PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR IMPLEMENTATION OF THE CONSERVATION RESERVE ENHANCEMENT PROGRAM AGREEMENT FOR OREGON

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U.S. Department of Agriculture
Farm Service Agency

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EXECUTIVE SUMMARY

This programmatic environmental assessment (PEA) identifies the possible environmental consequences resulting from the proposed implementation of the Conservation Reserve Enhancement Program (CREP) agreement for the State of Oregon. The PEA process is designed to inform decision makers and the public about the potential environmental effects of the proposed action and to ensure public involvement in the process. The process will help decision makers take into account all environmental factors when making decisions related to the proposed action outlined in the CREP agreement.

This PEA has been prepared by the United States Department of Agriculture (USDA) Farm Service Agency (FSA) in accordance with the requirements of the *National Environmental Policy Act* (NEPA) (42 *United States Code* 55 parts 4321 et seq., 2000), the Council on Environmental Quality (CEQ) implementing regulations (40 *Code of Federal Regulations* [CFR] 30 parts 1500 et seq., 2004), and *Environmental Quality and Related Environmental Concern—Compliance with the National Environmental Policy Act* (7 CFR 7 parts 799 et seq., 2004).

PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed action is to implement Oregon's CREP agreement. Under this agreement, 100,000 acres of eligible agricultural land would be removed from production and enhanced by approved conservation practices (CPs) to establish and maintain improved water quality and long-term, high-quality fish and wildlife habitat. CPs proposed in the CREP agreement include the planting of grass filter strips, the establishment of riparian and wildlife buffers, and wetland restoration and enhancement.

The Oregon CREP agreement is needed to meet the following CREP goals:

- Restore 100 percent of the area enrolled for the riparian buffer CP to a properly functioning condition in terms of distribution and growth of woody plant species
- Reduce sediment and nutrient pollution from agricultural lands adjacent to riparian buffers by more than 50 percent
- Establish adequate vegetation on enrolled riparian areas to stabilize 90 percent of stream banks under normal (non-flood) water conditions
- Reduce the rate of stream water heating to ambient levels by planting adequate vegetation on all riparian buffer lands
- Provide a contributing mechanism for farmers and ranchers to voluntarily meet the water quality requirements established under Federal law and under Oregon's agricultural water quality laws
- Provide adequate riparian buffers on 2,000 stream miles to permit natural restoration of stream hydraulic and geomorphic characteristics that meet the habitat requirements of salmon and trout
- Attain annual enrollment goals for specified geographic regions in Oregon until the 100,000-acre cap is fulfilled.

PROPOSED ACTION AND THE NO ACTION ALTERNATIVE

This PEA documents the analysis of the proposed action and the no action alternative. Under the no action alternative, no lands would be enrolled in CREP. The proposed action would seek to enroll up to 100,000 eligible acres along streams inhabited by fish species listed as threatened or endangered under the *Endangered Species Act*, streams where agricultural water quality management plans have been developed, and streams on reservations or tribal trust lands. In addition, the proposed action would seek to restore up to 5,000 eligible acres of wetlands on cropland and marginal pastureland that are either hydrologically connected to these streams or located in coastal estuaries. A minimum of 1,250 acres of the 5,000 acres of wetlands would be wetlands located in coastal estuaries.

The proposed action would provide participants with annual rental payments and maintenance payments for the 10–15 year contracts. Three types of one-time incentive payments are also available under the proposed CREP agreement. Depending upon the specific CP, producers may be eligible to receive: (1) a signing incentive payment of $10 per acre for each acre enrolled for each full year of the contract; (2) a practice incentive payment equal to 40 percent of the total eligible cost of the installation of the CP; and (3) a cumulative impact incentive payment, based on enrollment of at least 50 percent of a streambank within a 5-mile stream segment in the CREP agreement, equal to four times the applicable base rental rate for each acre enrolled. For wetland restoration, a one-time incentive payment of 25 percent of the cost of hydrology restoration would be provided.

An additional incentive program called the Tualatin Watershed Option is available under the proposed action. This program, sponsored by Clean Water Services, increases the benefits and assistance available to producers within specific portions of the Tualatin River Watershed. The use of a riparian buffer is the only authorized CP for this option; however, other CPs would still be applicable under the proposed CREP within the Tualatin River Watershed.

SUMMARY OF ENVIRONMENTAL CONSEQUENCES

It is expected that there would be both positive and temporary minor negative impacts associated with implementation of the proposed action. A summary of the potential impacts is given in Table ES-1.

Table ES-1. Summary of potential impacts from implementation of the proposed action and the no action alternative.

Resource	Proposed Action	No Action
Biological Resources	Enhancement or addition of native vegetation would result in a positive impact on vegetation resources Woody vegetation would provide food, cover, nesting areas, and travel corridors for resident wildlife Enhancement of aquatic species habitat, as well as improve overall water quality and temperature Positive effect on threatened and endangered fish species and habitat Temporary negative impacts due to human disturbance	Eligible land would remain in agricultural production Potential long-term negative effects to terrestrial and aquatic wildlife and their habitat Continued polluting of water sources is likely to persist in limiting aquatic threatened and endangered species

Table ES-1. (continued).

Resource	Proposed Action	No Action
Cultural Resources	High potential for encountering recorded and unidentified archaeological sites Actions to be reviewed with the Oregon State Historic Preservation Office and tribal representatives, followed by archival and field investigations as warranted Class I literature search to be conducted once sites are determined	Continuation of farming not expected to impact resource Change in farming practices that would disturb previously undisturbed areas may result in impacts to known or unknown archaeological, architectural, or traditional cultural resources
Water Resources	Reduced sediment loading Increased rates of aquifer recharge Reduced agricultural runoff, pollutant loading, and nutrient leaching Restoration of hydrology and plant communities associated with existing or degraded wetlands	Water resources are likely to continue to be subject to impairments such as low dissolved oxygen content, the presence of fecal coliform, high sediment levels, and fluctuating water temperatures
Earth Resources	Stabilization of soils and topography as a result of decreased erosion and runoff Reduced sedimentation in riparian areas Temporary increase in erosion during implementation	Current rates of erosion and changes in topography due to erosion would be expected to continue
Air Quality	Potential long-term positive impacts to air quality Temporary, negligible, negative impacts to air quality during implementation	No significant change to existing air quality conditions
Recreation Resources	Increased availability of wildlife game species Improved water quality and abundance of fish species Increased wildlife viewing opportunities Temporary displacement of wildlife may occur during implementation	Current recreational activities would continue CPs would not be used to improve lands and waters used by the public for hunting, fishing, wildlife viewing, hiking, boating, swimming, and other water-related activities
Socio-economics and Environmental Justice	Estimated loss of 719 farm worker positions Implementation would create total net present value of approximately $9 million over the contract period Increased recreation opportunities would generate economic activity No impacts to environmental justice	Socioeconomic conditions would continue to follow current trends Minimal number of farmlands placed in conservation easements would not contribute significantly to slowing farmland conversion No impacts to environmental justice

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ACRONYMS AND ABBREVIATIONS

AQI	Air Quality Index
BA	biological assessment
BEA	Bureau of Economic Analysis
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BP	before present
CCC	Commodity Credit Corporation
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CP	conservation practice
CREP	Conservation Reserve Enhancement Program
CRITFC	Columbia River Inter-Tribal Fish Commission
CRP	Conservation Reserve Program
CWS	Clean Water Services
DDT	dichloro-diphenyl-trichloroethane
EO	Executive Order
EPA	Environmental Protection Agency
EQIP	Environmental Quality Incentives Program
ERS	Economic Research Service
ESA	*Endangered Species Act*
ESU	evolutionary significant unit
FEMA	Federal Emergency Management Agency
FSA	Farm Service Agency
FR	*Federal Register*
FWS	Fish and Wildlife Service

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GORP	Great Outdoor Recreation Pages
GRP	Grassland Reserve Program
GWMA	groundwater management area
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NSFHWAR	National Survey of Fishing, Hunting and Wildlife Associated Recreation
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OHJV	Oregon Habitat Joint Venture
ONHIC	Oregon Natural Heritage Information Center
OPRD	Oregon Parks and Recreation Department
ORS	*Oregon Revised Statutes*
ORSHPO	Oregon State Historic Preservation Office
OWEB	Oregon Watershed Enhancement Board
PCB	polychlorinated biphenyl
PEA	programmatic environmental assessment
PFMC	Pacific Fisheries Management Council
PM_{10}	particulate matter less than 10 microns in diameter
PSMFC	Pacific States Marine Fisheries Commission
ROI	region of influence

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TCP	traditional cultural property
TWO	Tualatin Watershed Option
UFSG	unhealthy for sensitive groups
USACE	U.S. Army Corps of Engineers
USC	*United States Code*
USCB	U.S. Census Bureau
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
WHIP	Wildlife Habitat Incentives Program
WRP	Wetlands Reserve Program

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1.0 PURPOSE OF AND NEED FOR ACTION

1.1 INTRODUCTION

The United States Department of Agriculture (USDA) Farm Service Agency (FSA) proposes to implement the Conservation Reserve Enhancement Program (CREP) agreement for the State of Oregon. This programmatic environmental assessment (PEA) has been prepared to analyze the potential environmental consequences associated with the proposed action and the no action alternative in accordance with the *National Environmental Policy Act* (NEPA) (42 *United States Code* [USC] 55 parts 4321 et seq., 2000), the Council on Environmental Quality (CEQ) implementing regulations (40 *Code of Federal Regulations* [CFR] 30 parts 1500 et seq., 2004), and *Environmental Quality and Related Environmental Concerns—Compliance with the National Environmental Policy Act* (7 CFR 7 parts 799 et seq., 2005). This analysis is programmatic in nature and does not address individual site-specific impacts, which will be evaluated for individual CREP contracts prior to approval.

1.2 BACKGROUND

FSA was established during the reorganization of USDA in 1994. The mission of FSA is to:

> "…ensure the well-being of American agriculture and the American public through efficient and equitable administration of agricultural commodity, farm loan, conservation, environmental, emergency assistance, and domestic and international food assistance programs." (FSA 1997)

The Conservation Reserve Program (CRP) was established under Title XII of the *Food Security Act of 1985* (16 USC 58 part 3831, 1996). The purpose of CRP is to cost-effectively assist owners and operators in conserving and improving soil, water, and wildlife resources on their farms and ranches. Highly erodible and other environmentally sensitive acreage, normally devoted to the production of agricultural commodities, is converted to a long-term resource conservation cover. CRP participants enter into contracts for periods of 10–15 years in exchange for annual rental payments and cost-share assistance for installing certain conservation practices (CPs).

The initial goal of CRP was to reduce soil erosion on highly erodible cropland. Subsequent amendments to CRP regulations have made certain cropland and pastureland eligible for CRP based on benefits to water quality and wildlife habitat. The *Farm Security and Rural Investment Act of 2002*, commonly known as the 2002 Farm Bill, authorizes CRP through 2007 and raises the overall enrollment cap to 39.2 million acres (16 USC 58 part 3831, 1996). The *Conservation Reserve Program Final Programmatic Environmental Impact Statement* contains a detailed analysis of the impacts of implementing the CRP nationwide, including the CREP component (FSA 2003a).

The Secretary of Agriculture initiated CREP in 1997. CREP is authorized pursuant to the *Federal Agriculture Improvement and Reform Act of 1996* and is a subset of CRP (7 USC 100 parts 7201 et seq., 1998). This program is based on the continuous CRP model but differs in four important ways (FSA 2004a):

- CREP is targeted to specific geographic areas and is designed to focus CPs on addressing specific environmental concerns.

- CREP is a partnership between USDA, State and/or tribal governments, other Federal and State agencies, environmental groups, wildlife groups, and other stakeholders who have an interest in addressing particular environmental issues.

- CREP is results-oriented, and requires States to establish measurable objectives and conduct annual monitoring to measure progress toward implementation of those objectives.

- CREP is flexible, within existing legal constraints, and may be adapted to meet local conditions on the ground.

This voluntary program uses financial incentives to encourage farmers and ranchers to enroll in contracts of 10–15 years in duration to remove lands from agricultural production. The two primary objectives of CREP are the following:

- Coordinate Federal and non-Federal resources to address specific conservation objectives of a State and the nation in a cost-effective manner

- Improve water quality, erosion control, and wildlife habitat related to agricultural use in specific geographic areas.

CRP and CREP are administered by FSA in cooperation with the Natural Resource Conservation Service (NRCS), the Cooperative State Research and Education Extension Service, State forestry agencies, and local soil and water conservation districts. FSA is the lead agency in the development of this PEA.

1.2.1 Oregon Goals

CREP agreements are designed to meet specific regional conservation goals and objectives related to agriculture. The proposed agreement with Oregon is focused on assisting in the recovery of fish species that have been listed as threatened or endangered under the *Endangered Species Act* (ESA) and improving water quality.

A number of fish species native to Oregon have been either listed or proposed for listing as threatened or endangered species under the ESA. Agricultural activities in riparian corridors, along with agriculture-related impacts to water quality, have contributed to habitat loss for these fish species in Oregon. The CREP agreement seeks to help alleviate some of these problems. Under the proposed CREP agreement, farmers and ranchers who voluntarily participate will enter into contracts with the Federal government for 10–15 years, agreeing to remove portions of their land from agricultural production and plant them to grass, shrubs, and trees.

The Oregon CREP agreement would intend on enrolling up to 100,000 acres located along any of the following (USDA 2004a):

- Streams inhabited by fish listed under Federal law as threatened or endangered species

- Streams where agricultural water quality management plans have been developed pursuant to *Oregon Revised Statutes* (ORS) 568.930 to 568.933 (2003)

- Streams on reservations or tribal trust lands.

The Oregon CREP would seek to restore up to 5,000 acres of wetlands on cropland and marginal pastureland that are either hydrologically connected to these streams or located in coastal estuaries. A minimum of 1,250 acres of the 5,000 acres of wetlands would be wetlands located in coastal estuaries.

The specific goals and objectives for the Oregon CREP agreement include the following:

- Restore 100 percent of the area enrolled for the riparian buffer CP to a properly functioning condition in terms of distribution and growth of woody plant species

- Reduce sediment and nutrient pollution from agricultural lands adjacent to riparian buffers by more than 50 percent

- Establish adequate vegetation on enrolled riparian areas to stabilize 90 percent of stream banks under normal (non-flood) water conditions

- Reduce the rate of stream water heating to ambient levels by planting adequate vegetation on all riparian buffer lands

- Provide a contributing mechanism for farmers and ranchers to voluntarily meet the water quality requirements established under Federal law and under Oregon's agricultural water quality laws

- Provide adequate riparian buffers on 2,000 stream miles to permit natural restoration of stream hydraulic and geomorphic characteristics which meet the habitat requirements of salmon and trout.

In addition, the annual enrollment goal for each of the following geographic regions in Oregon would be attained until the 100,000-acre cap is fulfilled (Figure 1):

<u>Coastal Basin</u>
1,250 acres of riparian forest buffer
1,000 acres of restored wetland
2,250 total acres (180 stream miles) of riparian buffer

<u>Columbia Basin</u>
8,000 acres of riparian forest buffer and filter strips
1,000 acres of restored wetland
9,000 total acres (700 stream miles) of riparian buffer

<u>Interior Drainages Basin</u>
3,500 acres of riparian forest buffer and filter strips
1,000 acres of restored wetland
4,500 total acres (375 stream miles) of riparian buffer

The intended outcome of the Oregon CREP agreement is to enhance the ability of producers to enroll certain acreage under CRP where deemed desirable by the USDA and the Commodity Credit Corporation (CCC). CCC is a Federal entity within USDA that was created to stabilize, support, and protect agricultural income and prices.

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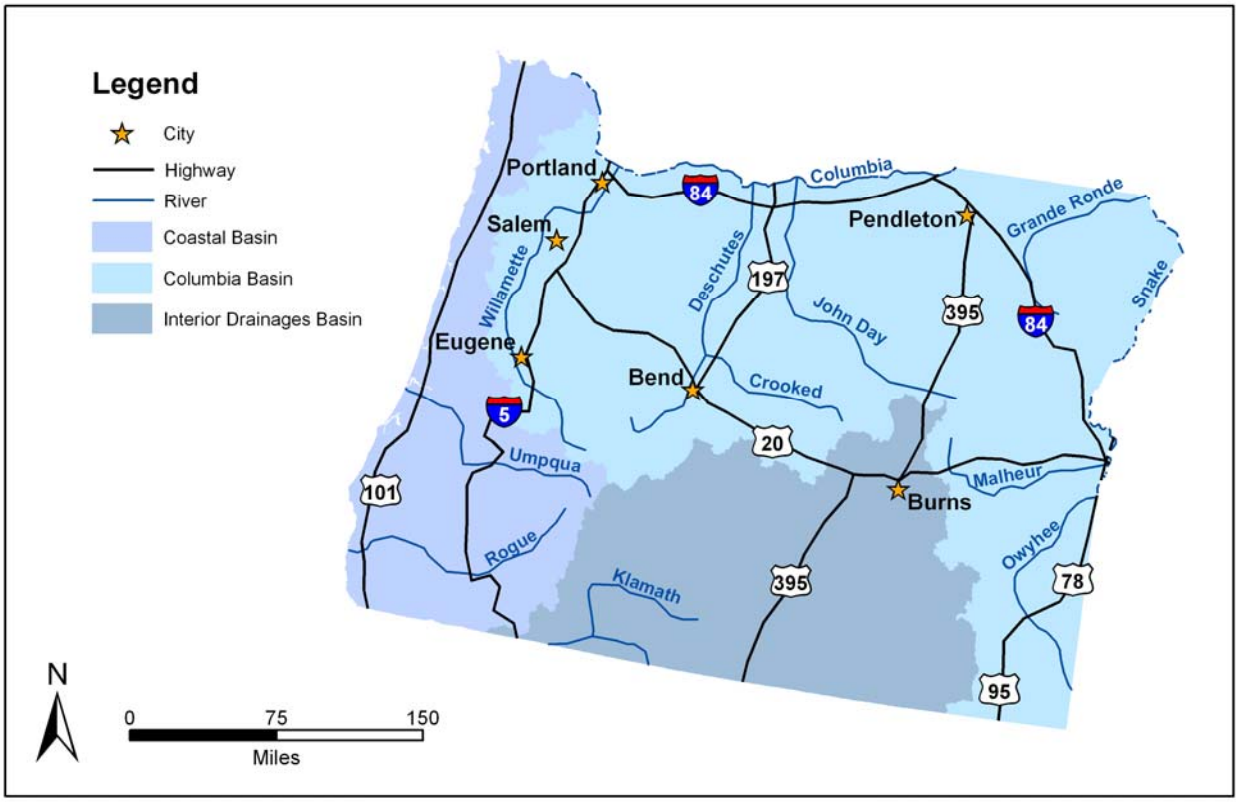

Figure 1. The Coastal Basin, Columbia Basin, and Interior Drainages Basin of Oregon.

1.3 PURPOSE AND NEED FOR ACTION

The purpose of this action is to implement Oregon's CREP agreement to reduce and mitigate agriculture-related impacts to streams throughout Oregon that provide current or historical habitat for fish species listed as threatened or endangered under the ESA. Under this agreement, eligible farm and ranch land would be planted in grasses, shrubs, and/or trees.

The Oregon CREP agreement is needed to:

- Restore native riparian vegetation and wetlands removed or eliminated by historical farming and ranching activities to reduce rates of sedimentation and moderate water temperatures
- Provide a contributing mechanism for farmers and ranchers to voluntarily meet the water quality requirements established under Federal law and under Oregon's agricultural water quality laws
- Enhance the ability of producers to enroll certain acreage under CRP
- Provide for partnerships between Federal, State, and local governments and with private conservation organizations to create mutually beneficial conservation management practices for agriculture and Oregon's threatened and endangered species
- Fairly compensate producers for their contribution to sustaining wildlife resources on private lands.

1.4 REGULATORY COMPLIANCE

This PEA has been completed as part of the NEPA process and is in compliance with its implementing regulations (40 CFR 30 parts 1500 et seq., 2004) and the FSA implementing regulation *Environmental Quality and Related Environmental Concerns—Compliance with the National Environmental Policy Act* (7 CFR 7 parts 799 et seq., 2005). The intent of NEPA is to protect, restore, and enhance the human environment through well-informed Federal decisions. The following non-exclusive list of higher-tier executive orders (EOs), acts, and relevant decision and guidance documents apply to actions undertaken by Federal agencies and form the basis of the analysis presented in this PEA:

- *Clean Air Act* (42 USC 85 parts 7401 et seq., 1999)
- *Clean Water Act* (33 USC 26 parts 1251 et seq., 2000)
- *Endangered Species Act of 1973* (16 USC 35 parts 1531 et seq., 1988)
- EO 11514, Protection and Enhancement of Environmental Quality (35 *Federal Register* [FR] 4247, 1977)
- EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 32, 1995)
- *National Historic Preservation Act* (16 USC 1A part 470, 2000).

1.5 ORGANIZATION OF THE PEA

This PEA discloses the potential impacts of the proposed action and the no action alternative on affected environmental and economic resources. Chapter 1.0 provides background information relevant to the proposed action and discusses the purpose and need for the proposed action. Chapter 2.0 describes the proposed action and the no action alternative. Chapter 3.0 describes the baseline conditions (i.e., the conditions against which potential impacts of the proposed action and alternative are measured) for each of the resource areas. Chapter 4.0 explains the potential environmental impacts to these resources. Chapter 5.0 provides an analysis of cumulative impacts and irreversible and irretrievable resource commitments. Chapter 6.0 describes mitigations to reduce potential impacts of the proposed action. Chapter 7.0 is a list of the preparers of this document, Chapter 8.0 presents a list of those persons and agencies contacted during the preparation of this document, and Chapter 9.0 contains references used in the PEA.

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2.0 DESCRIPTION OF THE ALTERNATIVES

This chapter describes the alternatives, which include the proposed action and the no action alternative. These two alternatives are compared in terms of their environmental impacts and ability to achieve the objectives listed in Section 1.2.

2.1 ALTERNATIVE 1—NO ACTION

Alternative 1, the no action alternative, would involve not implementing the Oregon CREP agreement. No land would be enrolled in CREP, and the goals for the Oregon CREP would not be met. This alternative would result in a continuation of the current agricultural practices that have lead to the decline in fish species listed as threatened or endangered under the ESA and a continued decrease in water quality.

2.2 ALTERNATIVE 2—PROPOSED ACTION

Alternative 2, the proposed action, would implement the Oregon CREP agreement. This alternative would enroll up to 100,000 acres along streams inhabited by fish species listed as threatened or endangered under the ESA, streams where agricultural water quality management plans have been developed pursuant to ORS 568.930 to 568.933 (2003), and streams on reservations or tribal trust lands. Specific CPs would be installed on eligible land and according to rules in *Agricultural Resource Conservation Program for State and County Offices* (*Handbook 2–CRP*) (FSA 2003b).

This alternative would seek to restore up to 5,000 acres of wetlands on cropland and marginal pastureland which are either hydrologically connected to these streams or located in coastal estuaries. A minimum of 1,250 acres of the 5,000 acres of wetlands would be wetlands located in coastal estuaries.

2.2.1 Eligible Land

The proposed Oregon CREP agreement would enroll 100,000 acres in CRP. Once the CREP agreement is approved, landowners would enroll eligible lands in the program on a voluntary basis. As such, the exact location of parcels that might be enrolled is not known.

To be eligible, land would be required to be adjacent to a stream segment that is either: (1) determined to support any of the fish species listed in Section 3.1.3.4 of this PEA and the *Addendum to the Oregon CREP Agreement* (USDA 2000), (2) within an area where an agricultural water quality management area plan has been developed and approved pursuant to ORS 568.930 to 568.933 (2003), or (3) on reservations or tribal trust lands.

Under this alternative, land within these areas would have to be either cropland that was planted or considered planted to a crop in 2 of the last 5 years, or marginal pasture land. If the land is currently enrolled in CRP, that contract must expire before being eligible for CREP.

2.2.2 Established Conservation Practices

The CPs proposed for implementation under the Oregon CREP agreement for Alternative 2 include the following:

- CP21, Filter Strips

- CP22, Riparian Buffer
- CP23, Wetland Restoration
- CP29, Marginal Pastureland Wildlife Habitat Buffer
- CP30, Marginal Pastureland Wetland Buffer.

These CPs, which require a contract period of between 10 and 15 years, would be installed according to *Handbook 2–CRP* rules unless otherwise specified in Oregon's CREP agreement (USDA 2004a). For lands to be devoted to CP22, CP29, and CP30, the maximum average width may exceed 180 feet provided that the minimum design specification needed for water quality purposes would be met as detailed in *Handbook 2–CRP*. A description of each CP is provided in Appendix A.

Preparation of lands for installation of CPs may include removal of existing vegetation or rocks through the use of tilling, burning, or approved agricultural chemicals. Temporary covers may be installed. Earth moving equipment may be used to construct surface dikes, dams, levies, and subsurface piping and structures to regulate water flow. Fire breaks, fencing, and roads may also be installed.

2.2.3 Financial Support to Land Owners

The proposed action would provide participants with annual rental payments for each acre enrolled. The rental rate for non-irrigated land would be determined as calculated in *Handbook 2–CRP*. Rental rates for irrigated land would be established by the Deputy Administrator for Farm Programs on a watershed basis using existing data. If the producer agrees to enter into an agreement with the State and it is acceptable to CCC, then CCC would pay the irrigated rental rate to lease surface water allocated to those lands to the State for instream flow purposes. Otherwise, non-irrigated rental rates would apply.

Under Alternative 2, CCC would cost share with producers for 50 percent of the eligible reimbursable costs of all approved CPs. The State of Oregon would provide an additional 25 percent. For Wetland Restoration (CP23), CCC would pay an incentive payment equal to 25 percent of the cost of hydrology restoration in accordance with specifications in *Handbook 2–CRP*.

CCC would provide an annual incentive payment as a percentage of the base CRP contract annual rental rate otherwise applicable to the land that would be enrolled in CREP in the following amounts:

- Fifty percent for land enrolled either as CP22, CP29, or CP30 (Riparian Buffer, Marginal Pastureland Wildlife Habitat Buffer, or Marginal Pastureland Wetland Buffer, respectively)
- Twenty-five percent for land enrolled as CP21 (Filter Strips)
- Fifty percent for land enrolled as CP23 (Wetland Restoration).

Alternative 2 would provide producers with a cumulative impact incentive payment based on enrollment along a particular stream segment in any case where a total of at least 50 percent of the streambank within a 5-mile stream segment is enrolled in CRP under this CREP agreement. Individuals eligible for this payment would participate in CREP along that stream segment. The payment would be a one-time incentive payment and would equal four times the applicable base rental rate for each acre enrolled. In addition, an annual maintenance incentive payment for each enrolled acre would be provided in the same manner as other CRP contracts. A one-time CRP signing incentive payment and practice incentive payment would be provided for enrollment in CP21, CP22, CP29, and CP30 (Filter Strips, Riparian

Buffer, Marginal Pastureland Wildlife Habitat Buffer, and Marginal Pastureland Wetland Buffer) as outlined in *Handbook 2–CRP*. A one-time incentive payment equal to 25 percent of the cost of hydrology restoration as specified by FSA would be paid for CP23 (Wetland Restoration).

This alternative would provide for direct cost-share payments from the State of Oregon for 75 percent of the costs of certain water developments, watering facilities, pipelines, and livestock crossings. To be eligible for this cost share, these practices must be specified in the conservation plan for the subject land enrolled in CREP, specified in the State cost-share contract, and not eligible for cost share by FSA.

In the case where the producer agrees to lease surface water, the State of Oregon would pay the application fees for lands enrolled in CREP at the irrigated rental rate. For permanent instream water right transfers, the State would pay transaction costs, including any certified water rights examiner fees, public notice fees, application fees, and other costs as determined on an individual basis.

The State of Oregon would purchase permanent instream water right transfers for lands enrolled in CREP at the irrigated rental rate. Purchases would be made on a per-acre basis and purchase price would be no more than the net present value of the irrigated rental rate for the subject acreage for a period of 10–15 years following the signing of the CREP contract, assuming a 6 percent discount rate.

2.2.4 Tualatin Watershed Option

An additional incentive program called the Tualatin Watershed Option (TWO) is available under Alternative 2. TWO is sponsored by Clean Water Services (CWS), an Oregon county service district and political subdivision of State government organized under ORS Chapter 451 (ORS 451 parts 010 et seq., 2003) with headquarters in Hillsboro, Oregon. Under the Oregon CREP, TWO increases the benefits and assistance available to producers within specific portions of the Tualatin River Watershed. This includes perennial streams identified on U.S. Geological Survey (USGS) quadrangle maps and upstream from the Durham wastewater treatment facility. The only eligible CP for this option would be CP22 (Riparian Buffer); however, other CPs would still be applicable under the proposed CREP within the Tualatin River Watershed.

TWO would provide funds to cover the implementation and maintenance of CPs that exceed amounts reimbursed by CCC and the State of Oregon, provided that producers have elected to have CWS or its contractor assume responsibility for the implementation and maintenance of CPs.

Incentive payments would be provided to producers in the amount of $127.50 per acre per year for irrigated cropland, and between $52.25 and $131 per acre per year for non-irrigated cropland, depending on soil type. For irrigated marginal pastureland, incentive payments would be $127.50 per acre per year. Incentive payments for non-irrigated marginal pastureland would be $66 per acre per year. These payments would be in addition to the soil rental payments made by CCC under CREP.

Direct cumulative impact incentive payments would be provided to producers in any case where a total of at least 50 percent of the stream bank within a stream segment that is at least 2 miles long but less than 5 miles long is enrolled in TWO. Payment would be equal to the cumulative impact incentive payment that would be paid under CREP (if the requirements for payment under that program were met).

A lump sum bonus payment would be provided when water rights leased to the State of Oregon for instream use under TWO have a priority date preceding the priority dates of water rights that are usually suspended each summer. The bonus payment would be $20 per acre per year of enrollment, and would increase by a factor of 1.5 when the land enrolled in TWO and to which the water rights are appurtenant

exceeds 5 acres. Priority dates that qualify for payment would vary by stream and would be established by CWS.

A lump sum bonus payment would also be provided to producers when water rights that would otherwise be leased to the State of Oregon are transferred permanently to the State for instream use. The bonus payment would equal the amount that would be paid for a 15-year lease, including the 5-acre bonus if applicable, multiplied by a factor of 1.5. The bonus payment would be in addition to any payments to producers made by the State for permanent transfers. CWS would pay all transaction costs for water-right leases and permanent transfers not paid by the State.

TWO would provide for the purchase of permanent, 30-year, or 20-year conservation easements on enrolled land. The amount paid for permanent conservation easements would be 30 percent of the net present value of the total TWO annual program payments, provided the land is enrolled in TWO for 15 years. Annual program payments would consist of the sum of the annual soil rental, practice incentive, and maintenance payments. The discount rate used to calculate net present value would be 4 percent. Easement purchases would be made on a lump sum basis, and payment for easements would be in addition to all other TWO payments, including annual payments. The amount paid for 30-year easements would be 75 percent of the amount paid for permanent easements, and the amount paid for 20-year easements would be 50 percent of the amount paid for permanent easements.

DRAFT

3.0 AFFECTED ENVIRONMENT

This chapter describes relevant existing conditions for the resources potentially affected by the proposed action. In compliance with guidelines contained in NEPA and CEQ regulations, the description of the affected environment focuses on those aspects potentially subject to impacts.

3.1 BIOLOGICAL RESOURCES

3.1.1 Definition of Resource

Biological resources are plant and animal species and the habitats in which they occur. This analysis divides these resources into vegetation; terrestrial wildlife; aquatic wildlife; and threatened, endangered, and sensitive species and their defined critical habitat.

3.1.2 Region of Influence

The region of influence (ROI) for biological resources includes land within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin proposed for enrollment in CREP and listed in Section 1.2.1.

3.1.3 Affected Environment

3.1.3.1 Vegetation

Ecoregions, by definition, are areas of relatively uniform ecological systems that have similar vegetation, climate, and geology. Oregon is divided into nine Level III Ecoregions (Figure 2) (Thorson et al. 2003). From west to east, there are the Coast Range, the Willamette Valley, the Klamath Mountains, the Cascades, and the Eastern Cascades Slopes and Foothills. Along the eastern border from north to south, there are the Columbia Plateau, the Blue Mountains, the Snake River Plain, and the Northern Basin and Range. These Level III Ecoregions are further subdivided into 65 Level IV Ecoregions or, for the purpose of discussion in this analysis, *subregions* (Table 1) (Bryce et al. 2003, McGrath et al. 2002, Pater et al. 1998). The predominant subregions and potential natural vegetation of the Level III Ecoregions within the ROI are described in the following subsections.

Coast Range

The Coast Range Ecoregion is located within the North Coast, South Coast, Willamette, Umpqua, and Rogue river basins (i.e., subdivisions of basins) (Figure 2) (Oregon Watershed Enhancement Board [OWEB] 2002). All of these river basins lie within the Coastal Basin except the Willamette, which lies in the Columbia Basin (Figure 3). Although the Coast Range is divided into seven subregions, it is dominated by the Mid-Coastal Sedimentary subregion, which covers approximately 3,739 square miles. This subregion is composed of predominantly Douglas fir plantations with hemlock mixed throughout (Thorson et al. 2003). Understory vegetation consists of salal, sword fern, vine maple, Oregon grape, and rhododendron (Thorson et al. 2003). Bigleaf maple, grand fir, western red cedar, and red alder dominate the canopy in riparian areas and on wet slopes, with salmonberry and oxalis in the understory (Thorson et al. 2003).

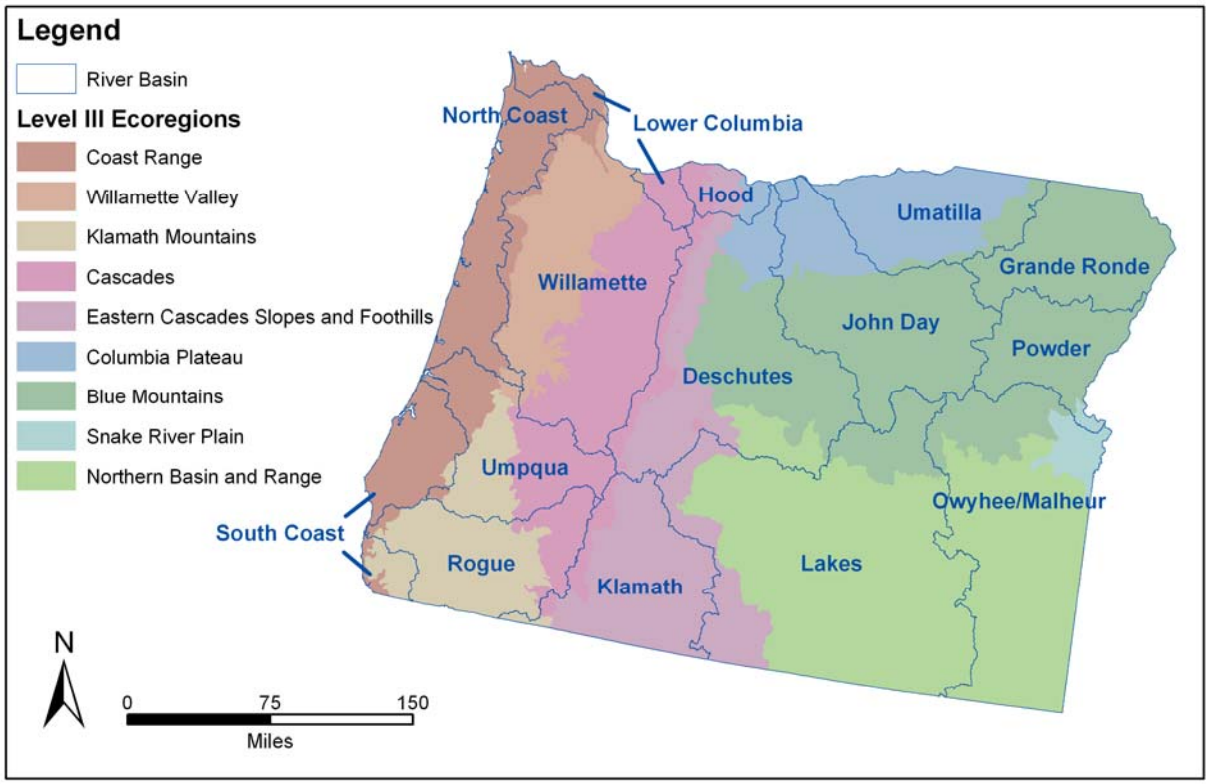

Figure 2. Level III Ecoregions in the ROI.

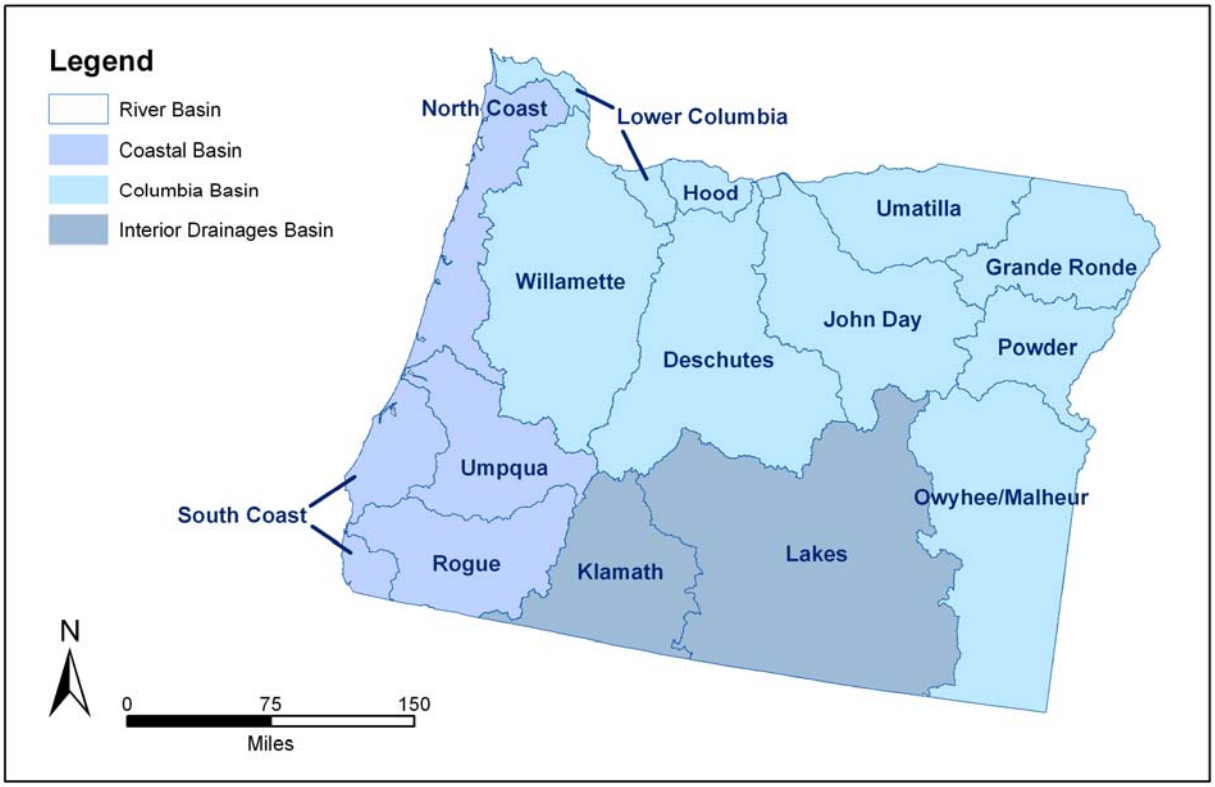

Figure 3. Basins and river basins in the ROI.

Table 1. Level III and Level IV Ecoregions in the ROI.

Level III Ecoregions	Level IV Ecoregions (square miles in parentheses)
Blue Mountains	John Day/Clarno Uplands (5,022), John Day/Clarno Highlands (2,475), Maritime-Influenced Zone (1,391), Melange (1,228), Wallowas/Seven Devils Mountains (526), Canyons and Dissected Highlands (1,093), Canyons and Dissected Uplands (1,091), Continental Zone Highlands (1,555), Continental Zone Foothills (3,715), Blue Mountain Basins (1,084), Mesic Forest Zone (2,226), Subalpine-Alpine Zone (540), Deschutes River Valley (1,576), Cold Basin (400)
Cascades	Western Cascades Lowland and Valleys (3,905), Western Cascades Montane Highlands (2,729), Cascade Crest Montane Forest (1,909), Cascade Subalpine/Alpine (331), High Southern Cascade Montane Forest (915), Southern Cascades (1,414)
Coast Range	Coastal Lowlands (633), Coastal Uplands (1,177), Volcanics (2,043), Willapa Hills (751), Mid-Coastal Sedimentary (3,739), Southern Oregon Coastal Mountains (692), Redwood Zone (31)
Columbia Plateau	Umatilla Plateau (3,712), Pleistocene Lake Basins (1,407), Yakima Folds (109), Deep Loess Foothills (146), Deschutes/John Day Canyons (674), Umatilla Dissected Uplands (743)
Eastern Cascades Slopes and Foothills	Grand Fir Mixed Forest (162), Oak/Conifer Foothills (461), Ponderosa Pine/Bitterbrush Woodlands (1,077), Pumice Plateau (4,236), Pumice Plateau Basin (640), Klamath/Goose Lake Basins (1,039), Fremont Pine/Fir Forest (1,672), Southern Cascades Slope (515), Klamath Juniper Woodland (784)
Klamath Mountains	Rogue/Illinois Valleys (285), Oak Savanna Foothills (818), Umpqua Interior Foothills (921), Serpentine Siskiyous (440), Inland Siskiyous (2,610), Coastal Siskiyous (853), Klamath River Ridges (121)
Northern Basin and Range	Dissected High Lava Plateau (3,984), Pluvial Lake Basins (2,092), High Desert Wetlands (1,651), Owyhee Uplands and Canyons (2,991), High Lava Plains (10,262), Semiarid Uplands (1,041), Partly Forested Mountains (103), Salt Shrub Valleys (725), Barren Playas (179)
Snake River Plain	Treasure Valley (499), Unwooded Alkaline Foothills (489)
Willamette Valley	Portland/Vancover Basin (269), Willamette River and Tributaries Gallery Forest (674), Prairie Terraces (1,971), Valley Foothills (3,415)
Source: Thorson et al. 2003	

Willamette Valley

The Willamette Valley Ecoregion lies within the Willamette, Lower Columbia, North Coast, and Umpqua river basins, which are located within the Coastal and Columbia basins (Figures 2 and 3) (OWEB 2002). There are four subregions within the Willamette Valley, the predominant one being the Valley Foothills, which covers 2,415 square miles. The Valley Foothills are a series of rolling foothills with vegetation consisting of oak savanna and prairies containing fescue, blue wildrye, brodiaea, and oatgrass cover (Thorson et al. 2003). Some Douglas fir forests are present, with understory containing oceanspray, hazel, poison oak, baldhip, alien Himalayan, and sword fern (Thorson et al. 2003). The Prairie Terraces subregion composes the majority of the remaining area within the Willamette Valley and consists of flat to slightly rolling fluvial terraces vegetated by Oregon white oak with a camas, sedge, fescue, and tufted

hairgrass cover. Douglas fir groves can be found occasionally, and ash, oak, maple, and fir are dominant along riparian zones with poison oak, hazel, and Indian plum in the understory (Thorson et al. 2003).

Klamath Mountains

The Klamath Mountain Ecoregion is within the Umpqua, Rogue, Klamath, and South Coast river basins, all of which are located within the Coastal Basin (Figures 2 and 3) (OWEB 2002). This ecoregion contains seven subregions, the dominant being the Inland Siskiyous, which covers 2,610 square miles. The Inland Siskiyous subregion consists of highly dissected mountains that are vegetated by Douglas fir, ponderosa pine, Oregon white oak, California black oak, madrone, serviceberry, snowberry, Oregon grape, California fescue, and poison oak (Thorson et al. 2003). The Umpqua Interior Foothills, the second largest subregion, contains Oregon white oak, Douglas fir, ponderosa pine, and madrone, but also grand fir, tan oak, and chinquapin. The understory consists of snowberry, salal, Oregon grape, poison oak, oceanspray, and swordfern (Thorson et al. 2003).

Cascades

The Cascades Ecoregion is within the Lower Columbia, Hood, Willamette, and Deschutes river basins of the Columbia Basin; the Umpqua and Rogue river basins of the Coastal Basins; and the Klamath River Basin of the Interior Drainages (Figures 2 and 3) (OWEB 2002). Of the six subregions in the Cascades Ecoregion, the dominant is the Western Cascades Lowland and Valleys. This subregion is vegetated by Douglas fir, western hemlock, western redcedar, bigleaf maple, red alder, vine maple, salal, rhododendron, Oregon grape, huckleberry, thimbleberry, swordfern, oxalis, hazel, and blackberry, and covers approximately 3,905 square miles (Thorson et al. 2003). The second major subregion is the Western Cascades Montane Highlands, which consists of Pacific silver fir, western hemlock, mountain hemlock, Douglas fir, noble fir, bigleaf maple, red alder, and Pacific yew. The understory is vine maple, rhododendron, Oregon grape, huckleberry, and thimbleberry (Thorson et al. 2003). The Western Cascades Montane Highlands covers approximately 2,729 square miles.

Eastern Cascades Slopes and Foothills

The Eastern Cascades Slopes and Foothills Ecoregion lies within the Hood, Deschutes, Klamath, and Lakes river basins (Figure 2). These river basins are located within the Columbia Basin and Interior Drainage Basin (Figure 3) (OWEB 2002). The Eastern Cascades Slopes and Foothills Ecoregion is divided into nine subregions. The dominant subregion, the Pumice Plateau, covers 4,236 square miles and is vegetated by lodgepole pine in flat areas or depressions, ponderosa pine on slopes, and white pine at higher elevations. Riparian areas support stream dogwood, mountain alder, willows, and quaking aspen. Understory vegetation is relatively low-growing shrubs, such as antelope bitterbrush, and Idaho fescue (Thorson et al. 2003). After the Pumice Plateau, the Freemont Pine/Fir Forests is the next most dominant subregion. The Freemont Pine/Fir Forests covers 1,672 square miles and contains mostly ponderosa pine and western juniper in lower elevations, and white fir, whitebark pine, and lodgepole pine in higher elevations. Understory vegetation is mainly snowberry, heartleaf arnica, antelope bitterbrush, longstolon sedge, and Wheeler bluegrass (Thorson et al. 2003).

Columbia Plateau

The Columbia Plateau Ecoregion is within the Hood, Deschutes, Umatilla, and John Day river basins, all of which are located within the Columbia Basin (Figures 2 and 3) (OWEB 2002). The Umatilla Plateau is the most dominant of the six subregions within the Columbia Plateau Ecoregion. This subregion consists of 3,712 square miles that are nearly flat to gently rolling. It is vegetated by grasslands including bluebunch wheatgrass, Sandberg bluegrass, and Idaho fescue. Sagebrush can be found sparingly throughout. Cheatgrass, a non-native and highly invasive species, can be found in broad areas (Thorson et al. 2003). The second most dominant subregion is the Pleistocene Lake Basin, which covers 1,407 square miles. The Pleistocene Lake Basin is characterized by bluebunch wheatgrass, needle-and-thread, Indian

ricegrass, Sandberg grass, and basin big sagebrush. Cheatgrass can be found in broad patches in this subregion as well (Thorson et al. 2003).

Blue Mountains

The Blue Mountains Ecoregion is located in the Umatilla, Grand Ronde, Deschutes, John Day, Powder, Lakes, and Owyhee/Malheur river basins (Figure 2). These river basins are within the Columbia Basin and Interior Drainage Basin (Figure 3) (OWEB 2002). The Blue Mountains Ecoregion is very diverse and can be divided into 14 subregions. The John Day/Clarno Uplands subregion is mostly grasslands and covers 5,022 square miles. Vegetation in this subregion includes bluebunch wheatgrass, basin wildrye, Idaho fescue, Wyoming big sagebrush, and Thurber needlegrass. Riparian areas consist of mockorange, chokecherry, clematis, white alder, willows, cottonwood, and water birch. Western juniper and ponderosa pine can be found in transitional areas (Thorson et al. 2003). The Continental Zone Foothills subregion covers 3,715 square miles and is vegetated by bluebunch wheatgrass, mountain big sagebrush, Wyoming big sagebrush, Idaho fescue, Sandberg bluegrass, and Nevada greasebush (Thorson et al. 2003).

Snake River Plain

The Snake River Plain Ecoregion is within the Powder and Owyhee/Malheur river basins in the Columbia Basin (Figures 2 and 3) (OWEB 2002). The Snake River Plain Ecoregion is quite smaller than the other ecoregions in Oregon, and contains only two subregions. The Treasure Valley and Unwooded Alkaline Foothills subregions contain approximately the same acreage. The Treasure Valley subregion covers 499 square miles and consists of Wyoming big sagebrush, basin big sagebrush, bluegrass, bluebunch wheatgrass, cheatgrass, basin wildrye, Thurber needlegrass, and rabbitbrush. Shadscale, greasewood, and inland saltgrass can also be found in saline areas (Thorson et al. 2003). The Unwooded Alkaline Foothills subregion covers 489 square miles and contains Wyoming big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, Thruber needlegrass, Indian ricegrass, and cheatgrass. Black greasewood, shadscale, fourwing saltbush, and inland saltgrass can be found in saline-alkaline areas (Thorson et al. 2003).

Northern Basin and Range

The Northern Basin and Range Ecoregion lies within the Deschutes, Lakes, and Owyhee/Malheur river basins (Figure 2). These river basins are located within the Columbia Basin and the Interior Drainage Basin (Figure 3) (OWEB 2002). The Northern Basin and Range Ecoregion can be divided into nine subregions. The most predominant is the High Lava Plains subregion, which covers 10,262 square miles. This subregion consists of Wyoming big sagebrush, mountain big sagebrush, bluebunch wheatgrass, Sandberg bluegrass, Thurber needlegrass, bottlebrush squirreltail, and Idaho fescue. Silver sagebrush, creeping wildrye, and mat muhley can be found in depression areas, and western juniper is scattered throughout shallow and rocky soils (Thorson et al. 2003). The second most predominant subregion is the Dissected High Lava Plateau. It covers 3,984 square miles and consists of Wyoming big sagebrush, low sagebrush, Douglas rabbitbrush, bluebunch wheatgrass, Idaho fescue, bottlebrush squirreltail, Sandberg bluegrass, Thurber needlegrass, Indian ricegrass, and cheatgrass, with scattered western juniper in rocky areas (Thorson et al. 2003).

3.1.3.2 Terrestrial Wildlife

The Oregon Department of Fish and Wildlife (ODFW) oversees the wildlife in the State of Oregon, which includes approximately 451 native species of birds, 146 native mammals, 68 native freshwater fishes, 29 native amphibians, and 33 native reptiles (ODFW 1996).

ODFW big game hunting regulations include the take of mule deer, black-tailed deer, Rocky Mountain elk, cougar, bighorn sheep, black bear, pronghorn antelope, and Rocky Mountain goat (Table 2). The western gray squirrel is also included within the big game regulations. Of all big game hunting, mule and

Table 2. Terrestrial game species in the ROI.

Common Name	Scientific Name	Common Name	Scientific Name
Black bear	*Ursus americanus*	Striped skunk	*Mephitis mephitis*
Black-tailed deer	*Odocoileus hemionus hemionus*	Weasels	*Mustela sp.*
Bighorn sheep	*Ovis canadensis*	Blue grouse	*Dendragapus obscurus*
Cougar	*Puma concolor couguar*	Ruffed grouse	*Bonasa umbellus*
Elk	*Cervus elaphus*	Sage grouse	*Centrocercus urophasianus*
Pronghorn	*Antilocapra americana*	Ring-neck pheasant	*Phasianus colchicus*
Mountain goat	*Oreamnos americanus*	Chukars	*Alectoris chukar*
Mule deer	*Odocoileus hemionus*	Hungarian partridge	*Perdix perdix*
White-tailed deer	*Odocoileus virginianus*	California quail	*Callipepla californica*
Beaver	*Castor canadensis*	Mountain quail	*Oreortyx pictus*
Bobcat	*Felis rufus*	Wild turkey	*Meleagris gallopavo*
Gray fox	*Urocyon cinereoargenteus*	Mourning dove	*Zenaida macroura*
Red fox	*Vulpes vulpes*	Coot	*Fulica americana*
Marten	*Martes americana*	Snipe	*Gallinago gallinago*
Muskrat	*Ondatra zibethicus*	Crow	*Corvus brachyrhynchos*
Mink	*Mustela vison*	Band-tailed pigeon	*Columba fasciata*
Raccoon	*Procyon lotor*	Mallard	*Anas platyrhynchos*
River otter	*Lontra canadensis*	Pintail	*Anas acuta*
Badger	*Taxidea taxus*	Canvasback	*Aythya valisineria*
Coyote	*Canis latrans*	Redhead	*Aythya americana*
Nutria	*Myocastor coypus*	Scaup	*Aythya marila / Aythya affinis*
Opossum	*Didelphis virginiana*	Canada goose	*Branta canadensis*
Porcupine	*Erethizon dorsatum*	Merganser	*Anatidae* (family)
Spotted skunk	*Spirogale putorius*		

Source: ODFW 2004a

black-tailed deer species are the most popular among hunters (ODFW 2004a). Bear, cougar, pronghorn, sheep, and goat populations are estimated by the ODFW (2001) as stable or increasing in numbers.

Black-tailed deer herd composition in Oregon averages 16–27 bucks per 100 does and 41–52 fawns per 100 does (ODFW 2001). Factors affecting herd size and composition include high mortality rates due to deer hair-loss syndrome, which has been plaguing the State for 4 years; habitat changes; poor fawn

recruitment; and disease. Populations in Douglas County, where mild winter conditions allow for higher survival, are doing better than populations throughout the rest of the State (ODFW 2004b).

A 2001 survey recorded the highest number of mule deer in Wallowa game units (roughly Baker, Union, and Wallowa counties) (ODFW 2001). In 2004, population size levels in these units were expected to be below average to average due to low fawn survival (ODFW 2004b). Management objectives in these units are 15 bucks per 100 does, but are currently estimated at 6–14 bucks per 100 does. Dry conditions in these high desert areas cause high winter mortality rates due to lack of suitable vegetation. The 2001 estimate for the Oregon mule deer population was 283,000 individuals (ODFW 2003).

The 2004 elk population was estimated to be higher than average in all portions of the State except the northeastern areas where calf recruitment has been problem, causing the population to decline slightly (ODFW 2004b). Low calf recruitment rates could be the result of poor foraging habitat combined with severe weather conditions. The herd composition in 2001 averaged 13 bulls per 100 cows and 46 calves per 100 cows for Roosevelt elk. Rocky Mountain elk herd composition averaged 12 bulls per 100 cows and 29 calves per 100 cows (ODFW 2001). Low bull numbers could cause delays in cow conception leading calves to be born late. This late birthing period could cause growth stunting, resulting in a decline in calf survival.

Furbearer harvest in Oregon includes seasons for beaver, bobcat, gray fox, red fox, marten, muskrat, mink, raccoon, river otter, badger, coyote, nutria, opossum, porcupine, spotted skunk, striped skunk, and weasels (ODFW 2004a).

The ODFW sets regulations for migratory bird hunting, which encompasses the take of mourning doves, band-tailed pigeons, ducks and mergansers, pintail and canvasbacks, coots, black brants, Canada goose, and snipe (ODFW 2004a). Upland game includes blue, ruffed, and sage grouse; pheasants; fall and spring turkey; chukar; Hungarian partridge; California and mountain quail; and crows (ODFW 2004a).

Non-game species (i.e., species that are not hunted, fished, or trapped) make up 88 percent of all Oregon fish and wildlife species. The non-game category often includes species such as bats, turtles, woodpeckers, hawks, frogs, and songbirds. There are roughly 600 non-game species in Oregon. Excluding those listed in the U.S. Fish and Wildlife Service (FWS) threatened and endangered species list, 121 Oregon non-game species are considered sensitive species and there is concern for their long-term well being (ODFW 2005).

3.1.3.3 Aquatic Wildlife

Fishing, both commercial and sport, is widespread in Oregon. Game fish include species such as salmon, shad, steelhead, sturgeon, trout, bass, bluegill, catfish, crappie, sunfish, perch, walleye, and mullet (Table 3). Freshwater non-game and shellfish include bullfrogs, crayfish, freshwater clams, Pacific lamprey, smelt, suckers, northern pikeminnows, carp, chub, and sculpin. Marine non-game fish include herring, anchovy, sardines, smelt, lingcod, rockfish, cabezon, greenling, flounder, and perch (ODFW 2004c).

Mercury, polychlorinated biphenyls (PCBs), dioxins, and pesticides affect water quality in Oregon, causing some aquatic species to not be fit for consumption. The 2004 fishing regulations for Oregon indicate 14 bodies of water within the State that contain high levels of these pollutants and advise anglers as to how much, if any, fish from these waters they can safely consume (ODFW 2004c).

Table 3. Aquatic game species in the ROI.

Common Name	Scientific Name	Common Name	Scientific Name
Brook trout	*Salvelinus fontinalis*	White crappie	*Pomoxis annularis*
Rainbow trout	*Oncorhynchus mykiss*	Green sunfish	*Lepomis cyanellus*
Lake trout	*Salvelinus namaycush*	Pumpkinseed sunfish	*Lepomis gibbosus*
Brown trout	*Salmo trutta*	Redear sunfish	*Lepomis microlophus*
Cutthroat trout	*Salmo clarki*	Bullhead catfish	*Ictalur Ictalurus nebulous us Ictalurus nebulous nebulous*
Atlantic salmon	*Salmo salar*	Channel catfish	*Ictalurus punctatus*
Chinook salmon	*Oncorhynchus tshawytscha*	White catfish	*Ameiurus catus*
Kokanee salmon	*Oncorhynchus nerka*	Walleye	*Stizostedion vitreum*
Coho salmon	*Oncorhynchus kisutch*	Yellow perch	*Perca flavescens*
Chum salmon	*Oncorhynchus keta*	Sacramento perch	*Archoplites interruptus*
Steelhead	*Oncorhynchus mykiss*	Whitefish	*Coregonus clupeaformis*
Largemouth bass	*Micropterus salmoides*	Sturgeon	*Acipenser sp*
Smallmouth bass	*Micropterus dolomieu*	Shad	*Alosa sapidissima*
Striped bass	*Morone saxatilis*	Mullet	*Mugilidae* (family)
Bluegill	*Lepomis macrochirus*	Grayling	*Thymallus arcticus*
Black crappie	*Pomoxis nigromaculatus*		

Source: ODFW 2004c

Invasive fish species are causing population decline to some native fish species. Included on the list of Oregon's 100 most invasive species are Asian carp, Atlantic salmon, black carp, round goby, ruffe, Shimofuri goby, and snakeheads (Oregon Department of Agriculture [ODA] 2003).

Oregon supplements its game fish population with hatchery-raised fish. Within the northeast region of the State, there are four hatcheries that raise steelhead and spring/summer/fall Chinook salmon. The high desert region of Oregon contains five hatcheries that raise rainbow, brook, cutthroat, and brown trout, as well as kokanee and Atlantic salmon. There are five hatcheries in the southwest region that raise salmon, spring/summer/winter steelhead, Coho salmon, rainbow trout, and Chinook salmon. The northwest region contains the most hatcheries, with 19 that raise steelhead, Coho salmon, Chinook salmon, rainbow trout, Tule fall Chinook salmon, and Rogue River fall Chinook salmon (ODFW 2004d).

Aquatic resources are divided among 15 major river basins within the State of Oregon: North Coast, South Coast, Lower Columbia, Rogue, Umpqua, Hood, Willamette, Deschutes, Klamath, John Day, Umatilla, Grande Ronde, Powder, Lakes, and Owyhee/Malhuer (OWEB 2002). These river basins are grouped into the three larger geographic basins called the Coastal Basin, Columbia Basin, and Interior Drainages Basin.

Coastal Basin

The North Coast River Basin contains eight tributaries that flow directly into the Pacific Ocean. Approximately half of the river basin is privately owned; however, portions are also managed by the

Bureau of Land Management (BLM), U.S. Forest Service (USFS), tribes, and State and local governments. The majority of the area is forested, with some urban and agricultural usage. Major habitat issues in the North Coast River Basin include invasive species, destructive habitat modifications (dams/culverts), high water temperatures, and elevated levels of fine substrate that make areas unsuitable for fish spawning. Streams within the river basin currently support Coho salmon, a federally-listed threatened species, as well as cutthroat trout, Chinook salmon, chum salmon, and steelhead (OWEB 2002).

The South Coast River Basin is located in the southwestern-most portion of the State. Approximately 79.8 percent of this river basin is forest land, 60.8 percent of which is privately owned. USFS manages 21.8 percent of the river basin and other public land managers include BLM and State and local governments. Primary usage of the land is forestry, grazing, and agriculture. Streams within the river basin currently support Coho salmon and fall Chinook salmon. Habitat concerns include high water temperatures, bacteria in streams, low dissolved oxygen, and invasive exotic riparian species (OWEB 2002).

The Umpqua River Basin is primarily forested and harvested for the timber industry. Agricultural usage comprises approximately 14 percent of the river basin. Over 45 percent of river basin ownership is private, with adjacent lands managed by USFS and BLM. A small portion of the river basin is managed by State and local governments and the National Park Service (NPS). There are 32 primary rivers and streams within the river basin. Streams currently support Coho salmon, spring Chinook, and summer steelhead. Major water issues include high bacteria cultures, unbalanced pH (hydrogen ion concentration) levels, high water temperatures, and adverse habitat and flow modifications (OWEB 2002).

The Rogue River Basin, located in the extreme southwest portion of the State, is primarily privately-owned forest lands, with almost equal portions managed by BLM and USFS. Smaller portions are managed by NPS and State and local governments. The main land uses are mining and forestry. Chinook salmon and steelhead fishing are extremely popular in the Rogue River Basin. Coho salmon occur in this river basin as well. Issues of concern include high water temperatures, adverse habitat and flow modifications, bacteria presence, unbalanced pH levels, and high levels of fine sedimentation. Urban development has had a severe impact on juvenile salmonid populations within the Rogue River Basin (OWEB 2002).

Columbia Basin

The Lower Columbia River Basin is located in the northwest portion of Oregon, inland from the Pacific Coast. The Columbia River is the most hydroelectrically-developed river in the world, causing natural fish migration to be impossible. The majority of the Columbia River floodplain is diked to accommodate human developments. Species diversity in these diked areas is very low relative to undiked areas. Listed species that occur within the river basin include Columbia River winter steelhead, summer steelhead, spring Chinook, fall Chinook, and chum salmon. The vast majority of the landscape is privately-owned forest lands, with some agricultural and urban uses. Concerns about the river basin include high water temperatures, low dissolved oxygen content, bacteria, and fish passage barriers (particularly at hatchery locations) (OWEB 2002).

The Hood River Basin is located in north-central Oregon, just east of the Lower Columbia River Basin. Approximately 25 percent of the land is used for agriculture and 55 percent is devoted to forestry practices. Agriculture is mainly in the form of orchard crops and wheat. High levels of fine sedimentation from streambank erosion are of major concern in the river basin. Flow and habitat modifications are having an adverse impact on salmonid species. In addition, water temperatures are higher than average throughout most of the streams, resulting in low dissolved oxygen content. Streams within the river basin currently support winter steelhead, summer steelhead, spring Chinook, fall Chinook, and bull trout, all of

which are federally-listed species. Dams and culverts deflect natural fish migration throughout this river basin (OWEB 2002).

The Willamette River Basin is located east of the North Coast River Basin and continues through north and central Oregon. Most land within this river basin is privately-owned forest land, with agricultural usage comprising 27 percent of the remaining land. The Willamette River Basin is the most populated by urban development and contains over 10,000 cities. Streams currently support bull trout, spring Chinook, winter steelhead, rainbow trout, and cutthroat trout. Concerns in this river basin include urban development, agricultural runoff, habitat and stream flow modification, high bacteria levels and toxins, high water temperatures, loss of wetlands, and invasive fish species (OWEB 2002).

The waterways in the Deschutes River Basin, located in the high desert region of central Oregon, lack suitable salmonid habitat. Streams have high rates of bank erosion and often contain fine sediment making them unfit for spawning, and there are few large pools for juvenile rearing. Furthermore, there are frequent dams and culverts that divert fish migration, as well as overall poor water quality. Natural stream succession within the Deschutes River Basin has been interrupted by urban development and agricultural processes, leading to the decline in suitable fish habitat (Washington State Conservation Commission 2004)

The John Day River Basin is located in north-central Oregon. It is bordered by the Umatilla River Basin to the north, the Deschutes to the south and west, and the Powder to the east. The John Day River Basin is almost 60 percent privately-owned, with the remaining land managed by USFS, BLM, NPS, tribes, and State and local governments. The river basin currently supports summer steelhead and bull trout, both federally-listed species. Concerns include high water temperatures, stream alterations due to mining, accumulated fine sedimentation, low dissolved oxygen content, and bacteria presence (OWEB 2002). Grazing allotments adjacent to the John Day River have created concern over severe bank erosion and increased water temperatures.

The Umatilla River Basin, located in northern Oregon, is bordered by the Grande Ronde River Basin to the east, the Columbia River to the north and west, and the John Day River Basin to the south. The Umatilla River Basin is approximately 86 percent privately owned. Management of the remaining land is divided among tribes, USFS, ODFW, BLM, and other Federal agencies. Much of the land, almost 42 percent, is dedicated to agricultural uses in the form of ranching, wheat crops, and orchards. Major concerns in this river basin include high water temperatures, adverse habitat and flow modifications, nuisance aquatic weeds and vegetation, high levels of fine sedimentation, toxins within waterways, bacteria presence, and unbalanced pH levels. Summer steelhead and bull trout occupy streams within the river basin (OWEB 2002).

The Grande Ronde River Basin is located in the extreme northeast portion of Oregon. It is bordered by Washington and Oregon to the north and east, the Powder River Basin to the south, and the Umatilla River Basin to the west. The river basin supports the local economy through agriculture, ranching, and timber harvesting. The river basin is approximately 46 percent privately owned, with the remaining land managed by tribes, USFS, BLM, and other Federal agencies. Forest lands comprise the majority of the river basin at 60.2 percent, and agricultural land occupies 10 percent of the river basin. Major water quality issues within the river basin include bacteria presence in waterways, high water temperatures, very high levels of fine sedimentation in streambeds, low nutrient content, nuisance aquatic vegetation, and low dissolved oxygen content. Fish passage from the Grande Ronde River Basin is limited by eight major dams on the Columbia River, making it impossible for most anadromous fish to make it to the Pacific Ocean (OWEB 2002).

The Powder River Basin is located at the northeast portion of Oregon and is bordered by the Snake River to the east, the Grande Ronde River Basin to the north, the John Day River Basin to the west, and the Owyhee/Malheur River Basin to the south. Approximately half of the land within the river basin is privately owned. The remaining land is managed by BLM (17.9 percent), USFS (31.4 percent), and, to a smaller extent, other Federal agencies and State government. Anadromous fish do not occur in the Powder River Basin, which limits funds for restoration projects. However, federally-listed bull trout do occur in the river basin. Issues of concern include high bacteria content, high levels of fine sedimentation in streambeds, low dissolved oxygen content, nuisance aquatic weeds and vegetation, adverse habitat and flow modifications, and extremely high water temperatures. The Powder River Basin was previously used by the mining industry, and the ill effects of historic mining practices still influence water quality within this river basin today (OWEB 2002).

The Owyhee/Malheur River Basin is located in the extreme southeastern portion of Oregon. It is bordered by Idaho on the east, the Lakes River Basin on the west, the Powder River Basin to the north, and the Nevada border to the south. The river basin is largely shrub/grasslands (86.9 percent), with some forest and agricultural lands mixed within. BLM manages the majority of the land, with private lands comprising the majority of the remaining land. Major industry in the river basin includes onion farming and cattle ranching. Water quality concerns include high bacteria rates, high levels of toxins, nuisance aquatic vegetation, and high water temperatures. The only currently-listed species within the river basin is the bull trout (OWEB 2002).

Interior Drainages Basin

The Lakes River Basin, located in the south-central portion of the State, is bordered by the California/Nevada border to the south, the Klamath River Basin to the west, the Owyhee/Malheur River Basin to the east, and the Deschutes River Basin to the north. The majority of the Lakes River Basin is managed by BLM and private landowners. Smaller portions of the land are managed by USFS, FWS, tribes, and State and local governments. Approximately 74 percent of the landscape is shrub/grasslands, with some forest and agricultural lands mixed within. This river basin contains many federally-listed fish species including the Warner sucker, Lahontan cutthroat, Borax Lake chub, Hutton tui chub, and Foskett speckled dace. Water quality is good within the river basin, with concerns mainly about high water temperatures and wetland restoration in such arid conditions (OWEB 2002).

The Klamath River Basin is located in south-central Oregon in the southern high desert region. It is bordered by the Rogue River Basin to the west and the Lakes River Basin to the east. The Klamath River Basin is almost equally divided between private land owners and USFS. Small portions are also managed by BLM, FWS, NPS, and State government. The majority of the land is forested, with grasslands and agricultural lands comprising the remaining areas. Water allocation causes controversy within the river basin, resulting in most landowners not wanting to participate in restoration. This lack of owner participation is one key issue involving the river basin. Other issues include loss of wetlands, high water temperatures, bacteria presence in water, low dissolved oxygen content, and nuisance aquatic weeds and algae growth. Streams within this river basin currently support bull trout, Lost River suckers, and shortnose suckers, all of which are listed as threatened or endangered (OWEB 2002).

3.1.3.4 Threatened, Endangered, and Sensitive Species and Their Defined Critical Habitat

In the State of Oregon there are 30 federally-listed threatened or endangered fish and wildlife species and subspecies. This includes five endangered and nine threatened fish, two endangered and four threatened birds, two endangered and two threatened mammals, one endangered and two threatened reptiles, and one endangered and two threatened invertebrates (FWS 2004) (Table 4).

Table 4. Threatened, endangered, and candidate wildlife species in the ROI.

Species	State Status [1]	Federal Status [1]	Species	State Status [1]	Federal Status [1]
Albatross, short-tailed (*Phoebastria albatrus*)	E	E	Butterfly, Fender's blue (*Icaricia icariodes fenderi*)	NL	E
Butterfly, Oregon silverspot (*Speyeria zerene hippolyta*)	NL	T	Chub, Borax Lake (*Gila boraxobius*)	E	E
Chub, Hutton tui (*Gila bicolor*)	T	T	Chub, Oregon (Oregonichthys crameri)	NL	E
Cuckoo, yellowed-billed (*Coccyzus americanus*), western distinct population segment (DPS)	SC	C	Dace, Foskett speckled (*Rhinichthys osculus*)	T	T
Deer, Columbia white-tailed (*Odocoileus virginianus leucurus*), Columbia River DPS	NL	E	Eagle, bald (Haliaeetus leucocephalus)	T	T
Fairy shrimp, vernal pool (*Branchinecta lynchi*)	NL	T	Frog, Columbia spotted (*Rana luteiventris*), Great Basin DPS	SU	C
Frog, Oregon spotted (*Rana pretiosa*)	SC	C	Horned lark, streaked (Eremophila alpestris strigata)	SC	C
Murrelet, marbled (Brachyramphus marmoratus maroratus)	T	T	Owl, northern spotted (Strix occindentalis caurina)	T	T
Pelican, brown (Pelecanus occidentalis)	E	E	Plover, western snowy (Charadrius alexandrinus nivosus)	T	T (coastal population only)
Salmon, Chinook (*Oncorhynchus tshawytscha*), fall, Snake River	T	T	Salmon, Chinook (*Oncorhynchus tshawytscha*), Lower Columbia River	SC	T
Salmon, Chinook (*Oncorhynchus tshawytscha*), spring/ summer, Snake River	T	T	Salmon, Chinook (*Oncorhynchus tshawytscha*), Upper Willamette River	NL	T
Salmon, chum (*Oncorhynchus keta*), Columbia River	SC	T	Salmon, Coho, (*Oncorhynchus kisutch*), Oregon Coast	SC	T
Salmon, sockeye (*Oncorhynchus nerka*), Snake River in Idaho where found	NL	E	Sea-lion, Steller (*Eumetopias jubatus*), eastern population segment	SV	T
Sea turtle, green (*Chelonia mydas*)	E	T	Sea turtle, leatherback (*Dermochelys coriacea*)	E	E
Sea turtle, loggerhead (*Caretta caretta*)	T	T	Skipper, Mardon (*Polites mardon*)	NL	C

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Table 4. (continued).

Species	State Status [1]	Federal Status [1]	Species	State Status [1]	Federal Status [1]
Squirrel, Washington ground (*Spermophilus washingtoni*)	E	C	Steelhead (*Oncorhynchus mykiss*), Lower Columbia River	SC	T
Steelhead (*Oncorhynchus mykiss*), Middle Columbia River	SV	T	Steelhead (*Oncorhynchus mykiss*), Snake River Basin	SV	T
Steelhead (*Oncorhynchus mykiss*), Upper Willamette River	SC	T	Sucker, Lost River (*Deltistes luxatus*)	E	E
Sucker, shortnose (Chasmistes brevirostris)	E	E	Sucker, Warner (Catostomus warnerensis)	T	T
Trout, bull (Salvelinus confluentus)	SC	T	Trout, Lahontan cutthroat (Oncorhynchus clarki henshawi)	T	T
Whale, humpback (Megaptera novaeangliae)	E	E	Wolf, gray (*Canis lupus*), western DPS	E	T

[1]Status Codes: C = Candidate; E = Endangered; SC = Critical; SU = Undeterminable Status; SV = Vulnerable; T = Threatened; NL = not listed.

Source: ONHIC 2004, FWS 2004

The State recognizes six candidate species for listing: two birds, two amphibians, one mammal, and one insect (FWS 2004). Oregon also contains 118 species listed as a concern to the FWS, and 46 species that the ODFW consider to be close to critical condition if immediate actions are not taken (Oregon Natural Heritage Information Center [ONHIC] 2004).

There are currently 18 plant species federally-listed as threatened or endangered in Oregon (Table 5). Seven of these species are listed as threatened and eleven as endangered. There are two species, slender moonwart and northern wormwood, which are candidates for Federal listing. Only Malheur wire-lettuce has designated critical habitat. Spalding's catchfly is in the process of receiving designated critical habitat, but as of yet, there is no exact location for designation.

Critical Habitat

Only 14 of the 50 species listed under the ESA have designated critical habitat within Oregon. This includes one endangered plant, one threatened insect, three threatened birds, one threatened crustacean, six threatened fish, and two endangered fish. Appendix B provides a complete listing of species with critical habitat and the associated counties and hydrological units of occurrence.

Malheur wire-lettuce, an endangered plant, has designated critical habitat in Harney County, located 27 miles from the town of Burns. The critical habitat occurs on a 160-acre scientific study area managed by BLM. Though the last existing population of Malheur wire-lettuce does not cover the entire 160 acres, this area was designated as habitat to buffer the population from negative impacts, such as the invasion of nuisance exotic species (47 FR 218, 1982).

Table 5. Threatened, endangered, and candidate plant species in the ROI.

Species	State Status [1]	Federal Status [1]	Species	State Status [1]	Federal Status [1]
McDonald's rock-cress (*Arabis mcdonaldiana*)	NL	E	Cook's lomatium (*Lomatium cookii*)	E	E
Marsh sandwort (Arenaria paludicola)	NL	E	Kincaid's lupine (*Lupinus sulphureus*)	T	T
Applegate's milk-vetch (*Astragalus applegatei*)	E	E	MacFarlane's four-o'clock (*Mirabilis macfarianei*)	E	T
Golden paintbrush (Castilleja levisecta)	E	T	Rough popcorn (Plagiobothrys hirtus)	E	E
Willamette daisy (*Erigeron decumbens*)	E	E	Nelson's checker-mallow (*Sidalcea nelsoniana*)	T	T
Gentner's fritillary (*Fritillaria gentneri*)	E	E	Spalding's catchfly (*Silene spaldingii*)	E	T
Water howellia (Howellia aquatilis)	NL	T	Malheur wire-lettuce (Stephanomeria malheurensis)	E	E
Western lily (Lilium occidentale)	E	E	Howell's spectacular Thelypody (*Thelypodium howellii spectabilis*)	E	T
Large-flowered wooly meadowfoam (*Limnanthes floccosa grandiflora*)	E	E	Slender moonwort (*Botrychium lineare*)	NL	C
Bradshaw's desert-parsley (*Lomatium bradshawii*)	E	E	Northern wormwood (*Artemisia campestris ssp. borealis var. wormskioldii*)	NL	C

[1]Status Codes: C = Candidate, E = Endangered, T = Threatened, NL= not listed.

Source: ONHIC 2004, FWS 2004

The threatened Oregon silverspot butterfly has designated critical habitat in Lane County. Lane County was chosen because it is the only place where a healthy population of silverspots exists (45 FR 129, 1980).

There are 28 designated critical habitat areas containing a total of 18,000 acres for western snowy plover. Of these areas, seven are located within five counties in Oregon. This critical habitat is used by the threatened plovers primarily for nesting and over-wintering (64 FR 234, 1999).

There are 76 critical habitat units in 20 counties throughout Oregon for the threatened northern spotted owl. This habitat comprises approximately 3.2 million acres managed by USFS (2,211,000 acres) and BLM (1,046,000 acres). Northern spotted owls use this critical habitat for nesting, roosting, foraging, and dispersal of young (57 FR 10, 1992).

The marbled murrelet, a threatened bird species, has designated critical habitat in 12 counties in Oregon totaling 1,515,300 acres. Of this land, 1,338,200 acres are federally managed, 175,100 acres are State

managed, 1,100 acres are county managed, and 900 acres are privately owned. Critical habitat for this species was determined by the need for large diameter conifers for nesting platforms, overstory canopy for nesting cover, and distance from a marine environment (61 FR 102, 1996).

Vernal pool fairy shrimp, a threatened crustacean, has four units containing a total of 7,574 acres of critical habitat in Jackson County. The North Agate Desert Unit includes 2,130 acres, the White City East Unit includes 2,251 acres, the White City West Unit includes 2,301 acres, and the Table Rocks Unit includes 892 acres (68 FR 151, 2003).

There are 640 acres of critical habitat for the threatened Borax Lake chub located in Harney County. Most of the critical habitat is located on federally-managed land; however, some critical habitat does occur on private land (47 FR 193, 1982).

The Warner sucker is a threatened endemic species in Oregon whose decline is attributed to the introduction of exotic fish species. Critical habitat for the Warner sucker, designated in Lake County in 1985, is focused around Twelvemile Creek (approximately 4 stream miles), Twentymile Creek (approximately 18 stream miles), Spillway Canal north of Hart Lake (approximately 2 stream miles), Snyder Creek (approximately 3 stream miles), and Honey Creek (approximately 16 stream miles). Criteria for critical habitat included the presence of the species and low gradient streams (50 FR 188, 1985).

On September 21, 2004, the Klamath River and Columbia River threatened populations of bull trout were designated with 1,748 miles of stream and 61,235 acres of lakes and marches as critical habitat. Of this allotment, 706 miles of stream and 33,939 acres of marshes and lakes are located in Oregon. The critical habitat for bull trout occur in 23 counties in Oregon. These critical areas were chosen because they are areas that bull trout historically occupied and they provide movement corridors and areas for spawning, rearing, foraging and over-wintering (69 FR 193, 2004).

Approximately 13,679 square miles of critical habitat was designated for the threatened Snake River fall Chinook salmon in Idaho, Oregon and Washington. In Oregon, critical habitat occurs within 11 counties. These counties are either within the critical habitat in their entirety, or bordering critical habitat areas. Critical habitat includes river reaches of the Salmon, Snake, and Columbia rivers, as well as their tributaries that are presently or were historically accessible to this species (excluding areas above Dworshak Dam, Hells Canyon Dam, and any impassible falls) (58 FR 247, 1993).

There are 22,390 square miles of designated critical habitat for the threatened Snake River spring/summer Chinook salmon. In Oregon, critical habitat occurs within 12 counties that are wholly or partially within this designation. Critical habitat includes river reaches of the Snake, Salmon, and Columbia rivers; this includes all tributaries that are presently or historically accessible to the species. Exclusions from the critical habitat are the Clearwater River, areas above Hells Canyon Dam, and above any impassible falls (58 FR 247, 1993).

Sockeye salmon, a threatened fish species, has designated habitat in or bordering 11 counties in Oregon. Hydrologic units designated for critical habitat are based on present or historical access of the unit to sockeye salmon. Hydrological units include the Lower Salmon, Middle Salmon-Panther, Upper Salmon, Middle Salmon-Chamberlain, Lower Snake, Lower Snake-Tucannon, and Lower Snake-Asotin (58 FR 247, 1993).

On September 29, 2003, the National Oceanic and Atmospheric Administration (NOAA) amended the final rule for critical habitat designation for 19 evolutionary significant units (ESUs) of salmon and steelhead in Oregon, Washington, California, and Idaho. The amendment was made under a court order

from a Federal district court. NOAA will be re-issuing critical habitat to these ESUs after an additional economic impact analysis is completed (68 FR 188, 2003). Because the future critical habitat may closely match the previously assigned habitat, for purposes of this analysis, previous critical habitat areas will be included for the following listed species:

- Lower Columbia River Chinook salmon had designated critical habitat in or bordering eight counties in Oregon. Hydrological units that contained critical habitat in Oregon included the Lower Columbia, Lower Columbia-Clatskanie, Lower Columbia-Sandy, Middle Columbia-Hood, Clackamas, and Lower Willamette (65 FR 32, 2000).

- Upper Willamette River Chinook salmon had designated critical habitat in or bordering 14 counties in Oregon. Hydrological units that contained critical habitat in Oregon included the Lower Columbia, Lower Columbia-Clatskanie, Lower Willamette, Middle Willamette, Middle Fork Willamette, Coast Fork Willamette, Upper Willamette, McKenzie, North Santiam, South Santiam, Molalla-Pudding, Tualatin, Yamhill, and Clackamas (65 FR 32, 2000).

- The Oregon Coast/California Coast Coho salmon had designated critical habitat in or bordering 13 counties in Oregon. Hydrological units that contained critical habitat in Oregon included the Alsea, Coos, Coquille, Necanicum, Nehalem, Sixes, Siletz-Yanquina, Siuslaw, Siltcoos, Umpqua, North Umpqua, South Umpqua, and Wilson-Trask-Nestucca (65 FR 32, 2000).

- Snake River Basin steelhead had designated critical habitat in or bordering 12 counties in Oregon. Hydrological units that contained critical habitat in Oregon included Hells Canyon, Imnaha, Lower Snake-Asotin, Upper Grande Ronde, Wallowa, Lower Grande Ronde, Middle Columbia-Lake Wallula, Middle Columbia-Hood, Lower Columbia-Sandy, Lower Columbia-Clatskanie, Lower Columbia, and Lower Willamette (65 FR 32, 2000).

- The Lower Columbia River steelhead ESU had designated critical habitat in or bordering seven counties in Oregon. Hydrological units that contained critical habitat in Oregon included Lower Columbia-Clatskanie, Lower Columbia, Upper Willamette, Middle Willamette, Lower Willamette, North Santiam, South Santiam, Yamhill, Molalla-Pudding, and Tualatin (65 FR 32, 2000).

- Middle Columbia River steelhead had designated critical habitat in or bordering 16 counties in Oregon. Hydrological units that contained critical habitat in Oregon included Walla Walla, Middle Columbia-Lake Wallula, Middle Columbia-Hood, Umatilla, Willow, Upper John Day, North Fork John Day, Middle Fork John Day, Lower John Day, Lower Deschutes, Lower Columbia-Sandy, Lower Columbia-Clatskanie, Lower Columbia, Lower Willamette, and Trout (65 FR 32, 2000).

- Upper Willamette River steelhead had designated critical habitat in or bordering 12 counties in Oregon. Hydrological units that contained critical habitat in Oregon included the Lower Columbia, Lower Columbia-Clatskanie, Lower Columbia-Sandy, Middle Columbia-Hood, Clackamas, and the Lower Willamette (65 FR 32, 2000).

- Columbia River chum salmon had designated critical habitat in four counties in Oregon. Hydrological units that contained critical habitat in Oregon included the Lower Columbia, Lower Columbia-Sandy, Lower Columbia-Clatskanie, and the Lower Willamette (65 FR 32, 2000).

3.2 CULTURAL RESOURCES

3.2.1 Definition of Resource

Cultural or heritage resources are defined as those sites, structures, landscapes, districts, objects, records, and lifeway skills that are of importance to a culture or community for historic, scientific, traditional, or religious reasons. Cultural resources are tied to places, persons, events, or practices of social custom and traditional skills and are recognized for their heritage, social, educational, and scientific value through the passage of State and Federal laws for their protection.

Archaeological resources are locations and objects from past human activities. Architectural resources are standing structures that are usually over 50 years of age and of significant historic or aesthetic value. Traditional cultural properties (TCPs) hold importance to American Indians or other ethnic groups for the continuing practice of traditional culture. Any of these properties may meet the criteria for inclusion in the National Register of Historic Places (NRHP) and this determination of eligibility (36 CFR 8 parts 800.3–800.13, 2004) must be completed before the initiation of ground disturbance or alteration of a landscape or structure.

Regulations require Federal agencies to document, protect, and manage the physical and visual integrity of heritage resources. This project will require compliance with Federal and State historic preservation statutes and regulations including, but not limited to:

- *American Indian Religious Freedom Act of 1978* (42 USC 21 part 1996, 1994)
- *Antiquities Act of 1906* (16 USC 1 parts 431–433, 2003)
- *Archaeological Resources Protection Act of 1979* (16 USC 1B parts 470aa–470mm, 2002)
- *Historic Sites, Buildings, and Antiquities Act* (16 USC 1 parts 461–467, 1935)
- *National Historic Preservation Act of 1966* (16 USC 1A part 470, 2000)
- *Native American Graves Protection and Repatriation Act* (25 USC 32 parts 3001 et seq., 1990)
- *Museums; Historical Societies; Preservation of Historical and Archaeological Properties and Objects; Oregon Historic Families Database* (ORS 358 parts 015–961, 2003).

The Oregon State Historic Preservation Office (ORSHPO) and Oregon Heritage Commission have developed a statewide historic preservation plan and handbook for preservation planning (ORSHPO 2001) that offer goals for the State and general guidance for compliance with heritage resource protection.

3.2.2 Region of Influence

The ROI for cultural resources includes land within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin proposed for enrollment in CREP and listed in Section 1.2.1.

3.2.3 Affected Environment

The character of the physiographic provinces—Coast Range, Klamath Mountains, Deschutes-Umatilla Plateau, Willamette Valley, Blue Mountains, Cascade Range, Harney Desert, Basin and Range, Payette

Section—major river valleys, and changing climatic regimes through time created the rich environmental mosaic of Oregon that influenced human adaptation and the development of a wide variety of cultures.

To date, more than 1,600 properties in the 36 counties of Oregon, including 15 districts (encompassing 5,978 contributing prehistoric and historic resources), are on the NRHP (ORSHPO 2001, Oregon Parks and Recreation Department [OPRD] 2004a, OPRD 2004b). Approximately 40,000 properties in Oregon have been identified as having historical significance. There are an estimated 40,000–45,000 archaeological sites in Oregon, even though only 7 percent of the State's land surface has been surveyed, and more than 2,000 known historic cemeteries and hundreds of miles of historic trails.

The following brief outline of Oregon's cultural history is summarized from Aikens (1993), d'Azevedo (1986), Lavender (1958), Meinig (1968), Walker (1998), ORSHPO (2001), and BLM (2004).

3.2.3.1 Prehistoric Periods (12,000 years before present [BP]–A.D. 1,500)

The American Indian prehistoric record is marked by a wide variety of archaeological remains that document response to cultural and climatic change and regional resources. Site types include shell middens, villages, pit houses, temporary campsites, lithic sites and quarries, burials, fishing structures and implements, rock ovens and cairns, rock art, hunting blinds, and drive lanes.

PaleoIndian Period (12,000–9,000 years BP)

Peoples of this period were highly mobile hunters who used the atlatl and spear to hunt large game, including species now extinct such as the mammoth, mastodon, and bison predecessors.

Early Archaic Period (9,000 BP–6,000 BP)

Semi-nomadic hunting and gathering continued during this time. A wide variety of tools were used including the atlatl, fish hooks, fish spears, net sinkers, manos and metates, and camas ovens. Perishable artifacts, such as woven baskets, mats, and sandals, survive from this period.

Middle Archaic Period (6,000 BP–2,000 BP)

This period was marked by a warmer and drier climate and stabilization of sea levels at modern level. There is evidence of fire used to manipulate plant growth and animal populations. The archaeological record reflects increased diversity in tool types and the development of distinctive regional cultures and expansion of trade networks. More stone quarries come into use during this period, and pit houses and coastal shell middens reflect long-term residency in many areas.

Late Archaic Period (2,000 BP–A.D. 1500)

Fishing technology and plant processing techniques continued to diversify and the bow and arrow replaced the atlatl and dart. Elements of distinctive Northwest, Plateau, Great Basin, and California styles in tools, art, and shelter began to coalesce. Many villages increased in size and were occupied year-round, and the Columbia River trade network flourished. Contemporary climatic conditions were reflected in the landscape, plants, and animals.

3.2.3.2 Protohistoric and Historic Periods (A.D. 1550–Present)

For purposes of historic research and preservation planning, Oregon's history is organized into specific chronological themes (ORSHPO 2001). These themes, as well as a few highlights of the Euroamerican settlement of Oregon, are briefly discussed in the following subsections.

Exploration (1543–1811)

European and Asian traders visited coastal and Columbia River Indian people and supplied the burgeoning fur trade. Trade goods appeared in coastal village sites, and shipwrecks were common. Horses

arrived in Oregon about 1730, and several tribes, notably the Nez Perce, became master horse breeders and equestrians. Lewis and Clark wintered (1805–1806) at Fort Clatsop at the mouth of the Columbia River.

Fur Trade and Mission to the Indians (1812–1846)

Forts and missionary settlements were established during this period. Fort Vancouver was founded in 1820 by Hudson's Bay Company. The Siskiyou Trail, originally an American Indian trail and later a portion of the Oregon-California trail, linked Willamette Valley and the Sacramento Valley/San Francisco area beginning in the 1820s. By the 1830s, many trails were in use by fur trappers and dealers, cattle drives, military, and freighting. The Oregon Trail (1841–1869) entered present day southeastern Oregon at the Snake River crossing on the Idaho border, with major destinations of the Willamette Valley for settlers and southwestern Oregon and northern California for gold seekers. Portions of the trail later became stage, railroad, and vehicle roads.

Settlement, Statehood, and Steampower (1847–1865)

By the 1850s, American Indian populations had declined through disease and conflicts, and reservations were established. Oregon was accepted into the Union in 1859.

With the Oregon Trail immigrants, and later peoples from Europe, Asia, and Mexico, homesteading, pioneer settlements, farming, ranching, dairying, and logging established quickly. Transportation and communication flourished via ferries and steamboats, ocean-going ships, and improved roads.

Railroads and Industrial Growth (1866–1883)

The completion of the Southern Pacific Railroad in 1887 assured the success of the major Oregon industries of agriculture, logging, fishing, and mining.

Progressive Era (1884–1913)

Urban and commercial development continued with increased immigration to Oregon and the expansion of modernized cities, sophisticated architecture and utilities, and educational services.

The Motor Age (1914–1940)

Widespread use of railroads, followed by trucks, autos, improved roads, farm machinery, manufacturing equipment, and power dams assured the modernization of Oregon and many of its industries.

War and the Post-War Era (1941–1967) and the Contemporary Era (1968–Present)

Economic, social, and political developments; the rise of tourism and recreation as economic forces; and the continuation of traditional industries in Oregon responded to international conditions and reflected the events and trends of much of the U.S. during these critical times.

3.3 WATER RESOURCES

3.3.1 Definition of Resource

The *Clean Water Act* (33 USC 26 parts 1251 et seq., 2000) was created to protect the nation's lakes, rivers, aquifers, wetlands, and coastal areas. For the purposes of this analysis, water resources include surface water, groundwater, wetlands, and floodplains. Surface waters are rivers, streams, and lakes. This analysis also addresses impaired surface waters, defined by the Environmental Protection Agency (EPA) as those with levels of pollutants that exceed State water quality standards.

Groundwater refers to subsurface hydrologic resources such as aquifers that are used for domestic, agricultural, and industrial purposes. For this analysis, groundwater includes sole source aquifers. Wetlands are defined by the U.S. Army Corps of Engineers (USACE) as areas that are characterized by a prevalence of vegetation adapted to saturated soil conditions. Wetlands can be associated with surface water or groundwater and are identified based on specific soil, hydrology, and vegetation criteria defined by USACE. For the purposes of this analysis, floodplains are defined as 100-year floodplains, designated by the Federal Emergency Management Agency (FEMA) as those low-lying areas that are subject to inundation by a 100-year flood (i.e., a flood that has a 1 percent chance of being equaled or exceeded in any given year).

3.3.2 Region of Influence

The ROI for water resources includes land within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin proposed for enrollment in CREP and listed in Section 1.2.1.

3.3.3 Affected Environment

3.3.3.1 Surface Water

The Oregon Department of Environmental Quality (ODEQ) is required by the *Clean Water Act* (33 USC 26 parts 1251 et seq., 2000) to compile a list of Oregon water bodies and water body segments that do not meet water quality standards. This list of water body impairments is updated every 2 years by ODEQ to identify and prioritize areas of poor water quality. Standards for water quality are based on beneficial uses, such as drinking water, cold water fisheries, agricultural usage, industrial water supply, and recreational usage (ODEQ 2003a).

The *Oregon Final 303(d) List of Impaired Waters* identifies 1,726 water bodies and water body segments that do not meet water quality standards (Appendix C) (ODEQ 2002). The majority of impairments were listed because they did not meet the standards for criteria such as dissolved oxygen content, presence of fecal coliform, sedimentation levels, pH levels, and temperature. Other impairments include the presence of heavy metals, dichloro-diphenyl-trichloroethane (DDT), *E. coli* bacteria, and aquatic weeds or algae blooms (ODEQ 2002).

The major river systems in Oregon include the Columbia, Willamette, Grande Ronde, Deschutes, John Day, Umpqua, Rogue, Klamath, Snake, Malheur, and Owyhee (Figure 4). The Columbia River runs for 1,200 miles, forming the border between Washington and Oregon, before flowing into the Pacific Ocean at the town of Astoria, Oregon. The most hydroelectrically-developed river system in the world, the Columbia drains a 219,000 square mile basin called the Columbia Basin Province that extends from the crest of the Cascade Mountains in Oregon and Washington to the Rocky Mountains of Montana and Wyoming (USACE 2002). The Columbia River in Oregon drains the Willamette, Deschutes, John Day,

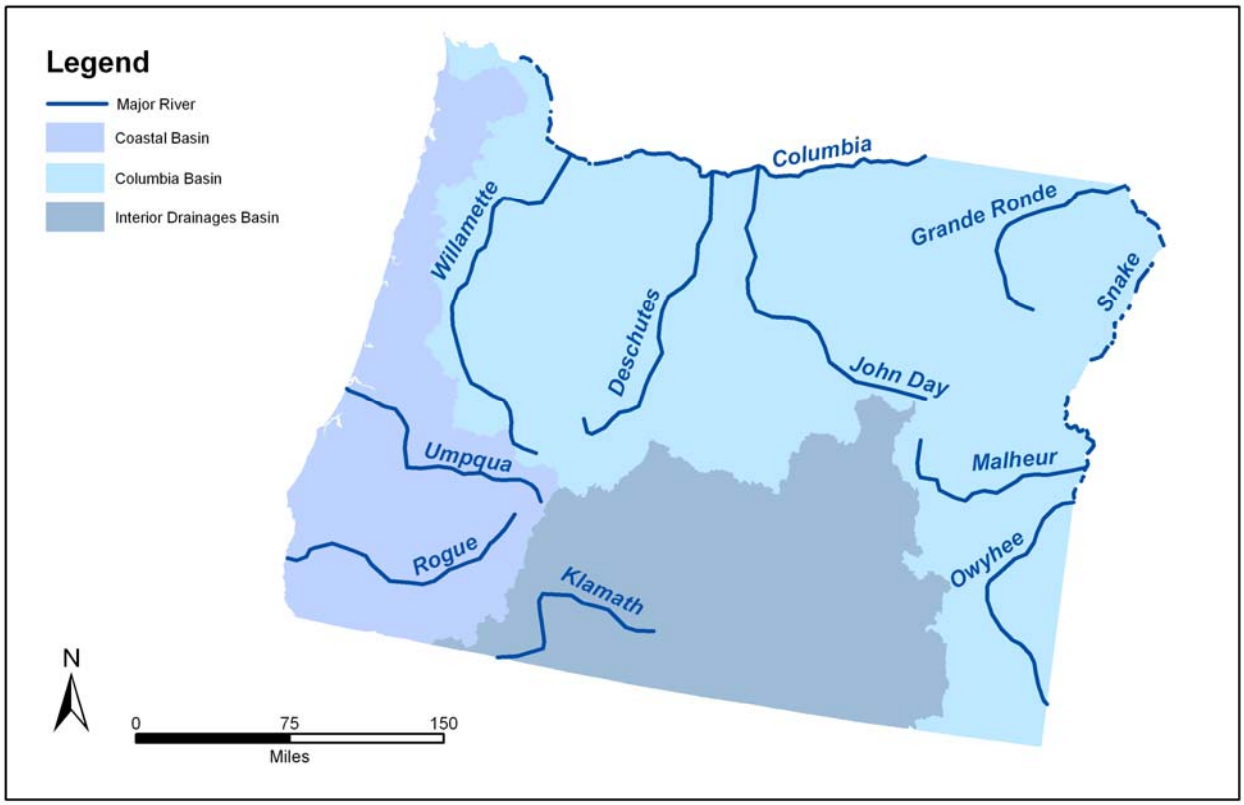

Figure 4. Major river systems in the ROI.

Lower Columbia, Hood, Umatilla, Grande Ronde, Powder, and Owyhee/Malheur river basins. The Willamette, John Day, Deschutes, and Snake Rivers are the major tributaries of the Columbia River in Oregon. Water quality impairments within the Columbia River include the presence of arsenic, DDT metabolite, PCBs, polynuclear aromatic hydrocarbons, and poor water temperature (ODEQ 2002).

The Willamette River flows for 240 miles northward between the Coastal Range and the Cascades Range to form and drain the Willamette Valley. This river runs a zigzag course through Benton, Linn, Polk, Marion, Yamhill, and Clackamas counties before its confluence with the Columbia near the city of Portland, Oregon (Wikimedia 2004). Water impairments within the Willamette include the presence of DDT, DDT metabolite, dieldrin, PCBs, arsenic, pentachlorophenol, manganese, iron, mercury, fecal coliform, and polynuclear aromatic hydrocarbons, as well as poor water temperature and dissolved oxygen content (ODEQ 2002).

The Grande Ronde River is roughly 180 miles long and is located in northeastern Oregon. The Grande Ronde drains the area on the east side of the Blue Mountains on the Columbia Plateau before joining the Snake River from the east, approximately 5 miles north of the Oregon/Washington border, and approximately 15 miles from the mouth of the Salmon River (Wikimedia 2004). Water impairments within the Grande Ronde include the presence of fecal coliform, poor water temperature, and sedimentation levels (ODEQ 2002).

The Deschutes River is approximately 240 miles long and drains the eastern side of the Cascades Range while meandering through central Oregon. This river flows through Deschutes, Jefferson, Sherman, and Wasco counties before joining with the Columbia River approximately 12 miles east of the Dalles in Oregon (Wikimedia 2004). Water quality impairments within the Deschutes include the presence of

chlorophyll a, poor water temperature, turbidity, dissolved oxygen content, sedimentation, and pH levels (ODEQ 2002).

The John Day River drains most of the Blue Mountains region and flows for 281 miles in northeastern Oregon. The John Day River flows east of the Cascade Range until its confluence with the Columbia River upstream from the Columbia River Gorge. The John Day begins in Grant County and flows through Gilliam, Jefferson, Wheeler, and Sherman counties until its confluence with the Columbia from the northwest, approximately 10 miles north of Biggs, Oregon (Wikimedia 2004). Impairments within the John Day include the presence of fecal coliform, poor water temperature, dissolved oxygen content, and pH levels (ODEQ 2002).

The Umpqua River, roughly 111 miles in length, lies on the Pacific Coast of Oregon and flows only through Douglas County. The Umpqua drains an expansive series of valleys in the mountains west of the Cascade Mountains, as well as the area south of the Willamette Valley. At Reedsport, Oregon, the Umpqua enters Winchester Bay, which flows into the Pacific Ocean (Wikimedia 2004). Water impairments within the Umpqua include the presence of fecal coliform and poor water temperature (ODEQ 2002).

The Rogue River begins in southwest Oregon, near Crater Lake in the Cascade Mountains, and flows approximately 240 miles until it reaches the Pacific Ocean at Gold Beach, Oregon. The Rogue drains approximately 75 percent of the Rogue River-Siskiyou National Forest (Wikimedia 2004). Water impairments within the Rogue include the presence of fecal coliform, poor water temperature, and pH levels (ODEQ 2002).

The Klamath River begins in southern Oregon at Upper Klamath Lake, near the area of Klamath Falls. The Klamath flows for approximately 240 miles and enters the Pacific Ocean at Klamath, California. The Klamath River drains arid farming valleys in the Cascade Range (Wikimedia 2004). Water impairments include the presence of chlorophyll a and ammonia, poor dissolved oxygen content, pH levels, and temperature (ODEQ 2002).

The Snake River is the main tributary of the Columbia River, flowing 1,038 miles through Wyoming, Idaho, Washington, and Oregon. In Oregon, the Snake River passes through the counties of Wallowa, Baker, and Malhuer, helping the Columbia to drain the Columbia River Basin. The Snake runs the length of the Idaho/Oregon border before joining with the Columbia River near Pasco, Washington (Wikimedia 2004). The Owyhee, Malheur, and Grande Ronde rivers are the major tributaries of the Snake River in Oregon. Water quality impairments within the Snake River include the presence of mercury and poor water temperature (ODEQ 2002).

The Malheur River flows for 165 miles and drains the high desert plateau region of the Blue Mountains. This river zigzags north and south through Oregon until it meets the Snake River from the west approximately 2 miles north of Ontario, Oregon (Wikimedia 2004). Water impairments within the Malheur include the presence of fecal coliform, DDT, dieldrin, chlorophyll a, and poor water temperature (ODEQ 2002).

The Owyhee River enters Oregon at the extreme southeast region in Malheur County. The Owyhee flows in a zigzag fashion until it enters the Snake River from the east at the Idaho/Oregon border (Wikimedia 2004). Major water impairments within the Owyhee include the presence of fecal coliform, chlorophyll a, DDT, dieldrin, and mercury, as well as poor water temperature and dissolved oxygen content (ODEQ 2002).

3.3.3.2 Groundwater

Basalt from lava flows, sand and gravel deposits, and bedrock contain the groundwater reservoirs in Oregon. In 2003, approximately 90 percent of Oregon residents relied on groundwater for drinking water. There is one sole source aquifer in Oregon, the North Florence-Dunal Aquifer, which lies on the Pacific Coast and supplies over 50 percent of the drinking water to residents within the Clear Lakes Watershed region (EPA 2003).

ODEQ is responsible for implementing protection programs to protect groundwater from pollution, clean up polluted groundwater, and monitor and assess groundwater quality. In accordance with the statutory policies set out in ORS Chapter 468B parts 155 and 160 and the authority given in part 180 (2003), ODEQ can declare a groundwater management area (GWMA) if non-point source pollutants are found in the water supply (ODEQ 2004). Oregon currently has three GWMAs (ODEQ 2004). The Northern Malheur County GWMA was established in 1989 when nitrate contamination was identified within the water supply. The Umatilla Basin GWMA was established in 1990 when nitrate-nitrogen concentrations were found to exceed Federal drinking water standards. The Southern Willamette Valley GWMA was established in 2004 due to high levels of nitrate contamination.

Point-source pollutant threats to groundwater in Oregon include 19,978 leaking underground storage tanks, 12 National Priority List sites where hazardous substances have been released, 33 dry-cleaning sites where solvents are released, and 40,000 underground injection systems. There are also 230 facility land sites treating effluent or biosolids, 1,168 permitted wastewater disposal sites, 500 confined animal feeding operations, and 480 solid waste landfills (ODEQ 2003b).

3.3.3.3 Wetlands

The 1987 USACE Wetland Delineation Manual (USACE 1987) provides guidelines to identify and delineate wetlands. For regulatory purposes under the *Clean Water Act* (33 CFR 3 part 328.3, 2004), wetlands are defined as:

> "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

Approximately 2 percent of Oregon is covered by wetlands, encompassing 1.2–1.5 million acres. The five main types of wetlands in Oregon are palustrine, lacustrine, estuarine, riverine, and marine (USGS 2000).

Palustrine, lacustrine, and estuarine wetlands are the dominant wetland types in Oregon. Palustrine wetlands cover approximately 1,390,900 acres of land in Oregon and comprise 59.6 percent of all wetlands within the State (NRCS 2003). These non-tidal or tidal freshwater wetlands are dominated by shrubs, trees, and other emergent wetland plants. Palustrine wetlands are classified as less than 20 acres in size with a water depth of 6.6 feet when the water is at its lowest point (NRCS 2003).

Lacustrine wetlands cover approximately 557,600 acres of land in Oregon, approximately 23.9 percent of the total wetlands in the State (NRCS 2003). Lacustrine wetlands are non-tidal and tidal freshwater wetlands and deepwater habitats that are also 20 acres in size, but are over 6.6 feet in depth, with non-persistent emergent or submersed and floating plants.

Estuarine wetlands occupy about 25,400 acres, which is approximately 1.1 percent of the total wetlands in Oregon (NRCS 2003). These are tidal wetlands or deep water tidal habitats that are adjacent to tidal wetlands. Water salinity in estuarine wetlands is usually greater than 0.5 parts per thousand (ppt) (USGS 2000).

Riverine and marine wetlands are less dominant in Oregon. Riverine wetlands are defined as non-tidal and tidal freshwater wetlands that are located within a channel with vegetation much like that of the lacustrine wetlands. Marine wetlands are tidal wetlands that are exposed to currents and waves, usually from the ocean, giving them a salinity of more than 30 ppt. Marine wetlands are often associated with high-energy coast lines (USGS 2000).

3.3.3.4 Floodplains

Floodplains are natural areas located adjacent to rivers and main stream channels. These areas act as a natural storage area for excess water overflow during periods of high precipitation. EO 11988, *Floodplain Management* (42 FR 26951, 1979), requires that Federal agencies:

> "…take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains..."

FEMA delineates 100-year floodplains for the National Flood Insurance Program. The State of Oregon has 255 communities prone to a 100-year flood (Oregon Department of Land Conservation Development 1999). Because FEMA maps are delineated to use for insurance purposes, mapping of 100-year floodplains is mainly limited to urban or highly developed areas.

The lack of 100-year floodplain mapping in the more remote regions of Oregon makes it difficult to complete a statewide analysis using FEMA-defined floodplains (FWS, EPA, and USACE 2001). However, site-specific evaluations would be conducted prior to enrolling a site into CREP to determine if the site is within, or would impact a 100-year floodplain.

3.4 EARTH RESOURCES

3.4.1 Definition of Resource

For the purposes of this analysis, earth resources include topography, soils, and paleontological resources.

3.4.2 Region of Influence

The ROI for earth resources includes land within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin proposed for enrollment in CREP and listed in Section 1.2.1.

3.4.3 Affected Environment

3.4.3.1 Topography

There are four major physiographic provinces in Oregon. The Pacific Border Province is located in the western portion of the State. The Sierra-Cascade Province is east of and parallels the Pacific Border Province. The Columbia Plateau Province lies in the northeastern and north-central part of the State. The Great Basin Province is located in the south-central portion of the State.

Pacific Border Province

The Pacific Border Province comprises three distinct regions including the Oregon Coast Range, the Klamath Mountains, and the Willamette Valley. The Oregon Coast Range runs parallel to the coast and consists of igneous and sedimentary rocks. The average height of these mountains in the north is 1,800 feet and 3,600 feet in the south, and the highest point is Mary's Peak at 4,097 feet (Encarta 2004). The

Klamath Mountains are steeper than the Oregon Coast Range to the north and consist of rugged metamorphic and igneous peaks and several alluvial basins. The highest peaks are over 7,000 feet (Encarta 2004). The Willamette Valley, located just east of the Oregon Coast Range, is the only large alluvial lowland in Oregon. This slightly hilly to level valley contains the meandering Willamette River.

Sierra-Cascade Province

The Sierra-Cascade Province is dominated by the Cascade Range. The Cascades are actually made up of two volcanic regions. The western Cascades are older, broader, and more deeply eroded (Oregon Department of Geology and Mineral Industries 2004). The high Cascades to the east contain Mount Hood, which is the highest peak in Oregon at 11,239 feet (Encarta 2004).

Columbia Plateau Province

The Columbia Plateau Province contains both glaciated and non-glaciated landforms and can be subdivided into the Blue Mountains, the Deschutes-Umatilla Plateau, the Harney Desert, and the Payette Section. The Blue Mountains can be described as a large plateau with some steep and rugged areas (Encarta 2004). Glaciations formed the peaks and lakes of this region. The Deschutes-Umatilla Plateau is a lava plateau that has been dissected by the Deschutes, John Day, and Umatilla rivers. The Harney Desert, also known as the High Lava Plains, consists of relatively young lava flows and is covered in places by ash and pumice (Encarta 2004). The Payette Section, also called the Owyhee Upland, consists of older lava flows that have been dissected by rivers and streams.

Great Basin Province

The Great Basin Province contains the Basin and Range located in south-central Oregon. The ranges trend north-south and alternate with broad basins.

3.4.3.2 Soil

In general, western Oregon experiences moderate temperatures and high precipitation. This leads to the development of thick soils that are leached of soluble minerals. Fertilizer must be added to these soils in order for them to be productive agriculturally. The Willamette Valley experiences less precipitation and thus soils tend to be less leached. Eastern Oregon is fairly dry, and so these soils are high in soluble minerals and do not require fertilizer to be productive. For the following detailed analysis of soil orders present in the ROI, soils are described by the Level III Ecoregions described in Section 3.1.3.1 (Thorson et al. 2003, University of Idaho 2004) (Table 6).

Table 6. Soil orders in the Level III Ecoregions of the ROI.

Level III Ecoregion	Soil Order
Coast Range	Alfisols, andisols, entisols, inceptisols, spodosols, ultisols
Willamette Valley	Alfisols, entisols, inceptisols, mollisols, ultisols, vertisols
Cascades	Alfisols, andisols, entisols, inceptisols, mollisols, spodosols, ultisols
Eastern Cascades Slopes and Foothills	Alfisols, andisols, aridosols, histosols, inceptisols, mollisols
Columbia Plateau	Aridisols, entisols, mollisols
Blue Mountains	Alfisols, andisols, aridisols, entisols, inceptisols, mollisols, vertisols
Snake River Plain	Aridisols, entisols, inceptisols, mollisols
Klamath Mountains	Alfisols, inceptisols, mollisols, ultisols, vertisols
Northern Basin and Range	Alfisols, aridisols, entisols, histosols, inceptisols, mollisols, vertisols

Source: Thorson et al. 2003

- Alfisols are relatively fertile and tend to be very productive for both agriculture and silviculture. Alfisols are found in all of the Level III Ecoregions in Oregon except for the Columbia Plateau and the Snake River Plain.

- Andisols are soils that have formed in volcanic ash or other volcanic ejecta. They possess a high water-holding capacity and the ability to fix large quantities of phosphorus, and thus make unavailable to plants, large quantities of phosphorus. Andisols occur in the Coast Range, Cascades, Eastern Cascades Slopes and Foothills, and the Blue Mountains.

- Aridisols are found in more arid regions and contain calcium carbonate. They are generally not used for agriculture unless irrigation water is available. Aridisols are found in the Columbia Plateau, Blue Mountains, Snake River Plain, and the Northern Basin and Range.

- Entisols are very diverse and develop in unconsolidated parent material. They usually lack genetic horizons except an A horizon. Entisols are found in all of the Level III Ecoregions in Oregon except for the Klamath Mountains and the Eastern Cascades Slopes and Foothills.

- Histosols are composed mainly of organic materials and are ecologically important because of the large quantities of carbon they contain. In Oregon, they occur only in the Eastern Cascades Slopes and Foothills and the Northern Basin and Range.

- Inceptisols exhibit minimal horizon development but are more developed than entisols. Inceptisols are widely distributed and occur under a wide range of ecological settings. They are found in all of the Level III Ecoregions in Oregon except for the Columbia Plateau.

- Mollisols are characterized by a thick, dark, surface horizon. They are rich in organic materials and thus very productive agriculturally. They occur in all of the Level III Ecoregions in Oregon except the Coast Range.

- Spodosols often occur under coniferous forests in cool and moist climates. They are naturally infertile and thus require additions of lime to be productive agriculturally. Spodosols are found in the Coast Range and the Cascades.

- Ultisols are generally found in older, stable landscapes. Although they have relatively low fertility, these soils occur in favorable climate regimes where they can support productive forests. Ultisols can be productive agriculturally with the use of fertilizer and lime.

- Vertisols are clay-rich soils that shrink and swell with changes in moisture content, and thus tend to lack distinct, well-developed horizons. Vertisols exhibit minimal horizon development and can occur in a wide range of ecological settings. They are found in the Willamette Valley, Blue Mountains, Klamath Mountains and the Northern Basin and Range.

3.4.3.3 Paleontological Resources

Paleontological resources are tied closely to a geologic setting—sedimentary strata, landforms, and areas of erosion into older rocks. The geological setting can be used to predict the occurrence of fossils, their type, abundance, and quality of preservation. The geology of Oregon is complex and, with some exceptions, is composed mainly of igneous rocks (i.e., granite, andesite, rhyolite, basalt) from very ancient to relatively recent geologic events, and includes in its origin fragments of islands, sea floor, and older continental rocks that have accreted to form the bedrock of the State (Alt and Hyndman 1978, 1995). Marine, river, and lake bed deposits contain plant, invertebrate, and vertebrate fossils from the

Tertiary Period (60–20 million years ago). For example, the John Day Basin in north-central Oregon is internationally known for fossils preserved in sediments deposited 54–6 million years ago. Oregon cave sediments often preserve fossils from the Pleistocene to Holocene epochs (2 million–10,000 years ago).

Paleontological resources are considered part of the national natural, scientific, and educational heritage and are protected and addressed under the broad directive of NEPA. Additional historic, cultural, and natural resource preservation statutes may also apply to fossil resources on State and Federal lands.

3.5 AIR QUALITY

3.5.1 Definition of Resource

Although the *Clean Air Act* (42 USC 85 parts 7401 et seq., 1999) is a Federal law, States are generally responsible for implementing the Act. Each State is required by EPA to develop a state implementation plan that contains strategies to achieve and maintain the National Ambient Air Quality Standards (NAAQS). NAAQS establish limits for six criteria pollutants including ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, lead, and respirable particulates (PM_{10}, or particulate matter less than 10 microns in diameter). Areas that violate air quality standards are designated as non-attainment areas for the relevant pollutants. Areas that comply with air quality standards are designated as attainment areas for relevant pollutants.

3.5.2 Region of Influence

The ROI for the air quality analysis is area within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin. Air quality control regions that encompass this area include the Portland Intrastate, Central Oregon Intrastate, Eastern Oregon Intrastate, Southwest Oregon Intrastate, and the Northwest Oregon Intrastate (40 CFR 16 part 81.338, 2004) (Table 7).

Table 7. Air Quality Control Regions in the ROI.

Air Quality Control Regions in Oregon	Counties within each Region
Portland Intrastate	Benton, Clackamas, Columbia, Lane, Linn, Marion, Multnomah, Polk, Washington, Yamhill
Central Oregon Intrastate	Crook, Deschutes, Hood, Jefferson, Klamath, Lake, Sherman, Wasco
Eastern Oregon Intrastate	Baker, Gilliam, Grant, Harney, Malheur, Morrow, Umatilla, Union, Wallowa, Wheeler
Southwest Oregon Intrastate	Coos, Curry, Douglas, Jackson, Josephine
Northwest Oregon Intrastate	Clatsop, Lincoln, Tillamook
Source: 40 CFR 16 part 81.338, 2004	

3.5.3 Affected Environment

ODEQ is responsible for ensuring that air quality within the State meets and maintains NAAQS. The ODEQ operates 17 air quality monitoring sites in cities throughout Oregon. Pollutants that cause the greatest concern in the State include smog, carbon monoxide, fine particulate matter (e.g., wood smoke and dust), and air toxins (ODEQ 2003c).

EPA developed the Air Quality Index (AQI) as an approximate indicator of overall air quality that can be easily interpreted by the public. The AQI converts concentrations of all criteria air pollutants into one normalized number (0–500) that defines the air quality for the area. The AQI establishes air quality categories of good (0–50), moderate (51–100), unhealthy for sensitive groups (UFSG) (101–150), unhealthy (151–200), very unhealthy (201–300), and hazardous (301–500).

In 2003, Oregon air quality was negatively influenced by severe forest fires in the Cascades during the months of August and September; however, all areas of the State still met the NAAQS for that year. As reported by ODEQ (2003c), the 17 air quality monitoring stations averaged 314 days of good air quality and 42 days of moderate air quality. Only three cities reported UFSG days: Klamath Falls (2 days), Oakridge (16 days), and Portland (1 day). No monitoring stations within Oregon reported days of unhealthy, very unhealthy, or hazardous AQIs in 2003.

Overall Oregon has relatively clean air; however, as of November 2004, there were six counties considered non-attainment areas (EPA 2004). Polk and Marion counties were designated as non-attainment areas for carbon monoxide and ozone, and Lane, Jackson, Lake, and Union counties were designated as non-attainment areas for particulates.

3.6 RECREATIONAL RESOURCES

3.6.1 Definition of Resource

Recreational resources are natural or anthropogenic settings that are designated or available for recreational use by the public. In this analysis, recreational resources include lands and waters used by the public for hunting, fishing, wildlife viewing, hiking, boating, swimming, and other water-related activities.

3.6.2 Region of Influence

The ROI for recreational resources includes land within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin proposed for enrollment in CREP and listed in Section 1.2.1.

3.6.3 Affected Environment

Because the land that could be enrolled in CREP is privately held, access to this land for recreational activities is presently controlled by landowners. However, there is public land available for recreation in the proposed CREP area. For example, there are three national monuments in Oregon including the John Day Fossil Beds, Oregon Caves, and Newberry National Monument (Great Outdoor Recreation Pages [GORP] 2004). Crater Lake is the only national park in the State, but there are 233 State parks (GORP 2004, Oregon Department of Forestry [ODF] 2004, OPRD 2004c). In addition, there are 24 national wildlife refuges, 1 national grassland, 14 national forests, 5 State forests, 5 recreation areas, and 39 wilderness areas in the proposed CREP area (Figure 5) (Appendix D) (GORP 2004, ODF 2004).

There are 46 wild, scenic, or recreational rivers within the proposed CREP area (Appendix D). Wild rivers are those that are undeveloped, unpolluted, and have limited trail access. Scenic rivers are accessible by trail and some roads. Recreational rivers are those that are easily accessed by road and have been developed along the shoreline (GORP 2004).

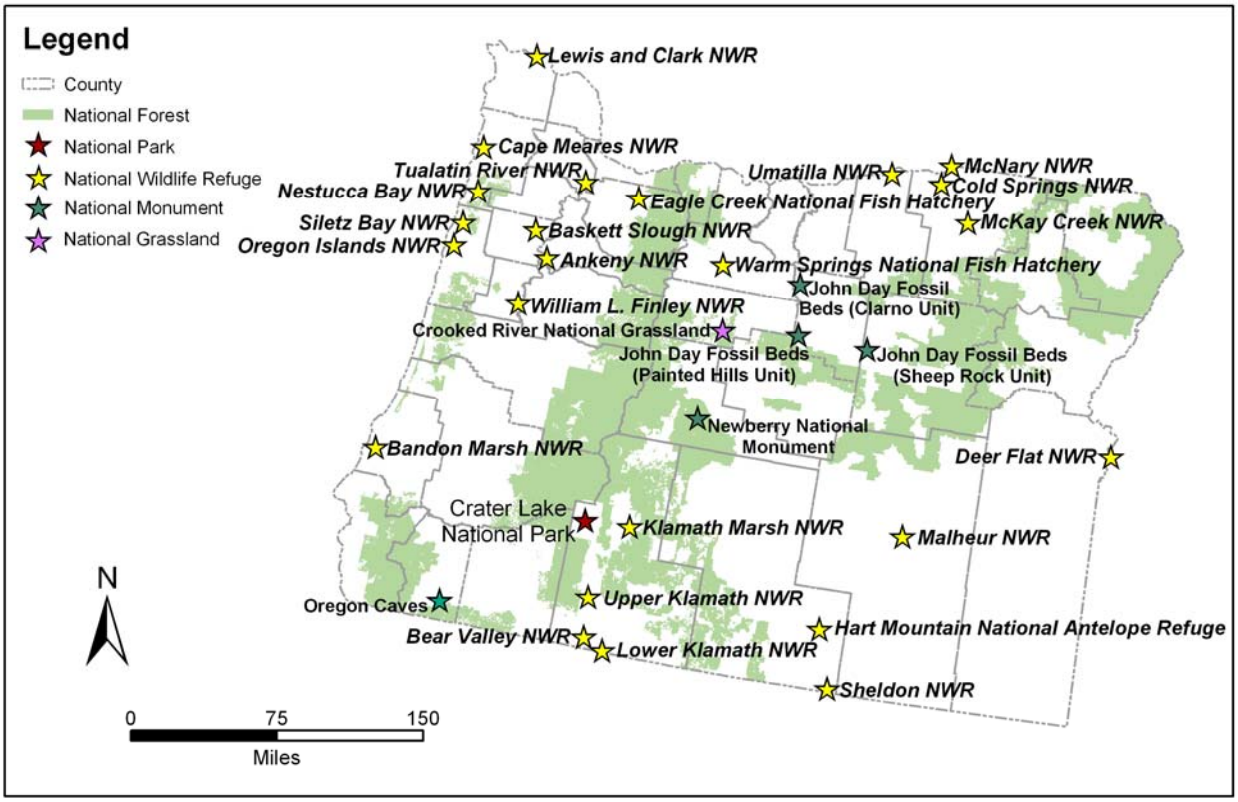

Figure 5. National forests, grassland, park, wildlife refuges, and monuments in the ROI.

Public land provides recreational activities such as hunting, hiking, camping, fishing, biking, and backpacking. Hunting and fishing require State-issued licenses for both public and private land; however, American Indians with tribal treaty rights cannot be required to buy State fishing licenses (Columbia River Inter-Tribal Fish Commission [CRITFC] 2005a). A discussion of the economics associated with hunting, fishing, and other recreational activities is provided in Sections 3.7 and 4.7.

3.7 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

3.7.1 Definition of Resource

Socioeconomic analyses generally include investigations of population, income, employment, and housing conditions of a specific area. Socioeconomic issues that are significant and considered in detail in this analysis are farm and non-farm employment and income, farm production expenses and returns, agricultural land use, and recreation spending in the ROI.

In addition to these characteristics, populations of special concern are identified and analyzed for environmental justice impacts. EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 FR 32, 1995), requires that Federal agencies:

> "…make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations..."

Race and ethnicity are two distinct categories of minority populations. A minority population can be described by either category, or by a combination of the two. Race as defined by the U.S. Census Bureau (USCB) includes White, Black or African American, American Indian or Alaskan Native, Asian, and Native Hawaiian or Other Pacific Islander (USCB 2001). Ethnicity is defined as either being of Hispanic or Latino origin and any race, or not of Hispanic or Latino origin and any race (USCB 2001). Hispanic or Latino origin is further defined as "a person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin regardless of race" (USCB 2001). A minority population can be described as being composed of a minority group and exceeding 50 percent of the population in an area or the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population (CEQ 1997a).

National poverty thresholds are measured in terms of household income and are dependent upon the number of persons within the household. Individuals falling below the poverty threshold are considered low-income individuals. USCB census tracts where at least 20 percent of the residents are considered poor are known as poverty areas. When the percentage of residents considered poor is greater than 40 percent, the census tract is considered an "extreme poverty area" (USCB 1995).

3.7.2 Region of Influence

The ROI for analysis of socioeconomics and environmental justice is the land within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin proposed for enrollment in CREP and listed in Section 1.2.1.

3.7.3 Affected Environment

3.7.3.1 Demographic Profile

The total population within the ROI was 3,421,399 people in 2000, which was almost a 17 percent increase from the population of 1990 (USCB 1993a, 2003a). In 2000, approximately 79 percent of the total population was located in urban areas or urban clusters, and 21 percent of the population was located within rural areas (USCB 2003b). This was an increase of approximately 9 percent from the 1990 urban population (USCB 1993b).

As reported by USCB (2003a), the 2000 demographics for the non-Hispanic ROI population were 90.8 percent White, 1.7 percent Black or African American, 1.3 percent American Indian or Alaska Native, 3.2 percent Asian, 0.2 percent Native Hawaiian or Pacific Islander, and 2.8 percent all other races or combination of races. Hispanic or Latino of any race accounts for 8.0 percent of the population. The total minority population within the ROI was 563,783 or 16.5 percent of the total ROI population. Overall the ROI is not a location of a concentrated minority population; however, it is important to note that there are several American Indian reservations within the ROI that do have concentrated minority populations including the Umatilla and Warm Springs reservations (Table 8).

In 2002, there were 65,555 farm operators managing 40,033 farms in the ROI (USDA 2004b). Data collected for a maximum of three operators per farm indicated that less than 5 percent of these were minority operators (USDA 2004b).

3.7.3.2 Non-Farm Employment and Income

Between 1990 and 2003, the non-farm labor force within the ROI ranged from 1,491,733 in 1993 to 1,858,879 in 2003 (Bureau of Labor Statistics [BLS] 2003). Non-farm employment also ranged during this period from a low of 80,649 positions in 1995 to a high of 152,151 positions in 2003 (BLS 2003).

The unemployment rate within the ROI varied from a high of 8.2 percent in 2003 to a low of 4.8 percent in 1995 (BLS 2003).

Table 8. Tribal and reservation population, size, and location of reservations and off-reservation trust land in the ROI.

Reservation/Off-Reservation Trust Land	Members	Population in 2000	Area (acres)	County
Burns Paiute	341	148	13,738	Harney
Coos, Lower Umpqua, and Siuslaw	754	NA[1]	NA[1]	Coos
Coquille	819	128	6,512	Coos
Cow Creek	1,289	NA[1]	NA[1]	Douglas[2]
Grand Ronde	4,926	30	11,040	Yamhill
Klamath	3,466	NA[1]	NA[1]	Klamath[2]
Siletz	4,094	182	4,204	Lincoln
Umatilla	2,447	1,427	172,882	Umatilla
Warm Springs	3,980	3,038	644,000	Wasco, Jefferson, Marion, Clackamas, Gilliam

[1] No current land base

[2] Reservation in planning stage

Source: Northwest Area Foundation 2004, Legislative Commission on Indian Services 2004

Median household income within the ROI in 1999 ranged from $28,750 in Wheeler County to $52,122 in Washington County (USCB 2003c). The average poverty rate for the ROI in 1999 was 11.6 percent, and varied from a high of 18.6 percent in Malheur County to a low of 6.6 percent in Clackamas County (USCB 2003d). The ROI would not be considered a poverty area.

3.7.3.3 Farm Employment and Income

The average wages for agricultural employment in Oregon are among the highest in the U.S. (Currey 2001). As reported by the 2002 Census of Agriculture (USDA 2004b), there were 122,845 hired farm workers on 10,978 of the 40,033 farms within the ROI in 2002, accounting for a payroll of $620,422,000. Table 9 lists the hired farm and contract labor costs per county within the ROI and labor costs as a percentage of total production costs. In 1997, the total hired farm and contract labor costs were $544,062,000, which was 23.6 percent of total production costs. In 2002, the total hired farm and contract labor costs were $683,186,000, which was 24.5 percent of total production costs.

The Bureau of Economic Analysis (BEA) (2004) reported a realized net farm income of $67,737,000 in 2002. This was a decrease of 86 percent as compared to the 1992 net farm income. BEA (2004) also reported that total government payments to farms within the ROI were $80,290,000 in 2002, a decrease of 18 percent from 1992. Farm wages and perquisites in 2002 were $606,764,000, which was an increase of 45 percent over those of 1992. These costs were a significant contributor to the 87 percent reduction in net farm proprietors' income within the ROI from 1992 (BEA 2004).

3.7.3.4 Farm Production Expenses and Returns

In 2002, farm production expenses were $2,786,838,000 within the ROI. This is a slight increase over the 1997 figure of $2,589,342,000 (adjusted to 2002 dollars) (USDA 2004b). Using the 2002 acreage in active farm production (17,080,422 acres), the average cost per acre within the ROI in 2002 was $163.16

(USDA 2004b). The cost per acre of agricultural inputs (e.g., seed and fertilizers), less hired farm labor and contract farm labor, was $123.16 (USDA 2004b). Average net cash return per farm within the ROI was $15,156 in 2002 (USDA 2004b). The average net cash receipts per acre within the ROI in 2002 was $35.49 (USDA 2004b). Table 10 lists the average farm production expenses and return per dollar of expenditure in 2002 within each county in the ROI. Table 11 lists the average value of land and buildings and the average value of machinery and equipment per farm in 2002 within each county in the ROI.

3.7.3.5 Current Agricultural Land Use Conditions

In 2002, 14,272,846 acres of land within the ROI were actively used for agricultural purposes including cropland, hay land, and pastureland. This was a 5.4 percent decrease from 1997 (USDA 2004b). Table 12 lists the acreage for different agricultural land uses in 1992 and 1997 and the percent change during that period. In 1997, 546,937 acres within the ROI were enrolled in either CRP or the Wetlands Reserve Program (WRP). In 2002, 483,237 acres were enrolled. As of October 2005, 528,146 acres within the ROI will be enrolled in CRP (FSA 2004b). The average value of farm land in 2003 was estimated at $1,200 per acre (ODA 2004).

3.7.3.6 Tribal Salmon Fishing

The Confederated Tribes of the Umatilla Indian Reservation and the Confederated Tribes of the Warm Springs Reservation of Oregon have reserved rights to anadromous fish in accordance with treaties signed in 1855. As noted by CRITFC (2005b), salmon play an integral role in tribal religion, culture, and economics. Wholesale salmon buyers had previously offered tribal fishers between $0.50 and $0.80 per pound, which usually failed to even cover fishing costs (CRITFC 1999). Direct or "over-the-bank" sales to the public, occurring seasonally along the Columbia River from the Bonneville Dam near Portland east to McNary Dam near Umatilla, allow tribal fishers to support their families and continue their traditional livelihood. However, the loss and degradation of aquatic habitat has resulted in declining wild salmon populations, and tribal fisheries managers must reduce harvests in response to declining populations.

Table 9. Hired farm and contract labor as a percentage of total production.

Area	2002				1997			
	Hired Farm Labor ($1000)	Contract Labor ($1000)	Total Production Expenses ($1000)	Labor as a Percent of Total Production Expenses	Hired Farm Labor ($1000)[1]	Contract Labor ($1000)[1]	Total Production Expenses ($1000)[1]	Labor as a Percent of Total Production Expenses
Oregon	620,422	62,764	2,786,838	24.5	557,008	54,192	2,589,342	23.6
Baker	4,316	356	43,672	10.7	3,111	698	41,913	9.1
Benton	14,244	2,684	55,430	30.5	10,381	2,757	58,392	22.5
Clackamas	98,199	6,602	267,319	39.2	76,016	5,391	231,762	35.1
Clatsop	1,332	94	6,730	21.2	718	116	6,547	12.7
Columbia	4,245	1,122	27,435	19.6	4,209	379	18,386	25.0
Coos	2,750	270	22,556	13.4	4,186	563	26,463	17.9
Crook	3,805	610	30,335	14.6	3,153	502	30,113	12.1
Curry	4,161	268	14,660	30.2	2,008	421	10,150	23.9
Deschutes	2,213	577	27,406	10.2	2,448	644	26,821	11.5
Douglas	7,566	1,639	47,168	19.5	2,348	663	34,759	8.7

Table 9. (continued).

Area	2002				1997			
	Hired Farm Labor ($1000)	Contract Labor ($1000)	Total Production Expenses ($1000)	Labor as a Percent of Total Production Expenses	Hired Farm Labor ($1000)[1]	Contract Labor ($1000)[1]	Total Production Expenses ($1000)[1]	Labor as a Percent of Total Production Expenses
Gilliam	2,229	385	21,598	12.1	2,797	218	21,293	14.2
Grant	2,257	948	18,454	17.4	1,975	330	19,848	11.6
Harney	3,749	421	32,204	12.9	4,386	781	37,187	13.9
Hood River	22,955	1,706	54,160	45.5	23,586	1,041	56,312	43.7
Jackson	16,645	2,586	60,476	31.8	16,349	351	51,710	32.3
Jefferson	7,614	255	38,083	20.7	6,262	254	38,370	17.0
Josephine	2,710	178	13,553	21.3	4,960	236	18,987	27.4
Klamath	11,978	1,410	96,553	13.9	10,905	1,118	90,267	13.3
Lake	6,727	1,004	50,938	15.2	3,916	1,635	34,190	16.2
Lane	17,966	1,322	87,582	22.0	14,376	1,557	86,893	18.3
Lincoln	1,392	328	7,773	22.1	782	64	4,989	17.0
Linn	18,816	1,636	122,930	16.6	21,747	1,414	149,696	15.5
Malheur	24,233	3,294	199,113	13.8	23,571	4,800	187,621	15.1
Marion	112,892	7,360	368,118	32.7	109,156	6,910	361,188	32.1
Morrow	19,276	2,200	217,048	9.9	14,813	2,434	129,507	13.3
Multnomah	18,853	1,268	47,614	42.3	14,331	406	35,917	41.0
Polk	16,168	2,125	70,096	26.1	14,573	2,065	75,853	21.9
Sherman	1,378	130	15,029	10.0	1,428	429	19,840	9.4
Tillamook	9,182	463	67,619	14.3	5,889	184	55,063	11.0
Umatilla	27,969	1,896	177,021	16.9	29,189	3,987	203,891	16.3
Union	5,555	1,716	55,785	13.0	6,071	1,476	47,802	15.8
Wallowa	2,503	415	24,332	12.0	2,060	347	24,564	9.8
Wasco	11,606	353	44,487	26.9	15,928	734	49,767	33.5
Washington	60,630	9,369	189,683	36.9	50,473	6,492	149,793	38.0
Wheeler	1,097	67	7,243	16.1	736	37	7,293	10.6
Yamhill	51,211	5,705	156,634	36.3	48,174	2,758	146,195	34.8

[1]*Value in 2002 dollars.*
Source: USDA 2004b

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Table 10. Average farm production expenses and return per dollar of expenditure in 2002.

Area	Average Size of Farm (acres)	Average Total Farm Production Expense ($)	Average Cost per Acre ($)	Average Net Cash Return per Farm ($)	Average Net Cash Return per Acre ($)	Average Return per $ Expenditure ($)
Oregon	427	69,575	163	15,156	35	0.22
Baker	1,237	62,211	50	8,958	7	0.14
Benton	143	60,912	426	35,172	246	0.58
Clackamas	46	57,254	1,245	15,732	342	0.27
Clatsop	90	27,137	302	3,994	44	0.15
Columbia	71	31,354	442	3,254	46	0.10
Coos	193	30,115	156	2,734	14	0.09
Crook	1,369	44,092	32	11,411	8	0.26
Curry	340	70,141	206	4,244	12	0.06
Deschutes	85	16,834	198	-4,351	-51	-0.26
Douglas	185	22,186	120	648	4	0.03
Gilliam	4,122	139,345	34	8,634	2	0.06
Grant	2,265	46,718	21	7,211	3	0.15
Harney	3,006	61,108	20	10,915	4	0.18
Hood River	52	95,859	1,843	14,133	272	0.15
Jackson	129	30,981	240	-1,938	-15	-0.06
Jefferson	1,639	88,979	54	6,479	4	0.07
Josephine	44	18,566	422	-1,499	-34	-0.08
Klamath	572	78,755	138	14,146	25	0.18
Lake	1,619	110,256	68	19,608	12	0.18
Lane	91	34,039	374	3,073	34	0.09
Lincoln	88	20,728	236	2,205	25	0.11
Linn	164	52,467	320	14,527	89	0.28
Malheur	924	156,535	169	29,130	32	0.19
Marion	106	114,750	1,083	24,563	232	0.21
Morrow	2,999	581,899	194	95,292	32	0.16
Multnomah	48	67,252	1,401	31,389	654	0.47
Polk	128	52,743	412	22,039	172	0.42
Sherman	2,418	71,229	29	28,679	12	0.40
Tillamook	119	203,672	1,712	75,301	633	0.37
Umatilla	808	107,351	133	28,820	36	0.27

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Table 10. (continued).

Area	Average Size of Farm (acres)	Average Total Farm Production Expense ($)	Average Cost per Acre ($)	Average Net Cash Return per Farm ($)	Average Net Cash Return per Acre ($)	Average Return per $ Expenditure ($)
Union	482	56,121	116	4,509	9	0.08
Wallowa	1,030	47,993	47	2,331	2	0.05
Wasco	2,020	82,535	41	6,926	3	0.08
Washington	69	99,728	1,445	26,047	377	0.26
Wheeler	4,501	43,371	10	1,087	0	0.03
Yamhill	84	67,254	801	26,121	311	0.39

Source: USDA 2004b

Table 11. Average value of land and buildings and machinery and equipment per farm in 2002.

Area	Average Size of Farm (acres)	Average Value of Land and Buildings per Farm ($)	Average Value of Machinery and Equipment per Farm ($)
Oregon	427	508,882	63,462
Baker	1,237	662,738	63,215
Benton	143	507,363	62,936
Clackamas	46	418,469	44,015
Clatsop	90	285,734	35,520
Columbia	71	337,543	34,404
Coos	193	376,831	37,710
Crook	1,369	699,605	59,914
Curry	340	790,974	51,513
Deschutes	85	423,461	23,540
Douglas	185	346,175	36,772
Gilliam	4,122	1,288,176	167,689
Grant	2,265	776,913	64,512
Harney	3,006	815,042	69,141
Hood River	52	521,070	49,621
Jackson	129	428,469	43,963
Jefferson	1,639	830,129	123,348
Josephine	44	211,540	28,095
Klamath	572	527,619	97,123
Lake	1,619	773,588	136,503
Lane	91	363,136	38,602
Lincoln	88	318,161	23,618

Table 11. (continued).

Area	Average Size of Farm (acres)	Average Value of Land and Buildings per Farm ($)	Average Value of Machinery and Equipment per Farm ($)
Linn	164	516,273	65,318
Malheur	924	550,305	106,943
Marion	106	510,810	87,306
Morrow	2,999	1,127,290	144,885
Multnomah	48	505,733	46,930
Polk	128	548,559	56,604
Sherman	2,418	889,122	138,674
Tillamook	119	557,675	81,089
Umatilla	808	605,831	82,553
Union	482	510,520	193,196
Wallowa	1,030	596,339	50,768
Wasco	2,020	782,204	79,336
Washington	69	537,825	47,656
Wheeler	4,501	1,217,864	54,371
Yamhill	84	541,936	58,874

Source: USDA 2004b

Table 12. Acreage change for different agricultural land uses from 1997 to 2002.

Land Use	Acres in 1997	Acres in 2002	Percent Change
Cropland[1]	1,307,505	1,300,286	-0.6
Hay land[2]	4,171,974	4,117,101	-1.3
Pastureland[3]	9,601,536	8,855,459	-7.8
Woodland[4]	604,712	622,134	2.9
House lots, ponds, roads, wasteland, etc.	686,342	641,175	-6.6
CRP and WRP[5]	546,937	483,237	-11.6
Active Agriculture[6]	15,081,015	14,272,846	-5.4
Total Land in Farms	17,658,213	17,080,422	-3.3

[1] *Cropland excludes all harvested hay land and cropland used for pasture or grazing.*

[2] *Hay land includes all harvested and cropland used for pasture or grazing.*

[3] *Pastureland includes all pasture and rangeland, other than cropland and woodland pastured.*

[4] *Woodland excludes all wooded pasture lands.*

[5] *Operations with land enrolled in the CRP or WRP are counted as farms if they received $1,000 or more in government payments.*

[6] *Active agricultural lands include the sum of cropland, hay land, and pastureland.*

Source: USDA 2004b

3.7.3.7 Recreational Values

3.7.3.7.1 Hunting

According to the National Survey of Fishing, Hunting and Wildlife Associated Recreation (NSFHWAR) (FWS and USCB 2001), 248,000 non-resident and resident hunters, ages 16 and up, participated in hunting-related activities within Oregon in 2001. This number decreased by 45,000 from the 1996 survey. Hunting-related expenditures contributed approximately $365 million in revenue to the State of Oregon. Of these hunting-related expenditures, $109 million went to trip-related expenses, $233 million to equipment, and $24 million to expenses such as membership dues, licenses, and permits. Of the hunters surveyed, 226,000 hunted big game, 60,000 hunted small game, and 42,000 hunted migratory birds (some individuals hunted in more than one category) (FWS and USCB 2001).

Hunting license sales in 2003 generated significant revenue for the State of Oregon. Black-tailed deer licenses alone brought in $3,404,788. Rocky Mountain and Roosevelt elk licenses created revenue of $4,618,281; black bear licenses created $290,300; and cougar licenses generated $111,590. Revenue from the sale of pronghorn antelope and big horn sheep hunting licenses garnered $67,475 and $9,660, respectively, for Oregon (ODFW 2004e).

Wildlife stamps have also generated revenue for Oregon. The ODFW sold 56,962 upland game stamps statewide to create revenue of $447,385 in 2003 (ODFW 2004e). In that same year, waterfowl stamps created revenue of $185,310 (2004e).

3.7.3.7.2 Fishing

The NSFHWAR estimated that 687,000 resident and non-resident anglers, ages 16 and up, participated in fishing related activities in 2001 (FWS and USCB 2001). Of that total, 513,000 were residents of Oregon, while the remaining 174,000 resided in other states. Fishing-related expenditures in 2001 resulted in approximately $602 million in revenue to the State of Oregon from non-resident and resident anglers. Fishing-related expenditures included $259 million for trip-related expenses, $245 million for equipment, and $97 million for other expenses such as licenses, permits, and membership dues. Licenses and tags in 2003 created revenue of roughly $18 million for the State (ODFW 2004f). The number of anglers actively fishing in Oregon increased from 658,000 individuals in 1996 to 687,000 in 2001. The NSFHWAR indicated that trout were the game fish species of preference for anglers, while steelhead and salmon were close seconds (FWS and USCB 2001). Other game species include salmon, shad, steelhead, sturgeon, trout, bass, bluegill, catfish, crappie, sunfish, perch, walleye, and mullet (ODFW 2004c).

3.7.3.7.3 Wildlife Viewing

Approximately 1.7 million individuals participated in wildlife viewing activities in Oregon (FWS and USCB 2001). Wildlife viewing includes non-consumptive activities, such as photographing, observing, or feeding wildlife. Wildlife viewing activities created revenue of $769 million for Oregon in 2001. Expenditures included $305 million for trip-related expenses, $340 million for equipment, and $124 million for other related expenses such as donations, memberships, and contributions. The number of individuals that left their home areas to participate in wildlife viewing increased from 715,000 in 1996 to 910,000 in 2001. The number of participants that viewed wildlife from around their own homes increased from 972,000 in 1996 to 1.2 million in 2001. The 2001 survey indicated that individuals who participated in wildlife viewing away from their homes most often went to publicly-owned, wooded areas (FWS and USCB 2001).

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter discloses the potential environmental consequences or impacts to resources described in Chapter 3 that may result from implementing the proposed action or the no action alternative. As this analysis is programmatic and not site-specific, resource impacts may not always be quantifiable. In compliance with guidelines contained in NEPA and CEQ regulations, each individual CREP agreement will require a site-specific environmental evaluation to be completed by FSA.

4.1 BIOLOGICAL RESOURCES

4.1.1 Alternative 1—No Action

Under the no action alternative, land eligible for CREP enrollment would remain in agricultural production and the proposed CPs would not be implemented. Water resources, vegetation, and wildlife habitat in these areas are likely to continue to be degraded and polluted from runoff of agricultural chemicals, sediment, and animal waste. Without implementation of the proposed CPs, poor water quality would continue to limit the viability of threatened and endangered aquatic species. Impaired waterways within the State are likely to remain as such, exposing terrestrial and aquatic species to harmful pathogens, heavy metals, poor water temperature, low levels of dissolved oxygen, and fecal coliform.

4.1.2 Alternative 2—Proposed Action

Implementation of the proposed action would result in positive long-term impacts to biological resources throughout Oregon. Removing previously harvested agricultural acres from production and implementing the proposed CPs would be beneficial to native vegetation, terrestrial and avian wildlife, aquatic wildlife, and threatened and endangered species; all of which have been displaced from these areas due to current and historical agricultural practices.

4.1.2.1 Vegetation

All of the proposed CPs would add or enhance native vegetation and result in a positive impact on vegetation resources within the ROI. The addition of Filter Strips (CP21) would create narrow bands 20–150 feet in width of grass or other permanent native vegetation on areas adjacent to streams, lakes, ponds, wetlands, water-filled ditches, sinkholes, and groundwater recharge areas (FSA 2003b). Implementation of Riparian Buffers (CP22) would create areas 35–180 feet in width of trees and shrubs on acreage located by perennial or intermittent streams, lakes, ponds, wetlands, seeps, and areas of groundwater recharge (FSA 2003b). Wetland Restoration (CP23) would involve planting or restoring native woody vegetation or grasslands associated with wetland areas to restore the function of the wetland (NRCS 2000a). Implementation of Marginal Pastureland Wildlife Habitat Buffers (CP29) would result in the enhancement or restoration of existing vegetation in marginal pasturelands with primary grass, shrub, and forb communities to improve water quality of perennial or intermittent streams (FSA 2003b). Marginal Pastureland Wetland Buffers (CP30) would enhance or restore native plant communities associated with wetland resources (FSA 2003b).

To restore or enhance native vegetation within the ROI, some herbicides may be used. Herbicides used during CP implementation would be pre-approved by the governing Federal agency of the specific site and applied strictly according to the label directions to minimize the threat to biological resources within the area.

4.1.2.2 Terrestrial Wildlife

Implementation of the proposed CPs would enhance and restore wildlife habitat resulting in a beneficial impact to wildlife species within the ROI. The establishment of filter strips would create narrow bands of grasses or other permanent vegetation that would provide valuable wildlife habitat. Filter strip areas are often used by ground-nesting bird species for nesting cover and winter thermal cover. Filter strips also offer grazing forage for wildlife as well as nectar and pollination areas for insects (NRCS 2000b). Acreage enrolled in CREP would be planted with native vegetation; however, landowners may also request introduced grasses to create vegetative diversity. Establishing a filter strip of native grasses on one side of a water body and a filter strip of introduced grasses on another will create diverse wildlife habitats adjacent to each other (NRCS 2000b). Filter strips may require mowing to stimulate vegetative growth. Mowing should take place before or after the nesting time for ground-nesting birds, which generally occurs during the month of August.

The establishment of riparian buffers would create areas of native trees and shrubs located adjacent to streams, lakes, ponds, wetlands, seeps, and groundwater recharge areas. The woody vegetation established in buffers would provide food, cover, and travel corridors for resident wildlife. Riparian buffers 35–180 feet wide may be attached to pre-existing vegetation, such as windbreaks or shelterbelts (FSA 2003b). Connecting riparian buffers with pre-existing vegetation would maximize local forest habitat for wildlife. Riparian buffers could be planted in specific patterns and with vegetation types to benefit resident wildlife.

Riparian buffers should not be planted in areas of grassland that currently do not contain woody vegetation, as this may increase predation and brood parasitism on grassland nesting species. Non-game migratory songbirds often use grassland areas for nesting and brooding areas. Introducing woody vegetation into these areas could have a detrimental effect on grassland species. Also, as buffers mature, periodic harvesting of some trees may be necessary. Such harvest may temporarily disrupt daily migration patterns of resident wildlife.

Wetland restoration would enhance wildlife habitat and provide valuable resources for migratory shorebirds, waterfowl, reptiles, amphibians, and other terrestrial wildlife species. Approximately 30 percent of Oregon's 164 resident terrestrial vertebrate wildlife species use wetland resources regularly for food, water, nesting, and thermal cover (Oregon Habitat Joint Venture [OHJV] 2004). In addition, millions of migratory bird species use these wetlands as stopover areas from the Pacific Flyway (OHJV 2004).

Human disturbance for maintenance procedures of wetland-related CPs should be minimal during the presence of waterfowl. Regular human disturbance may cause waterfowl to relocate to other areas, lowering the productivity of these species or abandonment of young broods. Screened buffer zones could be used to minimize disturbance to these species during maintenance procedures (NRCS 2000a).

Implementation of wildlife habitat buffers and wetland buffers would establish or restore native vegetation communities. While the established vegetation would be planted primarily to restore water quality, these areas would also be valuable habitat for nesting, brooding, thermal cover, food source, and travel corridors for wildlife. Buffers would establish vegetation adjacent to water sources often frequented by resident and migratory wildlife, offering these species cover from predation and thermal cover in adverse weather.

4.1.2.3 Aquatic Wildlife

Implementation of the proposed CPs would restore and enhance aquatic species habitat, as well as improve overall water quality and temperature. Establishing permanent vegetative filter strips would reduce sediment, nutrient, pesticide, and other contaminant runoff into water sources. Pollutants would be

taken up by the vegetation, while sediment would settle to the bottom of the strips rather than into water sources. Currently, high sediment loading accounts for a large portion of water body impairments in Oregon (ODEQ 2002). These sediments may cover larger, gravel-like sediment lining the bottom of water channels. These gravel substrates are required by several aquatic species including trout for spawning areas.

Riparian Buffers (CP22) and Marginal Pastureland Wildlife Habitat Buffers (CP29) would establish native woody and non-woody vegetation around water sources in the ROI. The addition or enhancement of native vegetation would help promote a more diverse selection of aquatic insects available for fish consumption. In the long term, the root systems of trees established in the riparian buffers would stabilize stream banks, resulting in less sediment runoff. Once the buffers are mature, fallen trees and debris would eventually create cover areas for aquatic species and induce channel morphology that would create pools, riffles, and gravel beds for spawning habitat. Shade from overstory trees would promote cooler water and higher oxygen contents in streams and rivers. High water temperatures reduce the amount of dissolved oxygen water can retain. High temperature and low dissolved oxygen content are currently among the highest impairments to Oregon surface water resources (ODEQ 2002). In addition, riparian area buffers would filter out large amounts of industrial and agricultural pollution entering streams.

Wetland Restoration (CP23) and the establishment of Marginal Pastureland Wetland Buffers (CP30) would restore or enhance the native vegetation associated with wetlands. Implementation of these CPs would restore the function of degraded wetlands and buffer areas around wetlands to reduce pollutant and sediment loading. Wetlands benefit all aquatic species by acting as nutrient sinks, reducing pollutants such as coliform, and acting as areas for sediment to settle out of water columns. Freshwater fish, such as walleye, yellow perch, bullhead catfish, and bluegill, use wetlands in the floodplains of large rivers for spawning areas and often leave open lakes to spawn in shallow wetlands. Commercial and game fish, such as striped bass, salmon, and shellfish species, depend on the presence of coastal wetlands for spawning and rearing areas (USFS et al. 1995).

4.1.2.4 Threatened, Endangered, and Sensitive Species and Their Defined Critical Habitat

The majority of Oregon's threatened and endangered species are fish, primarily salmonids. Salmonid habitat analysis performed by the State of Oregon in 2000 indicated that good habitat would comprise all or some of the following benchmarks: (1) greater than 35 percent pool area, (2) less than 12 percent fine substrate in riffles, (3) greater than or at least 35 percent gravel substrate in riffles, (4) a volume of greater than 20 woody debris pieces lodged within 100 meters of the water channel, (5) greater than 70 percent shaded, and (6) riparian conifer density of greater than 150 large conifers per 305 meters (Flitcroft et al. 2002). Under the proposed action, the benchmark criteria would be reached over time, resulting in a positive effect on threatened and endangered fish species.

Filter Strip (CP21) establishment would reduce the amount of fine sedimentation into water sources. Stream bed spawning areas for most salmon, steelhead, trout, and sucker species should consist of pea- to orange-size gravel substrate that is free of fine sediments (Pacific States Marine Fisheries Commission [PSMFC] 2002). Juvenile mortality of these species is often due to predation and human disturbance that causes high siltation rates and ruin spawning beds or smother eggs. Implementation of filter strips would reduce fine sedimentation and the amount of pollutants entering water sources.

Implementation of Riparian (CP22) and Marginal Pastureland Wildlife Habitat Buffers (CP29) would provide the highest benefit to threatened and endangered fish species in Oregon. Riparian buffers would be planted adjacent to water sources to minimize pollutant and sediment runoff. The establishment of overstory vegetation would create shade over the water, resulting in decreased water temperatures and increased dissolved oxygen content, two of the highest impairments to Oregon water sources (ODEQ

2002). Salmonids are primarily cold water species that require a temperature of approximately 39.2–55.4 degrees Fahrenheit (4–13 degrees Celsius) (Pacific Fisheries Management Council [PFMC] 2000). In times of increased temperature, egg emergence may be accelerated causing hatching of smaller than average young, increased susceptibility to parasites in adults and young, and an increase in metabolism that makes it necessary for the fish to feed more often. Cooler water also holds dissolved oxygen more efficiently than warmer water. A decrease in dissolved oxygen reduces the survival of salmonid eggs, causes young to be smaller at emergence, increases physiological stress, and reduces salmonid growth (PFMC 2000). After riparian vegetation is mature, debris and downed woody vegetation would help create pools and cover from predation within streams, creating juvenile rearing habitat for listed salmonids. Vegetation would also stabilize stream banks, resulting in less fine sediment runoff into streams and allowing gravel substrate to be available for spawning habitat.

Wetland Restoration (CP23) and the implementation of Marginal Pastureland Wetland Buffers (CP30) would restore and enhance wetlands within Oregon. Wetlands and estuaries offer juvenile-rearing habitat for some salmonids, as well as act as nutrient sinks and water purification areas that restore water quality. The draining and filling of wetlands and coastal estuaries has resulted high numbers of salmonid mortalities (PSMFC 2002). During their lifecycle, species such as chum salmon rely heavily on wetlands and coastal estuaries to feed on copepods, amphipods, and small crustaceans, as well as to provide areas of protection from predation. Wetland buffers would shade wetland and estuary areas resulting in decreased water temperature. Increased water temperature in wetlands leaves salmonids more susceptible to predation and disease.

Implementation of the proposed action is not expected to largely affect terrestrial or avian federally-listed species. Avian species may benefit from increased roosting and nesting areas. Terrestrial species may benefit from increased travel corridors and vegetative diversity. Implementation of CPs should not take place near or during breeding and nesting periods of listed species.

A biological assessment (BA) regarding CPs proposed in the Oregon CREP is currently underway. Section 7 consultation regarding threatened and endangered species within the ROI will be addressed in the completed BA. The BA will also address CP implementation including the use of herbicides, pesticides, fertilizers, lime, or any other such applications, as well as the timing of CP implementation (McMaster 2005, Appendix E). CP practices would be pre-approved by the governing agency to ensure no harm occurs to any fish or wildlife species, or to their associated habitats. Any use of herbicides, pesticides, fertilizers, or lime would be strictly according to label instructions and directions of the governing agency (McMaster 2005, Appendix E).

4.2 CULTURAL RESOURCES

4.2.1 Alternative 1—No Action

Under the no action alternative, farming practices in land proposed for CREP enrollment would continue. Though the continuation of farming in previously disturbed areas is not expected to impact cultural resources, a change in farming practices that would disturb previously undisturbed areas may result in impacts to known or unknown archaeological, architectural, or traditional cultural resources.

4.2.2 Alternative 2—Proposed Action

As this PEA does not address specific locations, detailed cultural resource information and determination of effects is not offered at this time and all actions should be reviewed with ORSHPO, tribes, and participating State and Federal agencies during the planning and implementation phases. When specific

sites are identified by legal description and actions are proposed, a Class I literature search should be conducted to determine if any previous cultural resource inventories have been conducted on these properties and if any further investigations or mitigations are warranted.

Potential may be great for recorded and unidentified archaeological sites to exist on CREP properties, especially those near water sources, areas of known habitation or other cultural activities, certain topographic or geologic features, and prehistoric and historic trails.

The following assumptions were considered during this cultural resources analysis:

- Actions discussed in this PEA may have potential direct, indirect, and cumulative effects on cultural resources.

- All project planning and work initiated under this PEA would meet required Federal and State historic preservation statutes, regulations, and guidelines. Any permitting or ground-disturbing actions would be preceded by consultation with ORSHPO and tribal representatives, followed by archival and field investigations as warranted.

- Expected and cumulative adverse effects on identified cultural resources, including physical and visual impacts, would be determined and mitigation plans developed for heritage resource protection and for the treatment of TCPs and unanticipated discoveries.

- Enhancement projects would be conducted on a mosaic of Federal, State, and private lands and different ecologies. Some environmental settings have potential for more cultural and paleontological resources. Each project would require participation by and consultation with several public and private agencies, some of which would have oversight and permitting roles.

4.3 WATER RESOURCES

4.3.1 Alternative 1—No Action

Under the no action alternative, the CPs described in Section 2.2 would not be implemented. Water resources within the State of Oregon are likely to continue to be subject to impairments such as low dissolved oxygen content, the presence of fecal coliform, high sedimentation levels, unbalanced pH levels, fluctuating water temperature, presence of heavy metals, DDT, *E. coli* bacteria, and aquatic weeds and algae blooms.

4.3.2 Alternative 2—Proposed Action

4.3.2.1 Surface Water

Implementation of the proposed CREP agreement would have long-term positive effects on surface water used for drinking, cold water fisheries, agriculture, industrial water supply, and recreation. The CPs described in Section 2.2 are designed primarily to improve water quality.

Under Alternative 2, Filter Strips (CP21) and Riparian Buffers (CP22) would be established on areas immediately adjacent to permanent bodies of water. Filter strips and riparian buffers are designed to reduce the runoff of sediments, nutrients, pesticides, and other contaminants by slowing the velocity of runoff. A decrease in velocity allows sediments to settle and soluble pollutants to be taken up by vegetation before reaching water bodies.

Wetland Restoration (CP23) is designed to restore the functions of natural wetlands. Wetlands purify water by removing phosphorus and nitrogen content commonly found around agricultural communities. Removing phosphorus and nitrogen from water sources reduces algae blooms that deplete the oxygen content in surface water. Implementation of Marginal Pastureland Wetland Buffers (CP30) would restore or enhance plant communities associated with existing or degraded wetlands to reduce nutrient and pollutant levels entering surface water.

Marginal Pastureland Wildlife Habitat Buffers (CP29) would establish buffers of native plant communities on marginal pastureland. These buffers would be situated adjacent to permanent water bodies to stabilize stream banks and reduce pollutant and sediment runoff.

Installation of CPs may involve the clearing of vegetation and some soil disturbance. These activities may result in high levels of sediment runoff, resulting in temporary negative impacts to surface water quality. The use of filter fencing or similar mitigation practices would reduce these impacts.

4.3.2.2 Groundwater

Implementation of the proposed CREP agreement would result in a positive effect on groundwater quality within the State. The enhancement or addition of native vegetation through the proposed CPs would slow the rate of rainwater flow over the ground, creating greater rates of aquifer recharge. The improvement in surface water quality discussed previously would result in improved quality of groundwater recharged by these surface waters. The leaching of nutrients into the groundwater would be reduced due to the discontinuation of agricultural practices on enrolled acreage.

4.3.2.3 Wetlands

Implementation of the proposed action would result in a positive effect on wetlands adjacent to acreage enrolled in CREP. Marginal Pastureland Wetland Buffers (CP30) would be established on degraded pasturelands to restore hydrology and plant communities associated with existing or degraded wetlands. These buffers are expected to enhance water quality and reduce the amount of nutrients and pollutants entering waterways. The removal of some land from agricultural use may affect the number and size of wetlands formed by anthropogenic features associated with agricultural activities such as reservoirs and drainage channels; however, this effect is expected to be minor.

4.3.2.4 Floodplains

The establishment of native vegetation on enrolled acreage may have a minor positive effect on floodplains. Implementation of the proposed CPs would help reduce erosion and improve the function of floodplains.

4.4 EARTH RESOURCES

4.4.1 Alternative 1—No Action

Under Alternative 1, the CPs described in Section 2.2 would not be implemented. The current rates of erosion and the changes in topography due to erosion would be expected to continue. There would be negligible effects to paleontological resources.

4.4.2 Alternative 2—Proposed Action

Long-term positive impacts to topography and soils are expected to occur under Alternative 2. Implementation of the proposed CPs would result in localized stabilization of soils and topography as a result of decreased erosion and runoff. In pasturelands, exclusion of cattle from streams and riparian areas

bordering streams would reduce stream bank destabilization, resulting in reduced rates of sedimentation and subsequent improvements to water quality. Establishing permanent vegetation on former croplands would reduce erosion by wind and water. Short-term disturbances to soils during implementation of CPs may include tilling or installation of various structures such as fences, breakwaters, and roads. These activities may result in temporary increases in soil erosion. Managed haying and grazing would not be conducted on enrolled CREP lands. There would be negligible effects to paleontological resources.

4.5 AIR QUALITY

Impacts to air quality in attainment areas would be considered significant if:

- Any national, State, or local ambient air quality standard is violated by pollutant emissions associated with the proposed action
- Sensitive receptors (e.g., residential areas, hospitals, daycare facilities, elementary schools, parks, hospices, and outdoor restaurants) are exposed to substantially increased pollutant concentrations associated with the proposed action
- Pollutant emissions associated with the proposed action exceed any significance criteria established by the state implementation plan.

4.5.1 Alternative 1—No Action

Implementation of Alternative 1 would not change existing air quality conditions. The CPs described in Section 2.2 would not be implemented.

4.5.2 Alternative 2—Proposed Action

Implementation of the CPs proposed in the Oregon CREP may have positive effects on air quality within the ROI. Establishing vegetation would increase the amount of pollutants removed annually by trees each year. Trees remove many pollutants from the environment including nitrogen dioxide, sulfur dioxide, ozone, carbon monoxide, and some particulate matter. A study conducted by Dr. Dave Nowak of the USFS estimated that in the metropolitan areas of Portland, Oregon, trees account for 2,000,000 pounds of pollutants being removed from the environment (American Forests 2004). Implementing the proposed CPs in Oregon may result in a benefit to air quality; however, it is not possible to quantify this benefit at this time.

Removing land from agricultural practices and establishing vegetation on these lands would reduce the amount of exposed bare soil within the State. Minimizing soil exposure would have long-term positive impacts to air quality standards at the local scale.

Implementation and maintenance procedures associated with the CPs may include activities such as tilling and burning. These activities may temporarily and negatively impact local air quality. Watering areas before and after tilling would reduce the amount of PM_{10} released into the air. Prescribed burns used during implementation would have a short-term negative impact on air quality. The amount of prescribed burning that would be required during implementation is not known, but it is not expected that impacts associated with burning would be significant.

Installation of various structures such as roads, firebreaks, and fences may require the use of heavy-duty diesel construction vehicles. Primary emissions from construction vehicles include carbon monoxide and

PM_{10}. Best management practices would be used during construction activities to reduce the amount of emissions.

4.6 RECREATIONAL RESOURCES

4.6.1 Alternative 1—No Action

Under Alternative 1, CREP would not be implemented. CPs would not be used to improve lands and waters used by the public for hunting, fishing, wildlife viewing, hiking, boating, swimming, and other water-related activities.

4.6.2 Alternative 2—Proposed Action

Implementation of Alternative 2 would have a positive and long-term impact on recreational resources within the CREP area. Establishing the proposed CPs would increase the availability and quality of habitat for terrestrial wildlife species. This, in turn, would increase the abundance of these species and increase the opportunities for wildlife viewing and hunting. The proposed CPs would improve water quality in the CREP area as well as those areas downstream. Improved water quality would support an increase in fish populations and provide for additional fishing opportunities. The increase in game and fish populations may increase hunting and fishing expenditures (e.g., equipment and licenses) and improve socioeconomic conditions in the area. In addition to hunting and fishing impacts, the proposed CPs would increase the desirability of land to be used for hiking or camping by improving overall aesthetics. Although construction activities may displace wildlife species during installation of the proposed CPs, this impact would be temporary.

4.7 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

4.7.1 Alternative 1—No Action

Under Alternative 1, CREP would not be implemented and socioeconomic conditions would continue to follow the trends associated with the State of Oregon and the Pacific Northwest region of the U.S. Unique and prime farmland areas would continue to be targeted for the purchase of conservation easements; however, the small percentage of farmland placed in conservation easements is not likely to contribute significantly to slowing farmland conversion.

The loss and degradation of anadromous fish habitat is likely to continue under Alternative 1. As a result, tribal fisheries managers would continue to reduce harvests in response to declining wild salmon populations.

As the ROI would not be considered an area of concentrated minority population or a poverty area, there would be no impacts to environmental justice as a result of selecting the no action alternative.

4.7.2 Alternative 2—Proposed Action

The implementation of Alternative 2 would result in a maximum of 100,000 acres being conserved for a period of 10–15 years. This action would result in a net present value of approximately $9 million (Appendix F). This estimate does not include the potential bonus payments for water right leases and contributions from TWO.

The proposed action would result in a maximum loss of 100,000 acres of agricultural land. In 2002, there were 122,845 hired farm workers on the 17,080,422 acres of farms within the ROI, accounting for a payroll of $620,422,000 (USDA 2004b). Implementation of Alternative 2 would potentially decrease the agricultural lands to 16,980,422 acres and may result in the loss of approximately 719 hired farm worker positions at an estimated cost of approximately $3.6 million per year when all 100,000 acres are under contract. The loss of these positions would account for less than 1 percent of the hired farm worker positions available in 2002. The loss of production on 100,000 acres would reduce the amount of total farm production expenditures, less hired farm labor and contract labor, by approximately $12.3 million per year, or less than 1 percent of the total 2002 farm production expenditures (USDA 2004b).

Based on average Oregon rental rates, CREP enrollment is estimated at an average of $90 per acre for the 100,000 acres proposed (Loop 2005). In addition, an annual incentive payment of 25 percent of annual rental payments for filter strips and 50 percent for buffers and wetland restoration and an average annual maintenance fee of $7.50 are provided to participants.

Three types of one-time incentive payments are also available under the proposed CREP agreement. The first is a signing incentive payment for CP21, CP22, CP29, and CP30 (Filter Strips, Riparian Buffer, Marginal Pastureland Wildlife Habitat Buffer, and Marginal Pastureland Wetland Buffer, respectively) of $10 per acre for each acre enrolled for each full year of the contract (USDA 2000). The second type, a practice incentive payment, would be equal to 40 percent of the total eligible cost of the installation of CP21, CP22, CP29, and CP30 (USDA 2000). The third type is a cumulative impact incentive payment. It is based on enrollment of at least 50 percent of a streambank within a 5-mile stream segment in CREP, and would equal four times the applicable base rental rate for each acre enrolled. For Wetland Restoration (CP23), a one-time incentive payment of 25 percent of the cost of hydrology restoration would be provided.

Under TWO, Riparian Buffer (CP22) implementation would be provided with additional payments. CWS would cover all implementation costs not covered by CCC or the State if the producer has CWS implement the practice. Producers would also receive annual incentive payments of $127.50 per acre for irrigated and between $39.00 and $102.94 per acre for non-irrigated croplands. Direct cumulative impact incentive payments would be provided when a total of at least 50 percent of a streambank, at least 2 miles long and within a 5-mile stream segment, is enrolled.

It is expected that enrollment in CREP would improve stream habitat for threatened and endangered fish species and wildlife habitat for game species such as black-tailed deer, sage grouse, and ring-necked pheasants. This may increase wildlife-related recreation opportunities and thus generate associated economic activity within the ROI. As reported by the Economic Research Service (ERS) (2004), non-market benefits from wildlife viewing associated with the implementation of CRP in the U.S. are estimated to be $737 million annually. In Oregon, Washington, and California, these benefits are estimated at $1 million. These are conservative estimates and do not include improved hunting for many species and the increased protection CRP land affords threatened and endangered species, for which good nationwide data do not exist (ERS 2004).

Hines, Sommer, and Petrulis (1991) noted that enrolling lands into CRP negatively affected agricultural-based industries such as transportation and processing. The replacement of expenditures that would have supported local agriculture-related industries with CRP payments is often spent on other commodities within the local community. Impacts are generally greater where agriculture is the dominant economic activity and CRP enrollment is high.

The purpose of the proposed action is to improve water quality and restore aquatic habitat. By implementing the CREP agreement, the loss and degradation of anadromous fish habitat due to

agriculture-related impacts would decrease. Tribes that rely on salmon for their religion, culture, and economics would be directly and positively affected by the proposed action.

As the ROI would not be considered an area of concentrated minority population or a poverty area, there would be no impacts to environmental justice as a result of the proposed action.

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5.0 CUMULATIVE IMPACTS AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.1 CUMULATIVE IMPACTS

5.1.1 Definition of Cumulative Impacts

As defined by CEQ regulations (40 CFR 30 part 1508.7, 2004):

> "Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency ('Federal or non-Federal') or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

CEQ guidance suggests that the first steps in assessing cumulative impacts involve defining the scope of the proposed action and other actions and evaluating the nature of potential interactions between the actions (CEQ 1997b). Scope must consider geographic and temporal relationships between the proposed action and other actions. Actions overlapping with or in proximity to the proposed action would be expected to have more potential for a relationship than those more geographically separated. Similarly, actions that coincide even partially in time would tend to offer a higher potential for cumulative effects.

For the purposes of this analysis, the ROI includes land within the Coastal Basin, the Columbia Basin, and the Interior Drainages Basin proposed for enrollment in CREP and listed in Section 1.2.1. The primary sources of information used to identify reasonably foreseeable future actions are public documents prepared by Federal, State, and local government agencies.

5.1.2 Past, Present, and Reasonably Foreseeable Future Actions

The Oregon NRCS manages the implementation of several programs that are focused on conserving and enhancing natural resources within the State. These programs are summarized in the following subsections to demonstrate the types of past, present, and reasonably foreseeable future actions that may occur in the ROI.

5.1.2.1 Environmental Quality Incentives Program

The Environmental Quality Incentives Program (EQIP) provides technical, financial, and educational assistance for farmers and ranchers to address natural resources concerns on their private working lands. EQIP promotes agricultural production and environmental quality as compatible national goals and provides incentive payments and cost shares to implement selected CPs. NRCS provided almost $18 million in EQIP assistance to Oregon farmers and ranchers in 2003 (NRCS 2005a).

5.1.2.2 Farm and Ranch Lands Protection Program

The Farm and Ranch Lands Protection Program, formerly known as the Farmland Protection Program, protects working agricultural land from conversion to non-agricultural uses. The program provides funding to State, tribal, local governments, and non-governmental organizations to acquire conservation easements from landowners. Participating landowners agree not to convert their land to non-agricultural uses and to develop and implement a conservation plan for any highly erodible land. In 2003, NRCS

provided approximately $1 million to assist in the acquisition of conservation easements on 13,323 acres of farmland in Oregon (NRCS 2005a, 2005b).

5.1.2.3 Grassland Reserve Program

The Grassland Reserve Program (GRP) is a voluntary program for landowners to protect and restore grassland, including rangeland, pastureland, shrubland, and certain other lands, while maintaining these areas as grazing lands. The program emphasizes support for grazing operations, plant and animal biodiversity, and grasslands most vulnerable to conversion to cropland, urban development, or other uses. In 2003, there were 15 GRP projects totaling 11,610 acres in Oregon (NRCS 2005c).

5.1.2.4 Wetlands Reserve Program

WRP is a voluntary land retirement program. It is designed to assist landowners in restoring and protecting wetlands by entering into permanent easements, 30-year easements, and cost-share agreements (NRCS 2005d). In 2003, the WRP allocation to Oregon for 18 contracts covering a total of 2,951 acres was almost $8.5 million (NRCS 2005a, 2005d).

5.1.2.5 Wildlife Habitat Incentives Program

The Wildlife Habitat Incentives Program (WHIP) offers opportunities to landowners to develop and improve wildlife habitat on private lands. Through the program, NRCS provides technical and financial assistance to landowners to develop upland, wetland, riparian, and aquatic habitat areas on their property. WHIP places special emphasis on establishing CPs that benefit wildlife and fisheries habitats of threatened and endangered species (NRCS 2004). In 2003, NRCS obligated $290,000 in WHIP financial assistance to three contracts covering 311 acres in Oregon (NRCS 2005e).

5.1.3 Analysis of Cumulative Impacts

When considered in combination with other past, present, and reasonably foreseeable future actions, the incremental impact of the proposed action is expected to result in net positive impacts to biological, water, earth, and recreational resources in the area proposed for CREP enrollment and in waters downstream. No negative cumulative impacts to any other resource discussed in Chapter 3 are expected.

5.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

As required by NEPA, any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented must be identified in the environmental analysis. Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effect that this use may have on future generations. Irreversible commitments are those that consume a specific resource that is renewable only over a long time period. Irretrievable commitments are those that consume a specific resource that is neither renewable nor recoverable for use by future generations. No irreversible or irretrievable resource commitments are expected from implementation of the proposed action.

6.0 MITIGATIONS

This chapter presents mitigation measures that would be used to avoid or lessen impacts to biological, cultural, and earth resources. Each measure must be addressed on an individual contract basis through the conservation plan and associated environmental evaluation.

6.1 BIOLOGICAL RESOURCES

- Filter strips may need to be mowed periodically to maintain filtering properties. Grassland nesting species may use filter strip areas for nesting, brooding, and cover areas. Before mowing takes place, the area would be inventoried to determine if any grassland species are using the filter strip as habitat. Once species are identified, mowing would be scheduled around nesting and brooding schedules to alleviate detrimental impacts to the species.

- Current or historical grassland areas presently devoid of woody vegetation would not be entered into Riparian Buffers (CP22) or Marginal Pastureland Wildlife Habitat Buffer (CP29) contracts. Areas of grasslands not currently containing woody vegetation would remain so to protect ground-nesting grassland species. Introducing woody vegetation into areas of grassland would increase brood parasitism and predation on grassland nesting species by creating perch sites for avian predators, such as hawks and owls. Areas of woody vegetation also create travel corridors for terrestrial predators, such as skunks and raccoons. The benefits of woody vegetation in large grassland areas to forest birds and other resident wildlife often do not offset the negative impacts to grassland birds (Naddra and Nyberg 2001).

- Consideration should be given to the periodic and rotational harvest of riparian buffers to restore productivity of the buffer. Some dead or dying snags would be left for cavity nesting species such as woodpeckers that may inhabit the area. Timing of harvest would not coincide with breeding or rearing times of any sensitive species. Periodic harvesting may temporarily interrupt daily migration patterns of resident wildlife.

- Human disturbance for maintenance procedures of wetland-related CPs would be minimal during the presence of waterfowl. Screened buffer zones may be used to minimize disturbance to these species during maintenance procedures (NRCS 2000a). Regular human disturbance may cause waterfowl to relocate to other areas, lowering the productivity of these species or causing the abandonment of young broods.

- CP implementation that requires the use of herbicides, pesticides, fertilizers, lime, or any other such applications, as well as the timing of CP implementation, would be pre-approved by the governing agency to ensure no harm occurs to any fish or wildlife species, or to their associated habitats. Any use of herbicides, pesticides, fertilizers, or lime would be strictly according to label instructions and directions of the governing agency.

6.2 CULTURAL RESOURCES

- The ORSHPO, along with Federal, State, and tribal agencies with environmental and heritage resources oversight, would be consulted as each individual CREP contract is developed and implemented. These offices would be able to indicate if any cultural resources are known within the ROI or if additional field inventories would be necessary. The ORSHPO and tribal cultural

resource offices would offer advice and technical background for specific areas of the State and would support compliance efforts under the *Oregon Historic Preservation Plan* (ORSHPO 2001).

- FSA and ORSHPO offices will communicate with participating tribes to integrate planning with cultural resource protection and mitigation of adverse impacts, as well as soliciting input on the identification and protection of any TCPs.

- Historic preservation planning should be coordinated through ORSHPO: Dennis Griffin, archaeologist (503–986–0674, dennis.griffin@state.or.us); Stephen Poyser, preservation planner (503–986–0686, stephen.poyser@state.or.us); and Kirk Ranzetta (503–986–0678, kirk.ranzetta@state.or.us) or Sarah Jalving (503–986–0679, sarah.jalving@state.or.us), review and compliance specialists.

6.3 EARTH RESOURCES

- Inquiries about Oregon paleontological resources and review of potential impacts by project plans on these resources should be made to the appropriate Federal, State, and tribal land managers.

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8.0 PERSONS AND AGENCIES CONTACTED

Table 13 shows the Federal, State, and local agencies; American Indian tribes; and interest groups contacted for the CREP PEA.

Table 13. CREP PEA consultation.

Name	Title	Agency
Allen, Jeff	Executive Director	Oregon Environmental Council
Ball, Lindsay	Director	Oregon Department of Fish and Wildlife
Beebe, Spencer B.	President	Ecotrust
Bierly, Ken	Acting Director	Oregon Watershed Enhancement Board
Brian, Tom	Chairman, Board of Directors	Clean Water Services
Brunoe, Bruce, Sr.	Chairman	Confederated Tribes of the Warm Springs Reservation
Coba, Katy	Director	Oregon Department of Agriculture
Cowart, Coy	President	Oregon Cattlemen's Association
DeVoe, John	Executive Director	Waterwatch of Oregon
Dillon, Dave	Executive Vice President	Oregon Farm Bureau
Foreman, Allan	Chairman	Klamath Tribes
Hobernicht, Richard W., Col.	District Engineer	U.S. Army Corps of Engineers
Loop, Lois	Conservation Program Specialist	Farm Service Agency, Oregon State Office
Mercier, Mark	Chairman	Confederated Tribes of the Grande Ronde Tribal Council
Merritt, Regna	Executive Director	Oregon Natural Resources Council
Mulkey, Gwen	President	Oregon Women for Agriculture
Paulus, Fritz	Executive Director	Oregon Water Trust
Pigsley, Delores	Chairman	Confederated Tribes of Siletz Indians
Rosen, Rudolph	Director	Ducks Unlimited, Western Regional Office
Sampson, Donald	Chairman	Umatilla Board of Trustees
Scronce, Karl	President	Oregon Wheat Growers League
Severson, Dick	President	Agri-Business Council of Oregon
Shively, Paul	Regional Manager	Sierra Club, Northwest Regional Office
Stacey, Bob	Executive Director	1000 Friends of Oregon
Sundstrom, Johnny	President	Oregon Association of Conservation Districts
Teeman, Albert	Chairperson	Burns-Paiute General Council
Whitworth, Joe S.	Executive Director	Oregon Trout

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APPENDIX A
SUMMARY OF RELEVANT CONSERVATION PRACTICES

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APPENDIX A—SUMMARY OF RELEVANT CONSERVATION PRACTICES

Following this paragraph is a summary listing of conservation practices (CPs) for the proposed Oregon Conservation Resource Enhancement Program (CREP).

CP21—Filter Strips

Purposes:

- Reduce pollution and protect surface water and subsurface water quality
- Reduce sediment, particulate organics, and sediment-adsorbed contaminant loadings in runoff
- Reduce dissolved contaminant loadings in runoff
- Reduce sediment, particulate organics, and sediment-adsorbed contaminant loadings in surface irrigation tailwater
- Restore, create, or enhance herbaceous habitat for wildlife and beneficial insects
- Maintain or enhance watershed functions and values.

Maintenance Standards:

- Encourage shallow sheet water flow across the filter so that the filter functions properly
- Repair occurring channels or rills immediately
- Treat concentrated flow areas using terraces, dikes, berms, trenches, or vegetative barriers
- Remove sediment when accumulation reaches a height of 6 inches or higher and level filter so that sheet flow is re-established
- Filter strips removing bacteria or other pathogens may be closely mowed to allow sunlight and air movement to decimate entrapped pathogens
- Control all weeds, particularly noxious weeds, in the filter area
- Use pre-approved prescribed burning to manage and maintain filter strip.

CP22—Riparian Buffer Strips, CP29—Marginal Pastureland Wildlife Habitat Buffer

Purposes:

- Remove nutrients, sediment, organic matter, pesticides, and other pollutants from surface runoff and subsurface flow using vegetation
- Reduce pollution and protect surface water and subsurface water quality while enhancing the ecosystem of the water body

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- Provide a source of detritus and woody debris for aquatic wildlife while enhancing habitat for terrestrial wildlife
- Create shade to lower water temperatures to improve habitat for aquatic organisms
- Create wildlife habitat and establish wildlife corridors
- Reduce excess amounts of sediment, organic material, nutrients, and pesticides in surface runoff and reduce excess nutrients and other chemicals in shallow groundwater flow
- Provide a harvestable crop of timber, fiber, forage, fruit, or other crops consistent with other intended purposes
- Restore natural riparian plant communities
- Moderate winter temperatures to reduce freezing of aquatic over-wintering habitats
- Increase carbon storage in plant biomass and soils
- Increase connectivity of existing terrestrial wildlife habitats.

Maintenance Standards:

- Prevent harvesting or grazing of buffers by domestic livestock
- Establish vegetation that closely matches native and historical vegetation
- Periodically harvest trees, once buffer stands mature, to maintain plant health and buffer function
- Control noxious weeds and other undesirable plants, insects, and pests
- Apply registered chemicals, strictly according to authorized and registered uses, to control unwanted vegetation and pests.

CP23—Wetland Restoration, CP30—Marginal Pastureland Wetland Buffer

Purposes:

- Restore the functions and values of wetland ecosystems on land previously committed to agricultural use
- Restore hydric soil conditions, hydrologic conditions, hydrophytic plant communities, and wetland functions that occurred on the disturbed wetland site prior to modification to the extent practicable
- Modify the hydrologic condition, hydrophytic plant communities, and/or other biological habitat components of a wetland for the purpose of favoring specific wetland functions or values (e.g., managing site hydrology for waterfowl or amphibian use or managing plant community composition for native wetland hay production).

Maintenance Standards:

- Provide a permanent water supply, similar to the needs of the wetland

- Restore vegetation as close to the original natural plant communities as the site will allow
- Monitor depth to measure the accumulation of sedimentation to determine when removal of sedimentation is required
- Mow and fertilize vegetation on dam and spillway to prevent the growth of trees and brush in these areas
- Perform erosion control maintenance on the spillway
- Remove debris from trashtrack
- Repair damages from wildlife, such as beaver or muskrat damage
- Ensure any use of fertilizers, mechanical treatments, prescribed burning, pesticides, and other chemicals to assure the wetland enhancement function shall not compromise the intended purpose and shall be pre-approved by the governing agency.

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APPENDIX B
CRITICAL HABITAT

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APPENDIX B—CRITICAL HABITAT

Table B-1 lists species with critical habitat designations in Oregon. Also included are the counties and hydrological units in which the critical habitat is located.

Table B-1. Critical habitat in Oregon.

Common Name	Scientific Name	Counties Containing or Bordering Critical Habitat	Hydrological Units
Butterfly, Oregon silverspot[1]	*Speyeria zerene hippolyta*	Lane	Not applicable (NA)
Chub, Borax Lake[2]	*Gila boraxobius*	Harney	NA
Fairy shrimp, vernal pool[3]	*Branchinecta lynchi*	Jackson	NA
Murrelet, marbled[4]	*Brachyramphus marmoratus marmoratus*	Benton, Clatsop, Coos, Curry, Douglas, Josephine, Lane, Lincoln, Polk, Tillamook, Washington, Yamhill	NA
Owl, northern spotted[5]	*Strix occidentalis caurina*	Benton, Coos, Clackamas, Curry, Deschutes, Douglas, Hood River, Jackson, Jefferson, Klamath, Lake, Lane, Lincoln, Linn, Marion ,Polk, Tillamook, Wasco, Yamhill	NA
Plover, western snowy[6]	*Charadrius alaxandrinus nivosus*	Coos, Curry, Douglas, Lane, Tillamook	NA
Salmon, Chinook (fall, Snake River)[7]	*Oncorhynchus tshawytscha*	Baker, Clatsup, Columbia, Gilluim, Hood River, Morrow, Multnomah, Sherman, Umatilla, Wallowa, Wasco	NA
Salmon, Chinook (spring/summer, Snake River)[7]	*Oncorhynchus tshawytscha*	Baker, Clatsop, Columbia, Gillium, Hood River, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco	NA
Salmon, Chinook (Lower Columbia River)[8]	*Oncorhynchus tshawytscha*	Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, Washington	Lower Columbia, Lower Columbia-Clatskanie, Lower Columbia-Sandy, Middle Columbia-Hood, Clackamas, and Lower Willamette
Salmon, Chinook (Upper Willamette River)[8]	*Oncorhynchus tshawytscha*	Benton, Clatsop, Columbia, Clackamas, Douglas, Lane, Lincoln, Linn, Marion, Multnomah, Polk, Tillamook, Washington, Yamhill	Lower Columbia, Lower Columbia-Clatskanie, Lower Willamette, Middle Willamette, Middle Fork Willamette, Coast Fork Willamette, Upper Willamette, McKenzie, North

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Table B-1. (continued).

Common Name	Scientific Name	Counties Containing or Bordering Critical Habitat	Hydrological Units
			Santiam, South Santiam, Molalla-Pudding, Tualatin, Yamhill, and Clackamas
Salmon, chum (Columbia River)[8]	*Oncorhynchus keta*	Clatsop, Columbia, Multnomah, Washington	Lower Columbia, Lower Columbia-Sandy, Lower Columbia-Clatskanie, and Lower Willamette
Salmon, Coho (Oregon and California population)[8]	*Oncorhynchus kisutch*	Benton, Clatsop, Columbia, Coos, Curry, Douglas, Josephine, Lane, Lincoln, Polk, Tillamook, Washington, Yamhill	Alsea, Coos, Coquille, Necanicum, Nehalem, Sixes, Siletz-Yanquina, Siuslaw, Siltcoos, Umpqua, North Umpqua, South Umpqua, and Wilson-Trask-Nestucca
Salmon, sockeye[7]	*Oncorhynchus nerka*	Clatsop, Columbia, Gillium, Hood River, Morrow, Multnomah, Sherman, Umatilla, Wallowa, Wasco	Lower Salmon, Middle Salmon-Panther, Upper Salmon, Middle Salmon-Chamberlain, Lower Snake, Lower Snake Tucannon, and Lower Snake-Asotin
Steelhead (Snake River Basin)[8]	*Oncorhynchus mykiss*	Baker, Clatsop, Columbia, Gilliam, Hood River, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco	Hells Canyon, Imnaha, Lower Snake-Asotin, Upper Grande Ronde, Wallowa, Lower Grande Ronde, Middle Columbia-Lake Wallula, Middle Columbia-Hood, Lower Columbia-Sandy, Lower Columbia-Clatskanie, Lower Columbia, and Lower Willamette
Steelhead (Lower Columbia River)[8]	*Oncorhynchus mykiss*	Clackamas, Clatsop, Columbia, Hood River, Marion, Multnomah, Washington	Lower Columbia-Clatskanie, Lower Columbia, Upper Willamette, Middle Willamette, Lower Willamette, North Santiam, South Santiam, Yamhill, Molalla-Pudding, and Tualatin
Steelhead (Middle Columbia River)[8]	*Oncorhynchus mykiss*	Clatsop, Columbia, Crook, Gilliam, Grant, Harney, Hood River, Jefferson, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco, Wheeler	Walla Walla, Middle Columbia-Lake Wallula, Middle Columbia-Hood, Umatilla, Willow, Upper John Day, North Fork John Day, Middle Fork John Day, Lower John Day, Lower Deschutes, Lower Columbia-Sandy, Lower Columbia-Clatskanie, Lower Columbia, Lower Willamette, and Trout
Steelhead (Upper Willamette River)[8]	*Oncorhynchus mykiss*	Benton, Clatsop, Clackamas, Columbia, Lincoln, Linn, Marion, Multnomah, Polk,	Lower Columbia, Lower Columbia-Clatskanie, Lower Columbia-Sandy, Middle

Table B-1. (continued).

Common Name	Scientific Name	Counties Containing or Bordering Critical Habitat	Hydrological Units
		Tillamook, Washington, Yamhill	Columbia-Hood, Clackamas, and Lower Willamette
Sucker, Warner[9]	*Catostomus warnerensis*	Lake	NA
Trout, bull[10]	*Salvelinus confluentus*	Baker, Clatsop, Columbia, Crook, Deschutes, Gilliam, Grant, Harney, Hood River, Jefferson, Klamath, Lake, Lane, Linn, Malheur, Morrow, Multnomah, Sherman, Umatilla, Union, Wallowa, Wasco, and Wheeler	NA
Malheur wire-lettuce[11]	*Stephanomeria malheurensis*	Harney	NA

Source: [1]45 Federal Register (FR) 129, 1980; [2]47 FR 193, 1982; [3]68 FR 151, 2003; [4]61 FR 102, 1996; [5]57 FR 10, 1992; [6]64 FR 234, 1999; [7]58 FR 247, 1993; [8]65 FR 32, 2000; [9]50 FR 188, 1985; [10]69 FR 193, 2004; [11]47 FR 218, 1982

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APPENDIX C
IMPAIRED SURFACE WATERS

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APPENDIX C—IMPAIRED SURFACE WATERS

Table C–1 lists impaired surface waters in the basins of Oregon. Surface waters are designated as impaired by the Oregon Department of Environmental Quality (ODEQ) and listed in the *Oregon Final 303(d) List of Impaired Waters* (ODEQ 2002). Explanation of impairments and season codes are provided at the end of the table.

Table C–1. Impaired surface waters in Oregon.

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Alsea	Alsea River	0–10	FC	Y
Alsea	Alsea River	15.2–47.4	T	S
Alsea	Alsea River	4.9–31.4	DO	9/15–5/31
Alsea	Buck Creek	0–7.7	T	S
Alsea	Camp Creek	0–2.7	T	S
Alsea	Cascade Creek	0–4.4	T	S
Alsea	Depew Creek	0–1.5	T	S
Alsea	Green River	0–6.7	T	S
Alsea	Little Lobster Creek	0–2.1	T	S
Alsea	Lobster Creek	0–17.7	T	S
Alsea	Mercer Lake/Mercer Creek	0.6–2.5	AW/A	*
Applegate	Applegate River	0–46.8	T	S
Applegate	Beaver Creek	0–3.5	T	S
Applegate	Beaver Creek	0–8.8	BC, S	*
Applegate	Cheney Creek	0–6	DO	6/1–9/30
Applegate	East Fork Williams Creek	0–2.4	DO	6/1–9/30
Applegate	Forest Creek	0–9.3	DO	6/1–9/30
Applegate	Grouse Creek	0–1.8	DO	6/1–9/30
Applegate	Humbug Creek	0–5	T	S
Applegate	Jackson Creek	0–3.5	DO	6/1–9/30
Applegate	Little Applegate River	0–20.9	T	S
Applegate	Palmer Creek	0–5.7	T	S
Applegate	Powell Creek	0–2	T	S, 10/1–5/31
Applegate	Slate Creek	0–5.3	DO	6/1–9/30
Applegate	Slate Creek	0–5.3	T	S
Applegate	Star Gulch	0–4.3	T	S
Applegate	Sterling Creek	0–2.5	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Applegate	Thompson Creek	0–3.9	DO	6/1–9/30
Applegate	Waters Creek	2.4–4.3	T	S
Applegate	West Fork Williams Creek	0–3	DO	6/1–9/30
Applegate	Williams Creek	0–7.1	DO	6/1–9/30
Applegate	Williams Creek	0–7.1	T	S
Applegate	Yale Creek	0–1.3	T	S
Chetco	Chetco River	39.4–57.1	T	S
Chetco	Hunter Creek	0–16.6	T	S
Chetco	Jack Creek	0–1.2	T	S
Chetco	North Fork Chetco River	0–5.1	T	S
Chetco	North Fork Hunter Creek	0–4.8	T	S
Chetco	Pistol River	0–19.8	DO	6/1–9/30
Chetco	Pistol River	0–19.8	T	S
Chetco	South Fork Pistol River	0–0.5	T	S
Chetco	Winchuck River	0–11.1	DO	10/1–5/31
Chetco	Winchuck River	0–11.1	T	S
Coos	Burnt Creek	0–2.6	T	S
Coos	Catching Slough	0–5.6	FC	Y
Coos	Cedar Creek	0–11.6	T	S
Coos	Coalbank Slough	0–0.5	FC	Y
Coos	Coos Bay	7.8–12.3	FC	Y
Coos	Eel Lake/Eel Lake	0–2.5	pH	S
Coos	Elk Creek	0–8.7	Fe	Y
Coos	Haynes Inlet	0–3.3	FC	Y
Coos	Isthmus Slough	0–10.6	DO	S/F
Coos	Isthmus Slough	0–10.6	FC, Mn	Y
Coos	Joe Ney Slough	0–2.2	FC	Y
Coos	Kentuck Slough	0–2.2	FC	W/Sp/F
Coos	Larson Slough	0–3.9	FC	Y
Coos	Millicoma River	0–8.9	DO	10/1–5/31
Coos	North Slough	0–2.4	FC	Y
Coos	North Tenmile Lake/North Tenmile Lake	0–4.5	AW/A	*

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Coos	Pony Creek	0–5.8	FC	W/Sp/F
Coos	Pony Slough	0–0.8	FC	Y
Coos	South Fork Coos River	0–31.1	DO	Y
Coos	South Slough	0–5.3	FC	Y
Coos	Tenmile Lake/Tenmile Lake	0–5	AW/A	*
Coos	Tioga Creek	0–17.5	T	S
Coos	Willanch Slough	0.7–2.8	FC	Y
Coos	Williams River	0–20.9	T	S
Coquille	Alder Creek	0–3.1	T	S
Coquille	Baker Creek	0–2.9	T	S
Coquille	Battle Creek	0–1.5	T	10/1–5/31
Coquille	Bear Creek	0–13.2	DO, FC	W/Sp/F
Coquille	Belieu Creek	0–3.1	T	S
Coquille	Bingham Creek	0–2.4	T	S
Coquille	Boulder Creek	0–4	T	S
Coquille	Cherry Creek	0–3.8	T	S
Coquille	Coquille River	0–35.6	FC	Y
Coquille	Coquille River	21–35.3	T	S
Coquille	Coquille River	4.2–35.6	ChlA	S
Coquille	Cunningham Creek	0–7.4	DO, FC	Y
Coquille	Dement Creek	0–6	T	S
Coquille	East Fork Coquille River	0–26.2	T	S
Coquille	Elk Creek	0–5.7	T	S
Coquille	Fishtrap Creek	0–4.7	Fe	Y
Coquille	Middle Creek	0–24.2	T	S
Coquille	Middle Fork Coquille River	0–39.6	DO, FC	W/Sp/F
Coquille	Middle Fork Coquille River	0–39.6	T	S, 10/1–5/31
Coquille	North Fork Coquille River	0–44.2	T	S
Coquille	Rowland Creek	0–4.6	T	S
Coquille	Salmon Creek	0–9.2	T	S
Coquille	South Fork Coquille River	0–18.9	FC	W/Sp/F
Coquille	South Fork Coquille River	0–42.2	T	S
Coquille	Twelvemile Creek	0–10.2	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Coquille	Unnamed1	0–3.6	T	S
Coquille	Woodward Creek	0–7.6	T	S
Illinois	Althouse Creek	0–7.5	T	S
Illinois	Anderson Creek	0–3.2	T	S
Illinois	Briggs Creek	0–11.6	T	S
Illinois	Canyon Creek	0–5.9	T	S
Illinois	Collier Creek	0–4.5	T	S
Illinois	Deer Creek	0–16.9	T	S
Illinois	East Fork Illinois River	0–14.7	T	S
Illinois	Elk Creek	0–4.1	T	S
Illinois	Fall Creek	0–4.8	T	S
Illinois	Free and Easy Creek	0–2.1	T	S
Illinois	Illinois River	0–31.9, 32.1–56.1	T	S
Illinois	Indigo Creek	0–8.2	T	S
Illinois	Josephine Creek	0–12.4	T	S
Illinois	Klondike Creek	0–7.4	T	S
Illinois	Lawson Creek	0–11.1	T	S
Illinois	Little Sixmile Creek	0–1.2	T	S
Illinois	McMullin Creek	0–6.6	T	S
Illinois	North Fork Indigo Creek	0–6	T	S
Illinois	North Fork Silver Creek	0–7	T	S
Illinois	Panther Creek	0–2.6	T	S
Illinois	Rancherie Creek	0–5.2	T	S
Illinois	Rough and Ready Creek	0–6.1	T	S
Illinois	Silver Creek	0–13.3	T	S
Illinois	Sixmile Creek	0–5.2	T	S
Illinois	Soldier Creek	0–2	T	S
Illinois	South Fork Canyon Creek	0–2.4	T	S
Illinois	South Fork Deer Creek	0–2.2	T	S, 10/1–5/31
Illinois	South Fork Rough and Ready Creek	0–6.3	T	S
Illinois	South Fork Silver Creek	0–7	T	S
Illinois	Squaw Creek	0–3	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Illinois	West Fork Illinois River	0–17.3	T	S
Illinois	Whiskey Creek	0–4.2	T	S
Lower Columbia	Bear Creek	2.5–9	T	S, 9/15–5/31
Lower Columbia	Cullaby Lake/Cullaby Lake	0–1.6	AW/A	S
Lower Columbia	Gnat Creek	0–9.8	T	9/15–5/31
Lower Columbia	Klaskanine River	0–2.7	DO	Y
Lower Columbia	Lewis And Clark River	0–10.8	DO	6/1–9/14
Lower Columbia	Lewis And Clark River	8.6–10.8	T	S
Lower Columbia	Skipanon River	0–2	DO	Y
Lower Columbia	Skipanon River	0–6.1	DO	Sp/S
Lower Columbia	Smith Lake	0–0	AW/A	S
Lower Columbia	Unnamed Creek	0–0	CrHx, Cu, Zn	Y
Lower Columbia	Unnamed Creek	0–3.2	Fe, Mn	Y
Lower Columbia	Youngs River	9–23.2	T	S
Lower Columbia Clatskanie	Beaver Creek	0–14	T	S
Lower Columbia Clatskanie	Clatskanie River	0–1.9	DO	Y
Lower Columbia Clatskanie	Clatskanie River	0–1.9	FC, T	S
Lower Columbia Clatskanie	Clatskanie River	1.9–25.5	T	S, 9/15–5/31
Lower Columbia Clatskanie	Little Clatskanie River	0–6.2	T	S
Lower Columbia Clatskanie	South Fork Goble Creek	0–3.9	BC	*
Lower Columbia Clatskanie	Tide Creek	0–16.1	T	9/15–5/31
Lower Rogue	Big Boulder Creek	0–1.8	T	S
Lower Rogue	Boulder Creek	0–3.9	T	S
Lower Rogue	Butte Creek	0–2.5	T	S
Lower Rogue	Coyote Creek	0–7.4	T	S
Lower Rogue	East Fork Whisky Creek	0–3.7	T	S, 10/1–5/31
Lower Rogue	Foster Creek	0–5.2	T	S
Lower Rogue	Grave Creek	0–33.1	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Lower Rogue	Hog Creek	0–5.2	T	S
Lower Rogue	Indian Creek	0–1.7	T	S
Lower Rogue	Jumpoff Joe Creek	0–21.3	T	S, 10/1–5/31
Lower Rogue	Louse Creek	0–10	T	S, 10/1–5/31
Lower Rogue	Pickett Creek	0–3.9	T	S
Lower Rogue	Quartz Creek	0–7.3	T	S
Lower Rogue	Quosatana Creek	0–8.1	T	S
Lower Rogue	Reuben Creek	0–6.5	T	S
Lower Rogue	Shasta Costa Creek	0–13.4	T	S
Lower Rogue	Slate Creek	0–3.1	T	S
Lower Rogue	Taylor Creek	0–5.3	T	S
Lower Rogue	West Fork Whisky Creek	0–4.2	T	S
Lower Rogue	Whisky Creek	0–2.4	T	S, 9/15–5/31
Lower Rogue	Wolf Creek	0–11.5	T	S
Middle Rogue	Ashland Creek	0–2.8	FC	Y
Middle Rogue	Battle Creek	0–3.9	T	S
Middle Rogue	Bear Creek	0–26.3	FC	Y
Middle Rogue	Bear Creek	0–26.3	T	S
Middle Rogue	Birdseye Creek	0–1.4	T	S
Middle Rogue	Butler Creek	0–5.2	DO	Sp/S, 10/1–5/31
Middle Rogue	Butler Creek	0–5.2	FC	W/Sp/F
Middle Rogue	Butler Creek	0–5.2	T	S
Middle Rogue	Carter Creek	0–4.8	T	S
Middle Rogue	Cold Creek	0–4.2	T	S
Middle Rogue	Coleman Creek	0–6.9	DO	6/1–5/31
Middle Rogue	Coleman Creek	0–6.9	FC	Y
Middle Rogue	Coleman Creek	0–6.9	T	S
Middle Rogue	Crooked Creek	0–4.3	FC	Y
Middle Rogue	Emigrant Creek	0–3.6, 5.6–15.4	T	S
Middle Rogue	Evans Creek	0–19.1	FC	Y
Middle Rogue	Gaerky Creek	0–4.6	T	S
Middle Rogue	Galls Creek	0–4.5	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Middle Rogue	Griffin Creek	0–14.4	DO, T	10/1–5/31
Middle Rogue	Griffin Creek	0–14.4	FC	Y
Middle Rogue	Griffin Creek	0–9.2	T	S
Middle Rogue	Hobart Creek	0–0	T	S
Middle Rogue	Jackson Creek	0–12.6	FC	Y
Middle Rogue	Jackson Creek	0–12.6	T	S, 10/1–5/31
Middle Rogue	Larson Creek	0–6.7	DO	10/1–5/31
Middle Rogue	Larson Creek	0–6.7	FC	Y
Middle Rogue	Larson Creek	0–6.7	pH	6/1–5/31
Middle Rogue	Larson Creek	0–6.7	T	S
Middle Rogue	Lazy Creek	0–4.5	FC	Y
Middle Rogue	Lazy Creek	0–4.5	pH	10/1–5/31
Middle Rogue	Lazy Creek	0–4.5	T	S
Middle Rogue	Lone Pine Creek	0–0	T	S
Middle Rogue	Meyer Creek	0–5.3	FC	Y
Middle Rogue	Meyer Creek	0–5.3	T	S
Middle Rogue	Neil Creek	0–4.8	DO	6/1–5/31
Middle Rogue	Neil Creek	0–4.8	T	S, 10/1–5/31
Middle Rogue	Payne Creek	0–2.1	FC	Y
Middle Rogue	Payne Creek	0–2.1	T	S
Middle Rogue	Payne Creek	1–2.1	DO	6/1–5/31
Middle Rogue	Ramsey Canyon	0–3.1	T	S
Middle Rogue	Reeder Reservoir/Ashland Creek	4.9–5.4	S	*
Middle Rogue	Rock Creek	0–6.5	T	S
Middle Rogue	Salt Creek	0–6.2	T	S
Middle Rogue	Savage Creek	0–4.8	T	S
Middle Rogue	Tyler Creek	0–4	T	S
Middle Rogue	Wagner Creek	0–7.4	T	S
Middle Rogue	Walker Creek	0–6.7	T	10/1–5/31
Middle Rogue	West Fork Evans Creek	0–17.1	T	S
Necanicum	Necanicum River	0–15	T	S
Necanicum	Necanicum River	0–20.6	T	9/15–5/31

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Necanicum	Necanicum River	0–5.9	EC	S
Necanicum	Pacific Ocean	26–30	FC	Y
Necanicum	Sunset Lake	0–3.1	AW/A	S
Nehalem	Beneke Creek	0–10.1	T	S
Nehalem	Buster Creek	0–9.1	T	9/15–5/31
Nehalem	Cook Creek	0–9.3	T	9/15–5/31
Nehalem	Cronin Creek	0–1.8	T	9/15–5/31
Nehalem	East Fork Nehalem River	0–9.8	T	S
Nehalem	East Humbug Creek	0–4.5	T	9/15–5/31
Nehalem	Fishhawk Creek	0–11.9	T	S, 9/15–5/31
Nehalem	Foley Creek	0–3.7	T	S
Nehalem	Gods Valley Creek	0–4.8	T	9/15–5/31
Nehalem	Humbug Creek	0–6.5	T	S, 9/15–5/31
Nehalem	Nehalem Bay	0–4.1	FC	*
Nehalem	Nehalem River	0–3	FC	Y
Nehalem	Nehalem River	14.7–120	T	S, 9/15–5/31
Nehalem	North Fork Nehalem River	10.5–23.6	T	S, 9/15–5/31
Nehalem	Northrup Creek	0–7.5	T	S, 9/15–5/31
Nehalem	Oak Ranch Creek	0–9.3	T	S, 9/15–5/31
Nehalem	Pebble Creek	0–9.8	T	S, 9/15–5/31
Nehalem	Rock Creek	0–11	T	S, 9/15–5/31
Nehalem	Salmonberry River	0–5	T	S, 9/15–5/31
Nehalem	Soapstone Creek	0–3.9	T	S
Nehalem	West Humbug Creek	0–5.1	T	9/15–5/31
Nehalem	Wolf Creek	0–7.8	T	9/15–5/31
North Umpqua	Boulder Creek	0–8.7	T	Sp/S
North Umpqua	Calf Creek	0–8	T	S
North Umpqua	Canton Creek	0–10	S	*
North Umpqua	Canton Creek	0–12.5	T	S
North Umpqua	Cedar Creek	0–1.9	T	S
North Umpqua	City Creek	0–6.6	T	S
North Umpqua	Cooper Creek Reservoir/Cooper Creek	0–5.9	Fe, Hg	Y

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
North Umpqua	Copeland Creek	0–11.6	T	S
North Umpqua	Deer Creek	0–2.6	T	S
North Umpqua	Diamond Lake/Diamond Lake	0–3.7	AW/A	*
North Umpqua	Diamond Lake/Diamond Lake	0–3.7	pH	S
North Umpqua	East Fork Rock Creek	0–5.9	T	9/15–5/31
North Umpqua	East Pass Creek	0–3	T	9/15–5/31
North Umpqua	Fish Creek	0–6.9	DO	S
North Umpqua	Fish Creek	0–6.9	T	Sp/S
North Umpqua	Harrington Creek	0–3.8	T	S, 9/15–5/31
North Umpqua	Honey Creek	0–3.2	T	S, 9/15–5/31
North Umpqua	Horse Heaven Creek	0–6.3	S	*
North Umpqua	Horse Heaven Creek	0–6.3	T	S
North Umpqua	Lake Creek	0.9–11.5	T	Y
North Umpqua	Lemolo Lake/North Umpqua River	91.8–93.5	pH	S
North Umpqua	Little Rock Creek	0–6.6	S	*
North Umpqua	Little Rock Creek	0–6.6	T	S
North Umpqua	Mellow Moon Creek	0–3.1	T	9/15–5/31
North Umpqua	Miller Creek	0–3.6	T	9/15–5/31
North Umpqua	Mowich Creek	0–7	T	S
North Umpqua	North Umpqua River	0–47.7, 68.3–72.3, 75.5–83.3	T	S
North Umpqua	North Umpqua River	34.8–65.9	T	Sp/S
North Umpqua	North Umpqua River	35–52	As	Y
North Umpqua	North Umpqua River	77–78	pH	S
North Umpqua	North Umpqua River	75–75, 77–78, 86.9–87.4	TDG	Y
North Umpqua	Panther Creek	0–1.7	T	S
North Umpqua	Platt I Reservoir	0–0	Hg	Y
North Umpqua	Potter Creek	0–2.7	BC	Y
North Umpqua	Rock Creek	0–12.4	T	S
North Umpqua	Rock Creek	12.4–19.1	T	9/15–5/31
North Umpqua	Scaredman Creek	0–2.1	T	9/15–5/31
North Umpqua	Slide Creek	0–4.9	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
North Umpqua	Steamboat Creek	0–6.1	DO	S
North Umpqua	Steamboat Creek	0–23.4	pH	S
North Umpqua	Steamboat Creek	0–19	T	S
North Umpqua	Steamboat Creek	10.9–23.4	S	*
North Umpqua	Steelhead Creek	0–4.8	T	S
North Umpqua	Susan Creek	0–4.3	T	S, 9/15–5/31
North Umpqua	Sutherlin Creek	0–16	As, Fe, Pb, Mn	Y
North Umpqua	Sutherlin Creek	4.6–10	Cu	Y
North Umpqua	Unnamed Creek	0–0	As, Pb, Fe	Y
North Umpqua	Unnamed Waterbody	0–2.8	T	9/1–5/31
North Umpqua	Watson Creek	0–7.7	T	S
Siletz-Yaquina	Depot Slough	0–1.3	FC	Y
Siletz-Yaquina	Drift Creek	0.8–21.6	T	S
Siletz-Yaquina	Elk Creek	0–29.5	S	*
Siletz-Yaquina	Elk Creek	0–29.5	T	S
Siletz-Yaquina	North Creek	0–3.2	T	S
Siletz-Yaquina	Nute Slough	0–1.5	FC	W/Sp/F
Siletz-Yaquina	Olalla Creek	0–3.2	FC	Y
Siletz-Yaquina	Poole Slough	0–2.6	FC	Y
Siletz-Yaquina	Salmon River	0–23.1	DO	9/15–5/31
Siletz-Yaquina	Siletz River	7–46.8	T	S
Siletz-Yaquina	Thompson Creek	0–2	FC	Y
Siletz-Yaquina	Unnamed Waterbody	0–3.1	ChlA, pH	S
Siletz-Yaquina	Yaquina River	0–15.4	FC	Y
Siletz-Yaquina	Yaquina River	15.4–27.6	T	S
Siletz-Yaquina	Yaquina River	27.6–57.5	DO	6/1–5/31
Siltcoos	Fiddle Creek	0–7.5	T	S
Siltcoos	Siltcoos Lake/Siltcoos Lake	0–2.3	AW/A	*
Siltcoos	Tahkenitch Lake/Tahkenitch Lake	0–3.4	AW/A	*
Siuslaw	Deadwood Creek	0–20.9	T	S
Siuslaw	Drew Creek	0–3.2	S	*
Siuslaw	Eames Creek	0–4.8	BC	*

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Siuslaw	Failor Creek	0–4	T	S
Siuslaw	Gibson Creek	0–1.5	T	9/15–5/31
Siuslaw	Indian Creek	0–22	T	S
Siuslaw	Knowles Creek	0–13.1	T	9/15–5/31
Siuslaw	Lake Creek	0–28.3	T	S
Siuslaw	McLeod Creek	0–7.4	S	*
Siuslaw	McLeod Creek	0–7.4	T	9/15–5/31
Siuslaw	Morris Creek	0–3.9	S	*
Siuslaw	North Fork Siuslaw River	0–21	T	S
Siuslaw	North Fork Siuslaw River	0.4–27.3	S	*
Siuslaw	North Fork Siuslaw River	0.4–27.3	T	9/15–5/31
Siuslaw	Porter Creek	0–4.9	S	*
Siuslaw	Siuslaw River	20–105.9	T	S
Siuslaw	Siuslaw River	5.7–105.9	DO	6/1–5/31
Siuslaw	South Fork Siuslaw River	0–3.8	BC	*
Siuslaw	Sweet Creek	0–11.5	T	S
Siuslaw	Taylor Creek	0–2.3	S	*
Siuslaw	West Fork Deadwood Creek	0–7.7	T	S
Siuslaw	West Fork Indian Creek	0–8.9	T	S
Sixes	Bald Mountain Creek	0–2.3	T	S
Sixes	Cedar Creek	0–4.5	T	S
Sixes	Crystal Creek	0–7.3	T	S
Sixes	East Fork Floras Creek	0–7.5	T	S
Sixes	Edson Creek	0–5.8	T	S
Sixes	Elk River	0–29.9	T	S
Sixes	Euchre Creek	0–2.6	T	S
Sixes	Floras Creek	0–12.8	T	S
Sixes	Floras Lake/Boulder Creek	0.8–2.1	AW/A	*
Sixes	North Fork Floras Creek	0–10.9	T	S
Sixes	Sixes River	0–30.1	DO	10/1–5/31
Sixes	Sixes River	0–30.1	T	S
Sixes	South Fork Floras Creek	0–3.7	T	S
Sixes	Unnamed Waterbody	0–1.5	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Sixes	Willow Creek	0–6.9	T	S
South Umpqua	Applegate Creek	0–4.8	T	S
South Umpqua	Bear Creek	0–4.7	T	S
South Umpqua	Beaver Creek	0–2.1	S	*
South Umpqua	Beaver Creek	0–2.1	T	S
South Umpqua	Black Canyon Creek	0–5.2	pH	S
South Umpqua	Black Rock Fork	0–9.7	T	S
South Umpqua	Boulder Creek	0–10.7	T	S
South Umpqua	Brownie Creek	0–5.8	T	S
South Umpqua	Buckeye Creek	0–9.8	T	S
South Umpqua	Callahan Creek	0–6.2	T	S
South Umpqua	Canyon Creek	0–4.3	T	9/15–5/31
South Umpqua	Castle Rock Fork	0–11.9	T	S
South Umpqua	Cattle Creek	0–3.2	T	S, 9/15–5/31
South Umpqua	Coffee Creek	1.8–4.7	T	S
South Umpqua	Cow Creek	0–2	Cl	Y
South Umpqua	Cow Creek	0–26.3	pH	S
South Umpqua	Cow Creek	0–26.3	T	S, 9/15–5/31
South Umpqua	Cow Creek	26.3–50.8, 60.8–74	T	S
South Umpqua	Dads Creek	0–3.4	T	S
South Umpqua	Days Creek	0–13.9	T	S, 9/15–5/31
South Umpqua	Deadman Creek	0–9	T	S
South Umpqua	Deer Creek	0–9.6	DO, FC	Y
South Umpqua	Deer Creek	0–9.6	T	S, 9/15–5/31
South Umpqua	Dismal Creek	0–2.7	T	S
South Umpqua	Drew Creek	0–8.3	T	S
South Umpqua	Dumont Creek	0–2.9	BC	
South Umpqua	Dumont Creek	0–2.9	T	S
South Umpqua	East Fork Creek	0–0	T	S
South Umpqua	East Fork Deadman Creek	0–5.8	T	S
South Umpqua	East Fork Shively Creek	0–3.5	T	9/15–5/31
South Umpqua	East Fork Stouts Creek	0–4.9	T	S, 9/15–5/31

Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
South Umpqua	Elk Creek	0–14.6	T	S
South Umpqua	Elk Valley Creek	1.9–6	T	S
South Umpqua	Fate Creek	0–2.5	T	S, 9/15–5/31
South Umpqua	Flat Creek	0–5	T	S
South Umpqua	Fortune Branch	0–4.7	T	S
South Umpqua	Francis Creek	0–3.7	T	S
South Umpqua	Galesville Reservoir	0–0	Hg	Y
South Umpqua	Iron Mountain Creek	0–3.8	T	S, 9/15–5/31
South Umpqua	Jackson Creek	0–25	BC, S	*
South Umpqua	Jackson Creek	0–25	pH, T	S
South Umpqua	Joe Hall Creek	0–3.4	T	S
South Umpqua	Lavadoure Creek	0–2.2	T	S, 9/15–5/31
South Umpqua	Martin Creek	0–2	T	S
South Umpqua	Martin Creek	0–3.3	T	9/15–5/31
South Umpqua	Middle Creek	0–12.8	T	S
South Umpqua	Middle Fork Deadman Creek	0–4.6	T	S, 9/15–5/31
South Umpqua	Mitchell Creek	0–4.2	T	S
South Umpqua	North Fork Deer Creek	0–6.7	EC	6/1–9/30
South Umpqua	North Myrtle Creek	0–0.5	Am	Y
South Umpqua	North Myrtle Creek	0–15	T	S
South Umpqua	Olalla Creek	0–15.6	BC	*
South Umpqua	Olalla Creek	0–15.6	T	S
South Umpqua	Poole Creek	0–3.3	T	9/15–5/31
South Umpqua	Quartz Creek	0–8.4	T	S
South Umpqua	Quines Creek	0–6	T	S
South Umpqua	Rice Creek	0–6.8	T	S, 9/15–5/31
South Umpqua	Riffle Creek	0–5.7	T	S
South Umpqua	Riser Creek	0–4.1	T	S
South Umpqua	Saint John Creek	0–5.6	T	S, 9/15–5/31
South Umpqua	School Hollow	0–1.6	T	S
South Umpqua	Shively Creek	0–5.2	T	9/15–5/31
South Umpqua	Skull Creek	0–2	T	S
South Umpqua	Slick Creek	0–4.9	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
South Umpqua	Slide Creek	2.6–4.4	T	9/15–5/31
South Umpqua	Snow Creek	0–5.3	T	S
South Umpqua	South Fork Middle Creek	0–4.4	T	S, 9/15–5/31
South Umpqua	South Myrtle Creek	0–22.2	T	S, 9/15–5/31
South Umpqua	South Umpqua River	0–57.7	AW/A	S
South Umpqua	South Umpqua River	0–15.9	As	Y
South Umpqua	South Umpqua River	0–57.7	BC	*
South Umpqua	South Umpqua River	0–15.9	Cd	Y
South Umpqua	South Umpqua River	0–15.9	FC	W/Sp/F
South Umpqua	South Umpqua River	15.9–57.7	FC	Y
South Umpqua	South Umpqua River	0–15.9	pH	S/F
South Umpqua	South Umpqua River	0–5	pH	W/Sp/F
South Umpqua	South Umpqua River	15.9–102.2	pH	S
South Umpqua	South Umpqua River	0–15.9	P	S
South Umpqua	South Umpqua River	0–15.9	T	S, 9/15–5/31
South Umpqua	South Umpqua River	57.7–102.2	T	S
South Umpqua	South Umpqua River	15.9–57.7	T	9/15–5/31
South Umpqua	South Umpqua River	0–51	Cl	Y
South Umpqua	South Umpqua River	5–15.9	DO	9/15–5/31
South Umpqua	South Umpqua River	80–102	S	Y
South Umpqua	Stouts Creek	0–7.9	T	S
South Umpqua	Thompson Creek	0–7.6	T	S, 9/15–5/31
South Umpqua	Union Creek	0–7	T	S, 9/15–5/31
South Umpqua	Unnamed Waterbody	0–2.9	T	S
South Umpqua	Unnamed Waterbody	0–2.9	T	9/15–5/31
South Umpqua	Weaver Creek	1.5–5.7	T	9/15–5/31
South Umpqua	West Fork Canyon Creek	0–8.8	T	S, 9/15–5/31
South Umpqua	West Fork Cow Creek	0–17.9	T	S
South Umpqua	Windy Creek	0–9.4	T	S
South Umpqua	Wood Creek	0–4	T	9/15–5/31
South Umpqua	Woodford Creek	0–3.5	T	S
Umpqua	Brush Creek	0–7.4	T	S
Umpqua	Buck Creek	0–0.7	T	S

Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Umpqua	Bum Creek	0–2.3	T	S
Umpqua	Calapooya Creek	0–18.7	DO	W/S/F
Umpqua	Calapooya Creek	0–18.7	FC	Y
Umpqua	Calapooya Creek	0–18.7	T, pH	S
Umpqua	Cedar Creek	0–3	T	S, 9/15–5/31
Umpqua	Cleghorn Creek	0–2.8	T	S, 9/15–5/31
Umpqua	Cook Creek	0–2.9	Cu, Fe, Pb, Mn	Y
Umpqua	Elk Creek	0–25.9	DO, FC	Y
Umpqua	Elk Creek	0–45.5	T	S
Umpqua	Halfway Creek	0–6.3	T	9/15–5/31
Umpqua	Herb Creek	0–2.7	T	S
Umpqua	Little Wolf Creek	0–5.4	T	S, 9/15–5/31
Umpqua	Middle Fork North Fork Smith River	0–4.6	T	S
Umpqua	Miner Creek	0–4.2	T	S, 9/15–5/31
Umpqua	North Fork Smith River	0–31.8	T	S
Umpqua	North Fork Smith River	19.1–31.8	BC	
Umpqua	North Fork Tom Folley Creek	0–2	T	S, 9/15–5/31
Umpqua	Rader Creek	0–4.7	T	S, 9/15–5/31
Umpqua	Russell Creek	0–2.2	T	S
Umpqua	Scholfield Creek	0–5	FC	Y
Umpqua	Smith River	15.7–83.7	T	S
Umpqua	Soup Creek	0–1.4	T	S
Umpqua	South Fork Smith River	0–7	T	S
Umpqua	South Sister Creek	0–8.6	T	S
Umpqua	Tom Folley Creek	0–8.2	T	S, 9/15–5/31
Umpqua	Umpqua River	1–6.7, 7.7–11.8	FC	Y
Umpqua	Umpqua River	11.8–109.3	T	S
Umpqua	Umpqua River	25.9–109.3	FC	W/Sp/F
Umpqua	Unnamed Waterbody	0–1.4	T	9/15–5/31
Umpqua	Unnamed Waterbody	0–1.6	T	S
Umpqua	West Branch North Fork Smith River	0–3.4	T	S

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Umpqua	West Fork Smith River	0–15.9	T	S
Umpqua	Wolf Creek	0–4	T	S
Umpqua	Wolf Creek	4–7.5	T	9/15–5/31
Umpqua	Yellow Creek	0–9.1	T	S, 9/15–5/31
Upper Rogue	Abbott Creek	0–2.1	T	S
Upper Rogue	Antelope Creek	0–19.7	EC	6/1–9/30
Upper Rogue	Antelope Creek	0–19.7	T	S
Upper Rogue	Big Butte Creek	0–11.6	DO	6/1–9/30
Upper Rogue	Big Butte Creek	0–11.6	T	S
Upper Rogue	Bitter Lick Creek	0–8.6	T	S
Upper Rogue	Burnt Canyon	0–3.2	T	S
Upper Rogue	Deer Creek	0–3.2	S	*
Upper Rogue	Elk Creek	0–13.3	T	S
Upper Rogue	Elk Creek	9.5–20.7	DO	6/1–9/30
Upper Rogue	Fish Lake/North Fork Little Butte Creek	15.9–17.6	ChlA, pH	S
Upper Rogue	Flat Creek	0–8.2	T	S
Upper Rogue	Foster Creek	0–4.9	T	S
Upper Rogue	Indian Creek	0–5.2	DO	6/1–9/30
Upper Rogue	Lake Creek	0–7.8	EC	6/1–5/31
Upper Rogue	Lake Creek	0–7.8	S	*
Upper Rogue	Lake Creek	0–7.8	T	S
Upper Rogue	Lick Creek	0–6.8	DO, EC	6/1–9/30
Upper Rogue	Little Butte Creek	0–16.7	DO	Sp/S, 10/1–5/31
Upper Rogue	Little Butte Creek	0–16.7	FC	Y
Upper Rogue	Little Butte Creek	0–16.7	S	*
Upper Rogue	Little Butte Creek	0–16.7	T	S
Upper Rogue	Lost Creek	0–8.4	S	*
Upper Rogue	Lost Creek	0–8.4	T	S
Upper Rogue	Nichols Branch	0–0.5	EC	6/1–9/30
Upper Rogue	North Fork Little Butte Creek	0–6.5	EC	6/1–9/30
Upper Rogue	North Fork Little Butte Creek	0–6.5	T	S
Upper Rogue	Reese Creek	0–3	DO, EC	6/1–9/30

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Table C-1. (continued).

Coastal Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Upper Rogue	Salt Creek	0–9	EC	6/1–9/30
Upper Rogue	Soda Creek	0–5.6	S	*
Upper Rogue	Soda Creek	0–5.6	T	S
Upper Rogue	South Fork Little Butte Creek	0–16.4	S	*
Upper Rogue	South Fork Little Butte Creek	0–16.4	T	S
Upper Rogue	Trail Creek	0–10.7	DO	6/1–9/30
Upper Rogue	West Branch Elk Creek	0–7.4	T	S
Upper Rogue	West Fork Muir Creek	0–3.3	T	S
Upper Rogue	West Fork Trail Creek	0–8.4	DO	6/1–9/30
Upper Rogue	Willow Creek	0–4.5	T	S
Upper Rogue	Woodruff Creek	0–6.2	T	S
Wilson-Trask-Nestucca	Bewley Creek	0–2	DO	9/15–5/31
Wilson-Trask-Nestucca	Dougherty Slough	0–4.9	DO	Y
Wilson-Trask-Nestucca	Hall Slough	0–2.8	DO	Y
Wilson-Trask-Nestucca	Hathaway Slough	0–1.2	DO	Y
Wilson-Trask-Nestucca	Hoquarten Slough	0–3.1	DO	Y
Wilson-Trask-Nestucca	Kilchis River	3–8.5	DO	9/15–5/31
Wilson-Trask-Nestucca	Mill Creek	0–3	DO	9/15–5/31
Wilson-Trask-Nestucca	Mill Creek	0–3	Fe	Y
Wilson-Trask-Nestucca	Nestucca River	0–28.9	DO	9/15–5/31
Wilson-Trask-Nestucca	Tillamook River	6.4–18.5	DO	9/15–5/31
Wilson-Trask-Nestucca	Trask River	4.1–10.2	DO	9/15–5/31
Wilson-Trask-Nestucca	Wilson River	3.5–10.1	DO	9/15–5/31
Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Beaver South Fork	Beaverdam Creek	0–10.8	T	S
Beaver South Fork	Dipping Vat Creek	0–7.7	T	S, 10/1–6/30
Beaver South Fork	Dry Paulina Creek	0–13.1	T	S, 10/1–6/30
Beaver South Fork	North Wolf Creek	0–10.3	T	S
Beaver South Fork	Powell Creek	0–12.7	T	S
Beaver South Fork	Roba Creek	0–7.2	T	S, 10/1–6/30
Beaver South Fork	South Fork Beaver Creek	0–26.4	T	S, 10/1–6/30
Beaver South Fork	South Fork Crooked River	0–18	T	S, 10/1–6/30

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Beaver South Fork	Sugar Creek	0–11.5	T	S
Beaver South Fork	Wolf Creek	0–17.1	T	S, 10/1–6/30
Brownlee Reservoir	Aspen Creek	0–1.6	T	S
Brownlee Reservoir	Beecher Creek	0–2.4	T	S
Brownlee Reservoir	Big Elk Creek	0–2.1	T	S
Brownlee Reservoir	Clear Creek	0–8.7	T	S
Brownlee Reservoir	Connor Creek	0–6.7	T	S
Brownlee Reservoir	East Pine Creek	0–18.7	T	S
Brownlee Reservoir	Elk Creek	0–9.5	T	S
Brownlee Reservoir	Fox Creek	0–6.4	T	S, 3/1–5/31
Brownlee Reservoir	Lake Fork	0–10.4	T	S
Brownlee Reservoir	Meadow Creek	0–3.3	T	S
Brownlee Reservoir	Morgan Creek	0–6.1	T	S, 3/1–5/31
Brownlee Reservoir	Okanogan Creek	0–1.3	T	S
Brownlee Reservoir	Pine Creek	0–32.7	T	S
Brownlee Reservoir	Trail Creek	0–1.6	T	S
Bully	Bully Creek	0–12.8	ChlA, FC	S
Bully	Bully Creek	15.9–57.1	FC	S/F
Bully	Auburn Creek	0–6.6	T	S
Bully	Burnt River	0–77.3	T	S
Bully	Burnt River	45.1–77.3	ChlA	S
Bully	Camp Creek	0–6.9	S	*
Bully	China Creek	0–7.7	T	S
Bully	Cottonwood Creek	0–5	T	S, 3/1–5/31
Bully	Dark Canyon	0–5.9	T	S, 3/1–5/31
Bully	Dixie Creek	0–6.9	T	S, 3/1–5/31
Bully	East Camp Creek	0–8	T	S
Bully	Geiser Creek	0–4.9	S	*
Bully	Lawrence Creek	0–9.4	T	S, 3/1–5/31
Bully	North Fork Burnt River	1.9–28.7	T	S
Bully	North Fork Dixie Creek	0–11.2	T	S, 3/1–5/31
Bully	Patrick Creek	0–1.3	S	*
Bully	Patrick Creek	0–1.3	T	S

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Bully	Pine Creek	0–2.7	T	S, 3/1–5/31
Bully	South Fork Dixie Creek	0–9.6	T	S, 3/1–5/31
Burnt	Trout Creek	0–8.8	S	*
Burnt	Trout Creek	0–8.8	T	S
Clackamas	Bargfeld Creek	0–2.3	EC	S
Clackamas	Clackamas River	0–15	EC	6/1–9/30
Clackamas	Clackamas River	0–22.9	T	S
Clackamas	Cow Creek	0–2.6	EC	10/1–5/31
Clackamas	Cow Creek	0–2.6	T	S
Clackamas	Deep Creek	1.9–14.1	EC	S
Clackamas	Eagle Creek	0–20	T	S
Clackamas	Fish Creek	0–6.8	T	S
Clackamas	North Fork Deep Creek	0–9	EC	S
Clackamas	Rock Creek	0–6.1	EC	10/1–5/31
Clackamas	Sieben Drainage Ditch	0–1.8	EC	10/1–5/31
Clackamas	Tickle Creek	0–2.3	EC	S
Coast Fork Willamette	Brice Creek	0–11.2	T	S
Coast Fork Willamette	Camas Swale Creek	0–9.4	DO	10/1–5/31
Coast Fork Willamette	Coast Fork Willamette River	0–31.3	FC, Hg	Y
Coast Fork Willamette	Coast Fork Willamette River	0–31.3	T	S
Coast Fork Willamette	Cottage Grove Reservoir/ Coast Fork Willamette River	28.5–31.3	Hg	Y
Coast Fork Willamette	Dorena Lake/Row River	7.4–11.3	Hg	Y
Coast Fork Willamette	King Creek	0–1.6	T	S
Coast Fork Willamette	Laying Creek	0–7.7	T	S
Coast Fork Willamette	Martin Creek	0–3.4	T	S
Coast Fork Willamette	Mosby Creek	0–21.2	T	S
Coast Fork Willamette	Row River	0–7.4, 11.3–20.8	T	S
Coast Fork Willamette	Sharps Creek	0–12.5	T	S
Imnaha	Big Sheep Creek	0–36.6	T	S
Imnaha	Crazyman Creek	0–6.7	T	S
Imnaha	Dry Creek	0–4.2	T	8/1–7/15
Imnaha	Freezeout Creek	0–8.5	T	S

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Imnaha	Grouse Creek	0–17.3	T	S
Imnaha	Gumboot Creek	0–7.4	T	8/1–7/15
Imnaha	Imnaha River	0–72	T	S
Imnaha	Lightning Creek	0–24.8	T	S
Imnaha	Little Sheep Creek	0–29	T	S
Jordon	Antelope Reservoir/ Jack Creek	4.1–8.4	Hg	Y
Jordon	Jordan Creek	0–54.4	Hg	Y
Little Deschutes	Crescent Creek	0–26.1	T	S
Little Deschutes	Little Deschutes River	0–54.1	DO	9/1–6/30
Little Deschutes	Little Deschutes River	0–54.1	DO	7/1–8/31
Little Deschutes	Little Deschutes River	54.1–78	T	9/1–6/30
Little Deschutes	Paulina Creek	0–13.2	T	S
Lower Columbia Sandy	Beaver Creek	0–8.3	EC	S
Lower Columbia Sandy	Bull Run River	0–5	T	S
Lower Columbia Sandy	Cedar Creek	0–4.3	EC	S
Lower Columbia Sandy	Gordon Creek	0–10.5	T	9/15–6/30
Lower Columbia Sandy	Kelly Creek	0–4.8	EC	S
Lower Columbia Sandy	Salmon River	0–0.9	T	S
Lower Columbia Sandy	Sandy River	0–29.5	DO	9/15–6/30
Lower Columbia Sandy	Sandy River	0–29.5	T	S
Lower Columbia Sandy	Unnamed Waterbody	0–2.9	EC	S
Lower Crooked	East Fork Mill Creek	0–7.6	T	S
Lower Crooked	Harvey Creek	0–1.4	T	S
Lower Crooked	Little McKay Creek	0–6.7	T	S, 10/1–6/30
Lower Crooked	Marks Creek	0–17.1	T	S, 10/1–6/30
Lower Crooked	McKay Creek	0–19.5	T	S
Lower Crooked	McKay Creek	14.7–19.5	T	10/1–6/30
Lower Crooked	Mill Creek	0–11.5	T	S, 10/1–6/30
Lower Crooked	Ochoco Creek	0–36.4	T	S
Lower Crooked	West Fork Mill Creek	0–4.9	T	S
Lower Deschutes	Buck Hollow Creek	0–37.7	T	S
Lower Deschutes	Clear Creek	0–15.1	T	S

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Lower Deschutes	Gate Creek	0–14.3	S	*
Lower Deschutes	Gate Creek	0–14.3	T	S
Lower Deschutes	Oak Canyon	0–6.3	T	S
Lower Deschutes	Rock Creek	0–15.9	S	*
Lower Deschutes	Rock Creek	0–14.1	T	S
Lower Deschutes	Sixteen Canyon	0–3.7	T	S
Lower Deschutes	Tenmile Creek	0–0	T	S
Lower Deschutes	Threemile Creek	0–11.3	T	S
Lower Deschutes	Wapinitia Creek	0–14.4	T	S
Lower Deschutes	White River	0–12	T	S
Lower Deschutes	Willow Creek	0–21.4	T	S
Lower Grande Ronde	Chesnimnus Creek	0–26.4	S	*
Lower Grande Ronde	Chesnimnus Creek	0–26.4	T	S
Lower Grande Ronde	Courtney Creek	0–6.9	T	S
Lower Grande Ronde	Crow Creek	0–20.2	T	S
Lower Grande Ronde	Elk Creek	0–13.7	S	*
Lower Grande Ronde	Elk Creek	0–13.7	T	S
Lower Grande Ronde	Joseph Creek	8.3–48.1	T	S
Lower Grande Ronde	Mud Creek	0–23	T	S, 10/1–6/30
Lower Grande Ronde	Peavine Creek	0–5.3	T	S
Lower Grande Ronde	Salmon Creek	0–13.6	T	S
Lower Grande Ronde	Sickfoot Creek	0–7.5	T	S, 10/1–6/30
Lower Grande Ronde	Wenaha River	0–14.6	T	S, 10/1–6/30
Lower Grande Ronde	Wildcat Creek	0–15.9	T	S, 10/1–6/30
Lower John Day	Bear Creek	0–4.6	T	S
Lower John Day	Bridge Creek	0–28.7	T	S
Lower John Day	Gable Creek	0–7.7	T	S
Lower John Day	Grass Valley Canyon	0–39.8	T	S
Lower John Day	Henry Creek	0–7.1	T	S
Lower John Day	Nelson Creek	0–5.7	T	S
Lower John Day	Pine Creek	0–15.8	BC	*
Lower John Day	Sorefoot Creek	0–7.5	T	S
Lower John Day	Stahl Canyon	0–5.7	T	S

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Lower John Day	Thirtymile Creek	0–39.3	T	S, 10/1–6/30
Lower Malheur	Alder Creek	0–4.1	T	S
Lower Malheur	Cottonwood Creek	0–35.3	T	S
Lower Malheur	Pole Creek	0–6.3	T	S
Lower Malheur	Willow Creek	0–0.2	EC	6/1–9/30, 10/1–5/31
Lower Owyhee	Fletcher Street Drain	0–0	Cu, Fe, Pb, Mn	Y
Lower Owyhee	Overstreet Drain	0–0	Cu, Fe, Pb, Mn	Y
Lower Willamette	Blue Lake/Arata Creek	0–0.9	AW/A	*
Lower Willamette	Blue Lake/Arata Creek	0–0.9	pH	S
Lower Willamette	Bybee Lake	0.5–1.7	AW/A	*
Lower Willamette	Bybee Lake	0.5–1.7	pH	S
Lower Willamette	Columbia Slough	0–8.5	Fe	Y
Lower Willamette	Columbia Slough	0–8.5	Mn	Y
Lower Willamette	Columbia Slough	0–8.5	T	Sp/S/F
Lower Willamette	Columbia Slough	0–9.8	Fe, Mn	Y
Lower Willamette	Fairview Creek	0–1.7	EC	Y
Lower Willamette	Fairview Creek	0–1.7	FC	W/Sp/F
Lower Willamette	Fairview Creek	0–1.7	pH	Sp/S
Lower Willamette	Fairview Lake/Osburn Creek	2–2.8	pH	10/1–5/31
Lower Willamette	Johnson Creek	0–23.7	DDT, D, PCB, FC, PAH	Y
Lower Willamette	Kellogg Creek	0–5	EC	10/1–5/31
Lower Willamette	Mount Scott Creek	0–6.1	EC	10/1–5/31
Lower Willamette	Phillips Creek	0–1.2	EC	10/1–5/31
Lower Willamette	Smith Lake	1.7–3	AW/A	*
Lower Willamette	Smith Lake	1.7–3	pH	S
Lower Willamette	Spring Brook Creek	0–2.3	FC	Y
Lower Willamette	Tryon Creek	0–5	T	S
McKenzie	Blue River	0–1.8	T	Sp/S/F
McKenzie	Blue River	1.8–15.5	T	S
McKenzie	Deer Creek	0–8.3	T	S
McKenzie	French Pete Creek	0–12.9	T	S
McKenzie	Horse Creek	0–14.2	T	S

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
McKenzie	McKenzie River	0–34.1, 54.4–83	T	S
McKenzie	McKenzie River	34.1–54.5	T	Sp/S/F
McKenzie	Mill Creek	0–2.7	T	S
McKenzie	Mohawk River	0–25.4	DO	10/1–5/31
McKenzie	Mohawk River	0–25.4	T	S
McKenzie	Shotgun Creek	0–6.6	T	S
McKenzie	South Fork McKenzie River	0–4.5	T	Sp/S/F
McKenzie	Unnamed Waterbody	0–1.2	T	S
Middle Columbia Hood	Chenoweth Creek	0–7.9	T	S, 10/1–6/30
Middle Columbia Hood	Dry Creek	0–16.6	T	S, 10/1–6/30
Middle Columbia Hood	Eightmile Creek	0–22	T	S, 10/1–6/30
Middle Columbia Hood	Eightmile Creek	0–34.5	S	*
Middle Columbia Hood	Fifteenmile Creek	0–52.7	S	*
Middle Columbia Hood	Fifteenmile Creek	0–40	T	S, 9/15–6/30
Middle Columbia Hood	Fivemile Creek	0–17.9	S	*
Middle Columbia Hood	Fivemile Creek	0–17.9	T	S, 10/1–6/30
Middle Columbia Hood	Indian Creek	0–7.8	Cpf	Y
Middle Columbia Hood	Lenz Creek	0–1.5	Cpf, Zn	Y
Middle Columbia Hood	Mill Creek	0–7.7	T	S, 9/15–6/30
Middle Columbia Hood	Mitchell Creek	0–2.3	Zn	Y
Middle Columbia Hood	Mosier Creek	0–16.1	T	S
Middle Columbia Hood	Neal Creek	0–5.6	Cpf, G, Fe	Y
Middle Columbia Hood	North Fork Mill Creek	0–3.7	T	S, 10/1–6/30
Middle Columbia Hood	Ramsey Creek	0–13.2	S	*
Middle Columbia Hood	Ramsey Creek	0–5.4	T	S, 10/1–6/30
Middle Columbia Hood	Rock Creek	0–10.6	T	S, 10/1–6/30
Middle Columbia Hood	South Fork Mill Creek	0–8.5	T	S
Middle Columbia Hood	Threemile Creek	0–14.6	T	S, 10/1–6/30
Middle Columbia Hood	West Fork Mosier Creek	0–7.9	T	S
Middle Fork John Day	Big Creek	0–11.6	T	S
Middle Fork John Day	Camp Creek	0–15.6	T	S
Middle Fork John Day	Caribou Creek	0–3.6	T	S

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Middle Fork John Day	Clear Creek	0–12.7	T	S
Middle Fork John Day	Coyote Creek	0–2.5	T	S
Middle Fork John Day	Crawford Creek	0–3.5	T	S
Middle Fork John Day	Davis Creek	0–6.8	T	S
Middle Fork John Day	Dry Fork Clear Creek	0–11	T	S
Middle Fork John Day	Granite Boulder Creek	0–8.1	T	S
Middle Fork John Day	Little Boulder Creek	0–2.1	T	S
Middle Fork John Day	Little Butte Creek	0–2.6	T	S
Middle Fork John Day	Long Creek	0–36.7	T	S
Middle Fork John Day	Lunch Creek	0–4.1	T	S
Middle Fork John Day	Middle Fork John Day River	0–69.8	T	S, 9/15–7/15
Middle Fork John Day	Mill Creek	0–3.1	T	S
Middle Fork John Day	Placer Gulch	0–4.2	T	S
Middle Fork John Day	Ragged Creek	0–4.1	T	S
Middle Fork John Day	Squaw Creek	0–9.4	T	S
Middle Fork John Day	Summit Creek	0–8.6	T	S, 8/15–7/15
Middle Fork John Day	Unnamed Waterbody	0–2.4	T	S
Middle Fork John Day	Vinegar Creek	0–7.1	T	S
Middle Fork Willamette	Anthony Creek	0–4.3	DO	10/1–5/31
Middle Fork Willamette	Anthony Creek	0–4.3	DO	6/1–9/30
Middle Fork Willamette	Anthony Creek	0–4.3	T	S
Middle Fork Willamette	Bohemia Creek	0–4.4	T	9/15–6/30
Middle Fork Willamette	Coal Creek	0–8.9	T	S
Middle Fork Willamette	Fall Creek	0–7, 13–32.7	T	S
Middle Fork Willamette	Hills Creek	1.7–8.2	T	S
Middle Fork Willamette	Little Fall Creek	0–20.6	T	9/15–6/30
Middle Fork Willamette	Lost Creek	0–14.7	DO	6/1–5/31

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Middle Fork Willamette	Lost Creek	0–14.7	T	S, 9/15–6/30
Middle Fork Willamette	Middle Fork Willamette River	0–15.6, 52.5–64.1	T	S
Middle Fork Willamette	Mike Creek	0–2.2	T	S
Middle Fork Willamette	North Fork, Middle Fork Willamette River	0–14.1	T	S
Middle Fork Willamette	North Fork, Middle Fork Willamette River	14.1–49.4	T	9/15–6/30
Middle Fork Willamette	Packard Creek	0–5.2	T	S
Middle Fork Willamette	Portland Creek	0–3	T	S
Middle Fork Willamette	Salt Creek	0–13.6	T	S
Middle Fork Willamette	South Fork Winberry Creek	0–3.1	T	S
Middle Fork Willamette	Unnamed Waterbody	0–2.3	T	S, 9/15–6/30
Middle Fork Willamette	Winberry Creek	2.9–8	T	S
Middle Owyhee	North Fork Owyhee River	0–9.6	T	S
Middle Snake Payette	Shepherd Gulch	0–3.6	FC	Sp/S
Middle Snake Payette	South Fork Jacobsen Gulch	0–3	FC	Sp/S
Middle Willamette	Abernethy Creek	0–15.5	T	S
Middle Willamette	Bashaw Creek	0–4.8	FC	Y
Middle Willamette	Champoeg Creek	0–7.5	D	Y
Middle Willamette	Clark Creek	0–1.9	EC	*
Middle Willamette	Gibson Gulch	0–2.8	DO	10/1–5/31
Middle Willamette	Glenn Creek	0–7	DO	10/1–5/31
Middle Willamette	Mill Creek	0–25.7	FC	Y
Middle Willamette	Patterson Creek	0–7.2	T	S
Middle Willamette	Pringle Creek	0–6.2	Cu, D, Pb, Zn	Y
Middle Willamette	Pringle Creek	0–6.2	EC	*
Middle Willamette	Pringle Creek	0–6.2	T	S

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Middle Willamette	Rickreall Creek	0–24.9	T	S
Middle Willamette	Winslow Gulch	0–2.5	DO	10/1–5/31
Molalla-Pudding	Butte Creek	18.7–35.6	T	S
Molalla	Drift Creek	0–9.5	T	S
Molalla	Molalla River	0–25	FC	W/Sp/F
Molalla	Molalla River	0–48.2	T	S
Molalla	Pine Creek	0–1	T	S
Molalla	Pudding River	0–35.4	DDT	Y
Molalla	Pudding River	0–35.4	FC	Y
Molalla	Pudding River	0–61.7	T	S
Molalla	Silver Creek	0–5.9	FC, T	S
Molalla	Table Rock Fork Molalla River	0–12	T	S
Molalla	Zollner Creek	0–7.8	As, Cld, D, Fe, FC, Mn, N	Y
Molalla	Zollner Creek	0–7.8	T	S
North Fork John Day	Alder Creek	0–5.5	S	*
North Fork John Day	Baldy Creek	0–5	S	*
North Fork John Day	Bear Wallow Creek	0–7.4	T	S
North Fork John Day	Beaver Creek	0–6.1	T	S
North Fork John Day	Big Creek	0–10.7	T	S
North Fork John Day	Big Wall Creek	0–21.3	S	*
North Fork John Day	Big Wall Creek	0–21.3	T	S, 3/1–7/15
North Fork John Day	Bowman Creek	0–6.9	T	S
North Fork John Day	Bridge Creek	0–9	T	S
North Fork John Day	Buck Creek	0–1.6	T	S, 8/15–7/15
North Fork John Day	Bull Run Creek	0–9.3	S	*
North Fork John Day	Bull Run Creek	0–9.3	T	S
North Fork John Day	Cable Creek	0–7.1	T	S
North Fork John Day	Camas Creek	0–36.7	T	S, 3/1–7/15
North Fork John Day	Clear Creek	0–7.1	T	S
North Fork John Day	Cottonwood Creek	0–22.5	BC	*
North Fork John Day	Crane Creek	0–5.9	T	S
North Fork John Day	Desolation Creek	0–21.1	T	S

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
North Fork John Day	Ditch Creek	0–19.5	T	S
North Fork John Day	East Fork Cottonwood Creek	0–6.5	BC	*
North Fork John Day	Fivemile Creek	0–21.3	T	S
North Fork John Day	Frazier Creek	0–6.2	T	S
North Fork John Day	Granite Creek	0–11.2	T	S
North Fork John Day	Granite Creek	11.2–16.2	S	*
North Fork John Day	Hidaway Creek	0–16.2	T	S
North Fork John Day	Hog Creek	0–4.1	S	*
North Fork John Day	Indian Creek	0–5.4	T	S, 3/1–7/15
North Fork John Day	Lane Creek	0–7.1	T	S
North Fork John Day	Mallory Creek	0–14.3	T	S
North Fork John Day	Meadow Creek	0–10.4	T	S, 8/15–7/15
North Fork John Day	North Fork Cable Creek	0–7.5	T	S, 3/1–7/15
North Fork John Day	North Fork John Day River	0–31.7	T	S
North Fork John Day	North Fork John Day River	0–86.2	T	3/1–7/15
North Fork John Day	North Fork John Day River	31.7–97.1	T	S
North Fork John Day	Onion Creek	0–4.5	T	S
North Fork John Day	Owens Creek	0–14.8	T	S
North Fork John Day	Porter Creek	0–7.4	S	*
North Fork John Day	Potamus Creek	0–18.4	T	S
North Fork John Day	Rancheria Creek	0–5.1	T	S
North Fork John Day	Skookum Creek	0–12.4	T	S
North Fork John Day	South Fork Cable Creek	0–8.4	T	S, 3/1–7/15
North Fork John Day	South Trail Creek	0–6.6	T	S
North Fork John Day	Sponge Creek	0–2.7	T	S, 8/15–7/15
North Fork John Day	Stalder Creek	0–4.1	T	S
North Fork John Day	Swale Creek	0–11.1	S	*
North Fork John Day	Swale Creek	0–11.1	T	S
North Fork John Day	Trail Creek	0–1.9	T	S, 8/15–7/15
North Fork John Day	Wilson Creek	0–10.7	S	*
North Fork John Day	Wilson Creek	0–10.7	T	S
North Santiam	Bear Branch	0–9.8	T	S
North Santiam	Blowout Creek	0–11.9	T	S

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
North Santiam	Boulder Creek	0–2.4	T	S
North Santiam	Chehulpum Creek	0–7.1	T	S
North Santiam	Elkhorn Creek	0–7.4	T	S
North Santiam	Little North Santiam River	0–25.1	T	S
North Santiam	Marion Creek	0–6.2	T	S
North Santiam	North Santiam River	0–26.5	T	S, 9/1–6/30
North Santiam	Santiam River	0–12	DO	9/15–6/30
North Santiam	Santiam River	0–12	T	S, 9/15–6/30
North Santiam	Stout Creek	0–8.9	T	S
North Santiam	Unnamed Waterbody	0–2.8	T	S
Powder	Anthony Creek	0–16	T	S
Powder	California Gulch	0–4.4	T	S
Powder	Dean Creek	0.4–5.2	T	S
Powder	East Fork Goose Creek	0–2.7	Tb	Sp/S
Powder	Elk Creek	0–7.7	T	S
Powder	Indian Creek	0–5.2	T	S
Powder	North Powder River	0–18.3	T	S
Powder	Powder River	0–69	DO	S
Powder	Powder River	0–69, 71.9–130	FC	Y
Powder	Powder River	0–69, 71.9–115.6	T	S
Powder	Silver Creek	0–6.1	T	S
Powder	Sutton Creek	0–15.9	T	S, 3/1–5/31
Powder	West Fork Sutton Creek	0–3.3	T	S, 3/1–5/31
South Santiam	Beaver Creek	0–16	T	S
South Santiam	Crabtree Creek	0–32.1	T	S
South Santiam	Hamilton Creek	0–11.6	T	S
South Santiam	McDowell Creek	0–5.7	T	S
South Santiam	Middle Santiam River	5.3–37.1	T	S
South Santiam	Neal Creek	0–10	T	S
South Santiam	Quartzville Creek	3.3–26.8	T	S
South Santiam	South Santiam River	0–25.9 35.7–63.4	T	S, 9/15–6/30

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
South Santiam	Sucker Slough	0–9.8	T	S
South Santiam	Thomas Creek	0–26.1	T	S
South Santiam	Wiley Creek	0–17.2	T	S
Trout	Auger Creek	0–6.5	S	*
Trout	Auger Creek	0–6.5	T	S
Trout	Big Log Creek	0–5.5	S	*
Trout	Big Log Creek	0–5.5	T	S
Trout	Bull Cree	0–1.8	S	*
Trout	Bull Creek	0–1.8	T	S
Trout	Cartwright Creek	0–4.3	S	*
Trout	Cartwright Creek	0–4.3	T	S
Trout	Dick Creek	0–2.2	S	*
Trout	Dick Creek	0–2.2	T	S
Trout	Dutchman Creek	0–4.8	S	*
Trout	Dutchman Creek	0–4.8	T	S
Trout	Potlid Creek	0–5.2	S	*
Trout	Potlid Creek	0–5.2	T	S
Trout	Tenmile Creek	0–5.9	T	S, 10/1–6/30
Trout	Trout Creek	0–50.7	S	*
Trout	Trout Creek	0–50.7	T	S
Tualatin	Koll Wetland	0–0	CrHx, Cu, Pb, Ag, Zn	Y
Umatilla	Birch Creek	0–15.6	Fe	Y
Umatilla	Butter Creek	0–18	Fe	Y
Umatilla	Hermiston Ditch	0–2.7	pH	6/1–9/30
Umatilla	McKay Creek	0–15	Fe	Y
Umatilla	Umatilla River	0–32.1	DO	10/1–6/30
Umatilla	Umatilla River	0–32.1	Mn	Y
Umatilla	Umatilla River	0–56	Fe	Y
Umatilla	Unnamed Waterbody	0–3.1	N	Y
Umatilla	Wildhorse Creek	0–33.1	Fe	Y
Upper Crooked	Allen Creek	0–10.1	T	S
Upper Crooked	Bear Creek	0–34.3	T	S, 10/1–6/30

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Upper Crooked	Cow Creek	0–7.2	T	S
Upper Crooked	Crazy Creek	0–3.5	T	S
Upper Crooked	Deep Creek	0–10.6	T	S
Upper Crooked	Deer Creek	0.9–4	T	S
Upper Crooked	Double Corral Creek	0–5.4	T	S
Upper Crooked	Fox Canyon Creek	0–6.8	T	S, 10/1–6/30
Upper Crooked	Fox Creek	0–4.9	T	S
Upper Crooked	Gray Creek	0–6.7	T	S
Upper Crooked	Happy Camp Creek	0–6.7	T	S
Upper Crooked	Horse Heaven Creek	0–14	T	S
Upper Crooked	Howard Creek	0–9.5	T	S
Upper Crooked	Indian Creek	0–9.1	T	S
Upper Crooked	Jackson Creek	0–5.9	T	S, 10/1–6/30
Upper Crooked	Klootchman Creek	1–5.3	T	S
Upper Crooked	Little Horse Heaven Creek	0–2.9	T	S
Upper Crooked	Little Summit Creek	0–10	T	S, 10/1–6/30
Upper Crooked	Lookout Creek	0–1.5	T	S
Upper Crooked	Lytle Creek	0–4.2	T	S
Upper Crooked	North Fork Crooked River	0–44.7	T	S
Upper Crooked	Peterson Creek	0–10.7	T	S
Upper Crooked	Porter Creek	0–4.5	T	S, 10/1–6/30
Upper Crooked	Shotgun Creek	0–5.9	T	S
Upper Crooked	Wickiup Creek	0–8.6	T	S
Upper Crooked	Wildcat Creek	0–4.3	T	S, 10/1–6/30
Upper Deschutes	Brush Creek	0–2	T	Y
Upper Deschutes	Canyon Creek	0–11.4	T	Y
Upper Deschutes	First Creek	3.6–12.1	T	9/1–6/30
Upper Deschutes	Indian Ford	0–11.2	T	S
Upper Deschutes	Lake Creek	0–1.5	T	S
Upper Deschutes	Lava Lake	0–0	DO	6/1–9/30
Upper Deschutes	Odell Creek	0–11	T	S, 9/1–6/30
Upper Deschutes	Odell Lake/Odell Creek	11–16.3	pH	S
Upper Deschutes	Squaw Creek	0–21	T	9/1–6/30

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Upper Deschutes	Squaw Creek	1.6–21	T	S
Upper John Day	Badger Creek	0–9	T	S
Upper John Day	Battle Creek	0–7.3	T	S
Upper John Day	Bear Creek	0–10.1	T	S
Upper John Day	Canyon Creek	0–27.5	T	S
Upper John Day	Corral Creek	0–8.7	BC	*
Upper John Day	Cottonwood Creek	0–16.4	T	S
Upper John Day	Dads Creek	0–8.6	T	S
Upper John Day	Dans Creek	0–6	T	S
Upper John Day	Deardorff Creek	0–9.6	T	S
Upper John Day	Deer Creek	0–11.9	T	S
Upper John Day	Dog Creek	0–5.5	T	S
Upper John Day	East Fork Canyon Creek	0–9.2	T	S
Upper John Day	Ennis Creek	0–2.8	T	S, 10/1–6/30
Upper John Day	Fields Creek	0–10.2	T	S, 10/1–6/30
Upper John Day	Flat Creek	0–11.7	T	S, 10/1–6/30
Upper John Day	Grasshopper Creek	0–5.3	T	S, 10/1–6/30
Upper John Day	Grub Creek	0–13.5	T	S
Upper John Day	Indian Creek	0–6.1	T	S
Upper John Day	Little Pine Creek	0–5.1	T	S
Upper John Day	McClellan Creek	0–6.4	T	S
Upper John Day	Mountain Creek	0–21.7	T	S
Upper John Day	Murderers Creek	0–24.7	T	S
Upper John Day	North Fork Deer Creek	0–4.2	T	S
Upper John Day	Pine Creek	0–3.8	T	S
Upper John Day	Rail Creek	0–7.1	T	S
Upper John Day	Reynolds Creek	0–9.3	T	Y
Upper John Day	Rock Creek	0–24.7	T	S
Upper John Day	Slyfe Creek	0–6	T	S
Upper John Day	South Fork John Day River	0–57.3	T	S
Upper John Day	Strawberry Creek	0–5.8	T	S
Upper John Day	Sunflower Creek	0–8.7	T	S
Upper John Day	Tex Creek	0–6.9	T	S, 10/1–6/30

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Upper John Day	Tinker Creek	0–4.6	T	S
Upper John Day	Utley Creek	0–5.5	BC	*
Upper John Day	Utley Creek	0–5.5	DO	10/1–6/30
Upper Malheur	Bear Creek	0–14.7	T	S
Upper Malheur	Big Creek	0–6.1	T	S
Upper Malheur	Bluebucket Creek	0–12.1	T	S
Upper Malheur	Crane Creek	0–1.1	T	S
Upper Malheur	Dry Creek	0–8.3	T	S
Upper Malheur	Elk Creek	0–1	T	S
Upper Malheur	Lake Creek	0–11.9	T	S
Upper Malheur	Little Crane Creek	0–9.3	T	S
Upper Malheur	Little Malheur River	0–28.5	T	S
Upper Malheur	North Fork Malheur River	0–18	FC	Sp/S
Upper Malheur	North Fork Malheur River	20.8–59.3	T	S
Upper Malheur	Pine Creek	0–24.7	T	S
Upper Malheur	Stinkingwater Creek	0–27.8	T	S
Upper Malheur	Summit Creek	0–14.2	T	S
Upper Quinn	Indian Creek	0–8.4	T	S
Upper Quinn	McDermitt Creek	0–12.3	T	S
Upper Quinn	Sage Creek	0–5.2	T	S
Upper Willamette	A-3 Drain	0–0	As, DCE, Pb, Hg, TECE	Y
Upper Willamette	A-3 Drain	0–0	EC	6/1–5/31
Upper Willamette	Amazon Creek	0–22.6	As, Pb	Y
Upper Willamette	Amazon Creek	0–22.6	EC	6/1–5/31
Upper Willamette	Amazon Diversion Canal	0–1.8	DO	Sp/S/F
Upper Willamette	Amazon Diversion Canal	0–1.8	FC	Y
Upper Willamette	Calapooia River	0–42.8	FC	W/Sp/F
Upper Willamette	Calapooia River	0–42.8	T	S
Upper Willamette	Coyote Creek	0–26.2	DO	Sp/S/F
Upper Willamette	Coyote Creek	0–26.2	FC	Y
Upper Willamette	Ferguson Creek	0–10	T	S
Upper Willamette	Fern Ridge Reservoir/Long Tom River	24.2–31.8	FC	W/Sp/F

Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Upper Willamette	Fern Ridge Reservoir/Long Tom River	24.2–31.8	Tb	*
Upper Willamette	Long Tom River	0–24.2	FC	W/Sp/F
Upper Willamette	Long Tom River	0–24.2	T	S
Upper Willamette	Luckiamute River	0–31.7	FC	W/Sp/F
Upper Willamette	Marys River	0–13.9	DO	10/1–5/31
Upper Willamette	Marys River	0–13.9	FC	W/Sp/F
Upper Willamette	Marys River	0–13.9	T	S
Upper Willamette	Muddy Creek	0–33	T	S
Upper Willamette	Soap Creek	0–16.8	DO	10/1–5/31
Upper Willamette	South Fork Berry Creek	0–2.1	T	S
Upper Willamette	Willow Creek	0–2.8	As	Y
Walla Walla	Mill Creek	22.9–26	T	S
Walla Walla	North Fork Walla Walla River	0–18.7	T	S
Walla Walla	Pine Creek	0–37.8	Fe	Y
Walla Walla	South Fork Walla Walla River	0–27.1	T	S
Walla Walla	Walla Walla River	40.6–50.6	T	S
Wallowa	Bear Creek	0–7.5	S	
Wallowa	Bear Creek	0–24.1	T	S
Wallowa	Deer Creek	0–10.2	T	S
Wallowa	Fisher Creek	0–5.1	T	S, 10/1–6/30
Wallowa	Howard Creek	0–11	T	S
Wallowa	Howard Creek	0–11	T	10/1–6/30
Wallowa	Hurricane Creek	0–7.6	S	*
Wallowa	Little Bear Creek	0–8	T	S
Wallowa	Lostine River	0–9	S	*
Wallowa	Minam River	0–10.2	S	*
Wallowa	Minam River	0–10.2	T	S
Wallowa	Minam River	10.2–49.4	T	Y
Wallowa	Prairie Creek	0–12.5	DO	Sp/S
Wallowa	Prairie Creek	0–12.5	EC	6/1–9/30
Wallowa	Prairie Creek	0–12.5	FC	W/Sp/F
Wallowa	Prairie Creek	0–12.5	S	*

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Wallowa	Spring Creek	0–4.5	DO	Sp/S
Wallowa	Spring Creek	0–4.5	FC	W/Sp/F
Wallowa	Wallowa River	0–50	FC	Y
Wallowa	Wallowa River	0–50	pH	S
Wallowa	Wallowa River	0–50	S	*
Wallowa	Wallowa River	0–50	T	S, 10/1–6/30
Willow	Balm Fork	0–9.5	FC	S
Willow	Basin Creek	0–8.7	T	S, 3/1–5/31
Willow	Willow Creek	0–27.4	ChlA	S
Willow	Willow Creek	0–27.4	FC	Y
Willow	Willow Creek	0–51.7	pH	S
Willow	Willow Creek	0–72.6	T	S
Yamhill	Baker Creek	0–14.2	T	S
Yamhill	Cedar Creek	0–2.3	Fe	Y
Yamhill	Deer Creek	0–12	T	S
Yamhill	Deer Creek	0–20.4	FC	Y
Yamhill	Mill Creek	0–17	T	S
Yamhill	Mill Creek	0–22.2	FC	S
Yamhill	North Yamhill River	0–20.1	DO	10/1–5/31
Yamhill	North Yamhill River	0–20.1	FC	Y
Yamhill	North Yamhill River	0–32.4	T	S
Yamhill	Panther Creek	0–14	T	S
Yamhill	Salt Creek	0–32.8	ChlA, T, Mn	S
Yamhill	Salt Creek	0–32.8	DO	Sp/S/F
Yamhill	Salt Creek	0–32.8	FC	W/Sp/F
Yamhill	South Yamhill River	0–42.6	FC	W/Sp/F
Yamhill	South Yamhill River	18.1–61.7	FC	S
Yamhill	South Yamhill River	0–18.1	Fe	Y
Yamhill	South Yamhill River	0–42.6	T	S
Yamhill	Turner Creek	0–2.5	T	S
Yamhill	West Fork Palmer Creek	0–5.2	Cpf	Y
Yamhill	Willamina Creek	0–9.9	FC	W/Sp/F
Yamhill	Yamhill River	0–11.2	FC	W/Sp/F

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Table C-1. (continued).

Columbia Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Yamhill	Yamhill River	0–11.2	Fe, Mn	Y
Crosses Basins				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Crosses Subbasins	Columbia River	0–142	As, DDTM, PCB	Y
Crosses Subbasins	Columbia River	0–142	T	S
Crosses Subbasins	Columbia River	142–303.9	PCB	Y
Crosses Subbasins	Columbia River	98–142	PAH	Y
Crosses Subbasins	Crooked River	0–51	FC, T	S
Crosses Subbasins	Crooked River	0–51, 82.6–109.2	pH	Y
Crosses Subbasins	Crooked River	51–70	TDG	*
Crosses Subbasins	Crooked River	82.6–109.2	T	S
Crosses Subbasins	Deschutes River	0–46.4, 168.2–189.4	T	S 9/1–6/30
Crosses Subbasins	Deschutes River	46.4–99.8	T	Y
Crosses Subbasins	Deschutes River	126.4–162.6	T	S
Crosses Subbasins	Deschutes River	126.4–162.6	T	9/1–6/30
Crosses Subbasins	Deschutes River	162.6–168.2	T	S, 9/1–6/30
Crosses Subbasins	Deschutes River	0–46.4, 162.6–168.2	pH	S
Crosses Subbasins	Deschutes River	126.4–162.6	pH	Y
Crosses Subbasins	Deschutes River	46.4–99.8	pH	W/Sp/F
Crosses Subbasins	Deschutes River	168.2–189.4	ChlA	6/1–9/30
Crosses Subbasins	Deschutes River	168.2–189.4	DO	7/1–6/30
Crosses Subbasins	Deschutes River	46.4–99.8, 189.4–222.2	DO	9/1–6/30
Crosses Subbasins	Deschutes River	168.2–222.2	S	*
Crosses Subbasins	Deschutes River	168.2–222.2	Tb	Sp/S
Crosses Subbasins	Grande Ronde River	36.3–80.7	S	*
Crosses Subbasins	Grande Ronde River	36.3–80.7	T	S
Crosses Subbasins	Grande Ronde River	80.7–162.4	FC	W/Sp/F
Crosses Subbasins	John Day River	0–181.7, 182–277.6	T	S

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Table C-1. (continued).

Crosses Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Crosses Subbasins	John Day River	182–265	DO	Sp/S
Crosses Subbasins	John Day River	182–265	FC	Y
Crosses Subbasins	John Day River	36–40	pH	9/1–6/30
Crosses Subbasins	Klamath River	207–231, 250–251	T	S
Crosses Subbasins	Klamath River	231–250	Am	W/S
Crosses Subbasins	Klamath River	231–251	ChlA, pH	S
Crosses Subbasins	Klamath River	231–250	DO	Sp/S/F
Crosses Subbasins	Lake Billy Chinook/Deschutes River	110.1–116	ChlA	Sp/S/F
Crosses Subbasins	Lake Billy Chinook/Deschutes River	110.1–116	pH	S
Crosses Subbasins	Malheur River	0–67	ChlA	S
Crosses Subbasins	Malheur River	0–67	DDT, D, FC	Y
Crosses Subbasins	Malheur River	126.8–185.9	T	S
Crosses Subbasins	Malheur River	93.4–119.9	FC	S
Crosses Subbasins	Owyhee River	0–18	ChlA, FC	S
Crosses Subbasins	Owyhee River	0–18	DDT, D	Y
Crosses Subbasins	Owyhee River	104–120, 161–172	DO	3/1–5/31
Crosses Subbasins	Owyhee River	18–28.5	DO	Y
Crosses Subbasins	Owyhee River	71.2–142, 165.6–191.5	T	S, 3/1–5/31
Crosses Subbasins	Owyhee River	71.2–124.2	Hg	Y
Crosses Subbasins	Owyhee, Lake/Owyhee River	28.7–71	Hg	Y
Crosses Subbasins	Rogue River	0–27.2	pH	S
Crosses Subbasins	Rogue River	68.3–94.9	pH	W/Sp/F
Crosses Subbasins	Rogue River	0–94.9, 110.7–132.2	T	S
Crosses Subbasins	Rogue River	110.7–132.2	FC	W/Sp/F
Crosses Subbasins	Rogue River	68.3–110.7	FC	S
Crosses Subbasins	Simtustus, Lake/Deschutes River	102.3–106.3	ChlA	Sp/S/F

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Table C-1. (continued).

Crosses Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Crosses Subbasins	Simtustus, Lake/Deschutes River	102.3–106.3	pH	S
Crosses Subbasins	Snake River	173–404	Hg	Y
Crosses Subbasins	Snake River	173–404	T	S
Crosses Subbasins	Willamette River	0–72	Ald, DDT, DDTM, D, PCB	Y
Crosses Subbasins	Willamette River	0–119.7	BC	*
Crosses Subbasins	Willamette River	0–148.8	FC	W/Sp/F
Crosses Subbasins	Willamette River	0–119.7	Fe	Y
Crosses Subbasins	Willamette River	0–24.8	Mn	Y
Crosses Subbasins	Willamette River	0–119.7, 148.8–186.4	Hg	Y
Crosses Subbasins	Willamette River	0–24.8	PCP	*
Crosses Subbasins	Willamette River	0–24.8	PAH	Y
Crosses Subbasins	Willamette River	0–186.4	T	S
Crosses Subbasins	Willamette River	54.8–148.8	DO	10/1–5/31
Crosses Subbasins	Willamette River	174.5–186.4	As	Y
Interior Drainages Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Alsea	Mercer Lake/Mercer Creek	0.6–2.5	ChlA	S
Alsea	North Fork Cascade Creek	0–2.7	T	S
Alsea	North Fork Yachats River	0–3.6	T	S
Alsea	Phillips Creek	0–2.1	T	S
Alsea	Preacher Creek	0–2.1	T	S
Alsea	School Fork	0–3.2	T	S
Alsea	South Fork Alsea River	0–17.2	T	S
Alsea	South Fork Lobster Creek	0–4.3	T	S
Alsea	Stump Creek	0–2	T	S
Alsea	Williamson Creek	0–2.7	T	S
Alsea	Yachats River	0–13	T	S
Alvord Lake	Big Trout Creek	0–16.6	T	S
Alvord Lake	Denio Creek	0–6.1	T	S
Alvord Lake	Little Wildhorse Creek	0–2.5	T	S

Table C-1. (continued).

Interior Drainages Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Alvord Lake	Van Horn Creek	0–8.2	T	S
Alvord Lake	Willow Creek	0–33.5	DO	6/1–9/30
Alvord Lake	Willow Creek	0–33.5	T	S
Donner and Blitzen	Ankle Creek	0–7.6	T	S
Donner and Blitzen	Big Indian Creek	0–7.1	T	S
Donner and Blitzen	Bridge Creek	0–2.2	T	S
Donner and Blitzen	Deep Creek	0–7.2	T	S
Donner and Blitzen	Donner and Blitzen River	45.3–77.3	T	S
Donner and Blitzen	Fish Creek	0–7.5	T	S
Donner and Blitzen	Indian Creek	0–4.2	T	S
Donner and Blitzen	Little Blitzen River	0–3.6	T	S
Donner and Blitzen	McCoy Creek	0–26.2	T	S
Donner and Blitzen	Mud Creek	0–4.8	T	S
Goose Lake	Bauers Creek	0–11.2	T	S
Goose Lake	Camp Creek	0–14.3	T	S
Goose Lake	Cox Creek	0–15.2	T	S
Goose Lake	Dent Creek	0–6.1	T	S
Goose Lake	Drews Creek	25.1–39.8	T	S
Goose Lake	East Branch Thomas Creek	0–4.9	Fe	Y
Goose Lake	East Camp Creek	0–4.9	T	S
Goose Lake	Hay Creek	0–12.8	T	S
Goose Lake	North Fork Cox Creek	0–4.5	T	S
Goose Lake	Quartz Creek	0–5.7	T	S
Goose Lake	Shingle Mill Creek	0–3.9	T	S
Goose Lake	Thomas Creek	0–12	DO	S
Goose Lake	Thomas Creek	0–12	DO	3/1–5/31
Goose Lake	Thomas Creek	0–35.9	T	S
Goose Lake	Thomas Creek	12–35.9	BC	*
Goose Lake	Thomas Creek	12–35.9	Fe	Y
Guano Nevada	Bond Creek	0–2.1	T	S
Guano Nevada	Home Creek	0–21.3	T	S
Guano Nevada	Rock Creek	12.4–52.5	T	S, 3/1–5/31
Guano Nevada	Skull Creek	0–13.3	T	S

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Table C-1. (continued).

Interior Drainages Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Harney Malheur Lakes	Coffeepot Creek	0–10.3	T	S
Harney Malheur Lakes	Mill Creek	0–7.1	T	S
Harney Malheur Lakes	Paul Creek	0–10.2	T	S
Harney Malheur Lakes	Rattlesnake Creek	0–15.1	T	S
Harney Malheur Lakes	Riddle Creek	0–24.4	T	S
Illinois	Althouse Creek	0–7.5	T	S
Lake Abert	Augur Creek	0–2.7	T	S
Lake Abert	Bear Creek	0–9.5	T	S
Lake Abert	Ben Young Creek	0–8	T	S
Lake Abert	Chewaucan River	35.2–61.5	BC	*
Lake Abert	Chewaucan River	9–61.5	T	S
Lake Abert	Coffeepot Creek	0–10	T	S
Lake Abert	Dairy Creek	0–15.3	T	S
Lake Abert	Elder Creek	0–5.7	T	S
Lake Abert	Little Coffeepot Creek	0–4.3	T	S
Lake Abert	Morgan Creek	0–4.8	T	S
Lake Abert	Shoestring Creek	0–7	T	S
Lake Abert	South Creek	0–10.6	T	S
Lake Abert	Swamp Creek	0–6.2	T	S
Lake Abert	West Fork Shoestring Creek	0–3.4	T	S
Lake Abert	Willow Creek	0–15.3	T	S
Lost	Antelope Creek	2–3	T	S
Lost	Barnes Valley Creek	0–14	T	S
Lost	Klamath Strait	0–0	Am, ChlA, FC, pH, T	S
Lost	Klamath Strait	0–0	DO	Y
Lost	Lapham Creek	0–4	T	S
Lost	Long Branch Creek	0–4.6	T	S
Lost	Lost River	0–59.7	ChlA, T	S
Lost	Lost River	0–59.7	DO, FC	Y
Lost	Miller Creek	0–9.6	T	S
Lost	North Fork Willow Creek	0–2.3	T	S
Lost	Unnamed Waterbody	0–2.2	T	S

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Table C-1. (continued).

Interior Drainages Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Silver	Claw Creek	0–15.1	T	S
Silver	Egypt Creek	0–8.9	T	S
Silver	Nicoll Creek	0–14.1	T	S
Silver	Salt Canyon	0–1.2	T	S
Silver	Sawmill Creek	0–10.7	T	S
Silver	Silver Creek	8.3–63.6	T	S
Silver	Wickiup Creek	0–9	T	S
Silvies	Hay Creek	0–12.3	T	S
Silvies	Little Bear Creek	0–5.7	T	S, 3/1–5/31
Silvies	Myrtle Creek	0–17.6	T	S
Silvies	Scotty Creek	0–9.5	T	S
Silvies	Silvies River	0–20	DO	3/1–5/31
Silvies	Silvies River	0–20	T	S, 3/1–5/31
Silvies	Skull Creek	0–5.9	T	S
Silvies	Snow Creek	0–2.8	T	S
Summer Lake	Silver Creek	5–21.2	T	S
Summer Lake	West Fork Silver Creek	0–8.3	T	S
Upper Klamath	Clover Creek	0–8.4	S	*
Upper Klamath	Grizzly Creek	0–3	T	S
Upper Klamath	Hoxie Creek	0.8–4.4	T	S
Upper Klamath	Jenny Creek	0–17.8	T	S
Upper Klamath	Johnson Creek	0–9.4	T	S
Upper Klamath	Keene Creek	0–9.7	T	S
Upper Klamath	Mill Creek	0–3.9	T	S
Upper Klamath	South Fork Keene Creek	0–3.1	T	S
Upper Klamath	Spencer Creek	0–18.9	BC	*
Upper Klamath	Spencer Creek	0–18.9	S	*
Upper Klamath	Unnamed Waterbody	0–4.3	S	*
Warner Lakes	Burnt Creek	0–9	BC	*
Warner Lakes	Burnt Creek	0–9	T	S
Warner Lakes	Camas Creek	0–18.7	T	S
Warner Lakes	Deep Creek	12–37.9	DO	3/1–5/31
Warner Lakes	Deep Creek	12–37.9	T	S

Table C-1. (continued).

Interior Drainages Basin				
ODEQ Subbasin	**Water Body**	**River Mile**	**Impairment**	**Season**
Warner Lakes	Drake Creek	0–12	T	S
Warner Lakes	Fifteenmile Creek	0–6.6	Ag	Y
Warner Lakes	Fifteenmile Creek	0–6.6	T	S, 3/1–5/31
Warner Lakes	Honey Creek	0–17.6	T	S
Warner Lakes	Horse Creek	0–10.3	T	S
Warner Lakes	Little Honey Creek	0–7.4	T	S
Warner Lakes	Mud Creek	0–8.8	T	S
Warner Lakes	North Fork Twelvemile Creek	0–3.6	T	S
Warner Lakes	Parsnip Creek	0–4.1	T	S
Warner Lakes	Polander Creek	0–2.6	T	S
Warner Lakes	Porcupine Creek	0–4	T	S
Warner Lakes	Twelvemile Creek	0–17.3	Ag	Y
Warner Lakes	Twelvemile Creek	0–13	T	S, 3/1–5/31
Warner Lakes	Twentymile Creek	0–28.9	As, Ag	Y
Warner Lakes	Twentymile Creek	0–28.9	T	S, 3/1–5/31
Warner Lakes	Unnamed Waterbody	0–2.5	T	S
Warner Lakes	Willow Creek	0–6.5	T	S

[1] *Impairments are Ag = silver, Ald = aldrin, Am = ammonia, As = arsenic, AW/A = aquatic weeds or algae, BC = biological criteria, Cd = cadmium, ChlA = chlorophyll a, Cpf = Chlorpyrifos, CrHx = chromium (hex), Cl = chlorine, Cld = chlordane, Cu = copper, D = dieldrin, DCE = dichloroethylene, DDT = dichloro-diphenyl-trichloroethane, DDTM = DDT metabolite, DO = dissolved oxygen, EC = E. coli bacteria, FC = fecal coliform, Fe = iron, G = guthion, Hg = mercury, Mn = manganese, N = nitrate, P = phosphorus, PAH = polynuclear aromatic hydrocarbon, Pb = lead, PCB = polychlorinated biphenol, PCP = pentachlorophenol, pH = hydrogen ion concentration, S = sedimentation, T = temperature, Tb = Turbidity, TDG = total dissolved gas, TECE = tetrachlorethylene, and Zn = zinc.*

[2] *Seasons are Sp = spring, S = summer, F = fall, W = winter, Y = year round, and * = not reported.*

Source: ODEQ 2002

REFERENCES

ODEQ. 2002. *Oregon Final 303(d) List of Impaired Waters.* Oregon Department of Environmental Quality. Available via http://www.deq.state.or.us/wq/303dlist/303dpage.htm. Accessed February 14, 2005.

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APPENDIX D
RECREATIONAL RESOURCES

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APPENDIX D—RECREATIONAL RESOURCES

Table D-1 lists recreational features located in Oregon. These features include national forests, national grassland, national monuments, a national park, national wildlife refuges, recreation areas, State forests, and wilderness areas. Table D-2 lists wild, scenic, and recreational rivers in Oregon.

Table D-1. National forests, national grassland, national monuments, national park, national wildlife refuges, recreation areas, State forests, and wilderness areas in Oregon.

Feature	Name
National Forest	Deschutes
	Fremont
	Klamath
	Malheur
	Mount Hood
	Ochoco
	Rogue River
	Siskiyou
	Siuslaw
	Umatilla
	Umpqua
	Wallowa-Whitman
	Willamette
	Winema
National Grassland	Crooked River
National Monument	John Day Fossil Beds
	Newberry National Monument
	Oregon Caves
National Park	Crater Lake
National Wildlife Refuge	Ankeny
	Bandon Marsh
	Baskett Slough
	Bear Valley
	Cape Meares
	Cold Springs
	Deer Flat
	Eagle Creek National Fish Hatchery
	Hart Mountain National Antelope Refuge

Table D-1. (continued).

Feature	Name
National Wildlife Refuge (continued)	Klamath Marsh
	Lewis and Clark
	Lower Klamath
	Malheur
	McKay Creek
	McNary
	Nestucca Bay
	Oregon Islands
	Sheldon
	Siletz Bay
	Tualatin River
	Umatilla
	Upper Klamath
	Warm Springs National Fish Hatchery
	William L. Finley
Recreation Area	Columbia River Gorge National Scenic Area
	Diamond Craters Recreation Area
	Hells Canyon National Recreation Area
	Oregon Cascades Recreation Area
	Oregon Dunes National Recreation Area
State Forest	Clatsop
	Elliott
	Santiam
	Sun Pass
	Tillamook
Wilderness Area	Badger Creek
	Black Canyon
	Boulder Creek
	Bridge Creek
	Bull of the Woods
	Columbia
	Cummins Creek
	Diamond Peak
	Drift Creek

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Table D-1. (continued).

Feature	Name
Wilderness Area (continued)	Eagle Cap
	Gearhart Mountain
	Grassy Knob
	Hells Canyon
	Kalmiopsis
	Menagerie
	Middle Santiam
	Mill Creek
	Monument Rock
	Mountain Lakes
	Mount Hood
	Mount Jefferson
	Mount Thielsen
	Mount Washington
	North Fork John Day
	North Fork Umatilla
	Olallie
	Red Buttes
	Rock Creek
	Rogue-Umpqua Divide
	Salmon Huckleberry
	Sky Lakes
	Steens Mountain
	Strawberry Mountain
	Table Rocks
	Three Arch Rocks
	Three Sisters
	Waldo Lake
	Wenaha-Tucannon
	Wild Rogue
Source: Great Outdoor Recreation Pages [GORP] 2004, Oregon Department of Forestry [ODF] 2004	

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Table D-2. Wild, scenic, and recreational rivers in Oregon.

Name	Location	Total (miles)	Wild (miles)	Scenic (miles)	Recreational (miles)
Big Marsh Creek	Deschutes National Forest (NF)	15	0	0	15
Chetco River	Siskiyou NF	44.5	22.5	8	11
Clackamas River	Mount Hood NF	47	0	20	27
Crescent Creek	Deschutes NF	10	0	0	10
Crooked River	Ochoco NF	15	0	0	15
Crooked River, North Fork	Ochoco NF	32.3	11.1	9.5	11.7
Deschutes River	Deschutes NF	173.4	0	30	143.4
Donner und Blitzen River	Bureau of Land Management (BLM), Burns District	72.7	72.7	0	0
Eagle Creek	Wallowa-Whitman NF	27	4	6	17
Elk River	Siskiyou NF	19	2	0	17
Grande Ronde River	Umatilla NF, Wallowa-Whitman NF	43.8	26.4	0	17.4
Illinois River	Siskiyou NF	50.4	28.7	17.9	3.8
Imnaha River	Wallowa-Whitman NF	77	15	4	58
John Day River	Malheur NF, Umatilla NF, and Wallowa-Whitman NF	147.5	0	0	147.5
John Day River, North Fork	Umatilla NF, Wallowa-Whitman NF	54.1	27.8	10.5	15.8
John Day River, South Fork	Malheur NF	47	0	0	47
Joseph Creek	Wallowa-Whitman NF	8.6	8.6	0	0
Klamath River	BLM, multiple districts	11	0	11	0
Little Deschutes River	Deschutes NF	12	0	0	12
Lostine River	Wallowa-Whitman NF	16	5	0	11
Malheur River	Malheur NF	13.7	0	7	6.7
Malheur River, North Fork	Malheur NF	25.5	0	25.5	0
McKenzie River	Willamette NF	12.7	0	0	12.7
Metolius River	Deschutes NF	28.6	0	17.1	11.5
Minam River	Wallowa-Whitman NF	39	39	0	0
North Powder River	Wallowa-Whitman NF	6	0	6	0
Owyhee River	BLM, Vale District	120	120	0	0
Owyhee River, North Fork	BLM, Vale District	9.6	9.6	0	0
Owyhee River, West Little	BLM, Vale District	56.7	56.7	0	0
Powder River	BLM, Vale District	11.7	0	11.7	0

Table D-2. (continued).

Name	Location	Total (miles)	Wild (miles)	Scenic (miles)	Recreational (miles)
Quartzville Creek	Willamette NF	12	0	0	12
Rapid River	Hells Canyon National Recreation Area	26.8	26.8	0	0
Roaring River	Mount Hood NF	13.7	13.5	0	0.2
Rogue River	Siskiyou NF	84.5	34	7.5	43
Rogue River, Upper	Rogue River NF	40.3	6.1	34.2	0
Salmon River, Oregon	Mount Hood NF	33.5	15	4.8	13.7
Sandy River	Mount Hood NF	24.9	4.5	3.8	16.6
Smith River, North Fork	Siskiyou NF	13	8.5	4.5	0
Snake River	Hells Canyon National Recreation Area	66.9	32.5	34.4	0
Sprague River, North Fork	Fremont NF	15	0	15	0
Squaw Creek	Deschutes NF	15.4	6.6	0	8.8
Sycan River	Fremont NF, Winema NF	59	0	50.4	8.6
Umpqua River, North	Umpqua NF	33.8	0	0	33.8
Wenaha River	Umatilla NF	21.55	18.7	2.7	0.15
White River	Mount Hood NF	46.5	0	24	22.5
Willamette River, North Fork of the Middle Fork	Willamette NF	42.3	8.8	6.5	27

Source: GORP 2004

REFERENCES

GORP. 2004. Resources. Great Outdoor Recreation Pages. Available http://gorp.away.com/gorp/resource/us_national_park/main.htm. Accessed February 14, 2005.

ODF. 2004. State Forests Management. Oregon Department of Forestry. Available via http://www.oregon.gov/ODF/STATE_FORESTS/state_forest_management.shtml. Accessed February 14, 2005.

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APPENDIX E
CONSULTATION

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APPENDIX E—CONSULTATION

The following pages of this appendix contain scanned images of consultations received during the environmental analysis of the Oregon Conservation Reserve Enhancement Program (CREP). The original consultations are being kept as part of the Oregon CREP project file.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Suite 100
Portland, Oregon 97266
Phone: (503) 231-6179 FAX: (503) 231-6195

TAKE PRIDE IN AMERICA

Reply To: 8330.02992(05)
File Name: PortageCREP.doc
TS Number: 05-1314

RECEIVED
MAR 21 2005

MAR 16 2005

Heidi Hall
Portage Environmental, Inc.
1075 S. Utah Avenue, Ste. 200
Idaho Falls, ID 93402

Dear Ms. Hall:

This is in response to your letter, dated February 1, 2005, that was sent to our Regional Office to request information on listed and proposed endangered and threatened species that may be present within the area of Oregon's Conservation Reserve Enhancement Program (CREP). We understand that you are working on behalf of the Farm Service Agency (FSA) to fulfill the requirements of the National Environmental Policy Act (NEPA) for specific activities to be carried out under the CREP program.

We have begun discussions with FSA and their representatives regarding the reinitiation of their 1999 CREP programmatic consultation under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The need for reinitiation is due to the addition of new practices, and a larger geographical program area that will now include all of Oregon. As a result, threatened and endangered species that were not previously considered could be affected, and will be evaluated as the consultation is brought up to date. In addition, all of the CREP activities that may result in effects to listed species will be evaluated. Because work may occur in every type of habitat, including wetlands, riparian areas, streams and uplands, it is possible that listed species could occur in or near CREP project areas. We will be working with FSA and their designated representatives to evaluate the potential effects of each activity on listed species over the coming months as the section 7 consultation proceeds. We hope to jointly identify measures that can be used to avoid and minimize any potential adverse effects to the extent possible (e.g., through Best Management Practices, surveying for species presence and avoiding areas where listed species occur, etc.).

The enclosed list (Attachment A) includes all of the threatened and endangered species that may occur within the State of Oregon for your reference and use in completing the NEPA documents. The list also includes information about whether or not Critical Habitat has been designated for each species, with links to the pertinent Federal Register notices. Candidate species under review for listing and "species of concern" are also included. Candidate species have no protection under the Act, but are included for consideration as it is possible candidates could be listed prior to project completion. Species of concern are those taxa whose conservation status is of concern to the Service (many were previously known as Category 2 candidates), but for which further information is still needed. The National Marine Fisheries Service has jurisdiction over the anadromous species. If you require further information about anadromous species, please contact their Oregon State Habitat Office at 1201 NE Lloyd Blvd., Ste. 1100, Portland, OR 97232. The office phone number is (503) 231-5400.

For your reference, we are enclosing the requirements of Federal action agencies under the Act (see Attachment B). The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems on which they depend may be conserved. Under section 7(a)(1) and 7(a)(2) of the Act and pursuant to 50 CFR 402 *et seq*., Federal agencies are required to utilize their authorities to carry out programs which further species conservation and to determine whether projects may affect threatened and endangered species, and/or critical habitat. A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) which are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (NEPA) (42 U.S.C. 4332 (2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to the Biological Assessment be prepared to determine whether they may affect listed and proposed species. Recommended contents of a Biological Assessment are described in Enclosure B, as well as 50 CFR 402.12. If the Federal agency determines, based on the Biological Assessment or evaluation, that threatened and endangered species and/or critical habitat may be affected by the project, the Federal agency is required to consult with the Service following the requirements of 50 CFR 402 which implement the Act.

Your interest in threatened and endangered species is appreciated. The Service encourages Federal agencies and others to investigate opportunities for incorporating conservation of threatened and endangered species into project planning processes as a means of complying with the Act. For future species lists, please visit our website at http://www.fws.gov/pacific/oregonfwo/FWO_home.html for instructions on how to make requests. Feel free to contact Jennifer Thompson of my staff at (503) 231-6179 if you would like further information.

Sincerely,

for Kemper M. McMaster
State Supervisor

Enclosures

cc: Lois Loop, Farm Service Agency
Pat Oman, NOAA - National Marine Fisheries Service, Oregon State Habitat Office
Scott Hoefer, NOAA - National Marine Fisheries Service, Oregon State Habitat Office

FEDERALLY LISTED THREATENED, ENDANGERED, PROPOSED, CANDIDATE SPECIES AND SPECIES OF CONCERN WHICH MAY OCCUR WITHIN OREGON

LISTED SPECIES[1]

Mammals		
Right whale	*Balaena glacialis*	E**
Sei whale	*Balaenoptera borealis*	E**
Blue whale	*Balaenoptera musculus*	E**
Finback whale	*Balaenoptera physalus*	E**
Gray wolf	*Canis lupus*	E
Steller northern sea lion	*Eumetopias jubatus*	T**
Canada lynx[2]	*Felis lynx canadensis*	T
Humpback whale	*Megaptera navaeangliae*	E**
Columbian white-tailed deer	*Odocoileus virginianus leucurus*	E
Sperm whale	*Physeter macrocephalus*	E**
Birds		
Marbled murrelet[3]	*Brachyramphus marmoratus*	CH T
Western snowy plover (coastal pop.)[4]	*Charadrius alexandrinus nivosus*	CH T
Bald eagle[5]	*Haliaeetus leucocephalus*	T
Brown pelican	*Pelecanus occidentalis*	E
Northern spotted owl[6]	*Strix occidentalis caurina*	CH T
Amphibians and Reptiles		
Loggerhead sea turtle	*Caretta caretta*	T**
Green sea turtle	*Chelonia mydas*	T**
Leatherback sea turtle	*Dermochelys coriacea*	CH E**
Olive (Pacific) ridley sea turtle	*Lepidochelys olivacea*	T**
Fish		
Modoc sucker[7]	*Catostomus microps*	E
Warner sucker	*Catostomus warnerensis*	CH T
Shortnose sucker	*Chasmistes brevirostris*	PCH E
Lost River sucker	*Deltistes luxatus*	PCH E
Hutton tui chub	*Gila bicolor* ssp.	T
Borax Lake chub	*Gila boraxobius*	CH E
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	T
Chum salmon (Columbia River)[8]	*Oncorhynchus keta*	T**
Coho salmon (Oregon Coast)[9]	*Oncorhynchus kisutch*	T**
Coho salmon (S. OR/N. CA Coast)[10]	*Oncorhynchus kisutch*	T**
Steelhead (Lower Columbia River)[11]	*Oncorhynchus mykiss* ssp.	T**
Steelhead (Snake River Basin)[12]	*Oncorhynchus mykiss* ssp.	T**
Steelhead (Middle Columbia River)[13]	*Oncorhynchus mykiss* ssp.	T**
Steelhead (Upper Willamette River)[14]	*Oncorhynchus mykiss* ssp.	T**
Sockeye salmon (Snake River)[15]	*Oncorhynchus nerka*	CH E**
Chinook salmon (Lower Columbia River)[16]	*Oncorhynchus tshawytscha*	T**
Chinook salmon (Upper Willamette River)[17]	*Oncorhynchus tshawytscha*	T**
Chinook salmon (Snake River)[18]	*Oncorhynchus tshawytscha*	CH T**
Oregon chub	*Oregonichthys crameri*	E
Foskett speckled dace	*Rhinichthys osculus* ssp.	T
Bull trout (Columbia River Basin)[19]	*Salvelinus confluentus*	CH T
Bull trout (Klamath River Basin)[20]	*Salvelinus confluentus*	CH T

Invertebrates		
Vernal pool fairy shrimp	*Branchinecta lynchi*	T
Fender's blue butterfly[21]	*Icaricia icarioides fenderi*	E
Oregon silverspot butterfly	*Speyeria zerene hippolyta*	CH T
Plants		
Macdonald's rockcress	*Arabis macdonaldiana*	E
Applegate's milk-vetch	*Astragalus applegatei*	E
Golden Indian paintbrush[22]	*Castilleja levisecta*	T
Willamette daisy[23]	*Erigeron decumbens* var. *decumbens*	E
Gentner mission-bells[24]	*Fritillaria gentneri*	E
Howellia	*Howellia aquatilis*	T
Western lily	*Lilium occidentale*	E
Large-flowered wooly meadowfoam[25]	*Limnanthes floccosa* ssp. *grandiflora*	E
Bradshaw's lomatium	*Lomatium bradshawii*	E
Cook's lomatium[26]	*Lomatium cookii*	E
Kincaid's lupine[27]	*Lupinus sulphureus* var. *kincaidii*	T
MacFarlane's four o'clock[28]	*Mirabilis macfarlanei*	CH T
Rough popcorn flower[29]	*Plagiobothrys hirtus*	PE
Nelson's checker-mallow	*Sidalcea nelsoniana*	T
Spalding's campion	*Silene spaldingii*	T
Malheur wire-lettuce	*Stephanomeria malheurensis*	E
Howell's spectacular thelypody[30]	*Thelypodium howellii* ssp. *spectabilis*	T
PROPOSED SPECIES		
Fish		
Coastal cutthroat trout (SW WA/Lower Columbia River)	*Oncorhynchus clarki clarki*	PT
CANDIDATE SPECIES[31]		
Mammals		
Pacific fisher[32]	*Martes pennanti pacifica*	
Washington ground squirrel	*Spermophilus washingtoni*	
Birds		
Yellow-billed cuckoo	*Coccyzus americanus*	
Streaked horned lark	*Eremophila alpestris strigata*	
Amphibians and Reptiles		
Columbia spotted frog	*Rana luteiventris*	
Oregon spotted frog	*Rana pretiosa*	
Fish		
Coho salmon (Lower Columbia River)[33]	*Oncorhynchus kisutch*	** CF
Steelhead (Oregon Coast)[34]	*Oncorhynchus mykiss* ssp.	** CF
Invertebrates		
Taylor's checkerspot	*Euphydryas editha taylori*	
Mardon skipper (butterfly)	*Polites mardon*	
Plants		
Northern wormwood	*Artemisia campestris* var. *wormskioldii*	
Slender moonwort	*Botrychium lineare*	
Siskiyou mariposa lily	*Calochortus persistens*	

SPECIES OF CONCERN

Mammals

Pallid bat (west of Cascade crest)	*Antrozous pallidus pacificus*
White-footed vole	*Arborimus albipes*
Red tree vole	*Arborimus longicaudus*
Pygmy rabbit	*Brachylagus idahoensis*
Pale western big-eared bat	*Corynorhinus townsendii pallescens*
Pacific western big-eared bat	*Corynorhinus townsendii townsendii*
Spotted bat	*Euderma maculatum*
California wolverine	*Gulo gulo luteus*
Silver-haired bat	*Lasionycteris noctivagans*
Small-footed myotis (bat)	*Myotis ciliolabrum*
Long-eared myotis (bat)	*Myotis evotis*
Fringed myotis (bat)	*Myotis thysanodes*
Long-legged myotis (bat)	*Myotis volans*
Yuma myotis (bat)	*Myotis yumanensis*
California bighorn	*Ovis canadensis californiana*
Preble's shrew	*Sorex preblei*
Camas pocket gopher	*Thomomys bulbivorus*
Gold Beach western pocket gopher	*Thomomys mazama helleri*
Pistol River pocket gopher	*Thomomys umbrinus bottae detumidus*

Birds

Northern goshawk	*Accipiter gentilis*
Tricolored blackbird	*Agelaius tricolor*
Western burrowing owl	*Athene cunicularia hypugea*
Upland sandpiper	*Bartramia longicauda*
Ferruginous hawk	*Buteo regalis*
Greater sage-grouse	*Centrocercus urophasianus*
Black tern	*Chlidonias niger*
Band-tailed pigeon	*Columba fasciata*
Olive-sided flycatcher	*Contopus cooperi*
Yellow rail	*Coturnicops noveboracensis*
Willow flycatcher	*Empidonax trailli adastus*
Harlequin duck	*Histrionicus histrionicus*
Yellow-breasted chat	*Icteria virens*
Western least bittern	*Ixobrychus exilis hesperis*
Acorn woodpecker	*Melanerpes formicivorus*
Lewis' woodpecker	*Melanerpes lewis*
Mountain quail	*Oreortyx pictus*
White-headed woodpecker	*Picoides albolarvatus*
White-faced ibis	*Plegadis chihi*
Oregon vesper sparrow	*Pooecetes gramineus affinis*
Purple martin	*Progne subis*
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*

Amphibians and Reptiles

Tailed frog	*Ascaphus truei*
Oregon slender salamander	*Batrachoseps wrighti*
Northwestern pond turtle	*Clemmys marmorata marmorata*
Common kingsnake	*Lampropeltis getula*
California mountain kingsnake	*Lampropeltis zonata*
Del Norte salamander	*Plethodon elongatus*
Larch Mountain salamander	*Plethodon larselli*
Siskiyou Mountains salamander	*Plethodon stormi*
Northern red-legged frog	*Rana aurora aurora*

Foothill yellow-legged frog	*Rana boylii*
Cascades frog	*Rana cascadae*
Southern torrent (seep) salamander	*Rhyacotriton variegatus*
Northern sagebrush lizard	*Sceloporus graciosus graciosus*

Fishes

Green sturgeon	*Acipenser medirostris*
Goose Lake sucker	*Catostomus occidentalis lacusanserinus*
Jenny Creek sucker	*Catostomus rimiculus* ssp.
Klamath largescale sucker	*Catostomus snyderi*
Malheur mottled sculpin	*Cottus bairdi* ssp.
Margined sculpin	*Cottus marginatus*
Slender sculpin	*Cottus tenuis*
Alvord chub	*Gila alvordensis*
Catlow tui chub	*Gila bicolor* ssp.
Summer Basin tui chub	*Gila bicolor* ssp.
Sheldon tui chub	*Gila bicolor eurysoma*
Oregon Lakes tui chub	*Gila bicolor oregonensis*
River lamprey	*Lampetra ayresi*
Pacific lamprey	*Lampetra tridentata*
Goose Lake lamprey	*Lampetra tridentata* ssp.
Pit roach	*Lavinia symmetricus mitrulus*
Coastal cutthroat trout (Oregon Coast)	*Oncorhynchus clarki clarki*
Coastal cutthroat trout (Upper Willamette)	*Oncorhynchus clarki clarki*
Coastal cutthroat trout (S. OR/CA Coast)	*Oncorhynchus clarki clarki*
Westslope cutthroat trout	*Oncorhynchus clarki lewisi*
Catlow Valley redband trout	*Oncorhynchus mykiss* ssp.
Goose Lake redband trout	*Oncorhynchus mykiss* ssp.
Warner Valley redband trout	*Oncorhynchus mykiss* ssp.
Interior redband trout	*Oncorhynchus mykiss gibbsi*
Umpqua Oregon chub	*Oregonichthys kalawatseti*
Millicoma dace	*Rhinichthys catarctae* ssp.

Invertebrates

American acetropis grass bug	*Acetropis americana*
Denning's agapetus caddisfly	*Agapetus denningi*
Beller's ground beetle	*Agonum belleri*
Newcomb's littorine snail	*Algamorda newcombiana*
Scott's apatanian caddisfly	*Allomyia scotti*
California floater (mussel)	*Anodonta californiensis*
Cascades apatanian caddisfly	*Apatania tavala*
Malheur pseudoscorpion	*Apochtonius malheuri*
Franklin's bumblebee	*Bombus franklini*
Willamette valley cave cricket	*Ceuthophilus perplexus*
Siskiyou chloealtis grasshopper	*Chloaeltis aspasma*
Cockerell's striated disc (snail)	*Discus shimekii cockerelli*
Mt. Hood primitive brachycentrid caddisfly	*Eobrachycentrus gelidae*
caddisfly (no common name)	*Farula constricta*
Green Springs Mountain farulan caddisfly	*Farula davisi*
Mt. Hood farulan caddisfly	*Farula jewetti*
Tombstone Prairie farulan caddisfly	*Farula reapiri*
Great Columbia River spire snail	*Fluminicola columbianus fuscus*
Sagehen Creek goeracean caddisfly	*Goeracea oregana*
Lynn's clubtain dragonfly	*Gomphus lynnae*
Schuh's homoplectran caddisfly	*Homoplectra schuhi*
Planarian (no common name)	*Kenkia rhynchida*
caddisfly (no common name)	*Lepania cascada*

Oregon giant earthworm	*Megascolides macelfreshi*
Minor Pacific sideband (snail)	*Monadenia fidelis minor*
caddisfly (no common name)	*Moselyana comosa*
caddisfly (no common name)	*Namamyia plutonis*
Siskiyou carabid beetle	*Nebria gebleri siskiyouensis*
Columbia Gorge neothremman caddisfly	*Neothremma andersoni*
Tombstone Prairie oligophlebodes caddisfly	*Oligophlebodes mostbento*
Peaclam	*Pisidium ultramontanum*
Insular blue (butterfly)	*Plebejus saepiolus insulanus*
Roth's blind ground beetle	*Pterostichus rothi*
caddisfly (no common name)	*Rhyacophila chandleri*
Obrien rhyacophilan caddisfly	*Rhyacophila colonus*
Haddock's rhyacophilan caddisfly	*Rhyacophila haddocki*
caddisfly (no common name)	*Rhyacophila leechi*
One-spot rhyacophilan caddisfly	*Rhyacophila unipunctata*
Malheur Cave amphipod	*Stygobromus hubbsi*
Wahkeena Falls flightless stonefly	*Zapada wahkeena*

Plants

Pink sand verbena	*Abronia umbellata* ssp. *breviflora*
Henderson ricegrass	*Achnatherum hendersonii*
Wallowa ricegrass	*Achnatherum wallowaensis*
Henderson's bentgrass	*Agrostis hendersonii*
Howell's bent grass	*Agrostis howellii*
Blue Mountain onion	*Allium dictuon*
Robinson's onion	*Allium robinsonii*
Malheur Valley fiddleneck	*Amsinckia carinata*
Bog anemone	*Anemone oregana* var. *felix*
Hells Canyon rockcress	*Arabis hastatula*
Koehler's rockcress	*Arabis koehleri* var. *koehleri*
Rogue Canyon rockcress	*Arabis modesta*
Crater Lake rock cress	*Arabis suffrutescens* var. *horizontalis*
Hairy manzanita	*Arctostaphylos hispidula*
Estes' artemisia	*Artemisia ludoviciana* ssp. *estesii*
White top aster (Curtus)	*Aster curtus*
Wayside aster	*Aster vialis*
Laurence's milk-vetch	*Astragalus collinus* var. *laurentii*
Mulford's milk-vetch	*Astragalus mulfordiae*
Bastard kentrophyta	*Astragalus tegetarioides*
Bensonia	*Bensoniella oregana*
Upward-lobed moonwort	*Botrychium ascendens*
Prairie moonwort	*Botrychium campestre*
Crenulate grapefern	*Botrychium crenulatum*
Mountain grapefern	*Botrychium montanum*
Twin spike moonwort	*Botrychium paradoxum*
Stalked moonwort	*Botrychium pedunculosum*
Cox's mariposa-lily	*Calochortus coxii*
Greene's mariposa-lily	*Calochortus greenei*
Howell's mariposa-lily	*Calochortus howellii*
Peck's mariposa-lily	*Calochortus longebarbatus* var. *peckii*
Green-band mariposa-lily	*Calochortus macrocarpus* var. *maculosus*
Broad-fruit mariposa-lily	*Calochortus nitidus*
Umpqua mariposa-lily	*Calochortus umpquaensis*
Dwarf evening-primrose	*Camissonia pygmaea*
Saddle Mountain bitter cress	*Cardamine pattersonii*
Idaho sedge	*Carex idahoa*
Chambers' paintbrush	*Castilleja chambersii*

Fraternal paintbrush	*Castilleja fraterna*
Mendocino coast indian paintbrush	*Castilleja mendocinensis*
Purple alpine paintbrush	*Castilleja rubida*
Cliff paintbrush	*Castilleja rupicola*
Slender wild cabbage	*Caulanthus major* var. *nevadensis*
Barren Valley collomia	*Collomia renacta*
Pt. Reyes bird's-beak	*Cordylanthus maritimus* ssp. *palustris*
Cold-water corydalis	*Corydalis aquae-gelidae*
Baker's cypress	*Cupressus bakeri*
Greeley's cymopterus	*Cymopterus acaulis* var. *greeleyorum*
Clustered lady's-slipper	*Cypripedium fasciculatum*
Pale larkspur	*Delphinium leucophaeum*
Willamette Valley larkspur	*Delphinium oreganum*
Peacock larkspur	*Delphinium pavonaceum*
Few-flower bleedingheart	*Dicentra pauciflora*
Frigid shootingstar	*Dodecatheon austrofrigidum*
Oregon willow herb	*Epilobium oreganum*
Siskiyou willow herb	*Epilobium siskiyouense*
Siskiyou daisy	*Erigeron cervinus*
Engelmann's daisy	*Erigeron engelmanii* var. *davisii*
Howell's daisy	*Erigeron howellii*
Oregon daisy	*Erigeron oreganus*
Golden wild buckwheat	*Eriogonum chrysops*
Crosby's buckwheat	*Eriogonum crosbyae*
Cusick's erigonum	*Eriogonum cusickii*
Prostrate wild buckwheat	*Eriogonum prociduum*
Green buckwheat	*Eriogonum umbellatum* var. *glaberrimum*
Pacific wallflower	*Erysimum menziesii* ssp. *concinnum*
Coast Range fawn-lily	*Erythronium elegans*
Queen-of-the-forest	*Filipendula occidentalis*
Purdy's fritillary	*Fritillaria purdyi*
Warner Mt. bedstraw	*Galium serpenticum* ssp. *warnerense*
Elegant gentian	*Gentiana plurisetosa*
Waldo gentian	*Gentiana setigera bisetaea*
Seaside gilia	*Gilia millefoliata*
Boggs Lake hedge-hyssop	*Gratiola heterosepala*
Cronquist's stickseed	*Hackelia cronquistii*
Three Forks stickseed	*Hackelia ophiobia*
Purple-flowered rush-lily	*Hastingsia bracteosa* var. *atropurpurea*
Large-flowered rush lily	*Hastingsia bracteosa* var. *bracteosa*
Shaggy horkelia	*Horkelia congesta* ssp. *congesta*
Henderson's horkelia	*Horkelia hendersonii*
Cooper's goldflower	*Hymnoxys lemmonii*
Grimy ivesia	*Ivesia rhypara* var. *rhypara*
Venator Canyon ivesia	*Ivesia rhypara* var. *shellyi*
North Umpqua kalmiopsis	*Kalmiopsis frangrans*
Large-flowered goldfields	*Lasthenia macrantha* ssp. *prisca*
Thin-leaved peavine	*Lathyrus holochlorus*
Large flowered goldfields	*Lasthenia macrantha* ssp. *prisca*
Davis' pepper cress	*Lepidium davisii*
Hazel's prickly-phlox	*Leptodactylon pungens* ssp. *hazelae*
Purdy's lewisia	*Lewisia cotyledon* var. *purdyi*
Kellogg's lily	*Lilium kellogii*
Moss	*Limbella fryei*
Bellinger's meadowfoam	*Limnanthes floccosa* ssp. *bellingeriana*
Dwarf wooly meadowfoam	*Limnanthes floccosa* ssp. *pumila*
Red-fruited desert parsley	*Lomatium erythrocarpum*

Greenman's desert parsley	*Lomatium greenmani*
Ochoco lomatium	*Lomatium ochocense*
Salmon River lomatium	*Lomatium salmoniflorum*
Suksdorf's lomatium	*Lomatium suksdorfii*
Colonial luina	*Luina serpentina*
Ashland lupine	*Lupinus lepidus* var. *ashlandensis*
White meconella	*Meconella oregana*
Smooth stickleaf	*Mentzelia mollis*
Packard's stickleaf	*Mentzelia packardiae*
Detling's microseris	*Microseris laciniata* spp. *detlingii*
Disappearing monkeyflower	*Mimulus evanescens*
Membrane-leaved monkeyflower	*Mimulus hymenophyllus*
Siskiyou monardella	*Monardella purpurea*
Little mousetail	*Myosurus minimus* ssp. *apus* var. *sessiliflorus*
Wolf's evening-primrose	*Oenothera wolfii*
Barrett's penstemon	*Penstemon barrettiae*
Blue-leaved penstemon	*Penstemon glaucinus*
Peck's penstemon	*Penstemon peckii*
Red-root yampah	*Perideridia erythrorhiza*
Silvery phacelia	*Phacelia argentea*
Playa phacelia	*Phacelia inundata*
Siskiyou phacelia	*Phacelia leonis*
Mackenzie's phacelia	*Phacelia lutea* var. *mackenzieorum*
Tiny-flower phacelia	*Phacelia minutissima*
Coral seeded allocarya	*Plagiobothrys figuratus* var. *corallicarpus*
Desert alloycara	*Plagiobothyrs salsus*
Oregon semaphore grass	*Pleuropogon oregonus*
San Francisco bluegrass	*Poa unilateralis*
Profuse-flowered mesa mint	*Pogogyne floribunda*
Williams combleaf	*Polyctenium williamsiae*
Snake River goldenweed	*Pyrrocoma radiata*
Obscure buttercup	*Ranunculus reconditus*
Bartonberry	*Rubus bartonianus*
Saddle Mountain saxifrage	*Saxifraga hitchcockiana*
Ertter's ragwort	*Senecio ertterae*
Western senecio	*Senecio hesperius*
Henderson sidalcea	*Sidalcea hendersonii*
Bristly-stemmed sidalcea	*Sidalcea hirtipes*
Maple-leaved sidalcea	*Sidalcea malachroides*
Coast checker bloom	*Sidalcea malvaeflora* ssp. *patula*
Cascade Head catchfly	*Silene douglasii* var. *oraria*
Hitchcock's blue-eyed grass	*Sisyrinchium hitchcockii*
Pale blue-eyed grass	*Sisyrinchium sarmentosum*
Western necklace	*Sophora leachiana*
Biennial stanleya	*Stanleya confertiflora*
Oregon sullivantia	*Sullivantia oregana*
Howell's tauschia	*Tauschia howellii*
Lichen	*Texosporium sancti-jacobi*
Short-podded theylpody	*Thelypodium brachycarpum*
Arrow-leaf thelypody	*Thelypodium eucosmum*
Howell's theylpody	*Thelypodium howellii* ssp. *howellii*
Douglas clover	*Trifolium douglasii*
Leiberg's clover	*Trifolium leibergii*
Owyhee clover	*Trifolium owyheense*
Leach's brodiaea	*Triteleia hendersonii* var. *leachiae*
Western bog violet	*Viola primulifolia* ssp. *occidentalis*
Small-flowered death camas	*Zigadenus fontanus*

(E) - Listed Endangered *(T) - Listed Threatened* *(CH) - Critical Habitat has been designated for this species*
(PE) - Proposed Endangered *(PT) - Proposed Threatened* *(PCH) - Critical Habitat has been proposed for this species*
(S) - Suspected *(D) - Documented*

Species of Concern - Taxa whose conservation status is of concern to the Service (many previously known as Category 2 candidates), but for which further information is still needed.

(CF) - Candidate: National Marine Fisheries Service designation for any species being considered by the Secretary for listing for endangered or threatened species, but not yet the subject of a proposed rule.

*** Consultation with National Marine Fisheries Service may be required.*

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[1] U.S. Department of Interior, Fish and Wildlife Service, October 31, 2000, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12
[2] Federal Register Vol. 65, No. 58, Mar 24, 2000, Final Rule - Canada lynx
[3] Federal Register Vol. 57, No. 45328, October 1, 1992, Final Rule - Marbled Murrelet
[4] Federal Register Vol. 64, No. 234, December 7, 1999, Final Rule - Critical Habitat for the Western Snowy Plover
[5] Federal Register Vol. 60, No. 133, July 12, 1995, - Final Rule - Bald Eagle
[6] Federal Register Vol. 57, No. 10, January 15, 1992, Final Rule - Critical Habitat for the Northern Spotted Owl
[7] U.S. Department of Interior, Fish and Wildlife Service, June 11, 1985, Determination of Endangered Status and Critical Habitat for Modoc Sucker; 50 FR 24526- 24530
[8] Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Columbia River Chum Salmon
[9] Federal Register Vol. 63, No. 153, August 10, 1998, Final Rule - Oregon Coast Coho Salmon
[10] Federal Register Vol. 62, No. 87, May 6, 1997, Final Rule - Coho Salmon
[11] Federal Register Vol. 63, No. 53, March 19, 1998, Final Rule-West Coast Steelhead
[12] Federal Register Vol. 62, No. 159, August 18, 1997, Final Rule - Snake River Steelhead
[13] Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead
[14] Federal Register Vol. 64, No. 57, March 25, 1999, Final Rule - Middle Columbia and Upper Willamette River Steelhead
[15] Federal Register Vol. 56, No. 224, November 20, 1991, Final Rule - Snake River Sockeye Salmon
[16] Federal Register Vol. 64, No. 56, March 24, 1999, Final Rule - West Coast Chinook Salmon
[17] Federal Register Vol. 64, No. 56, March 24, 1999, Final Rule - West Coast Chinook Salmon
[18] Federal Register Vol. 57, No. 78, April 22, 1992, Final Rule – Snake River Chinook Salmon
[19] Federal Register Vol. 63, No. 111, June 10, 1998, Final Rule - Columbia River and Klamath River Bull Trout
[20] Federal Register Vol. 63, No. 111, June 10, 1998, Final Rule - Columbia River and Klamath River Bull Trout
[21] Federal Register Vol. 65, No. 16, January 25, 2000, Final Rule - Erigeron decumbens var. decumbens, Lupinus sulphureus ssp. kincaidii, and Fender's blue butterfly
[22] Federal Register Vol. 62, No. 112, June 11, 1997, Final Rule - Castilleja levisecta
[23] Federal Register Vol. 65, No. 16, January 25, 2000, Final Rule - Erigeron decumbens var. decumbens, Lupinus sulphureus ssp. kincaidii, and Fender's blue butterfly
[24] Federal Register Vol. 64, No. 237, December 10, 1999, Final Rule - Fritillaria gentneri
[25] Federal Register Vol. 67, No. 216, November 7, 2002, Final Rule - Lomatium cookii and Limnanthes floccosa ssp. grandiflora
[26] Federal Register Vol. 67, No. 216, November 7, 2002, Final Rule - Lomatium cookii and Limnanthes floccosa ssp. grandiflora
[27] Federal Register Vol. 65, No. 16, January 25, 2000, Final Rule - Erigeron decumbens var. decumbens, Lupinus sulphureus ssp. kincaidii, and Fender's blue butterfly
[28] Federal Register Vol. 61, No. 52, March 15, 1996, Final Rule - Mirabilis macfarlanei
[29] Federal Register Vol. 65, No.16, January 25 , 2000, Final Rule - Plagiobothrys hirtus
[30] Federal Register Vol. 64, No. 101, May 26, 1999, Final Rule - Thelypodium howellii ssp. spectabilis
[31] Federal Register Vol. 69, No. 86, May 4, 2004, Notice of Review - Candidate or Proposed Animals and Plants
[32] Federal Register Vol. 69, No. 68, April 8, 2004, 12-Month Finding for a Petition to List the West Coast Distinct Population Segment of the Fisher
[33] Federal Register Vol. 60, No. 142, July 25, 1995, Proposed Rule - Threatened Status for Three Contiguous ESUs of Coho Salmon
[34] Federal Register Vol. 63, No. 53, March 19, 1998, Final Rule-West Coast Steelhead

ATTACHMENT B

FEDERAL AGENCIES RESPONSIBILITIES UNDER SECTION 7(a) and (c)
OF THE ENDANGERED SPECIES ACT

SECTION 7(a)-Consultation/Conference

Requires:

1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of Critical Habitat. The process is initiated by the Federal agency after they have determined if their action may affect (adversely or beneficially) a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed Critical Habitat.

SECTION 7(c)-Biological Assessment for Major Construction Projects[1]

Requires Federal agencies or their designees to prepare a Biological Assessment (BA) for construction projects only. The purpose of the BA is to identify proposed and/or listed species which are/is likely to be affected by a construction project. The process is initiated by a Federal agency in requesting a list of proposed and listed threatened and endangered species (list attached). The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

To complete the BA, your agency or its designee should: (1) conduct an on-site inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species is present and whether suitable habitat exists for either expanding the existing population or for potential reintroduction of the species; (2) review literature and scientific data to determine species distribution, habitat needs, and other biological requirements; (3) interview experts including those within FWS, National Marine Fisheries Service, State conservation departments, universities, and others who may have data not yet published in scientific literature; (4) review and analyze the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; (5) analyze alternative actions that may provide conservation measures and (6) prepare a report documenting the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed species will be affected. Upon completion, the report should be forwarded to our Portland Office.

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[1]A construction project (or other undertaking having similar physical impacts) which is a major Federal action significantly affecting the quality of the human environment as referred to in NEPA (42 U.S.C. 4332. (2)c). On projects other that construction, it is suggested that a biological evaluation similar to the biological assessment be undertaken to conserve species influenced by the Endangered Species Act.

APPENDIX F
NET PRESENT VALUE ANALYSIS

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APPENDIX F—NET PRESENT VALUE ANALYSIS

Data used for the net present value analysis for the proposed Oregon Conservation Reserve Enhancement Program over 30 years is shown on the following pages of this appendix.

Buffers (includes CP22, CP29, and CP30)

Year	Discount Factor	Buffers (Total Acres Enrolled)	Cost Share (FSA)	Incentive Payment	Practive Incentive Payment (FSA)	Signing Incentive Payment (FSA)	Cumulative Impact Incentive	Rental Rate	Maintenance	State Cost Share	Lost Jobs Income	Lost Sales	Sum	NPV
2005	1.00	12495	2,391,231	562,275	1,912,985	1,561,875	1,124,550	1,124,550	93,713	1,195,615	-454,318	-1,538,884	7,973,591	7,973,591
2006	0.95	24990	2,391,231	1,124,550	1,912,985	1,561,875	1,124,550	2,249,100	187,425	1,195,615	-908,636	-3,077,768	7,760,926	7,372,879
2007	0.90	37485	2,391,231	1,686,825	1,912,985	1,561,875	1,124,550	3,373,650	281,138	1,195,615	-1,362,955	-4,616,653	7,548,261	6,812,305
2008	0.86	49980	2,391,231	2,249,100	1,912,985	1,561,875	1,124,550	4,498,200	374,850	1,195,615	-1,817,273	-6,155,537	7,335,596	6,289,356
2009	0.81	62475	2,391,231	2,811,375	1,912,985	1,561,875	1,124,550	5,622,750	468,563	1,195,615	-2,271,591	-7,694,421	7,122,931	5,801,672
2010	0.77	74970	2,391,231	3,373,650	1,912,985	1,561,875	1,124,550	6,747,300	562,275	1,195,615	-2,725,909	-9,233,305	1,145,385	886,277
2011	0.74	87465	2,391,231	3,935,925	1,912,985	1,561,875	1,124,550	7,871,850	655,988	1,195,615	-3,180,227	-10,772,189	370,446	272,311
2012	0.70	92960	1,051,606	4,183,200	841,285	686,875	494,550	8,366,400	697,200	525,803	-3,380,026	-11,448,954	-3,216,867	-2,246,458
2013	0.66	92960		4,183,200				8,366,400	697,200		-3,380,026	-11,448,954	-5,765,379	-3,824,870
2014	0.63	92960		4,183,200				8,366,400	697,200		-3,380,026	-11,448,954	-5,765,379	-3,633,627
2015	0.60	92960		4,183,200				8,366,400	697,200		-3,380,026	-11,448,954	-5,765,379	-3,451,945
2016	0.57	92960		4,183,200				8,366,400	697,200		-3,380,026	-11,448,954	-5,765,379	-3,279,348
2017	0.54	80465		3,620,925				7,241,850	603,488		-2,925,707	-9,910,069	-4,990,439	-2,696,634
2018	0.51	67970		3,058,650				6,117,300	509,775		-2,471,389	-8,371,185	-4,215,499	-2,163,993
2019	0.49	55475		2,496,375				4,992,750	416,063		-2,017,071	-6,832,301	-3,440,560	-1,677,875
2020	0.46	42980		1,934,100				3,868,200	322,350		-1,562,753	-5,293,417	-2,665,620	-1,234,958
2021	0.44	30485		1,371,825				2,743,650	228,638		-1,108,435	-3,754,533	-1,890,680	-832,139
2022	0.42	17990		809,550				1,619,100	134,925		-654,116	-2,215,648	-1,115,740	-466,513
2023	0.40							0	0		0	0	0	0
2024	0.38													0
2025	0.36												0	0
TOTAL			**17,790,220**	**49,951,125**	**14,232,176**	**11,620,000**	**8,366,400**	**99,902,250**	**8,325,188**	**8,895,110**	**-40,360,509**	**-136,710,679**	**-5,339,786**	**9,900,031**
NPV per Acre														**495**

Wetlands

Year	Discount Factor	Wetlands (Total Acres Enrolled)	Cost Share (FSA)	Incentive Payment	Practive Incentive Payment (FSA)	Signing Incentive Payment (FSA)	Cumulative Impact Incentive	Wetlands Incentive Payment	Rental Rate	Maintenance	State Cost Share	Lost Jobs Income	Lost Sales	Sum	NPV
2005	1.00	3000	244,500	135,000			270,000	216,000	270,000	22,500	122,250	-109,080	-369,480	801,690	801,690
2006	0.95	5000	163,000	225,000			180,000	144,000	450,000	37,500	81,500	-181,800	-615,800	483,400	459,230
2007	0.90	5000		225,000					450,000	37,500		-181,800	-615,800	-85,100	-76,803
2008	0.86	5000		225,000					450,000	37,500		-181,800	-615,800	-85,100	-72,963
2009	0.81	5000		225,000					450,000	37,500		-181,800	-615,800	-85,100	-69,314
2010	0.77	5000		225,000					450,000	37,500		-181,800	-615,800	-310,100	-239,949
2011	0.74	5000		225,000					450,000	37,500		-181,800	-615,800	-310,100	-227,952
2012	0.70	5000		225,000					450,000	37,500		-181,800	-615,800	-310,100	-216,554
2013	0.66	5000		225,000					450,000	37,500		-181,800	-615,800	-310,100	-205,727
2014	0.63	5000		225,000					450,000	37,500		-181,800	-615,800	-310,100	-195,440
2015	0.60	5000		225,000					450,000	37,500		-181,800	-615,800	-310,100	-185,668
2016	0.57	5000		225,000					450,000	37,500		-181,800	-615,800	-310,100	-176,385
2017	0.54	2000		90,000					180,000	15,000		-72,720	-246,320	-124,040	-67,026
2018	0.51											0	0	0	0
2019	0.49											0	0	0	0
2020	0.46											0	0	0	0
2021	0.44											0	0	0	0
2022	0.42											0	0	0	0
2023	0.40											0	0	0	0
2024	0.38													0	0
TOTAL			**407,500**	**2,700,000**	**0**	**0**	**450,000**	**360,000**	**5,400,000**	**450,000**	**203,750**	**-2,181,600**	**-7,389,600**	**-1,264,950**	**-472,862**
NPV per Acre															**-24**

Filter Strips

Year	Discount Factor	Filter Strips (Total Acres Enrolled)	Cost Share (FSA)	Incentive Payment	Practive Incentive Payment (FSA)	Signing Incentive Payment (FSA)	Cumulative Impact Incentive	Rental Rate	Maintenance	State Cost Share	Lost Jobs Income	Lost Sales	Sum	NPV
2005	1.00	255	7,140	5,738	5,712	31,875	22,950	22,950	1,913	3,570	-9,272	-31,406	61,169	61,169
2006	0.95	510	7,140	11,475	5,712	31,875	22,950	45,900	3,825	3,570	-18,544	-62,812	51,092	48,537
2007	0.90	765	7,140	17,213	5,712	31,875	22,950	68,850	5,738	3,570	-27,815	-94,217	41,014	37,015
2008	0.86	1020	7,140	22,950	5,712	31,875	22,950	91,800	7,650	3,570	-37,087	-125,623	30,937	26,524
2009	0.81	1275	7,140	28,688	5,712	31,875	22,950	114,750	9,563	3,570	-46,359	-157,029	20,859	16,990
2010	0.77	1530	7,140	34,425	5,712	31,875	22,950	137,700	11,475	3,570	-55,631	-188,435	-30,784	-23,820
2011	0.74	1785	7,140	40,163	5,712	31,875	22,950	160,650	13,388	3,570	-64,903	-219,841	-46,599	-34,254
2012	0.70	2040	7,140	45,900	5,712	31,875	22,950	183,600	15,300	3,570	-74,174	-251,246	-62,414	-43,586
2013	0.66	2040		45,900				183,600	15,300		-74,174	-251,246	-126,521	-83,936
2014	0.63	2040		45,900				183,600	15,300		-74,174	-251,246	-126,521	-79,740
2015	0.60	2040		45,900				183,600	15,300		-74,174	-251,246	-126,521	-75,753
2016	0.57	2040		45,900				183,600	15,300		-74,174	-251,246	-126,521	-71,965
2017	0.54	1785		40,163				160,650	13,388		-64,903	-219,841	-110,706	-59,821
2018	0.51	1530		34,425				137,700	11,475		-55,631	-188,435	-94,891	-48,711
2019	0.49	1275		28,688				114,750	9,563		-46,359	-157,029	-79,076	-38,563
2020	0.46	1020		22,950				91,800	7,650		-37,087	-125,623	-63,260	-29,308
2021	0.44	765		17,213				68,850	5,738		-27,815	-94,217	-47,445	-20,882
2022	0.42	510		11,475				45,900	3,825		-18,544	-62,812	-31,630	-13,225
2023	0.40							0	0		0	0	0	0
2024	0.38												0	0
TOTAL				**545,063**	**45,696**	**255,000**	**183,600**	**2,180,250**	**181,688**	**28,560**	**-880,821**	**-2,983,551**	**-867,816**	**-433,328**
NPV per Acre														**-22**

Net Present Value	
Buffers	9,900,031
Wetlands	-472,862
Filter Strips	-433,328
Total	**8,993,840**

Assumptions:

1) 5% discount rate
2) $90/acre for rental
3) 25% incentive fee on top of rental fee
4) Cost share includes 50% of eligible costs
5) Estimated eligible costs for Filter Strips (CP21) is $56/acre
6) Estimated eligible costs for Riparian Buffer (CP22) is $333/acre
7) Estimated cost for Wetlands Restoration (CP23) is $163/acre
8) Estimated cost for Wildlife Habitat Buffer (CP29) is $532/acre
9) Estimated cost for Wetland Buffer (CP30) is $532/acre
10) Practice incentive payment is 40% of eligible costs per acre
11) Signing incentive payment is equal to $10 x the acres x the number of contract years
12) Maintenance is estimated at $7.50 per acre
13) CP29 and CP30 make up 1/4 of the total buffer acres
14) Average eligible costs for buffers is $382.75/acre
15) Estimated that 25% of CREP acres will meet the requirements for cumulative impact incentive payments
16) Contracts will average 12.5 years
17) The acreage in buffer is 94.7 % of total non-wetland acres
18) The acreage in filter strips is 5.3% of total non-wetland acres

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