RUBY LAKE NATIONAL WILDLIFE REFUGE
RUBY VALLEY, NEVADA

ANNUAL NARRATIVE REPORT
CALENDER YEAR 1996

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

REVIEW AND APPROVALS

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Ruby Valley, Nevada

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Refuge Manager — Date: 5-18-98

Acting Refuge Supervisor — Date: 5-27-98

Acting ARD Approval — Date: 5-27-98

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U. S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

INTRODUCTION

Ruby Lake National Wildlife Refuge (refuge) is located at the south end of Ruby Valley in northeastern Nevada. The refuge is 65 miles southeast of the town of Elko and lies along the eastern flank of the rugged and scenic Ruby Mountains at an elevation of 6,000 feet above mean sea level. In 1938 the refuge was established by Executive Order number 7923 under the Migratory Bird Conservation Act (45 Stat. 1222) as "a refuge and breeding ground for migratory birds and other wildlife". Lands incorporated into the refuge were withdrawn federal lands and purchased private lands.

The 37,632 acre refuge is contained within a closed basin and consists of a large marsh bordered by meadows, grasslands, and shrub-steppe uplands. The size of the marsh is approximately 17,000 acres. During the Pleistocene Epoch, the refuge was part of a much larger body of water known as Lake Franklin. This ancient lake covered over 300,000 acres and was more than 200 feet deep. As climatic conditions changed the lake level declined. Today, only 27,000 acres of wetlands remain in south Ruby Valley and consist of Ruby Lake and Franklin Lake marshes.

As the elevation of the land gradually increases and with increasing distance from the marsh, the moisture content of the soil decreases. This soil moisture gradient results in a variety of terrestrial habitats. Wet meadows and alkali playas, which border the marsh, transition to dry meadows, then grasslands, and finally shrub steppe habitat (sagebrush, greasewood, rabbitbrush). Pinyon pine and juniper occur at higher elevations and are mostly confined to adjacent Forest Service and Bureau of Land Management administered lands.

Large pristine wetlands are extremely rare in the Great Basin. Numerous wetlands in the Great Basin (as well as much of the west) have been degraded or lost because of water diversion. Wetlands on the refuge are not impacted by water diversion and the refuge water supply is normally abundant and of excellent quality. Even during the recent drought the refuge was one of the few areas in the Great Basin that contained wetland habitat. Some of the upland habitat types and springs on the refuge are unique in the Great Basin. Extensive meadows are rare in the high elevation desert of Nevada but provide important wildlife habitat. Saline meadows and grasslands, while not as rare as wet meadows, are dependent on springs and summer precipitation and contain a large number of native plant species. The refuge shrub steppe is a common but degraded plant community elsewhere in the Great Basin. Some of the shrub steppe habitat on the refuge has been impacted by past overgrazing. Soils and vegetation of these habitats are sensitive to disturbance and take a considerable amount of time to recover once damaged.

Wetlands on the refuge include permanently and seasonally flooded shallow marsh and infrequently flooded alkali playas. The permanent marsh is a mosaic of open water, bulrush stands, and islands. The average depth of the permanent marsh area is 3.5 feet with a range of 0.5 to 12 feet. The marsh is supplied with water from over 160 springs emanating from the basin floor and from springs located along the base of the southern half of the Ruby Mountains. Total wetland acres varies annually because of variability in annual snow pack on the Ruby Mountains.

The maximum wetland acreage occurs in the spring and gradually decreases during summer to a minimum acreage in the fall. The permanent marsh consists of a mosaic of open water and emergent vegetation (hardstem bulrush predominantly). Alkali playas are located mostly on the east side of the refuge. These areas are shallowly flooded periodically in the spring from melting snow and rain. When vegetated, playas provide excellent duck nesting habitat.

The management priority on the refuge is to maintain a high quality ecosystem, biological diversity, and a high level of productivity in order to meet the needs of wildlife. The marsh, meadows, grasslands, and shrub-steppe uplands are managed to provide high quality habitat for nesting and foraging wildlife. Nesting habitat is provided in areas where annual vegetation manipulation is prevented although prescribed fire is used periodically in meadows and grasslands to facilitate restoration of nesting habitat. A variety of vegetation management strategies are used on the refuge to provide foraging habitat. These strategies include water manipulation in the marsh and prescribed fire, grazing, haying, and irrigation in the non-marsh areas.

Grazing was the dominant tool used for vegetation manipulation until 1992. Prior to 1992, grazing was utilized on 96 percent of the non-marsh area. Under the draft revised Upland Habitat Management Plan (1992), grazing was reduced and utilized on 51 percent of the non-marsh area. Further reductions in grazing were made in 1997 to protect nesting habitat, riparian areas including springs and spring channels, and delicate grasslands. Grazing is now utilized to provide short stubble habitat on less than 10 percent of the non-marsh area.

Prescribed fire is used primarily as a means of rejuvenating meadows and grasslands that are covered by dense, matted Baltic rush which restricts and retards vegetative growth. Fire also is used to enhance the establishment and production of forbs and grasses in meadows, grasslands, and shrub steppe uplands.

Because of the rarity of large wetlands in the Great Basin, the refuge is a magnet for a wide diversity of wildlife species. The refuge is one of the most important waterfowl nesting areas in the Great Basin and the Intermountain West. The refuge consistently provides high quality upland and wetland habitats and is strategically located along migration corridors serving both the Pacific and Central flyways. During spring migration, birds converge on the refuge from the Humboldt River drainage to the west, Owens Valley to the southwest, the Great Salt Lake to the east, the Klamath Basin to the northeast and the Colorado River and Imperial Valleys to the south. Because of the biological diversity and pristine condition of the habitat, the South Marsh was declared a National Natural Landmark in 1972.

Although the refuge habitat management program emphasizes waterfowl nesting and foraging habitats, many other wildlife species benefit from this effort including grebes, egrets, herons, terns, greater sandhill cranes, shorebirds, raptors, and songbirds, because of similar habitat preferences. There are 207 migratory and resident bird species that utilize the refuge. An additional 23 bird species have been observed on the refuge but their occurrence is considered accidental. A total of 93 bird species nest on the refuge. Mammals found on the refuge include

many rodent species, mule deer, pronghorn, muskrats, rabbits and coyotes. The leopard frog, and gopher, garter, and rattle snakes occurs on the refuge; however, a complete species list of reptiles and amphibians has not been compiled for the refuge.

The refuge is an important production area for waterfowl, but also attracts large numbers of waterfowl migrating through both the Pacific and Central flyways. However, the primary importance of the refuge is to provide nesting habitat for canvasbacks and redheads. The South Marsh supports the largest nesting population of canvasbacks west of the Mississippi River and holds the highest concentration of nesting canvasbacks in North America. There are 13 other species of waterfowl which nest on the refuge and an additional 10 species which utilize the refuge during migration.

Spring waterfowl populations peak generally in April as breeding birds arrive and as migrant waterfowl travel through the area. Fall migrating waterfowl begin arriving as early as mid-August and the population peaks generally during September-October. Most waterfowl continue their migration south once the marsh freezes. During fall, large concentrations of waterfowl utilize the large shallow open water areas of the South Marsh. The shallow water provides access to aquatic invertebrates, sago pondweed seeds and tubers, and other submergant aquatic vegetation. During winter, the few remaining ducks, geese, and swans are confined to open water on the Collection Ditch, spring ponds, and small shallow areas where flowing water inhibits ice formation.

Trumpeter swans were originally transplanted to the refuge from Red Rock Lakes NWR in southwestern Montana between 1947-58. A successful resident breeding population was established on the refuge. During winter a small number of migrant swans from unknown locations use the refuge. The current resident trumpeter swan population is very small but appears to be stable. Despite the annual production of young, the population is not increasing because the young do not remain here following their first winter. It is not known where the swans are relocating. Presumably, the young swans are migrating north with birds that winter on the refuge. Tundra swans are observed briefly in south Ruby Valley during fall migration and in winter.

Canada geese nest and winter on the refuge. Greater white-fronted geese and snow geese have been observed migrating through Ruby Valley. The Canada goose population generally increases during winter, peaks prior to the nesting season and declines after broods fledge in August and September, when many of the family groups leave the refuge.

The refuge provides a significant amount of nesting habitat for the Lower Colorado River Valley greater sandhill crane population. This population nests exclusively in northeast Nevada. The refuge holds the highest concentration of nesting sandhill cranes in northeast Nevada. Nesting cranes have numbered as many as 50 pairs but have declined to less than 20 pairs as a result of poor survival of young. The refuge also serves as a staging area for cranes during migration.

A variety of raptor species are present in the area during all months of the year. The more

common nesting species include turkey vulture, red-tailed hawk, northern harrier and American kestrel. Golden eagles, prairie falcons, great-horned owls and short eared owls also nest in the area and utilize the refuge throughout the year. Rough-legged hawks and bald eagles are common winter residents on the refuge. Ferruginous and Swainson's hawk are occasionally observed.

The largest mule deer herd in Nevada occurs in the nearby Ruby Mountains and some of these animals forage and fawn on the refuge. The refuge has become increasingly more important to pronghorn antelope which use the grasslands during spring, summer, and fall. Grasslands and sagebrush steppe provide habitat for rabbits, rodents, coyotes, and bobcats which are attracted to the refuge because of high prey density. Riparian areas on the refuge are host to porcupines, weasels, and many song bird species. Muskrats inhabit the marsh. Both sage grouse and badgers are observed in the sagebrush steppe areas of the refuge and marmots live in the rocky slopes of the Ruby Mountains.

Pronghorn antelope were released on land administered by the Bureau of Land Management near the southeast side of the refuge in 1988 by the Nevada Division of Wildlife in an effort to increase the size of the local herd. The local population has increased from approximately 25 animals to over 100 animals. Pronghorn have been frequently observed on the refuge. The pronghorn are presumably attracted to the refuge because of the availability of high quality forage and water.

The small relict dace (*Relictus solitarious*), endemic to northeast Nevada, is the only fish native to the marsh. The relict dace was once abundant in the marsh but declined drastically following the introduction of largemouth bass in 1932-33. The relict dace now occurs only in a few isolated spring ponds and spring channels. Additionally, there has been much hybridization with speckled dace which has further threatened the integrity of the relict dace population. The speckled dace were introduced as a forage fish for bass. Only two other valleys in this region contain populations of relict dace but they are vulnerable to loss because the land is not protected.

Trout planted in the marsh and spring ponds include eastern brook, cutthroat, rainbow, and brown trout. The tiger trout, which is a hybrid of brown and brook trout, and the cutbow trout, a hybrid cutthroat and rainbow trout has also been planted in the marsh and ponds. The existence of the trout fishery at the refuge is dependent on annual stocking. All trout stocked on the refuge are reared at the state-operated Gallagher Fish Hatchery located on the refuge. Bass reproduce annually in the marsh.

Compatible public use allowed on the refuge includes environmental education, wildlife observation, fishing, and migratory bird hunting. Fishing accounts for the majority of public use on the refuge. Public use peaked near 70,000 visits during the mid 1980's when bass were at their peak population. A severe and long term drought from 1987 to 1993 resulted in a drastic decrease in the bass population and a corresponding decrease in public use. Public use has been steadily increasing since 1993 as water elevation in the marsh and the bass population recover.

A. HIGHLIGHTS

- ☞ Precipitation well above average (B)
- ☞ New Refuge Manager arrives (E1)
- ☞ Marsh continues to recover from drought (F2)
- ☞ West Marsh unit 10 dewatered (F2)
- ☞ Fire season busy for refuge personnel (F9)
- ☞ Waterfowl use days increased while production decreased (G3)
- ☞ Fish stocking decreased (G12)
- ☞ MAPS station established (G16)
- ☞ Public use increased (H1)
- ☞ East Marsh project completed (I-1)

B. CLIMATIC CONDITIONS

In contrast to a cool 1995, 1996 was generally warmer and much wetter. The first three quarters (January through August) of 1996 were warmer than the same time period in 1995 and the last quarter (September through December) was colder. The maximum and minimum average monthly temperatures for 1996 followed this pattern when compared to their respective long term means (Table 1). Precipitation received in 1996 was 2.76 inches greater than the total for 1995 and 8.73 inches greater than the long term mean (Table 1). Monthly precipitation exceeded 2.0 inches during six months in 1996 which is one month more than during 1995. Snow received in 1996 was 57.6 inches greater than the total for 1995 and 56.7 inches greater than the long term mean (Table 1). Monthly snow accumulation exceeded 8.0 inches during four months in 1996 which is three months more than during 1995. Evaporation during 1996 was 9.9 inches greater than during 1995 and 6.9 inches greater than the long term mean (Table 1). Hot temperatures during June, July, and August contributed to higher than normal evaporation rates during these months.

Precipitation received during the 1995-96 winter was greater than during the 1994-95 winter and was well above average (Figure 1). Water-year precipitation (October 1995 through September 1996) totaled 17.07 inches which was 2.12 inches less than the 1994-95 water-year but 4.4 inches greater than the long term water-year mean. The water-year snow pack (measured at the refuge headquarters) totaled 69.9 inches which was 21.6 inches less than the 1995-96 water-year but 21.1 inches greater than the long term water-year mean.

Table 1. Climatic conditions measured at Ruby Lake NWR during 1996.

Month	Precipitation (inches)		Evaporation[b] (inches)		Snow (inches)		Max. Avg. Temp. (°F)		Min. Avg. Temp (°F)	
	1996	Mean[a]	1996	Mean	1996	Mean[c]	1996	Mean[d]	1996	Mean[d]
Jan	4.38	1.30			39.3	11.9	41.2	39.0	20.3	13.8
Feb	1.40	1.17			7.8	8.7	43.2	43.3	19.2	18.0
Mar	2.02	1.40			14.5	7.5	51.1	48.3	25.3	24.2
Apr	1.76	1.14	5.4	4.4	4.4	3.7	57.0	57.7	32.2	30.4
May	2.10	1.24	7.3	6.3	0.0	0.8	65.2	66.7	40.2	37.6
Jun	0.15	0.95	10.9	8.9	0.0	0.1	81.0	77.3	47.2	44.7
Jul	0.18	0.51	11.3	10.4	0.0	0.0	89.1	86.8	54.1	51.5
Aug	0.00	0.64	10.9	9.4	0.0	0.0	87.8	85.0	48.8	49.3
Sep	0.35	0.74	6.2	6.1	0.0	0.2	74.0	76.6	38.3	40.6
Oct	2.58	0.99	3.5	3.3	6.7	1.8	61.0	65.0	29.1	30.6
Nov	2.45	1.34			9.1	5.3	50.2	49.8	24.0	22.7
Dec	4.11	1.38			24.3	9.4	40.3	40.7	22.2	15.4
Total	21.48	12.75	55.56	48.7	106.1	49.4				

[a] Mean precipitation, 1940 - 1995
[b] Evaporation not measured November - March
[c] Mean annual snow, 1940 - 1995
[d] Mean monthly temperature, 1940 - 1995

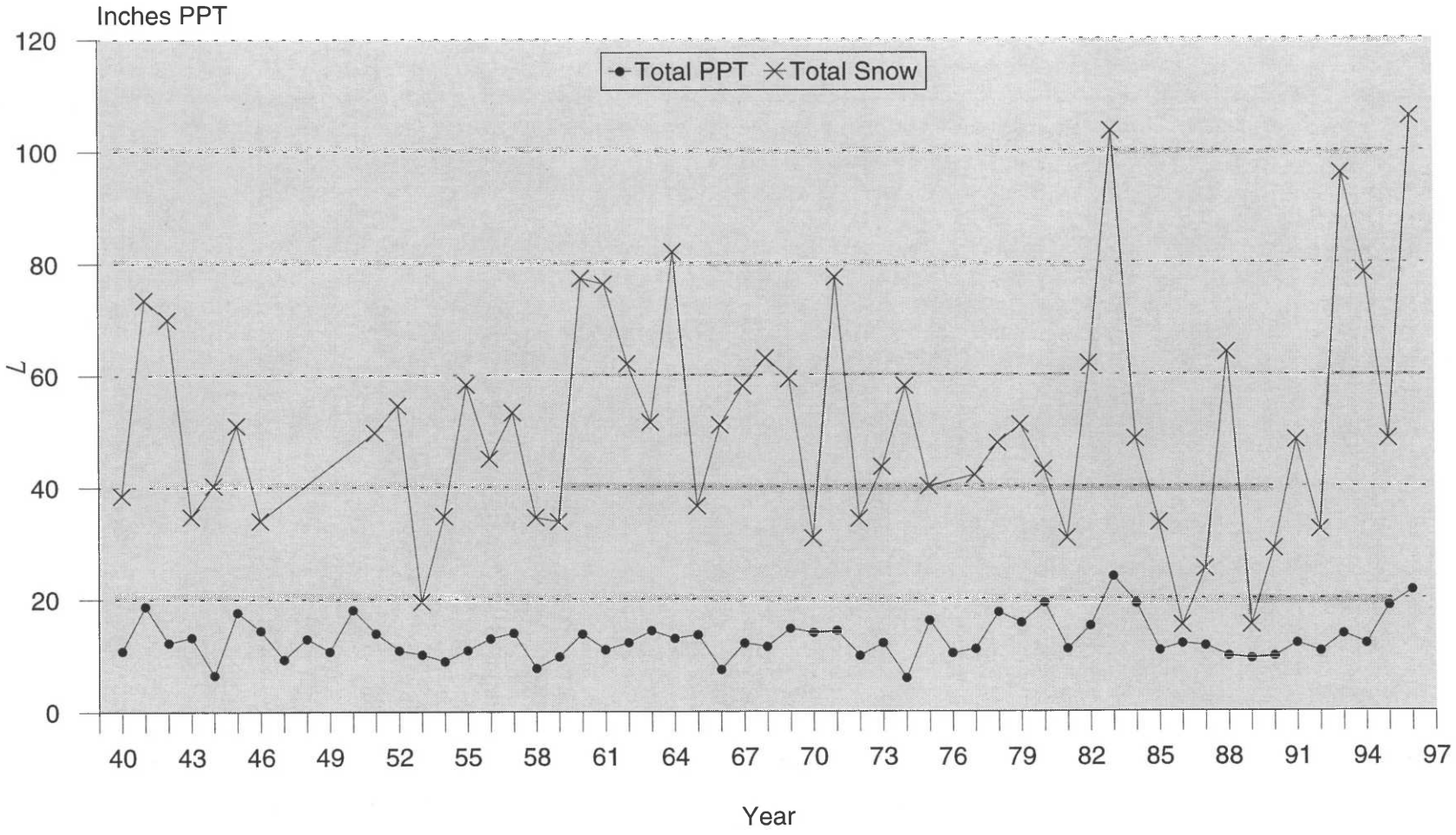


Figure 1. Calender year precipitation received at Ruby Lake NWR, 1940-1996.

D. PLANNING

5. Research and Investigations

Non-game bird surveys of the south Ruby Valley ecosystem. Surveys of habitats on the refuge and on adjacent Forest Service lands were initiated in 1992. The purpose of these surveys is to collect baseline data on non-game bird species occurring in south Ruby Valley during the migration and nesting periods. Transects are surveyed in marsh, meadow, grassland, shrub steppe and pinyon-juniper habitats. The study is funded by the refuge and Wildlife Biologist Mackay is the principle investigator.

A radio telemetry study to determine the causes of juvenile sandhill crane mortality in south Ruby Valley. Research was initiated in 1995 to determine causes of juvenile sandhill crane mortality. In 1996 radio transmitters were attached to eight of 17 juvenile sandhill cranes known to have hatched. Five marked juvenile cranes died; three chicks were killed by coyotes, one chick died from injuries received from a sibling or the parents, and one chick died from unknown causes. Only three of the 17 chicks fledged and these were marked chicks. The study was funded by the refuge and the Webless Non-game Migratory Bird Research Committee. Wildlife Biologist Mackay is the principle investigator.

Fall and winter locations of Canada geese nesting at Ruby Lake NWR. Research was initiated in 1993 to determine the fall and winter locations of nesting Canada geese. Study objectives include: 1) determine off-refuge locations of Canada geese from August through March, and 2) determine the survival rate both on- and off-refuge. A total of 124 geese have been marked with plastic neck collars (black with white codes) and standard aluminum leg bands. Marked geese have been observed mostly on the Snake River in Idaho. The study is funded by the refuge and Wildlife Biologist Mackay is the principal investigator.

Breeding biology and productivity of largemouth bass at Ruby Lake NWR (14570-03). This is ongoing research conducted by the Nevada Division of Wildlife (NDOW). The purpose of the study is to determine bass nesting and production, and angler harvest and influence on the bass population. A limited number of creel surveys were conducted in 1996 due to the lack of anglers. Michael Green, NDOW Fisheries Biologist is the principle investigator.

E. ADMINISTRATION

1. Personnel

Figure 2. 1996 refuge personnel; left to right 6, 5, 3, 1, 4, 8, 7, 2. JM 9/96

1. Kim D. Hanson, Refuge Manager	GS 12/1 EOD 02/24/96
2. Jeff Mackay, Wildlife Biologist	GS 09/4 EOD 03/24/91
3. Kevin J. DesRoberts, Operations Specialist	GS 09/2 EOD 06/11/95
4. Monica (Niki) S. McQueary, Administrative Support Assistant	GS 06/6 EOD 04/24/88
5. Daniel K. Johnson, Maintenance Worker	WG 09/5 EOD 07/14/91
6. Jeanne Tinsman, Volunteer (Biology)	EOD 06/11/95
7. Mary Reische, Volunteer	
8. Farrel Reische, Volunteer	

The permanent staffing level has remained unchanged during the past five years (Table 2). However, the refuge FTE allocation was reduced from 5.8 to 5.0 which prevented the hiring of biological and maintenance temporary personnel in 1996. The loss of these temporary position severly impacted refuge operations.

Table 2. Refuge staffing levels.				
Year	Permanent Full Time	Permanent Part Time	Temporary[a]	Total FTE Used
1996	5	0	1	5.1
1995	5	0	1	4.4
1994	5	0	3	5.8
1993	5	0	1	5.2
1992	5	0	2	5.5

[a] Includes Crew Leader position for YCC.

2. Youth Programs

Ruby Lake NWR hosted a 5-day residential Youth Conservation Corp (YCC) camp from 10 June through 2 August. Initially the crew consisted of three females and three males (Figure 3). However, one female enrollee resigned following the second week of work and one male enrollee resigned one week before the end of the program. Both resignations were due to personal problems. Justin Dean, a college student at Montana State University, returned for his second year as YCC crew leader. Justin did an excellent job completing work tasks and dealing with personnel issues. Despite some personnel problems, the program was very successful. The crew completed many projects and there were very few accidents or injuries. Refuge Operations Specialist DesRoberts provided tail gate safety sessions, environmental education, and overall coordination. Wildlife Biologist Mackay also conducted environmental education.

The crew completed the following projects during the 1996 YCC program:

1. As part of the refuge's Integrated Pest Management Plan, the crew removed several stands of Scotch thistle, white top and Russian knapweed.
2. Assisted wildlife biologist with trapping and banding geese.
3. Set-up camp, transported supplies to the helibase, and completed general clean-up for Hawkwatch International's banding and research station located in the Goshute Mountains.
4.Rock removal and trail maintenance around refuge headquarters.
5. Completed many fencing projects including: fence repair and reconstruction, construction of 1 mile of barbed wire fence and 2 miles of electric fence, and removal of several miles of barbed wire fence.
6. Cleaning public restrooms and removing litter.
7. Assisted with pouring cement for handicap accessible parking and fishing areas.
8. Finished constructing wood rail fence around Bressman's Cabin.
9. Assisted with constructing rock support structure for new sign in front of office.

Figure 3. The 1996 YCC crew. Right to left: Justin Dean, Shawn Stalder, Cecile McQueary, Laurie Stout, and Steven Scilacci. KD 7/96

Figure 4. The YCC crew completed many projects including installing a wood rail fence around the Bressman Cabin. KD 6/96

In addition to completing work projects, the crew participated in off-site environmental education. Educational experiences included a guided tour of a local gold mine and an over-night trip to Great Basin National Park (NP). The Great Basin NP trip included a hike to view the last remaining mountain glacier in the Great Basin, a tour of Lehman Caves, and a presentation by a Park Service biologist.

4. Volunteer Programs

Because of an inadequate FTE allocation and salary funding, the time contributed by volunteers is a valuable asset to the refuge. In 1996, eleven volunteers (including Federal and State employees) contributed 1,779 hours.

Volunteers Mary and Farrell Reische returned for another summer at Ruby Lake NWR and contributed 1,267 hours (Figures 5 and 6). Farrell , once again, was a tremendous asset to the refuge maintenance program. He assisted Maintenance Worker Johnson in completing several projects, including building a new foot bridge across Cave Creek. Mary also was a tremendous asset to the refuge. She assisted the Administrative Support Assistant with numerous clerical, filing, and organizing tasks and provided information to the visiting public. Both were recognized for their achievements with certificates of appreciation and a gift at the end of their tour of duty.

Figure 5. Mary Reische's administrative and organizational skills were a real asset to refuge administration. KD 9/95

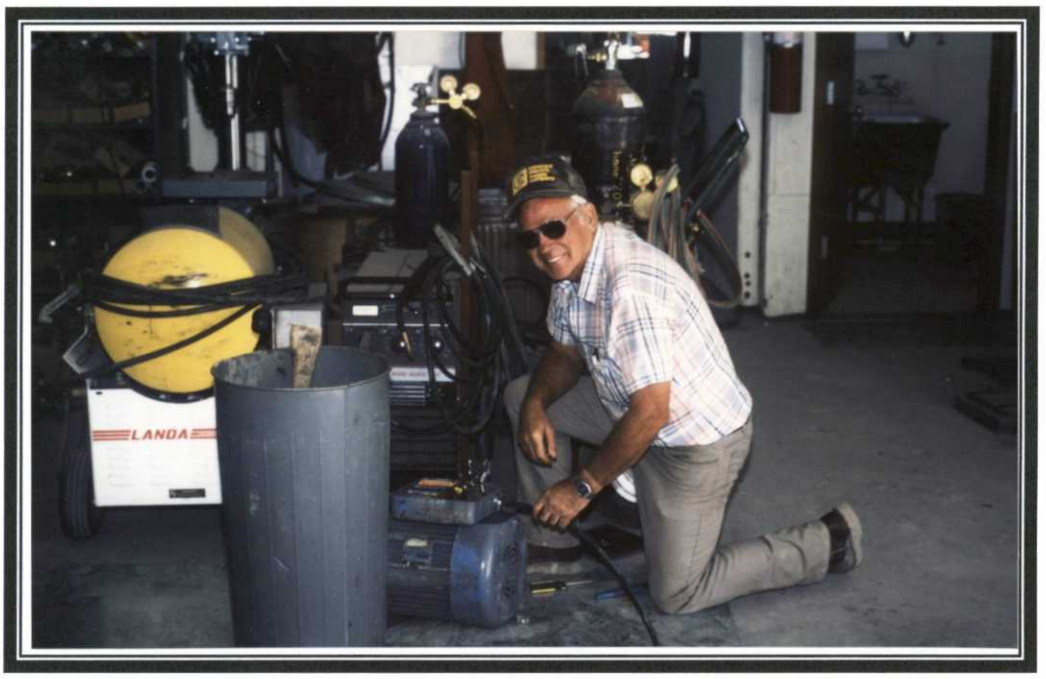


Figure 6. Farrell Reische assisted with several maintenance projects, which makes quite a difference when the permanent maintenance staff is only one person. KD 9/95

Volunteer Jeanne Tinsman established a Monitoring Avian Productivity and Survivorship (MAPS) station on the refuge. She also started a butterfly collection and assisted with bird surveys. Jeanne contributed a total of 252 hours.

Volunteer Edward Partee, a local Nevada Division of Wildlife employee, used vacation time to assist with our prescribed fires. Ed contributed 41 hours to the refuge during 1996.

Ten volunteers participated in the 1996 Christmas Bird Count. Along with refuge personnel, they braved the cold to count 61 species and 2,175 individual birds. The participants included personnel from the Elko District Bureau of Land Management, the U.S. Forest Service, Nevada Division of Wildlife, Ash Meadows National Wildlife Refuge, and residents of Elko, Nevada.

5. Funding

Operations and Maintenance base funding increased in 1996, however, total funding decreased again (Table 3).

The refuge fire preparedness budget was funded at $2,500. This funding was used to purchase tools, small equipment, personal protective equipment, and to conduct maintenance on fire equipment and the FTS fire weather station. Prescribed fire costs were covered with 1261 and 9120 funds.

The refuge received $5,000 in subactivity 6860. These funds were used to administer the grazing and haying programs.

Table 3. Station funding levels (000's).

FY	1261	1262	6860	9110	9120	1120	Total
1996	288.6	44.0	5.0	2.5	2.4	0	342.5
1995	222.0	137.0	5.0	4.9	0	0	369.7
1994	255.0	139.0	5.0	1.0	12.0	0	412.0
1993	191.0	100.6	5.0	0	8.0	1.0	305.6
1992	191.0	78.0	5.0	0	17.0	3.0	294.0
1991	191.5	137.0	5.0	0	2.0	0	335.5

Subactivity 1262 included three Maintenance Management System (MMS) projects (Table 4). All MMS projects were completed this year including the East Marsh restoration project first funded in 1995.

Table 4. Refuge MMS projects funded in 1996 (000's).

Project No.	Description	Funded Amount
95004	East Marsh restoration	30.0
95009	Vehicle lift replacement	7.5
94014	Gravel replacement for kiosks and restrooms	6.5
Total Funding		44.0

6. Safety

Fire breaks were disced around the refuge headquarters and residences as well as the Gallagher Fish Hatchery residences.

Furnaces and wood stoves were inspected and maintained in preparation for winter.

Fire extinguishers were inspected and maintained as necessary. The data base used to track fire extinguisher maintenance needs was brought up-to-date.

Refuge staff received certification in basic First Aid and Adult and Child CPR.

There were no lost time accidents this year involving service personnel or volunteers.

F. HABITAT MANAGEMENT

1. General

The refuge contains a large variety of wetland and upland habitats (Table 5). Most habitat types are in good condition but some have been negatively impacted by grazing. Grassland and shrub-steppe habitats have become infested with green rabbitbrush. Grazing in these habitats has resulted in a significant increase in the density of rabbitbrush and caused a loss of native plant species.

Table 5. Habitat types found on Ruby Lake NWR.

Habitat Type	Number of Acres	Percent of Vegetation Type
Open Water/Emergent Marsh	15,144.9	40.2
Alkali Playa	3,598.4	9.6
Meadow	4,246.9	11.3
Grassland	1,385.2	3.7
Shrub-steppe	13,256.6	35.2
Total	37632.0	100.0

2. Wetlands

The marsh continues to recover from the recent severs drought (Figure 7). More wetland acres were flooded in 1996 than in 1995, however, total flooded acres remained below average (Table 6). The volume of water flowing from springs appeared to be near to above average during most of the year, and was above average during November and December because of above average temperatures. Cave Creek experienced high flows and some flooding in early June. Flynn and Hager Spring flowed for three months in 1996, one month longer than in 1995. Flynn Spring began to flow in mid April and stopped flowing in late July, which is about two month earlier than normal. Flynn Spring Creek also experienced some flooding in early June. Butte Spring, located at the north and west corner of the refuge, began flowing in mid March. Butte Spring pond contained water through September.

Figure 7. The marsh is quickly recovering from the drought because of abundant precipitation. JM 5/96

Table 6. Estimated flooded acres in management units on Ruby Lake NWR during 1996.

Unit	Spring 1996	Spring Average[a]	Fall 1996	Fall Average[a]
West Marsh	1,240	1,240	1,240	1,240
North Marsh	6,000	6,800	2,500	3,000
East Marsh	11	1,755	11	1,400
South Marsh	7,000	7,300	7,000	7,000
Collection Ditch	25	25	25	25
Total	14,276	17,120	10,776	12,665

[a] Represents wetland acreage under average precipitation patterns.

Water elevations in the marsh management units have nearly returned to normal following the recent severe drought. Water output from springs contributing to the Collection Ditch during 1996 was 72 percent greater than during 1995 (Table 7). Other springs on the refuge also exhibited higher water output during 1996 than during 1995. Water was available to maintain the West Marsh units (10, 13, 14, and 20), marsh unit 21, and the South Marsh at desired management elevations throughout the year. However, the North Marsh unit did not reach desired management elevations and could not be maintained at desired management elevations

throughout the year. Water diversion to the East Marsh was kept to a minimum because of scheduled habitat enhancement work. During non-winter months, water in excess of that needed to maintain the small marsh units at desired management elevations, was diverted to the South Marsh.

Table 7. Inflow[a] to refuge marsh units from the Collection Ditch (1992 - 1996).

Year	Marsh Unit							Total
	10	13	14	20	21	NM	SM	
1992	641.70	466.93	818.96	911.22	2229.69	63.23	3829.61	8961.34
1993	1236.77	831.82	481.16	866.92	2277.59	923.44	7185.03	13802.73
1994	1068.29	627.45	544.88	948.59	1713.38	14.94	6396.94	11314.47
1995	1050.96	597.75	494.76	457.77	2145.84	490.51	13630.99	18868.58
1996	5913.99	701.16	160.42	479.61	1740.73	9460.72	14003.14	32459.77

[a] Inflow in acre feet. Values do not represent inflow from adjacent marsh units.

From February through April the water elevations in the West Marsh units were increased or decreased to achieve desired management elevations for waterfowl nesting. Water elevations were maintained at stable levels through June to prevent disturbance to nesting waterfowl. From July through September water elevations were allowed to decrease through evapotranspiration to enhance waterfowl foraging habitat. During late fall, the water elevations began increasing and were at desired management elevations by mid-winter. Much of the increase in water elevation during fall is due to decreased evaporation and emergent plant transpiration, rather than increased spring flows. During winter when the West Marsh units were ice-covered, water was diverted from the Collection Ditch and routed to the North Marsh through West Marsh units 20, 14, 13, and 10, in that order, to maintain sufficient dissolved oxygen concentrations for fish. Water was diverted to the South Marsh directly from the Collection Ditch and via marsh unit 21 when this unit was ice-covered.

During 1996 more water was provided to West Marsh units 10 and 21 and the North and East Marsh units from the Collection Ditch than in 1995 (Table 8). Less water was provided to West Marsh units 13, 14, 20, and the South Marsh in 1996 than in 1995 (Table 8). However, maximum water elevations in the North and South Marsh units during 1996 exceeded the 1995 maximum elevations in these units because of higher spring output and higher precipitation.

Table 8. Summary of water management in refuge management units during 1996.

Unit	Maximum Elevation	Minimum Elevation	Total Inflow[b] Acre Ft.	Total Outflow[c] Acre Ft.	Net Inflow Acre Ft.
10	5965.24 (5965.30)[a]	Drained (5964.86)	8946.48 (2099.90)	3664.15 (1421.24)	5282.33 (678.66)
13	5965.52 (5965.38)	5964.38 (5964.48)	1274.51 (1190.98)	1379.76 (1141.89)	-105.25 (49.09)
14	5965.78 (5965.74)	5964.14 (5964.76)	329.30 (706.26)	519.55 (326.54)	-190.25 (379.72)
20	5965.74 (5965.80)	5964.46 (5965.00)	479.61 (459.20)	404.84 (248.82)	74.77 (210.38)
21	5965.86 (5965.56)	5965.18 (5964.44)	1740.73 (2145.84)	1284.18 (1852.22)	456.55 (293.62)
North Marsh	5963.95 (5963.68)	<5961.90 (5961.60)	12346.80 (1980.55)	0.00 (0.00)	12346.80 (1980.55)
N East Marsh	5963.00 (5963.02)	5962.44 (5962.28)	518.49 (601.46)	0.00 (0.07)	518.49 (601.39)
S East Marsh	5963.38	5962.44	202.51	0.00	202.51
South Marsh	5965.52 (5964.66)[d]	5964.21 (5962.24)[d]	15143.24 (15566.64)	No Outflow	15143.24 (15566.64)
				TOTAL	33729.19 (19760.05)

[a] Measurements recorded in 1995 in parentheses.
[b] Does not include spring flow within units and uncontrollable spring flows.
[c] Does not include evapotranspiration.
[d] Elevations as measured at the Main Boat Landing.

The drawdown of West Marsh unit 13 was again delayed because of habitat enhancement work in the East Marsh. This work required that the East Marsh remain dry, therefore unit 13 remained flooded to facilitate routing of water during winter. However, a drawdown of West Marsh unit 10 was completed. Unit 10 was burned in October and nine islands were built with the D-3 dozer. Water was diverted to the unit in late November and water level reached objective elevation in December.

The water elevation in marsh unit 21 was intentionally maintained at a higher elevation in order to discourage California gulls from nesting in the unit. Since waterfowl use this unit more for courtship and roosting activities than for nesting, the higher water elevation did not affect waterfowl use of the unit.

The southern one-half of the North Marsh was flooded during spring from water diverted from the small marsh units (winter flows). The alkali plays located in the north one-half of the North Marsh were flooded from rain and melting snow during spring but were dry by late June. The south one-half of the unit was dry by mid August but received use by significant numbers of shorebirds and ducks during the spring and summer. In November, water was again diverted to the North Marsh from the West Marsh units. The south end of the North Marsh became shallowly flooded during early winter and provided excellent foraging habitat for waterfowl.

The East Marsh was kept as dry as possible to facilitate the completion of levee construction and habitat restoration work. Very little water was diverted into this unit and residual water was pumped into marsh unit 21 during the spring to hasten the drying process. The project was completed in August and water was diverted to the south management unit during December.

The maximum water elevation in the South Marsh occurred in late May, approximately 1.5 months earlier than in 1995 (Figure 8). During 1996, the maximum water elevation was 10.3 inches higher and the minimum elevation was 23.6 inches higher than in 1995. The South Marsh water elevation was the highest since 1987. Water from the Collection Ditch was diverted to the North Marsh during peak flows in April, May, and June to prevent impacts to canvasbacks and redheads nesting in other marsh units. The South Marsh elevation decreased 1.32 inches from April 1 through May 15 and increased 2.28 inches from May 15 through June 1. Extensive production of sago pondweed continued in the South Marsh.

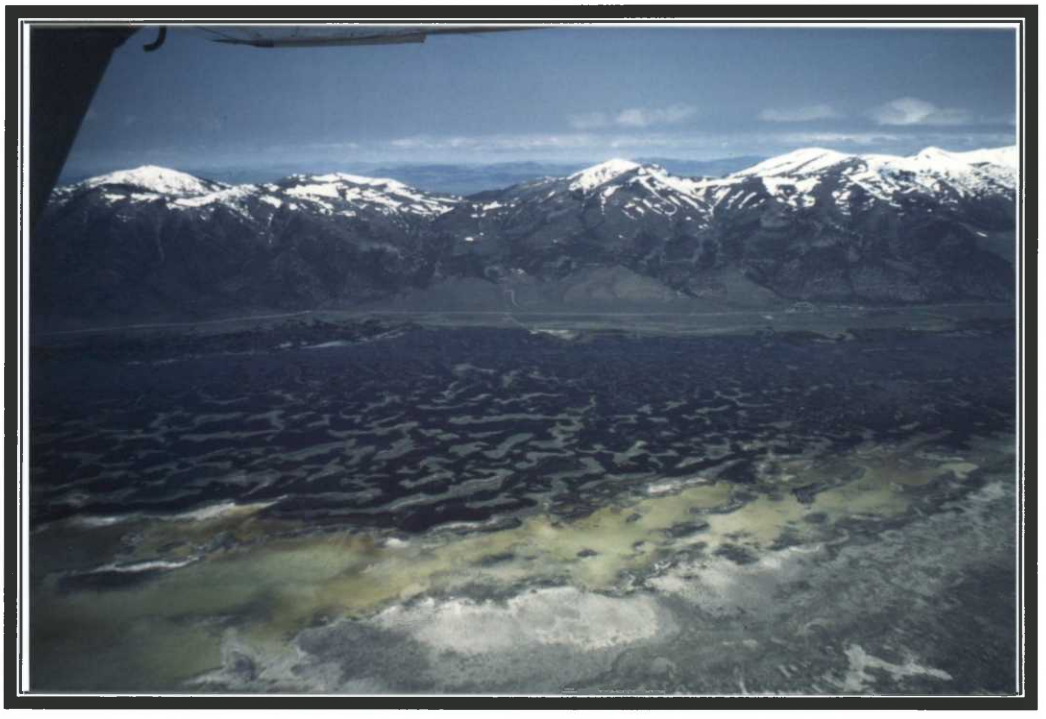


Figure 8. The South Marsh has fully recovered from the drought. JM 5/96

During the recent drought, small isolated cattail (*Typha angustifolia* and *T. latifolia*) stands expanded and new stands pioneered rapidly in bulrush habitat in all marsh units. Many of these stands are located along levee roads. In some areas cattails are now the dominant emergent species, having successfully out-competed bulrush. The expansion of cattails may negatively impact over-water nesting duck species because of the loss of open water and the loss of bulrush which is believed to be a superior nesting substrate. Cattail is believed to be an exotic species on the refuge.

5. Grasslands

Plant growth in 1996 began earlier than average because of warm spring temperatures. Total plant production in meadows and grasslands was average to above average because of abundant spring precipitation. Vegetation production was highest and the active growth period the longest in the meadows adjacent to the marsh because of subirrigation.

Several fencing projects were completed during 1996. Approximately 1 mile of barbed wire fence was removed and reconstructed along the south boundaries of meadow units I-K and V-E. A fence was constructed to protect spring number 129. This spring was used by cattle grazing the adjacent Forest Service allotment. Approximately 2 miles of take-down electric fence was constructed in the East Marsh north of the new levee. Several miles of barbed-wire fence was removed from meadow units II-A, II-G, III-A, and V-D.

7. Grazing

One Special Use Permit (SUP) for grazing was issued to the Duval Ranching Company, a long-time permittee. Grazing was implemented on 9,332 acres in 1996 at a level of 1,946 AUM's (Table 9). Cattle were first placed on the refuge 29 April and removed form the refuge 19 November. The grazing fee was set at $3.83 per AUM which is a decrease of $0.41 per AUM from 1995. The grazing fee was reduced in 1996 because the annual fee is determined by a formula using various agricultural market values, which declined in 1996. The revenue collected from grazing in 1996 totaled $7,455.61, which was $2,143.43 less than collected in 1995.

Table 9. Summary of grazing on Ruby Lake NWR in 1996.

Unit	Acres	AUM's Prescribed	AUM's Actual	Season of Use[a]	Utilization[b]
I-C	31.4	70	59.50	ES	Moderate
I-D	65.8	75	22.00	S	Light
I-D		100	117.33	LS	Heavy
I-F	136.9	40	41.83	F	Light
I-F		145	158.70	F	Moderate
I-F		40	45.50	W	Light
I-GH	251.8	100	176.80	F	Heavy
I-GH		100	63.00	F	Light
I-K	202.8	75	80.00	LS	Moderate
I-K		100	86.67	S	Moderate
I-L	190.8	135	81.67	LS	Moderate
I-M	220.0	100	95.20	S	Light
I-O	757.6	100	91.80	LS	Light
I-O		40	35.23	LS	Light
II-F	364.6	150	89.70	F	Moderate
II-F		0	28.80	W	Light (Trespass)
II-F		0	196.80	W	Light (Trespass)
II-H	688.0	100	70.00	ES	Light
II-H		100	93.33	S	Light
III-C	2,758.6	60	66.67	ES	Light
III-D	3,619.0	200	191.10	F	Moderate
V-E	45.1	70	55.00	F	Moderate
Total		1900	1946.63		

[a] Season of Use: Early Spring (ES) = 15 April to 15 May, Late spring (LS) = 15 May to 15 June, Summer (S) = 16 June to 15 August, Fall (F) = 16 August to 16 October, Winter (W) = 15 October until hay consumed (~15 December)

[b] Utilization: Light = 25-40 % utilization, Moderate = 40-65 % utilization, Heavy = 65-90 % utilization

8. Haying

During 1996 only two of five meadows were prescribed for haying. Wendall Neff, a local ranch operator, submitted the only bid to harvest and remove hay from meadow units I-C and I-E. All bales were removed by 15 September. Approximately 41 tons of hay were removed from unit I-C and 100 tons from unit I-E.

Irrigation of the hay meadows was initiated in late April and was terminated at the end of July. Vegetation production in meadow units I-C and I-E was good to excellent in both units. Only fair production of vegetation occurred in meadow units I-D and I-F because of the deteriorated condition of the irrigation system.

9. Fire Management

During 1996, six of the twelve planned prescribed fires were executed (Table 10). Wildlife Biologist Mackay is qualified as a Type III Burn Boss and served as the Burn Boss on all six prescribed fires. We received assistance from the Ely District Bureau of Land Management fire crews on three prescribed fires and fire crews from the Sheldon and Hart Mountain NWR and Klamath Basin NWR Complexes on three fires. The support provided by these crews was critical to successfully executing the fires. Interagency assistance is essential to the accomplishment of most prescribed fires because the refuge is not staffed adequately to execute large prescribed fires.

The resources objective for all the fires was to restore waterfowl and songbird nesting habitat. The fires executed in meadow units I-I, I-N, III-C, and V-A removed dense matted residual vegetation. This will allow regrowth of plants and restoration of nesting cover. West marsh unit 10 was burned following a summer draw-down to remove large dense stands of bulrush (Figure 9). Open water created by the fire will improve waterfowl foraging habitat and increase access to regrowth by over-water nesting ducks. The north three-quarters of the East Marsh was burned in an attempt to create open areas in the large dense bulrush which occupies the unit. The prescribed fire was conducted in the fall when fuel and peat were driest. Peat fires were ignited in approximately 60 percent of the unit and burned until late November (Figure 10).

Table 10. Summary of prescribed fires planned and executed on the refuge in 1996.

Unit	Month Burned	Acres	
		Prescribed	Achieved
Meadow Unit I-A	--	60	0
Meadow Unit I-I	May	210	125
Meadow Unit I-N	May	40	35
Meadow Unit II-B	--	190	0
Meadow Unit II-C	--	310	0
Meadow Unit II-F	--	240	0
Unit II East Meadows	--	60	0
Meadow Unit III-C	October	840	830
Meadow Unit V-A	October	21	40
Marsh Unit 10	October	210	390
North Marsh	--	1600	0
East Marsh	October	500	590
Total		4,281	2,010

Figure 9. The prescribed fire in marsh unit 10 burned into the night. JM 5/96

Figure 10. Dense bulrush in the East Marsh burned hot and ignited peat fires. JM 5/96

During 1996, three permanent staff and one refuge volunteer maintained fire qualifications which allowed them to execute prescribed fires and respond to local wildfires. Two staff members and the volunteer were qualified as Type 2 firefighters and one staff member was qualified as a Type 4 Incident Commander. Annual Interagency Operating Agreements were signed with the Elko Interagency Dispatch Center (EIDC) and the Ely Interagency Coordination Center (EICC). The refuge initial attack zones cover all of Ruby Valley and portions of adjacent valleys to the east, south, and west. Wildlife Biologist Mackay represents the refuge in the EIDC and EICC Operations Groups, which consists of Fire Management Officers from the Bureau of Land Management, the Humboldt National Forest, the Nevada Division of Forestry, and the Bureau of Indian Affairs.

The 1996 wildfire season started early and ended with a bang. Refuge staff responded to 11 reports of wildfires in our initial attack response area. The first wildfire occurred on 29 April and was started by a sheep herder attempting to smoke out a lizard from a rock pile. We responded to four fires in June, four fires in July, one fire in August, and one fire in September. The majority of the fires were suppressed at less than 10 acres. The Road Canyon fire, ignited by dry lightning occurred in August on the Ruby Mountains less than one mile from the refuge. The fire was pushed by thunder cell downdrafts and grew quickly in size to 1,750 acres when finally extinguished. Wildlife Biologist Mackay served as the Incident Commander for much of the duration of the fire. Two refuge engines, the refuge water tender, and the refuge D3 dozer were used on the fire in addition to other suppression resources including air tankers from Battle Mountain, Nevada.

The Ruby Dump fire occurred under windy conditions in late September and started after the local landfill was ignited by an unknown person. The landfill is located on Humboldt National Forest administered lands on the west refuge boundary less than 0.5 mile from the refuge headquarters (Figure 11). As luck would have it, only one refuge firefighter-qualified employee was on station when the fire was ignited. By the time he responded the fire had escaped to the surrounded area and was making strong runs uphill to the west and to the north. Fortunately, the fire burned with a south wind and away from the refuge headquarters. Suppression resources included four Nevada Division of Forestry (NDF) inmate hand crews, one NDF engine from Wells, Nevada, one NDF helicopter from Minden, Nevada, and one air tanker from Battle Mountain, Nevada, in addition to one refuge engine and the refuge D3 dozer (Figure 12). The fire totaled 1,917 acres, of which over 280 acres was on refuge lands and re-burned a section of the 1979 Shantytown fire (Figure 13). Fire camp and helibase was established in a meadow on the refuge (Figure 14) and the refuge office was used as the Incident Command Post. Suppression activities occurred over a five day period. Maintenance worker Johnson used the D3 dozer to rehabilitate the south dozer line.

Figure 11. Refuge facilities were not threatened during the Ruby Dump fire. JT 9/96

Figure 12. Air tankers assisted in suppression of the Ruby Dump fire. JT 9/96

Figure 13. Final size of the Ruby Dump fire. JM 9/96

Figure 14. The Ruby Dump fire helibase and fire camp were located in a refuge meadow. JM 9/96

Refuge fire vehicles include a 1987 Chevrolet dual-wheel, 1 ton, 4X4 pick-up truck, which carries a 200-gallon slip-on pumper unit, and a 1991 Dodge, 1.5 ton, 4X4 truck, equipped with a 250 gallon tank, pump and fiberglass utility bed (similar to BLM light engines). The 1987 fire truck and pumper unit has not been reliable for the past five years and the unit as taken out of service during most prescribed fires during 1996 because of equipment failure. The refuge water tender consists of a 1000-gallon unit which slips onto our 1993 Ford 5 yard dump truck. These fire vehicles are invaluable to our prescribed fire program, critical for protection of refuge resources from wildfire, and essential for participation in interagency fire suppression activities.

Firebreaks were maintained around refuge headquarters and the nearby Gallagher Fish Hatchery as a precautionary measure against wildfires. Local residents (i.e. Gallagher Fish Hatchery personnel) comprise the crew for the Ruby Valley #3 Volunteer Fire Department. A 750-gallon fire truck owned by Nevada Division of Forestry is stationed at the Gallagher Fish Hatchery and is often used as a water tender and a back-up engine when we execute prescribed fires on the refuge.

10. Pest Control

Refuge Pesticide Use Proposals were approved for the use of Rodeo (Glyphosate) and Weedmaster (Banvil plus 2,4-D) to control white-top (hoary cress), Russian knapweed, Canada thistle, Scotch thistle and green rabbitbrush. Naturally occurring populations of rust disease and lace bugs were again observed on Canada thistle in 1996. Although not widespread on the refuge, these biocontrol agents are useful in our war on weeds.

Rodeo was the only herbicide applied in 1996. Sixty-three ounces were applied along irrigation ditches in Units I-E, I-F, and I-N to facilitate water flow. Whitetop and Russian knapweed were removed by hand from the Collection Ditch levee and from around the Horse Barn structure by the YCC crew. The YCC crew also removed Scotch thistle by hand from the Brown Dike. Canada thistle was mowed on approximately 10 miles of levee roads (edge of road only) in June and July during the flowering stage, which was successful in reducing seed production. A follow-up mowing was not conducted.

11. Water Rights

The water rights adjudication process was initiated for the refuge in 1990. At our request, the State Engineer found that the refuge has never held any state appropriated water rights. During 1993, the Nevada State legislature approved funds for water rights adjudication. Numerous water rights applications were submitted in 1994 to the Nevada State Engineer. To date, the State of Nevada has not taken any action on the applications.

G. WILDLIFE

1. Wildlife Diversity

There are 207 migratory and resident bird species that utilize the refuge. Although management emphasis is placed on nesting waterfowl and sandhill cranes, many other wildlife species benefit from this effort because of similar habitat preferences. An additional 23 bird species are observed on the refuge infrequently. Mammals found on the refuge include many rodent species, mule deer, pronghorn, muskrats, rabbits and coyotes. The leopard frog and gopher, garter, and rattle snake occurs on the refuge; however, a complete species list of reptiles and amphibians has not been compiled for the refuge.

2. Endangered and/or Threatened Species

One to two adult bald eagles was often observed perched in a cottonwood tree located near Bressman Cabin. This tree remains a preferred traditional roost site. At least two different bald eagles were observed on the refuge during fall migration.

3. Waterfowl

In 1996, the estimated spring waterfowl population on the refuge peaked in May at 5,807 birds, which was 25.5 percent lower than the estimated peak spring population in 1995. The spring population on the refuge was lower because the majority of birds in south Ruby Valley were using nearby Franklin Lake. The estimated fall population on the refuge peaked at 14,332 birds in September which was nearly 110 percent higher than in 1995. The fall population on the refuge was higher this year most likely because of a higher flyway population. Total waterfowl use-days in 1996 were 26.1 percent higher than use-days in 1995 but 1.9 percent lower the 10-year mean (Table 11). Use-days for both geese and ducks exceeded the management objectives during 1996.

The estimated waterfowl breeding population in 1996 was 22.0 percent lower than in 1995 and 23.9 percent lower the 10-year mean (Table 11). Estimated total waterfowl production in 1996 was 14.2 percent lower than estimated production in 1995 and 42.2 percent below the 10-year mean. Total waterfowl production in 1996 was 76.6 percent below the desired management objective.

Table 11. Waterfowl breeding population, production, and use-days estimates for Ruby Lake NWR.

Population	1993	1994	1995	1996	10-Year Mean	Management Objective
Trumpeter Swan						
Breeding Pairs	4	5	6	6	6	None
Production	5	9	5	5	8	12
Use-days	7,288	9,723	9,140	9,486	6,613	None
Canada Goose						
Breeding Pairs	105	132	250	181	146	None
Production	110	190	90	304	249	600
Use-days	38,593	89,344	90,273	120,807	54,683	100,000
Ducks						
Breeding Pairs	3,219	3,129	3,254	2,551	3,447	None
Production	4,546	4,600	3,746	2,988	5,452	13,500
Use-days	2,468,915	2,639,315	1,551,124	2,102,668	2,214,229	2,050,000
Total						
Breeding Pairs	3,328	3,266	3,510	2,738	3,599	---
Production	4,661	4,799	3,841	3,297	5,709	14,112
Use-days	2,514,796	2,738,382	1,650,537	2,232,961	2,275,525	---

a. Swans

Six swan pairs initiated nesting on the refuge in 1996; one pair each in West Marsh units 10, 13, and 14, and three pair in the South Marsh. One pair in marsh unit 13 hatched and fledged two cygnets and one pair in marsh unit 14 hatched three and fledged two cygnets. In the South Marsh, one pair hatched four and fledged one, one pair hatched four cygnets which did not survive, and one pair hatched one cygnet which did not survive. One pair in marsh unit 10 and one pair in the South Marsh were unsuccessful. Swan production in 1996 remained below the desired management objective (Table 11).

Swan use days in 1996 were 3.6 percent higher than use days in 1995 and 30.3 percent higher than the 10-year mean (Table 11). Much of the increase in use days is attributed to the growth of the winter swan population. A larger number of trumpeter swans are migrating to the refuge from unknown locations. During January, 38 trumpeter swans were observed on the refuge. In October, 22 swans were observed and during December, 40 swans were observed on the refuge. During early December approximately 100 tundra swans were observed flying south over the refuge. Tundra swans use the refuge briefly as a stopping point during migration to their wintering grounds.

b. Geese

White-fronted geese have not been observed on the refuge or on Franklin Lake since 1990. One snow goose wintered on the refuge with a group of Canada geese.

The peak goose population in 1996 was lower than the peak population in 1995. The goose population peaked at 442 birds in April. However, goose use-days in 1996 were 25.3 percent higher than in 1995, 54.7 percent higher than the 10-year mean, and 17.2 percent higher than the management objective (Table 11). Goose production in 1996 increased over 1995 despite a smaller breeding population. Mild spring weather likely contributed to a higher survival rate of the young. Production in 1996 was 70.4 percent higher than in 1995 and 18.1 percent higher the 10-year mean (Table 11). However, goose production remained well below the desired management objective.

c. Ducks

Duck populations began increasing in March with the arrival of early nesting species and early spring migrants. The spring duck population peaked in May as migrants moved through and as additional nesting ducks arrived. The duck population then declined in mid-summer as non-breeders, males, and unsuccessful females moved to other locations to molt. The fall duck population peaked in September with the arrival of migrant birds. By late December the majority of ducks had departed the refuge for their southern wintering grounds.

Duck use days in 1996 were 26.2 percent higher than use days in 1995; 5.0 percent below the 10-year mean and 3.9 percent higher than the desired management objective (Table 11). A higher fall duck population contributed to the higher use days observed in 1996. Dabblers accounted for 1,168,049 use days in 1996; 19.6 percent higher than use days in 1995. Divers accounted for 934,619 use days in 1996; 22.3 percent higher than use days in 1995.

The duck breeding population in 1996 was 21.6 percent lower than in 1995 and 45.2 percent lower than the 10 year mean (Table 11). Both dabbler and diver pairs decreased as compared to 1995 (Table 12). Duck production in 1996 was 20.2 percent lower than in 1995, 45.2 percent lower the 10-year mean, and 77.9 percent lower than the desired management objective (Table 11 and 12). In 1996, dabbler production decreased 3.7 percent while diver production decreased 36.2 percent from 1995. However, mallard, green-winged teal, and northern pintail had noticeably higher production in 1996 as compared to 1995 (Table 12).

Table 12. Duck breeding population and production estimates for Ruby Lake NWR.

Species	Prod. Obj.	1994 Pairs	1994 Young	1995 Pairs	1995 Young	1996 Pairs	1996 Young	10-Year Mean Pairs	10-Year Mean Young
Mallard	--	258	348	235	132	243	315	280	426
Gadwall	--	434	694	587	704	328	423	667	916
A. Wigeon	--	43	39	45	58	46	60	40	45
G-w Teal	--	45	41	0	0	22	29	35	28
Cin/B-w Teal	--	381	610	441	529	371	479	468	684
N. Shoveler	--	152	182	162	170	126	163	152	195
N. Pintail	--	181	217	279	251	237	306	132	172
Total Dabblers	5,500[a]	1,494	2,131	1,749	1,844	1,373	1,775	1,774	2,466
Redhead	2,000	469	694	395	679	268	306	505	922
Canvasback	3,500	534	833	547	427	346	263	573	1,132
Lesser Scaup	--	288	507	277	499	323	369	261	453
R-n Duck	--	34	38	12	18	0	0	40	55
Ruddy Duck	--	310	397	274	279	241	275	294	424
Total Divers	8,000[b]	1,635	2,469	1,505	1,902	1,178	1,213	1,673	2,986
Total Ducks	13,500	3,129	4,600	3,254	3,746	2,551	2,988	3,447	5,452

[a] Production objectives not established for specific dabbler species.
[b] An objective level of 2500 established for species other than redhead and canvasback.

4. Marsh and Water Birds

Sandhill cranes began arriving on the refuge in late February; earlier than normal because of mild spring weather. During April, 18 crane pairs were counted on nesting territories. The number of colts that hatched on the refuge increased from last year and three colts survived to fledgling age in 1996 (Table 13).

In an effort to document causes of sandhill crane chick mortality, a radio telemetry study was initiated in 1995 and continued in 1996. Transmitters were attached to eight crane colts and monitored daily (Figure 15). Five of the eight colts did not survive to fledge. Three chicks were killed by coyotes, one chick died from injuries received from it's sibling or parent, and one chick was found dead from unknown causes. The study is scheduled to be continued in 1997.

Table 13. Sandhill crane breeding population and production statistics for Ruby Lake NWR.

Year	Pairs	Colts		Production Objective
		Hatched	Fledged	
1984	29	5	2	48
1985	34	3	3	48
1986	25	3	0	48
1987	15	2	0	48
1988	15	0	0	48
1989	12	5	0	48
1990	10	0	0	48
1991	15	2	0	48
1992	13	17	0	48
1993	15	5	0	48
1994	15	16	2	48
1995	19	8	1	48
1996	18	19	3	48
Mean	18	6.5	0.8	48

Figure 15. Transmitters attached to sandhill crane chicks. JM 5/96

Three grebe species: western, eared, and pied-billed, continued to use the refuge; only eared and pied-billed grebes nest on the refuge. Double-crested cormorants and great egrets also continued to nest on the refuge during 1996. Both species, in addition to great blue herons, snowy egrets, black crowned night-herons, American bitterns, and white-faced ibises, nested in one colony located in West Marsh unit 14. A second smaller ibis colony located in the South Marsh was also utilized. Cattle egrets continued to use the refuge during summer.

White pelicans are infrequently observed on the refuge, however, none were observed in 1996. Fourteen white pelicans were observed on Franklin Lake during the May monthly survey.

During 1996, coot use days were 29.6 percent higher than use days in 1995 and 25.1 percent lower than the 10-year mean (Table 14). Although the estimated breeding population in 1996 was slightly lower than in 1995, production was much higher. Coot production in 1996 was 32.1 percent higher than in 1995 but nearly 40 percent lower than the 10-year mean (Table 14).

Table 14. Coot breeding population, production, and use day estimates for Ruby Lake NWR.

	1992	1993	1994	1995	1996	10-Yr Mean
Breeding Pair	1,011	1,135	858	1,028	1,017	2,656
Production	1,929	1,978	1,647	1,285	1,892	3,146
Use Days	830,020	662,323	723,400	650,962	924,017	1,233,759

5. Shorebirds, Gulls, Terns and Allied Species

The North Marsh received use by large numbers of shorebirds during spring and summer. Flooded alkali playas provided the only shallow foraging areas on the refuge during 1996. American avocets, black-necked stilts, long-billed curlew, killdeer, and common snipe continued to nest on the refuge.

California gulls attempted to nest on islands in marsh unit 21 but were unsuccessful because of high water. The water elevation in unit 21 was intentionally kept high to discourage these birds from nesting on the refuge. A small population of California gulls first began nesting on the refuge in 1990. Franklin's gull was not observed on the refuge during 1996.

Both Forester's and black terns nested on the refuge during 1996. A few Caspian terns were observed during the summer, but this species does not nest on the refuge. Black terns were more numerous than Forester's terns and both species nested primarily in the West Marsh units with a few pairs nesting in the South Marsh.

6. Raptors

The majority of raptor species observed in south Ruby Valley in 1996 used the refuge as a foraging area. Red-tailed hawk, ferruginous hawk, Swainson's hawk, golden eagle, prairie falcon, sharp-shinned hawk, Cooper's hawk, great-horned owl, and northern saw-whet owl nested in the trees and rocky cliffs in the adjacent Ruby Mountains. Turkey vultures roosted in the trees at refuge headquarters. Northern harrier, American kestrel, and short-eared and long-eared owls nested on the refuge in 1996. Bald eagles and rough-legged hawks are common winter residents on the refuge. Although barn owls are observed occasionally in the northern half of Ruby Valley, there are few observations of these birds on the refuge. One barn owl was observed during mid April on the refuge. During late July, a juvenile red-shouldered hawk was observed on the refuge. This is only the second record of this species on the refuge.

7. Other Migratory Birds

In cooperation with the Migratory Bird and Habitat Research Laboratory, the annual Breeding Bird Survey was conducted in early June along a route established on the southwest side of the Ruby Mountains. The survey provides important information on annual occurrence of nesting species and breeding bird population trends in the Great Basin. A total of 33 species were observed during 1996. The Brewer's sparrow was again the most abundant species followed by sage thrasher, vesper sparrow, western meadowlark, American kestrel, common raven, sage sparrow, and black-throated sparrow. This route has been surveyed by refuge personnel since 1965.

To gather information on bird species wintering in the area, the refuge has hosted the Audubon Christmas Bird Count since 1978. On 17 December, 14 participants conducted the count on a clear but cold day. A total of 61 species were observed by the participants and 2,175 individual birds were counted. New records were set for the number of species observed and the total number of birds counted.

8. Game Mammals

In 1996, a small number of mule deer used the refuge during summer. The majority refuge use by mule deer occurs during their winter and spring migration. During years with deep snow pack, mule deer migrate to their wintering grounds in basins south of the refuge.

The pronghorn population in south Ruby Valley continues to increase and the refuge continues to be an important summer and fall use area. During 1996, at least six different herds of pronghorn, ranging from 4 to 26 animals, were observed on the refuge. At least eight young were observed on the refuge in 1996. Over 100 animals were counted on the refuge on the opening day of pronghorn hunting season.

10. Other Resident Wildlife

Sage grouse continued to utilize the refuge throughout the year. In cooperation with the Nevada Division of Wildlife, Wildlife Biologist Mackay conducted the annual strutting ground surveys during the spring. At least one viable lek site is located on the north and west side of the refuge on Forest Service administered land. This population nests on the refuge and females with young were frequently observed in the meadows adjacent to the North Marsh. Male bachelor groups were also observed frequently in the same area. There is the potential that another lek is located at the south and west side of the refuge but this site has not been located. The sagebrush steppe area near the Indian Creek gravel pit continues to be a core winter use area for the sage grouse.

Numerous bird species used the refuge in 1996. Coyotes are abundant in south Ruby Valley and several dens were located on the refuge. Because of the abundance and density of prey on the refuge, it is likely that the density of coyotes on the refuge is higher than the surrounding area. Striped skunks were first documented in south Ruby Valley during 1992. They appear to prefer Cave Creek near the refuge headquarters and the Gallagher Fish Hatchery. To our satisfaction no skunks have been observed in other areas of the refuge.

During 1996, few blacktail jackrabbits were observed. The local jackrabbit population has remained very small since their crash in 1994.

11. Fisheries Resources

The refuge continued to provide limited habitat for the native relict dace (*Relictus solitarious*). However, refuge personnel remain concerned about their survival on the refuge because of threats from hybridization with the introduced speckled dace and the presence of bass which are dace predators.

12. Wildlife Propagation and Stocking

Three trout species and one hybrid trout were stocked on the refuge in 1996. The total number of trout stocked on the refuge in 1996 was 43 percent less than stocked in 1995 (Table 15). All trout stocked on the refuge were reared at the Gallagher Fish Hatchery.

Table 15. Game fish stocked on Ruby Lake NWR.						
Fish	1991	1992	1993	1994	1995	1996
Rainbow	106,197	263,322	71,362	38,128	47,309	28,054
Brown	4,664	1,875	1,439	1,639	1,561	1,690
Tiger	8,900	9,896	14,545	0	0	3,276
Brook	5,854	6,500	0	11,169	5,100	500
Cutthroat	0	5,027	0	0	520	0
Cutbow	0	0	0	0	4,288	0
Bass	0	0	30,839	2,001	319	0
Total	125,615	286,620	118,185	52,937	59,097	33,520

15. Animal Control

The muskrat population during 1996 was at a low enough level that trapping was not warranted or conducted.

16. Marking and Banding

Volunteer Tinsman, with assistance from refuge personnel, established a MAPS (Monitoring Avian Productivity and Survivorship) station along Cave Creek. Six lanes were constructed in riparian habitat. Misting netting and banding was conducted 9 times from June through August. A total of 41 species and 322 birds were banded in 1996.

The preseason duck banding program conducted since 1992 was unable to continue during 1996 because of the lack of help. Our inability to hire a temporary biological assistant greatly impacted biological data collection on the refuge.

H. PUBLIC USE

1. General

Public use for 1996 increased nearly 93 percent over 1995 and 223 percent above the five year mean (Table 16). The increase is likely a result of the return of near average water elevations and the return of the bass population, which attracted more people, especially fisherman. The number of visitors utilizing the refuge for wildlife observation and other non-fishing related activities continues to increase steadily. The number of waterfowl hunters using the refuge in 1996 was slightly higher than in 1995, but still well below the five year mean. The abundance of waterfowl on Franklin Lake attracted many hunters, which likely contributed to the low numbers of hunters using the refuge.

Table 16. Estimates of refuge visitors by activity category.

Year	Fishing	Wildlife Observation	Migratory Bird Hunting[a]	Other[b]	Total
1996	32469	9996	127	869	43461
1995	15012	6989	94	451	22546
1994	9365	3273	264	300	13202
1993	7196	2871	239	121	10427
1992	7242	2725	52	163	10182
1991	9084	720	324	846	10974
Mean[c]	9682	2830	195	760	13466

[a] Estimates for migratory bird hunting are on a season basis; therefore, portions of two years are reported.
[b] Other includes trapping, interpretation, x-country skiing, ice skating and bicycling.
[c] Five year mean calculated for 1991-1995.

2. Outdoor Classrooms - Students

Each year the refuge assists the Elko County School District in providing environmental education to 5th graders. The environmental education program is conducted in an outdoor classroom setting during the spring and fall. Several state and federal agencies, Great Basin College, Mining Companies, and the private sector provide presenters for the program.

Refuge staff conducted six outdoor environmental education presentations during 1996. Wildlife Biologist Mackay presented a program on waterfowl identification to seven 5th grade classes in Lamoille Canyon on May 14th and 15th and September 24th. Volunteer Jeanne Tinsman presented a program on raptors to seven 5th grade classes in Lamoille Canyon on 15 May and 23 September. Refuge Operations Specialist DesRoberts presented a program on wildlife to seven

5th grade classes in Lamoille Canyon on 15-16 May and 23-24 September.

7. Other Interpretive Programs

In celebration in National Wildlife Refuge Week, refuge staff held an open house and "meet the new manager " on 6 October for nineteen people. In addition, a proclamation was issued by the Mayor of Elko proclaiming the week of 5 October as National Wildlife Refuge Week in the City of Elko. Once again, substantial outreach effort was made by refuge staff to advertise NWR Week. News releases were sent to seven area newspapers. Articles appeared in the Elko Daily Free Press (front page) and the Elko Independent. Public service announcements concerning NWR Week and the refuge tour were provided by the two local radio stations (KELK & KRJC). Announcements were posted at State and Federal agency offices in Elko, the Elko Chamber of Commerce and Gallagher Fish Hatchery. Despite widespread publication we were unable to attract many visitors.

8. Hunting

Only migratory bird hunting is permitted on the refuge, with open seasons for ducks, geese, coots, moorhens and snipe. Only dark geese may be hunted to prevent hunters from shooting trumpeter swans. The size of the hunt area is approximately 8,600 acres and includes permanent marsh, flooded alkali playas, spring ponds, and meadows.

The 1996-97 migratory game bird season for ducks, mergansers, coots, moorhens and snipe ran from 12 October through 11 January. Goose season opened 19 October and closed 18 January.

The combined daily limit on ducks was six, including no more than one female mallard, no more than two redheads, no more than one canvasback, and no more than two pintails of either sex. The possession limit for ducks was twice the daily bag limit. The daily and possession limit for coots and common moorhens was 25. The daily limit for snipe was eight and possession limit was 16. Daily limit for geese was three and the possession limit was six.

Hunting conditions were fair during the 1996-97 season. Waterfowl numbers peaked in late September. However, an early freeze occurred during late October, which forced most waterfowl to migrate. Warmer temperatures returned in November creating plenty of open water, but very few late migrants arrived to provide good hunting opportunity. The water elevation of the South Marsh was adequate to provide easy boat access to the hunting area.

Waterfowl hunting information was gathered from seven hunters through surveys conducted by refuge personnel and information requested from local resident hunters (refuge and fish hatchery personnel). These hunters accounted for 29 hunter visits (22.8 percent of the estimated total number of hunter visits), killed 58 birds, and reported 6 crippled birds (birds shot but not retrieved).

The number of waterfowlers hunting on the refuge and the amount of time spent hunting during the 1996-97 season was greater than during the 1995-96 season (Table 17). An estimated 251 birds were killed at a ratio of 2.0 birds killed per hunter visit. Fourteen waterfowl species were known to be killed with mallards being the most numerous species bagged (Table 19). The crippling rate was 9 percent.

One state-licensed guide receives a Special Use Permit annually to guide waterfowl hunters on the refuge. This guide led four hunters on three different days, who killed a total of 19 waterfowl.

Table 17. Estimates of statistics for waterfowl hunting on Ruby Lake NWR.

Hunting Season	Hunter Visits	Hours Hunted	Birds Retrieved[a]	Average Birds Per Hunter
1996-97	127	355	251	2.0
1995-96	94	157	286	3.0
1994-95	264	475	634	2.4
1993-94	239	488	515	1.9
1992-93	52	182	57	1.1
1991-92	324	907	680	2.1
Mean (91-96)	195	442	434	2.1

[a] Includes ducks, geese and coots.

Table 18. Shooting data estimates for the 1996-97 waterfowl season on Ruby Lake NWR.

Species	# Birds in Bag	Percent of Total	Estimated # of Birds Killed
Mallard	14	24.1	61
American Wigeon	12	21.2	53
Gadwall	11	19.0	48
Coot	7	12.1	31
Northern Pintail	3	5.2	13
Canada Goose	2	3.4	9
Northern Shoveler	1	1.7	4
Green-winged Teal	1	1.7	4
Cinnamon Teal	1	1.7	4
Blue-winged Teal	1	1.7	4
Canvasback	1	1.7	4
Redhead	1	1.7	4
Lesser Scaup	1	1.7	4
Ruddy Duck	1	1.7	4
Ringed-neck Duck	1	1.7	4
Total	58		251

9. Fishing

Anglers visit the refuge in pursuit of largemouth bass and rainbow, brook, cutthroat, brown, and tiger (brown x brook) trout. All trout are reared and stocked by the Gallagher Fish Hatchery located on the refuge and operated by the Nevada Division of Wildlife (Section G12). Fishing for trout on the refuge was best in spring and fall when water temperatures were cooler and trout were more active. Bass fishing was best during the breeding season when adults were guarding fry and during summer months when the water was warmer.

Anglers accounted for an estimated 74 percent of the total refuge visits in 1996. The number of anglers fishing on the refuge in 1996 increased over 1995 by 116 percent. This dramatic increase corresponds with the return of near average water elevations and increased fishing opportunities.

Sixteen creel surveys were conducted on the refuge by Nevada Division of Wildlife personnel in 1996. Anglers consisted of 20.2 percent trout anglers, 42.7 percent bass anglers, and 37.0 percent combination trout and bass anglers. A total of 1,181.5 hours of fishing effort was expended to harvest 706 fish with and additional 1,405 fish released by anglers. Overall success was 0.60 fish per hour and 2.23 fish per angler.

11. Wildlife Observation

During the past few years, the number of visitors using the refuge for wildlife observation has increased annually (Table 16). Wildlife observers, including photographers, accounted for an estimated 23 percent of the visitors using the refuge in 1996.

Recent publication of visitor guides on Nevada, which include the refuge, and outreach are increasing awareness of the refuge and are likely contributing to an overall increase in non-consumptive visitors.

16. Other Non-Wildlife Oriented Recreation

The refuge is used by bicyclists, picnickers, ice skaters, x-country skiers, etc. These recreationalists likely pursue these activities on the refuge because of the wildlife and wildland scenes.

17. Law Enforcement

Two refuge employees are collateral duty law enforcement officers; Refuge Manager Hanson and Maintenance Worker Johnson. Both employees attended the law enforcement refresher in Tucson, Arizona, and completed firearms requalification in Fallon, Nevada.

Higher levels of public use in 1996 required more law enforcement patrols. Wardens from the Nevada Division of Wildlife also conducted patrols on the refuge. A total of twenty five citations were issued by refuge officers, FWS special agents, and state wardens (Table 19).

Table 19. Summary of citations written at Ruby Lake NWR during 1996.	
Violation	Number of Citations
Hunting in a closed area	2
Take deer on refuge	1
Over limit of trout	2
Fishing without a valid license	11
Failure to tag a deer	2
Kill deer in wrong unit	1
Posses deer w/o validated tag	1
Operate motorboat w/o registration	1
Destruction of property	4
Total	25

The destruction of property case involved a disgruntled YCC employee. The employee used a 10 gauge shotgun to destroy one refuge directional sign and damage one entrance sign. The vandal and his companions were apprehended while returning to Elko by Elko County Sheriffs. Special Agent Barry Jordan took the case and issued four citations for destruction of property and unauthorized discharge of a firearm. The individual paid all fines, paid for replacement of both signs, and served 10 hours of community service on the refuge.

I. EQUIPMENT AND FACILITIES

1. New Construction

Levee construction was initiated in the East Marsh (MMS Project 95005M and DU Site Specific Agreement No. NV-0002-001) by Art Lacey Construction of Cambridge, Idaho during 1995. The 5,000 ft levee was completed on August 3, 1996 (Figure 16). The money remaining from the 1995 allocation ($11,330.81) and an additional $35,000 was required to complete the levee. Ducks Unlimited donated $44,000 towards the levee construction and $12,000 for habitat restoration work. The use of additional equipment and more time to compact material during construction was required to meet State compaction standards, which essentially doubled the cost of the levee. A six inch gravel base was later applied to make the levee more passable, with most of the work being done by volunteer Farrell Reische.

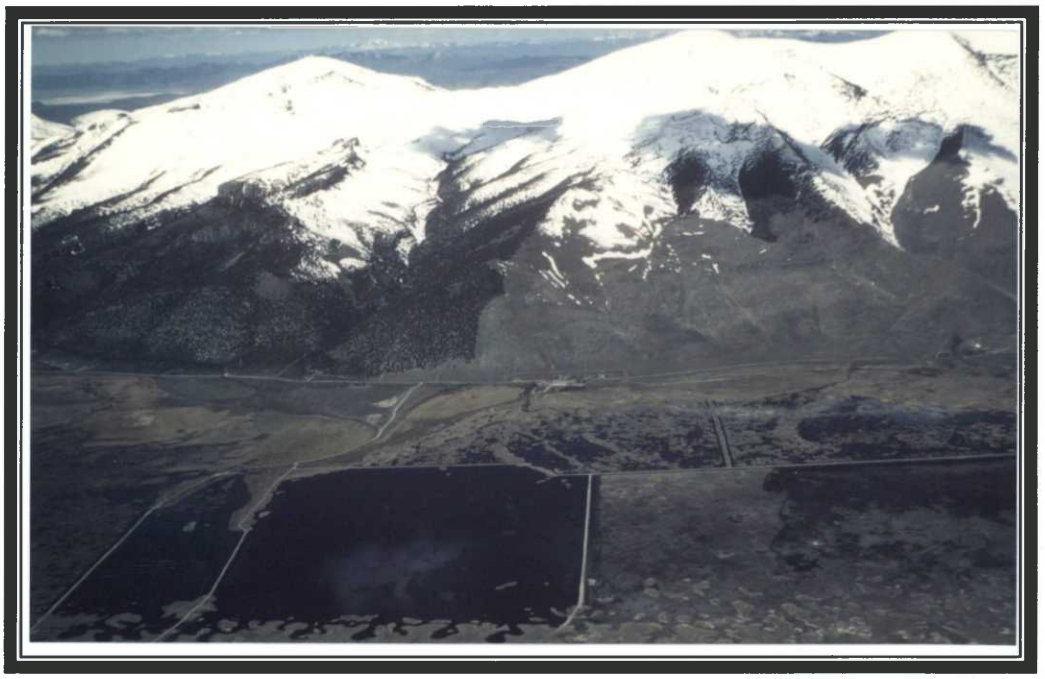


Figure 16. Construction of islands in the south unit of the East Marsh completed rehabilitation of this wetland unit. KD 4/97

2. Rehabilitation

The old refuge sign in front of the office was replaced with a new redwood sign mounted on a stone support structure constructed by maintenance worker Dan Johnson with assistance from the YCC crew.

Volunteer Farrell Reische replaced the Cave Creek bridge located between Quarters 17 and 46, replaced the cedar shingles on the kiosk at Brown Dike, and installed a safety railing along the loft in the metal storage building. Farrell also installed a power failure safety switch that controls the shop and storage building, fuel pumps and the petroleum, oil and lubricants storage building. Following a power failure, power can only be manually restored to these areas, which eliminates many safety hazards associated with automatic power restoration.

Cement handicap accessible parking areas were constructed at the restrooms located at Brown Dike and Narcisse Boat Landing. In addition, two handicap accessible fishing areas were constructed near Brown Dike; one adjacent to the Collection Ditch and one adjacent to marsh unit 21. Both projects were funded under MMS project M94014.

A cement pad was installed in front of the petroleum, oil and lubricants storage building.

4. Equipment Utilization and Replacement

A new vehicle lift was purchased and installed in the insulated vehicle bay located in the metal storage building with MMS funding (M95004) (Figure 17).

A D-6 dozer was borrowed from Stillwater NWR during October and November to construct islands in the south unit of the East Marsh (Figure 18).

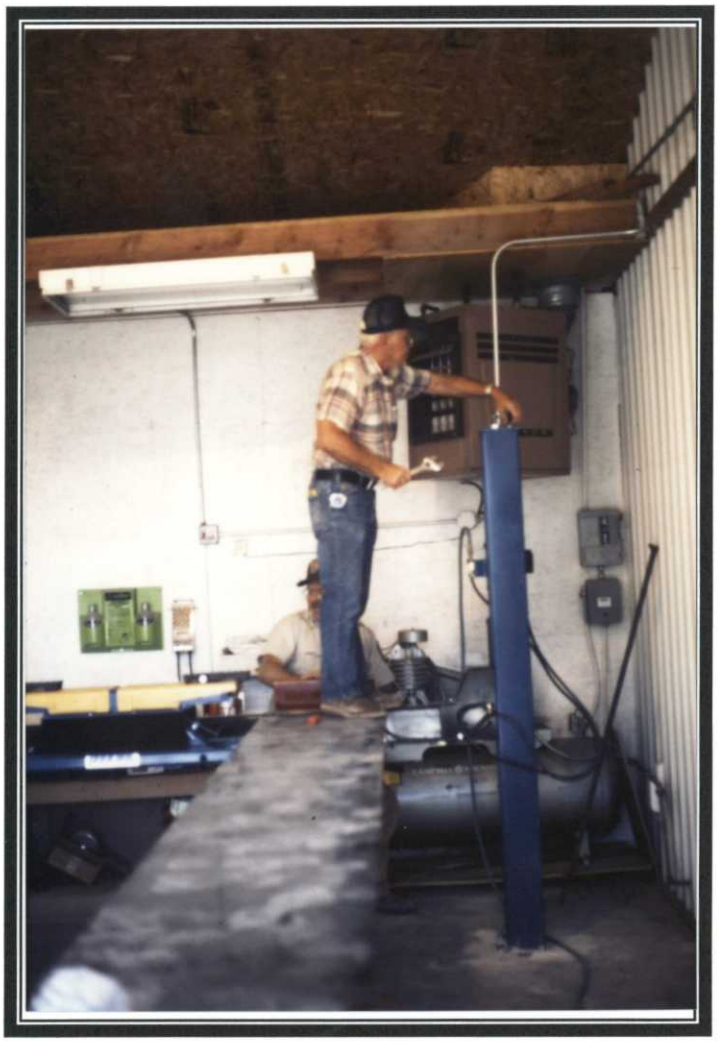


Figure 17. Volunteer Farrell Reische and Maintenance Worker Johnson installed the vehicle lift. The lift simplifies vehicle maintenance. KH 6/96

Figure 18. The large D-6 dozer was useful for building islands in the East Marsh. KD 11/97

6. Computer Systems

Computer equipment needed to convert the office computer system to a Local Area Network (LAN) was purchased in August. The LAN will allow cc:Mail and Internet access from each desktop and will facilitate file sharing between desktop personal computers (PC). Part of the equipment purchased included two Pentium 166 computers as replacements for outdated PC's. This brought the all office PC's up to the minimum standards required to operate in the Windows 95 environment. A Hewlett Packard LaserJet 5N printer was purchased to replace the HP III laser jet printer. The HP III was donated to the Ecological Services office in Las Vegas. Upgrades for word processing, spreadsheet, data base, and graphics software were also purchased. Installation of the LAN is scheduled for early in 1997.

J. OTHER ITEMS

1. Cooperative Programs

Six refuge employees (one permanent, one temporary and four YCC) backpacked into the Goshute Mountains in late July. The purpose of the trip was to assist with setting up the main camp at the Goshute Mountain Raptor Project site in northeast Nevada. The Project is staffed by volunteers who gather data on raptor migration by observation and trapping. The work is organized by Hawkwatch International in Salt Lake City, Utah, a non-profit organization which receives funds from the Fish and Wildlife Service and the Bureau of Land Management.

Refuge personnel participated in a fishing derby at Angel Lake on 29 June in cooperation with the U.S. Forest Service and Nevada Division of Wildlife. The derby, which was in celebration of National Fishing Week, drew 250 participants; 100 enthusiastic children and 150 adults.

Refuge personnel operate a weather station in cooperation with the National Weather Service. Weather information has been collected daily since 1940.

4. Credits

The 1996 Annual Narrative Report was prepared by Refuge Manger Hanson, Operations Specialist DesRoberts, Wildlife Biologist Mackay, and Administrative Support Assistant McQueary. Kim prepared sections E1 and 5, H17, and K. Kevin prepared sections: E2, 4, and 6, part of F2, F7, 8, and 10, H1, 2, 7, 8, 9, 11, and 16, I1, 2, and 4, and part of J1. Jeff prepared the Introduction and sections A, B, D5, parts of E4, E5, F1, 2, 5, 9, and 11, G, I6, part of J1 and J4. Jeff edited the report and Niki attached photographs and assembled the report.

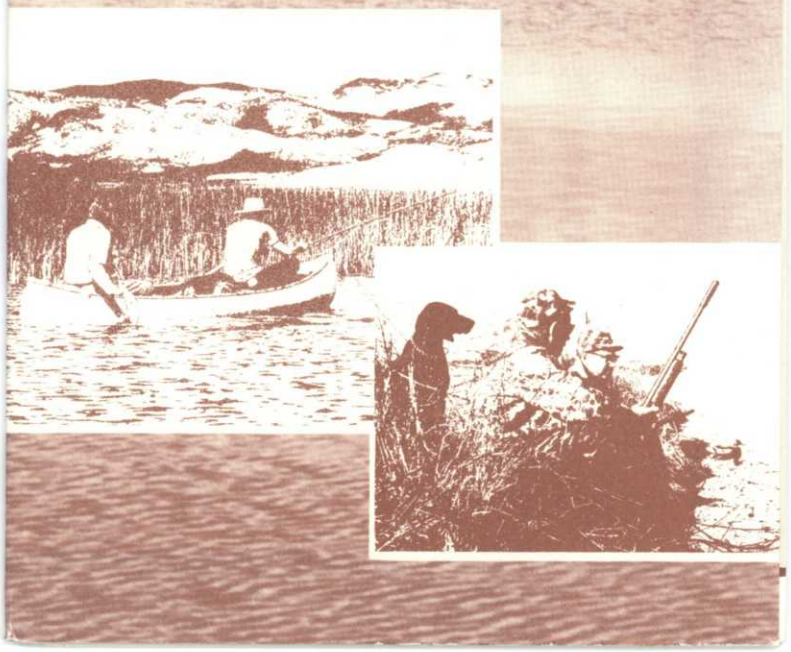
Photo credits:
JM: Jeff Mackay
KD: Kevin DesRoberts
KH: Kim Hanson
JT: Jeanne Tinsman

RUBY LAKE

NATIONAL WILDLIFE REFUGE

Nevada

Fishing
Hunting
Boating
General
Information



RUBY LAKE

Ruby Lake National Wildlife Refuge lies within a closed drainage basin in Ruby Valley of northeastern Nevada. The refuge is 65 miles southeast of the town of Elko and lies along the eastern flank of the rugged and scenic Ruby Mountains at an elevation of 6,000 feet above sea level.

The 37,632-acre refuge consists of marshes, open ponds and islands, bordered by wet meadows and grass/sagebrush-covered uplands. Ruby Lake National Wildlife Refuge is an important waterfowl nesting area. It is also strategically located along migration corridors serving both the Pacific and Central Flyways. The refuge is a meeting place for birds traveling several routes—west along the Humboldt River and to Owens Valley, east to the Great Salt Lake, northwest to the Klamath Basin, and south to the Colorado River.

HISTORY

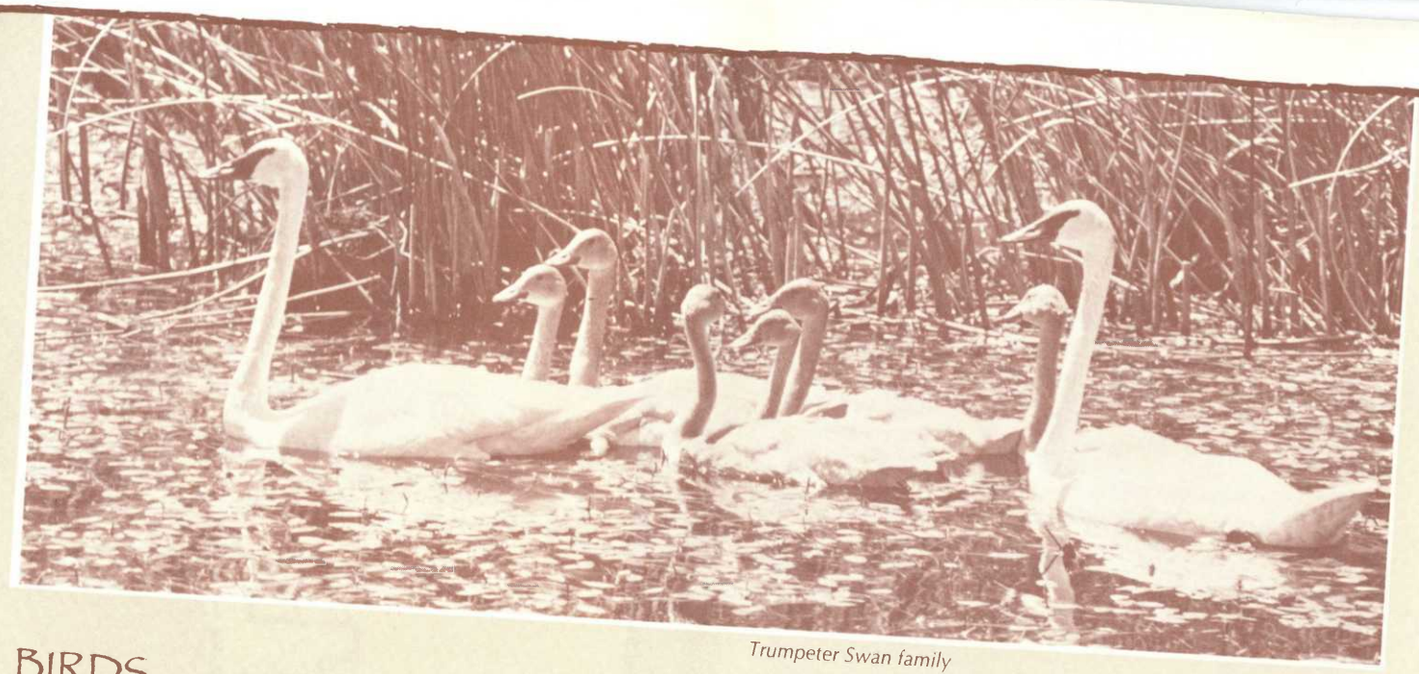
During the Pleistocene Epoch, the Ruby Marshes were part of a much larger body of water known as Franklin Lake. This ancient lake covered about 470 square miles and was over 200 feet deep. As conditions became drier, the lake level began to drop. Today, a balance has been reached and only the Ruby and Franklin Lake marshes remain.

In 1938, the importance of the Ruby Marshes to nesting and migratory waterfowl and water birds was recognized, and the Ruby Lake National Wildlife Refuge was established.

DEVELOPMENT

A collection ditch and a system of dikes have been constructed along the west central portion of the marsh to collect waters from over 160 springs along the base of the Ruby Mountains. Water reaching the end of the collection ditch flows into the 7,000-acre South Marsh, a natural depression. Water can also be diverted to the North Marsh to maintain 3,000 acres of wetlands that are especially attractive to puddle ducks and shorebirds.

Water is managed to provide optimum nesting and feeding habitat for migratory waterfowl and water-dependent birds. By careful manipulation of water levels and flows, 12,000 acres of marshlands can be maintained. Periodically, individual habitat units are rejuvenated by drying them up. As a result, the food resources and productivity of the aquatic environment are greatly enhanced. Management tries to imitate the processes of naturally occurring wetland ecosystems as much as possible to maintain the vitality and productivity of the marshes.

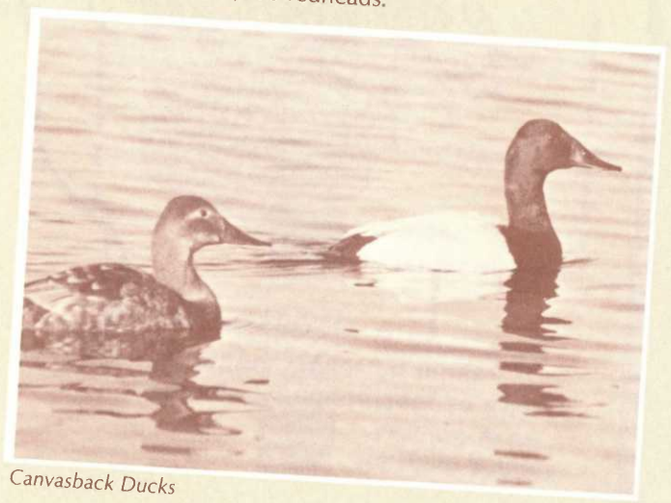


Trumpeter Swan family

BIRDS

Over 200 species of birds regularly use the refuge.

Waterfowl are the most conspicuous and most important to the primary objectives of the refuge. Nesting canvasbacks and redhead ducks are particularly important. Most of this nesting occurs on the South Marsh, where the refuge supplies some of the finest nesting habitat in Western America for these species. In good years the refuge has produced 3,500 canvasbacks and 2,500 redheads.



Canvasback Ducks

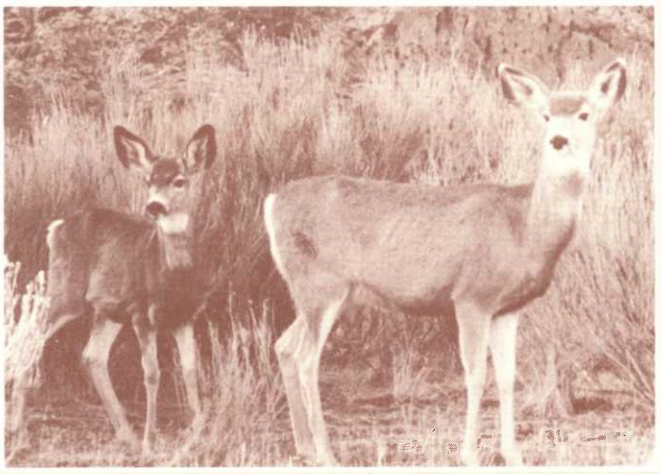
Redhead Ducks

The trumpeter swan, originally a transplant from the Red Rock Lakes National Wildlife Refuge in Montana, is also found on the refuge. Several pairs nest each year. In all, 15 different species of waterfowl nest on the refuge as well as a variety of other water-dependent birds such as coots, grebes, sandhill cranes, great blue herons, black-crowned night herons, white-faced ibis, and snowy egrets.

Bald and golden eagles and several other raptors including the endangered peregrine falcon are present at various times of the year. Numerous songbirds make use of the riparian habitat along Cave Creek, and several first records of occurrence for Nevada have been made in this area.

MAMMALS

Mountain lions and bobcats are regularly found in the foothills and mountains bordering the refuge on the west. Although present throughout the year, mule deer are most frequently observed in winter as they move from the foothills to feed and water on the refuge. Coyotes are common residents throughout the year. In the marsh, muskrats are abundant and they help keep dense stands of bulrush open and more attractive to waterfowl. Also, their houses and feeding platforms provide resting and nesting platforms for waterfowl and other marsh-dwelling birds.



Mule Deer

REPTILES

Great Basin rattlesnakes and gopher snakes are often seen crossing the roads during the summer months. Garter snakes are most often found near the marsh.

FISH

Eight species of fish are present in the refuge waters. The relict dace is the only species that is native to the marsh. This species is present in only a few other basins in northeastern Nevada. Largemouth black bass were stocked around 1932 and have successfully reproduced. Rainbow, Eastern brook and brown trout are stocked annually with occasional stocking of cutthroat and tiger trout (German brown trout, Eastern brook trout hybrid). A small population of Lahontan speckle dace has maintained itself from a 1950 stocking.

OPPORTUNITIES

Refuge roads are open, unless otherwise posted, to visitors who enjoy wildlife observation, photography, sightseeing, fishing and migratory bird hunting.

The refuge provides good opportunities to view wildlife. The best time to observe and photograph waterfowl and their young occurs from late May through July. Canada geese hatch first, followed by mallards and canvasbacks. September and October bring concentrations of up to 25,000 ducks and as many coots. These concentrations are best observed from the dikes. A separate leaflet is available and includes a checklist of refuge birds and other wildlife.

Because the refuge covers a variety of habitats including rough, uneven terrain, deep water, dense stands of bulrush (tules), wet meadows and ditches, the ease of access varies by area. Also, rainfall can make roads and fields muddy and slippery. Everyone should know their own abilities and limitations before using the refuge.

Disabled individuals are encouraged to consult the refuge manager for suggestions on visiting the refuge safely or for further assistance.

GENERAL REGULATIONS

Day Use Only—Camping and overnight parking are not permitted on the refuge (see Accommodations).

Pets—are allowed if on a leash or under close control.

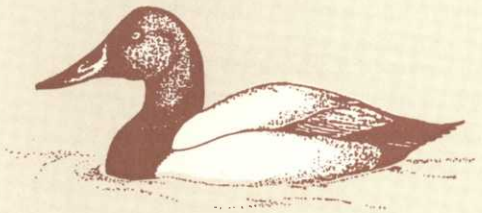
Dirt Bikes and ATCs—may be operated on refuge roads if licensed and the operator possesses a valid driver's license and proof of insurance.

Weapons—Unloaded weapons that are dismantled, cased or otherwise out of immediate reach may be transported by vehicle on refuge roads. Use of weapons is permitted only in the designated hunting areas during authorized refuge hunts.

Prohibited Activities—no littering, fires, fireworks or collecting objects of antiquity, including Native American artifacts.

Accidents—All accidents and injuries occurring on the refuge must be reported immediately to the refuge headquarters.

Phone: **(702) 779-2237.**



ACCOMMODATIONS

Roads—Refuge visitors must travel over 23 to 35 miles of gravel road to reach the refuge. Harrison Pass, although along the shortest route from Elko, is a steep, winding and often rough road. This Pass is not maintained during the winter. Visitors are encouraged to check with Refuge Headquarters about road conditions, especially during winter and spring months (November-May).

Gas—and limited supplies are available at Shanty Town, seasonally.

Licenses—Fishing and hunting licenses and state and federal "Duck Stamps" are **not available at Refuge Headquarters or Shanty Town**. The nearest license and stamp vendors are in Elko, Wells, and Ely.

Lodging—Besides camping, accommodations are available in Elko (65 to 90 miles), Wells (90 miles) and Ely (90 miles).

Camping—is not permitted on the refuge, but camp sites are available at the Forest Service campground south of Refuge Headquarters (1.5 miles). Primitive camping is allowed on all public land 300 feet west of the county road unless otherwise posted.

Telephone—A public telephone is located at Shanty Town.

Restrooms—are located at the Main Boat Landing, Narciss Boat Landing, on the Brown Dike and at Refuge Headquarters. Those at the Main Boat Landing and Refuge Headquarters are easily accessible to mobility impaired visitors.

For More Information Contact:

Refuge Manager
Ruby Lake National Wildlife Refuge
HC 60 Box 860
Ruby Valley, NV 89833
Telephone (702) 779-2237

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

RF11570 February 1995

FOR YOUR SAFETY AND ENJOYMENT

To help you have a safe and enjoyable visit, you may wish to consider these helpful hints in planning your trip into the marsh:

- Tell someone on land what area you plan to go to and the approximate time you plan to return.
- Weather can be very unpredictable on the marsh, especially in early summer. Sudden rain or snow storms are common. One hint is to watch the clouds in the west. If clouds begin to creep down the slopes of the Ruby Mountains rather than simply passing over horizontally, head for shore. Be prepared for strong gusty winds and rain or snow.
- The marsh is a maze of channels, islands, bulrush and open water and even the most experienced visitors can become lost. If you are new to the area, try to plan your first few trips with people familiar with navigating the marsh or do not get too adventurous. Markers are only in the main channel winding between the Main Boat Landing and "Old Ski Ponds." (See map.)
- If you plan an evening trip, try to return to the landing or at least the main channel before dark. This may take a great deal of restraint since the day's best fishing is often between sundown and dark. Consider the weather, your clothing and physical condition in timing your return. Also, it is always wise to take a light blanket and warm clothes for everyone when you enter the marsh. Carry a flashlight.
- If you become lost, try yelling for directions from nearby fishermen. Sound travels for a long distance in the marsh, especially at night. It may be a long night so stay dry and put on your warmest clothes. Beach on an island and wait for help. Use your overturned boat for shelter. Often brush is on the islands to start a small signal fire that can be seen easily from shore. If you know a party is in need of help in the marsh, you are welcome to contact Refuge Headquarters for assistance.

PROTECT YOURSELF FROM LIGHTNING

If outside, with no time to reach a safe building or an automobile, follow these rules:

- Do not stand underneath a natural lightning rod such as a tall, isolated tree in an open area.
- Avoid projecting above the surrounding landscape, as you would do if you were standing on a hilltop, in an open field, on the beach or fishing from a small boat.
- Get out of and away from open water.
- Stay away from wire fences, clotheslines, metal pipes, rails and other metallic paths which could carry lightning to you from some distance away.
- If you are hopelessly isolated in a level field or prairie and you feel your hair stand on end—indicating lightning is about to strike—drop to your knees and bend forward putting your hands on your knees. Do not lie flat on the ground.

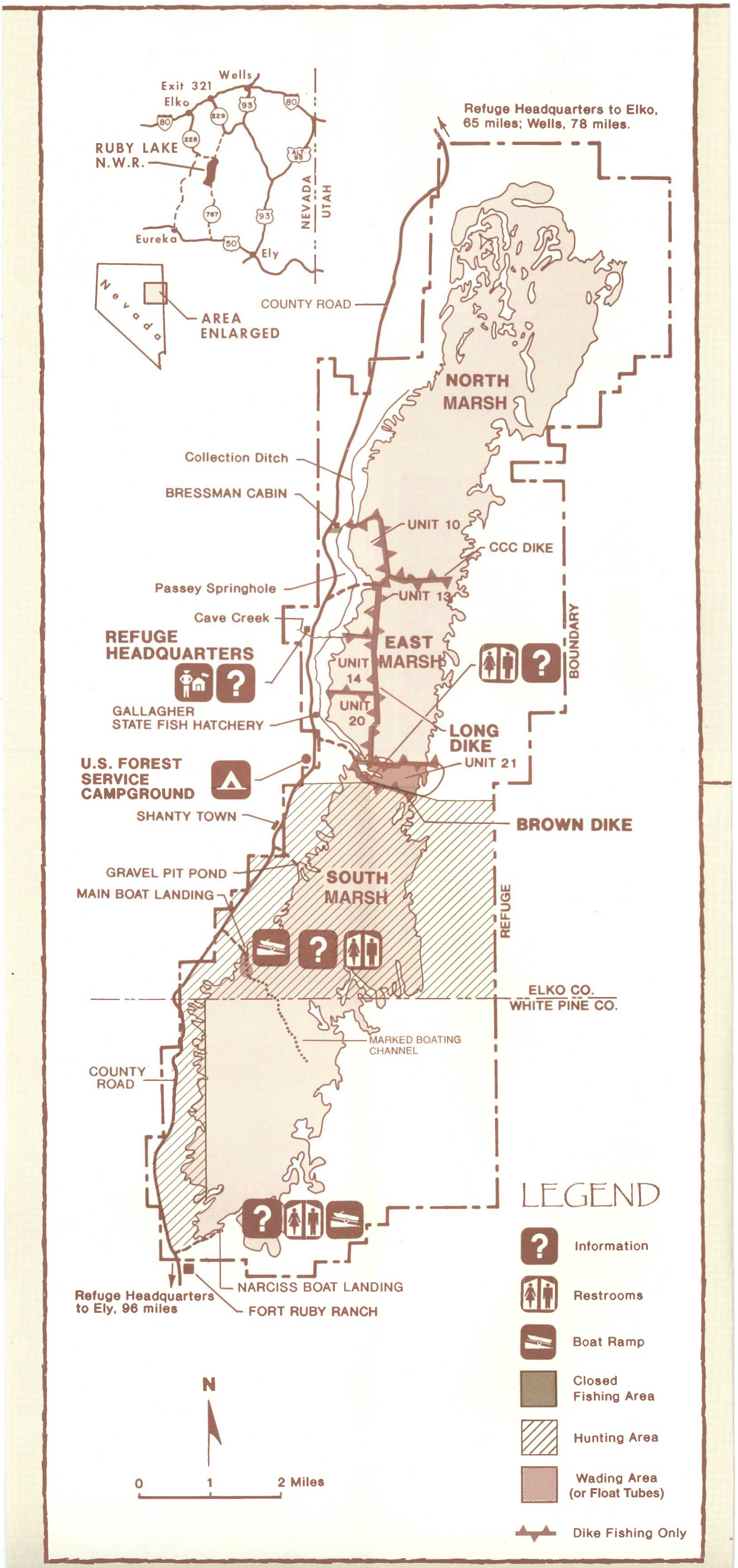
FIRST AID FOR LIGHTNING VICTIMS

Many people apparently "killed" by lightning can be revived if quick action is taken. When a group is affected, the apparently dead should be treated first; those unconscious but breathing will probably recover spontaneously.

First aid should be rendered to those not breathing within 4 to 6 minutes or less to prevent irrevocable damage to the brain. Mouth-to-mouth resuscitation should be administered once every 5 seconds to adults and once every 3 seconds to infants and small children.

If the victim is not breathing and has no pulse, cardiopulmonary resuscitation is necessary. This is a combination of mouth-to-mouth resuscitation and external cardiac compression. It should be administered by persons with proper training.

Medical attention also should be given to victims who appear only temporarily stunned or otherwise unhurt, since there may be hidden effects.


Wells
Exit 321
Elko
80
93
80
229
228
RUBY LAKE
N.W.R.
ALT. 93
NEVADA
UTAH
767
93
Eureka
50
Ely
Nevada
AREA
ENLARGED
Refuge Headquarters to Elko,
65 miles; Wells, 78 miles.
COUNTY ROAD
NORTH
MARSH
Collection Ditch
BRESSMAN CABIN
UNIT 10
CCC DIKE
Passey Springhole
UNIT 13
Cave Creek
REFUGE
HEADQUARTERS
EAST
MARSH
UNIT
14
UNIT
20
BOUNDARY
GALLAGHER
STATE FISH HATCHERY
LONG
DIKE
UNIT 21
U.S. FOREST
SERVICE
CAMPGROUND
SHANTY TOWN
BROWN DIKE
GRAVEL PIT POND
MAIN BOAT LANDING
SOUTH
MARSH
REFUGE
ELKO CO.
WHITE PINE CO.
MARKED BOATING
CHANNEL
COUNTY
ROAD
Refuge Headquarters
to Ely, 96 miles
NARCISS BOAT LANDING
FORT RUBY RANCH
N
0
1
2 Miles
LEGEND
Information
Restrooms
Boat Ramp
Closed
Fishing Area
Hunting Area
Wading Area
(or Float Tubes)
Dike Fishing Only

BOATING

January 1-June 14
Float tubes are permitted in Unit 21 and the Main Boat Landing on the South Marsh. No boats are permitted to be operated on the refuge.

June 15-July 31
South of Brown Dike (South Marsh) ONLY, motorless boats, float tubes and boats propelled with battery powered electric motors are permitted. Float tubes are also permitted in Unit 21.

August 1-December 31
In the South Marsh, motorless boats, float tubes and boats propelled by motors with a total of 10 hp or less are permitted. Float tubes are also permitted in Unit 21.

Water skis and jet skis are not permitted at any time.

Boat Launching

Boats on trailers can be launched ONLY at the Main Boat Landing and Narciss Boat Landing. Canoes or cartop boats can be launched ONLY at Main Boat Landing, Narciss Boat Landing, Gravel Pit Pond and Brown Dike. When parking at these landings, please park so that your vehicle does not obstruct traffic or the launching area.

Boat Storage

Boats may be stored at Main Boat Landing, Narciss Boat Landing, Gravel Pit Pond and Brown Dike from **April 1 through December 31**. The marsh usually freezes over by November 15 each year. Because boats can be trapped in deep snow or ice and travel to the refuge can be hazardous during winter, it is recommended that boats be removed from the refuge at the earliest time. Boats must be removed by January 1.

State regulations including those related to flotation devices, fire extinguishers and lights must be complied with.

FISHING

Fishing for largemouth black bass and trout attracts thousands of visitors each year. The trout are raised at the Gallagher Fish Hatchery which is located on the refuge and operated by the Nevada Department of Wildlife.

Season

The refuge is open year-round to fishing except in those areas posted as closed. Dike fishing ONLY is permitted on the area north of Brown Dike, except in Unit 21 and the Main Boat Landing, where wading and personal flotation devices (float tubes) are permitted. Bank fishing in the South Marsh is ONLY permitted at Brown Dike, the Main Boat Landing, and Narciss Boat Landing.

Fishing is allowed from 1 hour before sunrise until 2 hours after sunset.

Licenses

A Nevada State fishing license or permit is required of all persons 12 years of age and older before they fish. A Nevada Trout Stamp is also required to take or possess trout. **Licenses and stamps are not sold in Ruby Valley. Nearest vendors are in Elko, Wells, and Ely.**

Size

A 10-inch mandatory size limit for bass has been established on the refuge to improve the bass fishery. This allows bass to reach spawning size before they are subjected to angler harvest.

Limits

The State of Nevada fishing limits apply to the refuge.

Black (Largemouth) Bass—From January 1 through June 14, the daily and possession limits are 5 fish. From June 15 through December 31, after the bass nesting season concludes, the daily and possession limits are raised to 10 fish.

Trout—The daily and possession limits are 3 fish. Rainbow, brook and brown trout provide most of the angler harvest. Most trout are raised at Gallagher Fish Hatchery.

Closed Waters

Fishing is prohibited between Bressman Cabin and the first spring-pond south of the hatchery canopy, including the west bank of the Collection Ditch. The main hatchery rearing and brooding ponds, and Cave Creek west of the county road are also permanently closed. The dike between Units 14 and 20 is closed during the bass nesting season as posted.

Artificial Lures and Bait

Those portions of the Collection Ditch and associated springs which are open to fishing may be fished ONLY WITH ARTIFICIAL LURES. Possession or use of live or dead bait fish is prohibited anywhere on the refuge.

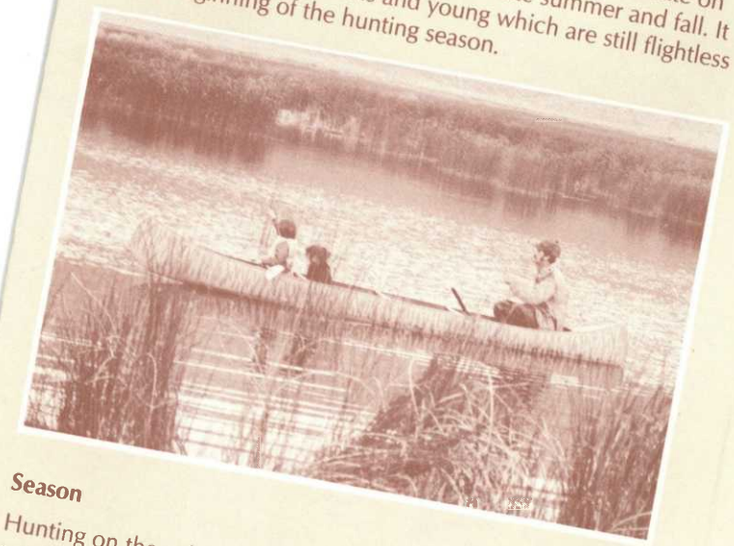
Ice Fishing

Refuge waters are open to ice fishing; however, access to the Refuge is more difficult during the winter (see Accommodations).

County Line is open to limited waterfowl hunting. Because of the abundance of small, shallow bays in this area, dabbling ducks such as gadwalls, mallards, shovelers, pintails and teal are common.

Also, the springheads along the entire west side of the South Marsh are open to waterfowl hunting. This area generally provides excellent late season jump shooting for dabblers.

The 4,300 acres of South Marsh in White Pine County is closed to hunting. The closure protects the local nesting population of canvasbacks and redheads which concentrate on the south end of the South Marsh in late summer and fall. It also protects the few hens and young which are still flightless at the beginning of the hunting season.



Season

Hunting on the refuge is open daily during the waterfowl season as established by the State of Nevada.

Species

Ducks (including mergansers), dark geese (including White-fronted and Canada geese), coots, common moorhens and snipe ONLY may be hunted. ALL OTHER SPECIES OF WILDLIFE ARE PROTECTED.

Licenses

All hunters 12 years of age or older must possess a valid Nevada hunting license. Children under 14 years of age must be accompanied by an adult licensed to hunt. Waterfowl hunters 12 to 65 years of age must possess a signed State Duck Stamp. Waterfowl hunters 16 years of age or older must also possess a signed Federal Migratory Bird Hunting and Conservation Stamp (Duck Stamp). Because these **licenses and hunting stamps are not available in Ruby Valley**, be sure to buy them in advance.

Reservations

No reservations or special refuge permits are needed.

Nontoxic Shot

The use of approved nontoxic shot is required when hunting waterfowl, coots, common moorhens and snipe on the refuge. Hunters may not have lead shot in their possession while hunting. We recommend that hunters practice on trap or skeet ranges to become familiar with ballistic differences between steel and lead shot.

Hunt Boundaries

No dike hunting is permitted. The open hunting area includes the area as posted from 50 feet south of the Brown Dike south to the White Pine County Line. In White Pine County, the springhead area from the County Road to the marsh edge is open as posted. For public safety, a no hunting zone is posted in the immediate vicinity of the Main Boat Landing. Refer to map.

Access

Boat access to the marsh hunting area is provided from the Brown Dike, Gravel Pit Pond and Main Boat Landings (see Boating). The east side of the hunting area is accessible by boat from one of the three landings or by walking south from the Brown Dike. Caution is necessary if attempting to cross the borrow ditch along Brown Dike. There are only a few places shallow enough to cross with chest waders. Walk-in access only is permitted to the springhead areas in White Pine County.

Blinds and Personal Property

Hunters may use portable hunting blinds and temporary blinds constructed of natural vegetation. All decoys and other personal property must be removed from the refuge and temporary blinds destroyed at the close of each day.

Helpful Hunting Hints

The use of dogs is not mandatory, but highly encouraged. Successful hunters usually have a dog to retrieve downed birds that otherwise might not be found.

"Skybusting" or shooting at birds over 50 yards from you results in excessive crippling losses of waterfowl and reduced opportunity for good shots by you and other hunters.

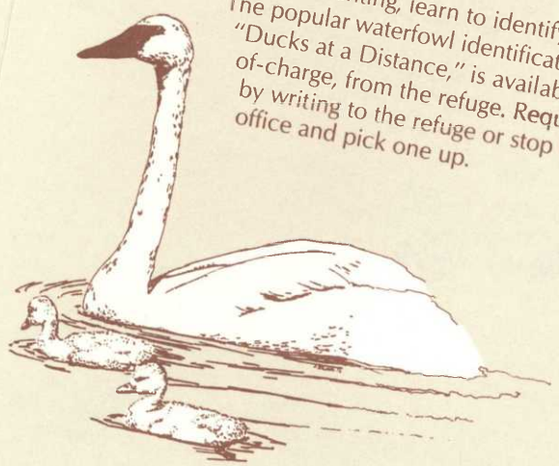
Decoys and calls should be used to bring birds into ideal shooting range. When setting out decoys, place the outer decoy at 40 yards from the blind. This will help you judge when to shoot and result in fewer cripples and more birds in your bag.

Be a sportsman and respect the rights of other hunters afield. When entering or leaving the field try to avoid flaring birds which are working another hunter's setup.

Swans Need Your Help

The once endangered trumpeter swan, originally a transplant from Red Rock Lakes National Wildlife Refuge in Montana, is found on the refuge. Several pairs nest each summer and 15 or more birds may winter here.

Tundra swans also use the marsh in fall and winter. These birds feed in the hunting area as well as in other areas of Ruby Valley. To protect swans from being shot by mistake, the entire valley is closed to the hunting of the much smaller snow and Ross' geese. Only Canada and white-fronted geese may be hunted.



As in all hunting, learn to identify your target. The popular waterfowl identification guide, "Ducks at a Distance," is available, free-of-charge, from the refuge. Request a copy by writing to the refuge or stop by the office and pick one up.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Ruby Lake National Wildlife Refuge
HC 60 Box 860
Ruby Valley, NV 89833