FINAL
ENVIRONMENTAL ASSESSMENT

MULTIPLE SPECIES GENERAL CONSERVATION PLAN
DOUGLAS COUNTY, WASHINGTON

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FINAL ENVIRONMENTAL ASSESSMENT
MULTIPLE SPECIES GENERAL CONSERVATION PLAN FOR AGRICULTURE
DOUGLAS COUNTY, WASHINGTON

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LIST OF ACRONYMS

BLM	Bureau of Land Management
BMP	Best Management Practice
B.P.	Before Present
CEQ	Council of Environmental Quality
CFR	Code of Federal Regulations
CP	Conservation Practices
CRP	Conservation Reserve Program
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
EQIP	Environmental Quality Incentives Program
ESU	Evolutionarily Significant Units
FCCD	Foster Creek Conservation District
FSA	Farm Service Agency
GCP	General Conservation Plan
HCP	Habitat Conservation Plan
HSI	Habital Suitability Index
ITP	Incidental Take Permit
NAAQS	National Ambient Air-Quality Standards
NHPA	National Historic Preservation Act
MSGCP	Multiple Species General Conservation Plan
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NRCS	Natural Resource Conservation Service
NWI	National Wetlands Inventory
PNC	Potential Natural Community
PSD	Prevention of Significant Deterioration
SAFE	State Acres for Wildlife Enhancement
SDCD	South Douglas Conservation District
TNC	The Nature Conservancy
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDOE	Washington State Department of Ecology
WDFW	Washington Department of Fish & Wildlife
WDNR	Washington State Department of Natural Resources
WRIA	Water Resource Inventory Area

MULTIPLE SPECIES GENERAL CONSERVATION PLAN
DOUGLAS COUNTY, WASHINGTON

DRAFT ENVIRONMENTAL ASSESSMENT

CHAPTER 1 – PURPOSE AND NEED FOR ACTION

INTRODUCTION

The Foster Creek Conservation District (FCCD), in cooperation with the South Douglas County Conservation District (Figure 1), and with the assistance of the U.S. Fish and Wildlife Service (USFWS), prepared a ~~draft~~ Multiple Species General Conservation Plan (MSGCP) (FCCD 2015). Private landowners, corporations, state or local governments, or other nonfederal landowners who wish to conduct activities that might incidentally "take" fish or wildlife species that are listed as endangered or threatened must first obtain an Incidental Take Permit (ITP or Permit) under Section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (16 U.S.C. § 1531 *et seq*.), Endangered Species Act (ESA) from the USFWS. A General Conservation Plan (GCP) is a type of programmatic habitat conservation plan (HCP) under which multiple Section 10 permits can be issued (USFWS 2007). The MSGCP covers many agricultural activities in Douglas County, Washington. This MSGCP provides land management guidance for protecting four federally listed and unlisted wildlife species (covered species) over approximate 879,000 acres of private lands for the next 50 years. The Douglas County MSGCP will facilitate review of future incidental take permit applications, and if approved would allow the "incidental take" of threatened or endangered species resulting from otherwise lawful activities on nonfederal agricultural lands within Douglas County. This action would provide participating agricultural producers in the MSGCP with legal protection under provisions of the ESA for covered agricultural activities.

The USFWS has prepared this ~~draft~~ Environmental Assessment (EA) pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321-4347). The draft EA and draft MSGCP were shared during a 60-day public comment period period beginning on November 14, 2014. Changes between the draft and final EA are noted in red font and/or in strike-through font.

ORGANIZATION OF THE DOCUMENT

This ~~draft~~ EA describes potential environmental consequences of implementing alternatives including the proposed Douglas County MSGCP. A notice to prepare an Environmental Impact Statement (EIS) was published in the Federal Register on May 30, 2000 (65 FR 34493-34494). Since that publication, and as the MSGCP has been developed and refined, the USFWS determined that an EA may be an appropriate NEPA analysis document.

Chapter 1 describes the purpose and need for the proposed action, decisions to be made, and the relationship to other laws, policies, and regulations.

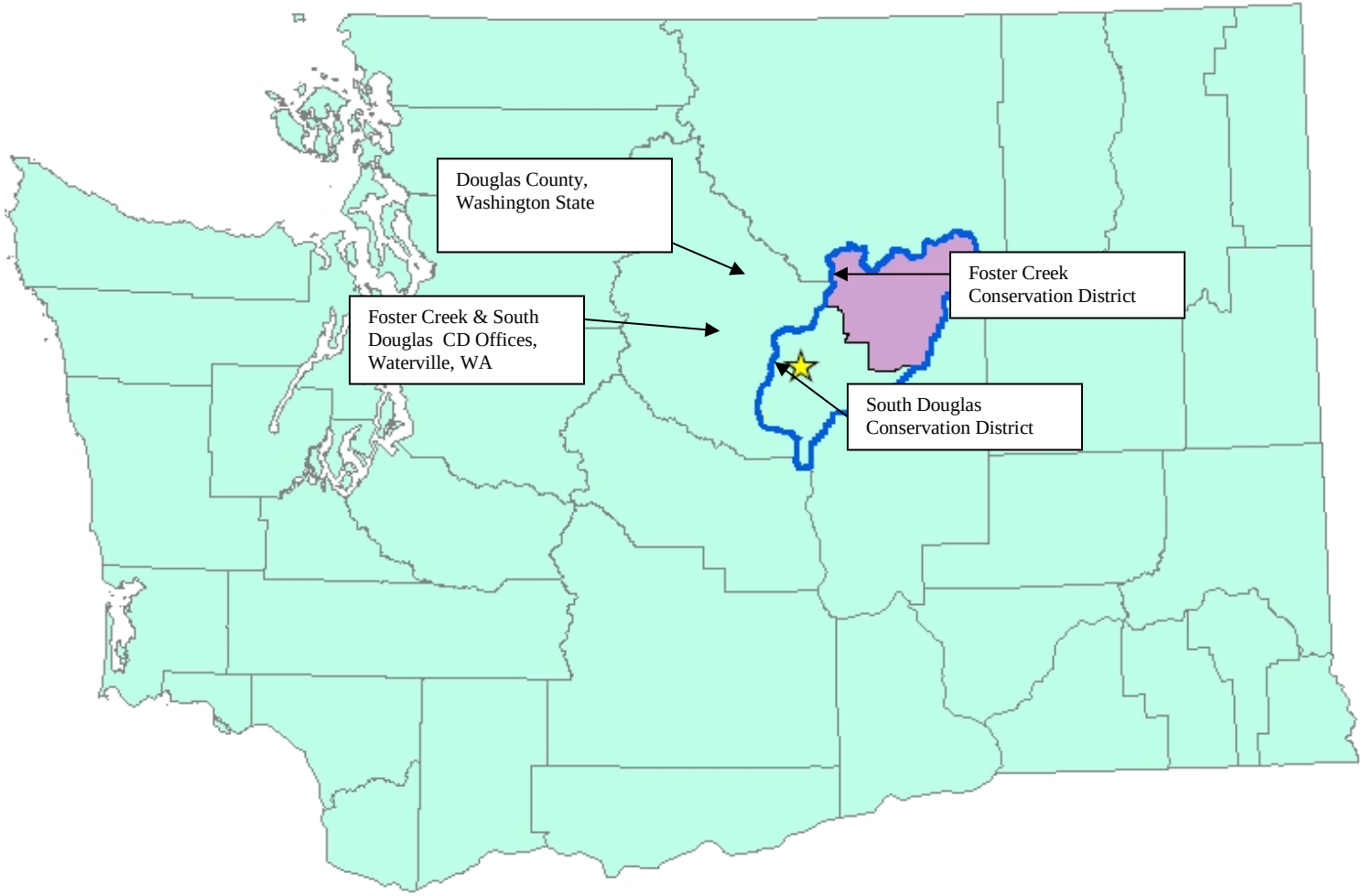
Chapter II describes the three alternatives (including the proposed action and the No-Action Alternative) identified through the scoping and agency/public involvement phases of the project. It also describes issues which will be used for alternative comparisons.

Chapter III describes the affected environment in Douglas County and the existing conditions of resources.

Chapter IV shows the expected effects on resources for each alternative action, if implemented.

Following the chapters is a List of Agencies, Organizations, and Other Persons that identifies those who have received notice of the EA and MSGCP or copies of the ~~early or current~~ draft ~~copies of this~~ EA; a List of Acronyms; and a Glossary defining terms used in the text that may be unfamiliar or specialized. The Literature Cited ~~Reference~~ section lists the sources of material referenced in the text. Appendix A includes a list of common and scientific names of many of the plants that are mentioned in the text of the EA.

Figure 1. Douglas County and Conservation Districts.



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PURPOSE AND NEED FOR THE PROPOSED ACTION

Purpose of the Proposed Action for the Applicants:

- To address Douglas County agricultural landowners' concerns about endangered and threatened species listings and the potential for these listings to impact how they can manage their lands.
- To develop long-term plans with assurances for listed or potentially listed species that also allow for continued agricultural use, and affirm the agricultural landowners' good land-stewardship efforts.

Need for Proposed Action for the Applicants:

- To ensure that agricultural landowners' ongoing and future agriculture activities are carried out in compliance with the ESA.

Purpose of the Proposed Action for the Fish and Wildlife Service

- To respond to future individual section 10(a)(1)(B) applications under a programmatic MSGCP and resultant incidental take permits for four covered species, related to activities that have the potential to result in take, pursuant to the ESA and its implementing regulations and policies.
- To conserve covered species and their habitats for the continuing benefit of the people of the United States (per section 2 of the ESA).
- To ensure covered species needs are met through minimizing and mitigating to the maximum extent practicable the impacts associated with the taking allowed by the future section 10 permits.

Need for the Proposed Action for the Fish and Wildlife Service

- To provide a means and implement steps to conserve the shrub-steppe habitat that supports the four covered species.
- To ensure the long-term survival of the covered species through protection and management of the covered species and their habitats.
- To ensure compliance with the ESA, NEPA, and other applicable Federal laws and regulations.

DECISIONS TO BE MADE

The decision the USFWS will make is to determine whether the action, with associated future incidental take permits, will meet the section 10(a)(2)(B) issuance criteria. In order to issue incidental take permits pursuant to the MSGCP, the USFWS must make the following findings:

- the proposed take is incidental to an otherwise lawful activity;
- the impacts of the proposed taking are minimized and mitigated to the maximum extent practicable;
- adequate funding will be provided to implement the measures proposed in the MSGCP and individual permits;
- the proposed taking will not appreciably reduce the likelihood of the survival and recovery of the covered species in the wild; and,
- any other measures or assurances the USFWS may require will be carried out.

RELATIONSHIP TO OTHER PLANS, POLICIES, AND LAWS

The primary laws, regulations, and plans that affect agricultural activities and development, permitting, and implementation of a habitat conservation plan are described below.

Endangered Species Act

The Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq*.), provides "...a means whereby the ecosystems upon which endangered species depend may be conserved". The USFWS and the National Marine Fisheries Service (NMFS) (together known as the Services) are responsible for listing candidate species, subspecies, or distinct population segments as threatened or endangered. Once a species is listed, the ESA protects the species and its habitat, through several mechanisms.

Under section 7 of the ESA, Federal agencies are required to further the purposes of the ESA and consult with the appropriate Service to ensure Federal actions are not likely to jeopardize the continued existence of a listed species or adversely modify or destroy critical habitat. The term "Federal action" is defined by regulation and includes all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies. Examples include actions such as the granting of permits, entering into contracts or leases, or participating in projects or funding such projects (50 Code of Federal Regulations (CFR) section 402.02). Approval of an ITP is a Federal action and, therefore, subject to consultation under Section 7 of the ESA. Federal agencies may engage in an action or authorized activity that results in the "take" of listed species as long as such take does not "jeopardize" the continued existence or survival of the listed species.

Section 9 of the ESA prohibits, among other things, the unauthorized taking of endangered species (50 CFR Part 17). The term "take" is defined to include "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct", of a species listed as endangered under the ESA. The USFWS has extended such prohibitions by rule to threatened species. "Harm" in the definition of "take" in the ESA means an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR 17.3). "Harass" means an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering.

Individuals and nonfederal entities without a Permit, who undertake otherwise lawful actions that lead to the "take" of a listed species, risk violating Section 9 take prohibitions and related sanctions. Section 10(a)(1)(B) of the ESA authorizes the Services to issue permits for "incidental take," of listed species. An "incidental take permit" allows a nonfederal entity to receive a permit that authorizes take that might occur "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity" (16 U.S.C. §1539(a)(1)(B); 50 CFR §17.3). An applicant typically must submit a "conservation plan" (typically called a Habitat Conservation Plan or HCP) to obtain an ITP, however in Douglas County a programmatic plan (GCP) was developed. This "plan" must specify among other things, the impacts that are likely to result from the taking and the steps that will be undertaken to minimize and mitigate such impacts (16 U.S.C. §1539(a)(2)(A); 50 CFR §17.22(b)(1) and 17.32(b)(1)). The Services may not issue ITPs

if so doing would jeopardize the continued existence of any listed species (16 U.S.C. §1536(a)(2)). This directive means that the proposed Federal action would not "reasonably…be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species" (50 CFR §402.02). The issuance criteria for an incidental take permit are summarized above under "Decisions to be made."

National Environmental Policy Act

The NEPA of 1969 (42 USC 4321 et seq.) requires that Federal agency decision-makers, in carrying out their duties, use all practicable means to create and maintain conditions under which people and nature can exist in productive harmony and fulfill the social, economic, and other needs of present and future generations of Americans. NEPA provides a mandate and a framework for Federal agencies to consider all reasonably foreseeable environmental effects of their proposed actions and to involve and inform the public in the decision-making process. This Act also established the Council on Environmental Quality (CEQ) in the Executive Office of the President to formulate and recommend national policies which ensure that the programs of the Federal government promote improvement of the quality of the environment. The CEQ set forth regulations (40 CFR Parts 1500-1508) to assist Federal agencies in implementing NEPA during the planning phases of any Federal action. These regulations together with specific Federal agency NEPA implementation procedures help to ensure that the environmental impacts of any proposed decisions are fully considered and that appropriate steps are taken to mitigate potential environmental impacts. An EA is a type of NEPA document that can be used to determine if there are significant impacts to the environment.

National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 U.S.C. 470 et seq.), expects Federal agencies to take into account the effects of their actions on properties eligible for inclusion in the National Register of Historic Places. "Properties" are defined herein as "cultural resources", which include prehistoric and historic sites, buildings, and structures that are listed on or eligible to be listed on the National Register of Historic Places. An "undertaking" is defined as a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; those requiring a Federal permit, license or approval; and those subject to state or local regulation administered pursuant to a delegation or approval by a Federal agency. The issuance of an incidental take permit can be an undertaking subject to Section 106 of the NHPA. The USFWS has determined that the Area of Potential Effects to consider for an undertaking can include that area where on-the-ground project activities will result in take of species, but this will vary with actual activities and site-specific conditions. Activities authorized, conducted, or funded by other Federal agencies, such as the Natural Resource Conservation Service, must also consider the NHPA.

Secretarial Order 3206

Secretarial Order 3206 (American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the Endangered Species Act), issued by the Secretaries of Interior and Commerce, clarifies the responsibilities of the component agencies, bureaus, and offices of the Departments of Interior and Commerce when actions taken under ESA and its implementing regulations affect,

or may affect, Indian lands, tribal trust resources, or the exercise of American Indian tribal rights. Secretarial Order 3206 acknowledges the trust responsibility and treaty obligations of the United States toward Indian tribes and tribal members, as well as its government-to-government relationship with tribes. The order requires the USFWS to carry out its ESA responsibilities in a manner that harmonizes the Federal trust responsibility to tribes, tribal sovereignty, and statutory missions of the Departments; strives to ensure that Indian tribes do not bear a disproportionate burden for the conservation of listed species, and avoids or minimizes the potential for conflict and confrontation.

Clean Air Act

The Clean Air Act of 1963, as amended (42 U.S.C. §§ 7401-7671q), regulates air-quality concerns in Douglas County. The Clean Air Act Amendment of 1977 provided for the Prevention of Significant Deterioration (PSD) program. The intent of the PSD program is to limit degradation in designated airsheds. Under this provision, certain national parks and wilderness areas were designated as Class I Airsheds whereas the remainder of the country was designated Class II. Although the PSD permit provisions of the Clean Air Act apply only to major stationary sources of air pollution, the U.S. Environmental Protection Agency (EPA) uses them to determine the degree of potential impacts from other sources on air quality. Agricultural land uses in Douglas County do not require a PSD permit. The 1977 amendment defines two types of National Ambient Air-Quality Standards (NAAQS), a primary standard and a secondary standard. Primary NAAQS's are designed to protect public health, allowing for an adequate margin of safety. The primary NAAQS have been set at levels low enough to protect people with pre-existing illnesses, children, or people with conditions that might be aggravated by such pollutants. Secondary standards are designed to protect human welfare from any known or anticipated adverse effects of the criteria pollutants on the soil, crops, animals, structure, or other property. Two agencies have air-quality responsibility in Douglas County: the EPA and the Washington State Department of Ecology (WDOE). The WDOE has adopted the NAAQS established by the EPA. The NAAQS of concern in Douglas County is inhalable particulate matter (PM_{10} and $PM_{2.5}$).

Clean Water Act

The Federal Water Pollution control Act ("Clean Water Act") of 1977, as amended (33 U.S.C. 1251), administered by the EPA and State water-quality agencies, is the principal Federal legislation directed at protecting water quality. Each state implements and carries forth Federal provisions, as well as approves and reviews National Pollutant Discharge Elimination System applications, and establishes total maximum daily loads for rivers, lakes, and streams. The states are responsible for setting the water-quality standards needed to support all beneficial uses, including protection of public health, recreational activities, aquatic life, and water supplies.

The Washington State Water Pollution Control Act, codified as Revised Code of Washington Chapter 90.48, designates the Washington State Department of Ecology as the agency responsible for carrying out the provisions of the Federal Clean Water Act within Washington State. WDOE is responsible for establishing water-quality standards, making and enforcing water-quality rules, and operating waste-discharge-permit programs. These regulations are described in Washington Administrative Code Title 173.

State Endangered, Threatened, and Sensitive Species Acts
The State of Washington has species of concern listings (Washington Administrative Code Chapters 232-12-014 and 232-12-011) that include all state endangered, threatened, sensitive, and candidate species. State Monitor species are not considered Species of Concern, but are monitored for status and distribution. These latter species are managed by Washington Department of Fish and Wildlife (WDFW), as needed, to prevent them from becoming endangered, threatened, or sensitive. The State list is separate from the Federal ESA list; the state list includes species status relative to Washington State jurisdiction only.

Farm Security and Rural Investment Acts or Farm Bills

The Farms Security and Rural Investment Acts or other Acts known as "Farm Bills" are subject to revisions over time. Farm Bill provisions support the production of a reliable, safe, and affordable supply of food and fiber; and promote stewardship of agricultural land and water resources. In addition, the Farm Bill facilitates access to American farm products at home and abroad; encourages continued economic and infrastructure development in rural America; and ensures continued research to maintain an efficient and innovative agricultural and food sector. The Farm Security and Rural Investment Act of 2002 (2002 Farm Bill) (P.L. 107-171) was signed into law on May 13, 2002. The Food, Conservation and Energy Act of 2008 (2008 Farm Bill) (P.L. 110-234), was enacted on June 18, 2008, and was very similar in form to the 2002 Farm Bill but increased the total funding for the above conservation title programs by $4.5 billion. The Agriculture Act of 2014 (2014 Farm Bill) was enacted on February 7, 2014, and retained many of the previous programs.

The most relevant programs under the Farm Bill are described in more detail in the MSGCP. Two of these are the Conservation Reserve Program (CRP) and State Acres for Wildlife Enhancement (SAFE). The CRP offers annual rental payments and cost-share assistance to farmers to establish long-term conservation covers (e.g., grass and shrubs) on eligible land to reduce soil erosion. Contracts are for a minimum of 10 years and a maximum of 15 years. The CRP requires an equitable balance among conservation purposes of soil-erosion control, water-quality protection, and wildlife habitat. The CRP reduces soil erosion, protects the Nation's ability to produce food and fiber, reduces sedimentation in streams and lakes, improves water quality, establishes wildlife habitat, and enhances forest and wetland resources. It encourages farmers to convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as tame or native grasses, wildlife plantings, trees, filter-strips, or riparian buffers.

The SAFE program is a type of CRP with contract lengths of 15 years. SAFE is focused on habitat enhancement for targeted species. In Douglas County SAFE acres are targeted for greater sage-grouse and Columbian sharp-tailed grouse.

The CRP and SAFE program are administered by the Farm Service Agency (FSA), with the Natural Resource Conservation Service (NRCS) providing assistance with technical land-eligibility determinations, conservation planning, and implementation.

CHAPTER II - ALTERNATIVES

DEVELOPMENT OF ALTERNATIVES

The development of the MSGCP and its alternatives began in 1999. Initially, the FCCD proposed to implement a programmatic HCP where the FCCD would hold a master permit and provide certificates of inclusion to enrolled participants. During internal review, the Service determined that the plan would better fit a GCP (USFWS 2007), resulting in the MSGCP for agricultural lands of Douglas County. The goal of the MSGCP is to enhance and maintain the ecological health of the County's environment and provide assurances to Permittees that their ongoing agricultural activities are in compliance with the ESA. Under the proposed MSGCP, private agricultural lands of Douglas County would be managed to maintain or improve a healthy functioning ecosystem while providing a sustainable production of agricultural products. It seeks a balance between maintenance and improvement of natural systems and habitats to meet ESA requirements and sustainable yields of agricultural products. During development of the MSGCP and the NEPA analysis, the FCCD advisory and technical committees explored strategies and issues identified through scoping and through public and agency participation.

SCOPING

Under the USFWS's NEPA implementing procedures, public scoping is not required to prepare an EA. However, both the USFWS and the FCCD conducted scoping and public workshops on several occasions over the years. The scoping process is an early and open process for determining the issues to be addressed related to the proposed action. Steps used in the scoping process included the following.

- Identifying the lands affected.
- Assessing FCCD, USFWS, WDFW, and public-involvement needs and inviting public participation.
- Determining the issues to be analyzed in depth.
- Identifying and eliminating from further study those issues not significant or important to the proposed MSGCP action.
- Identifying resource needs or management opportunities that contribute to development of alternatives.

From these elements, alternatives and issues were developed to reflect concerns and resource needs of agencies, public, and FCCD members and staff. The public scoping summary and workshop notes are filed at the Foster Creek Conservation District Office, Waterville, Washington, and at the USFWS Eastern Washington Field Office in Spokane Valley, Washington.

Throughout the MSGCP planning process, FCCD members and the public have been kept informed through public meetings, mailings, meeting with various concerned agencies, the FCCD website, news releases, individual contacts, and telephone conversations.

Initially the Service considered using an EIS as the NEPA analysis document, but later determined that an EA was appropriate. A notice of intent to conduct public scoping and prepare an EIS was published in the Federal Register on May 30, 2000 (65 FR 34493-34494). On June 22, 2000, the USFWS distributed a news release and letter to approximately 107 individuals, describing the scoping process and notifying them of a public workshop on June 29, 2000, in

Waterville Washington. Two orchardists, a representative of Chelan County, and a representative from the Colville Confederated tribes attended the public scoping workshop. No significant issues were brought up at the workshop. One written comment was received during the public comment period and is summarized as: Douglas County has a diverse avifauna that continues to be impacted by agriculture.

As there had been considerable evolution in the MSGCP development since the first scoping workshop, the FCCD hosted another public workshop in Waterville, Washington, on January 26, 2005. More than 50 participants were present. During the workshop, environmental issues identified in an early version of the HCP were reviewed with the participants in small "breakout" discussion groups. The attendees built on those issues, and also explored opportunities to address many of the issues, both through development of alternatives, and through analysis of effects.

ISSUES

Issues Key to Development and Evaluation of Alternatives

Resources, issues, and concerns identified through scoping described above, and developed through internal USFWS review, have been summarized as shown in Table 1. Potential indicators for assessing effects are also shown in Table 1. Resources, issues, and indicators will be used in this ~~draft~~ EA for evaluating and comparing alternatives.

Table 1. Issues Key to Alternative Development and Related Indicators

RESOURCE	ISSUES	INDICATORS
1. Aesthetics	Change in farmed acres versus natural appearing lands	Acres farmed versus natural or natural appearing vegetation
2. Economics (including agricultural production and socioeconomics)	Protection of agricultural production. Agricultural production viability. Value returned to agricultural operators. Value returned to society.	Acres in dryland production. Acres in irrigated production. Acres in rangeland use. Changes in farm income. Changes in benefits afforded by society.
3. Cultural Resources	Impact to or consideration of historic properties.	Ability to avoid impacts and consider protection of heritage resource materials.
4. Earth Resources (soils, air quality)	Protection of soil productivity, stability, and hydrologic function. Protection of air quality.	Acres of soil disturbance. Air quality, visibility, and particulates. Effects on Class I Airsheds. Changes in visibility and local air quality.

RESOURCE	ISSUES	INDICATORS
5. Fish and Aquatic Species (threatened and endangered fish species; other fisheries and aquatic resources)	Effects on resident and anadromous fish species, and other aquatic species.	Conservation of aquatic species. Potential changes in fish habitat including temperature and sediment. Cumulative effects of development. Cumulative effects of climate change.
6. Water Resources (wetlands, riparian, water quality)	Wetland condition and function. Effects on water quality. Effects on stream and riparian habitat.	Changes in stream channel and dry drainage stability. Changes in accelerated erosion affecting sediment yield and turbidity. Water quality. Changes in wetland and riparian quantity or quality, and dependent species. Cumulative effects of ongoing development; orchards developed to houses. Cumulative effects of climate change.
7. Covered Species (including threatened and endangered wildlife species and other covered special-status species)	Effects on habitats, Effects on covered species	Change or trend in habitat quality or quantity. Habitat fragmentation. Effects to species from agriculture. Species conservation measures. Cumulative effects of ongoing development; orchards developed to houses. Cumulative effects of climate change.

RESOURCE	ISSUES	INDICATORS
8. Range resources, habitats, and other wildlife and plant species (other non-covered species, biodiversity, habitats, vegetation)	Effects on populations and habitat of wildlife species. Maintenance of biodiversity. Ability to use range for livestock. Range forage quality. Extent of natural habitat altered. Effects on special status plant or animal species. Unwanted competing vegetation potential. Extent of CRP Lands or other protected habitats.	Presence of and changes to habitat. Changes in protected habitats. Changes in habitat diversity. Extent of range vegetation altered. Changes in acres available for livestock use. Change in acres of natural habitat and resultant effects on special-status species. Acres of unique and special habitat affected. Changes in acres of CRP/SAFE lands. Quality and arrangement of CRP/SAFE lands. Cumulative effects of ongoing development. Cumulative effects of climate change.

Issues Eliminated from Detailed Study

A few issues were eliminated from detailed study because the resources have a very low likelihood of being impacted by the alternatives. Noise and safety issues and potential geologic hazards should not change for ongoing farming activities, since similar farming with similar methods are likely to continue. Recreation is not a specific covered activity; and any changes to recreation would occur with or without the MSGCP. Surface water and groundwater quantity and groundwater is not likely to change, as irrigation from the Columbia River is not a covered activity, and other irrigation is likely to continue in similar locations and amounts as currently used. Wild and Scenic rivers are not considered as an issue because there are no designated Wild and Scenic Rivers in or adjacent to Douglas County. Some landowners were concerned about the transmission potential of parasites from domestic to native animals and vice versa. The extent of this issue in Douglas County is unknown, but is unlikely to change with any of the alternatives. Therefore, this issue was not considered further.

In the public Scoping workshops, attendees were concerned that if the current expanding coyote populations in Douglas County are not controlled, that some covered species benefits of the MSGCP would not be realized. At least 50,000 coyotes are estimated to live in Washington. Despite human encroachment, and past efforts to control coyotes outright, the species maintains its numbers, and it may be increasing in some areas. In many areas, the WDFW allows coyote hunting with a state hunting license, and there is no coyote tag or bag limit (WDFW 2004). While the attendees at the scoping workshops expressed concern that coyotes may need additional control measures beyond just allowing hunting, the USFWS recognizes that this is

beyond the control of the local agricultural landowners and not part of the MSGCP, and therefore, is not considered further in this EA. Additional control of coyotes may occur with or without the MSGCP.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER STUDY

At various times during the MSGCP development process the FCCD and USFWS considered alternate approaches that were not developed into alternatives. One approach was a wildlife-corridors approach, but it was likely to have extremely unequal impact to farmers depending on location of corridors. Some farmers would be unlikely to sign up and therefore this approach would not meet the purpose and need. Another alternative included listed fish as covered species under the GCP. The FCCD seriously considered this approach but slow progress on the development of a conservation strategy caused the FCCD to eliminate this alternative in order to focus on a terrestrial-species alternative. The FCCD considered alternatives with many more terrestrial covered species, but eventually decided to focus on four covered species. The FCCD also considered a programmatic HCP where they would hold the incidental take permit, and issue certificates of inclusion to individual landowners. After discussions with the USFWS, the FCCD agreed to use the General Conservation Plan Process.

ALTERNATIVES CONSIDERED IN DETAIL

Alternative 1, No-Action

Under the No-Action Alternative, agricultural-management practices would continue in Douglas County much as they do today. Under Alternative 1, the proposed MSGCP would not be implemented and USFWS would not issue an ITP for the listed or covered species. The farmers in Douglas County would continue to conduct farming operations without ITP coverage for farming and grazing activities. This alternative would not give landowners regulatory certainty, and actions that could result in take of listed species on nonfederal lands would be prohibited under Section 9 of the ESA. Where potential "take" of ESA species exists and the landowner desires to avoid ESA penalties, individual landowners might choose to prepare their own Habitat Conservation Plan and individually apply to the USFWS for a Section 10 permit. Also, under the No-Action Alternative, landowners would be less likely to enhance habitat for listed or covered species. The No-Action Alternative is summarized in Table 3.

Alternative 2, Proposed Action

The Proposed Action is the implementation of the proposed MSGCP for Douglas County, Washington. The MSGCP is incorporated by reference, and briefly summarized below.

The proposed term of the MSGCP is 50 years. Under the MSGCP, private agricultural lands in Douglas County would be managed to maintain or improve healthy functioning ecosystems while providing a sustainable production of agricultural products. This is a programmatic MSGCP, and individual farmers would join it voluntarily. If the MSGCP meets the issuance criteria, individual applicants will work with the FCCD to develop a Farm Plan and GCP Site Plan. The site-specific Farm Plan/GCP Site Plan will be completed by the Applicant, their appointee, or the FCCD. The Farm Plan would provide a description of on-going and planned agricultural activities for included lands, and would be very similar to a NRCS Conservation Farm Plan. The GCP Site Plan will add additional Best Management Practices (BMPs). After the development of a Farm Plan/GCP Site Plan and review and support from the FCCD,

applicants would apply for a section 10 permit. The USFWS would notice the receipt of the application in the Federal Register, request public comments, and review Farm Plans and applications for consistency with the MSGCP, the NEPA analysis, and related decision documents. If applications are consistent with expectations of the documents listed above, the USFWS would issue Section 10 permits.

BMPs are general in nature and are actions that benefit the covered species and habitat. BMPs include Conservation Practices, and additional land-use and species measures. Conservation Practices (CPs) are specific guidelines of the NRCS, such as Contour Buffer Strips, and will be utilized for minimization and mitigation for covered activities under the MSGCP. Other BMPs include land-use measures (such as "maintain remnant patches of shrub-steppe") and species-specific measures (such as "schedule essential spring-time agricultural activities near sage-grouse leks to occur late in the day"). The farm planning process and BMPs are described in Chapter 3 and Appendix E of the MSGCP. The FCCD agrees to cooperate with Farm Plan/GCP Site Plan development, implementation, and monitoring and adaptive management as described in Chapter 4 of the MSGCP and in a memorandum of understanding with the Service (Appendix I in the MSGCP). Implementation of these Farm Plans/GCP Site Plans, coupled with the ongoing management of other reserved lands in Douglas County, should result in improved habitats for the covered species over the term of the MSGCP

The MSGCP does not cover private non-agricultural land uses within Douglas County (approximately 148,761 acres), and it does not cover Federal land. It also does not cover State-owned land (approximately 140,131 acres), unless these lands are leased for agricultural production to private operators, as can occur with lands managed by the Washington State Department of Natural Resources (WDNR).

Covered Activities

Covered activities are described in the MSGCP (Table 1-3 and Appendix E). Covered activities in the MSGCP are those activities conducted by private landowners within Douglas County in the preparation of soil for crop production, the cultivation of crops, and the production and culture of animal products and fiber, for human consumption, feed, and/or sale as articles of trade or commerce. Covered activities include dryland farming, ranching, and limited irrigated farming (not from the Columbia River or Wenatchee River surface water). Lists of specific activities were developed for each of the agricultural types, and are included in Appendix E of the MSGCP.

Covered Species

In developing the MSGCP, the Private Landowners and Technical Advisory Committees reviewed the existing conditions of all known fish and wildlife species that are either resident or transitory in Douglas County (see detailed discussion in Chapter 1 and Appendix C of the MSGCP), then eventually narrowed these down to four covered species in Table 2 (see also Table 7).

Table 2. Covered Species in the Douglas County MSGCP

SPECIES	SCIENTIFIC NAME	STATUS
Pygmy Rabbit (Columbia Basin Distinct Population Segment)	*Brachylagus idahoensis*	Federal Endangered; State Endangered
Washington Ground Squirrel	*Spermophilus washingtoni*	Federal Candidate; State Candidate
Greater Sage-Grouse (Columbia Basin Distinct Population Segment)	*Centrocercus urophasianus*	Federal Candidate; State Threatened
Columbian Sharp-tailed Grouse	*Tympanuchus phasianellus columbianus*	State Threatened

As described in Chapter 1 of the EA, Habitat Conservation Plans are developed by applicants in order to apply for and receive an ITP. The MSGCP is a programmatic approach, but still the plan must specify the impacts that are likely to result from taking covered species, and the steps that will be undertaken to minimize and mitigate such impacts. Because of the challenges of quantifying incidental take over time for a programmatic GCP, Chapter 3 of the MSGCP explored three different approaches to quantify take: 1) a Habitat Suitability Index model (HSI) and population estimate with a simple percentage of the population impacted, 2) a quantification of existing habitat coupled with the assumption that at most 50 percent of the acres in the County would be enrolled, and 3) an evaluation of potential future changes in CRP/SAFE acres over time and the potential conversion of some of those acres. Chapter 3 describes the quantities of take based on the three different methods.

In summary, it is difficult to predict incidental take to covered species due to the programmatic nature of the MSGCP, and the mobile nature of the covered species. The USFWS explored three methods described above. While the HSI model is useful for evaluating habitat in the future, the take estimate component is very general, and the numbers of individuals taken will be difficult to measure in the future. Using habitat as a surrogate for take is a better fit for this MSGCP. The general habitat surrogate would likely be associated with low levels of disturbance, injury, or death of dispersing or foraging individuals or from ongoing agriculture activities. The CRP/SAFE acres conversion surrogate would be more likely to result in impairment of breeding, feeding, and sheltering and mortality from conversion of nesting, burrowing, or foraging habitat and by making covered species more vulnerable to predation.

Approach to Conservation Lands

The MSGCP requires that CRP and SAFE acres be monitored. Under “changed circumstances” in Chapter 4 of the MSGCP, if CRP and/or SAFE contracts are not renewed, farmers enrolled in the MSGCP agree to enroll in other available conservation programs. If there are none available, they will attempt to maintain the lands in conservation cover. If the conservation contract acres or similarly protected acres in the county decrease by more than 10 percent of the starting point (182,072 acres as of 30 June 2013), and additional acres to get above the 10 percent trigger (163,865 acres) cannot be implemented within two years, then the USFWS, with assistance of the FCCD and other members of the implementation and management committee, will revisit the

MSGCP to ensure it continues to meet issuance criteria. Monitoring requirements (Chapter 4 of MSGCP) ensure evaluation of changes to acres of CRP, SAFE, or similar conservation lands.

Approach to Other Reserved Lands

Only nonfederal agriculture lands from willing landowners (Applicants or Permittees) are covered by the MSGCP, but other entities manage lands that support and benefit covered species and their habitats in Douglas County including WDFW (16,361 acres), The Nature Conservancy (TNC) (21,676 acres), and the Bureau of Land Management (BLM) (53,965 acres). While it is likely that these reserved lands will continue with similar management, and may maintain or increase acres over time, the MSGCP includes a "changed circumstance" requirement (in Chapter 4 of the MSGCP) just in case the total acreage of those lands decreases by more than 10 percent of the 2013 acreage level. At that point, the USFWS, with assistance of the FCCD, Permittees, and other members of the implementation and management committee, will revisit the MSGCP to ensure it continues to meet issuance criteria. Monitoring requirements (Chapter 4 of the MSGCP) ensure evaluation of changes to the reserved lands.

Monitoring and Adaptive Management

Alternative 2 includes an adaptive-management plan and a monitoring plan to gauge the effectiveness of the MSGCP, to retain the option to propose additional or alternative conservation measures, and to deal with changed or unforeseen circumstances. This is described in Chapter 4 of the MSGCP. Periodic monitoring and review at both the site-specific and county-wide level will be used to evaluate management objectives and techniques to better achieve MSGCP goals. The monitoring process includes a county-wide habitat-suitability-index modeling effort which is discussed in Chapter 4, and described in more detail in Appendix G of the MSGCP.

Approach to Cultural Resources

The MSGCP includes a process to ensure that section 106 of the National Historic Preservation Act is considered by the USFWS or other Federal agencies during implementation as appropriate. This process is described in Appendix F of the MSGCP, and provides a list of activities that would not require additional review, and a process for other activities that do not fit on the list.

Alternative 3, Expanded MSGCP (Additional Conservation Lands)

Alternative 3 would include many of the same expectations as described for Alternative 2, including covered activities, covered species approach to other reserved lands, and monitoring and adaptive management. The key difference would be in the approach to conservation lands. In recent years, the conservation of wildlife species in Douglas County has been considerably improved by implementation of the CRP. Prior to 2009, about 33 percent of the "eligible lands" in Douglas County (186,144 acres (MSGCP 2012)) were enrolled in CRP. This alternative would increase the lands in CRP, SAFE, or similar protected lands by 100,000 acres above the 2009 benchmark of 186,144 CRP acres over the next 10 years, to result in conservation of about 50 percent of the eligible lands in Douglas County. This would be a voluntary commitment on the part of landowners. However, it would be more palatable to landowners if there were some sort of payment system to reward commitments to additional conservation lands. The FCCD has developed no payment or funding mechanism to date for this alternative.

The three alternatives are compared in Table 3.

COMPARISON OF ALTERNATIVES

Table 3. Summary of Alternatives

Actions	**Alternative 1** **No-Action Alternative**	**Alternative 2** **Proposed MSGCP**	**Alternative 3** **Expanded MSGCP**
Term of the MSGCP	Not applicable	50 years	50 years
Covered activities	No activities covered for incidental take, farming will likely continue.	See Table 1-3 and Appendix E of the MSGCP. Generally includes dry-land farming, ranching, and irrigated agriculture other than Columbia River or Wenatchee River surface water.	See Table 1-3 and Appendix E of the MSGCP. Generally includes dry-land farming, ranching, and irrigated agriculture other than Columbia River or Wenatchee River surface water.
Covered Species	None	Four species, see Table 2.	Four species, see Table 2.
Implement management for covered species	Farmers might, at their own discretion, manage for covered species.	Through farm planning, farmers would implement measures to improve habitat quality and manage for covered species (see Appendix E of the MSGCP for more detail).	Through farm planning, farmers would implement measures to improve habitat quality and manage for covered species (see Appendix E of the MSGCP for more detail).

Actions	Alternative 1 No-Action Alternative	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
Unfarmed private lands (CRP or other conservation lands) in Douglas County	CRP/ SAFE, and other conservation lands are likely to continue as long as the programs are renewed and funded in Douglas County (MSGCP Ch. 3). Farmers may or may not continue enrollment depending on their individual circumstances.	CRP/SAFE would continue as allowed and/or renewed under Farm Bill Programs. If CRP/SAFE contracts are not renewed, enrolled farmers will attempt to enroll acres in other available conservation programs, or maintain the land in conservation cover. If total conservation cover acres decrease by more than 10% of 2013 levels (182,072), and cannot be brought above that level in 2 years, then revisit the MSGCP (Ch. 4 of MSGCP).	CRP/SAFE would continue as allowed and/or renewed under Farm Bill Programs. In addition to CRP/SAFE, FCCD would develop process or funding to increase total reserved or restored shrub-steppe or grasslands by 100,000 acres above the 2009 benchmark of 186,144 acres (to total approximately 50% of eligible agriculture lands in Douglas County.)
Other reserved lands in Douglas County **(WDFW, TNC, BLM)**	WDFW, TNC, and BLM lands would likely continue to provide habitat for listed and unlisted species. See Figure 3-2 in MSGCP.	WDFW, TNC, and BLM lands would likely continue to provide habitat for listed and unlisted species. Nonetheless, if reserved lands decrease by more than 10% of 2013 levels in Douglas County, the MSGCP will be revisited to ensure it continues to meet issuance criteria (Chapter 4 in MSGCP).	WDFW, TNC, and BLM lands would likely continue to provide habitat for listed and unlisted species. Nonetheless, if reserved lands decrease by more than 10% of 2013 levels in Douglas County, the MSGCP will be revisited to ensure it continues to meet issuance criteria (Chapter 4 in MSGCP).

Actions	Alternative 1 No-Action Alternative	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
Monitoring and Adaptive Management	Some Farm Bill programs include a monitoring component. No additional monitoring is required.	The MSGCP includes an adaptive management and monitoring plan (Chapter 4 of MSGCP); FCCD commits to implement the plan (Appendix I of MSGCP)	Alternative 3 would include an adaptive-management and monitoring plan (Chapter 4 of MSGCP); FCCD commits to implement the plan (Appendix I of MSGCP)
Cultural Resources Review	No additional cultural resources review required; some Farm Bill programs already build in a cultural resources review process through FSA or NRCS.	The MSGCP includes a process to ensure section 106 of the National Historic Preservation Act is considered by the USFWS or other Federal Agencies (Appendix F of the MSGCP).	The expanded MSGCP would include a process to ensure section 106 of the National Historic Preservation Act is considered by the USFWS or other Federal Agencies (Appendix F of the MSGCP).

CHAPTER III – AFFECTED ENVIRONMENT

INTRODUCTION

Chapter III describes the current physical, biological, social, and economic components of Douglas County. Many plant names are used in several of the following sections. Where only a common name of a plant is used, the scientific name can be found in Appendix A.

DESCRIPTION OF AFFECTED ENVIRONMENT

County Overview

Located close to the geographical center of Washington State, Douglas County (Figure 1) lies on the northern edge of the Columbia Basin in the shelter of the Cascade Mountains to its West. The Columbia River bounds the County on the north, west, and a portion of the south side. The eastern county line lies just west of Banks Lake and Sun Lakes.

The shrub-steppe plant community was the predominate cover on the Douglas County landscape following the most recent glacial period (approximately 10,000-5,000 B.P.) up to the early 1900s. Over the past century, about 88 percent of the approximately 1,183,414 acres of private and public lands in Douglas County has been converted from natural shrub-steppe habitat to agricultural production. Figure 2 shows the habitat types and land uses within the County. Most remaining shrub-steppe in the county occurs on shallow soils and has been impacted by decades of livestock grazing, introduced vegetation, fire, fire suppression, and other anthropogenic disturbances (Quigley and Arbelbide 1997, Knick 1999)

The majority of Douglas County is rolling plateau, underlain by basalt, and interspersed by intermittent drainages. General elevations range between 2,000 and 3,000 feet mean sea level. Higher terrain is in the southwest at Badger Mountain and northeast in the Okanogan Highlands. Lower elevations include Moses Coulee and areas along the Columbia River (Johnson and Associates 1974). Much of the social and economic environment is related to the dry desert climate that prevails across the County. Tourism and recreation are increasing, but the County is for the most part sparsely populated and heavily dependent upon agriculture.

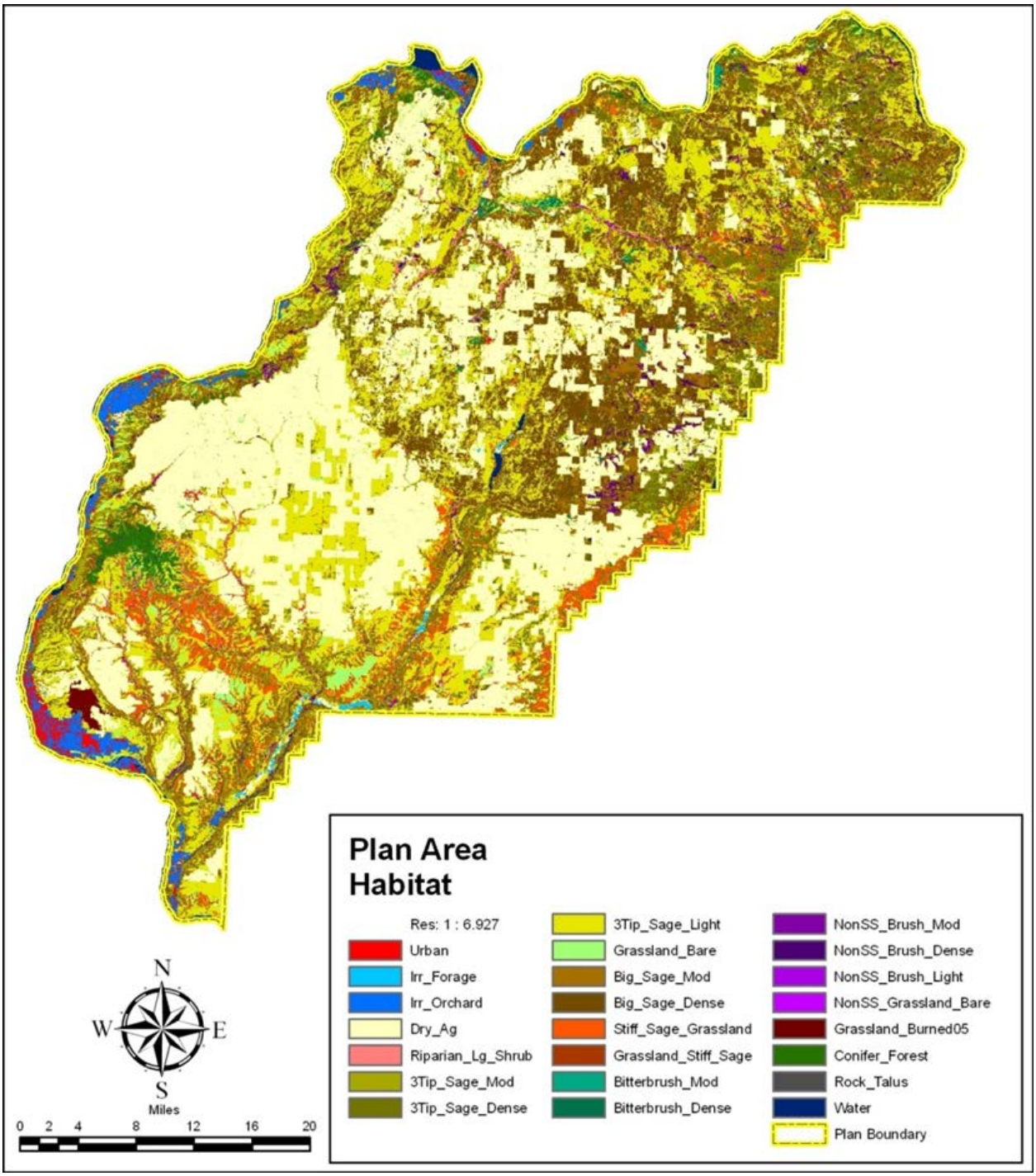

Figure 2. Existing Habitat in Douglas County (from Figure 2-7 in MSGCP)

Populations and Communities

The estimated 2012 population of Douglas County is about 39,350 or about 21.3 persons/square mile. East Wenatchee is the largest city with a population of 13,439 and the County Seat, Waterville, has a population of 1,155. Other incorporated cities include Rock Island, Mansfield, and Bridgeport (USDC 2012a, USDC 2012b). A portion of the town of Coulee Dam also is in the

County. In addition, there are historical settlement areas of Withrow, Douglas, Orondo, and the Palisades (Douglas County 1995; U.S. Census Bureau 2008).

Land Ownership and Use

Most of the agricultural land in production today was established in the late 1800's when most of the County was homesteaded. Two current land use trends are apparent in the county: agricultural activities are consolidating into larger operations and agricultural land is being removed from production and converted to commercial, industrial, and residential uses. Commercial, industrial, and residential uses are not covered activities under the MSGCP. Land-use zoning within Douglas County is shown in Figure 3.

The predominant land use in Douglas County is agriculture. Agricultural lands are defined as those involved in the preparation of soil for crop production, the cultivation of crops, and the production and culture of animal products and fiber for human consumption, feed and/or sale as articles of trade or commerce, including horticulture and commercial greenhouse operations.

Transportation System

Douglas County is crossed by three major highways and numerous tributary routes as shown in Figure 4.

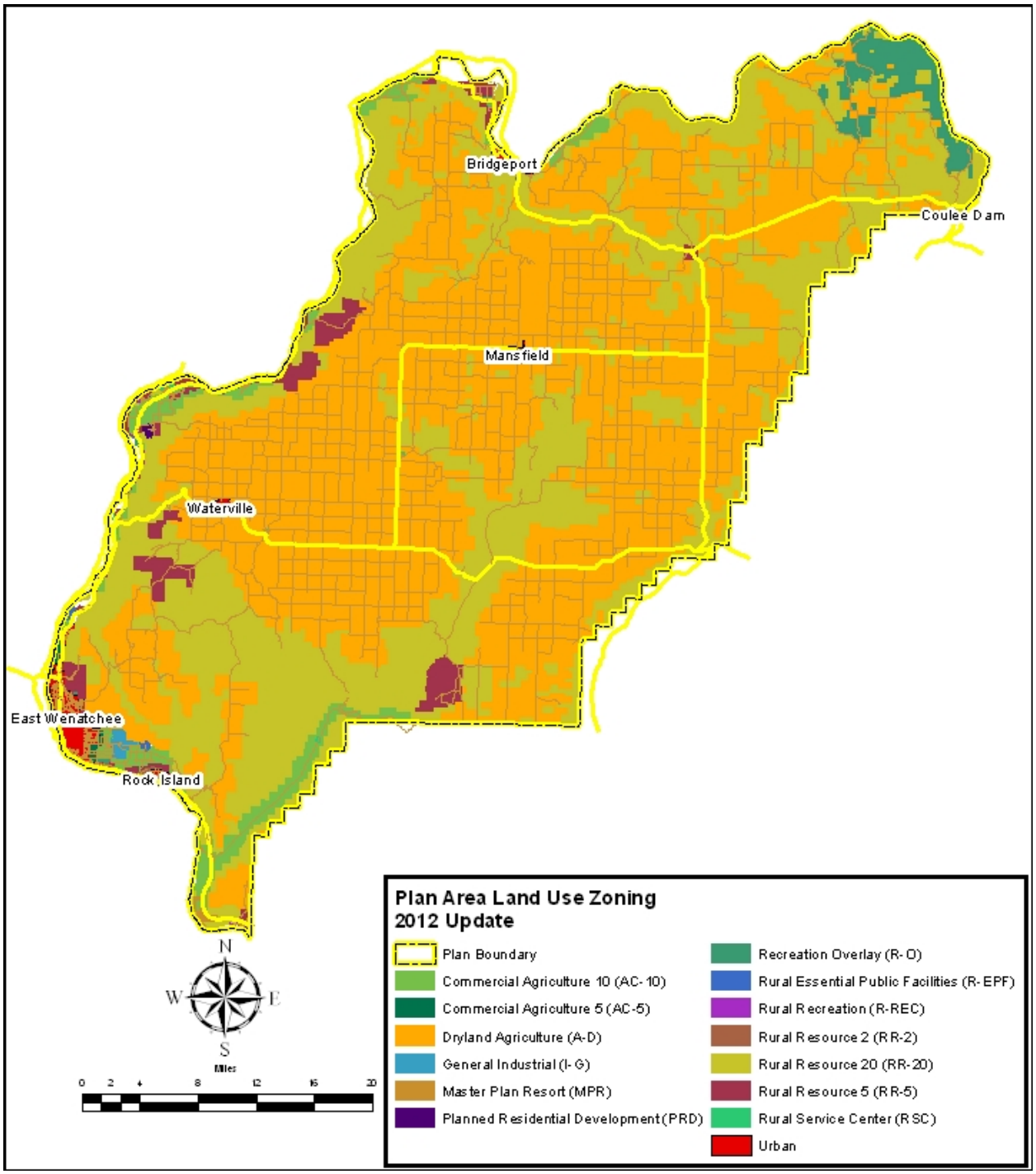

Figure 3. Current Land Use Zoning in Douglas County

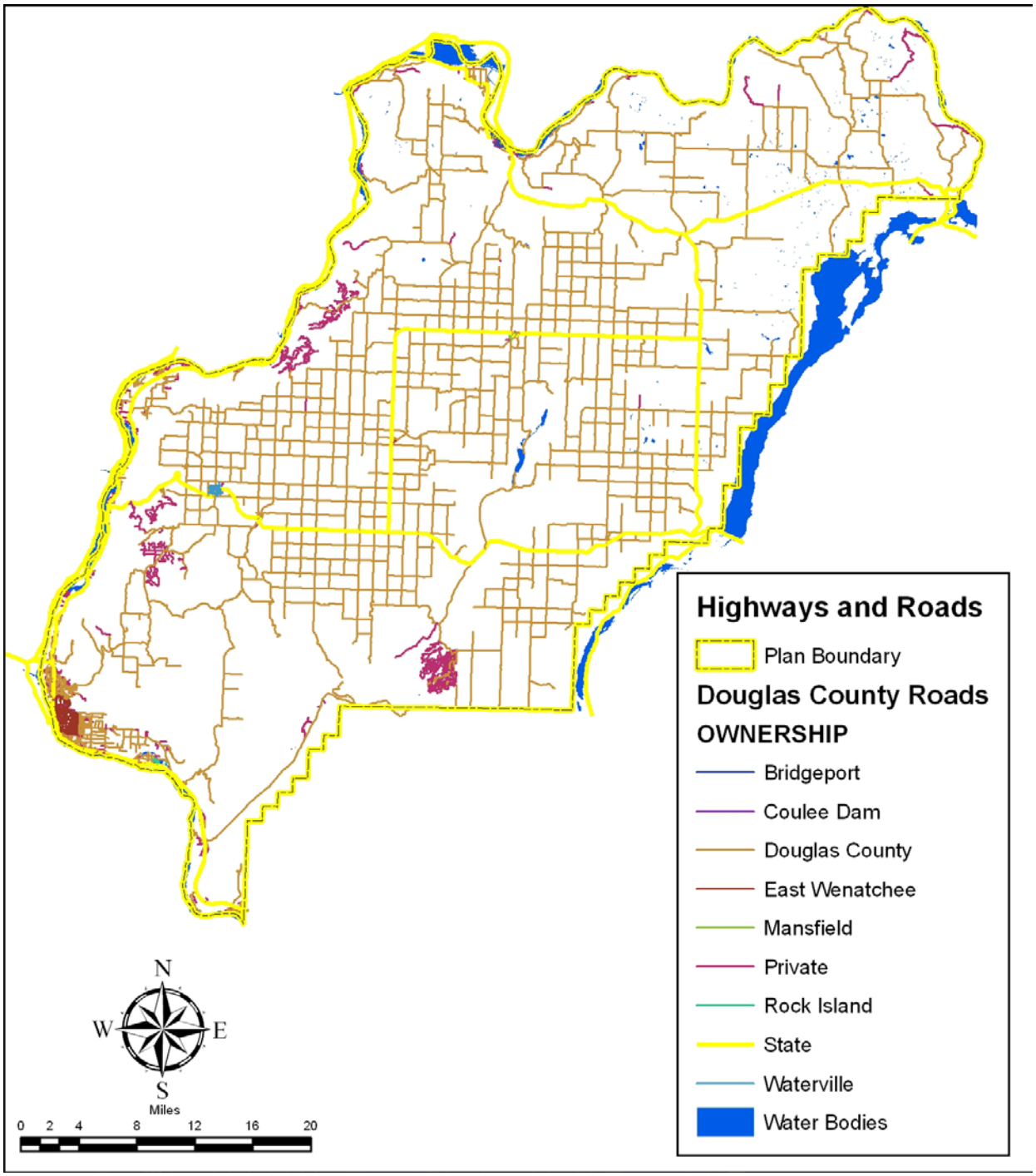

Figure 4. Transportation Routes in Douglas County

Climate

The precipitation in the County ranges from 6 to 24 inches annually, with an average of 11.2 inches (Figure 5). Temperatures in Waterville (2,640 ft.) range from an average winter temperature of 26°F to an average summer temperature of 65°F; and in East Wenatchee (780 ft.) temperatures range from an average winter temperature of 32°F to an average summer temperature of 71°F.

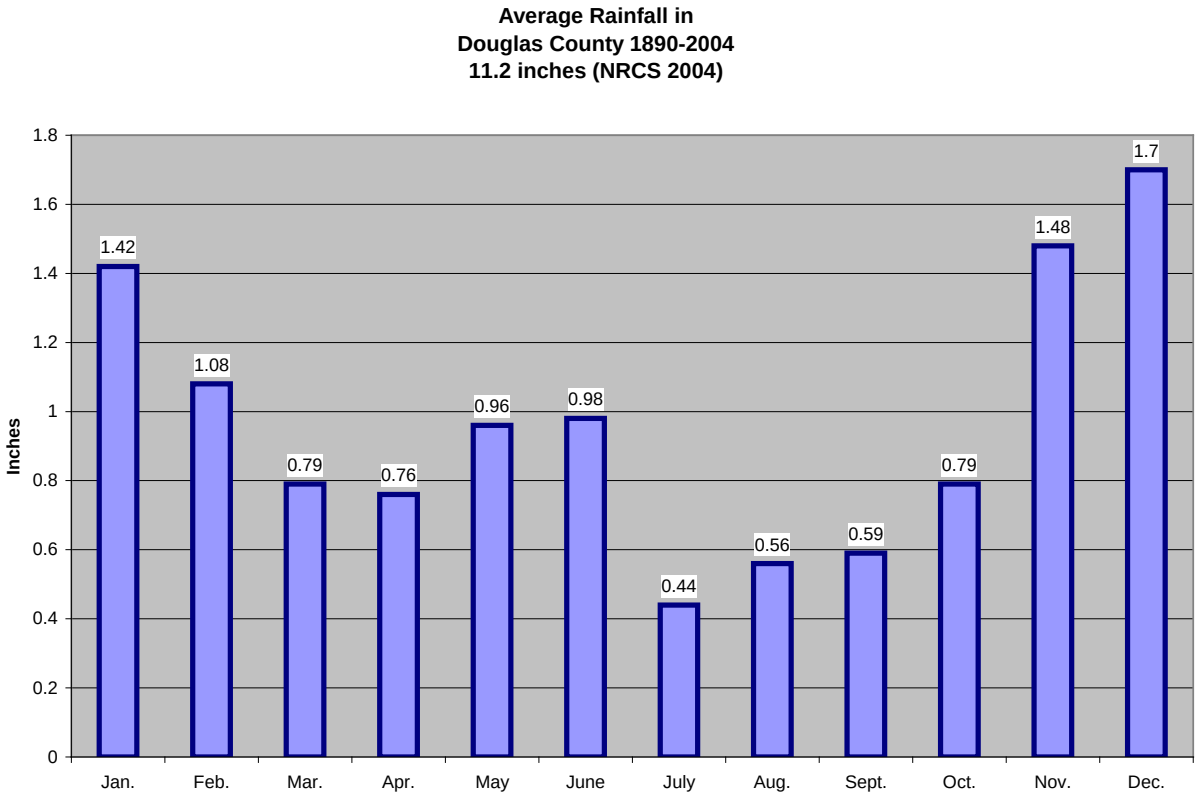

Figure 5. Precipitation Patterns in Douglas County

Subfreezing temperatures are experienced about 140 to 160 days per year. Average depth of the frost is generally 10-20 inches. Early snowfall will insulate the ground and reduce the depth of freezing to only a few inches, whereas lack of early snow can result in freezing depths approaching 30 inches. Flooding and erosion problems can result when the underlying soil is frozen and heavy runoff from rain or snowmelt occurs (Beieler 1981; Douglas County 1995; Johnson and Associates 1974).

Prevailing wind direction and speed varies according to topographic situation and season. Fifty mile-per-hour winds can be expected an average of once in 2 years, and 70 mile-per-hour winds once in 25 years. High winds occur with greater frequency on exposed ridges and the upland surface of the watershed than on the floodplains (Thompson and Ressler 1988).

Climate change is currently being researched and discussed regionally and nationally; local habitats may be affected within Douglas County. There are varying models and predictions for the changes that might be expected over 50 years and beyond. Temperature variations of one to three degrees Fahrenheit are predicted over the term of the MSGCP, and changes to precipitation patterns and quantities are predicted within Douglas County. Winter precipitation is predicted to come more in the form of rain and less in the form of snow in the Pacific Northwest (University of Washington 2013), the freeze-free season is predicted to increase, and precipitation may increase in winter, spring, and fall but decrease during summer (Kunkel et al 2013).

1. AESTHETICS

The visual character of Douglas County is highly variable from the river-bank agricultural lands along the Columbia River to the rangelands and cultivated high-plateau lands of the eastern part of the County. Coulees formed by the Missoula floods divide the County, including Moses Coulee, Palisades Coulee and Grand Coulee on the eastern edge (USGS 1974). Banks Lake, a storage reservoir for the Columbia Basin Project, is located in Grand Coulee.

Two transportation corridors cross the County providing visitors and residents opportunities to enjoy the existing landscapes (Figure 4). These include east-west Highway 2 from Coulee City to East Wenatchee and north-south Highway 97 from near Chelan to East Wenatchee. Other important roads that provide broad views of the existing landscape include Highway 165 from Coulee City to Grand Coulee passing by the aesthetically pleasing Banks Lake, Highway 174 from Grand Coulee to Bridgeport passing through extensive glacially affected landscapes, and Highway 28 from East Wenatchee to Quincy adjacent to the Columbia River.

The rolling high-plateau north and east of the County Seat, Waterville, provides open space views of natural habitat, rangelands and dryland farming. As precipitation levels are less than 12 inches, the tillage practice of fallowing is used on these dry farm lands to conserve soil moisture. Thus, actual cropping on any given year is only about 50 percent of the cultivated area in the County. The residual remnants of glacial-ice-rafted rocks (glacial erratics) scattered across the northern regions of the County provide unique character to these lands.

There are no visual quality zones or protection plans for the aesthetics and/or visual character of the rural portion of Douglas County. Many people view farmed land as aesthetically pleasing, while others may view more natural shrub-steppe or grassland as aesthetically pleasing. Much of the TNC, WDFW, and BLM lands in the County are natural-appearing shrub-steppe; CRP/SAFE lands retain or create a natural grassland or shrub-steppe appearance, as do grazed ranch lands. Thus, at minimum, roughly 599,000 acres in the County have a natural-looking appearance. Irrigated or dryland farm lands comprise about 368,000 acres of land (not including CRP acres). These numbers are rough estimates, but indicate that much of Douglas County has either a farmed or natural-habitat appearance.

2. ECONOMICS (AGRICULTURAL PRODUCTION AND SOCIOECONOMICS)

Current Land Use

Agricultural production activities in Douglas County, particularly dryland farming and livestock enterprises, are often low-margin economic activities. Frequently, it is the farming of large acreages with a low income per acre that leads to an economically viable production unit within the County. Often, especially for dryland farming enterprises, the farm units have been in the family since the land was first farmed, and farming is a social "way of life" for these families. Currently, approximately 1,027,628 acres of land are privately owned in Douglas County. Agricultural lands total 883,094 acres, of which 539,531 were classified as harvested cropland. Of the approximately 955 farms in the county, 157,898 acres are in wheat production, 4,291 acres are in barley and oat production, 14,551 acres are in orchards (USDA 2009), and 4,099 acres are in forage production. There were over 12,000 head of livestock in the County in 2007 (USDA 2009).

The predominant land use in Douglas County is agriculture in the form of dryland grain crop (with some CRP/SAFE), rangeland livestock grazing, and irrigated farming. Orchard activities occur along the Columbia River corridor and to some extent in the lower portion of Moses Coulee. The remainder of the County, on the Waterville plateau, is where the majority of the grain, crop, and livestock production take place. The current agriculture trend is toward fewer farms with larger acreage. Agricultural production on both drylands and orchard lands requires the removal of native vegetation followed by tillage and further land treatments. Often the optimization of livestock production on rangeland leads to modification of the natural habitat, although the modification is not as extreme as occurs with dryland farming and orchards.

Dryland crop farming takes up a large part of Douglas County's land area, particularly on the plateau. The predominant crop, because of soil types and climate, is winter wheat grown in fallow-rotation. Every other year, the ground sits idle in order to increase moisture and mineral/nutrient content of the soil. Consequently, the average dryland farm size in the County is larger when compared to other wheat-growing counties in the State. Acreage in active production (not in fallow rotation) changes from year to year depending on precipitation.

Because of soil types and climate, a portion of the land on the plateau is not suitable for dryland crop production, but is suitable for rangeland-grazing. The largest concentrations of rangeland areas are typically located at the fringes of the plateau, immediately adjacent to basalt breaks. Ranching includes cow/calf operations, with calves being born in early spring and weaned in October and November.

Along portions of the Columbia River corridor, the predominant irrigated agriculture activity is tree-fruit production. Sandy, well-drained soils; long, warm growing seasons; and the availability of irrigation water adjacent to the Columbia River, provide excellent orchard lands. Irrigated agriculture extends up into Moses Coulee as well; where, along with orchards, alfalfa hay and other forage are produced. Economic returns are usually greater per acre on the irrigated orchard lands. Ownership tenure on orchard lands tends to be measurably shorter than on drylands and rangelands. However, there is more pressure on these lands for conversion to residential and

recreational uses, particularly along the Columbia River fringe. This pressure is expected to increase during the coming decades.

In recent years, the CRP has had a major influence on the socioeconomics of Douglas County. The program has increased the amount of absentee ownership in the County, due to guaranteed rental payments. The CRP allows farmers to enroll some of their land into a 10 to 15-year plan of maintaining a cover crop, as opposed to typical winter wheat/ fallow rotation that involves harvesting and replanting. This is a multiple-use, federally funded program designed to conserve soil and water and to provide wildlife habitat. The Federal government pays an established dollar amount per acre to the farmer to keep that ground out of production, but maintained with an adequate cover crop and controlled for noxious weeds. Typical cover crops are crested wheat, tall wheat, Sherman big blue, rye grasses, or alfalfa.

Over time there was a shift from using CRP from primarily soil-erosion-control to providing habitat for wildlife (M. Bareither, NRCS, Pers. Comm. 2001). In past years, approximately 33 percent of eligible cropland acres in Douglas County were enrolled in CRP, but the limit is now 25 percent of eligible croplands. As of October 1, 2010, CRP acres in Douglas County had been reduced from approximately 186,000 acres, to approximately 149,500 acres. As of 30 June 2013, 182,072 acres were enrolled in CRP and similar programs within Douglas County; including approximately 63,000 acres enrolled in the SAFE program and managed as conservation cover specifically designed for greater sage-grouse and Columbian sharp-tailed grouse (Michele Ruud, Farm Service Agency, Pers. Comm. 2013). These acreage quantities vary by year and depend on program funding and signup opportunities.

Development

Rural portions of the County have experienced some residential and recreational growth. Residential development tends to be associated with recreational amenities like golf courses. Residential development is occurring primarily around the Columbia River corridor, due to water-related recreational activities and spectacular views. The recreational/tourist-based economy has diversified Douglas County's economic base. It is likely that the agriculture industry will continue to be a primary economic factor in the County in the future, although orchards may decrease due to residential development pressures.

Agricultural-Based Revenues

Agricultural economic statistics for Douglas County are shown in Table 4, including comparisons to state-wide values. In Douglas County there are about 955 farms with an average size of 925 acres (USDA 2009). The market value of agricultural products sold is more than $193 million.

Table 4. Summary of Agricultural Economic Indicators for Douglas County and Washington (USDA 2009)

INDICATOR	WASHINGTON	DOUGLAS COUNTY	COUNTY (% OF STATE VALUE)
Resource:			
Number of Farms	39,284	955	2.4
Total Farm Acres	14,972,789	883,094	5.9
Average Size of Farm (acres)	381	925	242
Median Size of Farm (acres)	30	70	233
Farms 1-9 Acres	9,211	208	2.3
Farms 10-49 Acres	14,790	226	1.5
Farms 50-179 Acres	7,307	187	2.6
Farms 180-499 Acres	3,479	83	2.4
Farms 500-999 Acres	1,731	65	3.8
Farms 1,000+ Acres	2,766	186	6.7
Value:			
Est. Market Value Land and Buildings Average per Farm	$759,146	$1,020,277	134.4
Estimated Market Value Equipment Average per Farm	$83,468	$100,225	120.1

INDICATOR	WASHINGTON	DOUGLAS COUNTY	COUNTY (% OF STATE VALUE)
Miscellaneous			
Beef cow Inventory (# farms)	10,065	78	< 1
Selected Crops Harvested			
Wheat for Grain (# farms)	2,612	168	6.4
(acres)	2,096,350	184,829	8.8
(bushels)	120,616,390	7,122	< 1
Oats for Grain (# farms)	138	8	5.8
(acres)	8,956	1,510	16.8
(bushels)	426,027	56,718	13.3
Barley for Grain (# farms)	843	18	2.1
(acres)	223,598	2,781	1.2
(bushels)	13,928,713	104,502	< 1
Forage (# farms)	10,243	61	< 1
(acres)	846,140	4,099	< 1
(dry tons)	3,595,392	11,304	< 1
Orchards (# farms)	5,470	397	7.2
(acres)	299,174	14,877	5
Market Value of Ag Products Sold:			
Total Sales: ($1,000)	$6,792,856	$193,367	2.8
Average per Farm ($)	$172,917	$202,479	--
Total Farm-Related Source Income			
Number of Farms	10,733	291	2.7
Total Income ($1,000)	244,801	$5,421	2.2
Total Government Payments (Income):			
Number of Farms	6,899	379	1.1
Total Payment ($1,000)	$138,272	$11,647	8.4
Average per farm ($)	$20,042	$30,730	--
Net Cash Farm Income			
Number of Farms	39,284	955	2.4
Total ($1,000)	$1,785,615	$62,671	3.5
Average Net Income per Farm ($)	$45,454	$65,624	--

3. CULTURAL RESOURCES

Prior to European-American settlement into the Douglas County region in the 1700's, the human residents were predominantly nomadic. Throughout spring, summer, and fall, hunting and gathering took place at areas away from the winter village. Task groups often went to specific areas to hunt, quarry tool stones, collect berries, or to gather other resources such as tules for making mats (Aikens 1993). The salmon runs, which took place at predictable times during the year, provided a valuable resource for immediate use and to store for winter provisions (Schalk 1977). By the end of summer, dried salmon and root crops were stocked in preparation for the winter. In winter, the people of the Columbia Plateau lived along major rivers in earth or mat lodges at semi-permanent villages. Their villages were situated in relatively warm locations that were protected from the harsh elements and the lodges were semi-subterranean (Ray 1939). The Wenatchee river region was a popular trade center for many groups (Hanes 1995). Considerable trade and communication occurred with Salish groups (including the Wenatchee, the Columbia Salish, the Chelan, and the Entiat) (Hanes 1995, Harder 2005) and people west of the Cascades and others up and down the Columbia River.

Douglas County is located within the ceded lands described in the Walla Walla treaty of 1855 and was used traditionally by a number of native people, many of whom are members of the Confederated Tribes of the Colville Reservation (Campbell 1985, 1989; Chalfant 1974a, 1974b). Both the Colville Confederated Tribes and the Yakama Indian Nation consider portions of Douglas County as having potential to contain important cultural resources. The Confederated Tribes of the Colville Reservation located on the north boundary of Douglas County are comprised of people from as many as 12 historical groups (Wenatchee, Chelan, Entiat, Methow, Okanogan, Nespelem, San Poil, Lakes, Colville, Moses Columbia, Palus, and Chief Joseph Wallowa Band of the Nez Perce) (Hanes 1995). Most of the Colville tribes traditionally lived in the central area of the Columbia Plateau (including Douglas County), with the primary exception being the Wallowa Nez Perce band (Ray 1974) who travelled from the high mountains of the Wallowas in the summer to deep canyons of the Snake River and its tributaries in winter.

Douglas County includes both the basalt flows of the Columbia Plateau and gravel deposits along the Columbia River put down by the Spokane floods (Harder 2005). A great deal of archaeological research in the region has been driven by irrigation and power-generating dam projects. Surveys along Rock Island Reservoir and along the shoreline have resulted in the discovery of 49 archaeological sites, 36 of which are prehistoric or have prehistoric components (Harder 2005). Known archaeological sites in the vicinity of East Wenatchee include two petroglyph sites and one multi-component site (potentially residential) along the Columbia River. Talus pit sites in the County may have served as cache pits for food or materials and are generally associated with prehistoric residential sites. Another significant high-profile archaeological site known as the Richey Clovis Cache was discovered in 1987 near Pangborn Airport just outside East Wenatchee. Archaeological excavation found 14 Clovis fluted points, 8 bifacial knives, 7 fluted point preforms, other stone tools, and mammoth or mastodon bone rods. Bison/bovine, deer, rabbit, and human blood were identified on the tools by blood-residue analyses of the artifacts (Gramly 1993). The materials on the site date to approximately 11,200 years before present (Mehringer and Folt 1990, Gramly 1993). The presence of the Richey Clovis Cache in conjunction with the known sites along the Columbia River and the

ethnographic and historical information suggest that this area has been a prominent crossroads for the span of human occupation in the Pacific Northwest (Harder 2005). Additional cultural or historic resources from early homesteaders may also occur in Douglas County.

4. EARTH RESOURCES (AIR QUALITY AND SOILS)

During scoping and other NEPA and outreach workshops, participants recommended that impacts be analyzed for: acres of soil disturbance, increased air pollutants including particulate matter, effects on Class I Airsheds, and changes in visibility and local air quality.

Air Quality

For the most part, current air quality within Douglas County is excellent. The exception is during certain periods in the spring under very windy conditions where considerable bare or exposed soil exists from agricultural operations on the Waterville Plateau and the eastern part of the County. During these short periods, wind-blown soil, mostly from dryland crop operations, creates a serious adverse impact on air quality. Air-pollution records have not been consistently kept across the County, but observations indicate there are no significant point-source polluters in the County. As there are no major air-pollutant sources in or near Douglas County it is assumed that ambient levels of carbon monoxide, lead, ozone, nitrogen oxide, and sulfur dioxide (all pollutants of air-quality concern) are typical of the levels found in other remote rural settings in Washington. No known monitoring of these pollutants has occurred, but since the alternatives are unlikely to change these air-pollutant levels, they will not be further addressed.

Under the Clean Air Act, certain national parks and wilderness areas were designated as Class I Airsheds. Portions of Douglas County are less than 50 air miles from wilderness areas where air quality is protected by designation as a Class I Airshed. However, prevailing winds are most often from these Class I Airsheds towards Douglas County, and therefore Class I Airsheds will not be further discussed in this EA.

Air quality in Douglas County is predominately adversely affected by wind erosion and occasionally by wildfire. Conservation practices have been developed for dryland farms that markedly reduce wind erosion and protect air quality. Occasional wildfire impacts are highly visible, but short-term in nature. In recent years, the removal and disposal of wood from orchard lands was accomplished by burning. This activity has been significantly reduced by WDOE rules and replaced by chipping activities.

With the exception of agricultural tillage operations during windy conditions, the location, terrain, and wind patterns produce good conditions for maintaining high-quality air conditions across the private agricultural lands of Douglas County. There is no recent air quality monitoring data in or near Douglas County, and no baseline values have been established. Douglas County has, on occasion, been included in air-forecast advisories issued by WDOE for air stagnation due to atmospheric temperature inversions. There are, on an average, 10 to 15 days during the winter months when the advisories are issued. When they are issued, they are generally for the entire State east of the Cascade Range and do not specifically single out Douglas County.

Visibility and Particulate Matter
The clarity of the air, or visibility, is another way to judge air quality. Visibility is affected by natural and human-caused materials in the air such as fine particles of soot or dust, sulfates, and nitrates. These materials alter visibility by changing the way light is transmitted through the atmosphere. Distant objects appear veiled by a haze that reduces both color and brightness. In Washington, concerns about visibility range from views in urban areas to views in parks and wilderness areas and at scenic vistas. Ten recording sites distributed throughout Washington provide visibility-monitoring data. The site closest to Douglas County is on Snoqualmie Pass, Washington (WDOE 1997), and is not relevant to the County.

Particulate matter consists of fine particles of smoke, dust, pollen, or other materials that remain suspended in the atmosphere for a substantial period of time. Particulate matter is measured in three forms: Total Suspended Particulate, $PM_{10,}$ and $PM_{2.5}$. PM_{10} is respirable or fine particulate matter, defined as smaller than 10 micrometers in diameter, while $PM_{2.5}$ is the same material smaller than 2.5 micrometers in diameter.

No known monitoring of particulate matter or baseline data has been established for Douglas County. Visual observations in the agricultural area of Douglas County indicate the largest source of suspended fine particles $PM_{10/2.5}$ appears to be road dust from automobiles and trucks, particularly on non-asphalt surfaced roads as well as cultivation activities (Papendick 2004). Additional known sources of total suspended particles in the rural area of the County include residential fireplaces and woodstoves and occasional wildfires on forest and rangelands.

Surface roughness is a key to controlling wind erosion from cultivated areas and dust pollution in downwind areas (Papendick 2004). Soils of the Columbia Plateau, including Douglas County, are highly susceptible to blowing (airborne movement) because of the dry environment, limited vegetation, high winds, intensive tillage, and because they contain substantial quantities of readily erodible and easily suspended fine particles. In the absence of detailed local data, the USFWS assumes that increased acreage tilled results in increased airborn fine particles and decreased visibility.

Soils
The most-current soil survey available is the 2006 NRCS Soil Survey of Douglas County, Washington. This unpublished survey in digital format presents a detailed soils map describing broad areas of the County with distinctive soils patterns, relief, and drainage. In addition, the 2006 Soil Survey provides details to relate soils and hydrology to erosion potential, vegetation, water quality, and wildlife habitat.

The northern Douglas County basalt plateau is dominated by glacial till and extremely fine, wind-blown soils (loess). Soils found on the plateaus and upland areas are usually a silt-loam type, suitable for dryland farming. The northern part of the County is dominated by the Touhey-Heytou soil association with very deep and well-drained, nearly level to moderately steep soils on broad uplands and basalt plateaus. The southern part of the County is dominated by the Renslow-Zen soil association, a very deep and moderately deep, well drained, nearly level to moderately steep soil, on broad basalt plateaus (Beieler 1981). The Douglas County Soil Surveys (Bieler 1981 and NRCS 2006) show that shallow silt-loam soils in the southern part of

Douglas County have generally poor drainage characteristics. The sand-loam and deeper silt-loam soils in the northern part of the County have better drainage characteristics (Johnson and Associates 1974).

In general, soils along the Columbia River are predominately well-drained sands and gravels which, when combined with irrigation, provide an excellent medium for orchards (KCM 1995). These river soils are of the Pogue-Quincy-Xerorthents soil association, a very deep, somewhat excessively drained, nearly level to very steep soil, on terraces and terrace escarpments (Beieler 1981, NRCS 2006).

Erosion and Sedimentation

Soils in both the northern and southern parts of Douglas County are equally susceptible to land-management practices that exacerbate conditions that contribute to soil erosion (E. Benson, NRCS, Pers. Comm., 2000). Shallow, fine-textured soils in Douglas County are easily eroded and can cause sediment pollution in streams (Johnson and Associates 1974). Wind and water erosion is severe in the county, but with the greatest erosion impacts on the Waterville-Mansfield Plateau. Heavy sediment yields are generated during periods of snowmelt, during rain-on-snow events when the underlying ground is frozen, or during high-intensity rainstorms in the summer months (Johnson and Associates 1974).

In Douglas County, most cultivated lands are fallowed, or left without a cover crop for a season that allows soil to regain moisture and to manage or reduce weeds or pests. When previously cultivated soils are left without a vegetative ground cover, especially with very fine soils that are common in Douglas County, surface-water runoff can result in delivery of topsoil to nearby stream systems. The delivery of sediment-laden water carrying silt, fertilizer, pesticides, and herbicides can pollute water supplies and threaten populations of fish and other aquatic organisms (Thompson and Ressler 1988). The East Foster Creek Watershed Hydrology and Sedimentology Study (Munson Engineers 1989) documents most soil grains transported through intermittent stream channels eventually travel through East Foster Creek and on to the Columbia River. However, a few intermittent streams pass through small ponds and reservoirs where the flow slows and the soil grains settle, thereby depositing part or the entire sediment load (Munson Engineers 1989). The Foster Creek Conservation District continues to work to reduce sediment transport via the Foster Creek drainage to the Columbia River.

5. FISH AND AQUATIC SPECIES

The two largest lakes within the MSGCP area are Grimes (124 acres) and Jameson (334 Acres). Both lakes are hydrologically closed basins, with inflows sufficient to maintain year-round lakes but the high evaporation rates result in saline conditions. There are five large hydroelectric dams (Grand Coulee, Chief Joseph, Wells, Rocky Reach, and Rock Island dams) on the Columbia River along the boundaries of Douglas County. Grand Coulee Dam is managed by the U.S. Bureau of Reclamation; Chief Joseph Dam is managed by the U.S. Corps of Engineers; Wells Dam is managed by Douglas County Public Utility District; and Rocky Reach Dam and Rock Island Dam are managed by Chelan County Public Utility District. Chief Joseph and Grand Coulee dams do not have fish-passage structures.

Stream and Creek Characteristics

Historically, fish production in Douglas County streams was likely limited due to low annual precipitation resulting in insufficient surface water runoff and habitat and high summer water temperatures. Most streams in Douglas County have been altered from their natural state as a result of grazing and agricultural use. The loss of streambank vegetation and stream complexity exacerbates temperature extremes in both summer and winter. Lack of shade from degraded riparian vegetation and reduced flow conditions can raise water temperatures above fish tolerance levels on smaller streams, and freezing water in streams with low winter flows jeopardize over-wintering fish survival. Decreased pools and backwater areas in streams limit refuge habitat for resident fish species during high and low flows.

Lower reaches of Foster and Rock Island Creeks are known to support anadromous fish species rearing, and perhaps spawning, at least during some seasons of the year (Pacific Groundwater Group 2003). Adult steelhead (*Oncorhynchus mykiss*) have been documented spawning from late April through early June in the lowest reaches of Foster Creek, but nowhere else in Moses Coulee Water Resource Inventory Area (WRIA) 44 and Foster Creek WRIA 50. There is a significant fish passage barrier, an approximately 35-foot high dam at Foster Creek river mile 1.03 (Pacific Ground Water Group 2003). Rock Island Creek provides access to anadromous fish year-round from the mouth up to the spring at river mile 0.52; upstream of that location the spring generally is dry from early spring to late fall. Juvenile anadromous fish rearing, including Chinook salmon (*O. tshawytscha*), has been observed in lower reaches near the mouths of both creeks, but it is unknown if they are progeny of adults spawning in the creeks or fish from the Columbia River system taking advantage of tributary rearing space. Douglas Creek does not support anadromous fish species due to infrequent water connections to the Columbia River (R2 Resource Consultants 2004).

Endangered and Threatened Fish Species

Within North Central Washington, many fish populations have declined and several species are listed as threatened or endangered. Table 5 lists the federally endangered and threatened fish species that may occur in or adjacent to Douglas County. More information on each species follows the table.

The negative influences on anadromous fish and several other migratory fish populations are generally separated into four groups: habitat, hatchery, hydropower, and harvest. Hydropower and habitat have the largest impacts in and downstream of Douglas County. Hydropower affects fish through passage barriers, passage delays, and changes in natural river flows. Habitat for fish and aquatic species is affected by reservoirs, water diversion, and upland and aquatic habitat degradation. Habitat degradation in Douglas County has occurred from conversion of natural habitat to agricultural uses, livestock grazing, fire suppression, and urbanization and road construction.

Table 5. Endangered or Threatened Fish Species in Douglas County

SPECIES	FEDERAL STATUS[1]	STATE STATUS[1]	HABITAT PRESENT
Bull Trout *Salvelinus confluentus*	T	C	Foraging, Migration, Overwintering; Columbia River with possible use in connecting reaches of lower Foster Creek, and lower Rock Island Creek
Upper Columbia River Steelhead *Oncorhynchus mykiss*	T	-	Migration, Rearing, Possible Spawning; Columbia River; Lower Foster Creek; Lower Rock Island Creek
Upper Columbia River Spring Chinook Salmon *Oncorhynchus tshawytscha*	E	-	Migration, Spawning, Rearing; Columbia River; Lower Foster Creek; Lower Rock Island Creek

Bull Trout
Federal Status: Threatened
State Status: Candidate

The Columbia River Distinct Population Segment of the bull trout was listed as threatened by the USFWS under the ESA in 1998, and the coterminous United States population of the bull trout (*Salvelinus confluentus*) was listed as threatened on November 1, 1999 (64 FR 58910). A Draft Bull Trout Recovery Plan was published in 2002 (USFWS 2002). Bull trout occur in British Columbia, Washington, Idaho, Western Montana, Oregon, and Northern Nevada. Bull trout have complex life histories (Cavender 1978), and two life-history forms in eastern Washington: resident and migratory. Anadromous life-history forms are also found nearer the Pacific Coast. Resident bull trout use small headwater streams and remain there during their entire life. Migrants also use tributary streams for several years, then migrate into larger rivers or lakes, and return to tributary streams to spawn. Bull trout typically spawn during fall, when water temperatures decrease to 41-48°F.

Bull trout eat terrestrial and aquatic insects, zooplankton, mysids (a type of small crustacean), and other fish species. Competition with introduced fish may cause reductions in bull trout populations. Introduced trout species offer significant competition in some streams and lakes. Brook trout use some of the same habitat for spawning and feeding, making hybridization a problem, particularly with isolated populations of resident bull trout.

Habitat - Bull trout have more specific habitat requirements than other salmonids (Reiman and McIntyre 1993). Migrants live part of their life in many types of river systems and/or lakes; however, spawning, rearing, and resident fish mostly occur in small to large tributary streams.

They prefer areas of channel and hydrologic stability to support the low temperatures, clean gravels, complex cover, and habitat diversity required for spawning and rearing. Changes in habitat conditions that increase water temperature or decrease water quality and channel complexity may favor competing species.

Existing Conditions - Migratory bull trout exist in the Columbia River with possible foraging, migration, or overwintering use in connecting reaches of lower Foster Creek, and lower Rock Island Creek.

Critical Habitat - In 2005, the USFWS designated final bull trout critical habitat (70 FR 56212 [September 26, 2005]), and in 2010 the USFWS revised critical habitat for the bull trout (75 FR 2270 [January 14 2010]). The revision included critical habitat for forage, migration, and overwintering in the mainstem of the Columbia River along the boundary of Douglas County and up-stream to Chief Joseph dam.

<u>Upper Columbia River Steelhead</u>
Federal Status: Threatened
State Status: None

The Upper Columbia River Steelhead Evolutionarily Significant Unit (ESU) (Upper Columbia steelhead) was listed as endangered under the ESA in 1997 by NMFS and subsequently down-listed to threatened in 2006; alternating legal decisions on endangered or threatened status in 2007 and 2009 ended up with the current designation of threatened for the Upper Columbia steelhead. Upper Columbia steelhead are addressed in the Upper Columbia Salmon Recovery Plan to NMFS (Upper Columbia Salmon Recovery Board's (UCSRB) 2007).

Steelhead exhibit complex life histories; they may exhibit anadromy or freshwater residency. Resident forms are usually referred to as "rainbow" or in some portions of its range "redband" trout, while anadromous life forms are termed "steelhead". Juveniles rear in freshwater from 1 to 4 years, then migrate to the ocean as smolts. They reside in the ocean for 2 to 3 years, and then return to their natal stream to spawn as 4- or 5-year-olds. Historically, steelhead likely inhabited most coastal streams in Washington, Oregon, and California, as well as many inland streams in these states and Idaho. However, during this century, over 23 indigenous, naturally-reproducing stocks of steelhead are believed to have been extirpated, and many more are thought to be in decline (62 FR 43938 [August 18, 1997]). Access to a substantial portion of historical habitat was blocked by Chief Joseph and Grand Coulee Dams. Upper Columbia steelhead occupy the Columbia River Basin upstream from the Yakima River, Washington, to the U.S./Canada border.

Habitat – Life-history characteristics for the Upper Columbia steelhead are similar to those of other inland steelhead ESU. However, some of the oldest smolt ages for steelhead, up to 7 years, are reported from this ESU; this may be associated with the cold stream temperatures. Based on limited data available from adult fish, smolt age in this ESU is dominated by 2-year-olds. Steelhead from the Wenatchee and Entiat Rivers return to freshwater after 1 year in salt water, whereas Methow River steelhead are primarily 2-year ocean residents (NMFS and USFWS 2000, 62 FR 43938 [August 18,1997]).

There are local habitat concerns related to irrigation diversions and hydroelectric development, as well as degraded riparian and instream habitat from urbanization and excessive livestock grazing. Hydroelectric development on the mainstem of the Columbia River has resulted in a major disruption of migration corridors and affected flow regimes and estuarine habitat. Some populations in this ESU must migrate through nine mainstem dams (UCSRB 2007).

Existing Conditions – Upper Columbia steelhead move to spawning areas from the Pacific Ocean through the upper Columbia River; spawning occurs in lower Foster Creek, and there is possible transient use in lower Rock Island Creek (Pacific Ground Water Group 2003).

Critical Habitat - Critical habitat for the Upper Columbia steelhead was designated in 2005 (70 FR 52630 [September 2, 2005]), and includes the Columbia River along Douglas County up to Chief Joseph dam. Critical habitat includes the stream channels within the designated stream reaches, out to the ordinary high-water line in most instances.

<u>Upper Columbia River Spring Chinook Salmon</u>
Federal Status: Endangered
State Status: None

Upper Columbia River spring Chinook salmon were listed by NMFS as endangered in 1999 (64 FR 14308 [March 24, 1999]), and they are addressed in the Upper Columbia Salmon Recovery Plan to NMFS (UCSRB 2007). Chinook salmon are the largest of the Pacific salmon species (NMFS and USFWS 2000). The Upper Columbia River spring Chinook ESU includes all naturally spawned populations of Chinook salmon in all river reaches accessible to Chinook salmon in Columbia River tributaries upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington, excluding the Okanogan River (63 FR 11481 [March 9, 1998]).

Habitat - Columbia River spring Chinook salmon are born in freshwater rivers, including the Columbia River in Douglas County (63 FR 11481 [March 9, 1998]). Over the winter, embryos develop in rock nests called redds and hatch into inch-long fish called alevins. From March through May, the young fish emerge as fry and eat insect larvae and small crustaceans called water fleas. Fry also become food for larger fish and many birds such as great blue herons and terns. Salmon fry migrate downriver to the ocean in late June and July. Upper Columbia River spring Chinook salmon primarily migrate to the ocean as sub-yearlings (63 FR 11481 [March 9, 1998]).

Upper Columbia River spring Chinook begin returning from the ocean in the early spring, with the run peaking in mid-May (UCRSRB 2007). They enter tributaries from April through July. After migration, they hold in freshwater tributaries until spawning occurs in the late summer, peaking in mid- to late-August. Juvenile spring Chinook spend a year in freshwater before migrating to salt water in the spring of their second year of life. Most Upper Columbia River spring Chinook return as adults after two or three years in the ocean, although some precocious males, or jacks, return after one winter at sea. A few other males mature sexually in freshwater without migrating to the sea. However, the run is dominated by four and five year old fish that

have spent two and three years at sea. The salmon bodies also provide nutrients for aquatic insects that nourish the new salmon fry once they hatch.

Some populations in this ESU must migrate through nine mainstem dams (UCSRB 2007, 63 FR 11481 [March 9, 1998]). There are local habitat concerns related to irrigation diversions and hydroelectric development, as well as degraded riparian and instream habitat from urbanization and excessive livestock grazing.

Artificial propagation efforts have had a significant impact on spring-run Chinook populations in this ESU, either through hatchery-based enhancement or extensive trapping and transportation efforts (63 FR 11481 [March 9, 1998]). Recent total abundance of this ESU is quite low, and escapements in 1994-1996 were the lowest in at least 60 years (NMFS and USFWS 2000, 63 FR 11481 [March 9, 1998]). At least six populations of spring Chinook salmon in this ESU have become extinct, and almost all remaining naturally-spawning populations have fewer than 100 spawners. In addition to extremely small population sizes, both recent and long-term trends in abundance are downward.

Existing Conditions - Upper Columbia River spring Chinook Salmon move to spawning areas from the Pacific Ocean through the Upper Columbia River with possible transient use, rearing, or spawning in connecting reaches of lower Foster Creek and lower Rock Island Creek (Pacific Groundwater Group 2003).

Critical Habitat - Critical habitat was designated in 2005 ((70 FR 52630 [September 2, 2005]), and includes the Columbia River along Douglas County up to Chief Joseph dam. Critical habitat includes the stream channels within the designated stream reaches, out to the ordinary high-water line in most instances.

Recreational Fisheries

In addition to anadromous fish in the Columbia River, fish populations in Douglas County streams are dominated by introduced eastern brook trout, coastal rainbow trout, and possibly native rainbow trout. Eastern brook trout (*Salvelinus fontinalis*) have been stocked in Washington State since the late 1890's and are found in flowing waters of Douglas County. Brook trout prefer cool headwater ponds and spring-fed streams. However, brook trout populations have been observed to adapt well to degraded habitat, including warm water temperatures (>20°C (68°F)) and high levels of sedimentation.

Lakes in the County contain both warm-water fish and trout species (mostly put-and-take fisheries managed by WDFW). Grimes and Jameson Lakes were historically unpopulated by fish (Pacific Groundwater Group 2004), but now both support a trout fishery. Introduced Lahontan cutthroat trout are present in Grimes Lake and in Lake Lenore just east of the County.

Candidate, Sensitive, and Species of Concern- Fish and Aquatic Species

Special-status aquatic invertebrate species found, or potentially found in the Columbia River in Douglas County are shown in Table 6. In summary, as described in the table, the special-status aquatic species have been affected by loss of habitat, inundation from impoundments, water-

quality issues, loss of substrates due to sedimentation, changes in hydrology, and loss of wetland or riparian habitats in central Washington generally, and Douglas County specifically.

Table 6. Aquatic Special-status Species in or near Douglas County

AQUATIC SPECIAL-STATUS SPECIES	STATUS	LIFE HISTORY, THREATS	POTENTIAL OCCURRENCE
California floater *Anodonta californiensis*	FSC (Federal Species of Concern) SC (State Candidate)	This freshwater bivalve (clam or mussel family) has a larval stage that is parasitic on fish. It reaches maturity at 4-5 years, and has a life span up to 15 years. It has been extirpated from much of its historical range, and is affected by dams, fluctuating water levels, the decline of native host fish, pollution, sedimentation, and possibly invasive species such as the Asian clam (WDFW 2005).	The population status is unknown, but has declined. The species occurs in the Columbia and Okanogan Rivers; and in Curlew Lake, Ferry County (WDFW 2005).
Giant Columbia River limpet *Fisherola nuttalli*	SC	Other Related Names: Shortface Lanx; Lanx nuttallii. This species is sporadically distributed in the Columbia River and a few major tributaries. Populations have been lost from most tributaries and almost all of the Columbia River itself, likely due to impoundments, nutrient enhancement, and loss of rocky substrate (Mazzacano 2009.)	It is found in the Columbia River drainage system of the Pacific Northwest, including Idaho, Washington, Oregon, and Montana. Its presence in the Columbia River drainage in British Columbia is assumed from the discovery of a shell; it may also occur in the Okanogan River drainage in British Columbia (Clarke 1981, Neitzel and Frest 1990, all as cited in Mazzacano 2009).
Great Columbia River spire snail *Fluminicola columbiana*	FSC SC	Other Related Names: Fluminicola columbianus; Fluminicola hindsi, Ashy Pebblesnail, Fluminicola fuscus. The species was originally known from the Lower Snake and Columbia River drainages in Washington, Oregon, Idaho, British Columbia, and possibly Montana (Frest and Johannes 1995 as cited in USFS 2009).	It has been extirpated from the middle and upper Columbia River in Washington, Montana, and British Columbia, and may be extinct in the lower Columbia River in Washington and Oregon. It is still extant in some tributaries in Washington (Frest and Johannes 1995 as cited in USFS 2009).

6. WATER RESOURCES (WETLANDS, RIPARIAN, WATER QUALITY)

The final Watershed Plan for Foster Creek WRIA 50 and Moses Coulee WRIA 44 (FCCD 2004), covering most of Douglas County, was completed in 2004 and approved by the State of Washington and adopted by Douglas and Grant Counties. That document provides the most comprehensive and recent review of Douglas County water resources. Some of the issues identified in the watershed plan, especially water quantity, water quality, and habitat in Douglas County are relevant to this EA.

Streams and Lakes

The Columbia River winds 156 miles along the County's northern and western perimeter (Figure 6) draining two major watersheds, Foster Creek Water Resource Inventory Area 50 (Foster Creek WRIA 50) and Moses Coulee Water Resource Inventory Area (Moses Coulee WRIA 44) (Pacific Groundwater Group 2003). In most places along the river, there are a series of nearly level to gently sloping terraces. Long, steep slopes lead from these terraces to the broad, upland plateau.

Major natural lakes in Douglas County include Jamison Lake and Grimes Lake (FCCD 2004). Atkins Lake once was 149 acres but now is dry in the summer. Several smaller lakes (less than 100 acres) and seasonal "potholes" are scattered throughout the area. The natural lakes are sustained by groundwater. Major man-made reservoirs are limited to impoundments behind Columbia River hydroelectric dams including Rock Island Lake, Entiat Lake, Pateros Lake, and Rufus Woods Lake (KCM 1995; Johnson and Associates 1974).

While the Columbia River borders Douglas County, interior water resources are not large. Precipitation is generally less than 12 inches annually and there are only two significant streams, Foster Creek and Douglas Creek. Most streams in Douglas County consist of intermittent flows with perennial reaches sustained by a groundwater. High flows occur during the spring, and flows during the rest of the year can cease altogether. The two major drainage basins that handle the surface water runoff are Moses Coulee and Foster Creek, both of which drain directly into the Columbia River. Riparian and wetland areas are more scattered in the County. Within the dryland areas, "dry drainages" can affect water resources and water quality.

Precipitation occurring within Douglas County may run off directly to a stream, percolate to groundwater, or return to the atmosphere through evaporation or evapotranspiration (Pacific Groundwater Group 2003). Groundwater and surface water move from higher elevation portions of the plateau toward major surface drainages. There may be transfers of water between groundwater and streams as water moves towards the Columbia River. Many of the streams become sub-surface as they approach the Columbia River basin because the alluvium becomes coarser and more permeable to water.

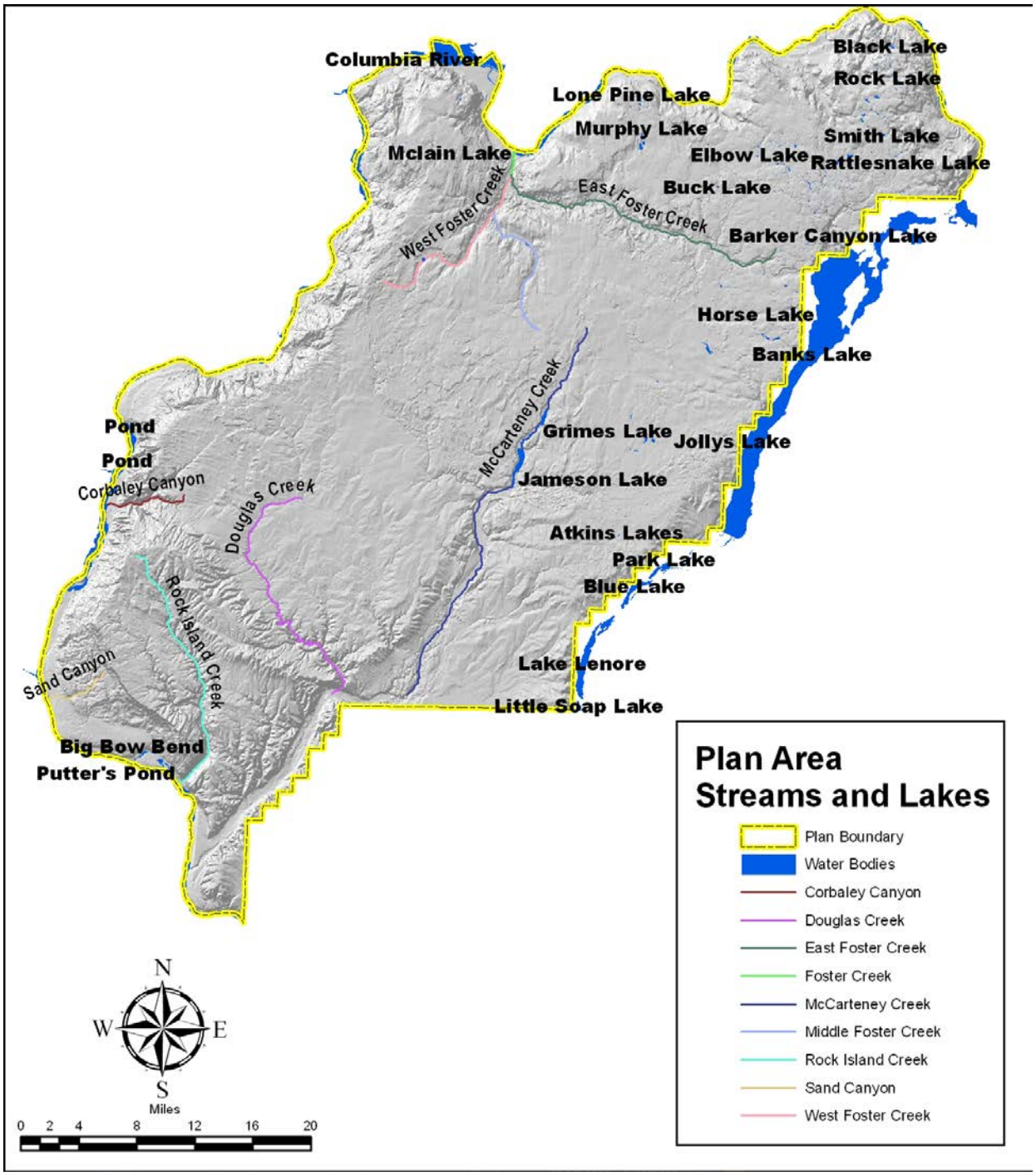

Figure 6. Streams and Lakes in Douglas County

Flood events are generally caused by summer thunderstorms, and warm rain-on-snow storm events. Thunderstorms occur primarily during the summer months and normally have high rainfall intensities over relatively small areas (KCM 1995; Johnson and Associates 1974). Rain-on-snow events occur in the late winter or early spring. Early snowfall will insulate the ground and reduce the depth of freezing to only a few inches, whereas lack of early snow can result in freezing depths approaching 30 inches. With the ground frozen and infiltration prevented, melting snow combined with rainfall can create a large runoff event.

Flooding problems are not widespread, but are occasionally severe on alluvial fans and localized flood plains, which are subject to flash floods (KCM 1995; Johnson and Associates 1974). Major floods have occurred, on average, about every 10 years, although smaller storms with localized damage are more frequent. The existing stream corridors have been shaped and reshaped by flood events. Flood water moves fast and transports sediment; most of that sediment ends up in the Columbia River, but a few intermittent streams pass through small ponds and reservoirs where the flow slows and sediments settle out (Munson Engineers1989).

Wetlands and Riparian Habitat

In the northern portion of Douglas County, the National Wetlands Inventory (NWI) shows over 20,000 acres of wetlands, or approximately 3.5 percent of the landscape. Most of the wetland types are lacustrine wetlands (open water, including the Columbia River reservoirs) and palustrine wetlands (marshes, bogs, swamps, and ponds), with only 6.85 acres mapped as riverine wetlands. These wetland systems provide important functions for fish and aquatic species including: removing potential pollutants (such as sediment, nitrogen, phosphorous, metals, and toxic organic compounds); reducing downstream erosion and flooding; recharging groundwater; maintaining base flows in streams; and supporting the food web. In the southern portion of Douglas County, the NWI shows 8,857 acres of wetlands, or approximately 1.2 percent of the landscape. National Wetland Inventory maps covering this area also show large amounts of open water and lacustrine wetland habitat (6,876 acres), which includes the Columbia River impoundments.

Riparian vegetation occurs along natural drainage corridors and the Columbia River and other stream courses where soil and moisture conditions support the growth of trees and shrubs. Native riparian vegetation can be characterized by a mosaic of shrubby thickets with patches of deciduous trees and grass/forbs-dominated plant communities (Crawford 2003, Thomson and Ressler 1998). A diversity of shrub and deciduous tree species occurred historically and still occur in some places, and may include the following species: common chokecherry, bittercherry, Wood's rose, black hawthorn, water birch, common cow parsnip, snowberry, mock orange, hackberry, red-osier dogwood, willow, black cottonwood, and quaking aspen. Riparian habitats may also include succulent herbs in the groundcover such as sticky geranium, northern bedstraw, fescue, waterleaf, and bracken fern. Along the Columbia River, high river-water levels, groundwater, and irrigation overflow provide moisture levels sufficient to foster a dense, lush shrub/grass understory and stands of cottonwoods (KCM 1995) in some areas.

Most streams and riparian habitats within Douglas County have been altered from their natural state as a result of grazing and/or agricultural use. Grazing activities affect riparian habitat by removal of annual vegetation growth, decreased diversity of vegetation, and physical disturbance

to sensitive soils. Agricultural activities can cause nutrient and sediment loading of streams from runoff and erosion, contamination from pesticides, and loss of riparian vegetation. All Douglas County streams (including the pre-dam Columbia River) are or were historically flood prone.

In the semi-arid conditions encountered in Douglas County, smaller, intermittent streams and draws may naturally have little or no characteristic riparian vegetation. Instead, streams and draws may consist of largely upland plant species, including big sagebrush, bitterbrush, rabbitbrush, and spiny hopsage. The presence of woody and herbaceous vegetation assists in moderating stream temperature, sedimentation, water quality, and water quantity (Knutson and Neaf 1997). In a natural condition, seasonal drainages would include shrubs and forbs such as chokecherry, Wood's rose, ballhead waterleaf, water birch, seep-spring monkey flower, crimson columbine, and stinging nettle; however the drainage bottoms may now be dominated by exotic plants and have cattle trails through them. Russian olive and black locust (both introduced tree species), can be found in riparian habitats in Douglas County. Now naturalized, Russian olive and black locust were originally planted by settlers and natural-resource managers for shade trees and wildlife cover. Reed canarygrass is sometimes found in the riparian areas. It is a grass species that has replaced other native riparian grasses along stream banks and in wetland complexes.

Wetland/Riparian Species of Concern

Several special-status plant and animal species may occur in or near riparian or wetland habitats in Douglas County. Generally, these special-status plant species occur in unique micro-sites, such as alkaline pools, or they have been impacted by habitat loss, sometimes by river impoundments, or other loss of wetland habitats. Plant species that are documented or likely to occur in Douglas County in moist areas such as around vernal pools or wet depressions include (Camp and Gamon 2011): Constricted Douglas' Onion (*Allium constrictum ;* State Sensitive), Porcupine Sedge (*Carex hystericina;* State Watch), Giant Helleborine (*Epipactis gigantean ;* State Watch), Tiehm's Rush (*Juncus tiehmii;* State Threatened), Inch-High Rush (*Juncus uncialis;* State Sensitive), Adder's Tongue (*Ophioglossum pusillum;* State Threatened); and Woodsage (*Teucrium canadesnse* ssp. *Viscidum;* State Sensitive). Two other special-status plant species occur in alkaline soils in vernal pools or moist areas: Dwarf Phacelia (*Phacelia tetramera;* State Sensitive), and Mountain Blue Curls (*Trichostema oblongum).*

One plant, Ute Ladies'-Tresses (S*piranthes diluvialis),* a federally threatened and State endangered species, may occur in the County. The species is known to occur in eight western states, and in Washington it is known to occur in Okanogan and Chelan Counties and is possible in Douglas County (Camp and Gamon 2011). The plant occurs in low-elevation, intermountain valley plains, with stream meanders and wetland complexes; temporarily inundated wet meadow zones and swales with stable subsurface moisture and relatively low vegetation cover. The four known sites in Washington all occur on the Chelan County side of Lake Entiat on the Columbia River (Tim McCracken, USFWS, Pers. Comm., 2009). One site is in a periodically flooded moist meadow adjacent to pine and Douglas-fir woodlands and sagebrush steppe.

A riparian dependent bird, the Willow Flycatcher (*Empidonax traillii brewsteri*) is a Bird of Conservation Concern, regionally, and nationally due to declining populations (USFWS 2008a).

The willow flycatcher breeds in the U.S. and Canada, and winters in Mexico and Central America (Sedgewick 2000). Once common throughout the western United States, the willow flycatcher has been eliminated from much of its historical range. Willow flycatchers are common on the west side of Washington in wetlands, shrubby areas, and clearcuts, while in the central Columbia Basin, willow flycatchers are rare, probably because conditions are more arid (King 1955). In Douglas County specifically, willow flycatchers are uncommon to rare, but breeding and migrating birds have been found in suitable habitat. Shrub-steppe habitats are generally considered peripheral to the breeding range but birds may be found in areas of low-density development, forest patches, and wetlands (Smith et al. 1997). This species prefers riparian habitats with dense patches of shrubs and openings. Willow flycatchers feed primarily on insects but occasionally eat fruit. Flycatchers are aerial foragers (i.e., they feed while flying) exhibiting both hawking and hover-gleaning hunting strategies (Sedgewick 2000). A primary threat is habitat loss due to development, poor land management practices (e.g. over-grazing), contaminants, and altered hydrology (Craig and Williams 1988, Altman and Holmes 2000, Sedgwick 2000).

Water Quality

A number of lakes and seasonal potholes in central Washington are saline. Salinity is caused when lakes have no outlets except evaporation, particularly in areas with high evaporation rate and where runoff waters into such lakes pick up and carry various mineral solids into the lakes. Over long periods of time, these lakes accumulate varying amounts of such solids, which change the chemistry of the waters (WDOE 1973). Grimes and Jameson Lakes have no outlets and have had water-quality problems associated with runoff from nearby lands for more than 40 years, although changes in agriculture practices and a continued rise in lake level have improved the water quality and trophic status of Jameson Lake. A review and comparison of water-quality data collected in 1975 and 1985 to water-quality data for samples collected in spring and summer 2004 have shown significant decreases in phosphorus levels in both Jameson and Grimes Lakes (Pacific Groundwater Group 2004).

Washington State Department of Ecology classifies all of the streams in the County as Class A Excellent (WAC 173-201a). Water-quality standards for Class A waters have been established to provide beneficial uses of the water which include irrigation, drinking and stock water, habitat for fish and wildlife, and recreation. None of the water bodies draining interior lands are currently listed as 303(d) water-quality-limited waters.

Limited detailed water-quality data is available within Douglas County. Historical information is restricted to Rock Island Creek and Douglas Creek (Pacific Groundwater Group 2003). WDOE monitored the water quality of Rock Island and Douglas Creeks in 1987. Douglas Creek was again sampled in 1988 and 1989 by South Douglas Conservation District (SDCD), in 1992 and 1993 by the U.S. Geological Survey (USGS), and from 1988 to 2001 by the BLM. WDOE monitoring of Rock Island Creek was restricted to monthly water-temperature measurements in 1987. Water temperatures measured in April, May, June, July, and October complied with the State standard for Class A waters; temperatures were not sampled in August or September (Pacific Groundwater Group 2003).

In Douglas Creek, water temperatures measured by WDOE near the long-term BLM gauging site at River Mile 1.5 exceeded the State temperature threshold for Class A waters in May and July 1987, reaching a peak temperature of 21.1^{o}C (70.7°F). A one-time grab-sample of dissolved oxygen and pH was well within the State's Class A requirements. The SDCD collected monthly surface water data at 12 locations in the Douglas Creek watershed in 1988 and 1989. Samples included water temperature, discharge, specific conductivity, dissolved oxygen, and pH. A more detailed water-quality characterization was performed by the USGS at the same location in 1999. The SDCD and USGS data is reported in the WRIA 44/50 Final Phase II Basin Assessment (Pacific Groundwater Group 2003).

The SDCD data indicated that the low-flow tributaries and headwaters of Douglas Creek, where crop production was prevalent, showed high nutrient levels in the late 1980's. Nitrate and phosphate levels were found to be inversely related to stream flow and directly related to suspended sediment levels. Isaacson (1989) pointed out that the waters of the uppermost watersheds most likely contain high nutrients due to the high percentage of fertilized land and low stream flows that do not dilute the nutrients until lower in the watershed. Shallow groundwater also exhibited high levels of nitrate, but low levels of phosphorus (Pacific Groundwater Group 2003).

The USGS data in Douglas Creek showed that temperature, dissolved oxygen and pH complied with State standards for Class A waters in 1992 and 1993 (USGS 1992, 1993). The nitrate level in Douglas Creek was similar to the mean value determined from 71 summer samples from regional streams and rivers with similar geology, physiography, vegetation, and climate (USEPA 2000). Dissolved and total phosphorus levels in Douglas Creek were almost identical to regional averages from 127 samples.

The BLM data from the long-term gauging site (RM 1.5) indicate that summer water temperatures in Douglas Creek regularly exceed the State water Class A quality threshold of 18°C (64.4°F). These elevated water temperatures are apparently a natural condition due to the influence of groundwater with elevated temperatures. However, the peak water temperatures over this period (22.5^{o}C (72.5°F)) did not exceed levels reported by the EPA (2009) and Bell (1991) to be lethal to resident salmonids. The high dissolved-oxygen levels indicted that high water temperatures were not substantially reducing the amount of dissolved gases in Douglas Creek. The pH data depicted highly alkaline conditions in Douglas Creek, typical of streams in arid or semi-arid climates.

Sedimentation and erosion of soil was discussed under Earth Resources. Generally, erosion correlates with acreage tilled, but certain farm practices can minimize the erosion potential on a tilled field. Vegetated buffers also can limit sedimentation input to streams, lakes, and wetlands.

7. COVERED WILDLIFE SPECIES

Habitat loss and fragmentation have negatively affected covered species in Douglas County over time. Dobler and others (1996) explained that habitat loss and extreme fragmentation magnify other effects to wildlife. Shrub-steppe wildlife species are adapted to expansive landscapes of steppe and shrub-steppe communities. Some fragmentation impacts in Douglas County may have been somewhat ameliorated by the soil and habitat conditions. Shallow lithosol areas have retained some native habitats, in part because they were difficult or impossible to cultivate. The BLM, WDFW, and TNC, have worked and continue to work to conserve natural habitats in and around Douglas County. Also, careful stewardship of some grazing lands may have allowed somewhat natural habitats to remain. All this added together likely minimized the fragmentation and loss in Douglas County somewhat, and allowed shrub-steppe species and covered species to continue to persist.

Table 7 lists the covered Species in the MSGCP. All four species are year-round residents in Douglas County.

Table 7. Covered Species in the MSGCP

SPECIES **E = ENDANGERED** **T = THREATENED** **C = CANDIDATE**	**FEDERAL STATUS**	**STATE STATUS**
Pygmy Rabbit, Columbia Basin DPS, *Brachylagus idahoensis*	E	E
Greater Sage-Grouse, Columbia Basin DPS, *Centrocercus urophasianus*	C	T
Sharp-tailed Grouse, *Tympanuchus phasianellus columbianus*		T
Washington Ground Squirrel, *Urocitellus washingtoni*	C	C

The FCCD with assistance from WDFW and others, developed a HIS model for covered species, using data from 2005. The HSI is described in detail in Appendix G of the MSGCP, and rates both the quantity and quality of covered-species' habitats. Table 8 displays the modeled HSI condition for each covered species, and estimated populations based on model results, home range sizes, and/or population estimates in the County. Population numbers on the ground are likely lower than model predictions because habitat for most species is typically not fully occupied.

Table 8. Covered Species and HSI Habitat Values and Estimated Populations (MSGCP 2015)

COVERED SPECIES	EXISTING CONDITION HSI-ACRES[1]	EXISTING CONDITION-- ESTIMATED MSGCP SPECIES POPULATIONS (NUMBER OF INDIVIDUALS)[3]
Pygmy Rabbit	6,011	200
Greater Sage-Grouse	165,240	650
Columbian Sharp-tailed Grouse	61,847	619
Washington Ground Squirrel	37,930	215

[1] Existing conditions HSI-Acre values computed from habitat conditions data obtained with satellite imagery, and includes an acre-quality component, not just quantity.
[2] All populations and area data are estimated on best available HSI data prepared by M. Schroeder in 2005 (Appendix G, MSGCP)
[3] Estimated existing species populations in Douglas County. Modeled estimates are a conservative estimate in favor of the species, since it is based solely on habitat quantity and quality, not on species surveys. Estimated species population at risk is calculated by multiplying the quantity of HSI-Acres required for one individual of each species by the quantity of HSI-Acres in the entire County (MSGCP 2015) Pygmy rabbit population estimates, on the other hand, are based on a round estimate of 2013 numbers after recent reintroduction efforts.

The following sections briefly summarize each individual covered species' status, general range, threats, and other information. More detailed species descriptions are in Appendix D of the MSGCP.

Columbia Basin Pygmy Rabbit

The Columbia Basin pygmy rabbit (pygmy rabbit) was listed as a federally endangered species in March 2003. The pygmy rabbit has been listed in Washington State by WDFW as State-endangered since 1993 (WDFW 1995). No formal critical habitat designations under the ESA have been made. A Federal recovery plan was completed in 2012 for the pygmy rabbit (USFWS 2012a).

The pygmy rabbit is an herbivore inhabiting sagebrush habitat with deep soils. The current population of pygmy rabbits is critically low. Remaining wild individuals were limited to a small area in Douglas County before being placed into a captive breeding recovery program. In 2007 the USFWS, WDFW, and others reintroduced pygmy rabbits in Douglas County, but the animals did not survive. In 2011, the recovery strategy for the pygmy rabbit was modified in order to increase the potential for successful population recovery. The modified strategy included: 1) translocating wild pygmy rabbits to Washington from other states; 2) breeding pygmy rabbits in semi-wild conditions on the release site; and 3) releasing juvenile offspring of mixed lineage, and adult wild-caught pygmy rabbits from neighboring states (Becker 2013).

Based on this modified recovery strategy, beginning in the spring of 2011, pygmy rabbits from the captive-breeding facilities were moved to six and ten acre enclosures on Sagebrush Flat Wildlife Area. In 2011 and 2012, a total of 78 pygmy rabbits were translocated from Nevada, Utah, and Oregon and placed in the enclosures, where they joined captive-bred adults and kits.

As of 30 June 2013, more than 200 pygmy rabbit kits had been released into the wild. Winter surveys during December 2012 and January 2013 on more than 2,400 acres on or near the Sagebrush Flat Wildlife Area located approximately 110 active burrows (Becker 2013).

Normal mortality rates are high in pygmy rabbits, therefore it is difficult to estimate a current population size especially once the pygmy rabbits are released outside the pens, but during the summer of 2012 it was likely over 200 individuals. Many of these pygmy rabbits are likely to remain on sage brush flat; but others may disperse onto applicants/permittees land. The WDFW and USFWS continue to follow-up on possible sightings of pygmy rabbits in other areas. Ongoing threats to the species include: loss of deep-soil shrub-steppe habitat to agriculture and development; small population size and associated loss of genetic diversity, predation, and disease (WDFW 2005, USFWS 2012a).

Greater Sage-Grouse

After a "warranted but precluded" determination the Columbia Basin distinct population segment of the greater sage-grouse in the State of Washington became a candidate for Federal listing in 2001 (66 FR 22984). A petition to list the greater sage-grouse across its range in the Western U.S. was reviewed and declared "not warranted" by the USFWS in 2005 (70 FR 2243). However, after an additional status review, on March 5, 2010 (75 FR 13909), the USFWS found the greater sage-grouse to be "warranted, but precluded" for listing, making it a candidate species range wide as well as in the Columbia Basin. Critical habitat has not been designated. In the following discussions the general term "sage-grouse" will refer to the Columbia Basin Distinct population of the greater sage grouse.

Although the sage-grouse is classified as a game species in Washington, hunting was terminated in 1988 (Stinson et al. 2004) and they are currently listed as a State-threatened species (Hays et al. 1998). The sage-grouse is listed as a Bird of Conservation Concern (USFWS 2008a).

Only two isolated populations of sage-grouse remain in Washington (Stinson et al. 2004, Hays et al. 2004). One population exists in Douglas and Grant Counties, and the second on the Yakima Firing Range in Kittitas and Yakima Counties. A few non-breeding sage-grouse still occur in the southwest part of the Colville Indian Reservation (Berger et al. 2004), across the Columbia River from Douglas County. The 2011 estimated population of sage-grouse in Washington was approximately 1,165 birds: Douglas County–926, Yakima Training Center–213, and Lincoln County–26 (WDFW 2012). The number of males in the Moses Coulee population was estimated to be approximately 350 in 2012 (USFWS 2013). Based on these estimates, sage-grouse in Douglas County account for approximately 80 percent of the total sage-grouse population in the State. The sage-grouse inhabits shrub-steppe and mating occurs at leks. Threats include habitat loss and degradation from agriculture and development, large-scale fires, conversion of shrub-steppe to cropland, overgrazing, and encroachment of habitat by invasive weeds. The species may also be impacted by inappropriate use of herbicides, small isolated populations, and development of wind-energy facilities (WDFW 2005).

Columbian Sharp-tailed Grouse
The Columbian sharp-tailed grouse (sharp-tailed grouse) was listed as a State "Threatened" species in 1998. It is currently considered a Species of Concern by the USFWS (WDFW 2011). The WDFW released a recovery plan in 2012 (Stinson and Schroeder, 2012). Although the sharp-tailed grouse is classified as a game species in Washington, hunting was suspended in 1988.

Sharp-tailed grouse populations were in serious decline soon after large-scale habitat conversion to agricultural production began in the late-1800s. This decline continued through the mid-20th century, by which time the estimated population in Washington had been reduced to 10,000 birds (Stinson and Schroeder 2012). The sharp-tailed grouse population continued to decline and by 1970 was reduced to fewer than 4,000 birds. By the mid-1990s, the population had been reduced to approximately 1,000. The lowest population estimate was reached in 2001, at 472 birds. Since then the population has increased slowly; the estimated population in 2011 was 902 birds. Less than 3 percent of the historic range is currently utilized (Stinson and Schroeder 2012). The current sharp-tailed grouse population is restricted to seven isolated locations in Lincoln, Okanogan, and Douglas Counties. In Douglas County, they are found in the northeast corner from Bridgeport to Grand Coulee, and in the northwest corner in the Dyer area (Stinson and Schroeder 2012).

The sharp-tailed grouse inhabits meadow, shrub-steppe, and riparian/deciduous habitats especially in winter. Mating occurs at leks. Threats include habitat loss and degradation from development and conversion of habitat to agriculture and pastureland, overgrazing, and; invasion by cheatgrass or noxious weeds (Schroeder and Tirhi 2003). The species is also negatively affected by small isolated populations and potential development of wind-energy projects.

Washington Ground Squirrel
The Washington ground squirrel is a Federal and State Candidate species (77 FR 70103). The Washington ground squirrel is a shrub-steppe species that is found in small to large colonies. The species hibernates up to 8 months per year. The Washington ground squirrel occupies sites with sandy or silt-loam soils that are deep and supportive enough to accommodate its burrow structures (Betts 1990, Yensen and Sherman 2003 as referenced in USFWS 2012b). The population size is unknown but declining.

The species is endemic to eastern Washington and North-central Oregon. In eastern Washington the number of known colonies has decreased markedly and they are only known to exist in the west central portion of their former range (Betts 1990, 1999). As of 2012, the Washington Natural Heritage Program contained 567 verified Washington ground squirrel polygons (i.e., mapped estimate of areas containing squirrels) and 65 verified point locations in its database, any one of which could constitute an individual, small colony, or large colony. This database does not include all the detections that were made during a 2009-2010 survey in the Odessa area (USFWS 2012b). Prior to 1978, several active colonies were present throughout Douglas County and surveys in 2002 by Bureau of Land Management employees found Washington ground squirrels in almost three-quarters of the 19 sections surveyed in the southern part of Douglas County (Musser et al. 2002). Threats include habitat loss and degradation from conversion to agriculture and development, invasive plant species, cheat grass invasions, and

fires (WDFW 2005, USFWS 2012b). Washington ground squirrels depend on deep soil, and much of this habitat has been developed for agriculture (USFWS 2008b). Fragmentation of habitat isolates remaining populations, and illegal target shooting occurs in some areas (WDFW 2005, USFWS 2008b, USFWS 2012b).

8. RANGE RESOURCES, HABITATS, AND OTHER WILDLIFE AND PLANT SPECIES

The natural habitats of Douglas County are influenced by a wide range of temperature and precipitation, along with geologic, topographic, and soil conditions that result in five general habitat categories: 1) riparian; 2) wetlands; 3) shrub-steppe and rangelands; 4) forest woodlands; and 5) cliffs, talus, and other unique habitats. Riparian and wetlands were discussed previously. Shrub-steppe and rangelands are discussed below. Forest woodlands and cliffs, talus, and other unique habitats are not further discussed because they should not be affected by MSGCP implementation.

In their Comprehensive Wildlife Conservation Strategy, WDFW (2005) notes that despite extensive habitat conversion due to agriculture and other factors, the Columbia Plateau ecoregion still has a few large expanses of wildlands and areas of high biodiversity (notably the Yakima Training Center and Hanford Reservation). Approximately 239 plant and animal species, including many endemic plant species, are found in the Washington portion of the Columbia Plateau ecoregion. There are concentrations of endemic species in unique habitats and there are other species found in habitats that have been altered by human activities. Birds of prey, invertebrates, and anadromous salmon make up important components of biodiversity of this semi-arid landscape. In Washington State, shrub-steppe areas are high priority areas for conservation to protect biodiversity (Cassidy et.al. 1997). Douglas County continues to support many native species. This is likely due in part to varying geography and soils, which maintains remnant native habitat patches; in part due to the efforts of the WDFW, TNC, and BLM to maintain and restore blocks of natural habitats, and in part due to restoration of habitats through various Farm Bill programs.

Shrub-steppe and Rangelands

Shrub-steppe plant communities in Douglas County were historically co-dominated by shrubs and perennial bunchgrasses with a microbiotic crust of lichens and mosses on the surface of the soil. Shrub-steppe habitat that was located in areas of deep soil has largely been converted to agriculture, leaving most shrub-steppe habitat on shallow lithosol soils. Even in remaining patches of shrub-steppe, plant diversity has generally been impacted by decades of heavy, year-round grazing, introduced vegetation, wildfires, and other anthropogenic disturbances.

Biological soil crust is an integral component of shrub-steppe. Biological soil crusts, also known as “cryptobiotic crust,” “microbiotic crusts,” or “cyanobiotic crusts,” are fragile microfloral communities composed of blue-green algae, bacteria, fungi, mosses, and lichens. These crust communities play an important role in stabilizing soils from wind and water erosion, contributing to soil productivity, influencing nutrient levels, retaining moisture, altering soil temperature, and aiding seedling establishment (Paige and Ritter 1999). The lack of this crust disrupts the

ecosystem's nutrient cycle and can encourage the proliferation of non-native species, such as cheatgrass (WDNR 1998).

Shrub-steppe once covered most dryland areas of eastern Washington, including 10.5 million acrs extending from below the forests of the Cascades slope to the prairies of the Palouse. By 1890, largely due to the Homestead Act of 1862 and the land grants associated with the Northern Pacific railroad, nearly all that land was planted in crops. Land not suitable for crops was grazed. Only small fragments of sagebrush-bunchgrass habitat remained (WDNR 1998). Fragmentation, alteration of natural fire patterns, livestock grazing, and the addition of non-native plant species have continued to change the character of the remaining shrub-steppe habitat (WDNR 1998). The estimated total acreage of shrub-steppe historically within Douglas County was 1,095,016 acres, of which approximately 502,709 acres remain today, a loss of 56 percent (Daubenmire 1968).

The greatest changes in the remaining shrub-steppe habitat from historical conditions are the reduction of bunchgrass cover in the understory and an increase in sagebrush cover. Soil compaction is also a significant factor in some heavily grazed lands affecting water percolation, runoff, and soil-nutrient content. A long history of grazing, fire, and invasion by exotic vegetation has altered the composition of the plant community within much of the extant shrub-steppe in this region (Quigley and Arbelbide 1997; Knick 1999). It is difficult to find stands of shrub-steppe that are still in relatively natural conditions. Today, livestock grazing is the primary land use in the remaining shrub-steppe. According to the WDNR (1998), year-round livestock grazing results in a vastly altered landscape. In many places, there are more shrubs because livestock do not eat them, and there are fewer bunchgrasses because they are either eaten or trampled. The hooves of livestock have frayed the cryptobiotic crust that covers the soil.

In some cases, implementation of CRP has been beneficial, but shrub-steppe is still fragmented and "checkerboarded" in Douglas County. The first cultivated fields enrolled in CRP in Douglas County were seeded primarily with crested wheatgrass and other introduced grasses. Native grasses and forbs were seldom used; sometimes non-native grasses were used because there were shortages of seed from native species and they were less expensive. Native grasses and forbs were more commonly used during sign-ups in the late 1990's (Thomson and Ressler 1988).

Shrub-steppe plant communities are still the most widespread natural vegetative cover in Douglas County found largely on upland areas and in the Columbia River breaks (Figure 2). Woody perennial shrubs such as three-tip sage, big sage, bitterbrush, and rabbitbrush along with perennial and annual grasses such as bluebunch wheatgrass, Idaho fescue, and Sandberg bluegrass dominate the landscape. Shrub-steppe lands have been invaded by introduced annuals (cheatgrass, mustards, and others) as a result of past management practices, excessive grazing, and importation of species on wheels and vehicle under-carriages (Thomson and Ressler 1988).

Pellant and others (1999) assessed rangeland health through an "Ecological Site Inventory" on 16,197 acres of contiguous lands in public and private ownership, that provides a representative sample of the existing range condition within the County. The ecological status of the representative area was evaluated by the composition of the Potential Natural Community (PNC) described for the range of soil types in the area. The current plant community was then classified

into seral stages based upon the percent composition of PNC. Results of the study show that much of the rangeland in Douglas County is in mid- to late-seral stages.

Pellant and others (1999) also determined the biotic integrity of the representative area as part of the rangeland health assessment. Biotic integrity is a measure of the resistance to loss of rangeland functions, and the ability to recover functions following a disturbance. The biotic integrity of approximately 66 percent of the representative area was "intact". The biotic integrity of the remainder (34 percent of the area) was "at risk". The "at risk" designation is given to areas where most of the indicator species have moderate departures from what would be the expected optimum for the site.

Fire has impacted shrub-steppe in Eastern Washington. In the second half of the 19th Century, the fire regime across much of this habitat has been drastically altered. Baker (2006) presented evidence suggesting that pre-EuroAmerican fire rotations were 100−240 years in Wyoming big sagebrush. Charcoal deposits in lake sediments from a study area in northern Douglas and southern Okanogan counties indicate that between 500 and 1,500 years ago, fires occurred on average every 148 years (range 94−232 years; Scharf 2002). ~~The historic fire return interval in shrub-steppe was about 30-75 years, characterized by small, intense fires that removed fire-intolerant shrub overstory.~~ These infrequent fires helped maintain both shrub and grassland communities (USFWS 2012a). The current fire return interval is often much shorter. The primary cause of the altered fire return interval is the introduction of cheatgrass and other invasive plant species. Native shrub-steppe plant communities are characterized by discontinuous bunchgrass, which limit the ability of fire to spread. Cheatgrass and other invasive species form a continuous vegetative layer that, when dry, provides fuel for large fires that can burn thousands of acres at much more frequent intervals. Cheatgrass also dries earlier, providing a longer fire season. This is significant in the sense that early season fires can cause high mortality of actively growing bunchgrass (USFWS 2012a).

High intensity, frequent fires have severe ecological impacts on shrub-steppe habitats. Sagebrush and other shrubs do not tolerate a short-term fire regime, which can result in the loss of the shrub component over extensive areas after repeated fires. In addition, shrubs can burn with such intensity that they permanently destroy the understory plants. Recovery of sagebrush and other shrubs in a shrub-steppe community can take decades. This results in the loss of habitat on an essentially permanent basis for many wildlife species (USFWS 2012a; Downs n.d.; Wambolt, et al. 2001; USGS 2013).

Shrub-steppe Plant and Animal Species of Concern

Numerous special-status species occur or may occur in the shrub-steppe rangelands of Douglas County. Special-status plant species that may be present on Douglas County rangelands are shown in Table 9, and special-status wildlife species are discussed below.

Table 9. Special-status Plant Species in Shrub-steppe Habitats that May Occur in Douglas County (Camp and Gamon 2011)

Common Name Scientific Name	**Status**	**Known or Potential in Douglas County**	**Habitat**
S=State Sensitive, ST=State Threatened, R1=State Review group 1			
Pauper Milk-Vetch *Astragalus misellus* var. *pauper*	S	Known	Shrub-steppe: occurs on open ridge tops and upper slopes, and rarely middle and lower slopes; occurs mostly on gentle slopes.
Snake River Cryptantha *Cryptantha spiculifera*	S	Potential	Occurs on dry, open, flat or sloping areas in stable or stony soils. Occurs where overall cover of vegetation is relatively low. Probably does not tolerate direct competition with other herbs or does not handle shade; its ability to grow and reproduce in a relatively harsh environment enables it to colonize areas where other plants can't survive.
Piper's Daisy *Erigeron piperianus*	S	Known	Shrub-steppe: dry, open places, often with sagebrush. It grows on level ground to moderate slopes; soil typically well-drained, generally somewhat alkaline.
Longsepal globemallow *Iliamna longisepala*	S	Known	Shrub-steppe and Forest: broad ecotone between the shrub-steppe and the adjacent forested slopes of the eastern flank of the Cascades. Can be found along gravelly streamsides in the open shrub-steppe and open ponderosa pine and Douglas-fir forests. The species also occurs on open hillsides in microsites not immediately adjacent to a stream channel.
Suksdorf's Monkey-Flower *Mimulus (=Erythranthe) suksdorfi*	S	Potential	Shrub-steppe: occurs in open, moist, or rather dry places, from the valleys and foothills to moderate or occasionally rather high elevations in the mountains. Found in microhabitats that have undergone local disturbance from small erosive events (i.e., slumps, slides, and frost boils).

Common Name Scientific Name	Status	Known or Potential in Douglas County	Habitat
Red Poverty-Weed *Monolepis pusilla*	ST	Known	Shrub-steppe: species occurs in desert regions and is often found on saline or alkaline soil; saline-alkaline clay, salt-encrusted soil, and on the edge of a dry alkaline pond. Adapted to extreme conditions, and its associated native annuals are largely limited to growing directly beneath greasewood shrubs in response to cattle trampling and compacting the soil between the shrubs.
Coyote Tobacco *Nicotiana attenuata*	S	Known	Shrub-steppe: Dry, sandy bottom lands, dry rocky washes, and in other dry open places. Occurs in areas that are prone to periodic disturbances, caused either by erosion or by human activities.
Hedgehog Cactus *Pediocactus simpsonii* var. *robustior*	R1	Known	Shrub-steppe: found in thin, rocky soil on ridge tops, desert valleys, and low mountains.
Fuzzytongue Penstemon *Penstemon eriantherus* var. *whitedii*	S	Known	Shrub-steppe: occurs on west-facing slopes of small canyons, and in dry and rocky habitats in the foothills of the Cascade Range and in the Columbia Basin. Found in dry, open places in the plains, valleys, and foothills, sometimes ascending to moderate elevations; some sites have high levels of caliche fragments.
Thompson Clover *Trifolium thompsonii*	ST	Known	Shrub-steppe and Forest: occurs in a range of habitats, from open ponderosa pine woods to areas dominated by grasses and herbs. Occasional shrubs, including sagebrush species, also are present. A majority of the occurrences are on the fringe of the ponderosa pine zone. The species grows along ridgelines, on steep slopes, alluvial fans, and canyon bottoms. It also occurs on the deeper soils in areas characterized by “biscuit-swale” topography.

In addition to several covered animal species described previously, other key animal species may use the upland habitats in Douglas County. Sandhill crane (*Grus Canadensis)* and ferruginous hawk (*Buteo regalis)* are possible, but rare migrants in the County. There will be no change to their use and distribution in the County under all alternatives, therefore they are not discussed further. Other special-status wildlife species are described in Table 10.

Table 10. Special-status Wildlife Species in or Near Shrub-steppe Uplands in Douglas County

SPECIES **Status**	**Distribution including Douglas County**	**Habitat**
Bald Eagle, *Haliaeetus leucocephalus* BCC (Bird of Conservation Concern (USFWS 2008a)) ST (State Threatened)	Migratory and resident bald eagles, while most-frequently found along the banks of the Columbia River, may occur throughout Douglas County (Watson and Rodrick 2001). Numerous bald eagle nesting territories and winter roost sites are known on the Colville Indian Reservation along Lake Roosevelt, north of Douglas County. There are also winter roosts near Brewster, and on the east side of Banks Lake (Erik Ellis, BLM, Pers. Comm. May 4, 2009). Generally bald eagles spend little time in the interior of Douglas County, and are more likely along the Columbia River.	The bald eagle nests in large trees, with the nesting territory usually near marine shores, large lakes, or rivers. Their prey includes fish, waterfowl, and small mammals. The bald eagle commonly scavenges on waterfowl, big game, and livestock. Threats include: loss of shoreline trees for nesting and perching; cutting and loss of communal roost sites; concentration of DDE, PCBs, and/or dioxins from prey causing reduced reproduction of birds on the Columbia River; lead poisoning acquired from scavenging; oil from oil spills; loss of prey from declines in waterfowl, salmon stocks, and other prey; many eagles are sensitive to disturbance while nesting or foraging (WDFW 2005).
Brewers Sparrow, *Spizella breweri* BCC	Washington is near the northwestern limit of summer breeding range for migrating Brewer's sparrows. Birds occur primarily in Okanogan, Douglas, Grant, Lincoln, Kittitas, and Adams counties (Smith et al. 1997).	Most native shrub-steppe habitat in Douglas County is considered habitat for Brewer's sparrows in Washington (Smith et al.1997). Brewer's sparrow populations have decreased in some parts of their range. Causes are not well understood, but it is suspected that the decline is due at least in part to destruction of sagebrush habitat. Known threats include increasing annual grass cover; decreasing shrubs; habitat loss and fragmentation due to agriculture, fire, development; and excessive grazing (Dobler 1994; Vander Haegen et al. 2000, Gebauer 2004).

SPECIES Status	Distribution including Douglas County	Habitat
Burrowing Owl, *Athene cunicularia*. SC	The burrowing owl is a fairly common to uncommon breeder in shrub-steppe in eastern Washington, while it is rare in the winter in eastern Washington.	The burrowing owl is an inhabitant of shrub-steppe, grasslands, and steppe; it will also use agricultural lands or suburban areas. It often uses abandoned mammal burrows for nesting. Its diet is made up of small mammals and insects. The species is largely migratory, wintering in the southwest U.S., Mexico, and Central America (Nordstrom 2003). Threats include (Nordstrom 2003) loss of habitat, direct and indirect effects of pesticides. Cultivation of grasslands and native prairies destroys nesting burrows and foraging habitat and degrades habitat quality resulting in decline of prey and decreased availability of nesting burrows, and may increase vulnerability to predators. Burrowing owl populations have declined due to poisoning, trapping, and shooting. The 44-year population trend from breeding bird survey data for eastern Washington shows a non-significant decline, with considerable uncertainty due to low sample size (Sauer et al. 2011). In general, there is poor information about local populations and population trends.
Golden Eagle, *Aquila chrysaetos* BCC	The golden eagle is fairly common, and breeds widely in mountainous areas of the State, especially in eastern Washington. Breeding and resident birds occur in suitable habitats throughout the State of Washington including Douglas County (McCall and Musser 2000; Kochert et al. 2002; Smith 2004; Smith et al. 1997).	The golden eagle occurs primarily in dry open forests, shrub-steppe, canyons, deserts, and alpine areas. It nests mostly on cliffs. Prey includes marmots, jackrabbits, ground squirrels, and carrion. Golden eagle habitat is usually open shrub-steppe or desert-type country. Threats include habitat loss and disturbance of nest sites, loss of foraging areas, decreased prey populations, and direct human-caused mortalities (Watson and Whalen 2003). Anthropogenic sources of mortality include lead and other contaminants, power line electrocutions, collision with wind turbines, and shooting.

SPECIES Status	Distribution including Douglas County	Habitat
Grasshopper sparrow, *Ammodramus savannarum perpallidus*	Grasshopper sparrows are found over much of North America and wintering birds are found throughout the southern U.S. and all of Mexico and into Central America. There are also populations in California, southern Idaho, and southwest Wyoming, and a pocket from northwest Oregon, through the Columbia Basin (including Douglas County) in Washington and extending into the Okanogan valley of British Columbia (Vickery 1996).	Four subspecies of grasshopper sparrows are recognized in North America (Paczek 2004). Only *Ammodramus savannarum perpallidus* occurs in Douglas County. The migrating grasshopper sparrow arrives in the Columbia Basin in early May. They eat mostly insects and primarily grasshoppers in summer; in winter birds eat primarily seeds, especially grass and sedges (Judd 1901). The grasshopper sparrow prefers moderately open grasslands and prairies with patchy bare ground, and generally avoids grasslands with extensive shrub cover, although some level of shrub cover is important for birds in western regions (Walcheck 1970). They appear positively associated with perennial grasslands, and are most abundant on sites that have loamy soil with fair range conditions, or shallow soil with poor range conditions (Vander Haegan et al. 2000). Threats include habitat loss and fragmentation (they are more likely to occupy large tracts of habitat than small fragments) (Vander Haegan et al. 2000), impacts from brown-headed cowbird parasitism (Dechant et al. 2002), nest disturbance, and excessive grazing.

SPECIES Status	Distribution including Douglas County	Habitat
Lewis' woodpecker, *Melanerpes lewisi*. BCC SC	The Lewis' woodpecker is a locally common to uncommon summer resident, and a rare to locally common winter resident in eastern Washington. Migrant birds are rare in the winter. In Douglas County, Lewis' woodpecker breeding populations are restricted to the breaks area adjacent to the Columbia River, in open pine forests.	The Lewis woodpecker requires snags of advanced decay for nesting. It rarely drills bark, and it switches its diet from insects in summer to acorns and other nuts, seeds, and fruits in winter. The woodpecker catches insects by fly catching (hawking) and gleaning. The species uses open forests with a shrubby understory, and woody riparian corridors of eastern and central Washington (Lewis et al. 2002). In the Columbia Basin, it occupies the transition zone between ponderosa pine and sagebrush. Threats include habitat loss and degradation. Lewis' woodpecker habitat can be lost due to fire suppression, grazing, timber harvesting and replanting with high densities of seedlings; decline of cottonwood forests, and loss of large snags for nest sites (Lewis et al. 2002). There is a lack of information on many life-history aspects, including: habitat selection at the nest site, stand, and landscape scales; population demography; potential competition for nest cavities with starlings; and urbanization and residential development in breeding and over-wintering habitat that may result in habitat loss (WDFW 2005).
Loggerhead Shrike, *Lanius ludovicianus* BCC SC	The loggerhead shrike is a fairly common local summer resident in eastern Washington, while rare in the winter.	The loggerhead shrike is a small avian predator that impales its prey on thorns and barbed wire, an adaptation for eating large prey without the stronger feet and talons of raptors (Vander Haegen 2003a). The shrike is both a passerine and a top-level predator. In eastern Washington it prefers alternating patches of shrub-steppe and grassy areas. In Douglas County, birds are patchily distributed at low densities in areas of shrub-steppe interspersed with grassland (Smith et al. 1997). Threats include conversion of shrub-steppe to agriculture, loss of wintering areas, direct or indirect effects from pesticides, and mortalities from vehicle collisions (Vander Haegen 2003a, Dechant et al. 1998). There is a lack of knowledge on the best habitats or landscapes for the species.

SPECIES Status	Distribution including Douglas County	Habitat
Merriam's Shrew *Sorex merriami* SC (State Candidate)	The Merriam's shrew is found east of the Cascades and Sierra Nevadas, south to southern Arizona and New Mexico, and east to the western Great Plains (Aserrad 2004). Merriam's shrews are found primarily in the arid portions of central and southeastern Washington.	The Merriam's shrew is primarily associated with arid shrub-steppe and steppe communities but it also has been found in semi-arid grasslands, pinyon-juniper woodlands, high-elevation brushlands, and even mixed woodlands of ponderosa pine, Douglas-fir, and cottonwood. Merriam's shrews feed on invertebrates, including spiders, beetles, caterpillars, cave crickets, and ichneumonid wasps. Threats include habitat loss, fragmentation, and degradation (WDFW 2005). The use of insecticides may negatively impact this insectivorous species.
Peregrine Falcon, *Falco peregrinus* BCC SC	About 120 nesting pairs of peregrine falcons are distributed throughout Washington, with major concentrations on the northwest coast, San Juan Islands, Cascade foothills, and along the Columbia River. In 2002, five locations on the eastern border of Douglas County were known to have nesting peregrine falcons (Hayes and Buchanan 2002). Most of these sites were located along Banks Lake. Prominent large cliffs (150 ft. or more in height) are the most common characteristic of nesting habitat (Hays and Milner 2004).	The peregrine falcon is a territorial predator of pigeons, doves, shorebirds, waterfowl, seabirds, and other birds. It nests on high cliffs, and occasionally tall buildings or bridges. Threats include: environmental contaminants (concentrated persistent chemicals such as DDE that can cause eggshell thinning), limited nest locations, and nesting disturbance (Hays and Milner 2004). Despite these concerns, the breeding population continues to increase in Washington and across the nation (Green et al. 2006).

SPECIES Status	Distribution including Douglas County	Habitat
Prairie Falcon, *Falco mexicanus*	There is a low density of prairie falcons in Washington; they breed in all eastern and central counties except Pend Oreille, and they winter throughout the shrub-steppe and farmlands of eastern Washington (Hays and Dobler 1999). In Douglas County, most breeding is in the cliffs of Moses Coulee, although birds can be found county-wide.	The prairie falcon nests on cliffs and depends on abundant prey in steppe and shrub-steppe. Prey items include horned larks, meadowlarks, other birds, and small mammals. Prairie falcon home ranges during the nesting season include adequate cliff nests within a reasonable distance to habitat that supports good numbers of Washington ground squirrel colonies (Marzluff et al. 1997). Threats include habitat loss (conversion of steppe to agriculture and residential development); reduced prey populations; toxic effects from poisoning of ground squirrels; habitat degradation by wildfire; loss of nest sites, or loss of prey habitat near nest sites; and human disturbance that causes nesting failure or abandonment (WDFW 2005, Hays and Dobler 1999). The 44-year trend from the breeding bird survey shows that Prairie falcon has a non-significantly increasing trend in the state, but the trend is significantly increasing across the western United States (Sauer et al. 2011).

SPECIES Status	Distribution including Douglas County	Habitat
Sage Sparrow, *Amphispiza belli nevadensis* BCC SC	It is an uncommon migrant and summer resident in the shrub-steppe of eastern Washington, and a rare migrant west of the Cascades.	The sage sparrow is an obligate shrub-steppe species. Breeding populations are found in the sagebrush/bunchgrass communities in the central part of the State (Vander Haegen 2003b) including Okanogan, Douglas, Grant, Lincoln, Adams, Franklin, Benton, Yakima, and Kittitas Counties (Smith et al. 1997). Populations are most abundant in areas of deep loamy soil and continuous sagebrush cover 1-2 m (3.3-6.6 ft) high (Vander Haegen et al. 2000). In south central Washington, sage sparrows are one of the most common shrub-steppe birds (Vander Haegen et al. 2001). Breeding evidence in Douglas County is primarily restricted to mature big sagebrush communities in the Sagebrush Flats, Moses Coulee, and Jameson Lake areas (Smith et al. 1997). Threats include habitat loss and degradation, habitat degradation by cheatgrass and other invasive plant encroachment, and increased fire frequency that kills native plants and shrubs while increasing invasive species (VanderHaegen 2003b, WDFW 2005). There is a lack of knowledge about general life history and ecology of this subspecies and effects of land-management activities on population persistence in landscapes.

SPECIES Status	Distribution including Douglas County	Habitat
Sage Thrasher, *Oreoscoptes montanus* BCC SC	Confirmed breeding evidence has been recorded in Douglas, Grant, Lincoln, Adams, Yakima, and Kittitas counties. Habitats also occur in Okanogan, Chelan, Whitman, Franklin, Walla Walla, Benton, Klickitat, and Asotin Counties (Smith et al. 1997). Sage thrashers in Douglas County are at the northern extent of the breeding range in Washington (Smith et al. 1997). Confirmed and probable breeding evidence has been reported in shrub-steppe habitats located in the northeastern, central, and southern parts of the County especially Moses Coulee, Dutch Henry Draw, and Foster Creek Drainage (Smith et al. 1997).	The sage thrasher is a sagebrush obligate and a fairly common breeder in shrub-steppe of eastern Washington (Vander Haegen 2003c). The species uses sagebrush and bitterbrush habitats in the Columbia Basin, including areas north up to Omak, Washington. Threats include (WDFW 2005) habitat loss due to residential development, agricultural conversion, burning, herbicide and pesticide treatments, and heavy grazing by livestock. Remaining habitat patches are fragmented. There is a lack of information on effects of land-management activities on population persistence in landscapes.
White-tailed Jackrabbit, *Lepus townsendii* SC	Within Washington, the species is limited to the Columbia Plateau and Okanogan ecoregions. They are uncommon in Douglas County.	The white-tailed jackrabbit (a hare) is an herbivore inhabiting open shrub-steppe. In eastern Washington, white-tailed jackrabbits are found in bunchgrass and rabbitbrush habitats. White-tailed jackrabbit numbers are cyclic. Threats include loss and degradation of habitat due to conversion of shrub-steppe to agriculture and development, and overgrazing. Populations may also be impacted by limited distribution and isolation, and potentially disease (WDFW 2005).

CHAPTER IV - ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

The purpose of Chapter IV is to show the environmental consequences of carrying out the alternatives described in Chapter II, and provide a basis for the comparison of the alternatives.

Environmental impacts are discussed in terms of their direct, indirect, and cumulative effects. Direct effects are caused by the action and occur at the same time and place as the action. Indirect effects are caused by the action and occur later than the action or are farther removed in distance (40 CFR 1408.8). Cumulative effects are those that affect the environment as a result of the incremental impacts of this action and other past, present, and reasonably foreseeable future actions (40 CFR 1508.7).

The environmental consequences for each general issue follow.

1. AESTHETICS

Past and future agricultural production activities will continue to affect the aesthetics of Douglas County because of the contrast between natural landscapes and those modified by agricultural activities. These contrasts consist of changes in line, form, color, and texture of the vegetation and landform. The effects these alterations have on aesthetics are dependent upon individual human values.

The aesthetic issue of concern is loss or gain in scenic quality, and the issue indicator is the change in the appearance of farmed acres versus naturally vegetated acres. For the private lands of Douglas County, each alternative was examined for the overall change to the existing visual conditions.

Effects Common to All Alternatives

Much of the private land within Douglas County has been altered by agricultural practices. Thus, the landscape for the most part is not in a natural aesthetic condition. The landscape and aesthetics of private agricultural lands will not remain static. This disturbance of natural landscapes and vegetative habitat will continue to some degree under all alternatives. Changes in aesthetic impacts, regardless of alternative, will most likely be due to the results of climatic factors and long-term socioeconomics across the County. Cumulative effects are likely to continue under all alternatives. Specifically, orchards are likely to continue to be developed into urban or rural housing, changing the aesthetic character along the Columbia River.

Effects from Alternative 1, No-Action Alternative

The No-Action alternative does not propose any beneficial actions that would result in improved aesthetics. Similar farming methods would likely continue. Currently about 599,000 acres in the County appear in a natural condition, while about 368,000 appear in a farmed condition. In 2010, Douglas County lost its 33 percent CRP exemption, and is now managing down to only 25 percent of the eligible acres in CRP. While this could have resulted in an increase of dryland farming, numerous enrollments in the SAFE program have made up for the decreased CRP acres, thereby likely minimizing the aesthetic impact that could have occurred from a decrease in CRP.

The CRP contracts last 10 years, and SAFE contracts will continue for 15 years, but both CRP and SAFE can be renewed.

Effects common to Alternatives 2 and 3
None.

Effects from Alternative 2, Proposed MSGCP
The adoption of Alternative 2, the MSGCP, will attempt to address the potential future loss of CRP/SAFE through implementation of a changed circumstances requirement. If some CRP/SAFE is not renewed, the FCCD will work with Permittees to find similar conservation programs to make up for any potentially lost acres. As the MSGCP and the "changed circumstances" requirements are implemented, there may be short-term changes in CRP/SAFE or similar acres. If there is a decrease of 10 percent or more of conservation contract acres or similarly protected acres (approximate starting point of 119,072 acres enrolled in CRP and 63,000 acres in SAFE for a total of 182,072 acres) and they can't be addressed within 2 years, then the MSGCP parties (FCCD, USFWS, Permittees, and potentially others) must reconvene to revisit the MSGCP. But generally, there will be low positive or low negative impacts to natural-appearing habitats in Douglas County, and the natural appearing habitat may be more likely to be maintained over the no-action alternative.

Effects from Alternative 3, Expanded MSGCP
Alternative 3 would include similar protection for 100,000 more acres than the 2009 benchmark of 186,144 CRP acres. These increased conservation acres would move toward a natural appearance over approximately 10 years, and likely decrease the farmed lands by an equivalent amount. This would result in additional natural appearing acres, and fewer farmed-appearing acres. However, because aesthetics are dependent upon individual human values it is hard to determine which type of open land is more "aesthetically pleasing". A change in the appearance of about 100,000 acres would affect about 8 percent of the County.

2. ECONOMICS (AGRICULTURAL PRODUCTION AND SOCIOECONOMICS)

Effects Common to All Alternatives
It is unlikely that any alternative would have a significant effect on the level of irrigated orchard production in Douglas County. Because most orchards would not be considered covered activities under the action alternatives, there should be no change to activities, and no change to costs as a result of implementation of the MSGCP. Cumulative effects are likely to continue with all alternatives; orchards may decrease in the future as development pressures along the Columbia River continue. With this reduction in orchards the average farm income and value of agricultural operations in Douglas County may decrease, while urbanization increases.

Economic data in Table 4 in the Affected Environment showed that in 2007 government payments (including CRP and other programs) provided a large source of income for Douglas County Farmers. This is not likely to change by alternative, and is likely to continue into the future as long as the Farm Bill programs continue similar to the current programs.

Effects from Alternative 1, No-Action Alternative
Because dryland and ranch agricultural operations under Alternative 1 would continue much as they have over the past several decades, it is unlikely there will be any dramatic economic change in the future. The land area in dryland production and rangeland use is expected to remain near present levels under Alternative 1. This production level and acreage, however, is highly dependent upon future governmental policy with regards to CRP/SAFE. In 2010, Douglas County lost its 33 percent CRP exemption, and is now managing down to only 25 percent of the eligible acres in CRP. While this could have resulted in an increase of dryland farming, numerous enrollments in the SAFE program have made up for the decreased CRP acres. The SAFE contracts will continue for fifteen years, but both CRP and SAFE can be renewed.

With the exception of cumulative impacts from on-going development pressures resulting in decreased numbers of orchards, and increased rural development and urbanization, there would be no or little additional economic costs by implementing the No-Action Alternative.

Under Alternative 1, there would be no additional benefits to society accrued through additional conservation efforts for covered species.

Effects Common to Alternatives 2 and 3
Not all eligible landowners will enroll in the MSGCP under alternative 2 or 3. This unpredictability in enrollees makes any economic and social impacts harder to quantify.

There would be a direct positive social value by implementing Alternative 2 or Alternative 3. Society as a whole, both in Douglas County and the region, would benefit from implementing the proposed action, by providing for conservation of lands to better support the four covered species. This societal benefit has positive value.

Effects from Alternative 2, Proposed MSGCP
With implementation of Alternatives 2 there will be slow improvement in the quality of the wildlife habitat on rangeland and farmland in Douglas County where BMPs are applied on the ground. For the most part, the BMPs required by the MSGCP in Alternatives 2 and 3 reflect guidelines for good land stewardship and are already being practiced by many agricultural operators. The direct impact of the increased cost due to implementing BMPs and its potential adverse impact on farm operations in Douglas County are difficult to assess. For a farmer who is not already implementing these good stewardship measures, implementation would add additional operating expenses to the farm operation, estimated at 3 to 8 percent over the existing farm operating expenses (B. Dudek, FCCD, Pers. Comm., 2008), although the true costs will vary with site-specifics. Cost-share may be available through some Farm Bill or other programs. Many of the BMPs, especially the NRCS Conservation Practices, will also maintain or improve land productivity, resulting in a short or long-term economic benefit.

Where existing farm operations are marginal or less, additional costs from implementing conservation practices and BMPs will most likely not be welcomed, and in these instances the farmers may choose not to enroll in the MSGCP. It is likely that existing successful farm operators will accept the added cost of the MSGCP implementation as a long-term investment to their operations and will be willing to participate. Because the MSGCP builds on top of existing

programs (such as Farm Bill programs), there is some cost to implementation, but it is not significant.

Alternative 2 is unlikely to lead to a significant change in dryland grain production, rangeland use, or levels of agricultural production activities. The CRP and SAFE programs are likely to continue at levels similar to current levels, but if they do not there is a trigger-point built into the changed circumstances in the MSGCP, where if there is a decrease of 10 percent or more of conservation contract acres or similarly protected acres (approximate starting point of 182,072 acres of CRP and SAFE), and the Permittees and FCCD cannot provide or document additional conservation-cover acres to make up for the decrease within 2 years, then the USFWS, FCCD, and others will reconvene to determine if the MSGCP still conserves covered species adequately. The options at that point may include adaptive management processes that are not predictable today, or termination or suspension of Permits.

Effects from Alternative 3, Expanded MSGCP

Similar to Alternative 2, implementation of BMPs under Alternative 3 will result in improved habitats, however Alternative 3 includes the protection of an additional 100,000 acres of CRP or similar conservation acres over the 2009 benchmark of 186,144 acres. Therefore, Alternative 3 would have an increased economic impact over Alternative 1 and Alternative 2. Over the 10-year period to meet the additional acreage-goal, dryland farming would likely decrease by equivalent acres, and the levels of production activities would drop accordingly. If the FCCD developed or found a funding mechanism to support these conserved or restored acres, the economic impacts would be ameliorated somewhat.

Should CRP-like acreage be expanded in Douglas County, it would most likely only occur on dryland croplands. It would be expected that dryland farm operating expenses would be less under Alternative 3 due to farming less acres, but farm income would also be less. Ranching may decreased under Alternative 3, if restoration of grazing land was needed to reach the 100,000 acre increase of CRP-like lands. While CRP or SAFE contract acres may not change over Alternative 1, it is possible that if a similar rental program was developed for the additional CRP-like acres, the losses from farm income could be ameliorated somewhat.

The return of an additional 100,000 acres of farmland back into a restored “natural” habitat under Alternative 3 would have a larger beneficial or positive societal impact than provided under Alternative 2 through conservation of more lands and species, resulting in a positive social benefit beyond those available under Alternative 2.

There will likely be indirect negative impacts on local communities in Douglas County from implementing Alternative 3. The need for supplies ranging from fertilizers, farm supplies, grain storage, etc. would likely decrease proportionately to the acres removed from farming.

The economic and socioeconomic effects of the proposed alternatives are summarized in Table 11.

Table 11. Comparison of Effects for Economics, Agricultural Production, and Socioeconomics

INDICATORS	Alternative 1 No-Action	Alternative 2- Proposed MSGCP	Alternative 3 Expanded MSGCP
Acres in dryland production	Acres in dryland production likely to stay similar to current conditions	Acres in dryland production likely to stay similar to current conditions; MSGCP changed circumstances ensures if lose 10% CRP then revisit MSGCP	Decrease in dryland agriculture acres to allow increase in CRP or similar protected conservation lands
Acres in irrigated production, including orchards	Irrigated non-orchard land likely to continue in similar conditions, while development pressures continue in orchard land along Columbia River	Will stay similar to No-Action alternative	Will stay similar to No-Action alternative
Acres in rangeland use	Likely to stay similar to current levels.	Likely to stay similar to No-Action alternative	Possible decreased grazing if necessary to allow increase in conservation lands.
Changes in farm income or levels of production	Difficult to predict, though orchards may decrease over time due to development pressures	Difficult to predict, though orchards may decrease over time due to development pressures	Negative impact to farm income, unless good rental program developed for increased CRP-like acres. Orchards may decrease over time due to development pressures
Changes in benefits afforded by society through habitat	No change to approach in conservation lands	BMPs implemented to improve habitat, and CRP or similar lands maintained at near current levels	BMPs implemented to improve habitat, and CRP or similar lands increased
Changes in extent of urbanization--cumulative effects	Urbanization and hobby farms may increase in the County	Urbanization and hobby farms may increase in the County	Urbanization and hobby farms may increase in the County

3. CULTURAL RESOURCES

As described in chapter 1, section 106 of the NHPA requires Federal agencies to consider the effects of their action on properties eligible for inclusion in the National Register of Historic Places.

Effects Common to All Alternatives

With or without the action alternatives, when projects have NRCS, or other Federal agency involvement, such as environmental quality incentives program (EQIP), etc., then NRCS or the other Federal agency must ensure compliance with the NHPA.

Effects from Alternative 1, No-Action Alternative

Alternative 1 would not provide any additional direct or indirect positive benefits for cultural resources, nor would it lead to any additional adverse impacts to the County's cultural resources.

Effects Common to Alternatives 2 and 3

The MSGCP does not expect large additions to the existing agriculture footprint. Farmers will likely farm in their existing footprints, and at similar tilling depths, therefore there should be little new impact to cultural resources. Where changes do occur and the activities move more soil or enter deeper into the soil than done under previous agriculture activities, or impact previously undisturbed habitats, then additional review could be required, as described below.

Certain site types such as rock features (cairns, talus pits, talus burials) occur most often in positions on the landscape that will not receive impacts or that can often be avoided with little difficulty. Appendix F in the MSGCP describes the cultural resources review process that would be used for various activities under Alternatives 2 and 3. Numerous low-impact activities will not require cultural resources review. For other activities, additional review under NHPA may be conducted, and a process for doing this is included in Appendix F in the MSGCP. Generally, for MSGCP covered activities which do not have NRCS involvement (those with NRCS involvement are addressed by NRCS), the FCCD and USFWS will have the opportunity to provide technical assistance to avoid or minimize impacts to potential cultural resources. Thus, implementation of Alternatives 2 and 3 will result in increased recognition of cultural resources, but the actual on-the-ground efforts will depend on site specifics and is difficult to predict.

4. EARTH RESOURCES (AIR QUALITY, GEOLOGY, MINERALS, AND SOILS)

Effects Common to All Alternatives

There are no details on quantities of PM 10 or PM 2.5 in the County; therefore in the following discussions we consider air quality generally, in terms of visibility and particulates.

Air emissions or dust levels would likely be low under all alternatives. These estimated emission or dust levels may have a short-term temporary, but overall negligible long-term adverse effect on regional air-quality and visibility goals.

Short-term adverse effects to air quality from smoke cannot be avoided over the range of alternatives. Prescribed fire can be a useful tool in the management of agricultural lands, particularly on range lands, but wildfires are a larger concern for smoke production. Under all

alternatives, Douglas County lands would remain at risk for wildfire. Wildfires generally occur at times and under conditions that impact local and regional air quality to a greater extent than do prescribed fires.

Effects from Alternative 1, No-Action Alternative
Alternative 1 would not change the existing soil management (ie: dust and particulates) in Douglas County.

Maintaining soil productivity is integral to maintaining the long-term productivity of the agricultural ecosystem. Soil productivity is the inherent capacity of a soil to support the growth of plants. Soils are affected by agricultural management activities, primarily by tillage and overgrazing, particularly on soils with high moisture content. Continued tillage of soils will occur with all alternatives, but in the No-Action alternative there are about 599,000 acres of the County in natural or natural-appearing vegetated-cover; while about 368,000 are tilled (this does include a small percentage of irrigated agriculture, some of which maintains permanent vegetation).

Ongoing agricultural tillage operations, road construction/maintenance, and vehicle operations along with natural wind-blown soil movement can contribute slightly to the temporary degradation of air quality in Douglas County. Land use practices that reduce the amount of tillage (no-till or low-till farming methods) may voluntarily occur, or be implemented under ongoing Farm Bill programs. These or similar types of efforts support the protection and maintenance of soil productivity.

Possible prescribed burning and dust from agricultural operations would temporarily affect local air quality. Alternative 1 would not be expected to provide further benefits, and is likely to continue current levels of wind-blown soil movement.

Effects Common to Alternatives 2 and 3
Potential impacts to the soil resource from agricultural operations include compaction, displacement, erosion, loss of nutrients, and the introduction of competing and unwanted vegetation (noxious weeds). Under Alternatives 2 and 3 Farm Plans will include erosion control measures to reduce sheet, rill and gully erosion at field edges by trapping sediment and reducing surface runoff, and therefore ensure that long-term productivity of the land is maintained or improved. On rangelands, BMPs require certain grazing standards addressing grazing periods, recovery periods, utilization levels, and stubble heights. These and other BMPs will generally increase the productivity of private agricultural lands, and decrease the amount of wind-blown soil movement. Alternatives 2 and 3 will likely improve soil productivity through implementation of BMPs, although the degree of improvement will depend on how many farmers join the MSGCP.

The direct and indirect positive benefits from implementing conservation-oriented BMPs would be additive to existing conservation practices in Douglas County. Thus, from a cumulative perspective, while existing air quality is generally high in Douglas County, implementation of Alternatives 2 and 3 would maintain or enhance future high-value air quality in the region.

Effects from Alternative 2, Proposed MSGCP
The BMPs implemented by Alternative 2 would also provide a positive benefit to soil productivity. Soil loss from continued tillage of soils under Alternative 2 will be improved over the No-Action Alternative due to the implementation of BMPs. Implementation of the MSGCP under Alternative 2 also requires efforts to maintain, or evaluate future changes in amounts of CRP/SAFE lands. Maintenance of CRP/SAFE lands near current levels or decreasing by 10 percent will conserve soil productivity.

Short-term air quality impacts will vary according to the comparative level of agricultural tillage treatments and soil types on which treatments are proposed. Short-term impacts to air quality likely correlate with acreage tilled; Alternative 2 will likely have less acreage tilled and therefore less short-term air-quality impacts than the No-Action Alternative, but the actual amount will depend on how many farmers sign up for the MSGCP.

Effects from Alternative 3, Expanded MSGCP
The most critical factors determining impacts on the soil productivity of the private agricultural lands in Douglas County would be the time, location, soil type, and amount of mineral soil exposed during tillage operation. Practices that reduce the soil exposure time will have a positive benefit to the soil resource. Alternative 3 would most likely lead to agricultural operations that have the least exposed mineral soil, thereby leading to the greatest direct and indirect benefits for the soil resource.

From a comparative viewpoint, Alternative 3 would provide the largest benefits to air quality by the reduction of particulates by reducing the amount of lands disturbed by agricultural tillage. By increasing the amount of conservation acres by 100,000 over the 2009 benchmark of 186,144 acres, significantly less lands would be subjected to annual tillage exposing bare mineral soil to the forces of both wind and water erosion. It would also result in less use of chemicals and less combustion of diesel, although some of both would be required for CRP establishment and maintenance.

Impacts to Earth Resources are summarized and compared by alternatives in Table 12.

Table 12. Comparison of Impacts to Earth Resources

INDICATORS	Alternative 1 No-Action	Alternative 2- Proposed MSGCP	Alternative 3
Acres of soil disturbance (tilled versus untilled)	Currently about 599,000 acres of the County are in natural or natural-appearing vegetated-cover; while about 368,000 are tilled (this does include a small percentage of irrigated agriculture some of which does maintain soil cover).	Similar to the current condition, but implementation of the MSGCP will result in long-term commitment to monitor and maintain conservation cover near current levels	Less tilled acres, and more vegetated acres than the other alternatives. Will increase natural-appearing vegetated acres by about 100,000 acres, therefore has the least acres of soil disturbance.
Soil productivity	Ongoing Farm Bill or voluntary soil conservation efforts will likely continue, but are difficult to quantify.	Implementation of the MSGCP may result in more landowners implementing soil conservation efforts, or improving soil conservation efforts.	Because more acres will be vegetated, more soil will be conserved and long-term productivity maintained or increased.
Air-quality goals	Current information, while not quantitative, indicates that Douglas County is meeting required air-quality goals.	Meeting of air-quality goals is likely to continue.	Meeting of air-quality goals is likely to continue and improve.
Short-term and long-term particulate matter; changes in visibility and local air quality	Short-term particulate and visibility impacts from wildfire are likely to continue. Ongoing tillage likely, with likely current levels of air quality, including blowing soil during seasonal wind events.	Short-term particulate and visibility impacts from wildfire are likely to continue. Less tilled acres than No-Action, due to long term commitment to maintain conservation cover near current levels, but short-term impacts to air quality will likely still occur.	Short-term particulate and visibility impacts from wildfire are likely to continue. Even less tilled acres than No-Action and Alternative 2, but will not eliminate short-term impacts to air quality.

5. FISH AND AQUATIC SPECIES

Bull trout, Upper Columbia River Spring Chinook, and Upper Columbia steelhead occur in the mainstem Columbia River and potentially in the lowest reaches of Foster Creek and Rock Island Creek, and other aquatic species of concern may occur in the mainstem Columbia River. Dryland agriculture can significantly alter runoff and erosion rates to streams, as well as impact functions of riparian areas. Grazing can cause vegetation changes, habitat alterations, and increased sediment input to streams. These impacts can affect fish and aquatic species habitat and are summarized here and also addressed in the next section of the document, Water Resources.

Effects Common to All Alternatives

Dryland farming, grazing, and irrigated agriculture will continue under all alternatives. Land disturbance and the use of pest-management measures along with production aids such as fertilizer would continue under all alternatives. The use of these practices may affect water quality, thereby affecting bull trout, steelhead, and spring Chinook salmon and other aquatic species. Irrigation from the Columbia River or from water originating in the Wenatchee River is not a covered activity under either action alternative, and therefore is likely to continue at the current levels.

Cumulative effects will likely continue under all alternatives. Where orchards are maintained, there may be a continuing cumulative impact to fish from irrigation water withdrawals, possible entrainment in improper or poorly maintained fish screens in the Columbia River, and continuation of degraded shoreline habitats. The conversion of orchards to rural and urban housing is likely to continue. Climate change will likely continue regardless of the alternative, and the resultant warmer and wetter weather may change the temperature or water quality in the Columbia River, which may adversely affect aquatic species.

Effects from Alternative 1, No-Action Alternative

Alternative 1 provides no additional beneficial effects to fish and aquatic species. Although difficult to measure, it is anticipated that the current land management practices as described in Alternative 1 would have a very low continuing adverse effect on the fisheries and aquatic species of Douglas County. Many landowners are already working with various organizations that provide technical assistance to help protect water and soil resources in Douglas County. These efforts would be expected to continue to some degree under the No-Action alternative.

Effects common to Alternatives 2 and 3

Bull trout, Upper Columbia River spring Chinook salmon, and Upper Columbia steelhead occur in the mainstem Columbia River and potentially in the lowest reaches of Foster Creek and Rock Island Creek, other aquatic species of concern may occur in the mainstem Columbia River, while the covered activities occur mainly in the uplands. Farm Plans will address cropping design, vegetative treatment, and erosion control practices to improve soil quality and reduce soil loss. Improving and maintaining upland soils and hydrology through BMPs will reduce soil loss, and thereby reduce indirect sediment transport effects to listed salmonids and their habitats. Therefore, while the sedimentation control BMPs are important, sediment often settles out before reaching the Columbia River, or is typically diluted due to the large size of the Columbia River. Implementation of BMPs to control soil erosion would decrease the risk of transporting

production aids (such as fertilizers or pesticides) from application sites to stream or lake fish habitat. BMPs address upland sediments to improve water quality. There is a small beneficial effect on listed salmonids and other Columbia River-dwelling aquatic species as a result of implementation of soil conservation BMPs in Alternatives 2 and 3, but it is not likely to be measurable.

The MSGCP Farm Plan process (Appendix G and Appendix H of MSGCP) implemented under Alternative 2 and Alternative 3 will include grazing systems with good range management practices, such as adequate fencing, appropriate distribution of water and salt, and adequate riding or herding management as necessary to ensure uniform cattle distribution. Good grazing management will improve riparian vegetative communities in areas that are currently degraded. While riparian areas can be subject to acute effects from animal use, upland animal management influences hydrology and sediment yields to streams and rivers as well. Farm Plans will also address forage improvement and protection, erosion control practices, and prescribed grazing to conserve shrub-steppe habitat. Improved water quality and riparian habitats will result in direct or indirect benefits for listed salmonids and other aquatic species, although since the improvements mostly occur in a small number of upland tributaries (because there are relatively few upland tributaries in Douglas County) the beneficial effects to listed fish in the Columbia River or lower Foster Creek would be small but still an improvement over the No Action Alternative.

Generally, with improved riparian habitats, associated water temperatures will also improve, but this will vary with site-specifics, the source of water, and local ambient air temperatures. We do not have data on likely water temperature changes in smaller tributaries from implementation of Alternatives 2 or 3, and any temperature changes in tributaries would be insignificant in the larger Columbia River.

Implementation of farm planning and BMPs will minimize and/or avoid adverse effects to listed fish, unlisted fish, aquatic species, and their habitats. Alternatives 2 and 3 will have minor positive benefits to fish and aquatic species through increased habitat quality from implementation of Farm Plans and GCP Site Plan BMPs, but this will vary with how many applicants sign up for the MSGCP.

Effects from Alternative 2, Proposed MSGCP
No additional effects from Alternative 2 are anticipated.

Effects from Alternative 3, Expanded MSGCP
Beneficial effects to fish and aquatic species habitats will be larger in Alternative 3, than in Alternative 2, due to the increase in the amount of CRP-like acres. The increase in the amount of CRP-like acres will, by itself, somewhat decrease the likelihood of sediment movement or production aid transport into streams or the Columbia River, thereby improving water quality over Alternative 2. However, again due to the upland focus of the Alternative and distance from the Columbia River, the benefits will not be large.

Impacts to fish and aquatic species by the various alternatives are described below in Table 13.

Table 13. Comparison of Impacts by Alternative to Fish and Aquatic Species

Species (main habitat used)	Alternative 1 No-Action	Alternative 2- Proposed MSGCP	Alternative 3
Bull trout, steelhead, spring Chinook (Columbia River, and possibly the lowest reaches of Foster Creek and Rock Island Creek)	Ongoing activities will not change listed salmonid use, most sediment will settle out before entering the Columbia River.	Generally the same as No-Action Alternative; with potential slight improvement in water quality from implementing BMPs and maintaining CRP-like acres at or near current levels.	Generally the same as No-Action Alternative; with even more increase in water quality due to implementing BMPs and increasing CRP-like acres; less sediment input due to less tilled lands.
California floater, giant river limpet, Columbia River spire snail (Columbia River)	Similar to fish discussion above, most sediment will settle out before entering the Columbia River, therefore likely no change to these river species.	Implementation of BMPs result in slight improvement of Columbia River water quality over No-Action, therefore slight improvement to species habitat.	Larger but still slight increase in water quality, due to less sediment input from less tilled land, therefore larger improvement to species habitat.

6. WATER RESOURCES (WETLANDS, RIPARIAN, WATER QUALITY)

While Douglas County adjoins one of the largest surface sources of water in the western United States (the Columbia River), it remains a "water poor" near-desert region with few small perennial streams. The effects of the proposed alternatives have been generally evaluated in terms of the following water resource indicators: changes in stream channel and dry drainage stability, changes in accelerated erosion affecting sediment yield and turbidity, changes in wetland/riparian habitat, changes in key habitats, and changes in water quality. These indicators are discussed below, and in Table 14.

Effects Common to All Alternatives

Water quality can be adversely impacted by the application of production aids (for example, fertilizers), but this risk may be somewhat decreased in arid areas such as Douglas County, where low amounts of precipitation are less likely to transport the chemicals, especially if they are applied at recommended agronomic rates at the right time of the year. Riparian and wetland buffers, where implemented, further decrease the likelihood of the chemical movements. Chemical production aids are not often used on range lands within Douglas County, but are more typically used on dryland or irrigated crops.

For the listed plant, Ute ladies' tresses, the impacts under all alternatives would be small, if any, because this plant is not known to occur in Douglas County, and if it did it would be found in wetland complexes on the edge of the Columbia River in habitats that are unlikely to be changed under any of the alternatives.

Cumulative effects are likely to continue; climate change may result in wetter and warmer average weather. While water temperatures may change as a result of climate change and more precipitation falling as rain rather than snow, it is difficult to predict how or whether wetland or riparian habitats will change as a result.

Effects from Alternative 1, No-Action Alternative

Many Douglas County landowners are already implementing good stewardship and positive farm practices, either voluntarily or with assistance from NRCS or other entities, and would continue to do so under Alternative 1. Wetland and riparian existing conditions are likely to continue in the future with voluntary good stewardship continuing, and, in some cases, currently degraded areas continuing in that degraded condition as well. Therefore, overall effects to wetland/riparian species of concern are not likely to change.

Effects common to Alternatives 2 and 3

Potential BMPs implemented with Alternatives 2 and 3 for dryland farming and ranching focus on protecting the soil resource and water quality by minimizing erosion events, limiting surface disturbance, and maintaining adequate surface protective cover during livestock grazing. Additional emphasis on farm planning and implementation of BMPs should result in maintained or improved riparian habitat and protection of wetlands. Implemented BMPs under Alternatives 2 and 3 also provide for the protection of wetlands and riparian areas. These actions would most likely lead to a reduction in accelerated erosion, decreasing sediments and turbidity in Douglas County streams and water bodies. The actions would also reduce nutrient transport to these same streams and water bodies resulting in improvements in water quality. Riparian BMPs should maintain or improve stream channel and dry drainage stability through establishment of vegetated riparian areas. On irrigated lands, BMPs will decrease chemical run-off from sites, as well as minimize sedimentation.

While there are no specific BMPs for special-status plant or animal species, improved riparian buffers and riparian protection should result in maintaining or improving habitats for these species.

Effects from Alternative 2, Proposed MSGCP

Accelerated erosion and sediment transport would be expected to be less in Alternative 2 than Alternative 1 because of farm planning and implementation of BMPs, however the actual change to accelerated erosion will depend on how many landowners sign on to the MSGCP.

Effects from Alternative 3, Expanded MSGCP

Erosion and sediment transport would be further decreased with Alternative 3, due to the transfer of dryland cropping to additional CRP-like lands as expected under Alternative 3. Water-resource impacts are compared by alternative in Table 14.

Table 14. Comparison of Impacts by Alternative to Water Resources

INDICATORS	Alternative 1 No-Action	Alternative 2- Proposed MSGCP	Alternative 3-
Changes in stream channel and dry-drainage stability	Likely to continue in existing condition.	Implement BMPs to maintain or restore riparian areas, potentially improving stream channel and dry-drainage stability.	Implement BMPs to maintain or restore riparian areas, potentially improving stability. More CRP-type lands should improve stream channel and dry-drainage stability over Alternative 2 and Alternative 1.
Changes in accelerated erosion affecting sediment yield and turbidity	Existing Farm Bill programs contribute to limiting erosion, but not all landowners are involved. Existing erosion and resultant turbidity likely to continue.	The MSGCP builds additional BMPs on existing Farm Bill programs, and therefore is likely to improve erosion and sediment controls; long term commitment to maintain CRP-like lands in conservation cover at or near current levels should minimize erosion, sediment yield, and turbidity.	Alternative 3 results in the most decrease in sediment yields, due to implementing BMPs, and additionally by increasing CRP-like lands by 100,000 acres over the 2009 benchmark of 186,144 acres (thereby decreasing tillage and erosion).
Changes in wetlands and riparian habitats, resultant changes to water quality and to most wetland/riparian species.	Existing conditions likely to continue in the future with voluntary good stewardship continuing, and currently degraded areas continuing as well; but not all landowners are involved.	Additional emphasis on farm planning and implementation of BMPs should result in more riparian buffers and protection of wetlands. Improved wetland and riparian buffers should result in improved water quality, and improved habitat for most wetland/riparian species.	Same as Alternative 2.
Ute ladies'-tresses	Ute ladies'-tresses: no change to habitat due to location in wetland complexes adjacent to Columbia River.	Same as No-Action.	Same as No-Action.

7. COVERED WILDLIFE SPECIES

Effects Common to All Alternatives

Agriculture land-use practices result in vegetative cover that is dramatically different than occurs naturally; there is intermittent land disturbance by equipment, control of pest species, and displacement of wildlife species either temporarily or for longer terms. Livestock management requires fencing and water development. Livestock and pasture maintenance activities often modify natural habitats such as shrub-steppe, by changing species composition, compacting soil surfaces, modifying soil micro-flora and fauna, and modifying microclimates.

Upland habitats that have been heavily grazed during the growing season have reduced perennial herbaceous cover, increased cover of non-native annual grasses and forbs, reduced cryptogrammic crusts, and increased big sagebrush cover (Paige and Ritter 1999). In many areas, little residual perennial grass remains by the end of the grazing season. Most grazed riparian areas have less woody and herbaceous vegetation, increased soil compaction and disturbance, and less stream-bank and channel stability. These effects have different impacts on covered species depending on timing and utilization of the forage by livestock. Light to moderate levels of grazing as occurs on steep slopes and in areas distant from water have relatively little direct or indirect adverse impacts on many shrub-steppe communities. Heavier grazing, as has occurred historically on lands in Douglas County and may continue to occur in some locations, tends to increase sagebrush densities and reduce understory grass densities.

Drylands that are cropped are usually tilled annually, at minimum and natural habitats are not available for covered species on the cultivated lands. Dryland and irrigated farming continues current levels of fragmentation that may increase predation on covered species through reduced cover, and increased abundance of predators (Vander Haegen et al. 2002, 2007, Chalfoun et al. 2002, Herkert et al. 2003, Sauer et al. 2008, Stnson and Schroeder 2012, p. 74-77).

Many of the riparian vegetation species along the Columbia River in Douglas County are not native. Irrigated orchards are located primarily in close proximity to the Columbia River. Some riparian habitat has been created and is supported by subsurface water flows from irrigated orchards.

The following matrix (Table 15) describes each species, its general habitat requirement, and how or whether dryland farming, grazing, or irrigated farming impacts the species. This will be useful to understand as we compare effects from alternatives (which have varying levels of the three types of farming) in the following discussion. Actual effects to covered species will vary with farm location, activity types, and habitat and species distribution on each farm. Farming activities and effects to covered species are discussed in more detail in the MSGCP Appendix E.

Table 15. Potential Impacts to Covered Species by General Covered Activities

Covered Species	Habitats used	Effects from Farming Activities
Sage-Grouse	Shrub-steppe and meadow step associated with sagebrush. Sage brush is a key food; also eat grasses forbs, and insects; sage brush provides nearly 100% of the winter diet. Mating occurs on leks in open areas including, but not limited to, natural meadows and cultivated fields. Nests often occur under shrubs, and occasionally in cultivated fields or idle cropland (Stinson et al 2004). Herbaceous cover is important for foraging and hiding for sage-grouse chick survival since mortality rates are high (Schroeder 2000).	All Farming Activities: Potential disturbance or harassment where activities occur in or near active leks. Dryland Farming: decreases habitat, may increase invasive weeds that degrade shrub-steppe habitats. Nests may be destroyed by burning or plowing stubble fields or idle cropland. Ranching/Grazing: Heavy livestock grazing can decrease perennial forbs and grasses, increase the dominance of introduced annuals, resulting in degraded or unsuitable habitat for the sage-grouse. Irrigated Farming: May decrease riparian areas, cover, and shrub-steppe.
Sharp-tailed Grouse	Habitat includes grassland for nesting, and sometimes hay fields (Stinson and Schroeder 2012). Mating occurs on leks. Herbaceous cover is important for nests and for chick survival, particularly for very young birds to hide and forage (Stinson and Schroeder 2012).	All Farming Activities: Potential disturbance or harassment where activities occur in or near active leks. Dryland Farming: decreases habitat, may increase invasive weeds; occasionally sharp-tailed grouse build nests in stubble fields; nests may be destroyed by burning or plowing stubble fields. Ranching/Grazing: In Washington riparian areas often provide winter habitats. Grazing in grasslands and riparian areas, where cattle tend to congregate impacts sharp-tailed grouse habitats. Irrigated Farming: may decrease riparian areas, cover, shrub-steppe and grasslands.

Covered Species	Habitats used	Effects from Farming Activities
Pygmy Rabbit	Burrowing herbivore, needs grasses, forbs, sagebrush in deep soils.	Dryland Farming: maintains existing habitat fragmentation of deep-soil habitat, potentially increases invasive plants; ongoing impact to deep soil habitat; bare ground may limit dispersal or increase vulnerability to predation. Ranching/Grazing: Pygmy rabbits generally tolerate moderate levels of grazing as long as sufficient perennial grasses and forbs remain to meet their nutritional needs. Presence of sagebrush cover is a requisite for pygmy rabbit habitat (WDFW 1995). Overgrazing may adversely affect pygmy rabbit populations by competing for forage, trampling burrows, and modifying habitat that could make the pygmy rabbits more susceptible to predators. Irrigated Farming: maintains existing levels of fragmentation.
Washington Ground Squirrel	Burrowing herbivore, needs grasses, forbs, sagebrush in deep soils.	Dryland Farming: maintains existing habitat fragmentation of deep-soil habitat, potentially increases invasive weeds; ongoing impact to deep soil habitat; bare ground may limit dispersal or increase vulnerability to predation. Ranching/Grazing: Washington ground squirrels generally tolerate moderate levels of grazing as long as sufficient perennial grasses and forbs remain to meet their nutritional needs. Overgrazing may adversely affect Washington ground squirrel populations through competition for forage, trampling burrows, and modifying habitat that could make Washington ground squirrels more susceptible to predators. Irrigated Farming: maintains existing levels of fragmentation.

All alternatives are likely to continue the beneficial effects to covered species from continuation of habitat conservation efforts on BLM, TNC, and WDFW lands. Cumulative effects, including ongoing development pressures to convert orchards to houses are expected to continue with all alternatives.

Climate change is likely to continue with all alternatives. Recent studies have looked at likely climate change and changes in biodiversity (Lawler and Mathias 2007). The biodiversity study summarized models that predicted that the shrub-steppe is likely to undergo changes in the coming century. Changes may include increased extent of woodlands, increased fires, increased erosion, and resultant loss or shifts in distribution of wildlife habitats. Cheatgrass invasion may worsen with increased fires, and it may out-compete native perennials, further altering the fire regimes (Billings 1948, Roberts 1990). Warmer and drier summers may also make fires more frequent. Encroachment of woodlands and/or dry conifer forests (Lawler and Mathias 2007) or other vegetation changes including increased weeds (Stockle et al. 2009) may also be enhanced due to increased atmospheric carbon dioxide resulting in increased plant water-use efficiencies.

Effects from Alternative 1 No-Action Alternative

Alternative 1 would provide the least protection to covered species because of greater amount of farmed acreages than the other two alternatives. Alternative 1 would most likely have the greatest direct and indirect adverse effects of the three alternatives on shrub-steppe habitat, mainly because there are not guarantees to maintain quantities of CRP/SAFE acres similar to current amounts.

Under Alternative 1, Dryland farming will likely continue in a manner and at locations similar to the existing condition.

Under Alternative 1, livestock would continue to have a large influence on plant community structure and composition across rangelands in Douglas County. Livestock grazing is likely to continue at similar levels as the current condition.

Other than the orchards considered above under “Effects common to all alternatives,” irrigated lands are likely to continue in a manner and at locations similar to the current situation.

Under Alternative 1, there would be no additional measures provided to minimize or mitigate any take of covered species that may occur.

Effects Common to Alternatives 2 and 3

The goal of the MSGCP is to improve habitat for covered species. On covered lands, habitat will improve over time, and existing agriculture is expected to continue with additional BMPs. It is unknown how many landowners will join the MSGCP. Therefore, habitats will be improved, but the degree of positive effect will vary over time and space depending on how many landowners sign up for the MSGCP.

BMPs that will be implemented under Alternative 2 or 3 will improve the quality of existing shrub-steppe habitat and riparian habitats. Certain key habitats, such as sage-grouse leks, will be protected with timing restrictions to minimize disturbance. Thus, the adverse direct and indirect environmental consequences of implementing Alternative 2 or 3 are likely less than Alternative 1. Alternatives 2 and 3 are expected to result in positive impacts to covered species in Douglas County.

Alternatives 2 and 3 include "changed circumstances" triggers that ensure that if habitat conservation areas (BLM, TNC, or WDFW lands) in the County decrease by 10 percent, the FCCD, USFWS, and others will reconvene to revisit the adequacy of the MSGCP at that time. However, based on BLM, TNC, and WDFW policy directions (see Chapter III in MSGCP), decreases in those conservation areas are unlikely to occur.

Sage-grouse and sharp-tailed grouse are affected by livestock grazing. These grouse species are adapted to high quality climax shrub-steppe habitat. Sagebrush provides forage and cover habitat throughout the year and the grass-forb understory supports food and cover during spring through fall. On some existing rangelands, plant communities have been altered to the point that they have limited potential for sage-grouse habitat, even in the short-term if grazing is totally removed. However, there are areas that contain enough remnant bunch grass and perennial forbs to contribute valuable nesting and brood-rearing habitat for both species if grazing pressure is reduced. BMPs include grazing prescriptions to ensure quality habitats. Therefore habitats are more likely to improve under Alternatives 2 and 3 than under Alternative 1.

Effects from Alternative 2, Proposed MSGCP

The goal of the MSGCP is to improve shrub-steppe habitat on Permittee's farms, particularly among existing dryland and rangeland agricultural operations. Foster Creek Conservation District, WDFW, and others developed a habitat suitability model (Chapter 3 and Appendix G of the MSGCP), and evaluated potential changes over time (at year 10 and year 50) for the Alternative 2, the MSGCP. The model includes general habitats used by the species and/or its prey, not just the most limited habitats. In general, the model predicts habitat suitability will improve over time, but the degree of improvement will depend on how many farmers sign up.

Species dependent on shrub-steppe generally need large patches of relatively undisturbed shrub-steppe plant species, including big, stiff, and three-tip sage species. CRP has been very beneficial in terms of protecting and enhancing wildlife habitats, including sage- and sharp-tailed grouse within Douglas County (Hemmer 2004). Sage-grouse will use CRP for nesting, and especially CRP with a component of big sagebrush (Schroeder and Vander Haegen 2011). Desirable blocks of shrub-steppe have emerged and are maturing on some CRP lands.

Implementation of Alternative 2 will further supplement the CRP and newer SAFE program by continuing to improve habitat quality for sage-associated species. The MSGCP includes a changed-circumstance-trigger, where if CRP and/or SAFE contracts are not renewed, farmers enrolled in the MSGCP agree to enroll in other available conservation programs. If there are none available, they will attempt to maintain the lands in conservation cover. If the conservation contract acres or similarly protected acres in the county decrease by more than 10 percent of the starting point (182,072 acres as of 30 June 2013), and additional acres to get above the 10 percent trigger (163,865 acres) cannot be implemented within two years, then the USFWS, with assistance of the FCCD and potentially other members of the implementation and management committee, will revisit the MSGCP to ensure it continues to meet issuance criteria. Monitoring requirements (Chapter 4 of MSGCP) ensure evaluation of changes to acres of CRP, SAFE, or similar protected-status lands.

BMPs would minimize and mitigate the take that may occur to covered species on enrolled lands, Alternative 2 would result in less take of covered species than Alternative 1.

Effects from Alternative 3, Expanded MSGCP

Alternative 3 would include additional CRP-like conservation lands to reduce fragmentation and to provide larger and more-closely linked areas of wildlife habitat to better meet the life-history needs of covered species as well as other wildlife species. The largest benefit would accrue where currently fragmented CRP/SAFE lands could be consolidated or blocked into larger units.

Alternative 3 would provide the greatest conservation benefit to covered species. Alternative 3 would provide the largest positive change to shrub-steppe or grassland-type habitats, and provides the greatest opportunity for wildlife corridors and ability to reduce habitat fragmentation. With the addition of 100,000 additional acres of CRP-like land, sagebrush and shrub-steppe habitat may be restored where it does not currently exist, resulting in a positive impact to all four covered species.

In addition to BMPs, Alternative 3 would provide additional acres of CRP-like land, larger blocks of shrub-steppe habitat would be provided, and therefore agriculture activities would result in less take of covered species.

8. RANGE RESOURCES, HABITATS, AND OTHER WILDLIFE AND PLANT SPECIES

Effects Common to All Alternatives

Grazing will continue to some degree under all alternatives. Much of the grazing on private lands occurs on the shrub-steppe habitat that also supports shrub-steppe plants and other wildlife. The quality of shrub-steppe habitat over time will vary with climate, soil depth, and soil moisture. The presence of noxious weeds or unwanted vegetation can disrupt the function and value of shrub-steppe habitats and rangeland. Unwanted vegetation or noxious weeds often get established through soil disturbance activities. Mechanical or chemical control of weeds may provide both adverse and beneficial impacts to habitats and plant and animal species, and some level of weed control would occur under all alternatives.

Under all alternatives, BLM, WDFW, and TNC are likely to continue to manage their lands in Douglas County for good range conditions.

Forest activities are not covered under the MSGCP, therefore there should be no change to the existing forest condition between all alternatives. The bald eagle and Lewis' woodpecker may use large trees and snags, especially along the Columbia River. These habitats should not change and there should be no impact over existing conditions from either alternative.

The golden eagle, prairie falcon, and peregrine falcon nest on cliffs, and none of the alternatives are expected to change activities at or near cliffs. Therefore, there should be no impact to nesting habitats over existing conditions.

Cumulative effects from climate change will continue with all alternatives. Recent studies have looked at climate change and changes in biodiversity (Lawler and Mathias 2007) and potential changes in agriculture in eastern Washington (Littell et al. 2009). Lawler and Mathias' (2007) biodiversity study summarized models that predicted that the shrub-steppe is likely to undergo changes in the coming century. Changes may include increased extent of woodlands, increased fires, increased erosion, and resultant decreased wildlife habitats. Cheatgrass invasion may worsen with increased fires, out-competing native perennials, and further altering the fire regimes.

Cumulative effects from ongoing loss of orchards and increasing rural or urban development may result in loss of range habitats under all alternatives, especially along the Columbia River.

Effects from Alternative 1, No-Action Alternative

Range Resource, Vegetation/habitat, Uplands

Under Alternative 1, additional BMPs would not be implemented. Range conditions would not be expected to improve as much under Alternative 1, as they would under Alternatives 2 and 3. The level of use by livestock will not change under Alternative 1. Under Alternative 1, it is unlikely that the existing level of grazing use will change in the foreseeable future.

In some areas, over-grazing of portions of the rangelands would continue. Under these conditions, the growth requirements of forage plant species are not being met resulting in a shift in the dominance from perennial cool-season bunchgrasses to shrubs or other less palatable species. Over time, invasive weeds would likely displace native plants, changing plant and animal interactions and affecting ecosystem functions. Farmers interested in improving their range management would likely continue to get technical assistance from NRCS or others.

Shrub-steppe Special-status Species (Plants & Wildlife)

Alternative 1 would likely maintain the existing vegetation resource conditions. These conditions would continue to impact special-status plants and wildlife. The shrub-steppe plants, brewers sparrow, burrowing owl, grasshopper sparrow, Merriam's shrew, sage sparrow, sage thrasher, and the white-tailed jackrabbit, and other shrub-steppe and grassland species may have slightly less habitat over time, because under Alternative 1, no additional BMPs beyond voluntary efforts will be implemented to improve the quality and extent of native and existing vegetative habitat.

Effects Common to Alternatives 2 and 3

Range Resource, Vegetation/habitat, Uplands

Where landowners join on to the MSGCP, BMPs will be implemented to ensure good grazing practices and maintenance or improvement of rangelands. A major goal under both Alternative 2 and 3 would be the protection and improvement of shrub-steppe habitat and rangeland. Livestock use of forage and other associated impacts would be managed such that native and desirable plants maintain vigorous growth, produce seed at least every other year, and maintain their abundance and distribution within each pasture to sustain strong forage production and desired habitat features.

BMPs and rangeland management practices proposed for implementation under Alternatives 2 and 3 are all generally accepted practices for good land stewardship. In some cases, changes in management practices may require the removal of livestock from some pastures, or seasonal rest/rotation potentially reducing the areas available for grazing, and/or resulting in more productive grazing pastures. There will be positive benefits through range improvements with resultant enhancement of plant and wildlife habitats.

Good range management will allow improvements in vegetation succession and plant diversity, and it may slow the degradation of cryptogamic crust. The benefits occurring to rangeland health, biotic integrity, and plant-species diversity would increase over time with implementation of Alternatives 2 and 3, and would be greater than would be expected under Alternative 1.

Shrub-steppe Special-status Species (Plants & Wildlife)
Brewers sparrow, burrowing owl, grasshopper sparrow, Merriam's shrew, sage sparrow, sage thrasher, and the white-tailed jackrabbit, and other shrub-steppe and other grassland species populations should generally improve as native shrub-steppe habitat improves. The golden eagle, prairie falcon, and peregrine falcon may benefit indirectly through increased prey availability. BMPs will result in gradual improvement of shrub-steppe habitats on Permittees' land, although the degree of improvement will vary with the number of farmers that apply for and receive permits in the MSGCP. Farm Plans and GCP Site Plan BMPs under both Alternatives 2 and 3 would have a positive beneficial impact on improving range conditions, thereby decreasing impacts to native plant and wildlife species.

Effects from Alternative 2, Proposed MSGCP
Range Resource, Vegetation/habitat, Uplands
Implementation of Alternative 2 and resultant BMPs would increase range and shrub-steppe habitat quality over Alternative 1. CRP-like habitats would be maintained at similar levels to current conditions, those levels will be monitored, and if there are steps to either bring the acres back up above 10 percent within two years or the MSGCP will be revisited. A similar measure ensures that BLM, WDFW, and TNC lands in Douglas County will be maintained and monitored, and if they decrease by more than 10 percent the GCP will be revisited.

Shrub-steppe Special-status Species (Plants & Wildlife)
Because shrub-steppe habitat quality will be improved over time, plant and wildlife species of concern numbers are likely to be maintained or increase over levels in Alternative 1. The amount and degree of improvement will vary with how many landowners sign up for the MSGCP.

Effects from Alternative 3, Expanded MSGCP
Range Resource, Vegetation/habitat, Uplands
Alternative 3 would have the greatest direct positive impacts on vegetation and habitat because an additional 100,000 acres would be restored to CRP-like habitats. Most likely, this would be a conversion of dry croplands to early stage shrub-steppe which provides more favorable habitat to many covered species. Livestock use may decrease under Alternative 3 in order to develop a portion of the CRP-like lands.

Shrub-steppe Special-status Species (Plants & Wildlife)
Alternative 3 could lead to an increase of up to 100,000 acres of additional shrub-steppe or grassland habitat that is beneficial to many wildlife species. Due to this increase of CRP-like lands, native shrub-steppe wildlife would benefit most from this alternative over other alternatives. Because there will be more CRP-like lands, the positive benefits to habitat and plant and wildlife species populations are expected to be markedly greater than that of Alternative 2.

Table 16 compares range resources, uplands, and special-status species, and habitats by alternative.

Table 16. Comparison of Impacts to Range, Uplands, Plants and Other Wildlife by Alternative

Issues	Alternative 1 No-Action	Alternative 2- Proposed MSGCP	Alternative 3 Expanded MSGCP
Range resource, vegetation/habitat, uplands; Grazing levels; Acres conserved (CRP-like).	No additional BMPs to improve range management. Grazing will continue. CRP-like acres may decrease in future depending on status of Farm Bill and other programs.	Implement BMPs for good range Management. Grazing will continue, with BMPs applied. Includes measures to make up for CRP-like acres loss, or revisit MSGCP.	Implement BMPs for good range Management. Grazing will continue with BMPs applied, potentially less than Alt 1 or 2. Increase CRP-like acres by about 100,000 acres.
Shrub-steppe special-status species (plants & wildlife).	Less conservation.	More conservation.	Most conservation.
Loss or gain in plant and wildlife habitats.	Loss of habitat due to no commitment to maintain current or similar levels of CRP-like acres.	Increase habitat quality through conserved acres and BMPs and commitment to maintain CRP-like acres at levels similar to current conditions.	Increase habitat quality and quantity through conserved acres, BMPs, and large increase in CRP-like acres.

COMPARISON OF ALTERNATIVES

In Table 17, we briefly summarize and compare the alternatives and issues.

Table 17. Comparison of Impacts by Issue and Alternative

Resource	Issue Indicator	Alternative 1 No-Action	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
1. Aesthetics	Acres farmed versus naturally vegetated.	Current: ~368,000 acres farmed; ~ 599,000 acres natural appearance; could lose CRP/SAFE over time.	MSGCP Changed Circumstances ensures if lose 10% CRP then revisit MSGCP.	Increase natural-appearing land (CRP-like lands) by 100,000 acres.
2. Economics (Agricultural Production and Socioeconomics)	Change in acres in dryland production.	Likely similar to current conditions.	Likely to stay similar to current conditions; MSGCP changed circumstances ensures if lose 10% CRP and can't address in 2 years, then revisit MSGCP.	Decrease in dryland agriculture to allow increase in CRP or similar protected lands.
	Acres in irrigated production, including orchards	Irrigated non-orchard land likely to continue in similar conditions. Cumulative effects: Irrigated orchards may decrease in future as development continues in orchard land along Columbia River.	Will stay similar to No-Action alternative.	Will stay similar to No-Action alternative.

Resource	Issue Indicator	Alternative 1 No-Action	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
	Change in acres in rangeland use.	No predicted change.	Little or no change.	Possible decrease in grazing and rangeland use.
	Changes in farm income or levels of production.	Difficult to predict, though orchards may decrease over time due to development pressures.	Difficult to predict, though orchards may decrease over time due to development pressures.	Negative impact to farm income, unless good rental program developed for increased CRP-like acres. Orchards may decrease over time due to development pressures.
	Changes in benefits afforded by society.	No additional species conservation.	BMPs implemented to improve habitat, and CRP or similar lands maintained at near current levels.	BMPs implemented to improve habitat, and CRP or similar lands increased.
	Cumulative. Effects: urbanization, orchards.	Urbanization and hobby farms may increase in the County.	Same as Alternative 1.	Same as Alternative 1.
3. Cultural Resources	Consider cultural resources.	No Change; if Federal action, agency must consider.	If NRCS involvement, NRCS will address. Otherwise, follow appendix F in MSGCP.	Same as Alternative 2.

Resource	Issue Indicator	Alternative 1 No-Action	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
4. Earth Resources (Air Quality, Geology, Minerals and Soils)	Acres of soil disturbance & soil productivity	Similar to current conditions. Ongoing Farm Bill or voluntary soil conservation efforts will likely continue.	Similar to current, with commitment to maintain similar levels conservation-cover acres (CRP-like) in long-term; potentially more landowners implementing soil conservation.	Less soil disturbance due to increase in CRP-like acres; more soil conserved.
	Air quality: visibility, particulates, and local air quality.	Similar to current conditions.	Similar to current, with commitment to maintain conservation-cover acres (CRP-like) in long-term.	Less tillage, less dust, better air quality.
5. Fish and Aquatic Species	Listed salmonids and aquatic species of concern.	Ongoing activities will not change listed salmonid use, most sediment will settle out before entering the Columbia River.	Generally the same as No-Action Alternative; with potential slight improvement in water quality from implementing BMPs and maintaining CRP-like acres near current levels.	Generally the same as No-Action Alternative; with even more increase in water quality due to implementing BMPs and increasing CRP-like acres; less sediment input due to less tilled lands.
	Cumulative effects-orchards.	Orchards may decrease, urban may increase.	Same as Alternative 1.	Same as Alternative 1.

Resource	Issue Indicator	Alternative 1 No-Action	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
6. Water Resources (Wetlands, Riparian, Water quality)	Water quality.	Similar to current conditions.	BMPs improve water quality, decrease sediments. Commitment to maintain conservation-cover acres (CRP-like) near current levels in long-term.	Even more increase in water quality, decrease sediments due to less acres tilled.
	Changes in stream channel and dry drainage stability.	No change.	BMPs to maintain or improve riparian habitats.	BMPs to maintain or improve riparian habitat, plus more CRP-like lands for increased stream channel and drainage stability.
	Changes in accelerated erosion affecting sediment yield and turbidity.	Similar to current conditions.	BMPs may improve erosion, decrease sediments. Commitment to maintain conservation-cover (CRP-like) near current levels in long-term.	More CRP-like lands, more decrease in sediments.
	Wetland/ riparian habitats, animals and plants.	No change.	BMPs increase riparian and plant habitat quality.	BMPs increase riparian and plant habitat quality.
	Ute ladies' tresses.	No change	No change.	No change.

Resource	Issue Indicator	Alternative 1 No-Action	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
7. Covered Wildlife Species	Habitat quality trends and habitat fragmentation.	Similar to current conditions.	BMPs increase habitat quality. Commitment to maintain conservation-cover (CRP-like) near current levels in long-term.	Increase CRP-like habitats and BMPs; most improvement.
	Agriculture effects to covered species.	Maintain or increase agriculture effects.	Implement BMPs to decrease agriculture effects.	Implement BMPs and increase CRP-like acres to further decrease agriculture effects.
	Implement BMPs for species.	No additional BMPs for covered species.	Implement BMPs for covered species, resulting in species benefit.	Implement BMPs for covered species coupled with more habitat acres, more species benefits.
8. Range Resources, Habitats, other Wildlife and Plants	Range resource, vegetation/ habitat, uplands.	Similar to current.	BMPs increase range quality.	Same as Alternative 2, over more habitat acres.
	Grazing levels.	No change.	BMPs may change or modify grazing to improve habitats.	BMPs plus CRP-like acres may have greater change or decrease to grazing.
	Acres conserved (CRP-like).	Similar to current conditions.	Similar to current, with commitment to maintain conservation-cover acres near current levels in long-term.	Increase CRP-like acres.
	Shrub-steppe special-status species (plants and wildlife).	No change.	BMPs improve habitat quality.	BMPs and added acres improve habitat quality and quantity.

Resource	Issue Indicator	Alternative 1 No-Action	Alternative 2 Proposed MSGCP	Alternative 3 Expanded MSGCP
	Cumulative effects-climate change.	Decrease habitats over time, increase weeds and fire.	Same as Alternative 1.	Same as Alternative 1.

LITERATURE CITED

Aikens, C. M. 1993. Archaeology of Oregon. U.S. Department of the Interior, Bureau of Land Management, Portland, Oregon. 134 pp.

Altman, B., and A. Holmes. 2000. Conservation strategy for landbirds in the Columbia Plateau of eastern Oregon and Washington. Version 1. Prepared for Oregon-Washington Partners in Flight. The American Bird Conservancy and Point Reyes Bird Observatory. March 2000. 130p.

Aserrad, J.M. 2004. Merriam's Shrew (*Sorex merriami). In* J.M. Azerrad (editor). Management recommendations for Washington's priority species, Volume V: Mammals. 5 p. [available online]/ jtt[://wdfw.wa.gov/hab/phs/vol5/odvil.pdf

Baker, W. L. 2006. Fire and restoration of sagebrush ecosystems. Wildlife Society Bulletin 34(1):177–185.Becker, P. 2013. Columbia Basin pygmy rabbit recovery annual report. Washington Department of Fish and Wildlife. Ephrata, WA. 6 pp.

Beieler, V.E. 1981. Soil survey of Douglas County, Washington. United States Department of Agriculture, Soil Conservation Service in cooperation with Washington State University, Agricultural Research Center. 180 pp.

Bell, M.C. 1991. Fisheries handbook of engineering requirements and biological criteria. Fish Passage Development and Evaluation Program, U.S. Army Corps of Engineers, Portland, OR. 352 pp.

Berger, M.T., R. Whitney, and D. Antoine. 2004. Columbian sharp-tailed grouse management on the Colville Indian Reservation. *In*: Schroeder, M., M. Berger, and L. Robb (eds). Abstracts: 24th Annual Meeting of the Western agencies Sage and Sharp-tailed Grouse Technical Committee. 38 pp. (http://sagemap.wr.usgs.gov/Docs/2004_Western_Grouse_Workshop_Proceedings.pdf)

Betts, B. J. 1990. Geographic distribution and habitat preferences of Washington ground squirrels (*Spermophilus washingtoni*). Northwestern Naturalist 71:27-37

Betts, J.B. 1999. Current status of Washington ground squirrels in Oregon and Washington. Northwestern Naturalist. 80:35-38.

Billings, W. D. 1948. Preliminary notes on fire succession in the sagebrush zone of western Nevada. Bull. of the Ecol. Society of America. 29:30.

Camp, Pamela and John G. Gamon (Eds.). 2011. Field Guide to the Rare Plants of Washington. University of Washington Press, Seattle. 345 pp. + appendices. P. 342, Spiranthes Diluvialis Also available online at: http://www1.dnr.wa.gov/nhp/refdesk/fguide/htm/fgmain.htm

Campbell, Sarah K. 1985. Summary of results, Chief Joseph Dam cultural resources project, Washington. University. of Washington, Office of Public Archeology, Seattle, Washington. 628 pp.

Campbell, Sarah K. 1989. Post-Columbian culture history in the Northern Columbia Plateau: A.D. 1500-1900. Ph.D. Dissertation, Dept of Anthropology, Univ. of WA, Seattle.

Cassidy, K.M., M.R. Smith, C.E. Grue, K.M. Dvornich, J.E. Cassady, K.R. McAllister, and R.E. Johnson. 1997. Gap analysis of Washington State: An evaluation of the protection of biodiversity. Volume 5 of the final report for the Washington Gap Analysis Project. USGS Biological Resources Division/University of Washington, Seattle. 137 pp. + maps.

Cavender, T.M. 1978. Taxonomy and distribution of the bull trout, *Salvelinus confluentus* (Suckley) from the American northwest. California Fish and Game 3:139-174

Chalfant, S. A. 1974a. An ethnohistorical report on aboriginal land use and occupancy by the Spokane Indians. Pages 25-142 in: David A. Horr Ed. Interior Salish and Eastern WA Indians IV,. Garland Publishing, Inc., New York.

Chalfant, S. A. 1974b. Material relative to aboriginal land use and occupancy by the Wenatchi Salish of Central WA. Pages 25-142 in: David A. Horr Ed. Interior Salish and Eastern Washington Indians IV, Garland Publishing, Inc., New York.

Chalfoun, A.D., F. R. Thompson III, M. J. Ratnaswamy. 2002. Nest predators and fragmentation: a review and meta-analysis. Conservation Biology 16(2): 306–318.

Clarke, A. H. 1981. The freshwater molluscs of Canada. National Museum of Natural Science, Ottawa, Ontario. 446 pp.

Craig, D. and P. L. Williams. 1998. Willow flycatcher (Empidonax traillii). *In*: The riparian bird conservation plan: a strategy for reversing the decline of riparian-associated birds in California. California Partners in Flight. http://www.prbo.org/calpif/htmldocs/riparian_v-2.html

Crawford, R.C. 1999. Preliminary key to shrub-steppe plant associations in Washington State. Washington Natural Heritage Program, Washington State Department of Natural Resources, Olympia.

Crawford, R.C. 2003. Riparian vegetation classification of the Columbia Basin, Washington. Washington Natural Heritage Program Report 2003-03, Washington State Department of Natural Resources. Olympia, Washington. Published in coordination with Bureau of Land Management, Spokane District and The Nature Conservancy. March 2003. 118 pp. http://www1.dnr.wa.gov/nhp/refdesk/pubs/columbiarip.pdf

Daubenmire, R. 1968. Plant communities. Harper & Row, NY. 300 pp.

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, M. P. Nenneman, A. L. Zimmerman, and B. R. Euliss. 1998 (revised 2002). Effects of management practices on grassland birds: Loggerhead Shrike. Northern Prairie Wildlife Research Center, Jamestown, ND. 19 pages.

Dechant, J.A., M.L. Sondreal, D.H. Johnson, L.D. Igl, C.M. Goldade, M.P. Nenneman, and B.R. Euliss. 2002. Effects of management practices on grassland birds: grasshopper sparrow. Grasslands Ecosystem Initiative, Northern Prairie Research Center, USGS, Jamestown, North Dakota. February 1998; revised March 2002. 28p.

Dobler, F. C. 1994. Washington State shrub-steppe ecosystem studies with emphasis on the relationship between non-game birds and shrub and grass cover densities. Pages 149-161 *in*: S. B. Monsen and S. G. Kitchen (comps). Proceedings of a symposium on ecology and management of intermountain annual rangelands. 1992. Boise, ID. General Technical Report. INT-GTR 313.Intermountain Research Station, Forest Service, U.S. Dept of Agriculture, Ogden, Utah.

Dobler, F.C., J. Elby, C. Perry, S. Richardson, and M. Vander Haegen. 1996. Status of Washington's shrub-steppe ecosystem: extent, ownership, and wildlife/vegetation relationships. Research report. Washington Dept of Fish and Wildlife, Olympia. 39p.

Douglas County. 1995. Transportation and land service. Douglas County Comprehensive Plan. 115 pp.

Downs, J. n.d. Effects of fire on shrub-steppe habitats. Pacific Northwest Laboratories. http://nerp.pnnl.gov/projects_veg/fire.asp. Accessed 25 August 2013.

Foster Creek Conservation District. 2004. Watershed management plan Moses Coulee and Foster Creek Watershed WRIA 44 & 50. Foster Creek Conservation District, USDA, Waterville, Washington 76 p.

FCCD and US Fish and Wildlife Service. 2015. Douglas County multiple species general conservation Plan. 140 p. Plus appendices.

Frest, T.J., and E.J. Johannes. 1995. Interior Columbia Basin mollusk species of special concern. Final report: Interior Columbia Basin Ecosystem Management Project, Walla Walla, WA. Deixis Consultants, Seattle, WA. Contract #43-0E00-4-9112. 274 pp. plus appendices.

Gebauer, M. 2004. "Sage brush" brewer's sparrow, *Spizella breweri breweri*. *In:* Accounts and measures for managing identified wildlife – Accounts V. B.C. Min. Environ., Lands and Parks, Wildlife Br. and Resource Inventory Br., Victoria, B.C. 13 p. http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_sagebrushbrewerssparrow.pdf

Gramly, R. M. 1993. The Richey Clovis Cache: Earliest Americans along the Columbia River. Persimmon Press Monographs in Archaeology, Buffalo, New York. 70 pp.

Green, M.G., T. Swem, M. Morin, R. Mesta, M. Klee, K. Hollar, R. Hazlewood, P. Delphey, R. Currie, and M. Amaral. 2006. Monitoring results for breeding American Peregrine Falcon (*Falco peregrinus anatum*), 2003. U.S. Department of Interior, Fish and Wildlife Service, Biological Technical Publication FWS/BTP-R1005-2006, Washington DC. http://library.fws.gov/BTP/peregrine_breeding.pdf.

Hanes, R.C. 1995. Treaties, spirituality, and ecosystems. Social Assessment Report for the Interior Columbia Basin Ecosystem Management Project. 47 pp. + appendices.

Harder, D.A. 2005. Pangborn Memorial Airport improvements cultural resources survey. Plateau Investigations, Pullman, WA. 31 pp.

Hays, D.W., M.J. Tirhi, and D. W. Stinson. 1998. Washington State status report for the sage grouse. Washington Department of Fish and Wildlife, Olympia. 56p.

Hays, D.W., and F.C. Dobler. 1999. Prairie falcon, *Falco mexicanus*. Pages 10-1 through 10-5 *in:* Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management Recommendations for Washington's Priority Species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Hays, D.W., and R. Milner. 2004. Peregrine falcon (*Falco peregrinus*). Pages 11-1 through 11-4 *In:* Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management Recommendations for Washington's Priority Species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Hays, D., M. Livingston, C. Leingang, and M. A. Schroeder. 2004. Sage and sharp-tailed grouse in Washington: a conservation overview. *In*: Schroeder, M.A., Matt Berger, and Leslie Robb (eds). 2004. Abstracts: 24th Annual Meeting of the Western agencies Sage and Sharp-tailed Grouse Technical Committee. 38 pp. http://sagemap.wr.usgs.gov/Docs/2004_Western_Grouse_Workshop_Proceedings.pdf

Hayes, G.E. and J. B. Buchanan. 2002. Washington State status report for the peregrine falcon. Washington Department of Fish and Wildlife. Olympia. 77 pp. [Available Online]: http://wdfw.wa.gov/wlm/diversty/soc/status/peregrine/finalperegrine.pdf

Hemmer, L.G. 2004. Conservation reserve program: effects of capping enrollment, *in:* Schroeder, M.A., Matt Berger, and Leslie Robb (eds). 2004. Abstracts: 24th Annual Meeting of the Western agencies Sage and Sharp-tailed Grouse Technical Committee. 38 pp. http://sagemap.wr.usgs.gov/Docs/2004_Western_Grouse_Workshop_Proceedings.pdf

Herkert, J. R., et al. 2003. Effects of prairie fragmentation on the nest success of breeding birds in the midcontinental United States. Conservation Biology 17:587–594.

Isaacson, A. 1989. Water quality report for South Douglas Conservation District. Water Management of North Idaho, Inc. 45 pp.

Johnson, L. and Associates, Inc. 1974. Water pollution control and abatement plan: Water Resource Inventory Areas 44 and 50. Prepared for Douglas, Washington. June 1974. 176 pp.

Judd, S.W. 1901. The relation of sparrows to agriculture. U. S. Dept. Agric. Div. of Biol. Surv. Bull. 15. 98 pp.

KCM, Inc. 1995. Comprehensive flood hazard management plan, Draft Report. Douglas County Transportation and Land Services.

King, J. R. 1955. Notes on the life history of Traill's flycatcher (*Empidonax traillii*) in southeastern Washington. Auk 72:148-173

Knick, S.T. 1999. Requiem for a sagebrush ecosystem. Northwest Science. 73:47-51.

Knutson, K.L. and V. L. Neaf. 1997. Management recommendations for Washington's priority habitats: riparian. Washington Dept of Fish and Wildlife, Olympia. 181 pp.

Kochert, M.N., K. Steenhof, C. L. McIntyre, and E. H. Craig. 2002. Golden eagle (*Aquila chrysaetos*). *In:* A. Poole and F. Gill, (eds.). The birds of North America, No. 684 The Birds of North America, Inc., Philadelphia, PA. 44 pp. http://bna.birds.cornell.edu/BNA/account/Golden_Eagle/

Kunkel, K.E., L. E. Stevens, S.E. Stevens, L. Sun, E. Janssen, D. Wuebbles, K.T. Redmond, and J.G. Dobson, 2013. regional climate trends and scenarios for the U.S. national climate assessment. Part 6. Climate of the Northwest U.S., National Oceanic and Atmospheric Administration Technical Report NESDIS 142-6.

Lawler J.J. and M. Mathias. 2007. Climate change and the future of biodiversity in Washington. Report prepared for the Washington Biodiversity Council. College of Forest Resources, University of Washington. Seattle. 42 pp.

Lewis, J.C, M. Whalen, and E.A. Rodrick. 2002. Lewis' woodpecker, *Melanerpes lewis*. Pages 26-1 through 26-5 *in*: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, (eds.) 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Littell, J., M. McGuire Elsner, L. Whitely Binder, A. Snover, (Editors). 2009. The Washington climate change impacts assessment, evaluating Washington's future in a changing climate. February 2009. University of Washington, Seattle, Washington. 484 pp.

Mazzacano, C. 2009. Limpets: giant Columbia River limpet (*Fisherola nuttali*). Profile on Xerces society website. [Available Online]: www.xerces.org (accessed 12-16-09).

Marzluff, M.M., B.A. Kimsey, L. S. Schueck, M. E. McFadzen, M. S. Vekasy, and J. C. Bednarz. 1997. The influence of habitat, prey abundance, sex, and breeding success on the ranging behavior of prairie falcons. Condor 99:567-584.

McCall, T., and J. Musser. 2000. Golden eagle survey summary. Washington Department of Fish and Wildlife, Olympia, WA.

Mehringer, P.J., and F.F. Folt, Jr. 1990. Volcanic ash dating of the Clovis Cache at East Wenatchee, Washington. National Geographic Research 6(4):495-503.

Munson Engineers, Inc. 1989. East Foster Creek watershed hydrology and sedimentology study. Foster Creek Conservation District. 29 pp.

Musser, J., N. Hedges, and E. Ellis. 2002. Washington ground squirrel, pygmy rabbit, and sage grouse survey. Bureau of Land Management, unpublished report.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 2000. Biological opinion on Washington conservation reserve enhancement program. November 16, 2000. Consultation with Farm Service Agency, Washington, D.C. 111 pp.

Neitzel, D.A. and Frest, T.J. 1992. Survey of Columbia River Basin streams for Columbia pebblesnail *Fluminicola columbiana* and shortface lanx *Fisherola nuttalli*. Technical Report PNL-8229, Battelle Pacific Northwest Laboratory, Richland, WA. 83 pp.

Nordstrom, N. 2003. Burrowing owl, *Athene cunicularia.* Pages 23-1 to 23-6 *in*: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Pacific Groundwater Group. 2003. WRIA 44/40 final phase 2 basin assessment. Foster Creek Conservation District, Waterville, WA. 57 pp.

Pacific Groundwater Group. 2004. WRIA 44/40 Interim draft water quality assessment Jameson and Grimes Lakes. Foster Creek Conservation District, Waterville, Washington. 1 pp.

Paczek, S. 2004. Grasshopper sparrows. *In*: Accounts and measures for managing identified wildlife – Accounts V.2004. British Columbia Ministry of Environment, , Lands and Parks, Victoria, B.C. 11 p. http://www.env.gov.bc.ca/wld/frpa/iwms/documents/Birds/b_grasshoppersparrow.pdf

Paige, C. and S.A. Ritter. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Partners in Flight Western Working Group, Boise, ID. 47 pp.

Papendick, R.I, editor. 2004. Farming with the wind II. Wind erosion and air quality control on the Columbia Plateau and Columbia Basin. College of Agriculture, Human and Natural

Resources Sciences Special Report XB1042 by the Columbia Plateau PM_{10} Project. Washington State University, Pullman. 96 pp. Can be found at: http://pnw-winderosion.wsu.edu/publicationsFWWII.html

Pellant, M., P. Shaver, D. Pike and J. Herrick. 1999. Draft interpreting indicators of rangeland health. Bureau of Reclamation.

Quigley, T.M., and S.J. Arbelbide. 1997. An assessment of ecosystem components in the interior Columbia Basin and portions of the Klamath and Great Basins. 4 Volumes. Gen. Tech. Rep. PNW-GTR-405. Northwest Research Station, USDA Forest Service, Portland, OR. 2066 pp.

Paige, C., and S. A. Ritter. 1999. Birds in a sagebrush sea: managing sagebrush habitats for bird communities. Partners in Flight Western Working Group, Boise, ID.

R2 Resource Consultants, Inc. 2004. Fish snorkel surveys on priority streams in WRIA 44 & 50. Foster Creek Conservation District, Waterville, Washington. 1 pp.

Ray, V.F. 1932. The San Poil and Nespelem: Salishan people of Northeastern Washington. University of Washington Press. Vol. 5, Seattle, Washington. 237 pp.

Ray, V.F. 1939. Cultural relations in the plateau of Northwestern America. Publications of the Frederick Webb Hodge Anniversary Publication Fund, 3. Southwestern Museum, Los Angeles, California. 154 pp.

Ray, V.F. 1974. Ethnohistorical notes on the Columbia, Chelan, Entiat, and Wenatchee Tribes. Pages 20-23 *in*: David Agee Horr (ed.), American Indian ethnohistory: Indians of the Northwest. Garland Publishing Co., New York. 2454 pp.

Reiman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout *Salvelinus confluentus*. Gen. Tech. Rpt. INT-302, Inter. Mtn. Res. Sta., Forest Service, USDA Ogden, UT 38 pp.

Roberts, T.C. Jr. 1990. Cheatgrass: management implications in the 90's. p. 19-21. In: Proceedings-Symposium on Cheatgrass Invasion, Shrub Die-off, and Other Aspects of Shrub Biology and Management, Las Vegas, NV. USDA Forest Service General Technical Report. INT-276 Ogden, UT.

Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2011. The north american breeding bird survey, results and analysis 1966 - 2010. Version 12.07.2011 USGS Patuxent Wildlife Research Center, Laurel, MD. http://www.mbr-pwrc.usgs.gov/bbs/bbs2010.html . (Accessed July 17, 2012.)

Schalk, R.F. 1977. The structure of anadromous fish resource. Pages 207-249 *in*: R. R. Binford (editor). For theory building in archaeology. Academic Press, New York, NY. 419 pp.

Scharf, E. A. 2002. Long-term interactions of climate, vegetation, humans, and fire in Eastern Washington. Ph.D. Dissertation, University of Washington, Seattle. 382 pp.

Schroeder, M.A. and M. Tirhi. 2003. Sharp-tailed grouse, *Tympanuchus phasianellus*. Pages 16-1 to 16-10 *in*: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management Recommendations for Washington's Priority Species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Schroeder, M. A., and W. M. Vander Haegen. 2011. Response of greater sage-grouse to the conservation reserve program in Washington State. Pp. 517–529 in S. T. Knick and J. W. Connelly (editors). Greater sage-grouse: ecology and conservation of a landscape species and its habitats. Studies in Avian Biology (vol. 38), University of California Press, Berkeley, CA.

Sedgwick, J.A., 2000. Willow flycatcher (*Empidonax traillii*). *In* The birds of North America, No. 533 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Schroeder, M.A. 2000. Populations dynamics of greater and Gunnison sage-grouse: a review. Job Progress Report. Upland Bird Research. Washington Department of Fish and Wildlife.

Smith, J.P. 2004. Fall 2003 raptor migration studies at Chelan Ridge, Washington. HawkWatch International, Inc., Salt Lake City, Utah. 33 p.

Smith, M.R., P.W. Mattocks, Jr., and K. M. Cassidy. 1997. Breeding birds of Washington State. Volume 4 in Washington State gap analysis - Final Report (K. M. Cassidy, C. E. Grue, M. R. Smith, and K. M Dvornich, eds.). Seattle Audubon Society Publications in Zoology No. 1, Seattle. 538 pp.

Stinson, D.W., and M.A. Schroeder. 2012. Washington State recovery plan for the columbian sharp-tailed grouse. Washington Department of Fish and Wildlife, Olympia, WA. 159.

Stinson, D.W., D.W. Hays, and M.A. Schroeder. 2004. Washington State recovery plan for the greater sage-grouse. Washington Department of Fish and Wildlife, Olympia, Washington. 109 pp.

Stöckle, C.O., R.L. Nelson, S. Higgins, J. Brunner, G. Grove, R. Boydston, M. Whiting, and C. Kruger. 2009. Assessment of climate change impact on eastern Washington agriculture, Chapter 5 *in:* Littell, J., M. McGuire Elsner, L. Whitely Binder, A. Snover, Amy Snover, (Editors). 2009. The Washington Climate Change Impacts Assessment, Evaluating Washington's Future in a Changing Climate. February 2009.

Thompson, J.E. and J.Q. Ressler. 1988. Foster Creek Watershed, Douglas County, Washington: Report of investigations into problems of soil erosion, water quality, and wildlife habitat improvement. Resource Planning Center, Central Washington University, Ellensburg, Wshington. 60 pp.

U.S. Census Bureau. 2008. Population estimates. Table 1: Annual Estimates of the Resident Population for Counties of Washington: April 1, 2000 to July 1, 2008 (CO-EST2008-01-53) Source: Population Division, U.S. Census Bureau. Release Date: March 19, 2009 http://www.census.gov/popest/estimates.php

U.S. Department of Agriculture. 2009. 2007 Census of Agriculture. http://www.agcensus.usda.gov/Publications/2007/Full_Report/Volume_1,_Chapter_2_US_State_Level/st99_2_001_ Accessed November 8, 2013.

U.S. Department of Agriculture, Forest Service. 2009. Species fact sheet: Ashy pebblesnail. Forest Service Region 6. [Available Online] www.fs.fed.us/sfpnw/issssp/documents/planning-docs/sfs-ig-fuscus-2009-02.doc

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). 2006. Published soil surveys of Washington. http://soils.usda.gov/survey/printed_surveys/state.asp?state=Washington&abbr=WA

U.S. Department of Commerce. 2012a. http://quickfacts.census.gov/qfd/states/53/53017.html. Accessed 6 November 2013. Douglas County Data.

U.S. Department of Commerce. 2012b. http://quickfacts.census.gov/qfd/states/53/5320155.html. Accessed 6 November. East Wenatchee Data.

U.S. Environmental Protection Agency (EPA). 2009. National recommended water quality criteria**.** EPA, Washington D.C. http://www.epa.gov/ost/criteria/wqctable

U.S. Fish and Wildlife Service (USFWS). 2002. Chapter 22 Upper Columbia recovery unit, Washington. *In*: Bull trout draft recovery plan for the Columbia Basin, Klamath River Basin and St. Mary-Belly River district population segments. Portland, Oregon. 113 pp.

USFWS. 2007. Final general conservation plan policy. Memo from Director, October 5, 2007. 6 p.

USFWS. 2008a. Birds of conservation concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. http://library.fws.gov/bird_publications/bcc2008.pdf. (Accessed July 17, 2012.)

USFWS. 2008b. Species assessment and listing priority assignment form, *Spermophilus washingtoni*, Washington ground squirrel. March 27, 2008.

U.S. Fish and Wildlife Service. 2012. Recovery plan for the Columbia Basin distinct population segment of the pygmy rabbit (*Brachylagus idahoensis*). U.S. Fish and Wildlife Service, Portland, OR. 110pp.

USFWS. 2012. U.S. Fish and Wildlife Service species assessment and listing priority assignment form. *Urocitellus washingtoni*. Washington Ground Squirrel. April 18, 2012. 25 pages.

U.S. Department of Interior, Fish and Wildlife Service. 2013b. Greater sage grouse *(Centrocercus urophasianus phaios)* Conservation Objectives: Final Report. U.S. Fish and Wildlife Service, Denver, CO. 92 pp.

U.S. Geological Survey (USGS). 1974. The channeled scablands of eastern Washington- the geologic story of the Spokane flood. U.S. Government Printing Office, Washington, D.C. 23 pp.

USGS. 1992. Water quality, sediment and tissue analysis of sample data collected in 1992 from USGS Station No. 12463500 Douglas Creek, Palisades, Washington, USGS Water Quality Database.

USGS. 1993. Water quality, sediment and tissue analysis of sample data collected in 1993 from USGS Station No. 12463500 Douglas Creek, Palisades, WA, USGS Water Quality Database.

USGS. 2013. Summary of science, activities, programs, and policies that influence the rangewide conservation of greater sage-grouse *(Centrocercus urophasianus)*. Open-File Report 2013-1098. 154 pp.

Upper Columbia Salmon Recovery Board. 2007. Upper Columbia spring Chinook salmon and steelhead recovery plan. 307p. + appendices.

Vander Haegen, M. 2003a. Loggerhead shrike, *Lanius ludovicianus.* Pages 30-1 to 30-5 *in*: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Vander Haegen, M. 2003b. Sage sparrow, *Ampispiza belli.* Pages 32-1 to 32-4 *in*: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Vander Haegen, M. 2003c. Sage thrasher, *Oreoscoptes montanus*. Pages 33-1 to 33-3 *in*: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Vander Haegen, W. M. 2007. Fragmentation by agriculture influences reproductive success of birds in a shrubsteppe landscape. Ecological Applications 17(3): 934–947.

Vander Haegen, W. M., F. C. Dobler, and D. J. Pierce. 2000. Shrubsteppe bird response to habitat and landscape variables in eastern Washington, USA. Conservation Biology 14:1145-1160.

Vander Haegen, W.M., S.M. McCorquodale, C.R. Peterson, G.A. Green, and E. Yensen. 2001. Wildlife of eastside shrubland and grassland habitats. Pages 292-316. *in*. D. H. Johnson and T. A. O'Neil, (directors). Wildlife-habitat relationships in Oregon and Washington. Oregon State University Press, Corvallis. 736 pp.

Vander Haegen, W. M., M. A. Schroeder, and R. M. DeGraaf. 2002. Predation on real and artificial nests in shrubsteppe landscapes fragmented by agriculture. Condor 104:496–506.Vickery, P.D. 1996. Grasshopper sparrow (*Ammodramus savannarum*). *In* The birds of North America, No. 239 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Walcheck, K.C. 1970. Nesting bird ecology of four plant communities in the Missouri river breaks, Montana. Wilson Bulletin 82:370-382.

Wambolt, C.L., K.S. Walhof, M.R. Frisina. 2001. Recovery of big sagebrush communities after burning in southwestern Montana. J. Environmental Mange. 61:243-252

Washington State Department of Ecology. 1973. Lakes of Washington, Volume II Eastern Washington. Water Supply Bulletin No. 14. 650 pp.

_____. 1997. Review of the Washington State visibility protection State implementation plan – Final Plan. Air Quality Program. Pub. No. 97-206. 39 pp.

Washington Department of Fish and Wildlife (WDFW). 1995. Washington State recovery plan for the pygmy rabbit. Wildlife Management Program, WA Dept Fish and Wildlife, Olympia. 73 pp.

_____ 2004. Living with wildlife in Washington. http://wdfw.wa.gov/wlm/living/coyotes.htm

_____. 2005. Washington's comprehensive wildlife conservation strategy. Final draft. Submitted September 19, 2005. 780 pp.

Washington Department of Fish and Wildlife. 2012. Threatened and endangered wildlife in Washington: 2011 Annual report. Endangered species Section. Wildlife Program. Washington Department of Fish and Wildlife, Olympia, WA.

Washington State Department of Natural Resources (WDNR). 1998. Our changing nature, natural resource trends in Washington State**.** 75pp.

Watson, J.W., and E.A. Rodrick. 2001. Bald eagle, *Haliaetus leucocephalus*. Pages 8-1 to 8-17 *in*: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management

recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Watson, J., and M. Whalen. 2003. Golden eagle, *Aquila Chrysaetos* IN: Larsen, E. M., J. M. Azerrad, and N. Nordstrom, eds. 2004. Management recommendations for Washington's priority species, Volume IV: Birds. Washington Department of Fish and Wildlife, Olympia. 268pp.

Yensen, E. and P.W. Sherman. 2003. Ground-dwelling squirrels of the Pacific Northwest. Boise, ID. April. 28 pp. + maps. As reference in USFWS 2012b.

PERSONAL COMMUNICATIONS

Bareither, Mark, USDA Natural Resources Conservation Service. 2001. Personal Communication with Britt Dudek, FCCD.

Benson, E. Natural Resource Conservation Service. 2000. Personal Communication with Brit Dudek, FCCD.

Dudek, Britt. Foster Creek Conservation District, 2008. Personal Communication with Michelle Eames regarding estimated expenses.

Ellis, Erik. Bureau of Land Management, wildlife biologist,. May 4, 2007. Bald eagle winter roost. Telephone conversation with Michelle Eames.

McCracken, Tim. U.S. Fish and Wildlife Service, Central Washington Field Office, Fish and Wildlife Biologist. June 23, 2009. Personal Communication with Michelle Eames. Forwarded E-mail with Ute Ladies' tresses locations.

Ruud, Michelle. 2013. U.S. Department of Agriculture, Farm Service Agency, Waterville, Washington. June 5, 2013. Personal Communication with Bob Tuck as referenced in MSGCP.

Schroeder, M. Washington Department of Fish and Wildlife. 2003. Personal communication with L. Robb as referenced in MSGCP.

Schroeder, M.A., Washington Department of Fish and Wildlife. 2005. Habitat Suitability Indexes for Selected Species of Douglas County, Washington. Unpublished. Project file, Foster Creek Conservation District, Waterville, WA.

GLOSSARY

Adaptive Management. A type of natural resource management in which decisions are made as part of an on-going process. Adaptive management involves testing, monitoring, evaluation, and incorporating new knowledge into management approaches based on scientific findings and the needs of society. Results are used to modify management policy.

Affected Environment. The natural, physical, and human-related environment that is sensitive to changes due to proposed actions.

Air-Quality Standards. Refers to standards for various classes of land as designated by the Clean Air Act, P.L. 88-206, Jan 1978.

Airshed. A geographical area that, because of topography, meteorology, and climate, shares the same air.

Alternative. One of several policies, plans, or projects proposed for decision-making.

Anadromous Fish. Fish that are born and reared in freshwater, move to the ocean to grow and mature, and then return to freshwater to reproduce. Salmon and steelhead are examples.

Archaeological. Refers to material remains, usually from the past, which when scientifically analyzed are used to describe and explain former ways of life.

Best Management Practice (BMP)- - Practices determined by the resource professional to be the most effective and practical means of preventing or reducing impacts of land management practices on natural resource values such as water quality. A general term for many kinds of conservation measures, including Conservation Practices, land-use measures, and species-specific measures.

Biodiversity or Biological Diversity. The relative distribution and abundance of different plant and animal communities and species within an area. The variety of life and its processes.

Candidate Species. Under the ESA regulations, "...those species for which the Service [USFWS] has on file sufficient information on biological vulnerability and threat(s) to support proposals to the list them as endangered or threatened species.

Changed Circumstances - Changes in circumstances affecting a covered species or the geographic area covered by the MSGCP that can reasonably be anticipated by the parties to the MSGCP and that can reasonably be planned for in the MSGCP (e.g. the listing of a new species, or a fire or other natural catastrophic event in areas prone to such eventChanged circumstances are not Unforeseen Circumstances.

Class I (air quality) Areas. Special areas (i.e., national parks and certain wilderness areas) protected for their air-quality-related values.

Connectivity. A measure of the extent to which conditions between essential or critical habitat areas provide habitat for breeding, feeding, dispersal, and movement of covered species.

Covered Activities. Certain activities carried out by Permittee on covered lands that may result in incidental take of covered species.

Covered Species. The species that have been adequately addressed in an HCP (or the MSGCP) and are included on an ITP. Covered species are also subject to the assurances of the "No Surprises" policy.

Council on Environmental Quality. An advisory council to the President of the United States established by the National Environmental Policy Act of 1969. It reviews Federal programs for their effect on the environment, conducts environmental studies, and advises the President on environmental matters.

Critical Habitat. Specific geographic areas designated by the National Marine Fisheries Service or the Fish and Wildlife Service that are essential for the conservation of a threatened or endangered species and which may require special management considerations.

Cultural Resources. The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) having scientific, prehistoric or social values.

Cumulative Impact or Effect. Under NEPA regulations, the incremental environmental impact or effect of the action together with impacts of past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Under ESA section 7 regulations, the effects of future state or private activities not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation

De-list. To remove from the Federal list of endangered and threatened species because such species no longer meets any of the five listing factors provided under section 4(a)(1) of the ESA and under which the species was originally listed (i.e., because the species has become extinct or is recovered).

Ecosystem. The complete biotic and abiotic system formed by the interaction of a group of organisms and the environment.

Ecosystem Health (rangeland health). A condition where the parts and functions of an ecosystem are sustained over time and where the system capacity for self-repair is maintained, such that goals for use, values, and services of the ecosystem are met.

Effect or Impact. Under NEPA regulations, a direct result of an action that occurs at the same time and place; or an indirect result of an action which occurs later in time or in a different place and is reasonably foreseeable; or the cumulative results from the incremental impact of the action

when added to other past, present and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions. Under ESA section 7 regulations, "effects of the action" means "the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline."

Endangered Species. Any species defined through the Endangered Species Act of 1973 as amended, as being in danger of extinction throughout all or a significant portion of its range and published in the Federal Register.

Endangered Species Act of 1973, as amended. 16 U.S.C. 1531-1544; Federal legislation that provides a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, and provides a program for the conservation of such endangered and threatened species.

Environmental Assessment (EA). A concise public document prepared in compliance with NEPA, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an Environmental Impact Statement or Finding of No Significant Impact

Environmental impact statement (EIS). A detailed written statement required by section 102(2) (C) of NEPA disclosing, among other things, an analyses of environmental impacts of a proposed action and alternative considered, adverse effects of the project that cannot be avoided, alternative courses of action, short-term uses of the environment versus the maintenance and enhancement of long-term productivity, and any irreversible and irretrievable commitment of resources

Erosion. Detachment or movement of soil or rock fragments by water, wind, ice, or gravity. Accelerated erosion is more rapid than normal, natural, or geologic erosion, primarily resulting from the activities of people, animals, or natural catastrophes. Accelerated erosion can be caused by management activities that (1) alter the natural erosion resisting forces (root strength, inter-particle binding), (2) alter the flow of ground or surface waters, or (3) change the natural slope locations of soil or rock materials.

Farm Plan – A generic term that typically refers to a Natural Resource Conservation Service "Conservation Plan" and can be based on the NRCS Resource Management System (RMS) planning process. The Farm Plan will include CPs for a site specific area. A GCP Site Plan includes additional BMPs (land-use measures, and species-specific measures described in Appendix E of MSGCP). The Farm Plan and GCP Site Plan together result in a site-specific plan for land leased or owned by an Applicant/Permittee that is developed consistent with expectations of the MSGCP.

Forage. All browse and non-woody plant that are available to the livestock or game animals and used for grazing or harvested for feeding.

Forb. Any herb other than grass.

Fragmentation. Breaking up of contiguous areas into progressively smaller patches of increasing degree of isolation. The opposite of connectivity defined above.

General Conservation Plan - A General Conservation Plan (GCP) is a type of programmatic HCP under which multiple Section 10 permits can be issued (USFWS 2007).

GCP Site Plan –A GCP Site Plan includes additional BMPs (land-use measures, and species-specific measures described in Appendix E of MSGCP). The Farm Plan and GCP Site Plan together result in a site-specific plan for land leased or owned by an Applicant/Permittee that is developed consistent with expectations of the MSGCP.

Habitat. The location where a particular taxon of plant or animal lives and its surroundings, both living and non-living; the term includes the presence of a group of particular environmental conditions surrounding an organism including air, water, soil, mineral elements, moisture, temperature, and topography.

Habitat Conservation Area (HCAs) - Multiple-use-areas or wildlife-emphasis-areas owned and/or managed by Federal agencies (mostly BLM), WDFW, and TNC in Douglas County.

Habitat Conservation Plan. Under section 10(a)(1)(B) of the ESA, a planning document that is a mandatory component of an incidental take permit application, also known as a Conservation Plan or HCP.

Habitat Suitability Index. A model used to analyze the effects of an action including estimates of changes to a species' habitat quality and quantity based on hypotheses of species-habitat relationships**.** The models for the covered species were developed based on Fish and Wildlife Service HSI models that are typically used for evaluating impacts on fish and wildlife habitat resulting from water or land use changes. The models and resultant maps for the MSGCP provide a broad view of habitat throughout the county, estimate improved habitat trends, and were originally developed for a larger list of covered species. After the MSGCP is approved and implementation commences, current satellite imagery will be utilized to create new HSI maps specifically for the four species covered by the current Plan.

Harm. Defined in regulations implementing the ESA promulgated by the Department of the Interior as an act "which actually kills or injures" listed wildlife; harm may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering."

Harass. Defined in regulations implementing the ESA promulgated by the Department of the Interior as: "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering.

Incidental Take. Take of any federally listed wildlife species that is incidental to, but not the purpose of, otherwise lawful activities (see definition for "take") [ESA section 10(a)(1)(B)].

Incidental Take Permit (ITP). A permit that exempts a permittee from the take prohibition of section 9 of the ESA, issued by the USFWS or NMFS pursuant to section 10(a)(l)(B) of the ESA.

Indirect Effects. Secondary effects which occur in locations other than the initial action or significantly later in time.

Intermittent Stream. Any nonpermanent flowing drainage feature having a definable channel and evidence of scour or deposition. This includes what are sometimes referred to as ephemeral streams if they meet these two criteria.

Issue. A point, matter, or question of public discussion or interest, to be addressed or resolved through the planning process.

Lek. A gathering area for displaying and mating used during the spring by sharp-tailed grouse or sage-grouse and often referred to as a dancing ground.

Listed Species. Species, including subspecies and distinct vertebrate populations, of fish, wildlife, or plants listed as either endangered or threatened under the ESA.

Mitigation. To moderate, reduce or alleviate the impacts of a proposed activity, including: a) avoiding the impact by not taking a certain action or parts of an action; b) minimizing impacts by limiting the degree or magnitude of the action; c) rectifying the impact by repairing, rehabilitating or restoring the affected environment; d) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; e) compensating for the impact by replacing or providing substitute resources or environments

Monitoring. The process of collecting information to evaluate if objectives and anticipated or assumed results of a management plan are being realized or if implementation is proceeding as planned.

Multiple Species General Conservation Plan (MSGCP) – A programmatic habitat conservation plan prepared by Foster Creek Conservation District and the U.S. Fish and Wildlife Service for certain agriculture activities in Douglas County, Washington.

National Ambient Air-Quality Standards (NAAQS). Standards designed to protect public health and welfare, allowing an adequate margin of safety. For particulate matter less than ten microns in size (PM10), 50 micrograms per cubic meter annual average and 150 micrograms per cubic meter, 24-hour average; not to be exceeded more than once per year.

National Environmental Policy Act (NEPA). Federal legislation establishing national policy that environmental impacts will be evaluated as an integral part of any major Federal action. Requires the preparation of an EIS for all major Federal actions significantly affecting the quality of the human environment

No-Action Alternative. The No-Action Alternative is required by regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The No-Action Alternative provides a baseline for estimating the effects of other alternatives. When a proposed activity is being evaluated, the No-Action Alternative discusses conditions under which current management direction would continue unchanged.

No Surprises. Assurances provided by the Fish and Wildlife Service through the section 10(a)(1)(B) process to non-Federal landowners. Essentially, private landowners are assured that if "unforeseen circumstances" arise, the Services will not require the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed to in the HCP without the consent of the Permittee.

Noxious Weeds. Rapidly spreading plants that can cause a variety of major ecological or economic impacts to both agriculture and wildlands.

Perennial Streams. Streams that flow continuously throughout the year.

Permittee. Private agriculture landowner or lessee, who has received an incidental take permit pursuant to the MSGCP.

Person. An individual, corporation, partnership, trust association, or any other private entity; or any officer, employee, agent, department or instrumentality of the Federal government, of any State, municipality, or political subdivision of a State, or of any foreign government; any State, municipality, or political subdivision of a State; or any other entity subject to the jurisdiction of the United States" [Section 3(12) of the ESA].

Prescribed Fire. A preplanned wildland fire burning under specified conditions to accomplish specific planned objectives. It could result from either a planned or unplanned ignition.

Proposed Action. Under NEPA regulations, a plan that has a goal which contains sufficient details about the intended actions to be taken or that will result, to allow alternatives to be developed and its environmental impacts to be analyzed (40 CFR 1508.23).

Proposed Species. A species for which a proposed rule to add the species to the Federal list of threatened and endangered species has been published in the Federal Register.

Range Condition. The degree of similarity of the existing plant community's species composition to the species composition of the plant association identified for that rangeland. If at least 50 percent of the species composition, for a plant community, is made up of species found in the plant association determined for that site, the site would be rated as being in <u>good</u> condition. For a <u>fair</u> condition rating the community must have at least 25 percent of species present in the plant association. <u>Poor</u> rated rangeland will have less than 25 percent of species present in the plant association.

Raptors. Predatory birds, such as falcons, hawks, eagles, or owls.

Riparian Areas/Habitats. Areas of land that are directly affected by water usually having visible vegetation or physical characteristics reflecting the influence of water. Streamsides, lake edges, or marshes are typical riparian areas.

Scoping. The NEPA procedure by which a Federal agency determines the range of issues and extent of analysis necessary for a proposed action. This includes but is not limited to: the range of actions, alternatives, and impacts to be addressed; the identification of significant issues related to a proposed action; and establishing the depth of environmental analysis, data, and task assignments needed.

Section 7. The section of the ESA which describes the responsibilities of Federal agencies in conserving threatened and endangered species. Section 7(a) (1) requires all Federal agencies "in consultation with and with the assistance of the Secretary [to] utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species and threatened species." Section 7(a)(2) requires Federal agencies to "ensure that any action authorized, funded, or carried out by such agency...is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of..." designated critical habitat.

Section 9. The section of the ESA dealing with prohibited acts, including the "take" of any listed species without specific authorization of the Fish and Wildlife Service or the National Marine Fisheries Service for species under the jurisdiction of each agency.

Section 10. The section of the ESA dealing with exceptions to the prohibitions of section 9 of the ESA. Section 10(a)(1)(a) is the section of the ESA that allows for permits for the taking of threatened or endangered species for scientific purposes or for purposes of enhancement of propagation or survival. Section 10(a) (1) (b) allows for permits for incidental taking of threatened or endangered species from an otherwise lawful activity.

Sediment. Any material carried in suspension by water, which would ultimately settle to the bottom. Sediment has two main sources: from the water channel itself and from disturbed upland sites.

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect any listed or unlisted covered species. See Harm and Harass.

Threatened Species. Any species of plant or animal which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range, and which has been designated in the Federal Register as such. In addition, some states have declared certain species in their jurisdiction as threatened or endangered.

Water Quality. The chemical, physical and biological characteristics of water.

Watershed. An entire area that contributes water to a drainage system or stream.

AGENCIES AND ORGANIZATIONS TO WHOM THIS DOCUMENT HAS BEEN SENT

A news release providing notice of the draft MSGCP and draft EA was shared with multiple entities, including Congressional representatives, Senators, County Commissioners, tribal representatives, many State and Federal Agencies, and media outlets.

During the public comment period for the draft Multiple-Species General Conservation Plan and the draft Environmental Assessment, between November 14, 2014, and January 13, 2015, the Fish and Wildlife Service (Service) posted a News Bulletin on the Washington Fish and Wildlife Office website (http://www.fws.gov/wafwo). The draft MSGCP and the draft EA were also available on the website.

On November 14, 2014, the Service also sent a "dear interested party letter" to 499 individuals on a mailing list we received from the Foster Creek Conservation District. Approximately sixteen of those were returned to sender.

During the comment period, hard copies of the draft documents were available at the Foster Creek Conservation District Office in Waterville, Washington, and in the Services' Eastern Washington Field Office in Spokane, Washington.

During the comment period, several electronic and hard-copies of the draft EA and draft MSGCP were distributed directly to individuals who requested them.

APPENDIX A – SOME COMMON AND SCIENTIFIC PLANT NAMES IN DOUGLAS COUNTY

Common plants, shrubs, and trees found in Douglas County.

Common Name	Genus and Species
ballhead waterleaf	*Hydrophyllum capitatum*
big sage	*Artemisia tridentata*
big sagebrush	*Artemisia tridentata*
bitterbrush	*Purshia tridentata*
bittercherry	*Prunus emarginata*
black cottonwood	*Populus trichocarpa*
black hawthorn	*Crataegus douglasii*
black locust	*Robinia pseudoacacia*
bluebunch wheatgrass	*Pseudoroegneria spicata*
bluebunch wheatgrass	*Agropyron spicatum*
cattail	*Typha latifolia*
cheatgrass	*Bromus tectorum*
chokecherry	*Prunus virginiana*
cow-parsnip	*Heracleum lanatum*
crimson columbine (western columbine)	*Aquilegia formosa*
Cusick's bluegrass	*Poa cusickii*
daisies	*Eriognum spp.*
Dalmatian toadflax	*Linaria dalmatica*
diffuse knapweed	*Centaurea diffusa*
Douglas-fir	*Pseudosuga menziesii*
goldenweed	*Happalopappus stenophyllus*
greasewood	*Sarcobatus sp.*
hackberry	*Celtis reticulata*
hawthorn	*Crataegus douglasii*
hedgehog cactus	*Pediocactus simpsonii var. robustior*
Idaho fescue	*Festuca idahoensis*
Indian wheat	*Plantago patagonica*
mock orange	*Philadelpus lewisii*
mustards	*Family: Brassicaceae*
needle grass	*Stipa spp.*
phlox	*Phlox hoodii*
plains prickly pear cactus	*Draba verna*
ponderosa pine	*Pinus ponderosa*
quaking aspen	*Populus tremuloides*

Common Name	Genus and Species
rabbitbrush (rubber rabbitbrush)	*Chrysothamnus nauseosus*
Red-osier dogwood	*Cornus stolonifera*
reed canarygrass	*Phalaris arundinacea*
rock Penstemon	*Penstemon gairneri*
Russian knapweed	*Centaurea repens*
Russian olive	*Elaeagnus angustifolia*
sagebrush stickseed	*Hackelia hispida var. disjuncta*
Sandberg bluegrass	*Poa secunda*
serviceberry	*Amelanchier alnifolia*
sheep springs monkey flower	*Mimulus guttatus*
six-weeks fescue	*Vulpia octofiora*
small bluebells	*Mertensia longiflora*
small fescue	*Vulpia microstachys*
snowberry	*Symphoricarpus albus*
spiny hopsage	*Grayia spinosa or Atriplex spinosa*
spring Whitlow grass	*Draba verna*
stiff sage	*Artemisia rigida*
stinging nettle	*Urtica dioicia*
thick-leaved thelypody	*Thelypodium lacinatum*
Thompson's paintbrush	*Castilleja thompsonii*
threadleaf sedge	*Carex filifolia*
three-tip sage	*Artemisia tripartita*
thyme buckwheat	*Eriognum thymoides*
water birch	*Betula occidentalis*
wax current	*Ribes cereum*
western groundsel	*Senecio integerrimus*
Whitlow Grass	*Draba verna*
willow	*Salix spp.*
wood's rose	*Rosa woodsii*
yellowbells	*Fritillaria pudica*