service estimates that 17,100 acre-feet of the acquired 20,000 acre-feet would be available for the wetlands delivery. Again, this is based on normal water supply...The long-term average yield is expected to be less than 100 percent."

Response: This is correct -- 17,100 AF of water would be available for wetlands delivery in 100 percent or greater years.

Comment 9: "Page 2-20. It is indicated that with a total supply of 55,700 acre-feet, about 12,100 acres of primary wetland can be sustained on average. This would result in a water supply of 4.6 acre-feet per acre...which is less than 5.0 acre-feet per acre required under the Proposed Action..."

Response: Acreage figures presented in the EIS are approximations based on model calculations (e.g., BLR model).

Comment 10: "Page 2-20. The average annual amount of spill under the Proposed Action is indicated to be 11,000 acre-feet on Page 2-2 and 10,000 acre-feet on page 2-20.

Response: The correct figure is 10,000 AF. This section of text was deleted in the FEIS.

Comment 12: "The Tribe objects to Alternative 3 based on the maximum use rate. The use of full water duty of 3.5 or 4.5 acre-feet per acre under this alternative is contrary to the agreement between the Tribe, the Service and the NDOW. It is contrary to the Alpine Decree. It is not consistent with P.L. 101-618, the ESA and recovery of cui-ui. It will not assist the lower Truckee River habitat restoration for the Lahontan cutthroat trout (LCT). It is contrary to the Secretary's trust responsibility in preserving the Tribal natural resources. Therefore, Alternative 3 should not be considered as a viable alternative...Alternative 3 should not be considered because it would clearly increase the demand in the Carson Division resulting in increased diversions from the Truckee River. This is inconsistent with P.L. 101-618, the Secretary's trust responsibility and the ESA."

Response: Comment noted in General Issue Response II., Alternatives.

Comment 12: Page 2-25 and 2-26. "The assumption of no drain water flow under Alternative 4 is not justified because of conveyance and distribution losses as well as return flows resulting from irrigation diversions of about 120,000 acre-feet to the remaining project lands."

Response: Please see response to Churchill County comments #244 and #303.

Comment 13: Page 2-29. "It is indicated that only 2.5 acre-feet of the Alpine decreed water right in Segment 7 can be transferred with the change in place of use. The transfer of consumptive use rate

(2.5 acre-feet per acre) is associated with the change in manner of use, not necessarily with the change in place of use so long as it is within the Carson River watershed. This is consistent with the transfer of 2.99 acre-feet per acre within Segment 8. This probably at least an open question."

Response: The Service agrees. This section has been corrected, and the term "place" has been replaced with "manner."

Comment 14: Page 2-31. "Alternative 5 includes exercising about 3,570 acre-feet of unused water rights held by the Navy. Exercise of those inactive water rights would require supplemental diversions from the Truckee River. This would also include the transfer of 3.5 instead of 2.99 acre-feet per acre. Activating additional rights is not consistent with the Service's obligation to protect the cui-ui in the lower Truckee River or with its trust obligation to the Tribe."

Response: Comment noted. The Service would not take any action relative to Navy water that would increase Truckee River diversions.

Comment 15: "Page 3-6 and Table 3.2.A. The 1989 irrigated water righted acreage, used as a baseline condition, consists of 5,670 acres of water rights devoted to wetlands and 47,008 in irrigated agriculture. The sum of the two components does not match with the acreage shown in Table 3.2.A."

Response: The typographical error in Table 3.2.A has been corrected. The correct figure for water-righted/irrigated acres in the Carson Division in 1989 is 52,678.

Comment 16: "Page 4-10 and Table 4.2.D. It is indicated that over the long run, the Newlands Project efficiency would increase for all action alternatives. This is predicated on the retirement of large parcels of agricultural lands. However, to achieve and increased project efficiency the purchases have to coupled with the retirement of distribution systems associated with the purchased lands, availability of efficient conveyance facilities to deliver wetland allocations, and maintaining a wetland delivery schedule coincidental with irrigation deliveries in the Carson Division."

Response: Please see General Issue Response VIII., Impacts to Newlands Project Efficiency.

Comment 17: "Page 4-13 and Table 4.2.E. It is not certain that there would be a reduction of five percent in Truckee Canal inflows to the Lahontan Reservoir under Alternative 3. This assumption is predicated on achieving a project efficiency of 71 percent. Until such time, Alternative 3 would cause increased diversions from the Truckee River. Similarly, releases from the Lahontan Reservoir would increase under Alternative 3 until such time a project efficiency of 71 percent is achieved."

Response: Comment noted. We would generally agree. Under existing efficiency rates, a 5 percent reduction in Truckee Canal inflow to Lahontan Reservoir would probably not occur. The Service has made the assumption that all conditions (including efficiencies) of the 1988 OCAP have been met. Based on this assumption, the NSM and BLR Model calculations offer relative comparisons of diversion based on a consistent set of assumptions.

Comment 18: Page 4-21. "It is indicated that the Truckee Canal losses are directly linked to ground-water recharge in the Fernley area and other areas adjacent to the canal. However, there are no defined ground-water resources along the canal other than the Fernley area. Most of the Truckee River losses outside of the Fernley area are not recoverable."

Response: Please see response to Bureau of Reclamation comment #19. It appears that the Carson Desert groundwater basin may be recharged by Truckee Canal losses along the section of the canal between the Hazen area and Lahontan Reservoir. The Service agrees with the statement regarding Truckee River losses; see Section 3.3.3.1.

Floyd Rathbun

Comment 1: "...since some 20,000 acre feet of water per year have been added to the F&WS annual water receipts by the purchases already completed, how many acres of additional wetlands now exist because of this water?"

Response: Under the No Action Alternative, the Service anticipates that about 12,100 acres of primary wetland habitat will be maintained. Without the acquisition of the 20,000 AF of water rights associated with the No Action Alternative, the Service estimates that, on average, about 9,700 acres of wetland habitat would exist in the primary wetland areas. Therefore, it is estimated that about 2,400 more acres of wetland habitat will exist, on average, in the primary wetland areas under the No Action Alternative.

Comment 2: "Perhaps "natural biodiversity" should be defined as the biodiversity achieved with no manipulation techniques as devised by people of European descent?...Apparently obtaining the "large benefits" to "natural biodiversity" will require removal of all the un-natural features, but you fail to describe this removal in your document, or how you plan to control water without the use of (irrigation system style) structures and ditches, etc.

Response: This is one possible interpretation of the term natural biodiversity. Management of water within the primary wetland areas is beyond the scope of this document.

Comment 3: "Your description of the amount of water needed for wetlands of various types included your choosing to use an "average" water delivery of 5 acre-feet per acre (acft/ac) every year to achieve your goals. I noticed that your historic management of wetlands in Stillwater (with all the attributes you are seeking) has required yearly receipt of 9 to 10 acft/ac, as described in your earlier EA's and reports. Since you have not described any improvement in managing that would result in a 50% water savings, you will still need about 10 acft/ac to provide the wetlands that our plan promises. This means that you will need 250,000 acre-feet of water delivered to the marshes each year, not the 125,000 acre-feet you are seeking. My conclusion can only be that given this discrepancy in your statistics, then all of your conclusions are in error or statistics have been manipulated to obscure the F&WS desire to "obtain" all of the water entering Lahontan Valley. Please revise this EIS to include the impacts off total control of all Lahontan Valley irrigation water and elimination of agricultural production by the F&WS."

Response: Comment noted. Historic management of the Refuge wetlands has not required 9-10 AF/acre annually. Please see General Issue Response VI., Quantity of Water Required to Meet Wetlands Needs.

Comment 4: "In several sections there is a reference that "historically, the Carson River sustained an average of about 150,000 wetland acres....I assume that this 150,000 acres represents the same type of wetland you propose to provide per PL 101-618, or you would have stated otherwise. However, this 150,000 acres of wetlands requires at least 750,000 acre-feet per acre of annual water inflow which is more water than flows in all the western Nevada rivers combined, it does not appear likely that your management actions are going to cause this much water to become available once again."

Response: Please see General Issue Response X., Historical Wetland Acreage Questioned.

Comment 5: "I was privileged to hear Senator Bryan speak in Fallon in September (1995). The Senator spoke strongly about the danger our nation is in because of our \$5 Trillion + debt. We literally have no money and are operating on borrowed cash. Because of this, Senator Bryan stated that it is very unlikely that the DOI-F&WS budget would include the millions of dollars this water acquisition project will require. Based on that statement, don't you suppose that you should stop your acquisition plans until the money is appropriated and available? Rather than spend more millions on this planning and EIS preparation, perhaps we should use that money to pay down the national debt."

Response: The Service is required to prepare and complete an environmental analysis for the actions that are mandated by Congress under Section 206 of Public Law 101-618. While the Service must complete the planning and impact assessment for the entire water rights acquisition program, it can only commit to and proceed with acquisitions based on available funding. As Congress makes funds available for the purposes mandated by Public Law 101-618, the Service will proceed with planned acquisitions.

Comment 6: "On the subject of money, in reviewing your economic analysis I was startled to see your conclusion that taking one-half to two-thirds of the irrigated lands out of production would only reduce \$50 million of agricultural sales by about \$8 million (less than one-sixth)...for example, please consider the economic effects of treating the \$50 million per year sales as an annually invested annuity at 5% interest each year for 30 years. This means that the value of Fallon area farm products is approximately \$3.3 billion over the same 30 years as your economic evaluation. This tremendous value could next be treated with multipliers to indicate one of the economic effects of you eliminating agriculture in the Newlands Project. Are you going to provide our society something that's worth over \$3 billion of lost revenues plus the taxpayers money you plan to spend?"

Response: Tables 4.16.A and 4.16.B were revised to indicate that column (7) refers to agricultural income and not total agricultural output.

Comment 7: "I believe that the U.S. Department of Interior, including the F&WS, should prepare a single EIS because of the immense cumulative effects of various DOI actions concerning control of water within western Nevada. This EIS lists some potential cumulative effects but does not include evaluation or conclusions about actions needed to mitigate them. As near as I can tell, even if the DOI is successful in eliminating irrigated agriculture in this area, the various planned actions mean that different sub-divisions of the DOI are going to demand more water than the Carson and Truckee River systems provide. After upstream water demands are met, DOI is preparing to compete against itself for scarce water supplies through the following "mandates": (1) Truckee River Operating Agreement, (2) Stillwater NWR Comprehensive Management Plan, (3) NDOW ownership of Carson Lake (and subsequent expulsion of livestock) (4) F&WS water acquisitions for Stillwater and (5) for quai fish in Pyramid Lake, (6) control of alleged abandoned &/or non-perfected water rights, (7) Fallon Indian Reservation water rights, (8) destruction of wetland qualities of Newlands area regulating reservoirs by prohibiting their use, (9) "recoupment" of Truckee River water diversions (since most of the water ended up in Stillwater WMA it looks like the refuge will have to provide the recoupment flows), (10) US Navy water rights claimed by various F&WS offices and Indian tribes, (11) potential future demand of Stillwater managers for more than 125,000 acre-feet off water per year as mentioned in the EIS, (12) expiration of the Tripartite Agreement (and subsequent expulsion of livestock from Stillwater NWR) etc..."

Response: Please see General Issue Response I., Programmatic EIS.

Comment 8: "Agricultural lands being taken out of production (no longer irrigated) are described as being likely to naturally revegetate in just a few years with little disruption in availability of wildlife habitat and minimal soil erosion...Now that you have had control of several properties for four or five years, why didn't you cite development of native plant populations on your own property. I suspect you didn't cite your own success because you haven't experienced the success reported in research, using your actual experience would likely lead you to different conclusions."

Response: the Service's own revegetation efforts were not discussed so as not to confuse the reader into believing the Service would revegetate all lands acquired and then transferred to private ownership. The Service has not committed to such mitigation. Under existing conditions, the Service has a two-year-old revegetation project under way. It is established on a Refuge parcel, and is a 23 acre plot revegetated with alkali sacaton, Great Basin wild rye, western wheatgrass, black greasewood, and Torrey saltbush. To date, the Service has maintained irrigation on the plot for two years, and revegetation efforts have successfully reestablished several of the species that were planted. Private lands bought by the Service within the Stillwater NWR boundary would remain in Federal ownership and would be revegetated with native species or possibly crop species that benefit wildlife and prevent wind erosion.

Comment 9: "page vii...Please state the date when 150,000 acres of "wetlands" were recorded and provide a map of the boundaries of the extremes in wetland acreage."

Response: Please see General Issue Response X., Historical Wetland Acreage Questioned.

Comment 10: "page x, costs-costs of this project aren't limited to the money spent for purchases but should include the lost agricultural production, lost property values of rural subdivisions, etc."

Response: The Service refers to costs as those expenditures that require capital funding. Impacts associated with lost agricultural production and lost agriculture profit are addressed in Section 4.16 EFFECTS ON AGRICULTURE, FARMLAND, AND LOCAL ECONOMY. There is no indication or evidence that has shown property values to be adversely impacted by the Service's proposed action to acquire water and water rights for wetland protection.

Comment 11: "page xv, tables-large increase in waterfowl populations will be reduced by loss of feed source from farmland; most of the cottonwood trees in the Lahontan Valley will very likely die and/or fail to reproduce to the detriment of bald eagles and quality of life of residents; it would be convenient to see a display of how much of the "wetland" areas are open water or various types of plants in this tabular format."

Response: Most waterfowl using the Lahontan Valley wetlands do not feed in farmlands, and, therefore, increases in waterfowl use of Lahontan Valley wetlands would generally occur regardless of how many farmlands are taken out of production (except that, as more water rights are acquired, more wetland habitat will be sustained). Bald eagle roosts in the Lahontan Valley are not located in areas that would be adversely impacted by the acquisition of water rights from farmland. To the extent that cottonwood trees along certain drains and canals are impacted, quality of life of some residents could be impacted. There is no indication that "most" cottonwood trees in the Lahontan Valley will die or fail to reproduce under the Preferred Alternative.

Comment 12: "page xvii, second paragraph--saying that aquifer recharge could be impacted then dismissing the possibility by simply saying you don't think it will happen does not offer the technical substantiation of your conclusion and seems arbitrary."

Response: The Service states that recharge of the shallow aquifer could be impacted, which could potentially impact recharge of the intermediate and basalt aquifers. The Service does not expect any of the action alternatives, except Alt. 4 to lower the shallow aquifer valley-wide. This is based on past data, which is explained in detail in Sections 3.3.3 and 4.3.3.

Comment 13: "page xix, jobs - what type jobs can be created"

Response: The Service did not speculate on what type of jobs can be created.

Comment 14: "page xix, second paragraph, reduction of statewide acreage (5%+/-) is misleading since it is calculated by comparing the very productive farm lands in Lahontan Valley with all lands in Nevada, including wildflood irrigated pasturelands which produce less than one ton per acre of forage. Please calculate the percentage of farm land loss of all the comparable farmland."

Response: Comment noted. The comparisons made by the Service in this section are for irrigated farmland.

Comment 15: "page xix, recreation - I think you should delete the word "hunting" from the statement promising permanent recreation opportunity, F&WS was barely forced to retain hunting as a use on refuges this past year and hunting activities seem destined to be attacked from both outside and inside of F&WS."

Response: Comment noted.

Comment 16: "page xix, recreation- water storage in regulating reservoirs has been eliminated from several, not reduced."

Response: Please see Section 4.17, Effects on Recreation, Alternatives 2,3,4, and 5.

Comment 17: "page xx, social values-hunting opportunities being enhanced on F&WS will only be true so long as refuges allow hunting, in the meantime hunting will be nearly eliminated from private lands and the balance will be a net loss."

Response: See response to Comment 15 above.

Comment 18: "page xx, last paragraph--recoupment will not only affect ag producers but all water-rights holders, including F&WS."

Response: Cumulative impacts of recoupment are addressed in Section 4.26.8, NEWLANDS PROJECT RECOUPMENT.

Comment 19: "page xxi, F&WS suggests that local economy benefiting from expansion of Naval Air Station will offset detrimental effects of F&WS actions on economy-they seem to be claiming someone else's actions as mitigation for damage they cause instead of standing the expense of mitigation themselves."

Response: In terms of federal actions in the Lahontan Valley, expansion of NAS-Fallon will offset some of the adverse impacts associated with the Service's action. However, this is part and parcel of the ongoing change in the community, and was in no way intended as the Service's mitigation. See Cumulative Effects, Section 4.26.12, Growth and Diversification.

Comment 20: "page xxi, second and last paragraphs- less water will be demanded in one and more water will be demanded in the other, I suspect the demand for more water will be the actual future action."

Response: Comment noted.

Comment 21: "page 1-1, last paragraph - discussion of the effects of population growth and competing demands for water indicates an awareness that the cause of the F&WS being short of water is not irrigated agriculture water usage....please include actions in your future management scheme which will obtain water from these non-agricultural sources."

Response: Prior to the Newlands Project and the related agricultural production, all water of the Carson River that entered the Lahontan Valley flowed into the wetlands. Currently, most of this water is used for agricultural production. Alternative 5, the Service's Preferred Alternative, relies on acquiring water from non-agricultural sources. There are other sections within Chapter 2 that address non-agricultural sources of water (See Section 2.3 PROCESS USED TO FORMULATE THE PROPOSED ACTION AND ALTERNATIVES, Section 2.5 ALTERNATIVES, Section 2.8.5 WATER AND WATER RIGHT ACQUISITION SOURCES AND METHODS ELIMINATED FROM DETAILED CONSIDERATION, and Table 2.B, COMPARISON OF WATER SOURCES ELIMINATED FROM DETAILED CONSIDERATION).

Comment 22: "page 1-5, seventh paragraph- if the Department of Interior OCAP is costing the refuge water delivery and causing water quality problems then why don't you change the OCAP instead of acquiring water rights?"

Response: Changes to OCAP that could provide increased drainwater or spill water inflow to the primary wetland areas has the potential to increase Truckee River diversions, which the Service has identified as an adverse impact to Pyramid Lake resources, which in turn is prohibited in Public Law 101-618 and is not condoned by the Service.

Comment 23: "page 1-22, recoupment - if the DOI folks seem to enjoy holding this threat over the heads of farmers, this recoupment process will obviously affect everyone who has an interest in the water in question. For example the F&WS received most of this water and the F&WS is purchasing lands/water rights for which this water was allegedly diverted; both of these facts indicate that the F&WS will be responsible for providing a large share of the recoupment water but I haven't found a description of how the F&WS intends to manage the marshes when the water is taken from their expected delivery."

Response: Please see Sections 4.26.8 and 4.26.17.

Comment 24: "page 1-25, compensation for most costs associated with conveying property titles to the US if very desirable when private lands are being purchased directly from individuals. Does this same procedure apply when the seller is a club or group such as the Nature Conservancy. A "non-profit" club should not be allowed to profit by purchasing land then selling it to the government."

Response: Comment noted. Arrangements and conditions of sale between private property owners and other private or non-profit organizations are confidential transactions and the details of such transactions are not within under the authority of the Service. Whether those parties agree to specific compensations and reimbursements is dependant upon the details of their specific contractual agreements.

Comment 25: "page 1-32 & 1-33, mitigation - several of the items classified as mitigation (and of course found unacceptable) should have been identified as alternative courses of actions to the chosen action of acquiring water rights from farmed land. for example preventing water diversion at upstream locations, using water pumped from mines, using Dixie Valley water, etc., are all legitimate actions in their own rights, no just forms of mitigation."

Response: Please see Sections 2.8 and 2.8.5. None of the water sources mentioned would, in their own rights, provide adequate volumes of water for wetlands protection.

Comment 26: "page 2-2, fifth paragraph - if the success of the F&WS project can be defined as the acres of "visible surface waters" then no additional water is needed, there is already enough water entering the refuge to provide much more than 25,000 acres of visible surface waters, several inches deep. Otherwise this paragraph indicates how tenuous the definitions of wetlands types are."

Response: The definition of wetland habitat was clarified to indicate that wetland habitat is habitat provided by shallow to deep water (up to 6-feet deep) and associated vegetation.

Comment 27: "Page 2-18 last paragraph describes an informal agreement between USDI-F&WS and NDOW to divide the waters they are in competition for under P.L. 101-618. What is seen as chummy cooperation by the participating parties looks more like collusion to me. Please address this federal action in this and other appropriate NEPA documents and evaluations and be prepared to alter this agreement as necessary!"

Response: The Service and NDOW have a mutual objective of sustaining wetlands in Lahontan Valley. The total impact of their joint activities are addressed in this document.

Comment 28: "page 2-41, first paragraph refers to regulating reservoirs being eliminated from discussion. You could have simply said the reservoirs have been eliminated. USDI Bureau of Reclamation with the obvious approval of F&WS decided to prohibit use of several of these reservoirs and destroyed thousands of acres of wetlands by having done this. Why wasn't that action considered detrimental to the waterfowl populations you are claiming to be concerned about and why wasn't that action prevented within by Section 404 of the Clean Water Act?"

Response: Comment noted. Concerns about waterfowl populations and the Clean Water Act relative to regulating reservoirs should be addressed to BOR.

Comment 29: "page 2-46, 47, & 48 consists of tables which are very nicely prepared. They also bring two more comments to mind. Promised wildlife population changes include large increases in waterfowl, shorebirds, etc., I believe that the F&WS actions will cause a decrease in these populations because the actions are going to cause a huge net loss in available food. Many species within these groups, including the fall migrants, indicate their dependence on irrigated lands by the amount of time spent foraging on agricultural lands and not in the existing wetlands. I do most of my goose and duck hunting on private lands that are cultivated and irrigated as cropland or pasture, please don't eliminate my hunting opportunities. Economic effects should not have ignored the effects on livestock production and sales since much of the affected acreage produces forages grazed as pasture."

Response: Increased acreage of wetlands will provide plentiful food for many species of waterfowl and shorebirds. Irrigated acreage will not be a limiting factor for fall migrants under the Preferred Alternative. Economic impacts of reduced livestock production and sales is addressed in Section 4.16.4.

Comment 30: "Page 3-20 please discuss the fact that in the 1840's Fremont indicated that the channel between Pyramid Lake and Winnemucca Lake was dry and in fact Winnemucca Lake itself was very likely dry. Floods in the 1860's brought water levels up and re-established Winnemucca Lake wetlands which have subsequently dried up again."

Response: Winnemucca Lake will not be affected by the Service's action, and this discussion is not relevant to the EIS.

Comment 31: "page 3-21 first paragraph states that prior to the 1860's Carson River flow was 410,000 acre feet per year. This statement implies that this was a normal, even frequent level of inflow but fails to explain why there was some 35,000 fewer acre feet delivered each year from 1966-92. Please explain that prehistorically (prior to the 1860's) the Great Basin experienced such severe droughts that Pyramid Lake and Walker Lake nearly dried up, Lahontan Valley wetlands must of dried up, Lake Tahoe levels became so low that trees were able to grow for hundreds of years at elevations now below the lake surface. There could not have been any flow for much of this time in these two rivers."

Response: The 410,000-AF figure, which is prefaced as an average, represents the average amount of water that is estimated to have flowed down the Carson River into the Lahontan Valley wetlands. The Service recognizes that there were very large fluctuations in year-to-year flow. Average annual outflows from the Lahontan Reservoir (375,000 AF/year) and the average historic Carson River flow-volume (410,000 AF/year) are not comparable. Among other factors, a portion of Carson River water is diverted from the river before it reaches the Lahontan Reservoir (i.e., less Carson River water makes it down the river) and Carson River water that is released from Lahontan Reservoir are supplemented with Truckee River water.

Comment 32: "Page 3-24 last sentence indicates that water provided by irrigation water rights is somehow of inferior quality because of the status of being provided as water righted water..."

Response: No value judgements relative to the "status of being provided as water righted water" were intended by the statement. The statement was made in attempt to communicate that irrigation water in the Newlands Project does not meet aquatic-life standards, and that the Service, as a Newlands Project water-right user, will therefore be using water for the wetlands that does not meet aquatic-life standards. This is not to criticize the quality of Project water, it is just a statement of existing conditions.

Comment 33: "page 3-28 given (1) your very realistic description of the toxic nature of salts occurring in Lahontan Valley soils and geologic formations, and (2) given the fact that this level of what you call contamination was well illustrated by the tremendous salt load your Stillwater Point Reservoir leached into the Hunter drain (now closed and the reservoir only partially used), and (3) given that naturally occurring hot springs in the Stillwater area contribute additional salt loads to the wetlands, and (4) given that F&WS wetlands can only be developed on these same salt contaminated soils, then it seems obvious that the toxic nature of the Stillwater NWR wetlands will continue after all the farmland has dried up and blown away. I find that the expenditure of federal tax dollars on a refuge marsh that is toxic to wildlife is irresponsible and should cease immediately. Are you sure that the problem is as bad as you indicate?"

Response: The quality of wetland inflows will be greatly improved by acquiring irrigation water for wetlands protection. The reduction in drainwater will substantially reduce dissolved-solids concentrations and contaminant levels. An increased volume of water will allow management for a number of objectives, including contaminant loading and avian botulism outbreaks. It should also be

recognized that dissolved salts are a major, and naturally occurring, component of Great Basin wetland ecosystems. For more information, please see Section 4.3.2, SURFACE WATER QUALITY.

Comment 34: "page 3-30 discusses middle Carson River area ground water recharge but fails to state that pumping water for urban use from aquifers recharged by the river is the same as pumping water from the river itself and this situation presents an opportunity to increase instream flows by controlling upstream water diversion."

Response: The text in Section 3.3.3.1 was modified to reflect that the Carson River below Dayton can lose water to the aquifer.

Comment 35: "page 3-38 I live within the Fallon City limits and am dependent upon the Basalt Aquifer for water. Your acquisition of irrigation water rights and the subsequent destruction of irrigated agriculture obviously puts the recharge of this aquifer at risk. Please be prepared to provide my household and neighborhood with water if you proceed with actions that cost us our water supply."

Response: The Service does not expect direct impacts to the basalt aquifer to result from its actions. Local governments have been considering development of a city water system since 1977 due to numerous concerns, including the issue of arsenic in the water system. Under existing conditions, groundwater levels in the basalt aquifer are declining, and may be attributed to increased pumping. During the Second Settlement Negotiations, the Service and various other parties attempted to negotiate with the community to resolve some of the issues you describe. Development of a community water system was discussed in those negotiations, but no resolution was reached.

Comment 36: "page 3-48 I understand that mosquitoes actually breed in areas of calm water. Please discuss mosquito biology in greater detail. It appears that the F&WS seeks to end up in control of most of the potential disease vector habitat and will be providing most of the vector populations that will migrate to inhabited areas. Please evaluate the potential for increased rates of people contracting diseases from insect bites and accelerated loss of quality of life for area residents due to vector populations produced in your wetlands. Please include the F&WS obligation to pay for vector abatement in your economic analysis."

Response: This section has been revised to incorporate comments provided by the Churchill County Mosquito Abatement District (CCMAD). The Service will coordinate with CCMAD on mosquito control issues during development of the Comprehensive Management Plan. Please also see the Service's responses to CCMAD comments.

Comment 36a: "page 3-50 presents information about research in Nye County which results in successful seeding of a number of species. This study is promising and in fact there are a number of techniques which are successfully used to establish vegetation in arid climates. However, either you have been able to produce the same results and have measured success in establishing ecologically appropriate vegetation on what is now irrigated lands or these study descriptions may as well have been published in the Journal of Irreproducible Results."

Response: Comment noted.

Comment 36b: "page 3-55 fourth paragraph describes wetland acreage as fluctuating widely and tries to correlate the fluctuations with agricultural activities. Lahontan Valley wetlands acreage fluctuation is normal, it often happens, and having happened doesn't prove a problem exists or what the cause is."

Response: In the paragraph to which this comment refers, fluctuations in wetland acreage were attributed to implementation of a more efficient OCAP, as well as to flooding and drought. There are additional factors. Fluctuations in wetland habitat acreage is not a problem, and was not stated as a problem in the EIS. Fluctuations in wetland habitat acreage have occurred for thousands of years, and fluctuations will continue. The problem is the significant reduction in the long-term average size of wetland habitat in the Lahontan Valley. This is not viewed as a fluctuation, but as a downward trend in the amount of wetland habitat. As pointed out in the EIS, the Newlands Project and associated agricultural production in the Lahontan Valley is one of the major factors affecting the amount of wetland habitat in the Lahontan Valley. Other factors include the diversion of water from the Carson River for agricultural production above Lahontan Reservoir, for municipal purposes, and for other purposes.

Comment 37: Page 3-56 second and third paragraphs state intention of F&WS to "reduce" grazing by domestic livestock in areas they control. I've heard representatives from both agencies express their interest in a 100% reduction and I suspect that the agencies will try to accomplish that. Please include lost revenues from eliminating the sale of products of a larger number of cattle (somewhere between 6,000 and 10,000 cows) in this document's economic evaluations."

Response: Comment noted. The statement to which this comment refers was modified to indicate that livestock grazing, in accordance with the 1987 management plan, has been reduced in the North Marsh and the marshes south of Division Road to improve nesting cover for dabbling and diving ducks. Changes in livestock grazing and potential economic effects are beyond the scope of this EIS.

Comment 38: "page 3-61 begins section of vegetative communities. Please include discussion of basic plant ecology knowledge dealing with the predictability of primary and secondary plant succession and the ecologists ability to recognize potential vegetation for specific areas."

Response: Although providing a discussion of basic plant ecology may increase reader's understanding of plant ecology, it is not necessary for the purposes of this document.

Comment 39: "page 3-64. it seems to be inconsistent to label riparian wetland vegetation on private land irrigation and drain ditches as "artificial" (with a connotation of being inferior to "natural") when the Stillwater NWR with the ditches, canals, drains, structures, dikes, etc. that this document describe contains that are not labeled "artificial" and thus are spared that stigma. Please describe Stillwater NWR wetlands as "artificial" in those areas created by diking, etc."

Response: The term "artificial" was used to differentiate riparian habitat along naturally occurring waterways and those that were constructed for the Newlands Project. As with many of the naturally occurring wetlands, water control structures have been constructed in naturally occurring waterways (e.g., Carson River).

Comment 40: "page 3-67 describes a Lahontan tui chub as being eligible for protection under F&WS policy relative to ESA - how was BOR able to dry up regulating reservoirs when that action harmed populations of this chub?"

Response: Lahontan tui chub was classified as a Category II Candidate Species in the DEIS. It was not classified as a federally listed species under the Endangered Species Act. A Category II listing meant that there was some evidence of vulnerability, but data was lacking to support listing of the species.

Comment 41: "page 3-69 section of waterfowl. Please comment on what Pacific Flyway populations are like when Lahontan Valley populations were low. Is there an overall reduction in populations? What are likely causes? Please specify contribution of agriculture lands to food supply of birds, especially fall migrants."

Response: Because of the many factors that affect waterfowl populations at the flyway level and at the Lahontan Valley level, there is no direct correlation between the two. The main factor that appears to affect waterfowl use of the Lahontan Valley is the amount of wetland habitat. One of the main factors affecting waterfowl populations throughout the Pacific Flyway is habitat quality and quantity. The use of agricultural lands by species is described in Sections 3.9, 3.9.1, 3.9.3, 3.9.4, 3.9.5, 3.9.6, and 3.13.

Comment 42: "page 3-70 discusses lack of reproductive success due to predation as a reflection of a lack of vegetative cover. Authors state the lack of nesting cover is caused by poor water quality and low quantities. An earlier page said that grazing caused low reproductive success. I suspect I'll find another rationalization or two as I continue to read."

Response: Reduced nesting cover (not "lack" of nesting cover) can result from many factors, including some livestock grazing regimes, low water availability, and poor water quality.

Comment 43: "page 3-88 where will the white-faced ibis population forage when agricultural fields have been reduced or eliminated."

Response: Prior to irrigated farming in the range of white-faced ibis, their feeding was concentrated in wetland habitat. Irrigated farmlands have subsequently provided another feeding habitat for the birds. It is expected that white-faced ibis will continue to feed in wetland habitats and irrigated farmlands as long as these habitat remain available in the Lahontan Valley. The Service's Preferred Alternative will not eliminate irrigated farmland, and the reduction in irrigated farmland acres is not expected to limit white-faced ibis populations.

Comment 44: "Page 3-95 section on socio-economic resources consistently understates the cost of lost agricultural production to the producers and to society as a whole...I believe that those mysterious, unspecified investment opportunities hinted at in the EIS have already been discovered and investments made or they were determined to not be adequately profitable and abandoned."

Response: Comment noted.

Comment 45: "page 4-7 second paragraph states the likelihood that the initial water purchases won't be adequate and more water rights will be acquired. You obviously mean that the additional water sources will be the farm land that happened to survive your first effort. Please incorporate full descriptions of the effect of the F&WS eliminating all agricultural use of water in the area."

Response: The section referred to is an impact description to Alternative 5, the Service's Preferred Alternative, which would make use of a variety of water sources to meet wetlands demand. The terms "other water sources" refers to water from the Middle Carson River Corridor, sewage effluent and conserved Navy water, and possibly groundwater pumping and does not refer to Carson Division irrigation water. The Service has selected Alternative 5 as its Preferred Alternative, the action alternative that would result in the least amount of adverse impacts to farmland. Alternative 5 would limit purchase in the Carson Division to 75,000 AF, which would retire 21,000 acres of irrigated lands.

Comment 46: "page 4-17 second and fourth paragraphs contradict each other. Which are you and BOR going to do, increase or decrease Lahontan water storage? I assume you will decrease it since one your PL 101-618 goals is to eliminate Truckee River water delivery to Lahontan Reservoir and the remaining Carson River water is not adequate for F&WS demands."

Response: The paragraphs contradict one another because they address separate mitigation measures that could each be used to address impacts to storage levels. Although the Service's actions are calculated to increase storage targets, adjusted OCAP could eventually cause slight decreases in Lahontan Reservoir storage levels. Although discussed (see Section 4.26.9), adjusted OCAP conditions are not fully incorporated into this document because they are not yet enacted or implemented.

Comment 47: "page 4-27 alternative 2 mitigation measures promises higher water quality in the wetlands yet previous descriptions of Stillwater NWR soils indicates that incoming water will be rapidly contaminated with soluble chemicals, please discuss this in light of the tremendous salt concentrations delivered from Stillwater Point Reservoir."

Response: Please see response to your comment #33 above.

Comment 48: "page 4-31 indicates that this action won't affect ground water recharge in Fernley which may be true. However, considering other proposed F&WS, BIA, BOR, etc. actions - this is one statement and subject which indicates the need for Department of Interior to prepare an EIS dealing with cumulative effects of multiple actions."

Response: Please refer to the cumulative impact section (Section 4.26) and the General Issue Response I., Programmatic EIS.

Comment 49: "Page 4-43 and 44 deal with erosion of soils as a result of areas that are no longer irrigated also being no longer vegetated. Saying that no mitigation is needed because the service lacks information contradicts all the information cited in other portions of the document and saying the service is not responsible for erosion from private lands that are no longer irrigated will probably be tested by litigation since it will be obvious that the action of taking the water was the direct cause of the loss of soil protecting vegetation."

Response: Nowhere does this section state that there is insufficient information available to mitigate the impacts. It does state that there is insufficient information to quantitatively define the relative increase in soil erosion conditions between one action alternative and another. Generally, short-term soil erosion impacts would increase as larger acreage of irrigated farmlands are retired. Under the Service's Preferred Alternative, the least amount of soil erosion would be expected. As part of the DEIS Proposed Action and the Preferred Alternative, the Service has stated its commitment to mitigate for the following soil erosion conditions: If lands bought are disturbed (disked, plowed or graded) at the time of purchase, the Service would reseed those lands and irrigate them for one season by delaying transfer of water rights. Private lands bought within the Stillwater NWR boundary would remain in Federal ownership and would be revegetated with native species or crop species to benefit wildlife and prevent wind erosion.

Comment 50: "Page 4-51 section 4.7 describes effect on plant communities. Please note that the substantial benefit to wetland habitats come at the substantial destruction of other habitats and should require much mitigation..."

Response: Impacts to riparian and agricultural plant communities are described in Section 4.7.2 and 4.7.3. Both losses are considered to be an unavoidable impact under all action alternatives. Unavoidable impact means that no mitigation measures have been identified.

Comment 51: "page 4-56 please explain how action will provide both spring nesting habitat and replace the food sources needed by fall migrants when they reach the valley. Please also describe what the specific food source needs of various shorebirds and colony nesting birds are relative to the present availability of these foods on irrigated lands and whether, as I suspect, your actions are going to damage populations of certain species by eliminating critical seasonal food supplies found on irrigated lands and explain how you will alter you actions if your actions will be detrimental."

Response: Please see responses to your comments #29 and #41 above.

Comment 52: " page 4-68 promises enhanced biodiversity but the document fails to explain how diversity is enhanced by increasing numbers of already existing species at the expense of losing other exiting populations and destroying habitats."

Response: In the discussion on biodiversity (Section 4.15) and throughout previous sections, the Service explains how some wildlife species will benefit from the significant increase in wetland habitat acreage and how some species will be adversely impacted. The biodiversity discussion states that native and overall biodiversity in wetland areas will be enhanced and that native biodiversity will be enhanced Lahontan Valley-wide. The discussion also recognizes that it is unclear whether overall biodiversity would increase or decrease as a consequence of the water rights acquisition program. There is no indication that any populations of wildlife would be lost as a consequence of the water rights acquisition program.

Comment 53: "Page 4-70 indicates you do expect negative impacts to overall biodiversity, which is an accurate assessment you could make in other locations of this document as well."

Response: Comment noted.

Comment 54: "Page 4-70 begins discussion of socio-economic effects. As mentioned earlier, my understanding of economic effects means that sales of agricultural products causes the value of newly created wealth to enter our economic system. Comparison of the dollars generated by sales of products from the productive segment of our society with the dollars spent for services and other forms of consumption (hiring house keepers, paying lawyers, payroll for government employees, etc.) is not a fair comparison. The money spent on expensive amenities is a nice thing to have, but the value of the money has to come from an abundance of production or we simply can't afford the luxuries. As mentioned earlier, our society's reliance on credit to artificially raise the perceived standard of living is resulting in bills that have to be paid in the near future....our society does not have to give up agriculture to have other forms of business enterprises described in your document."

Response: Please see response to Comment 44 above.

Comment 55: "page 4-72 as with the previous descriptions of economic effects, this material is designed to emphasize the tremendous efforts taken by the analysts to avoid understating the effects on the area economy so they can proceed to understate the effects on the economy. How is it possible that destruction of 63% of the productivity of the agricultural sector of the economy only reduces the productivity by 10% or so? Your economists could sell this previously unknown technique in the business world and retire from the tedious activity of EIS preparation."

Response: Comment noted. Alfalfa production and other irrigated crop production comprises only one component of Churchill County's agricultural economy.

Comment 56: "Page 4-75 describes farmers growing different crops in response to your actions. You correctly state that this transition would require economic incentives. I agree, if there were other crops available that could be produced profitably, they would already be in production."

Response: Comment noted.

Comment 57: "Page 4-76 includes announcement that F&WS refuses to pay anything more than the production value of water rights involves determining capitalized value of farmland then paying owner so little money that the family cannot afford to purchase another business."

Response: The discussion of water right values and acquisition by "production value" methods is included as a possible mitigation measure as a way to acquire those farmlands that are less productive and preserve the more productive farmlands within Lahontan Valley. The Service, does not appraise or purchase water-righted land based on "production values" but is required to use market values based on "before and after" appraisal values. See Section 2.6.4, ACQUISITION PROCESS AND STRATEGY for more details on fair market values.

Comment 58: "Page 4-77 first paragraph indicates that purchases will be from willing sellers because of F&WS policy when in fact PL 101-618 had to specify the willing seller limitation to prevent purchasers from abusing their power."

Response: Comment noted.

Comment 59: "Page 4-78 indicated that area livestock owners could simply buy hay and feed from other areas. That sounds easy but given the destruction of the agricultural economy, where will the cash come from that will be needed to make the purchases? Private enterprise doesn't have the same access to deficit spending that the F&WS has."

Response: Under the Preferred Alternative, about 30,000 acres of irrigated farmland will remain in production, therefore, it is highly unlikely that the Service's action will destroy the agricultural economy.

Sierra Club

Comment 1: "I am submitting these comments on behalf of the 3,100+ Nevada and E. California members of the Toiyabe Chapter of the Sierra Club. Many of our members are deeply concerned about the fate of the Lahontan Valley wetlands and strongly support a water rights acquisition program which maximizes benefits and minimizes costs. **Therefore, we support Alternative 3 as the preferred alternative as well as elements of Alt. 4.** Why did the USFWS select Alt. 2 as its proposed alternative when Alt. 3 is more cost effective and beneficial to the wetlands and has the least negative environmental and economic impacts?"

Response: Please see General Issue Response II., Alternatives, and General Issue Response III., Concerns with 2.99 Consumptive Use-rate.

Comment 2: "We compliment the USFWS on the readability and thoroughness of the document. It contrasts sharply and favorably with the EIS on the OCAP which appeared to be written in a foreign language. The DEIS includes an astounding amount of information about the complex water system,

values of the wetlands, and potential environmental impacts of alternatives. The range of alternatives is good and allowed a real look at the tradeoffs between maximizing environmental values v. economic values and between costs v. benefits, while still complying with PL 101-618's legal mandate to acquire water rights to support 25,000 acres of wetlands in Lahontan Valley. We also appreciate the separate DEIS on the acquisition program, because it is a stand-alone federal obligation. The TROA EIS will deal with the other legally mandated federal actions, all of which are contingent on each other. PL 101-618 clearly set the wetlands water rights acquisition program apart from other federal actions and initiated it long before the negotiations on other TROA-related actions could be completed or initiated. All environmental reviews, however, have weaknesses and this DEIS is no exception. Our specific comments follow."

Response: Comment noted.

Comment 3: "Water Duty: The DEIS does not provide adequate explanation or justification for why the USFWS is proposing to continue the acquisition of wetlands water rights and the annual obligation of paying O&M charges at the 3.5 af duty, but only using (transferring) wetlands water at the 2.99 af rate. The comparison between Alt. 2 and 3 shows the huge discrepancy in both expense of acquisition and amount of water rights needed as well as extra annual expenses for continuing this "political" policy which was developed for the first 20,000 af of wetlands water rights acquisitions. What is the biological or scientific rationale for these excess costs and impacts in the 3.5 af alternatives?"

Response: Please see General Issue Response III., Concerns with 2.99 Use-rate.

Comment 4: "Purchase v. other types of acquisitions: We totally support the decision of the USFWS that purchasing water rights is the preferable acquisition scenario. Leasing water is quite expensive, its availability when needed is questionable, and its benefits are quite limited. Importing water from Dixie Valley is extremely expensive, could have great negative environmental impacts as another interbasin water transfer, and is not timely as it would require funds not currently available and an EIS for which there are also no funds. Purchases or leasing water from the upper Carson River has a multitude of legal problems due to the requirements of the Alpine Decree and logistic impediments of delivering upriver water to the terminal wetlands. We do support, however, adding to the selected alternative working with the Bureau of Reclamation and TCID to acquire additional water for all Newlands Project water rights holders through increasing water conservation on the upper Carson River."

Response: The Service has chosen Alternative 5 as its Preferred Alternative in the FEIS. This alternative does rely on purchase and leasing of water rights in the Middle Carson River Corridor, upper Carson River waters are not considered as there is currently no existing conservation program under way and such a program would not be reasonably implemented in the near future.

Comment 5: "Drainwater: the DEIS does not do a very good job in considering drainwater in the alternatives nor in the impact analyses. a. Several alternatives include a reliance on drainwater supplies which may be less than realistic. How are proposed drainwater supplies guaranteed? b. In actuality, meeting efficiency targets has greatly reduced traditional drainwater supplies to the wetlands. We are now having to pay to acquire water which we used to get at no charge, especially since prime and drainwater are often mixed today in order to meet required deliveries. How is the USFWS going to make sure that we are paying for prime, higher quality river water rather than reused, lower quality drainwater for our acquisition dollars?"

Response: The Service believes there are adequate measuring devices on the key delivery canals and drains to monitor drainwater and irrigation water deliveries. The Service has stated in Section 2.7 MONITORING REQUIREMENTS that it will install or contract for new water measuring devices as needed to insure accurate accounting of irrigation water deliveries and drainwater inflow to avoid or prevent the concern you have identified.

The Service has gone to great lengths to include and evaluate the available information and calculations relative to drainwater from the Newlands Project, both past conditions and expected conditions under the 1988 OCAP. The Service has indicated that our drainwater estimates are conservative, meaning that the acquisition targets are at the high end of our expectations, which would allow for reducing water right acquisitions if the drainwater inflows prove to be greater (as many commentors have suggested) than what the Service has calculated in its core assumptions.

There are no guarantees for drainwater inflow to the wetlands, but the Service does address the possibility of drainwater assurances in Section 2.3.1.1 Factors Affecting the Volume of Water to be Acquired. It may be possible, in the future, to incorporate wetland drainwater assurances as part of the adjusted OCAP or the final OCAP to be evaluated pursuant to Section 209(j) of Public Law 101-618.

Comment 6: "Secondary wetlands: While PL 101-618 does not require water rights acquisitions for "secondary" wetlands, we are concerned about the impacts of the proposed federal actions as well as private actions on other wetlands. More information is needed in the EIS on what are secondary wetlands, where are they, how valuable are they, what are the impacts from the various alternatives, and will mitigation be provided for impacts from federal actions?"

Response: Secondary wetlands are described in Section 3.6.2 and 4.6.2. Please see General Issue Response IX., Loss to Secondary Wetlands.

Comment 7: "Impacts of acquisitions on M&I water supply: We suspect that the impacts of wetlands water rights acquisitions on well water from irrigation are overestimated in all the alternatives. Acquisitions are mainly occurring on marginal farmlands, on the peripheries of the Project, not in major recharge areas near main canals and the Carson River. Wouldn't the impacts of M&I developments on previous farmlands adjacent to the Carson River have more impacts on primary recharge areas and thus water table levels and water quality than wetlands water rights acquisitions on the Project's boundaries? How are the impacts from non-acquisition related development on water tables separated from acquisition-related impacts in the DEIS?"

Response: Comment noted. In general, conversion of farmlands to non-irrigated uses and abandonment of irrigation canals and drains along the Carson River would have more of an impact on primary recharge areas than similar conversions in areas where most water rights have been purchased thus far (i.e., Stillwater District and Island District). Aside from the cumulative impacts section, discussions in Chapter 4 on the potential impacts to groundwater only address potential impacts that could occur as a consequence of acquiring water rights for the primary wetlands.

Comment 8: "Economic analysis: We were most disappointed by the questionable consideration of economic impacts in the DEIS.

a. The wetlands water rights acquisition program is occurring in an area which is experiencing rapid economic changes. The DEIS overemphasizes the importance of these federal actions on both agriculture and the overall Lahontan Valley economy. Issues not examined but which should be: At what rate are farms going out of existence unrelated to the acquisition program? How much

agricultural land is being converted to M&I uses? What are the economic impacts of non-acquisition related losses of agricultural lands? How do the two impacts compare?"

b. While much is made of the loss of agricultural lands and impacts to the local economy based on these losses, the economic analysis does not really examine the economic benefits of the loss of agricultural lands. What are the benefits to the federal budget of the reduced farm subsidies? What are the benefits to the local economy of acquisition-related M & I development? What are the multiplier effects of acquisition-related development on the local economy? How do salaries of new jobs based on acquisition-related development compare to the loss of seasonal farming jobs? Is the employment base changing due to the loss of transient agricultural jobs v. the new construction or service jobs?

c. Very little attention was given to the benefits of new acquisition-related recreational opportunities. What are the multiplier effects of increased recreational opportunities. What are the multiplier effects of increased recreational visits to the wetlands? Is the economic analysis based on an assumption that acquisition would occur immediately, rather than over time? If so, why? What impacts does this implausible assumption have on the analysis of economic impacts of the acquisitions? What are the economic values for non-consumptive recreational uses? Why is there no value assigned to increased amenity values of expanded wetlands?

Response: The following responses correspond to the letters in the comment.

a. While the comment is correct in stating that the wetlands water rights acquisition program is taking place in an area that is experiencing rapid population growth and the attendant conversion of agricultural lands to residential/industrial use, it is beyond the scope of this EIS to account for such impacts. It is recognized that there are other conversions of land use in the Fallon area from agricultural production to some other use that are significant and unrelated to the acquisition program, but any attempt to discuss those concerns would serve to complicate the stated purpose of the EIS.

A recent review of Churchill County Assessor's Office (compiled in a draft Cooperative Extension Service Fact Sheet, which is presently under peer review) information indicates that agricultural lands comprise approximately 25 percent of the five land use categories (agricultural, residential, commercial, industrial, and unimproved) in 1995. The assessed value of these five categories, on a per acre basis, ranged from \$85 for agriculture to \$32,000 for commercial land (with commercial lands representing the smallest amount of acreage of the five categories). Furthermore, the data showed that the number of land parcels classified as agricultural and industrial have decreased between 1987 and 1995 (agricultural lands, from 2,380 in 1987 to 2,245 in 1995); industrial lands, from 115 in 1987 to 92 in 1995). In contrast, residential parcels increased from 3,373 to 5,117 during the same time frame.

The total assessed value of these five land categories increased 52 percent between 1987 to 1995, with the change in the total value of residential properties increasing 94 percent. Generally, agricultural and industrial assessed values decreased over that time. Although residential assessment rates may have changed over time, the trend strongly suggests an increase in the amount of lands being classified as residential. This is supported when consideration is given to the growth of single family units in Churchill County over the 5-year period. In 1990, there were 11,638 units classified as single family; by 1995, this number had increased to 14,058.

b. With the exception of the existence of Federal milk price supports and its economic impacts on dairies in the affected area, there are no indications that other Federal subsidies related to agriculture are being utilized.

While one could visualize that there are positive impacts from the acquisition program accruing to the communities, in terms of Federally-acquired lands that may become available for purposes related to M&I uses, those impacts are mostly unquantifiable at present. Furthermore, it is anticipated that there would be structural changes in the economic base in the communities and the attendant labor pool and wages; however, concise information that gives insights into this issue is lacking.

c. Note that consideration is given to the direct and indirect effects from changes in wetlands and other recreation area visitation, which relies on multipliers. This information is shown on page 4-94. As with other analyses, the time frame over which these changes are expected to occur depends on not only the rate of acquisitions, but also other factors, such as an expanded public education program, the completion of a visitor's center and an interpretive program, etc.

While the Service recognizes the existence of non-consumptive values associated with the wetlands and other recreation resources (see Section 3.17.4), definitive assessment of non-consumptive or non-market values are best accomplished through an extensive survey. Such a study is contemplated for the area, although no plans exist for such an endeavor.

Comment 9: "We fear that the DEIS estimations and community complaints about the possible economic and social impacts of the wetlands water rights acquisition program are greatly exaggerated. The community has no farmland conservation program or zoning restrictions to protect prime farmland. The community raises little or no objections to agricultural lands going out of production and being sold or used for residential or commercial development unrelated to the wetlands acquisition program. The community doesn't try to restrict its citizens from selling personal property or water rights not related to the wetlands acquisition program. The willing seller program is working excellently and providing immense benefits to the citizens of Lahontan Valley. The DEIS should accurately reflect all of the impacts of the wetlands acquisition program, both positive and negative, without overestimating the negative impacts and underestimating the positive impacts."

Response: Comment noted.

Rachel M. Thomas

Comment 1: "I strongly oppose the acquisition of any additional land by the U.S. Government for the following reasons and yes I do feel the action will have an impact on me in many ways. The Government should not be buying any more land. They cannot take proper care of the land they now own. They could use the money programmed to buy this land to put against the national debt which belongs to all of us. The primary production on the land is hay. The decrease of somewhere between 42 to 76 percent of 283,122 tons of hay per year is going to affect the supply and cost of hay throughout the west. This will further affect dairies and the cost of milk, all the people who own and ride horses for all kinds of reasons to include business and recreation. The cost of Rodeos, Fairs, trail rides, horse and stock shows. I live several hundred miles from your area, but if the Government goes ahead with this purchase, I know that it will be a lot harder for us to find hay, and the price will go out of site. If you say it won't, I want to see the information you base your opinion on. One final cost that will go up is the cost of caring for the wild horses that are kept in pens and fed. This will go right back to a higher cost to the Government."

Response: Your comment is noted. Under the Service's Preferred Alternative, alfalfa production is expected to be reduced by about 55 percent, to about 137,00 tons of hay per year. This alternative seeks to reduce adverse impacts to the agricultural community.

Transcript of Public Hearing, Sept. 6, 1995, Fallon Community Center, Fallon, Nevada

Russ Armstrong, TCID employee, land owner with irrigation waters

Comment 1: "...we've taken this position before at Fernley and other locations, and that is the desire to have this EIS put on hold until such time as the problematic EIS that is supposedly coming down the pike is in place."

Response: Please see General Issue Response I., Programmatic EIS.

Comment 2: "A couple of issues that were brought up, one was a tradeoff of employment that purportedly the buying out of the water and transferring it onto the wetlands and the opportunities that it would create here for the people in the valley. That statement was made with the expansion of Naval Air Station at Fallon; that it would probably compensate or offset to the number of jobs lost due to loss...."

Response: The Service has clearly stated that agricultural production and related jobs would be adversely impacted as a result of the acquisition of water rights. The economic assessment also evaluated the effects of the infusion of money into the local economy that results when property owners sell water rights as well as other actions that would impact the local economy such as the expansion of NAS-Fallon. The Service has not stated or implied that jobs created by NAS-Fallon expansion or the re-investment of profits received from the sale of water rights would compensate for employment opportunities lost in the agricultural sector. The EIS identified the creation of new jobs as an offset, it does not purport that these new jobs would replace or compensate for jobs lost in the agricultural sector. The EIS identifies, based on the available information, the anticipated number of jobs lost and the number of jobs that could potentially be created by re-investment of capital gains resulting from water right sales.

Comment 3: "Another tradeoff that the EIS stated would result in tourism, and I might point out that the first half of the EIS and the second half make points that are often in conflict with one another...Tourism hardly appears to be a trade for the losses the people here in the valley will be subject to and incur."

Response: Without more specific information related to what portions or sections of the first half of the DEIS is in conflict with the second half, the Service is unable to respond to this issue. The impact analysis identifies that recreational use and the related tourism is anticipated to increase from existing conditions as a result of more reliable and more productive wetland areas. The Service does not purport that tourism will compensate those individuals that are economically impacted by the acquisition of water rights nor will increased recreational use offset the loss of certain social values many local residents maintain. The EIS identifies both positive and negative impacts related to the acquisition of water rights and does not make value judgements related as to whether one aspect of the community is more valuable or desirable than another. Tourism is not expected to greatly increase expenditures in the affected area, and is not mentioned as such. Recreational opportunity would be greatly enhanced due to the increased acreage of primary wetlands habitat, and some additional employment due to recreational activity could occur, (see Section 4.17, RECREATION). Recreational expenditures due to increased wetlands are expected to triple.

Comment 4: "An erroneous position taken by the EIS is the fact that all the money that will be brought in by people selling their water rights, how well the community will be off, essentially how effective that will be for them. Well, we're confusing apples and oranges because the people involved

in agriculture today are involved in production. Production is a continuous and ongoing effort, assuming that a 10-year drought doesn't stand in the way, and it's a revenue generator."

Response: The EIS does not attempt to make value judgements regarding the quality of life for individuals affected by the water rights acquisition program. The impacts to social values have been identified and the consequences related to increased revenues or income related to water right sales has been estimated. The economic impacts of reduced agricultural production have been quantified in terms relating to income, profit, production, and employment. The economic consequences related to water right sales have been quantified in terms relating to income and employment. The Service does not believe that reporting the impacts relating to these two separate components of the local economy in similar and common units of measurement as a mixing of "apples and oranges" as Mr. Armstrong suggests.

The Service agrees that agriculture is a production industry which can be continuous and ongoing, but would also state that capital investment and development are also ongoing continuous economic activities that produce positive economic activity within a community.

Comment 5: "The EIS stated it was looking at Segment 7 of the Carson River but it failed to point out or acknowledge the fact that the State Park Service bought 7,000 acre feet of the water on Segment 7, that doesn't leave a whole lot left."

Response: The EIS identifies the acquisition of Segment 7 water rights by the State of Nevada, Division of Parks and Recreation (see Section 2.5.5 ALTERNATIVE 5). Based on the information available from the Division of State Lands, the State of Nevada has acquired about 5,600 AF of water rights from Segment 7 water-righted lands. This amounts to about 20 percent of the recorded water rights for Segment 7 of the middle Carson River. The Service believes that even with the State of Nevada acquisitions there are sufficient water rights to meet the Service's expectations, but availability is subject to willing sellers.

It should be noted that based on preliminary plans by the Division of Parks and Recreation, that recreational uses in that area may not need all of the water acquired for those recreational facilities and some of the water may become available for downstream recreation or wildlife use. This may have the potential to reduce wetlands water right acquisitions in Segment 7 if those surplus recreational water rights can be conveyed downstream for wetlands protection in Lahontan Valley.

Comment 6: "I said there were several conflicts between the front and the end of your Volume I. One of those is on revegetation. In the early part it states that there's a responsibility for revegetation but halfway back or beyond that point it states that there is no state law, or county ordinance requiring that you revegetate, so that would not happen."

Response: Mitigation measures in Section 2.5.2, Proposed Action, outlined the actions the Service was committed to take as part of the Proposed Action. Mitigation in the back half of Volume I, Chapter 4, outlined the possible mitigation available for all alternatives. Under the Proposed Action, the Service is committed to take actions to revegetate lands that were disturbed (disked, plowed or graded) at the time of purchase. Under Alt. 2, the Service would reseed those lands and irrigate for one season in an effort to establish a vegetative cover crop. The Service is also committed to revegetate those lands it acquires within Refuge boundaries that will remain in Federal ownership.

Comment 7: "The references that you have or some of the references in your Appendix II probably are not the most credible folks that you could find."

Response: Mr. Armstrong's opinion regarding the credibility of these authors is so noted. The reports, studies, and documents included in the Appendix, Volume II of the DEIS were reproduced to provide the reader with material that was referenced in the text that would have been difficult to review or obtain in from bookstores, public, or University libraries. The Service referenced those documents because the authors provided information that pertained to the EIS process and the Service believes that in all cases those authors demonstrated an expertise, experience, or knowledge in the subject of their reports, papers, or studies.

Comment 8: "... (Professor Dave Sunding) stated that whatever hay lands or production was taken out of here in the valley for dairies would simply be bought someplace else and brought in.. That's usually not the way it works.... The cost advantage comes for the producers to be integrated, to be able to raise a portion, if not all, the feed and give it to the cows and reap its production. It is a lot more expensive to bring the hay in by tons than it is to send the finished product, milk, in by tanker."

Response: Due to the large export sector that now occurs with alfalfa, it would appear that there will be no need for importation for dairy any time in the near future under the Preferred Alternative. This aspect was analyzed to provide the high end impact to agricultural production under other, more adverse alternatives. Mr. Armstrong's description of integrated farming and the economics of hay and milk transportation are so noted. Comments regarding statements made by Dr. Sunding, Professor of Agricultural Economics at the University of California, Berkeley are more appropriately addressed to Professor Sunding.

Comment 9: "Repeatedly in the EIS the term "willing seller" is used. That hasn't been defined because I don't think my idea of a willing seller and your idea of a willing seller are one and the same."

Response: Please see General Issue Response VII., Willing Seller Defined.

Steve King, City of Fallon, Assistant City Attorney

Comment 1: "...to further what Mr. Armstrong was getting at, and that is that Public Law 1202-618 must comport with federal laws and state laws as relating to the medium in which we're talking about, which is water rights, and I think the comprehensive EIS is a requirement under NEPA."

Response: Please see General Issue Response I., Programmatic EIS.

Comment 2: "Number two, I don't really see addressed in the document itself any recognition of the medium. We're not talking about water rights that are federal water rights, except to the limited extent that the Federal Government has an obligation and duty under applicable court decrees to deliver those water rights to the owners of the rights. Speaking for the City of Fallon, the City has a complete water system that is in place, it's been in place for many, many decades that has value of up to \$50 million... So any change in the regime of the surface water rights which go to recharge the underground aquifers necessarily are going to have an effect on the underground water rights, which we have direct state appropriated water rights for our water system."

Response: The Service is unclear as to what Mr. King means in his reference to "recognition of the medium". The Service has clearly identified the water rights held by the Navy for dust control at NAS-Fallon are the only federal water rights being considered as part of the wetlands water rights acquisition planning. The Service's reference to acquisition methods which rely on purchase, lease, exchange, or donation makes it fairly implicit that the water rights being considered are privately owned.

The City of Fallon holds water rights to groundwater resources. Approval of those rights by the Nevada State Engineer does not assure or guarantee availability of that water. Water rights are essentially authorizations to use water, not guarantees for water. Changes in the hydrologic regimes and conditions occur naturally and can effect recharge, but there are other factors and man-induced actions that can also effect recharge. The Service has identified, based on the information available, the anticipated impacts to groundwater recharge that could potentially result from the acquisition of water rights for wetland protection and the possible mitigation measures that could reduce or eliminate those impacts (see Sections 4.3.3.1 Groundwater Recharge and Levels as well as 4.3.3.2 Domestic Supply)

Terri King, Lahontan Conservation District

Comment 1: "In the Appendix there is a Refuge Management Plan dated April 1987. In several places in this plan it indicates that the Service will --a water management strategy guideline on how to best manage available water for the best will be developed; in another place it says that optimum use of water is not achieved, etcetera, throughout this plan. I'm just wondering if the Fish and Wildlife Service has done any of these plans, like they said they were going to increase, enlarge and cement canals and other things, I was wondering if they've done any of those things?"

Response: The Water Management Plan is developed each year in conjunction with the Nevada Department of Wildlife and the Truckee-Carson Irrigation District based on the amount of water that is anticipated to be available in the irrigation project as runoff. As concerns lining of ditches, there has not been any work on that.

Bjorn Selinder, Churchill County

Comment 1: "We are not prepared at this time to make a formal statement and would instead lend our support to an extension of the comment period for at least a minimum of 30 days. It sounds like we're going to be receiving that, so that's very good. We'll certainly do everything we can to help provide extensive comments within that additional time frame."

Response: The extension was granted and Churchill County's extensive comments were received and are duly addressed in this document.

Tim Findley, representing himself

Comment 1: "I'd like to pose my comments as a question to Fish and Wildlife and the U.S. Department of the Interior...Whether this EIS and the proposal to re-establish the wetlands to the extent of 25,000 acres and 125,000 acre feet, whether the Department of the Interior has considered the potentially devastating effect on the social and economic factors of the communities of Fallon and other Churchill County areas, and whether that will be mitigated in some form by actions of the United States Government to replace the losses in economic returns and social effects by this action?"

Response: All of the potential effects have been considered. Effects on Agriculture, Farmland, and Local Economy is addressed in Section 4.16. Effects on Social Values are discussed in Section 4.23. The Preferred Alternative causes the least impact to the agricultural community and its related social values.

Jeffrey Feike, Churchill County Hospital Administrator

Mr. Feike's oral statement has been broken down into a series of specific comments and responses.

Comment 1: "There is, of course, great concern that the Newlands Project water curtailments will dramatically impact water quality of our drinking water. Significantly reduced flows into the local aquifer increase the concentration of arsenic, nitrates, and heavy metals."

Response: The Service's actions to acquire water and water rights will not result in curtailments of water released from the Lahontan Reservoir. Under baseline conditions, the calculated long-term average reservoir releases would be about 250,700 AF/yr. Lahontan Reservoir releases for the Proposed Action, would be lessened by about 11 percent (28,000 AF/yr) and under the Preferred Alternative those reductions would be about 5 percent (13,800 AF/yr). These reductions are linked to declining irrigation demand associated with the 2.99 AF/acre use-rate for Newlands Project water acquired and used for primary wetland habitat.

The Service's impact evaluations do not consider the expected 5 percent reduction in Lahontan Reservoir releases to constitute a "curtailment" of inflow into Lahontan Valley, nor is there evidence that a small reduction (5 percent) would "significantly" reduce ground water recharge as Mr. Feike suggests. The recent drought period (1990-94) resulted in reduced Lahontan Reservoir releases (USGS Water Resources Data, 1991, 1992, 1993) in the range of 28 to 53 percent less than the 250,700 AF/yr baseline. Even when Lahontan Valley surface water inflows were reduced to a greater extent than would be expected under the Service's Preferred Alternative, shallow aquifer levels showed only a median decline of 1-2 ft. (Seiler and Allander, 1994). Nor did groundwater monitoring during that period show significantly significant declines in water quality related to arsenic, nitrates, or heavy metals.

Comment 2: "... higher levels of pollutants in the drinking water directly threatens the public health of the community of over 20,000 men, women, and children. These significant curtailments are being considered without an Environmental Impact Statement that specifically and scientifically studies potential damage to the community's drinking water."

Response: The Service's Preferred Alternative would not result in large volume or significant curtailment of surface water inflow to Lahontan Valley (see response to Mr. Feike's comment #1 above). The Service believes the DEIS and this FEIS both contain assessments of the anticipated groundwater resource, recharge, and domestic supply impacts associated with acquiring water for wetland habitat. (See Sections 3.3.3 GROUNDWATER and 4.3.3 EFFECTS ON WATER RESOURCES, GROUNDWATER.) The Service's assessment of the groundwater resources and anticipated impacts relied heavily on the scientific studies conducted by the USGS. The USGS is recognized as the nation's authority on water resources and has the responsibility to study and monitor water resources throughout the county. The specific USGS studies are referenced in the text of those sections of the FEIS identified above.

It should be noted that under existing conditions domestic water supplies in Lahontan Valley, both the City of Fallon's system and the most all individual domestic supply wells, are not in attainment for Nevada water quality standards for drinking water most often related to arsenic, manganese, or TDS and to a lesser extent for sulfate, chloride, fluoride, and uranium (Maurer and others, 1994).

Comment 3: "To date there are no comprehensive, scientific studies that explain in detail the local aquifer system and/or the impact of massive changes in water flows to the aquifer. The few studies that have been done are not scientifically valid and they are not reliable."

Response: The Service disagrees. The USGS studies are scientifically valid and have been prepared by the nation's authority and expert on water resources, and provide the best available information on this complex water system. There is no evidence or information that would support Mr. Feike's contention that surface water inflow, potential recharge, or irrigation practices resulting from the Service's proposed action to acquire water and water rights for primary wetland habitat would result in "massive changes" in water flows to the aquifer. The changes anticipated as a result of the Service's Proposed Action and alternatives considered (including the Preferred Alternative) are fully described in Section 4.3, EFFECTS ON WATER RESOURCES.

Comment 4: "These past studies are not valid because they do not measure what they claim to measure. They do not randomly sample wells that are representative of the region. They instead use wells that are convenient for their study based solely on the availability of historical data. What is remarkable is that in past studies the researchers do not even claim to have chosen truly representative wells."

Response: The studies referenced in the above comment include three reports published by the U.S. Geological Survey, which summarize existing data on groundwater levels, groundwater flow, and ground water chemistry in the Newlands Project area: Water-Resources Investigations Report 93-4118 "Water-level changes and directions of ground-water flow in the shallow aquifer, Fallon area, Churchill County, Nevada," Open-File Report 93-463 "Hydrogeology and potential effects of changes in water use, Carson Desert Agricultural area, Churchill County, Nevada," and Open-File Report 94-31 "Ground-water quality and geochemistry, Carson Desert, western Nevada."

Water-Resources Investigations Report 93-4118 describes water level changes using 126 wells for conditions prior to the Newlands Project to 1992, and for the period 1977 to 1992. Open-File Report 93-463 summarizes numerous studies of the area made from the early 1890s through 1992, including results of samples and measurements of many hundreds of wells, a description of the local aquifer systems, and discussion of potential impacts of changes in water use to the aquifers. Open-File Report 94-31 summarizes results of sampling over 200 wells tapping the shallow, intermediate, basalt, and thermal aquifers of the area. A portion of these wells were drilled or selected for sampling using a random site-selection program described in Open-File Report 94-39 "Data on ground-water quality in the Carson River Basin, western Nevada and eastern California, 1987-90," and Water-Resources Investigations Report 90-4101, "Computerized stratified random site-selection approaches for design of a ground-water quality sampling network."

The USGS data is based on a random site selection approach and represents the best available data on hydrology in the affected area. USGS only samples wells that it has permission to sample and only drills monitoring wells on lands that it has been granted access. The Service has reviewed the USGS studies in question, and believes the groundwater studies referenced in the EIS are valid and representative scientific studies.

Comment 5: "These past studies are also not reliable because they do not represent repeated longitudinal evaluations of wells that represent the region. The only longitudinal data available is on wells that have not been proven to accurately represent the local geographic strata. The conclusion is simple. If you do not measure what you claim to measure and have no appropriate longitudinal data, then you do not have a valid or reliable aquifer study."

Response: Comment is unclear. The Service has relied on the available data relating to groundwater and groundwater resources. Mr. Feike has not submitted any additional or new information to support his concerns. The Service hydrologist in coordination with USGS hydrologists,

geologists, has reviewed Mr. Feike's comment and is unclear as to the technical and scientific intent of the comment and the meaning of the terms "repeated longitudinal evaluations."

Comment 6: "From a scientific standpoint, we are being asked to proceed in the dark while aquifer studies need to be done before massive changes in water flows are implemented. The community should be given ample time to evaluate these new studies, especially in light of the curious inadequacies of previous studies."

Response: Comment noted. See response to above comments.

Truckee Carson Irrigation District

Comment 1: "The District has previously taken the position, and once again wishes to reiterate, that all pending and proposed environmental impact statements (EIS's) and environmental assessments (EA's) pertaining to the Truckee or Carson Rivers, the Newlands Project, the communities of Fallon, of Fernley, Churchill County, or the encompassed wetlands should be held in abeyance until the completion of the Programmatic EIS, now in-process by the Department of the Interior's Truckee-Carson Coordination Office. The proliferation of such documents as the "Environmental Assessment, Acquisition for Water Rights for Stillwater National Wildlife Refuge; Fiscal years 1991-1993", for 20,000 acre feet (and now within a few hundred acre feet of completion); the Service's "Draft EA: Phase I, Acquisition of Water Rights for the Cui-ui Fishery in the Truckee River and Pyramid Lake, NV" for 3,500 a.f.; and the subject EIS threaten the Newlands Project with anemia, before the Draft Programmatic EIS is even published. If and when the requirements of Section 206 of P.L. 101-618 are completed, some 66% of the Newlands Project production will have been eradicated ((D)EIS, Page ix). That will, in effect, eliminate Churchill County's agriculture."

Response: Please see General Issue Response I., Programmatic EIS. Under the Service's Preferred Alternative, 40% of the Newlands Project agricultural lands would show a change of use.

Comment 2: "By analysis and definition, agriculture is indeed a culture; just as validly as one founded on religion, race, ethnicity, or creed. Culture, as defined by Webster, is: "The totality of socially transmitted behavior patterns, arts, beliefs, institutions, and all other products of human work and thought....It is most inappropriate for the federal government to chart and pursue a course with that culture's annihilation as the very evident outcome."

Response: Comment noted. Impacts to social values are addressed in Sections 3.23 and 4.23.

Comment 3: "Page x, par. 7, Draft EIS. Under baseline conditions, it is estimated that there are about 57,312 acres of irrigated farmland in the affected area...It is somewhat misleading to express numbers in association with the Project in terms of acres, as above, because there is a wide range of water duties within the Project, which includes 2.99, 3.5, and 4.5 acre feet. However, within the Project proper there are some 58,848.52 irrigated acres (1995 allocation). That does not include the Service's cited 6,450 acres "in the Middle Carson River corridor", the river's Segment Seven. The Nevada Division of State Parks recently purchased all of two ranches, and a portion of a third, including the appurtenant water rights in Segment Seven. Those purchased water rights total an aggregate of 5,598 a.f.; which as presently planned, will either remain on their respective properties, or be moved to the Lahontan Reservoir for recreational use. In either case, that is nearly 6,000 a.f. that is outside the scope of this EIS. Also outside the scope of this EIS are those water rights associated with the Fallon Paiute-Shoshone Reservation --some 10,587.5 a.f. (3025 X 3.5) that are outside the scope of this EIS. In total, some 16,185.5 a.f. are outside the Service's influence."

Response: The Service believes that it is appropriate and common to use the number of irrigated and water-righted acres as one means to identify the size of an irrigation project. The Service has in the past received correspondence and reports from TCID that reference water-righted acres and measure Newlands Project conditions in terms of water-righted acres.

The Service has included the water-righted acreage for Segment 7 of the Carson River (see Section 2.5.5 ALTERNATIVE 5) and the water-righted acreage associated with the Fallon Paiute-Shoshone Reservation is included as part of the water-righted acreage base for the Carson Division of the Newlands Project. The Service agrees that the water-righted acreage held in trust by the Fallon Paiute-Shoshone Tribe is not available for purchase by the federal government for wetlands protection, but that those water-righted lands will remain in agricultural production. The total farmland acreage is referenced for the Affected Area in Section 3.16.3 FARMLANDS.

The water duty on most farmlands in the affected area is 3.5 AF/acre/year. The 57,312 acres figure includes 1989 water-righted irrigated farmlands in the Carson Division of the Newlands Project (47,000 acres) The Truckee Division of the Newlands Project (3,855 acres) and rangeland in the Middle Carson River corridor (6,450 acres). Both the state park land and Fallon Paiute Shoshone Reservation are within the affected area, and impacts are described for the entire affected area.

Comment 4: "It is not clear why only the Newlands Project and the Carson River's Segment Seven have been singled out for the targeting of water right purchases when in its natural state, the entire river contributed to the Carson Lake and Sink."

Response: This issue is addressed in detail in Section 2.8.5.3.

Comment 5: "Page xiii, para. 6: 'Diversions at Derby Dam that would occur under each alternative would be directly related to the Carson Division irrigation demands of each alternative. Consequently, all of the action alternatives would result in reductions in Derby Dam diversions from baseline conditions, which require the greatest amount of diversions of all the alternatives.' Although the language in this paragraph is not intuitively clear, its intent is that water rights taken out of agriculture and transferred to the wetlands would somehow place a lower demand for diversions on the Truckee River. This would only be valid if the assumption is made (and accepted) that the difference between the agricultural water right, say 3.5 a.f., and the transferred consumptive right, 2.99 a.f., is not diverted. Since the Service has stated that its intent is to petition for the full water-right, and not the consumptive rate, it would appear that the difference would then be minimal, at best."

Response: The Service has identified Alternative 5 as its Preferred Alternative and has stated its intent to utilize irrigation water rights on the wetlands at a 2.99 AF/acre use rate. Based on this commitment, the Service has calculated that there would be an overall long-term reduction in irrigation demand for the Carson Division. Over the long-term, under average hydrologic conditions this would result in reduced Truckee River diversions. The Service recognizes that in years when drought conditions occur, because of OCAP reservoir storage targets, there may be no reduction in Truckee River diversions as a consequence of reduced irrigation demand created by the 2.99 AF/acre use rate.

Comment 6: "Page xvii, par.2: 'All of the action alternatives have the potential to impact some 4,000-plus domestic wells in the region, and a few wells could go dry...' The quantity of 4,000 is not a static number. Outside Fallon's city limits, and beyond the reach of its delivery system, every new residence requires its own well. The 4,000 is analogous to a snapshot of a dynamic process. It is true and valid, but only for the instant in which it was taken. Even the Service's number changes to

4,500 wells in this EIS (Page 3-47, par. 4) 'A few wells going dry' would become many wells going dry, in short order."

Response: We agree that the number of wells in the region is not a static number. The number of wells in the area has been changed to 4,500 for both the executive summary and other domestic supply sections.

Comment 7: "Page xviii, par. 4: 'The proposed action would benefit cui-ui, an endangered fish species endemic to Pyramid Lake, because long-term average flows of the Lower Truckee River would increase over baseline conditions.' It is difficult to see how this would be the case. Diversions through the Truckee Canal are governed by "Operating Criteria and Procedures" (OCAP); therefore, those diversions may only occur within those parameters, which may vary from year to year, based on climatic and other conditions. Those diversions in turn are released into Lake Lahontan for that season's storage and use. In this process, there is no distinction as to whom the destined water recipient will be. Likewise, water releases, regardless of user, commence at the beginning of the season and cease at its end. The only conceivable way a benefit could be construed would be if the Service were to somehow leave some portion of its annual allocation in the Truckee River, allowing it to flow past Derby Dam."

Response: TCID comment #5 above addresses essentially the same issue. The Service has calculated that reduced irrigation demand would, on average, reduce Truckee River diversions under the existing provisions of OCAP. Reduced diversions would ultimately benefit Pyramid Lake resources. TCID is correct and the Service agrees that hydrologic conditions vary year to year and that under drought conditions or below average flow conditions on the Carson River, reduced irrigation demand will not result in reduced Truckee River diversions. The Service understands that OCAP would allow for Truckee River diversions to continue until storage targets are met regardless of Carson Division irrigation demand.

A consequence of exercising a use-rate of 2.99 AF/acre/year for a 3.5 AF/acre/year entitlement is that only 85 percent of the water that had been available for delivery to irrigated farmland headgate would be available for delivery to a primary wetland headgate (in a 100 percent or better year). Over time as more water rights are purchased for the primary wetlands, Carson Division demand would decline because the remaining 15 percent (i.e., 0.51 AF/acre/year) would not be calculated in Carson Division demand for wetlands water. Consequently, less water would be required to meet Carson Division demands, and, therefore, less water would have to be diverted from the Truckee River.

Comment 8: "Page xix, par. 1: 'Jobs lost due to reductions in alfalfa production could be partially offset by jobs created as a result of income gains associated with water right purchases.' This statement is based on at least two erroneous assumptions, which come from the commingling of revenue classifications: 1. Income based on productivity are earning created by the combining of the three factors of production: land, labor, and capital. Income derived from the sale of real estate (or any other property) is capital (as in capital gains). One of the biggest differences between the two is time. Production is longer-term, recurring on an annual basis. The sale of property is one-time, creating revenue only in the year of sale. Granted, payments may be strung out over a period of time, but revenue generation occurred only once. Another distinction between the two is employment. Production is the creation of something tangible, requiring the physical inputs of a work force, such as agriculture. Capital (real estate) sales provide only one time, indirect employment, from the services community, but a few people acting as agents. In the discipline of economics there is a theory known as "the velocity of money". It holds that every dollar earned by a worker (or conversely, spent by the employer) gets passed on within the community, time after time. Under normal economic circumstances, that velocity is five to one: every dollar earned (spent) becomes five

dollars in the repeated purchases of goods and services. 2. Capital sales, on the other hand, are a "one-shot" deal. The seller may choose to exercise one of several options: to include "take the money and run". Even this EIS; Appendix 2 recognizes that 70 % will be "taking flight". Only a portion of that money (30 %) will be included in the velocity of money. And that again will be a one-shot deal. The important net result is that a means of production, long-term revenue generation and product creation, will have been taken out of production permanently."

Response: The Service agrees with much of TCID's comment regarding its descriptions of the different aspects of production revenue (income) and capital gain (investment income). The Service questions the applicability of the \$5 multiplier for every \$1 income earned from agricultural employment and without citations or references for that analysis no changes were made in the Service's impact analysis.

The EIS identifies the economic consequences of lost agricultural production in terms relating to profit, income, production, and employment. The economic consequence related to income gains associated with water right sales are also identified in terms relating to income and employment. The Service does not believe that identification of both economic consequences in common denominators such as income and employment is commingling of revenue classifications as TCID suggests. The EIS does not place a value or preference on which economic activities are more desirable or of greater importance.

Comment 9: "Page xix, para. 3: 'Leasing of water rights by the Service, in contrast to their purchase, would only temporarily reduce irrigated farmland acreage and thus would maintain, over the long-term, more irrigated farmland in the Lahontan Valley.' A 1993 District-wide vote showed the majority of those voting preferred the leasing process, rather than water-right sales. If a program were in place in which a water-right owner were able to lease either a portion or all of his water, many water-right owners would find this a viable alternative. The owner would have the option, for instance, of tilling 4/5 of his holding while leasing 1/5 of his water right, thus leaving the field fallow. The owner would have a means to give a field (or fields) a rest, without having to experience a total loss, while recapturing his O&M charges and other costs for that year. To again cite from the EIS's own backup data (Appendix 2, page 12): 'Dry-year leasing is a promising alternative to permanent acquisition...This option has proven to be effective in other locations at improving environmental quality with minimum harm to agricultural interests. The chief advantage of a leasing program is that the scale of farming would be reduced only in dry years, thus leaving the agricultural infrastructure intact and fully operating in wet years. The chief disadvantage of dry-year leasing is more practical: there is a lack of dedicated funding available to make one-year lease purchases every year for an indefinite period. This lack of assured funding translates directly to uncertainty about water supplies available to support wetlands.'

The Truckee-Carson Leasing Authority (TCLA) already exists to assist in bringing lessee and lessor together and assist the Service in accomplishing their acquisition goals. --The lease-to-buy ratio is 1:10 (or greater). The cost to purchase one acre-foot could lease ten acre-feet for one year.-- The purchase of water-rights would require the buyer (USF&WS) to assume responsibility for operation and maintenance charges, in perpetuity. Leasing of water-rights typically leaves that responsibility with the lessor.--A large number of water-right owners have expressed interest in leasing. The "lack of dedicated funding" should be viewed as an obstacle, and not an impediment for the USFWS. Funding is, of course, a function of the (annual) budgeting process. Without those dollars in a given budget, the Service then has an opportunity to be creative. One possibility that has been successfully employed in the past by DOI agencies is to simply sell-off a parcel(s) of real estate that is being sought after by the private sector for use in development. With the federal government owning (or otherwise controlling) some 87 % of the State's real estate resources, there should

always be an opportunity to connect "willing seller/willing buyer". At a recent Truckee River Strategy Meeting, held in Reno, Nevada on 9/20/95, Dr. David Sunding, UC Berkeley, was the keynote speaker. Dr. Sunding had prepared the "Economic Impacts of the U.S. Fish and Wildlife Service Water Rights Acquisition Program for Lahontan Valley Wetlands", contained in volume 2, of this (Draft) EIS. Dr. Sunding stated that The Nature Conservancy and USFWS' purchasing efforts in the Newlands Project were a failure. When asked why, the response was that there has been a refusal to consider leasing."

Response: TCID's support and endorsement of leasing as a means of acquiring water for wetlands protection is so noted. The Service has chosen Alternative 5 as its Preferred Alternative. This alternative has a specific component of water acquisition that relies on leasing.

It should be noted that Dr. Sunding's opinions and statements made at the Truckee River Strategy Meeting are those of Dr. Sunding and not necessarily the position of the Service. The Service's selection of Alternative 5 as its Preferred Alternative does not support the contention that the Service has refused to consider leasing. While the Service contracted with Dr. Sunding to provide economic impact analysis for the EIS and has cited and referenced some of his report in the EIS, Dr. Sunding does not represent the Service nor does he make decisions regarding the Service's policy on Lahontan Valley wetlands water and water right acquisitions.

Comment 10: "Page xix, par.4: 'The Proposed Action and other action alternatives would more than double primary wetland habitat acreage in the Lahontan Valley, providing permanent and reliable recreation opportunity for hunting, birdwatching, and other general wetland-associated recreational use.' The two groups identified above, hunters and birdwatchers, cannot be expected to represent a large segment of the American population even combined! Likewise, they are not considered to be "big spenders" insofar as recreationalists are concerned. The hunter would, in all probability arrive as a camper-self-contained or otherwise- with needs for groceries and camping supplies and a tank of gasoline as he leaves town. Birdwatchers are likely to be out on an afternoon sojourn, unlikely to contribute much to the local economy other than perhaps a meal and a tank of gasoline on their way out. In other words, neither are acceptable or equitable trade-offs economically, when compared to what is being given up...This is hardly an equitable economic trade-off for the decimation of an agricultural economy."

Response: Comment noted. The document does not state that recreational use and expenditures are an equitable trade-off for impacts to agriculture. The purpose of the water rights acquisition program, as stated in Chapter 1, is to protect significant wetland habitat from continued degradation and to enhance habitat for wetland-dependent wildlife.

The EIS identified, based on the available information, the economic inputs anticipated by increased recreational use of the primary wetland habitat areas. The EIS does not place value judgements on the desirability or preference of economic income, but seeks to describe those consequences in quantifiable terms such as dollars or employment. The Service never stated that recreational spending or economic activity is an equitable trade-off as TCID suggests, nor does the Service believe that such increases in recreational spending would compensate individuals adversely impacted by adverse agricultural impacts.

Comment 11: " Page xix, par.5. 'Other lands would remain as vacant fallow lands, over time reverting back to more natural desert shrub habitat.' Problems experienced in California's Owens Valley, where the water was removed from the land in the 1920's, are indicative of those to be anticipated in the Lahontan Valley with fallow land. During periods of strong winds not unlike those experienced in Churchill County, dust from the Owens Valley may be uplifted, carried, and deposited

a few hundred miles away. Both valleys, Lahontan and Owens, being on the eastern side of the Sierra Nevada Mountain Range, are susceptible to the same (and nearly parallel) climatic conditions, including winds."

Response: The Service notes TCID's comparative analysis between Owens Valley water rights transfers and the potential consequences that may occur in Lahontan Valley. It should be noted that Owens Valley water rights were transferred out of the Owens Valley to southern California for domestic and agricultural supply while the Service's water rights acquisition plans would keep the water within Lahontan Valley but only change the place of use.

Without water the wetlands too are susceptible to severe wind erosion which is evident during windy periods in Lahontan Valley when large clouds of dust obscure the Stillwater Range. Historically, the wetlands and the Carson Sink were the natural hydrologic terminus of all of the Carson River flow. The Service's water rights acquisition plans seek to obtain a portion of those Carson River flow to provide a reliable water supply to sustain productive wetland habitat. Please see response to your Comment # 12 below.

Comment 12: "This Draft EIS has two conflicting positions on revegetation:.....(pages 2-22, par. 2 and p.3-50, par.5) The Service needs to take a single position, then observe it. Ideally, they would choose the one that is most beneficial to the community, in the interest of being the best "neighbor" possible..."

Response: The discussion in paragraph 5 on page 3-50 addressed baseline conditions (present conditions/activities) while the discussion in paragraph 2 of page 2-22 addressed one aspect of the Proposed Action (potential future conditions/activities).

Comment 13: "'Another action what will offset adverse impacts of the action alternatives to the local economy is the ongoing expansion of the Naval Air Station-Fallon.' There is very little correlation whatsoever between being an agronomist to working for a Department of Defense contractor on a military installation. The former is a producer, one of those who are in the 1:120 ratio (one American farmer produces the equivalent food needs of 120 people). He is self-employed, an entrepreneur, taking the risks and reaping the rewards of being responsible for himself. The latter is doing "housekeeping" tasks for rotational military units that are temporarily in Churchill County for training. It is essentially an "eight to five" job, which by comparison, produces nothing tangible and little intrinsic. A community of farms and ranches are net producers of goods, thus "creators of wealth". Defense establishments, on the other hand, are "net consumers of wealth" or resources."

Response: NAS-Fallon currently employs about 2,516 persons, including both military and civilian personnel, and has a total payroll in the area of \$53.7 million. A farmer would not have to become a defense contractor in order for adverse impacts to the economy to be offset. The Service anticipates that the growth of NAS-Fallon would allow for farmers who are selling water rights and making a change in lifestyle to invest in business ventures in the community if they so choose, or pay off local debts, thereby benefitting other members of the community. It is not the Service's position to make qualitative judgements about which type of job is more meaningful or useful. Impacts to social values are described in Section 4.23

Comment 14: "P.L. 101-618, in its paragraph 206(a)(2), only makes provision to "...sustain, on a long-term average, approximately 25,000 acres of primary wetland habitat within the Lahontan Wetlands..."(emphasis added). The operative word here appears to be approximately and its quantitative interpretation. It would appear rational to approach it from an "averages" perspective; such as using 25,000 as the median, with a "plus or minus" of N%. N could represent some logically

arrived at value, such as 5%, 8%, 12%, etc. The plus-side would represent water-years with greater than 100% of precipitation; while the minus-side, of course, would be drought years. No other interest-holder along the River, be it Carson City, Segment Seven, or the Newlands Project, enjoys a firm amount (or area) of water, without having to take into account (or recognize) the region's cyclical weather patterns.

Response: The Service agrees the objective of the water rights acquisition plans are provide sufficient water resources to sustain, on average, 25,000 acres of wetland habitat. The Service has chosen average as the measure of central tendency relative to this program in an effort to comply with Public Law 101-618 Section 206(a) which directs the Secretary to sustain, on a long-term average, approximately 25,000 acres of primary wetland habitat in the Lahontan Valley.

The Service has repeatedly stated in public meetings, hearings, and in discussions with TCID that the 25,000 acres and the water supply to meet that objective is based on averages, meaning quite simply that in some years there will be more wetland acres due to above average hydrologic conditions and in some years there will be less than 25,000 acres due to drought or shortage conditions. Calculation of the amount of water and water rights that would be needed to sustain an average of 25,000 acres of primary wetland habitat took into account these fluctuations. The commitment to maintaining an "average" of 25,000 acres recognizes the cyclic nature of the Carson River and Lahontan Valley hydrology. Please see responses to Bureau of Reclamation Comment #10, and Churchill County Comments #17 and #34, and in the document in Section 2.7, MONITORING REQUIREMENTS.

Comment 15: "P.L. 101-618 only recognizes area (approximately 25,000 acres), and not acre feet. The 125,000 a.f. appears to be an administrative prerogative. As such, the exercise of that prerogative should be subject to challenge and open to negotiation."

Response: The 5 AF/acre/year figure was determined as the best approximation given the various wetland habitats that exist in the primary wetland areas under baseline conditions.

Comment 16: "Historically, the Carson River sustained an average of 150,000 wetland acres in the Carson Lake, Stillwater, and Carson Sink marshes... If as stated, the wetlands' evaporative rate is 60.09 "/year (DEIS, Volume 2, Concept Page, p.1), that is five acre-feet/acre/year. It would then take 750,000 a.f./year (150,000* 60") in loss replacement to simply sustain that square-area of 150,000 acres. Eighty years of historical data (1912 through 1992 measured at the Ft. Churchill gauge) show that the Carson River's average water-year equals 266,569 a.f. per year. That is only 36% of the wetlands' annual losses. Where did the other 64 % (480,000) a.f. of water replacement come from? Or is it quite possible that the wetlands were significantly less than the purported 150,000 acres? And perhaps closer to 53,300 (266,569/60") acres, on average?"

Response: Please see General Issue Response X at the beginning of this Chapter.

Comment 17: "Page 1-17 (4) Management of Stillwater NWR: The EIS states that 'the Service intends to develop a Comprehensive Management Plan for Stillwater NWR to define the habitat objectives and public uses of the Refuge area. Such a plan is anticipated to discuss possible expansion of the Stillwater NWR boundaries in fulfillment of subpar. 206 b)(5) of Public Law 101-618, and will describe the Service's strategies for water and wetland management, public recreation, livestock grazing and other planned development. The Comprehensive Management Plan will be subject to NEPA review.' Once again, the Service is delaying a major portion of the NEPA compliance to a later date. The management of the Refuge is part and parcel of the acquisition program. The management strategies of the Refuge, its boundaries, and its subsequent water needs

are tied inextricably to the acquisition of the water rights. These items delineate the extent of the purchases and how the Valley will be impacted. Without the management plan, the EIS is only partially complete."

Response: Please see response to similarly worded question, Churchill County comment #44.

Comment 18: "Page 1-25, par. 1.9.4: This (D)EIS takes two conflicting stands on the Farmland Protection Policy Act (FPPA). The first is cited below: 'the Farmland Protection Policy Act was passed by Congress in December 1981 (amended June 17, 1994) to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agriculture uses. Federal agencies are to consider the total effects of their actions using the criteria which the department of Agriculture has supplied, and if there are adverse effects, to consider alternatives to lessen those effects.' Then later (p. 4-91), par. 4.16.4), the Service attempts to refute the need to comply with the requirements of the Farmland Protection Policy Act...An even cursory review of the FPPA informs the reader that this was written as, and intended to be, policy for all federal agencies. It leaves little open to interpretation as to compliance and by whom and certainly not by this (D)EIS. Par. 658.4 (a) does allow the moving agency to independently determine whether an area is still considered to be agricultural, considering the encroachment of urbanization. That question has little merit in the Lahontan Valley, as it pertains to water rights. The groundrules for FPPA are:

II Discussion of the Existing Regulations to Implement the FPPA

The current regulations were promulgated principally to enable federal agencies, with the help of the Soil Conservation Service (SCS), to measure the adverse effects, if any, of their programs and projects on farmland. The SCS has developed a Farmland Conversion Impact Rating Form, Form AD-1006, for this purpose. A federal agency considering a project on or affecting farmland completes and submits a Form AD-1006 to a local SCS office. The SCS determines if the proposed site or sites contain farmland subject to FPPA, i.e., farmland that is "prime", "unique", or of "statewide or local importance", as defined by the FPPA. If WSCS determines that the site or sites are not subject to the Act, SCS returns the form to the agency with that determination noted. Two of the above descriptions, prime and statewide importance, are used on the Service's own maps: figure 3.16.A (p. 3-103). It is a map which identifies, by color-coding, those two types of farmland within the Valley."

Response: Sections of the EIS that address FPPA (e.g., Sections 1.9.4, 3.16.4, and 4.16.4) were rewritten based on this and other comments, and an appendix was added (Appendix 10). Please see General Issue Response V.

Comment 19: "...the Service once again used the elusive term, willing seller, which has yet to be adequately defined. If, after a drought that has lasted an entire decade (with two years of reprieve), a water-right owner is financially "on the mat", is he truly a willing seller? To further confound that premise, what if, in reality, there is only one buyer- one who is at best, paying 25 % of market value (in comparison to off-Project values). How willing has this arrangement become? And to further exacerbate the willing seller misnomer, the shadow that prevails over the Project and its water (propagated by the federal government) keep other prospective farmers and/or ranchers, and their sources of financing, out of the equation."

Response: Please see General Issue Response VII., Willing Seller Defined.

Comment 20: "Page 2-2, par. 2.2(3): "For the proposed action, the Service will exercise only 2.99 AF/acre/year of the agricultural water rights acquired (which generally have 3.5 or 4.5 AF/acre/year entitlements). As a result, the wetlands would receive an annual average of about 102,000 AF of irrigation water, 13,000 AF of drainwater, and 11,000 AF of useable spills..." This may no longer be correct. It is understood that the Service is negotiating with the Nevada State Engineer and the Pyramid Lake Paiute Tribe to allow for the transfer of the full water-duty, but to not use over the 2.99 a.f. during years of 100% (or greater) precipitation. In those periods of less than 100%, the percent from that year will be calculated with the (normal) full water duty."

Response: The Service has taken no action or made no commitment to transfer water rights to the Lahontan Valley wetlands at 3.5 AF/acre or "full duty" as TCID suggests. The EIS remains correct in its assessment of impacts for the 2.99 AF/acre use rate under the Service's Preferred Alternative (Alternative 5). To provide comparative consideration the Service developed Alternative 3 to evaluate the consequences of using wetland water rights at the 3.5 AF/acre use rate. Such analysis and evaluation does not commit the Service to that action. Under the Preferred Alternative, the Service would exercise a use-rate of 2.99 AF/acre/year.

Comment 21: "Page 2-3, par.2: 'Cui-ui and Lahontan Cutthroat trout, endangered and threatened fish species that inhabit Pyramid Lake, will also benefit as a secondary consequence of the Proposed Action, transfer of the full water-duty.' This, too, may no longer be correct, for the same reasons presented in the discussion above."

Response: Comment noted. The Service has responded to a similar comment by TCID regarding potential for increased Truckee River flow below Derby Dam (see response to TCID comments #5 and #7 above). The DEIS conditions and related assessment and analysis continue to be accurately stated and no change is required.

Comment 22: "Page 2-3, par. 3: 'The Proposed Action will adversely impact agriculture production and related socio-economic values in Churchill County. Transferring agricultural water rights to Lahontan Valley's primary wetland habitats will take farmlands out of production and impact the livestock and dairy industry. In addition, taking lands out of production could potentially increase erosion and dust from fallow fields in Lahontan Valley. Loss of agricultural production will directly affect farm income as well as income and revenues of agriculturally dependent businesses in the community.' The issue of taking farmlands and dairies out of production is (or should be) both a state and national one. Nevada's largest concentration of dairies is located in the Lahontan Valley, providing dairy products for northern Nevada and northern California. The abundance of hay produced in the Valley supplies not only the local livestock industry, but is shipped to California; then in part, exported overseas."

Response: Comment noted. The Service is not "taking" farmlands or dairies out of production as TCID suggests. The Service proposes to acquire, at fair market value, from willing and voluntary sellers, water rights. The consequences of those acquisitions is that many existing alfalfa production operations will no longer remain in business in Lahontan Valley. Those agricultural operations that sustain and provide economically viable products will most likely choose to stay in business. Those agricultural operations that can not or do not return a profit will go out of business, some of them selling water rights to the Service, some choosing to selling their property either in whole or through subdivision to other private parties.

Comment 23: "It appears that this EIS drew the preponderance of its agricultural information from within its own Volume 2; Appendix 6: Economic Impacts of the USFWS' Water Rights Acquisition Program for Lahontan Valley Wetlands, by Professor David sunding; University of California at

Berkeley. It was "prepared for the Environmental Defense Fund under a Cooperative Agreement between The Nature Conservancy and the U.S. Fish and Wildlife Service." It would seem to have been much more appropriate had the research been provided by the University of Nevada - Reno. Several of its departments have been intricately involved in the very topics that are the subject of this EIS. That study tends to downplay the importance of agriculture in the Lahontan Valley. Some independent data, "Nevada: Agriculture Statistics 1993-94" , was retrieved that tends to rebut much of Sunding's position. Professor Sunding states alfalfa hay prices as \$80 per ton for livestock and \$100 per ton for dairies. "Nevada Agriculture draws no such distinction, and shows the 1993 statewide market as fluctuating...The 1993 statewide average was \$91.50 per ton. During the year of 1990, it never went below \$105 per ton, and had a high of \$110. This all points that it is a truly volatile commodity - and not in agreement with Sunding...."

Response: Although you are correct in showing the volatility in the agricultural market, it appears that Dr. Sunding's values are well within the representative range you submit. Dr. Sunding's economic analysis is based on an average production potential of about 6 tons of alfalfa/acre (even though average yield is closer to 5 tons/acre) in order to give value for alfalfa crops consumed "on-farm". The Service believes Dr. Sunding's work offers a close approximation of existing conditions, and if anything, overstate alfalfa production and its economic value.

Comment 24: "Hay, beef, and dairy productions are vertically integrated on most farms and ranches in the Lahontan Valley. Contrary to the opinion expressed in the Study: 'Assuming that there will be no change in the number of dairy animals in the Fallon area (which is consistent with the findings of Konyar and Knapp (1991)), the impacts of the acquisition program on dairy profits are simply the replacement cost of the local alfalfa not produced. Similarly, local livestock operations will be forced to find substitute rations to replace lost local alfalfa supplies.' Without the benefit of that vertical integration, removal of the one - hay production - would eliminate the other two. To move hay from outside the area, as the study suggests would not be economical, with shipping prices starting at \$15.00 per ton for a local haul, and increasing with distance. It would be more cost-effective to relocate operations and ship milk by bulk tank truck (as is already done), and ship market-ready beef by cattle truck, as is already the practice. It is either that, or terminate operations. Whatever the case, Nevada would have lost nearly 40% of its milk production; its third-ranking hay producer; and its third-ranking beef producer."

Response: TCID's economic feasibility assessment of hay and milk transportation is so noted. The Service agrees that if it is more cost-effective to relocate dairy or cattle operations because of transportation costs, then that would most likely occur. Such actions would occur regardless of whether the Service acquires water rights or not. The Service does not concur that Nevada will lose 40 percent of its milk production as a result of its proposed water rights acquisitions.

Comment 25: "It is not only incomes from agriculture and those businesses that provide agriculture's logistical support that will be affected. The County's tax-base will be dramatically eroded, as well. There is a major assessment difference between an actively producing, water-righted field and an abandoned desert parcel. There is a major "tax-revenue verses services-demanded paradox" between rural and suburban requirements. Per a study done by the American Farmland Trust, a dollar paid in agricultural property taxes demands \$.33 in tax-supported services; a dollar paid in commercial property taxes demands \$.40 in tax-supported services; and a dollar paid in residential property taxes demands \$1.12 in tax-supported services. It becomes intuitively clear that as more agricultural lands are taken out of production, and there is no replacement industry to replace those farms on the tax rolls, local government will be operating 'in the red.'"

Response: The Service concurs with TCID's assessment for potential tax-base erosion due to the conversion of agricultural land to other uses. The study cited by TCID references tax-base versus service demand conditions in several communities in northeast United States. The Service questions the applicability of those studies to Churchill County where local government provides only limited services (police, fire, and schools) to county residents. Communities in the northeast and east generally provide water, sewer, trash, police, fire, schools, and often electrical services to local residents. Since Churchill County does not provide the level of public utilities service that is common back east, it is not reasonable to assume that there would be the same tax-base to service demand cost ratio. This is particularly true when tax rates for agricultural lands are lower than other land uses. The conversion of lands from agricultural use to other land uses has been evaluated by the Service in the EIS and there is no evidence that the Service's proposed water right acquisition plans will erode the tax base as TCID suggests.

Comment 26: "Page 2-3, par. 4: 'Under the Proposed Action, the total loss to local economic activity from reductions in agriculture and agriculture-related industries is projected to be from \$6 to \$11 million. Countywide total income loss for all sectors of the economy are calculated to be about \$10.2 million.' This statement is very unclear! Does it mean that in aggregate, losses to the County are believed to be within a range of \$16.2 million (\$6 + 10.2 million) and \$21.2 million (\$11 + 10.2 million)? Such a range in an environmental impact statement is unacceptable. An EIS should, with relative accuracy, tell a community how adversely it will be impacted. This EIS does not."

Response: This EIS provides economic impact analysis based on the best available data. We agree that the economic projections portray a wide range. However, there are many variables affecting agricultural economics in Lahontan Valley. The discussion referenced in the above paragraph relative to the Proposed Action was deleted from the Final EIS.

Comment 27: "'If the Newlands Project operator, water-users, or other interested parties could develop and implement a cooperative drainwater assurance plan (as suggested during the Truckee-Carson Second Settlement Negotiations) to increase drainwater inflows into the wetlands, water right purchases would be reduced. Such drainwater assurances, which would increase drainflows over the Service's baseline estimates, would ultimately decrease the amount of water acquired for wetlands protection.'

As valid as this statement may be, the District is bound, under the Operating Criteria and Procedures (OCAP), to not only reduce drainwater returns, but, to the maximum extent possible, re-utilize those returns that have not already been reduced. The Project has maximized that re-use to the fullest extent possible, short of installing and running electric pumps, which has been determined by the Bureau of Reclamation to be impractical. This becomes one of those classic examples of two sets of conflicting requirements and implementing regulations coming from two separate federal governmental entities."

Response: The Service is aware of the dilemma of improving irrigation delivery efficiency rates and maintaining drainwater assurances. The Service has included references to drainwater assurances since this concept was advocated by local Lahontan Valley interests during the Second Settlement Negotiations. The Service recognizes the obligations of the Newlands Project operator relative to OCAP and does not propose or support actions that would be in conflict with those regulations, but is open to the possibility of developing drainwater assurances in the future if the parties involved can determine a way to resolve the potential conflicts of such a concept.

Comment 28: "Page 2-12, par. 2.3.4: The Service has stated that '...because the Newlands Project irrigation deliveries have not yet achieved the efficiency targets set by the 1988 OCAP, there is no

existing data that pertains to project operations with full achievement of OCAP targets.' The average reader must assume from this statement that since the Newlands Project has not obtained the efficiency targets outlined in OCAP, the data used to calculate the OCAP efficiencies in this (D)EIS would be actual attainments. And yet, later in the document (p. 3-5) the Service states that the modeling '...assumes that both OCAP targets and upstream diversions will be fully achieved because they are mandated by Public Law 101-618.' How does the Service anticipate increasing the efficiency rate up to 77.1 % in Alternative 4? The Bureau of Reclamation in its 1994 Newlands Project Efficiency Study reported to Congress that the efficiency rate achieved in 1989 (the last 100% year) by the Project was 62.2 %. Then on page 4-11, the Service in Table 4.2.D asserts that the efficiency calculations 92-year average is 67.8 % or 68.1 % in a full irrigation year. In addition, the District would like to point out that P.L. 101-618 does not mandate OCAP efficiency targets. Feasibility studies to Congress of reaching 75 % efficiency targets within a specified period of time was required by the Bureau of Reclamation, not the attainment of those targets."

Response: The value of modelling is that it allows the Service to evaluate conditions that may occur using a set of common and consistent set of baseline conditions. The Service calculations indicate that under Alternative 4 conditions when approximately 70 percent of the irrigation deliveries are directed to two areas, Stillwater and Carson Lake the results of routing large volumes of water through the major canals does inherently improve irrigation delivery efficiency rates. The Service recognizes that these calculations are based on a set a core assumptions, some of which have not been proven to be attainable, such as the baseline 67.8 percent efficiency target prescribed under OCAP. Use of these core assumptions that are consistent with the objectives of OCAP and the Service calculations about efficiency rates under each of the alternatives may be higher than what may actually occur, but it provides for a consistent and common baseline to compare the relative conditions from one alternative to the other. Figures in Table 4.2.D assumes that Newlands Project irrigation delivery efficiency targets have been achieved.

The phrase "...because they are mandated by Public Law 101-618" was deleted. However, because the efficiency targets are a component of those regulations, the Service does consider those targets to be important and that an assessment of the potential impacts to irrigation delivery efficiency must be addressed.

Comment 29: "Page 2-14 (8): This Section, 'Assumptions for Action Alternatives,' states that all wetlands deliveries of acquired irrigation water will be made through the existing conveyance system. The District is concerned that the Service does not address any conveyance system improvements to allow the delivery of up to 66 % of the Project's water to the wetlands. In a February 1993 report, 'Delivery System Alternatives for the Lahontan Valley Wetlands', prepared by the Bureau of Reclamation for the Service, the need for an expanded conveyance system is specifically stated. The report says: 'No single canal in the Stillwater area of the Newlands Project has the existing capacity to deliver the 100 cfs required by the U.S. Fish and Wildlife Service in addition to the existing water delivery demands on the system.' There are combinations of canals which could handle the flows but as the acquisition programs increase, how can the system absorb the additional loads on its far reaches? The canal, lateral, and ditch systems were designed for a graduated, ever-decreasing capacity to transport water. It was not designed to transport up to 66% of the Project's water to the Project's farthest reaches. As canals are running at capacity for longer periods of time, seepage problems become disproportionately higher. That seepage does, of course, adversely affect OCAP efficiencies, as well as increase the probability of a canal breaking under this additional stress. Once again an action which is a vital part of this EIS is being deferred until a later date for an additional NEPA review process. The District has discussed the eventual need for an expanded delivery system with the Service during the Service's O&M Contract negotiations in 1993. The

Service recognized the eventual need at that time and should include an in-depth discussion and alternatives for this topic in this EIS."

Response: The Service has not determined that any new conveyance system canals are needed to deliver the volume of irrigation water to be acquired under the Preferred Alternative. The Service does concur that coordination with the Newlands Project operator and Reclamation is essential in planning any anticipated improvements or enlargements of existing canals.

The Service is aware of the findings and recommendations contained in the early Reclamation report referenced by TCID. There are a number of assumptions made in the report that no longer are applicable and would change some of the findings. First, the Service has decided that it would take irrigation deliveries through some of the drains where monitoring devices can provide the necessary accounting of irrigation deliveries and drainwater flow. Additionally, the early Reclamation study assumed that agricultural irrigation demand and deliveries would remain unchanged for the Stillwater and Island sub districts and that wetland deliveries would be "on top" of the agricultural irrigation. The Service anticipates that the majority of water right acquisitions will occur within those two irrigation sub districts and that early assumption is arbitrarily too restrictive.

If new construction of conveyance canals is deemed necessary in the future the Service would work directly with Reclamation and the Newlands Project operator to develop and design those facilities. The Service has not deferred addressing irrigation conveyance and irrigation delivery efficiency, but has determined that no new facilities are needed and that none are anticipated. Irrigation delivery efficiency has been evaluated separately and the Service has responded to a similar TCID comment above.

Comment 30: "Page 2-29, par. 1. 'Nevada water law allows a water right to retain its priority when transferred to a downstream segment provided that all senior downstream users agree to honor the priority date for the water right being transferred. In segment 8, TCID is the representative for nearly all the downstream private water-right holders. TCID and Reclamation (Federal agency controlling the Newlands Project) would have to agree to honor the older priority date for water rights being transferred from Segment 7 to the primary wetlands in order for the Service to implement Minimal Acquisition Alternative.' To the best of this District's 'corporate memory', it was never approached by the Service with this request. Albeit a Board of Directors' decision, in all probability, it would have been supported."

Response: The Service appreciates TCID's support to recognize upstream water right priority dates for water rights that would be moved from Segment 7 down to the wetlands in Segment 8. Although there have been several informal discussions on the issue, the Service has not formally requested TCID Board approval of such an action, since the Service is still in the planning and alternative evaluation process associated with the Proposed Action and alternatives being considered in this EIS. Such agreements or requests would be part of the actual implementation process that occurs upon completion of the FEIS. As part of the Record of Decision the Service is to identify its implementation plans which is the more appropriate time to request TCID consideration of such a concept. One of the premises behind Bond 5 was the purchase of water rights in the Middle Carson River corridor for wetlands purposes.

Comment 31: "Page 2-31, par. 5: 'The Service evaluated the various alternatives in the Navy EA, 'The management of the Greenbelt Area at Naval Air Station (NAS) Fallon, Nevada' and determined net increases from this source would be 2,297 AF/year in full water allocation years based solely on the Navy's proposed action. If additional water was made available by exercising about 3,570 AF of unused water rights held by the Navy, the total possible water available from this source could be as

high as 6,750 AF/year. This document represents the draft edition of an EIS. As such, one would expect it to be as precise as available facts would allow. In actuality, the NASF's net savings is 357 a.f. (102 acres). This will only be gained with in reduction in return flows."

Response: Please see response to similarly worded comment, Natural Resources Conservation Service #10.

Comment 32: "Page 3-4, par. 3.2: The Below Lahontan Reservoir (BLR) and the Negotiated Settlement Model (NSM) are hybrids of other computer models that were created for totally different applications on the Carson and Truckee Rivers, respectively. They were developed for use by water planners and managers for use in planning and forecasting expectations until arrival of 'real-world' events. Both the BLR and the NSM were produced as a means of developing an array of alternatives for planning purposes, only. Used within this EIS, those models have had their data manipulated in order to achieve the desired results with focus being on the year 1989. Because there has been no attempt to validate any year except 1989, the models were not accepted nor endorsed by a majority of the affected entities during the 1994-95 negotiated settlement process. Their use within this EIS can neither be encouraged nor accepted."

Response: Please see response to similarly worded comment in Churchill County #10.

Comment 33: "Page 3-47, par. 4: 'The number of domestic water supply wells tapping the shallow aquifer is estimated to be 4,500. Although the Churchill County Health Department maintains records of domestic wells, it has not tabulated the number of active wells...' In its executive summary, the EIS uses 4,000 wells as the total number in the County. Granted, the difference is 12.5 %, but as an EIS, one would expect this to be as accurate (and consistent) as possible."

Response: The number in the executive summary has been changed to 4,500.

Comment 34: "Page 3-62, par. 8: 'Cattails and bulrushes have been shown to consume as much as 8484 [actually 84 inches] of water per year (7 AF/acre of cattails/year)...Saltgrass, a more salt tolerant species, consumes about 33 inches of water per year (about 2.7 AF/acre [actually 2.75] of saltgrass/year).' Is it prudent to apply seven acre-feet of water per year, in a desert environment, to a plant with only a marginal return to nature? Likewise, because of the water-table, why would it take 2.75 acre-feet of water (in a wetland) to grow saltgrass - a natural growing, 'low-maintenance' plant?"

Response: The figure "8484" was changed to "84" inches. Given the high evapotranspiration rates in hot, dry climates, large amounts of water are needed to offset these losses to sustain wetland habitats, habitats of which are critical to the survival of many species of waterfowl, shorebirds, and other wildlife.

Comment 35: "Page 3-102, par. 5: 'According to the 1987 Census of Agriculture (US Department of Commerce, 1989), total farm acreage in Churchill County amounted to nearly 360,000 acres. Of that total, some 62,540 acres (17 percent) were irrigated, with 43,750 acres classified as harvested cropland and 18,790 acres classified as pasture and other land. About 80 percent of the agricultural lands in Churchill County are open rangelands used for livestock grazing.' There is more information in what this paragraph does not say, than in what it does. The largest single land-owner in the County (just as throughout the rest of the State) is the U.S. Government. The largest private land-owner in the County is the Southern Pacific Railroad. Combined, these two landlords would account for nearly all of that 80 % that is 'used for grazing.' Grazing mining, geothermal and military uses are

about all that those vast tracts are available for. The prime and farmland of statewide importance have already been put to protective use."

Response: Comment noted.

Comment 36: "Page 3-131, par. 3.25: 'The market value of sale price of water rights can be separated from the value or sale price of the appurtenant land because the water rights are a separate interest and are not tied to the owner's real property. This means water rights can be sold separately from land, therefore their value can be determined separately from the land (and other improvements tied to the land).' What is not recognized in the above discussion is that the land and water together form a synergy, that is, 'that the whole is greater than the sum of its parts'. Taken individually, the water right may be worth one price, say X; while the land is worth yet another, Y. Combined, their value is greater than if the two prices $X + Y$, had simply been added together. Although that added worth may be intrinsic, thus not quantifiable, it exists just the same."

Response: This is the reason that an appraisal is completed; to estimate the intrinsic value of the water rights to the land and improvements. The measure of the market value for water rights should always consider a before and after method of appraising, whereas under the strict application of the before-and-after rule, which is followed by the federal courts and many states at the present time, the procedure for arriving at the compensation for a partial taking (water rights) is specific: The value of the entire parcel at the time of the proposed acquisition *minus* the value of the remainder parcel after the proposed acquisition equals the compensation, or true measure of market value.

This procedure estimates the market value of the water rights to be acquired and any damages that may result to the remainder as a result of the proposed acquisition of the water rights. Quite often, the value of the parts do not equal the whole and the difference is attributable to severance damages which is included in the measure of just compensation.

Comment 37: "Page 4-20, par. 4.2.6: 'One indirect effect of reduced energy generation and hydropower revenues is that Newlands Project O&M fees could be increased for Project water-users. One way for the Newlands Project operator to lower O&M costs would be to refinance or partially retire high-interest construction loans on the New Lahontan [Power] Plant. This would reduce annual debt-service obligations and payments by the Newlands Project operator that affect O & M costs. Such an action would reduce impacts to lost revenues associated with reduced hydropower, and thereby remove the need for increased O & M fees. However, this mitigation is outside the authority of the Service and would rely upon decisions and priorities of the Newlands Project operator.' The Truckee-Carson Irrigation District does not make any debt-service payments on the New Lahontan Power Plant from O&M assessments. All debt-service on this loan is directly from hydropower revenues received from Sierra Pacific Power Company."

Response: TCID's clarification on debt service relative to the New Lahontan Power Plant and the relationship of Sierra Pacific Power Company revenues to that loan are so noted. The Service continues to believe that the mitigation identified is reasonable and feasible, but that the mechanisms to accomplish such mitigation may involve other parties than TCID.

Comment 38: "Page 4-107, par. 4.25: 'The Service expects that its actions to acquire water-rights would result in both capital (one-time acquisition) costs and annual (ongoing) costs. Capital costs are defined as the cost to purchase water rights. Under this impact analysis the Service assumes that capital costs could vary (Table 4.25.A), and would include low, medium, and high costs. This range would include the cost for water rights at a production value pricing (low), the "proportional" value pricing (medium), and pricing that includes land as part of the water right acquisition price

(high).It should be pointed out that, although the USFWS' High includes real estate, the Market Value Appraisal is for water only: making the disparity between the two even greater. In fact, the USFWS' prices are 25.5%, 23.4% and 29.4% of market value, respectively; for an overall average of 26.1% of appraised market-value!"

Response: This comment is unclear.

Comment 39: "The Table also speculates an annual O&M cost of \$890,600. this does not fit the numbers of acre-feet of water rights that the Service intends to buy. $122,000 \text{ a.f./3.5 (a.f./acre)} = 34,857 \text{ water-righted acres} * \$28.00 \text{ (1995 O \& M assessment)} = \$975,996.00$. Three issues within the ongoing BOR/TCID O&M contract negotiations may affect that per-acre rate:---The miscellaneous revenue category may be removed from the contract or placed within other contract(s). The significance of this is that those revenues nominally cover approximately 20% of the Project's O&M costs.---It is the Bureau's desire that a tiered pricing structure be implemented. ----- The District may be burdened with BOR administrative costs that are directly related to the Project"

Response: The O & M Assessment is a weighted average based on 1989 costs, and is calculated to be \$7.30 per acre-foot..

Comment 40: "Page 4-10, par. 4.2.4: 'The model does not offer short-term impacts that may occur as the acquisition program is initiated and implemented. There are possible acquisition patterns that over the short run could adversely impact Project efficiency...retaining irrigated farmland at the end of irrigation canals and laterals; purchasing irrigated farmland in checkerboard patterns; or retaining small volume irrigation deliveries in outlying irrigation service districts that are furthest from Lahontan Reservoir.' There is a concern with the implications of this statement. As the efficiencies are impacted, will all water users in the Newlands Project be penalized in the form of OCAP debits for the next season for the actions of the Service? Should not the Service and/or the Interior Department be responsible for the resultant decline in efficiencies under the acquisition program?"

Response: Please refer to the Service's responses to Churchill County comment 17 and LVEA's comment #24a.

Comment 41: "Page 4-112, par. 4.26.2: ...There are 5,440.3 irrigable acres on the Reservation; all are served to a greater or lesser extent by the "TJ" Drain. Is it the Service's intent to potentially transfer or trade that full amount for off-Reservation lands? Of that quantity, what ever it becomes, will it be in a "trust" category as replacement for that now is? Section 103 of P.L. 101-618 authorizes the procurement of an additional 2,415.3 acres, with 8,453.55 a.f. of additional water rights to be purchased (and placed in trust) for the Tribe. does this mean that there is a potential for some 7,855.6 acres (presently off-Reservation and privately-owned) to be placed into a trust category? Paragraph (6) says in part "...Few, if any, socio-economic impacts are expected to result from the closure of the TJ Drain if tribal members elect to transfer water rights off lands near the TJ Drain and onto lands serviced by other drains.' In light of the preceding query about trust status, this may not be totally accurate."

Response: The closure of TJ drain is a distinct and separate action and does not affect the acquisition of water rights for wetland protection. The Service intention is to acquire water rights for wetlands. The Service has supported a concept that would transfer irrigated farming off of those lands drained by the TJ drain on to other existing farmland that would be vacant as a result of the Service's wetland water rights acquisition plans.

Whether all of the 5,440 irrigable acres on the Fallon Paiute-Shoshone Reservation that affect TJ drainage would participate in such a plan to relocate farming activities to other vacant land is highly unlikely. The Fallon Paiute-Shoshone Tribe authorization to acquire existing privately held water rights for an additional 2,415.3 acres as specified in Section 103 of Public Law 101-618 is a separate action and has been identified in the EIS and the anticipated cumulative impacts addressed in Section 4.26.1 ACQUISITION OF WATER RIGHTS FOR THE FALLON PAIUTE-SHOSHONE RESERVATION AGRICULTURAL LANDS.

The Service has not identified any adverse effects associated with changing the status of farmland from private ownership to trust status and without additional information, the Service has no indication that a change is needed.

Comment 42: "Page 4-115, par. 4.26.5: 'Implementation of land management plans would reduce the volume of water previously used on NAS-Fallon to irrigate crops for dust control and aircraft safety. These land management plans would positively benefit cui-ui recovery and the wetlands water rights acquisition program in that the conserved water could be available for cui-ui recovery and wetlands protection over the long term and would slightly reduce the amount of water rights to be acquired for wetlands. As a result, less agricultural lands would be taken out of production and fewer acres of taxable property would be removed from County tax roles.' Somehow, the EIS attempts to make a case that irrigated and cultivated lands on the Air Station are not put to beneficial agricultural applications. But they are: they are leased to agronomists for the production of alfalfa, grasses, and other hay and grain crops. Therefore, the only distinction between these parcels of productive lands and those on the other side of the fence is that real estate taxes are not generated. Operation and maintenance (O&M) charges, however are. This would appear to refute "less agricultural lands taken out of production" from above. It is obvious that whatever water savings that may be garnered from NASF will be identified for wetlands (downstream) use. It is not so apparent as to how the nominal savings would positively benefit cui-ui recovery."

Response: The EIS does not attempt to address whether water used for dust control on NAS-Fallon farmlands is beneficially used or not, such determinations are within the authority of the Nevada State Engineer. The Service does believe that the purpose of those water rights is to control dust, and that there are more efficient and effective ways to meet those objectives without farming alfalfa on those lands adjacent and next to the runway.

The water rights used to grow alfalfa are federal water rights and pursuant to Public Law 101-618, the Navy was to determine if there were ways or methods to conserve some of the water used for dust control. The Secretary was directed to make use of any conserved water for fish and wildlife purposes.

The Service believes that if less water is used, irrigation demand in the Carson Division can be reduced, which over the long-term, under average hydrologic conditions would potentially benefit Pyramid Lake resources. If the conserved water can not be shown to benefit endangered fish species the Secretary can use the water for wetland protection. The Service's position and policies regarding the conservation of Navy water has nothing to do with taxes or beneficial use as TCID suggests.

Comment 43: "As to the reality of water saved aboard NASF, the Station's EIS identifies it...Although an appreciable amount, 357 a.f. hardly fulfills any great expectation....As a component of achieving those savings, the Navy must execute: 'Extensive water conservation prescriptions, such as lining delivery canals and ditches with cement, improving irrigation scheduling, and establishment of vegetative windbreaks, would be included. Leveling fields, using laser technology, will be conducted

to improve irrigation efficiency and reduce runoff to drains. These actions should conserve approximately 1,059 acre-feet of water per year (U.S. Navy 1992a).¹ Most, if not all, of that 1,059 a.f. are return-flows to the irrigation system. Since they occur post-delivery, that is, after the water-user's headgate, they were part of his allocated duty. Generally speaking, any reduction in return-flows is a detriment to the wetlands, since it is water that will no longer get there. Reductions in return-flows after use are not transfer-able, since they comprise a portion of the water right, and water rights cannot be split. This reduction in return flows would, in all probability, more than offset any of the gains from transferring some 357 a.f."

Response: The Service is fully aware of the consequences of conserving irrigation water on NAS-Fallon lands and that there is the potential for reduced drainwater. The Service would, from a water quality standpoint, prefer delivery of irrigation water over drainwater whenever it is feasible and economically possible. The Service does not concur that the conservation practices will only provide 357 AF of water as TCID suggests. The Navy's EA on that program as well as the Memorandum of Understanding between the Service and NAS-Fallon for use of that water identifies about 2,300 AF of water to become available because of conservation efforts.

Comment 44: "Page 4-121, par.4.26.11:The above listings (description of NAS-Fallon's contribution to the Fallon community) probably should have been put into two columns, one for 'positives', the other for 'negatives'. For each category, there could be either a benefit or a detriment, based upon the situation at the time. Having to gear up for increased municipal services, school enrollment, domestic water demands, and heavier traffic could hardly be considered advantageous; especially when resources (capital or otherwise) are not available. Revenues from 'taxable sales' would have to be qualified. With restricted eligibility (active-duty, retired, medically retired, dependent), on-Station facilities, such as the commissary, exchange, clubs, gas station, and recreational outlets, can be patronized and not generate sales taxes to the local community..."

Response: The Service does not believe that more detailed assessment of NAS-Fallon expansion plans is warranted in a water rights acquisition EIS. The Department of the Defense prepared an EA addressing the consequences of military base relocation and closures. While DOD was exempted under NEPA from detailing the number of personnel involved in those relocation efforts, that document addresses impacts to the local community. The Service has used the available information to identify the cumulative effects of the Navy's expansion plans for NAS-Fallon in Section 4.26.11 NAS-FALLON EXPANSIONS.

Comment 45: "Page 4-122, par. 4.26.12: 'The affected area...only two (about 10 percent) of these proposed subdivisions involve lands where the Service or the State of Nevada have acquired the water rights for wetlands protection.' The other 905 of water-rights could go only one of two ways: remain as appurtenant to the property or be transferred within the Project. It would have been more productive for the USFWS to have investigated what happened to them, and why. this may have helped them in their procurement strategy."

Response: The Service made numerous inquiries to TCID and Churchill County to determine the "fate" of those water rights involved associated with recent subdivisions, but the records made available to the Service were inadequate to track what has happened to the 905 water rights TCID references in their comment. The Service can and does track the water rights for those properties where the Service has acquired the water rights, but does not believe it has the responsibility to track and record the "fate" of other water righted lands that are no longer irrigated due to subdivision. It would seem that this task should be undertaken by Churchill County and TCID rather than the Service.

Comment 46: "Page 2-37, par. 2.6.4 (7): 'Indirect Cost Savings - The Service would seek to acquire properties that would offer indirect savings or improvements for other federal programs. For instance, improving Project efficiency and improving drainwater quality are two programs that could benefit from such water right acquisitions.' The District has expressed concern with some of the Service's purchases. A case in point is a recent Service purchase of a farm where 10 acres with improvements (7 water-righted acres) with improvements of the original 150-acre parcel were retained by the owner. Because of that seven acres' location in respect to the Project's delivery system, water must be delivered more than a mile to the user's water-righted acreage. There are no other water-users on that lateral, thus the periodic delivery through it is grossly inefficient. This was a practice that was, according to the USFWS, not supposed to happen but has. "

Response: TCID is routinely included in the review of proposed parcel maps and subdivisions submitted to Churchill County. In the case cited, it should be noted that TCID approved the parcel map without conditions or expressed concerns. The Service does not agree that the acquisition cited created any inefficiency in terms of Newlands Project operations. Unless TCID has decided to move the headgate which serves the property the "more than a mile" of lateral is an uniform system. Any conveyance losses which may occur past the headgate are not charged against the Project. The Service has neither the desire nor the ability to control decisions by property owners related to parcel maps or subdivision of land and water rights that are made by property owners prior to their contracts with the Service. In the special case cited, it was the property owner's decision to retain a portion of the water right; the Service had offered to buy the entire property. The Service believes it is most appropriate for the Project operator to identify potential inefficiency issues during review of proposed parcel maps and subdivisions, when corrective action is more feasible and can be discussed with the affected property owner.

U.S. Geological Survey, United States Department of the Interior

Comment 1: "On Volume 1, page 3-40, the DEIS references the report by Maurer and others, (1994) ...as noting a 'substantial' increase in chloride concentrations in ground water pumped from the basalt aquifer from 1962 to 1992. The referenced report (page 60) states only the increase is 'statistically significant'. The approximate increase in chloride concentration is from about 90 mg/l to about 110 mg/l, a value greater than the uncertainty of the laboratory analyses and, as suggested by the statistical p-values shown on page 65 of the report, is therefore statistically significant. This strongly suggests that the chloride concentration in water pumped from the basalt (aquifer) is truly increasing near the edge of the basalt aquifer, the point of withdrawal by the Navy wells. We believe that the term 'substantial' is inappropriate because the increase of about 30 mg/l took place over a 30-year time period. Additionally, the concentrations of 110 mg/l is considerably lower than the 400 mg/l secondary maximum standard for chloride in public water systems for Nevada."

Response: the term substantial has been replaced with statistically significant in the text cited.

GLOSSARY

accumulation - The build-up of a chemical in an organism due to repeated exposure (Henry and Hickey 1991).

acre-feet (AF) - An acre-foot of water is the amount of water required to cover 1 acre of land to a depth of 1 foot; it is the equivalent of 325,851 gallons.

alkalinity - Refers to the extent to which water or soils contain soluble mineral salts. Waters with a pH greater than 7.4 are considered alkaline.

alluvial fan - Accumulation of sediment where a stream moves from a steep gradient to a flatter gradient and suddenly loses transporting power.

alluvium - Clay, sand, or other sediment that is gradually deposited by moving water (see also alluvial-fan).

Alpine Decree - The final decree of the U.S. District Court for the District of Nevada in *United States of America v. Alpine Land and Reservoir Co.*, Civ. No. D-183 BRT, entered December 18, 1980, and any supplements thereto.

appropriated water - Surface water in an irrigation district that has been assigned or allocated to owners of water rights.

appurtenant land - The land base to which water rights legally pertain or belong.

aquatic - Pertaining to water, in contrast to land. Living in or upon water.

aquatic habitat - The physical, chemical, and vegetative features that occur within the water of lakes, ponds, reservoirs, rivers, irrigation canals, and other bodies of water.

aquifer - An underground layer of porous rock, sand, or gravel containing large amounts of water.

artifact - An object made by humans; usually in reference to primitive tools, vessels, weapons, etc.

backward linkages - The impacts associated with the purchase of inputs needed to produce a good whose output will change as a direct consequence of the water rights acquisition program.

basin - A depressed area with little or no surface water; an area where water flows in, but where surface water does not flow out.

biodiversity (biological diversity) - *Refers to the full range of variability within and among biological communities, including genetic diversity, and the variety of living organisms, assemblages of living organisms, and biological processes. Diversity can be measured in terms of the number of different items (species, communities) and their relative abundance, and it can include horizontal and vertical variability.*

biota - The plant and animal life of a region.

bench land - Eligible land with a water duty of 4.5 AF/acre/year.

bottom land - Eligible land with a water duty of 3.5 AF/acre/year.

canal losses - seepage, evaporation, and operational spills from main-line canals and regulatory reservoirs.

carcinogenic - Any substance that produces or causes cancer.

carnivore - An animal that kills and eats other animals.

Carson Division - The Carson Division of the Newlands Project is located entirely within Churchill County; it contains about 67,840 acres of water-righted land and is supplied by a combination of Carson and Truckee River water from Lahontan Reservoir.

Carson River basin - The area which naturally drains into the Carson River and its tributaries and into the Carson River Sink, but excluding the Humboldt River drainage area.

cultural resource - The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) and conceptual content or context (as a setting for legendary, historic, or prehistoric events, such as a sacred area of native peoples) of an area. It includes historical, archaeological and architectural significant resources.

delivery - the amount of irrigation water delivered to a water-users headgate during the irrigation season.

demand - the amount of water that a water-right holder calls for or requests in any one irrigation season. Under Nevada State law demand should not exceed entitlement.

deposits - Material that is laid down through the actions of wind, water, ice, or other natural process.

detritus - An accumulation of decomposing plant and animal remains.

dissolved-solids - particles that are dissolved and suspended in water. See also total dissolved solids.

diversion - A structure in a river or canal that diverts water from the river or canal to another water course.

downzoning - The act of reclassifying a land use of a particular area or property to a lower development-intensity land use classification; such as from moderate density residential to agriculture.

drain - A canal that collects and transports excess water from irrigated farmland.

drainwater - see irrigation drainwater.

easement - A privilege or right that is held by one person or other entity in land owned by another.

ecosystem - The sum of all interacting parts of the environment and associated ecological communities within a particular area; an ecological system. Many levels of ecosystems have been recognized. Very few, if any ecosystems are self-contained; most influence, or are influenced by, components or forces outside the system.

Eco-Vision water - Water that is located in a carbonate aquifer in northeastern and central Nevada. The Eco-Vision project proposes to convey approximately 140,000 AF/year of water via the Humboldt River to divert for use within Lahontan Valley.

effect - A change in a resource, caused by a variety of events including project attributes acting on a resource attribute (direct), not directly acting on a resource attribute (indirect), another project attributes acting on a resource attribute (cumulative), and those caused by natural events (e.g., seasonal change).

efficiency - With reference to an irrigation water delivery system, the proportion of the amount of water delivered for irrigation use compared to the total amount of water released to meet that delivery (i.e., amount of delivery divided by amount of release).

effluent - Waste material discharged into the environment from a wastewater treatment facility.

eligible land - Newlands Project land which has a valid water right and which has been classified as irrigable or has a paid out water right.

emergent vegetation - Rooted, aquatic plants that have most of their vegetative (non-root) parts above water.

endangered species - Any species that is in danger of extinction throughout all or a significant portion of its range and listed as such by the Secretary of the Interior in accordance with the Endangered Species Act of 1973. Endangered species are afforded protection under the Act as amended and under various State laws for State-listed species.

entitlement - The annual maximum amount of water which can be delivered to a parcel of land, a product of eligible acres and water duty (expressed in acre-feet).

environment - The sum total of all biological, chemical, and physical factors to which organisms are exposed; the surroundings of a plant or animal.

ephemeral - pertains to streams, lakes and wetlands that exist temporarily each year.

ethnography - The branch of anthropology that deals descriptively with specific cultures, especially those of non-literate peoples.

evapotranspiration - The collective processes by which water is transferred from the surface of the earth, including from the soil and the surface of water-bodies (through evaporation) and from plants (through transpiration).

Fallon Indian Reservation - The lands set aside for the benefit of the Fallon Paiute-Shoshone Tribes by the orders of the Department of the Interior on April 20, 1907, and November 21, 1917, as expanded and confirmed by the Act of August 4, 1978, Public Law 95-337, 92 Stat. 457.

fallow - Allowing land that normally is used for crop production to lie idle.

farm profits - Sales minus fixed and variable costs.

flyway - A route taken by migratory birds between their breeding grounds and their wintering grounds. Four primary migration routes have been identified for birds breeding in North America: the Pacific, Central, Mississippi, and Atlantic Flyways.

foraging - The act of feeding; another word for feeding.

forward linkages - Impacts that are associated with the use of goods whose production will change as a direct consequence of the water rights acquisition program. For instance, if additional cost to an alfalfa producer is incurred due to water rights acquisitions, this cost will be passed on to dairy producers by forward linkages.

habitat - A place where an animal or plant normally lives and grows.

headgate - The control works or gate at the entrance to a canal or conduit system.

headgate entitlement - The amount of water/AF/year to which a particular water right is entitled.

hydrology - The science dealing with the properties, distribution, and circulation of water on and below the earth's surface and in the atmosphere. The distribution and cycling of water in an area.

impact - see effect.

indigenous - Native to the area.

industry outputs - The estimated value of commodities produced in any given year.

invertebrate - Animals that do not have backbones. Included are insects, spiders, mollusks (clams, snails, etc.), and crustaceans (shrimp, crayfish, etc.).

irrigated acreage - The amount of land that is irrigated.

irrigation delivery - Refers to the delivery of water for irrigation purposes.

irrigation drainwater - Ideally, subsurface water which flows from irrigated land and generally transports higher concentrations of dissolved salts than the water applied to the land; practically, any water which flows from the Newlands Project for which there is no claim to satisfy an agricultural water right.

irrigation return flow - Water which reaches surface drainage by overland flow or through groundwater discharge as a result of applied or natural irrigation.

irrigation season - The period when irrigation water is delivered for agricultural purposes; on the Newlands Project this is traditionally March 15 - November 15, subject to weather conditions and water supply.

lacustrine - Of or pertaining to lakes. More specifically, this term refers to permanent, seasonal, and intermittent lakes and reservoirs that typically have depths exceeding 6 feet and are larger than 20 acres, and that have less than 30 percent of their area covered by emergent wetlands vegetation.

Lahontan Valley wetlands - Wetland areas associated with Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and Fallon Indian Reservation, as designated in Public Law 101-618.

landowner - A person or entity indicated as the owner of property on the various ownership maps maintained by the Office of the County Assessor.

lease - A legal contract by which water rights are acquired for a specified period of time for a specified rent or compensation.

linear regression - A mathematical technique used to determine the functional relationship between two variables; the resulting model can be used to predict the values of one variable when values of the other variable are given.

Lower Truckee River - The Truckee River downstream from Derby Dam.

marsh - A periodically wet or continually flooded area where the water is shallow enough to allow the growth of emergent vegetation such as sedges, rushes, and cattails.

marsh habitat - Habitat that is characterized by shallow water and emergent vegetation. Unless otherwise specified, this term does not apply to similar habitat found in rivers, drains, or canals.

migratory bird - A bird that seasonally moves between geographic areas. In reference to birds in the Great Basin, a bird that breeds in Great Basin and subsequently moves south of the Great Basin for the winter months. Birds that migrate south of Mexico for the winter are considered neotropical migrants.

Middle Carson River - The Carson River corridor upstream of Lahontan Reservoir to the Dayton area. Does not include any portion of Carson Division of the Newlands Project.

mitigation - To avoid or minimize impacts of an action by limiting the degree or magnitude of the action; to rectify the impact by repairing, rehabilitating, or restoring the affected environment; to reduce or eliminate the impact by preservation and maintenance operations during the life of the action.

mobilization - Transport or movement of an element or other substance into the water column.

model - A mathematical formula that expresses the actions and interactions of the elements of a system in such a manner that the system may be evaluated under any given set of conditions.

multiplier - A number by which another number is multiplied. Used in economic analysis to show linkages.

National Environmental Policy Act (NEPA) - An act which encourages productive and enjoyable harmony between humans and their environment, to promote efforts that will prevent or eliminate damage to the environment and atmosphere, to stimulate the health and welfare of humans. The act also established the Council on Environmental Quality (CEQ).

Newlands Irrigation Project - A project, initiated with passage of the Reclamation Act in 1902, that was designed to irrigate land near Fallon, Nevada. The Bureau of Reclamation was given jurisdiction over public lands to construct and operate the project.

Newlands Project efficiency - The ratio of irrigation delivery demand to Lahontan Reservoir releases, excluding spills.

Operation and maintenance (O&M) costs - Charges paid by water users for delivery of water in the Newlands Project that are paid to the Newlands Project operator for reasonable and customary operation and maintenance of the delivery system.

Operating Criteria and Procedures (OCAP) - A set of criteria and procedures established by the Department of the Interior for the Newlands Project.

Orr Ditch Decree - The decree of the U.S. District Court for the District of Nevada in *United States of America v. Orr Water Ditch Company, et al.* - in Equity, Docket No. A3, including, but not limited to, the Truckee River Agreement.

palustrine - Of or pertaining to marshes or marsh habitat. More specifically, for this document, this term refers to permanently, seasonally, and intermittently flooded areas that typically have depths less than six feet and that have more than 30 percent of their area covered by emergent wetland vegetation.

passerine bird - A songbird or other perching bird that is in the order Passeriformes. Blackbirds, crows, warblers, sparrows, and wrens are examples.

perennial - In reference to a body of water, one that contains water year-to-year and that rarely goes dry.

pasture land - Eligible land with a water duty of 1.5 AF/acre/year.

peak flow - The maximum discharge of a stream during a specified period of time.

permeability - The property or capacity of porous rock, sediment, or soil to transmit water.

plant community - An assemblage of plant species of a particular composition. The term can also be used in reference to a group of one or more populations of plants in a particular area at a particular point in time; the plant community of an area can change over time due to disturbance (e.g., fire) and succession.

playa - A shallow basin where water collects and is evaporated.

pollutant - Any introduced gas, liquid, or solid that makes a resource unfit for a specific purpose (Studdard 1974, in Moore et al. 1990).

primary wetlands - *wetlands (see definition of wetland) located within Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and the Fallon Indian Reservation (i.e., the Lahontan Valley wetlands designated by Public Law 101-618).*

primary wetland habitat - *habitat provided by shallow or deep water (up to 6-feet deep), with or without emergent and aquatic vegetation in the designated Lahontan Valley wetlands at Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and the Fallon Indian Reservation. Primary wetland habitat only exists when and where a primary wetland or portion of a primary wetland is flooded with water (visible surface water). Consequently, the size and shape of "primary wetland habitat" will fluctuate from season-to-season and year-to-year while the size and shape of the "primary wetland" within which primary wetland habitat occurs will remain constant from season to season and from year to year. Primary wetlands only provide habitat for waterfowl, shorebirds, muskrats, aquatic insects, and other wetland-dependent wildlife when they contain surface water (i.e., when they provide wetland habitat).*

prime farmland - Farmland in an area or region that is considered to be the most ideal farmland based on several criteria; usually soil types and land productivity of the land are two of the most important criteria.

prime water - Ideally, Newlands Project irrigation water released from storage for delivery to a head gate; practically, any water delivered via a canal to a head gate.

purveyor - a private land owner or association that controls water rights for the ability to use the water.

raptor - A bird of prey, such as a hawk, eagle, or owl.

recoupment - Recovery or repayment of water that was diverted from the Truckee River to the Newlands Project in excess of amounts permitted by OCAP during the period between March 1973 and December 1987.

recreation day - A standard unit of use consisting of a visit by one individual to a recreation area for recreation purposes during any reasonable portion or all of a 24-hour period.

remediation - The act or process of correcting a problem.

reservoir - An artificially created lake in which water is collected and stored for future use.

reservoir storage - The volume of water held in a reservoir at any particular time.

return flow - see irrigation return flow.

riparian area - The land adjacent to rivers, streams, and irrigation canals and drain ditches where vegetation is influenced by higher amounts of water than the surrounding lands. For the purpose of this EIS, riparian areas do not include the land surrounding lakes and basin marshes.

sales - Gross cash receipts.

salinity - An expression of the amount of dissolved solids in water.

secondary wetlands - Wetland habitat in the EIS study area that are not associated with Stillwater National Wildlife Refuge, Stillwater Wildlife Management Area, Carson Lake and Pasture, and the Fallon Indian Reservation. These areas are not part of the primary wetlands mandated to be sustained by Public Law 101-618. The term "secondary" denotes location; it does not identify the relative importance to wetland-dependent wildlife.

sediment - Any material, carried in suspension by water, which ultimately settles to the bottom of water courses. Sediments may also settle on stream banks or flood plains during high water flow.

shorebirds - Long-legged birds, also known as waders, belonging to the Order Charadriiformes that use shallow wetlands and mud flats for foraging and nesting.

Service's objective - The goal of sustaining and maintaining a long-term average of 25,000 acres of primary wetlands in Lahontan Valley as mandated by Public Law 101-618.

soil erosion - The wearing away of the land's surface by water, wind, ice, or other physical process.

species - A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification. Examples include the American robin, mule deer, Fremont cottonwood, broadleaf cattail, and southern cattail.

spill - With reference to a reservoir operations, water that is released, either inadvertently or through precautionary releases, in excess of that required to compensate for delivery system losses and to meet irrigation demand.

spillway - The overflow channel of a dam.

submergent vegetation - Plants that grow completely submerged except when flowering.

sub-surface drainage - Irrigation water that percolated into the soil and subsequently flows under the surface of irrigated farmland into drains.

surface water - A body of water that has its upper surface exposed to the atmosphere.

targeting - A technique for acquiring or protecting water-rights whereby specific areas could be targeted, based on soil type classification or other relevant variables.

terminus - In reference to a stream or river, its end point; where it flows into a lake or other basin.

threatened species - Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, and one that has been designated as a threatened species in the Federal Register by the Secretary of the Interior. Threatened species are afforded protection under the Endangered Species Act of 1973.

total dissolved-solids (TDS) - The total concentration of solids (or salts) dissolved in water; specific conductance is a surrogate measure of dissolved solids. More specifically, total dissolved-solids is an aggregate of carbonates, bicarbonates, chlorides, sulfates, phosphates, nitrates, etc. of calcium, magnesium, manganese, sodium, potassium, and other cations that form salts.

trace elements - Metallic elements (with atomic number >21) generally occurring in trace amounts in water, including iron, manganese, copper, chromium, arsenic, mercury, and vanadium.

transfer rate - The use-rate for a water right that is transferred from an owner to a buyer during a transaction.

transient species - Animals that migrate through a locality without breeding or overwintering.

Tripartite Agreement - The 50-year agreement between the Truckee-Carson Irrigation District, the Nevada State Board of Fish and Game Commissioners, and the U.S. Fish and Wildlife Service regarding the establishment, development, operation, and maintenance of Stillwater National Wildlife Refuge and Management Area, dated November 26, 1948.

Truckee Division - The Truckee Division of the Newlands Project is located near Fernley, contains about 6,000 acres of water-righted land, and relies on water from the Truckee River.

Truckee-Carson Irrigation District (TCID) - the current contract operator of the Newlands Irrigation Project.

Truckee River Operating Agreement - The agreement to be negotiated between the Secretary of the Interior and the States of California and Nevada and others for the operation of Truckee River reservoirs.

Truckee River Agreement - A certain agreement dated July 1, 1935, and entered into by the U.S.A., Truckee-Carson Irrigation District, Washoe County Water Conservation District, Sierra Pacific Power Company, and other users of the waters of the Truckee River.

Truckee River basin - The area which naturally drains into the Truckee River and its tributaries and into Pyramid Lake, including that lake, but excluding the Lake Tahoe basin.

unconsolidated - A geological term that describes soil that is not compacted.

upland - An area where water normally does not collect and where water does not flow on an extended basis. Uplands are non-wetland areas.

use-rate - The amount of water/AF/year to which a particular water right is entitled.

vegetation community - see plant community.

vertebrate - An animal having a segmented backbone or vertebral column; includes mammals, birds, fish, amphibians, and reptiles.

water duty - The maximum rate at which water can legally be delivered to a farm head gate to satisfy a water right, usually expressed in AF/acre/year.

water year - that period of time between October 1 of one calendar year and September 30 of the next calendar year. Traditionally, hydrologic data (i.e., stream flows, precipitation, etc.) was summarized or totalled for this period of time.

waterfowl - A group of birds that include ducks, geese, and swans (belonging to the order Anseriformes).

water-righted acreage - The land base for which there are water rights.

water rights - A grant, permit, decree, appropriation, or claim to the use of water for beneficial purposes, and subject to other rights of earlier date of use, called priority, or prior appropriation.

watershed - The entire land area that collects and drains water into a river or river system.

wetland - *Land that is transitional between upland (terrestrial) and aquatic systems (greater than about 6-feet deep) where the water table is usually at or near the surface or the land is covered by shallow water... wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes (plants that require wet conditions); (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year (Cowardin and others, 1979).*

wetland habitat - Habitat provided by shallow or deep water (but less than 6-feet deep), with or without emergent and aquatic vegetation in wetlands. *Wetland habitat only exists when and where a wetland or portion of a wetland is covered with water (visible surface water). Consequently, the size and shape of "wetland habitat" will fluctuate from season-to-season and year-to-year while the size and shape of the "wetland" within which wetland habitat occurs will remain constant from season to season and from year to year. Wetlands only provide habitat for waterfowl, shorebirds, muskrats, aquatic insects, and other wetland-dependent wildlife when they contain surface water (i.e., when they provide wetland habitat).*

wildlife - All non-domesticated animal life; included are vertebrates and invertebrates.

zoning - The act of dividing a city or county into zones, and assigning particular, allowable land uses for each of the defined zones; also used in reference to the end product of such a process.

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