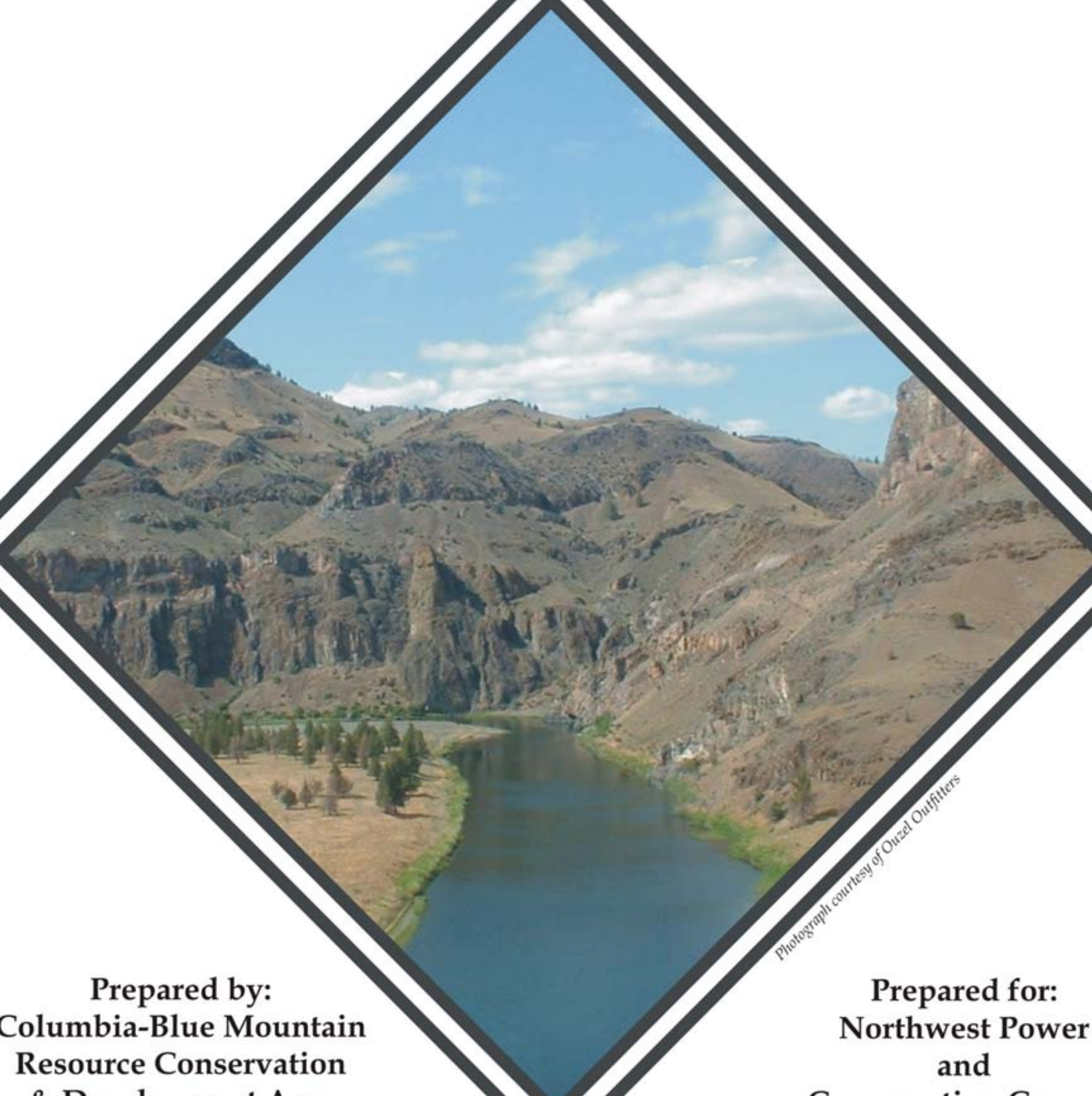
John Day Subbasin Revised Draft Plan

Appendix



Photograph courtesy of Ouzel Outfitters

Prepared by:
Columbia-Blue Mountain Resource Conservation & Development Area

Prepared for:
Northwest Power and Conservation Council

March 15, 2005

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Appendix A

Memorandum of Agreement
John Day Subbasin Coordination Team
For Subbasin Planning

(COMPLETED MARCH 21, 2003)
amended section 14.2, April 20,2003
amended Coordination Team meeting April 21, 2003

1. INTRODUCTION

The Northwest Power Planning Council ("NWPPC" or "Council") adopts a Fish and Wildlife Program under the Northwest Power Planning Act to guide the investment of fish and wildlife restoration funds by the Bonneville Power Administration ("BPA" or "Bonneville"). The Council's 2000 Fish and Wildlife Program calls for the adoption, by the Council, of subbasin plans in each major subbasin of the Columbia River Basin between 2002 and 2004.

The purpose of an adopted subbasin plan is to direct Bonneville funding to projects that enhance, mitigate and protect fish and wildlife populations that have been adversely impacted by the operation and maintenance of the Columbia River hydroelectric power system. The Council, Bonneville, the U.S. Bureau of Reclamation, the National Oceanic & Atmospheric Administration, Fisheries ("NOAA, Fisheries" or "NMFS") and the U.S. Fish and Wildlife Service ("USFWS") intend to use adopted subbasin plans to help meet requirements of the 2000 Federal Columbia River Power System Biological Opinion. The NMFS and the USFWS intend to use subbasin plans as building blocks for recovery planning for threatened and endangered species.

The purpose of the Memorandum of Agreement is to form a coordination team and establish a process that will be used by cooperating local stakeholders, private citizens, public organizations, local, tribal, state and federal governments to develop a watershed restoration plan for the John Day Basin in Eastern Oregon. The plan, directed by the Technical Guide for Subbasin Planning and the Oregon Specific Guidance document, will be submitted to the Northwest Power Planning Council for adoption as a subbasin plan under the Council's Fish and Wildlife Program. The plan will also be submitted to the Oregon Watershed Enhancement Board ("OWEB") for consideration and adoption by OWEB as the goals and priorities for watershed restoration in the John Day Basin under ORS 541.371(1)(c).

2. DEFINITIONS

2.1 "Basin" means all lands drained by the John Day River and their tributaries from ridge top to ridge top.

2.2 "Consensus" means an agreement of all parties that they can support an idea, proposal, alternative or recommendation, recognizing that not every party supports every idea, proposal, alternative or recommendation with equal enthusiasm. The "consensus" position represents the collective, general agreement of the participants on a topic, even though individual participants may prefer their own position over the collective position. Participants signing this MOA agree to support the collective "consensus" position. The anticipated product of the planning process is a Plan that each party to this agreement can support for adoption by the Council, or at a minimum not challenge before the Council.

2.3 "Council" means the Northwest Power Planning Council.

2.4 "Coordination Team" refers to the signatories of the John Day Subbasin MOA.

2.5 "Fiscal Agent" means the Party to this Agreement who will contract with the Council for the preparation of the Plan in order to oversee contract management for the Coordination Team.

2.6 "Limiting Factors" means conditions that prevent or impede watershed restoration. When used in reference to fish and wildlife, "limiting factors" refers to conditions that currently inhibit populations and ecological processes and functions relative to their potential.

2.7 "Party" means any involved stakeholders

2.8 "Plan" or Subbasin Plan or "SBP" means the plan for protection, mitigation and enhancement of fish and wildlife resources and water quality through watershed restoration that will be prepared under this Agreement and submitted to the Council for adoption as a subbasin plan under the Council's Fish and wildlife Program.

2.9 "Restoration" means to take actions likely to achieve watershed improvements and sustainable population levels of native fish or wildlife and their habitat and meet applicable harvest objectives, water quality standards and in-stream water rights.

2.10 "Subbasin Assessment" means a compilation of existing scientific and technical information about the John Day watershed prepared in accordance with the Subbasin Assessment template adopted by the Council. The Subbasin Assessment shall incorporate and build upon the existing watershed assessments including those submitted to the Oregon Watershed Enhancement Board and by federal land management agencies.

2.11 "Subbasin Technical Team" means interdisciplinary technical teams comprised of representatives of the stakeholders to assist in development of the Plan as described in Section 8. This team works under the direction of the Coordination Team.

2.12 "Stakeholder" is defined as persons or entities, which reside in, derive their livelihood from, or are involved with land or natural resource management, business, research or regulatory means within the John Day watershed.

3. PURPOSE OF AGREEMENT

The purpose of this Agreement is to establish a local Coordination Team to prepare a fish and wildlife restoration plan in a watershed context for the John Day Basin. The purpose of the Plan is to identify and prioritize strategies and actions needed to:

3.1 Protect and enhance stream flows to meet water quality standards, in stream water rights, fish and wildlife restoration objectives and existing water rights;

3.2 Support research, monitoring, and evaluation to guide existing and future restoration and management efforts in the subbasin;

3.3 Support management that maintains and enhances the wild fish populations in the John Day Subbasin;

3.4 Protect and enhance water quality to meet state and federal standards;

3.5 Maintain the resource base in the subbasin, consistent with acknowledged comprehensive land use plans, and the needs of the local resource-based economies;

3.6.1 Recognize the municipal and industrial water needs for the next 50 years;

3.4 Promote sustainability and conservation that is consistent with the customs, culture and quality of life in the Basin.

4. OPERATING PRINCIPLES

As a foundation for developing the Plan, the Coordination Team agrees to the following goals and operating principles:

4.1 Within the constraints of time, resources and existing regulatory program mandates and financial resources, develop a Plan to protect and restore the natural resources of the Basin including fish, wildlife and water quality in order to ensure regional economic viability and environmental quality for future generations;

4.2 Develop a Plan that will guide future fish & wildlife restoration funding by the Council, Bonneville, the Oregon Watershed Enhancement Board and other funding organizations;

4.3 Be consistent with and, to the extent possible, assist in addressing the requirements of the Endangered Species Act, the Clean Water Act, the Oregon Plan for Salmon & Watersheds, Wy-Can-Ush-Mi Wa-Kish-Wit (Spirit of the Salmon), and other laws and regulations;

4.4 Build upon past and on-going planning efforts by all parties to avoid redundancy, accelerate preparation, and maximize results. These existing efforts include, among others, watershed assessments, agricultural water quality management plans, Oregon Department of Fish and Wildlife fish management plans, federal land and resource management plans, John Day Subbasin Summary, tribal, state, and federal plans;

4.5 Consider the entire Basin including the cumulative impacts of activities in the Basin;

4.6 Prioritize restoration needs and opportunities and, to the extent possible, identify potential mechanisms to help fund implementation efforts;

5. STAKEHOLDERS OF THE JOHN DAY BASIN

The following entities represent stakeholders of the John Day Basin as identified to date. This list is not intended to limit participation and is open to others if future participation in the development of the subbasin plan is requested:

5.1 Tribes
- 5.1.1 Confederated Tribes of the Warm Springs Reservation
- 5.1.2 Confederated Tribes of the Umatilla Indian Reservation

5.2 Soil and Water Conservation Districts
- 5.2.1 Grant SWCD
- 5.2.2 Sherman County SWCD
- 5.2.3 Gilliam County SWCD
- 5.2.4 Wheeler SWCD
- 5.2.5 Monument SWCD
- 5.2.6 Wasco SWCD
- 5.2.7 Morrow SWCD

5.3 Watershed Councils
- 5.3.1 Pinehollow/Jackknife Watershed Council
- 5.3.2 North Fork John Day Watershed Council
- 5.3.3 South Fork John Day Watershed Council
- 5.3.4 Mid John Day Watershed Council
- 5.3.5 Gilliam East John Day Watershed Council
- 5.3.6 Grass Valley Canyon Watershed Council
- 5.3.7 North Sherman County Watershed Council

5.4 Municipalities (incorporated cities)
- 5.4.1 City of Canyon City
- 5.4.2 City of Condon
- 5.4.3 City of Dayville
- 5.4.4 City of Fossil
- 5.4.5 City of Grass Valley
- 5.4.6 City of John Day
- 5.4.7 City of Lonerock
- 5.4.8 City of Long Creek
- 5.4.9 City of Monument
- 5.4.10 City of Moro
- 5.4.11 City of Mount Vernon
- 5.4.12 City of Prairie City

5.4.13 City of Ukiah
5.4.14 City of Wasco

5.5 Counties
5.5.1 Lower John Day Partnership (representing Sherman, Gilliam, Wheeler and Wasco Counties)
5.5.2 Grant County
5.5.3 Umatilla County
5.5.4 Morrow County

5.6 State Agencies
5.6.1 Oregon Department of Fish and Wildlife
5.6.2 Oregon Department of Agriculture
5.6.3 Oregon Department of Environmental Quality
5.6.4 Oregon Department of Water Resources
5.6.5 Oregon Department of Parks and Recreation
5.6.6 Oregon Department of Forestry
5.6.7 Oregon Division of State Lands
5.6.8 Oregon State Police
5.6.9 OSU Extension
5.6.10 Oregon Department of Transportation
5.6.11 Oregon Watershed Enhancement Board

5.7 Federal Management Agencies
5.7.1 U.S. Bureau of Reclamation
5.7.2 U.S. Forest Service
5.7.3 U.S. Fish & Wildlife Service
5.7.4 U.S. Bureau of Land Management
5.7.5 National Park Service
5.7.6 USDA Natural Resources Conservation Service
5.7.7 USDA-Agriculture Research Service
5.7.8 National Oceanic & Atmospheric Administration, Fisheries
5.7.9 U.S. Army Corps of Engineers

6. COORDINATION TEAM AND STAKEHOLDER EXPECTATIONS

It is recognized that the John Day Subbasin Plan will be consistent with recovery goals for anadromous fish and wildlife as established by the Northwest Power Planning Council and supported by the Bonneville Power Administration. The John Day Subbasin Plan will make considerable demands on, and thus should benefit stakeholders in a tangible way.

The Coordination Team in the John Day Subbasin enters into this significant effort with the expectation that the approved plan will result in responsible agency and organization commitments to facilitate improved process for management plan actions including permitting process and program implementation. We expect streamlining of regulation, contracting and oversight of programs, in order to facilitate flexible, economically feasible and effective restoration projects. These expectations include:

- Expedite completion of programmatic consultation for BPA funded restoration programs in order to streamline compliance with Section 7 of the ESA.
- Continue to use programmatic approaches to facilitate National Environmental Policy Act (NEPA) compliance for individual BPA funded projects.
- Commit to expediting review of program contracts in order to better coordinate project funding cycle with project implementation schedules and timelines (i.e. ODFW in water work period). Investigate the use multi-year contracts and funding to facilitate more efficient project management.
- Simplify reporting processes to allow for more efficient use of implementation funds.
- Pursue a simplified review and consultation process for projects consistent with the John Day Subbasin Plan. Coordinate with State and Federal regulatory agencies (such as Division of State Lands and Army Corps of Engineers) to develop procedures allowing them to expedite review of permits and clearances of accepted plan elements.
- Develop consistent methods and criteria for prioritization and review of BPA funded projects.
- Work with all stakeholders to secure adequate and stable funding for implementing elements of the subbasin plan. Members of the Coordination Team have made commitments in good faith to basin stakeholders, and must be assured that the same level of commitment to the plan exists at all levels within the Council and BPA.
- Encourage federal land management agencies (BLM and USFS) to incorporate relevant sections of the John Day Subbasin Plan into Federal Management Plans.
- Commit to a ridgetop-to-ridgetop perspective that emphasizes the relationship between uplands and riparian habitats.
- Continue to communicate with stakeholders to identify and incorporate local priorities in watershed management.
- Commit to the John Day Subbasin Plan planning partners that the Plan will retain relevance and value for the duration of its implementation.
- Coordinate with agencies responsible for planning efforts such as TMDL, SB 1010, the Oregon Plan for Salmon and Watersheds, ODFW Native Fish Conservation Plan, and the Clean Water Act in order to reduce overlap.

7. FEDERAL AGENCY PARTICIPATION

All other federal agencies with authority and responsibility within the Basin may participate in the planning process. The planning process may include input from the Environmental Protection Agency, U.S. Fish and Wildlife Service, USDA Natural Resources Conservation

Service and NOAA, Fisheries so that the plan may be the foundation for fish and wildlife recovery plans in the Basin.

8. COORDINATION TEAM

Parties invited to participate in this partnership will include the following:

- Columbia-Blue Mountain RC&D
- Grant County Court
- Sherman County Court
- Lower John Day Partnership
- Grant Soil and Water Conservation District (SWCD)
- Gilliam County SWCD
- Monument SWCD
- Wheeler SWCD
- Wasco County SWCD
- Sherman County SWCD; North Sherman County Watershed Council; Pinehollow/Jackknife Watershed Council; Grass Valley Canyon Watershed Council
- North Fork John Day Watershed Council
- Mid John Day Watershed Council
- Gilliam East John Day Watershed Council
- Paleo Project
- Upper South Fork Watershed Council
- Confederated Tribes of the Warm Springs Reservation
- Confederated Tribes of the Umatilla Indian Reservation
- Oregon Department of Fish and Wildlife
- Oregon Water Resources Department
- U.S. Forest Service
- U.S. Bureau of Reclamation
- U.S. Bureau of Land Management

Each Party to this Agreement shall be represented by one spokesperson on the Coordination Team for the planning process. The Coordination Team will guide the planning process. The responsibilities of the Coordination Team are to:

(1) Provide decisions and consensus based recommendations based upon information developed by the Technical Teams after input from all participants (when consensus cannot be reached by the group in a timely manner, a super majority vote will be used to move forward);
(2) Establish protocols to facilitate decision making and communication regarding the contents of the Plan;
(3) Guide the Technical Team & stakeholders to develop a Plan with specific goals, strategies, priorities & actions for fish & wildlife restoration.

(4) The Coordination Team members will listen to each other and will keep open minds during the planning process. The partnership will refrain from lengthy speeches during group meetings and will refrain from side conversations.
(5) Coordination Team members will not personally attack or question the motivation of any other participant.
(6) Coordination Team members agree to work out differences through the planning process and not in the press or other public arenas.

At the first meeting of the Coordination Team, Karl Niederwerfer of NRCS, assigned to the Columbia-Blue Mountain RC&D was chosen as the facilitator. The facilitator (with input from the other partners) will be responsible for preparing the agenda for all meetings of the Coordination Team, leading discussions at the meetings, appointing a recorder for the meetings & all other aspects of facilitating the planning process.

9. TECHNICAL TEAMS

The Subbasin Technical Team shall be an interdisciplinary team organized to draw upon the knowledge, skills and abilities of different parties, resources agencies, tribes and organizations. The technical team, acting through the Coordination Team, may contract with outside professionals to perform their assigned tasks. The duties and responsibilities of the technical team are:

(1) to assist in the preparation of the subbasin assessment, including identification of limiting factors; to inventory existing fish, wildlife and watershed restoration programs and activities within the basin; to develop specific biological objectives that clearly describe the physical and biological changes needed to achieve the fish & wildlife watershed restoration vision;
(2) to prepare the initial draft of the Assessment and Inventory for review by the Coordination Team.
(3) to assist in the preparation & presentation of technical information & facilitation of stakeholder participation in technical matters as appropriate.

10. FISCAL AGENT

The Coordination Team has selected the Columbia-Blue Mountain RC&D as fiscal agent. The Columbia-Blue Mountain RC&D will act as contracting officer for all Parties to this Agreement. Fiscal agent operates under the guidance of the Coordination Team, work plan and budget developed by the Coordination Team. The Columbia-Blue Mountain RC&D will be primary contractor with the Northwest Power Planning Council and will act as contracting officer for all sub-contactors and parties to this agreement.

11. PLAN AND PLANNING PROCESS

The Plan will identify the goals for watershed restoration, establish the strategies to meet the goals and define objectives to measure progress toward the goals. The Plan will consist of four parts: an inventory of existing programs and activities, assessments of biological potential and opportunities for restoration, and a management plan. The management plan will include a vision statement, biological objectives, strategies and both short and long-term budgets for implementation.

The Parties will follow guidance provided by the NWPPC for the subbasin planning process and expect to take the following steps in the process:

11.1 Develop and Approve Work Plan and Budget
11.2 Review Subbasin Summary
11.3 Prepare Subbasin Assessment
11.3.1 Review and integrate existing assessments and plans
11.3.2 Integrate EDT analysis
11.3.3 Develop Working Hypotheses (Limiting Factors)
11.4 Inventory Existing Program and Activities
11.5 Develop and Approve Vision Statement
11.6 Identify Biological Objectives
11.7 Develop Strategies and Priorities
11.8 Prepare and Review Draft Management Plan
11.9 Distribute Draft Plan for Public Review and Comment
11.10 Revise Draft Plan in Response to Comments
11.11 Submit Plan to Council and OWEB
11.12 Submit Plan to Governing Bodies of all Parties
11.13 Coordinate with Federal, Tribal and State Regulatory Agencies
11.14 Defend Plan and answer questions from NW Power Planning Council and ISRP

12. PUBLIC PARTICIPATION AND COMMUNICATION DURING THE PLANNING PROCESS

Public Participation.

12.1 All meetings of the Coordination Team and Technical Team shall be open to the public. The Coordination Team shall solicit and encourage participation in the planning process by citizens and organizations in the Basin who are interested in and support fish & wildlife watershed restoration.

Communication.

12.2 While the Coordination Team is encouraged to advocate for management strategies and plan provisions, the Coordination Team agrees to refrain from unnecessarily characterizing the opinions, interests, positions, motivations or values of any other participant or group in any public discussions.
12.3 The Columbia-Blue Mountain Resource Conservation and Development Council will be the primary entity utilized to outreach and communicate with watershed stakeholders.
12.4 Coordination Team accepts responsibility for keeping their associates, colleagues, clients, constituencies, boards, commissions and councils informed of the

progress, to seek advice and comment from them and to work with them to understand the perspectives of other parties to the planning process.

12.5 Coordination Team agrees to bring back to the planning process relevant advice and comments from their associates, colleagues, clients, constituents, boards, commissions and councils.

13. INTERNAL DECISION MAKING

13.1 During meetings, the facilitator will be responsible for polling representatives to assess the degree of agreement on any given issue. For group decisions related to the process, the facilitator will assume general agreement if there is no dissent. Individuals are responsible for providing the facilitator with a clear indication of their level of agreement.

13.2 If consensus cannot be reached any member can request a vote. A super majority of 60% (currently 12 affirmative votes of 19 member Coordination Team) will be required to move decisions to finality (e.g. work plan, budget, subcontractors, final plan products).

13.3 Members in absentia can indicate their vote by fax, phone, or email prior to the date of voting or at the time of voting.

13.4 The Coordination Team will not agree to any provisions, action or agreement for which they are unwilling to seek the concurrence of those who share their interest and/or those they directly represent.

13.5 The Coordination Team understands that some parties to this Agreement may not have the authority to bind those whose interests they represent or whose interest they attempt to represent or articulate; and agreement(s) reached with such parties must remain tentative until the subbasin Plan is adopted or approved by the Coordination Team. These requirements should be made known to other team members at the time of the vote.

14. TIMELINES, IMPLEMENTATION AND FUNDING

14.1 The Coordination Team agrees to actively support work under this Agreement aimed at adoption of the Basin Plan by the Council and OWEB by Fall 2004 considering limitations imposed by availability of necessary personnel and budgets and/or changes in Council schedules.

14.2 The Parties agree that nothing in this Agreement commits their respective organizations to adopt or approve the Basin Plan, however, all Parties are encouraged to submit the Basin Plan to their governing boards.

15. GENERAL PROVISIONS

15.1 Any member of the Coordination Team may terminate its participation in this Memorandum of Agreement after thirty (30) days prior notice to the other Parties. During the intervening thirty (30) days, the Coordination Team agrees to actively attempt to resolve outstanding disputes or disagreements.

15.2 Coordination Team recognizes that some members and their representatives may have statutory responsibilities and otherwise obligations which cannot be waived or abrogated. This Agreement does not affect such non-discretionary mandates.

15.3 Nothing in this Agreement shall commit the members of the Coordination Team or their representatives to expenditure of funds not appropriated by law and administratively allocated for the Basin Planning process.

15.4 Amendments to this Agreement may be proposed by any member of the Coordination Team and shall become effective upon written approval of all members.

15.5 This Agreement shall terminate automatically upon approval of the Basin Plan by the Northwest Power Planning Council. However, it is implied that this Partnership will remain in effect to facilitate implementation and funding of the ensuing restoration activities derived from the Plan.

16. DISCLAIMERS

Nothing in this Agreement shall affect the legal position of any party on any issue through waiver, estoppels or other similar principle.

17. SIGNATURES OF PARTICIPANTS

17.1 By signing this Agreement, We understand that We are agreeing to participate in the Basin Planning process as described in this Agreement and that we will comply with the terms and conditions of the Agreement. We understand that we will be identified as a Participant in the planning process and will be represented on the Coordination Team.

17.2 This Agreement may be signed in counterparts if signed signature pages are sent to the Columbia-Blue Mountain RC&D

18. EFFECTIVE DATE

This Agreement shall be effective upon signatures by the parties identified in Section 8 above. Voting members of the Coordination Team will be determined by receipt of signature page.

Name: ____

Signature: ____

Title: ______________________

Organization: ____

Address: ____

Telephone: ______________________

Designated Representative: ___________________________________

Email Address: ____________________

Date: ___________________________

Appendix B

Newsletters

JOHN DAY SUBBASIN

WHO IS INVOLVED:

Columbia-Blue Mountain Resource, Conservation & Development

Soil & Water Conservation Districts Monument and Gilliam, Grant, Morrow , Sherman, Wasco & Wheeler Counties

Watershed Councils: North Fork John Day, North Sherman, Bridge Creek, Gilliam-East John Day, Mid John Day, North Sherman, Pine Hollow/Jackknife and Grass Valley Canyon

Gilliam, Grant, Morrow, Sherman, Umatilla, Wasco & Wheeler Counties

Confederated Tribes of the Warm Springs and Umatilla Indian Reservations

NOAA Fisheries

Bureau of Land Management

US Forest Service

US Bureau of Reclamation

US Fish & Wildlife Service

National Park Service

USDA Natural Resource Conservation Service

US Army Corps of Engineers

Oregon Dept of Fish & Wildlife

Oregon Dept of Agriculture

OR Dept of Environmental Quality

Oregon Dept of Water Resources

Oregon Dept of Parks & Recreation

Oregon Department of Forestry

Oregon Division of State Lands

OSU Extension

USDA Agriculture Research Service

Oregon Dept of Transportation

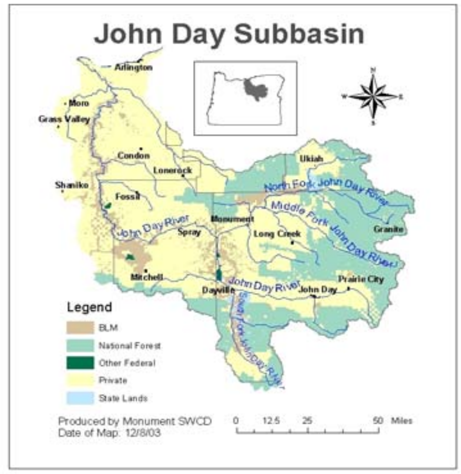
Oregon Watershed Enhancement Board

Columbia River Intertribal Fish Commission

Northwest Power & Conservation Council

Bonneville Power Administration

John Day Subbasin Planning Underway



Efforts are underway to develop a region-wide John Day Subbasin Plan that will cover 8,100 square miles in east-central Oregon.

Area watershed councils, soil & water conservation districts; tribal and local governments, and state and federal natural resource agencies serving Sherman, Gilliam, Wheeler, Crook, Morrow, Umatilla and Grant Counties are all involved in the planning process.

This is the first plan for the entire John Day Subbasin that involves such a wide spectrum of stakeholders.

While individual plans and studies for parts of the subbasin by numerous agencies have been done in the past, this is the first plan to encompass the entire John Day Subbasin. It is one of 62 subbasin plans currently under development in the Columbia Basin.

The Northwest Power and Conservation Council, an agency involved in mitigating the effects of the hydropower system on fish and wildlife in the Columbia Basin, launched subbasin planning in four Pacific NW states this past year.

The comprehensive planning effort is funded by the federal Bonneville Power Administration (BPA) at $15.2 million.

Subbasin plans must be completed by May 28, 2004. Goals, objectives and strategies developed in each plan will then be used as a basis for prioritization and funding for area projects by BPA, the Oregon Watershed Enhancement Board, the federal Bureau of Reclamation and numerous other state and federal agencies.

BPA is expected to provide approximately $140 million for fish and wildlife projects annually in the Northwest over the following four years with the guidance of the Council.

Completed subbasin plans will also serve as a guide in recovery planning by federal and state agencies for species listed under the Endangered Species Act.

The John Day is the longest free-flowing river in the Columbia Basin with its forks and mainstem flowing 284 miles from its source in the Strawberry Mountains to the Columbia River.

The John Day Subbasin is the fourth largest of the subbasins in the Columbia Basin, which includes parts of Oregon, Washington, Idaho and Montana. ◆

Local Input Important for Plan Success

Stakeholders with an interest in the John Day Subbasin Plan are encouraged to give input as it is developed over the next several months. Comments may be given to coordinators of local watershed councils, SWCDs, representatives of involved agencies, or to the Project Manager. Well-publicized public hearings will be held in the region in Spring 2004 when the draft plan is presented. Contact the Project Manager or Outreach Coordinator for updates on development of the plan. Meeting notices are posted on the Northwest Power & Conservation Council website at www.nwppc.org under the John Day Subbasin. "Development of the subbasin plan is dependent upon local input by stakeholders as well as agencies," said Karl Weist of the NW Power & Conservation Council.

Planning Coordinator:
Karl Niederwerfer
Columbia Blue-Mt. RC&D
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Project Manager:
Rick Barnes
Rick Barnes & Associates
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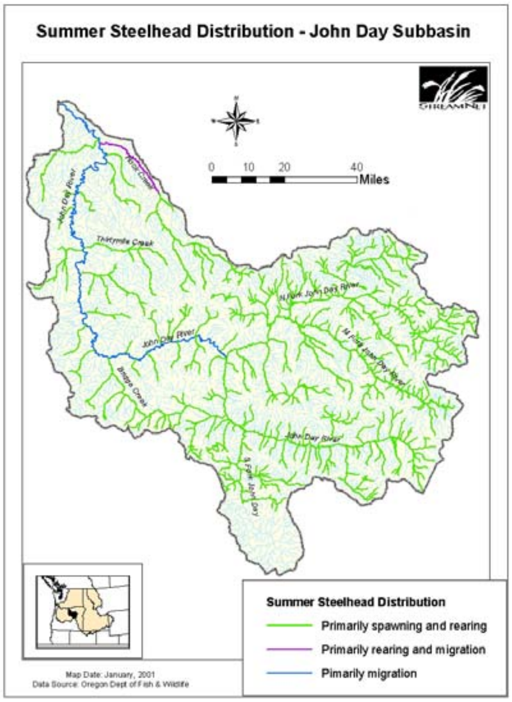
Outreach Coordinator:
Lyn Craig / Provisions
541-763-2355



John Day Subbasin: Draft Plan Development

APRIL 2004

Efforts are underway to complete the draft John Day Subbasin Plan by the deadline of May 28, 2004 as established by the NW Power & Conservation Council. Informative public meetings to gather public input will be held in several locations in the John Day Subbasin meeting in April and May before the draft plan is submitted – watch for these in your location.

Once the draft plan is submitted, it will be reviewed on the state and regional level with a public comment period in subsequent months.

EDT Process

The Ecosystem Diagnosis and Treatment (EDT) method provides a practical, science-based approach for development and later implementation of the John Day Subbasin Plan. The EDT model allows assessment of individual reaches of the John Day River through evaluation and comparison of the effects of watershed protection and restoration strategies for various aquatic species such as steelhead and bull trout.

Over the past few months Tim Unterwegner of the Oregon Dept. of Fish and Wildlife led a team with Linda Brown of the Confederated Tribes of Warm Springs and natural resources consultant Errol Claire in researching and assessing individual reaches of the John Day.

This painstaking process compared historic and contemporary fish populations and habitats with a hypothetical state, or template, where environmental conditions would be ideal within the watershed. For many reaches of the John Day, the template was reconstructed using historic aerial photos of the river dating to the 1930s, historic and contemporary research and records, and first-hand knowledge.

"This was a great opportunity," Unterwegner said. "Nothing like this has been done in this subbasin before."

Unterwegner and his team compiled EDT data on 851 of the 1,228 reaches, or 69.3% of the entire river. For each reach 47 habitat attributes were rated, which required more than160,000 data entries. The team put in nearly 900 work hours over a 15 week period. The EDT process is being used in the development of all 62 subbasin plans in the Pacific Northwest. EDT information for the John Day will be used for aquatic assessment and in helping to identify limiting factors and biological objectives. Most rivers and tributaries in the Columbia Basin have far fewer reaches than the John Day.

Unterwegner said research indicates that over the past two centuries the John Day River has lost much of its riparian vegetation and trees. Beaver populations are much smaller and the river has lost much of its meandering pattern. He said, "We've lost a lot over the past 200 years. That was apparent to us right away."

Vision Statement

The John Day Subbasin Coordination Team is comprised of about five dozen stakeholders and interested parties representing watershed councils, soil & water conservation districts, natural resource agencies and stakeholders across 7 counties of north central Oregon. Together, team members developed a vision statement for the John Day Subbasin:

"The vision for the John Day Subbasin is a healthy and productive landscape where diverse stakeholders from within and outside the subbasin work together to maintain and improve fish and wildlife habitat in a manner that supports the stewardship efforts of local land managers, makes efficient use of resources, and respects property rights. The result will be sustainable, resource-based activities that contribute to the social, cultural and economic well-being of the subbasin and the Pacific Northwest."

Further information on the subbasin planning process:
Northwest Power & Conservation Council www.nwcouncil.org
Rick Barnes & Associates, Rick Barnes 541-673-1208
Karl Niederwerfer, Columbia-Blue Mt. RC&D 541-278-6113
Lyn Craig, outreach coordinator 541-763-2355

Appendix C

Species Recognized by Native Americans as Culturally or Spiritually Significant

Pacific Lamprey (*Lampetra tridentata*)

Introduction. The Pacific lamprey (*Lampetra tridentata*) is an anadromous species native to the Pacific Northwest and the John Day Subbasin. Pacific lampreys have provided an important, local fishery for subsistence, ceremonial and medicinal purposes by Columbia River Basin tribes.

There are a number of different lamprey species, including parasitic and non-parasitic species, anadromous species and those that live their complete lifecycle in fresh water. People have commonly viewed lampreys as a threat even where they are native and live in harmony with their ecosystem. Some people seem to find their parasitic behavior repulsive, a view that is perhaps also sustained by their sliminess and snake-like appearance (Kostow 2002).

Little is known about Pacific lampreys because taxonomy and field identification of the various species is so difficult. Generally, species differentiation is based on adult characteristics, but lampreys are adults for a rather short period of their total lives (Kostow 2002). Until species identification and genetic characteristics of the species is better understood it will be difficult to determine if any unique populations exist.

Pacific lamprey were listed as a state sensitive species in 1993. In 1997 they were given further legal protected status by the state of Oregon. They are not included on the federal threatened or endangered species lists. However, because of apparent declines in lamprey populations, conservation groups in Oregon, Washington and California prepared a petition in January 2003 to give lamprey federal protection under the Endangered Species Act. Budget limitations have forced the U.S. Fish and Wildlife Service to defer formal consideration of the lamprey petition.

Life History. Much of the information contained in this assessment is based on observations and data from other Columbia River Basin or Pacific Northwest lamprey populations.

Pacific lampreys are an anadromous, parasitic species. They are parasitic during that portion of their life cycle that occurs in the ocean. It is assumed that they over-winter in subbasin streams prior to spawning the following spring or early summer. Bayer, *et. al.* (2000) observed that adult lampreys in the John Day River, tagged upon their arrival in August, hid under boulders and were sedentary until the following March, when they moved onto spawning grounds (Kostow 2002).

Lampreys do not feed once they enter freshwater. Adult lampreys may be attracted to pheromones (chemical stimuli) produced by juveniles (ammocoetes) living in the stream substrate, rather than relying on some homing instinct. During the over-winter period individuals survive on stored body fats, losing up to 20% of their weight and shrink in length. The size of adult Pacific lampreys can be highly variable depending when the measurements are taken. Measurements of adults reported in literature include 39.3 to 62.0 cm for migrating adults and 33.2 to 54.2 for spawning adults (Kostow 2002).

Spawning generally occurs just upstream of stream riffles and often near silty pools and banks. Lampreys' fecundity is thought to be highly variable, which might suggest a variety of life history patterns or age classes in a single spawning population. It has been estimated that the fecundity rate may vary from 15,500 to 240,000 eggs/female (Kostow 2002).

Lampreys spawn in low gradient stream sections. They construct gravel nests in the stream substrate at the tail-outs of pools or in riffles. Most authorities believe that all lampreys die after spawning. However, there have been several reported observations of robust lamprey kelts migrating downstream and an indication of repeat spawning in one Olympic Peninsula population (Kostow 2002).

Lamprey eggs hatch within two to three weeks, depending upon water temperature. The juveniles emerge from the spawning gravel at approximately 1 cm in length. The ammocoetes burrow into the soft substrate downstream from the nest and may spend up to six or seven years in the substrate. They are filter feeders that feed on algae and diatoms. The ammocoetes will move gradually downstream, moving primarily at night, seeking coarser sand/silt substrates and deeper water as they grow. They appear to concentrate in the lower parts of basins before undergoing their metamorphism. When body transformation, or metamorphism, from the juvenile to adult stage is complete, they migrate to the ocean from November through June (Kostow 2002).

Pacific lampreys enter saltwater and become parasitic. They feed on a wide variety of fishes and whales. They appear to move quickly offshore into waters up to 70 meters deep. Some individuals have been caught in high seas fisheries. The length of their ocean stay is unknown, but some have speculated that it could range from six to 40 months (Kostow 2002).

Ecological Importance. Evidence suggests that Pacific lamprey was well integrated into the native freshwater fish community and as such had positive effects on the system. It was in all probability a big contributor to the nutrient supply in oligotrophic streams of the subbasin as the adults died after spawning (Beamish 1980). Lamprey were an important part of the food chain for many species. It is suspected that it was an important buffer for upstream migrating adult salmon from predation by marine mammals (Close et. al. 1995). Some mammalian and avian predators may target lampreys during their migrations to and from the ocean. Most adult lampreys die shortly after spawning, feeding various scavenger species and contributing rich nutrients throughout their freshwater habitat (Kostow 2002).

Migrating ammocoetes are especially vulnerable to predation during their in-river and ocean migration. Most movement appears to occur at night, but their size (up to 10cm) and the number of predators, especially in the Columbia River and impoundments, pose a serious risk. Freshwater fishes (northern pikeminnow, white sturgeon, rainbow trout, smallmouth bass), saltwater fishes (sable fish, spiny dogfish), birds (terns, and gulls) and marine mammals (harbor seal, California sea lion) prey on eggs, ammocoetes and adult Pacific lamprey (see summary table, BioAnalysts 2000:17-18). Studies during the early 1980s found that adult Pacific lamprey were the most abundant item in stomachs of seals and sea lions in Washington, Oregon, and northern California (NOAA 1997; BioAnalysts 2000:22). Sperm whales are known to feed on lampreys (Hubbs 1967). (USDI 2003)

Population Data and Status. Pacific lamprey abundance throughout the Columbia River Basin has decreased significantly in recent years. In part, this reflects lamprey counts at Bonneville and The Dalles dams, which were lower in the 1990s than pre-1970 counts (Kostow 2002). Counts at Columbia River dam fish ladders are one of the few indicators of lamprey numbers in the Mid-Columbia ESU. However, even these counts are suspect because of certain lamprey characteristics. Lampreys typically migrate at night, while most fish ladder counting occurs during daylight hours. Fish counting stations typically were designed for counting salmon and steelhead, and lampreys can often times pass without being seen. Their erratic swimming in the faster current of the fish ladders could also result in multiple counts of an individual lamprey that may become dislodged and drift back down stream (Kostow 2002).

Pacific lampreys were collected from Clear Creek in the John Day River Subbasin in 1973 (Bond and Kan 1973). Recent lamprey distribution seems intact in the John Day Subbasin based on collections of ammocoetes. Close and Bronson (2001) found Pacific lamprey (ammocoetes) throughout the John Day Subbasin except for several survey stations in the upper South Fork and the very upper North Fork. Current adult abundance is unknown, but it is thought that there are approximately 10,000 adult Pacific lampreys migrating into the John Day Subbasin each year (David Close, CTUIR, personal communication, 2001). The large historic migrations are gone and no one sees concentrations of adult anywhere in the subbasin. However, CTUIR staff observed approximately 500 adult lamprey passing Tumwater Falls during the month of August in 1998 and 1999. Passage problems at dams, not in-stream habitat, is believed to be the major cause of declines (Internal ODFW memo dated 3 February 1993 from H.Weeks to J. Martin). (USDI 2003)

Productivity. Historic lamprey counts at Bonneville and The Dalles dams show the order of magnitude variations that can occur as lamprey numbers swung between tens of thousands and hundreds of thousands in just a few years (Kostow 2002). Because of their high fecundity rate, lamprey populations may be able to quickly rebound if freshwater and ocean survival conditions are favorable.

Lamprey fecundity in the John Day River was significantly lower than lamprey spawning in coastal Oregon streams and may be related to a higher energy cost of migration (environmental factor) resulting in fewer eggs produced (BioAnalysts 2000:16). Relative fecundity was 522.15 and 503.44 eggs/g body, and 417.94 eggs/g body wt. in the John Day River (Kan 1975). Kan (1975) suggested that the lower relative fecundity in the John Day lampreys was due to a higher cost of migration.

Distribution. Lamprey distribution seems to be intact in the John Day Subbasin, but abundance is not known (Kostow 2003). In 1999, staff from the Umatilla tribes conducted a detailed presence/absence survey of lamprey in the John Day, Umatilla, Walla Walla, Tucannon, and Grande Ronde subbasins (Close and Bronson 2001). They found Pacific lampreys throughout the John Day Subbasin. However, none were found at several survey stations in the upper South Fork (Izee Falls may prevent lamprey movement into the upper South Fork) and the very upper North Fork. (Kostow 2002)

From the late 1940s through the late 1980s the Oregon Fish Commission killed non-game fishes across the state with rotenone (Close *et al.* 1995). A 1969 rotenone treatment of the North Fork John Day River killed 33,000 adult lamprey and another rotenone event on the John Day in 1982 killed thousands of lamprey ammocoetes (Kostow 2002).

Subbasin Harvest.
Current Harvest. The only lamprey species that is harvested in Oregon is the Pacific lamprey. In recent years Pacific lamprey have been harvested at Savage Rapids Dam on the Rogue River, at Winchester Dam on the Umpqua River, at Willamette Falls on the Willamette River, in Fifteenmile Creek, at Sherars Falls on the Deschutes River, and in the John Day River. Most of the harvest outside of the Willamette Subbasin has been for personal use by Native Americans.

In 2001, the Oregon Fish and Wildlife Commission implemented OAR 635-044-0130 which requires that a permit be issued by the Commission before certain native non-game species, including Pacific lamprey, can be harvested (Kostow 2002).

Historic harvest. The John Day Subbasin was historically utilized for fishing purposes by the Umatilla, Columbia River, Paiute, Shoshone-Bannock and Warm Springs Indian Tribes. The subbasin was also utilized by the Rock Creek Indian Tribe (Swindell 1941). Although Celilo Falls was the major fishing site for Columbia Basin Tribes, the John Day River and tributaries supported a fishery at one time (Swindell 1941). The John Day River primarily was utilized for salmon and trout fishing but harvest of Pacific lamprey did occur within the subbasin. The Middle and North forks were the most popular areas chosen for harvesting. Lane and Lane (1979) noted one area in the John Day River utilized by the Umatilla and Columbia River Tribes was known as "*tuck-pus,*" near Albert Phillipi Park. Salmon, eels, and whitefish were harvested near this area. Camas Creek and the North Fork John Day were also noted as areas that eels were once harvested. Percy Brigham, CTUIR elder and fisherman, stated that he harvested eels at the mouth of the John Day River, and at an area he called "little falls" on the John Day River (Jackson *et. al.* 1997).

Cultural Significance to Tribes. The species is culturally significant for Native Americans, including members of the Confederated Tribes. The lampreys have religious and ceremonial importance to tribal members. Lampreys are fatty and highly nutritious. They are valued as a traditional source of food by some Native Americans (Kostow 2002). Lampreys have also been used for medicinal purposes. The oils of the "eels" have been used as hair oil and were traditionally mixed with salmon and used as a cure for tuberculosis.

Appendix C

Freshwater Mussels (multiple species)

Introduction. Freshwater mussels (Mollusca: Unionoida) are vital components of intact salmonid ecosystems and are culturally important to Native Americans. However, in part because freshwater mussels are sensitive to a myriad of pollutants and ecosystem alterations, these animals are now one of the most endangered faunal groups in North America.

Although the greatest diversity of freshwater mollusks occurs in the southeastern United States, the western states contain at least six endemic mussel species, and many endemic snail species. Historically, at least seven mussel species occurred in Oregon and Washington: the western pearlshell, *Margaritifera falcata* (Gould 1850); western ridged mussel, *Gonidea angulata* (Lea 1838); Yukon floater, *Anodonta beringiana* (Middendorff, 1851); California floater, *Anodonta californiensis* (Lea, 1852); western floater, *Anodonta kennerlyi* (Lea 1860); winged floater, *Anodonta nuttalliana* (Lea 1838); and Oregon floater, *Anodonta oregonensis* (Lea 1838) (USFS 2004, Williams *et al.* 1993, Frest and Johannes 1995).

Within the John Day River Subbasin, recent surveys were conducted for freshwater mussels in the Middle and North Fork John Day rivers. Based on these survey results, mussels appear to be common in the Middle and North Fork John Day; at least one mussel specimen was found at every site sampled. All three genera of mussels known for the western United States were found at nearly half of the sites surveyed on the Middle Fork John Day, and at 15% of the sites on the North Fork John Day. Preliminary data suggest that speckled dace are a host fish for *Anodonta* in the Middle Fork John Day River. The current status of freshwater mussels in other reaches within the system (e.g., main stem John Day River) is not known.

Life History. Freshwater mussels are unique among bivalves in that they require a host fish to complete their life cycle. Unlike male and female marine bivalves, which release sperm and eggs into the water column where fertilization takes place, fertilization of freshwater mussels takes place within the brood chambers of the female mussel. The female mussel carries the fertilized eggs in the gills until they develop into a parasitic stage called glochidia. Female mussels then release the glochidia into the water column where they must come into contact with a suitable host fish species. Once the glochidia are released they will survive for only a few days if they do not successfully attach to a host fish (O'Brien and Brim Box 1999, O'Brien and Williams 2002). Glochidia may attach to a non-host fish, but the glochidium will fail to encyst and will eventually be sloughed off. After successfully attaching to the host fish, glochidia metamorphose and drop to the substrate to become free-living juveniles (Jones 1950, Howard 1951). The time required for glochidial metamorphosis varies with water temperature and among mussel species.

The mussel/fish relationship is usually species-specific (Lefevre and Curtis 1912); only certain species of fish can serve as suitable hosts for a particular mussel species. The number of host fish utilized by a mussel species varies. Some mussel species have a very restricted number of host fish species (Watters 1994, Michaelson and Neves 1995) while other mussels parasitize a wide range of fish species (Watters 1994, Haag and Warren 1997). To increase their chances of coming into contact with a suitable host fish, some mussel species lure potential host fish by extending brightly colored portions of their mantles that mimic minnows, insects, or other prey (Coker *et al*. 1921, Kraemer 1970). In addition, some mussels release glochidia into the water column when light sensitive spots are stimulated by the shadow of a passing fish (Kraemer 1970, Jansen 1990). Other mussel species have evolved elaborate lures resembling fish food as mechanisms to attract specific host fishes (Haag *et al*. 1995, Hartfield and Butler 1997, O'Brien and Brim Box 1999). Knowledge of the reproductive biology of many mussels is incomplete (Jansen 1990), and the host fishes are known for only about a quarter of the mussel species in North America (Watters 1994). In the Middle Fork John Day River, speckled dace were found with encysted *Anodonta* glochidia, suggesting this fish species serves as a fish host.

The duration of the parasitic stage varies from about a week to several months (Fuller 1974, Oesch 1984, Williams *et al*. 1992), depending on mussel species and as a function of water temperature (higher temperatures causing shorter durations) (O'Brien and Brim Box 1999). After metamorphosis, juvenile mussels drop off from their host fish, and must fall to substrate suitable for their adult life requirements or they will not survive. Suitable substrates include those that are firm but yielding and stable (Fuller 1974). In general, shifting sands and suspended fine mud, clays and silt are considered harmful to both juvenile and mature mussels (Fuller 1974, Williams *et al*. 1992, Brim Box and Mossa 1999, Brim Box *et al*. 2002).

Mussels orient themselves on the bottom of a stream with their anterior ends buried in the substrate, usually with the two valves slightly open, which allows the intake of water through an incurrent siphon (and food and oxygen) while allowing waste materials to leave the body through an excurrent siphon (Oesch 1984). Food items include organic detritus, algae and diatoms (Coker *et al*. 1921, Matteson 1955, Fuller 1974). Increases in fine sediment, whether deposited or suspended, may impact mussels by interfering with feeding and/or respiration (Fuller 1974, Brim Box and Mossa 1999).

Although considered fairly sedentary, adult mussels may move in response to abnormal or transient ecological events. For example, water level fluctuations may cause some mussel species to seek deeper water (Coker *et al*. 1921, Oesch 1984). Often in late summer, mussel trails are visible as the water recedes. However, mussels colonize upstream areas mainly through the use of the parasitic glochidial life stage. Without this stage, freshwater mussel populations would, over generations, slowly shift downstream.

Ecological Importance. The richest mollusk fauna in the world is found in North America north of Mexico, and is represented by about 600 species of gastropods and 340 species of bivalves. Freshwater mussels are also considered the most endangered faunal group in North America, with over 70% of species either imperiled or extinct (Neves *et al*. 1997). Extinction rates for freshwater mussels are an order of magnitude higher than expected background levels (Nott *et al*. 1995), and mussels are imperiled disproportionately relative to terrestrial species (e.g., birds and mammals) (Williams *et al*. 1993). Given that freshwater mussels are an endangered global resource, they are assigned tremendous ecological importance by many freshwater biologists (Corn 1994).

Freshwater mussels are ecologically important because they are primary consumers, detritivores and act as nutrient sinks (McMahon and Bogan 2001). In addition, freshwater mussels filter and clarify large amounts of waters and therefore contribute to maintaining water clarity (McMahon and Bogan 2001). Freshwater mussels can also be important food items for fish, mink, otters and raccoon (Dillon, Jr. 2000).

Historic Distribution and Abundance.
Historical Data Collection. Ninety-seven records of historical mussel occurrences in Oregon were obtained, dating back to 1838, from the US Forest Service Freshwater Mollusk Database (USFS 2004). Of these records, only two do not list a specific drainage. Accounts from the Columbia River drainage comprise about a third of these records. These records from the Columbia Basin include five of the eight species known to currently occur in the western United States: *Anodonta beringiana*, *Anodonta nuttalliana, Anodonta oregonensis, Gonidea angulata* and *Margaritifera falcata.* No records were found from the John Day River or its tributaries.

Museum Collections. A total of 81 historical records of freshwater mussels from the western United States (i.e., shell material reposited in museum collections) were found at the United States National Museum (Smithsonian Institution) and California Academy of Sciences. Over half of these records of freshwater mussels were from the Columbia River drainage. Two records of *Gonidea* shells from the main stem John Day River were found at the United States National Museum dating from 1971.

Current Distribution and Abundance. Based on the results of a survey conducted in 2003, mussels were common in the Middle and North Fork John Day rivers, and at least one mussel specimen was found at every site sampled. All three genera were found at nearly half of the sites surveyed on the Middle Fork John Day, and at 15% of the sites on the North Fork John Day. Dense beds of *Gonidea* (~53 individuals/ft^2) and *Anodonta* (~26 individuals/ft^2) were found in the Middle Fork John Day River, and dense beds of *Margaritifera* (~21 individuals/ft^2) were found on the North Fork John Day River. In general, the relative abundance of *Margaritifera* per site declined from the headwaters to the confluence in each river, while *Anodonta* and *Gonidea* were relatively more common at sites downstream than headwater sites.

Nothing is known about the current distribution or abundance of freshwater mussels in the main stem or south fork of the John Day River. Additional surveys are needed to determine the current status of freshwater mussels in those reaches.

Cultural Significance to Tribes. Historically, freshwater mussels were an important food for tribal peoples of the Columbia River Basin. Native Americans in the interior Columbia River Basin harvested freshwater mussels for at least 10,000 years (Lyman 1984). Ethnographic surveys of Columbia Basin tribes reported that Native Americans collected mussels in late summer and in late winter through early spring during salmon fishing (Spinden 1908, Ray 1933, Post 1938). A few tribal elders from the Columbia and Snake River basins recalled that mussels were collected whenever conditions of the rivers were favorable (Hunn 1990, Chatters 1995). Tribal harvesters collected mussels by hand. When wading was not possible they used forked sticks (Post 1938). They prepared mussels for consumption by baking, broiling, steaming, and drying (Spinden 1908, Post 1938). The Umatilla Tribe preferred to boil freshwater mussels for consumption (Ray 1942).

Appendix C

Native American use of freshwater mussels decreased during the last 200 years, probably due to declines in native populations and assimilation following Euro-American settlement (Chatters 1987). A Umatilla tribal elder, however, remembered his parents trading fish for dried mussels as late as the 1930s (Eli Quaempts, CTUIR tribal member, personal communication, 1996). In addition, shell middens found at village sites near the mouth of the Umatilla River, as well as the presence of mussels at burial sites in the same area, suggest that freshwater mussels were historically important to the indigenous peoples of the mid-Columbia River Plateau for multiple reasons.

Appendix D

Terrestial Focal Species

American Beaver (*Castor canadensis*)

The following species account was prepared by: Paul Ashley and Stacy Stoval of the Southeast Washington Ecoregional Assessment in January 2004.

The American beaver (*Castor canadensis*) is a large, highly specialized aquatic rodent found in the immediate vicinity of aquatic habitats (Hoffman and Pattie 1968). The species occurs in streams, ponds, and the margins of large lakes throughout North America, except for peninsular Florida, the Arctic tundra, and the southwestern deserts (Jenkins and Busher 1979). Beavers construct elaborate lodges and burrows and store food for winter use. The species is active throughout the year and is usually nocturnal in its activities. Adult beavers are nonmigratory.

Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet. Beavers are exclusively vegetarian in diet. A favorite food item is the cambial, or growing, layer of tissue just under the bark of shrubs and trees. Many of the trees that are cut are stripped of bark, or carried to the pond for storage under water as a winter food cache. Buds and roots are also consumed, and when they are needed, a variety of plant species are accepted. The animals may travel some distance from water to secure food. When a rich food source is exploited, canals may be dug from the pond to the pasture to facilitate the transportation of the items to the lodge.

Much of the food ingested by a beaver consists of cellulose, which is normally indigestible by mammals. However, these animals have colonies of microorganisms living in the cecum, a pouch between the large and small intestine, and these symbionts digest up to 30 percent of the cellulose that the beaver takes in. An additional recycling of plant food occurs when certain fecal pellets are eaten and run through the digestive process a second time (Findley 1987). Woody and herbaceous vegetation comprise the diet of the beaver. Herbaceous vegetation is a highly preferred food source throughout the year, if it is available. Woody vegetation may be consumed during any season, although its highest utilization occurs from late fall through early spring. It is assumed that woody vegetation (trees and/or shrubs) is more limiting than herbaceous vegetation in providing an adequate food source.

Denney (1952) summarized the food preferences of beavers throughout North America and reported that, in order of preference, beavers selected aspen (*Populus tremuloides*), willow (*Salix spp.*), cottonwood (*P. balsamifera*), and alder (*Alnus spp.*). Although several tree species have often been reported to be highly preferred foods, beavers can inhabit, and often thrive in, areas where these tree species are uncommon or absent (Jenkins 1975). Aspen and willow are considered preferred beaver foods; however, these are generally riparian tree species that may be more available for beaver foraging but are not necessarily preferred over all other deciduous tree species (Jenkins 1981). Beavers have been reported to subsist in some areas by feeding on coniferous trees, generally considered a poor quality source of food (Brenner 1962; Williams 1965). Major winter foods in North Dakota consisted principally of red-osier dogwood (*Cornus* *stolonifera*), green ash (*Fraxinus pennsylvanica*), and willow (Hammond 1943). Rhizomes and roots of aquatic vegetation also may be an important source of winter food (Longley and Moyle 1963; Jenkins pers. comm.). The types of food species present may be less important in determining habitat quality for beavers than physiographic and hydrologic factors affecting the site (Jenkins 1981).

Aquatic vegetation, such as duck potato (*Sagittaria spp.)*, duckweed (*Lemna spp.)*, pondweed (*Potamogeton spp.)*, and water weed (Elodea spp.), are preferred foods when available (Collins 1976a). Water lilies (Nymphaea spp.), with thick, fleshy rhizomes, may be used as a food source throughout the year (Jenkins 1981). If present in adequate amounts, water lily rhizomes may provide an adequate winter food source, resulting in little or no tree cutting or food caching of woody materials. Jenkins (1981) compared the rate of tree cutting by beavers adjacent to two Massachusetts ponds that contained stands of water lilies. A pond dominated by yellow water lily (*y. variegatum*) and white water lily (*N. odorata*), which have thick rhizomes, had low and constant tree cutting activity throughout the fall. Conversely, the second pond, dominated by watershield (*Brasenia schreberi*), which lacks thick rhizomes, had increased fall tree cutting activity by beavers.

Reproduction. The basic composition of a beaver colony is the extended family, comprised of a monogamous pair of adults, subadults (young of the previous year), and young of the year (Svendsen 1980). Female beavers are sexually mature at 2.5 years old. Females normally produce litters of three to four young with most kits being born during May and June. Gestation is approximately 107 days (Linzey 1998). Kits are born with all of their fur, their eyes open, and their incisor teeth erupted.

Dispersal of subadults occurs during the late winter or early spring of their second year and coincides with the increased runoff from snowmelt or spring rains. Subadult beavers have been reported to disperse as far as 236 stream km (147 mi) (Hibbard 1958), although average emigration distances range from 8 to 16 stream km (5 to 10 mi) (Hodgdon and Hunt 1953; Townsend 1953; Hibbard 1958; Leege 1968). The daily movement patterns of the beaver centers around the lodge or burrow and pond (Rutherford 1964). The density of colonies in favorable habitat ranges from 0.4 to 0.8/km2 (1 to 2/mi2) (Lawrence 1954; Aleksiuk 1968; Voigt *et. al.* 1976; Bergerud and Miller 1977 cited by Jenkins and Busher 1979).

Home Range. The mean distance between beaver colonies in an Alaskan riverine habitat was 1.59 km (1 mi) (Boyce 1981). The closest neighbor was 0.48 km (0.3 mi) away. The size of the colony's feeding range is a function of the interaction between the availability of food and water and the colony size (Brenner 1967). The average feeding range size in Pennsylvania, excluding water, was reported to be 0.56 ha (1.4 acre). The home range of beaver in the Northwest Territory was estimated as a 0.8 km (0.5 mi) radius of the lodge (Aleksiuk 1968). The maximum foraging distance from a food cache in an Alaskan riverine habitat was approximately 800 m (874 yds) upstream, 300 m (323 yds) downstream, and 600 m (656 yds) on oxbows and sloughs (Boyce 1981).

Mortality. Beavers live up to 11 years in the wild, 15 to 21 years in captivity (Merritt 1987, Rue 1967). Beavers have few natural predators. However, in certain areas, beavers may face predation pressure from wolves (*Canis lupus*), coyotes (*Canis latrans*), lynx (*Felis lynx*), fishers (*Martes pennanti*), wolverines (*Gulo gulo*), and occasionally bears (*Ursus spp*.). Alligators, minks (*Mustela vison*), otters (*Lutra canadensis*), hawks, and owls periodically prey on kits (Lowery 1974, Merritt 1987, Rue 1967). Beavers often carry external parasites, one of which, *Platypsylla castoris*, is a beetle found only on beavers.

<u>Harvest</u>

Historic. Because of the high commercial value of their pelts, beavers figured importantly in the early exploration and settlement of western North America. Thousands of their pelts were harvested annually, and it was not many years before beavers were either exterminated entirely or reduced to very low populations over a considerable part of their former range. By 1910 their populations were so low everywhere in the United States that strict regulation of the harvest or complete protection became imperative.

Current. Data not provided.

Harvest of beavers in Oregon between 1969 and 1992 per 1,000 hectares in Union and Wallowa Counties were less than one and one to 10 respectively (ODFW, annual reports, cited in Verts and Carraway 1998). Harvest trends will not indicate population trend, because the price of beaver pelts often determines the level of harvest. The higher the pelt price, the higher the harvest because trappers put more effort into trapping beaver. If pelt prices are low, little effort is expended to trap beaver, regardless of population size.

<u>Habitat Requirements</u>

All wetland cover types (e.g., herbaceous wetland and deciduous forested wetland) must have a permanent source of surface water with little or no fluctuation in order to provide suitable beaver habitat (Slough and Sadleir 1977). Water provides cover for the feeding and reproductive activities of the beaver. Lakes and reservoirs that have extreme annual or seasonal fluctuations in the water level will be unsuitable habitat for beaver. Similarly, intermittent streams, or streams that have major fluctuations in discharge (e.g., high spring runoff) or a stream channel gradient of 15 percent or more, will have little year-round value as beaver habitat. Assuming that there is an adequate food source available, small lakes [< 8 ha (20 acres) in surface area] are assumed to provide suitable habitat. Large lakes and reservoirs [> 8 ha (20 acres) in surface area] must have irregular shorelines (e.g., bays, coves, and inlets) in order to provide optimum habitat for beaver.

Beavers can usually control water depth and stability on small streams, ponds, and lakes; however, larger rivers and lakes where water depth and/or fluctuation cannot be controlled are often partially or wholly unsuitable for the species (Murray 1961; Slough and Sadleir 1977). Rivers or streams that are dry during some parts of the year are assumed to be unsuitable beaver habitat. Beavers are absent from sizable portions of rivers in Wyoming, due to swift water and an absence of suitable dwelling sites during periods of high and low water levels (Collins 1976b).

In riverine habitats, stream gradient is the major determinant of stream morphology and the most significant factor in determining the suitability of habitat for beavers (Slough and Sadleir 1977). Stream channel gradients of 6 percent or less have optimum value as beaver habitat. Retzer *et. al.* (1956) reported that 68 percent of the beaver colonies recorded in Colorado were in valleys with a stream gradient of less than six percent, 28 percent were associated with stream gradients from seven to 12 percent, and only four percent were located along streams with gradients of 13 to 14 percent. No beaver colonies were recorded in streams with a gradient of 15 percent or more. Valleys that were only as wide as the stream channel were unsuitable beaver habitat, while valleys wider than the stream channel were frequently occupied by beavers. Valley widths of 46 m (150 ft) or more were considered the most suitable. Marshes, ponds, and lakes were nearly always occupied by beavers when an adequate supply of food was available.

Foraging. Beavers are generalized herbivores; however, they show strong preferences for particular plant species and size classes (Jenkins 1975; Collins 1975a; Jenkins 1979). The leaves, twigs, and bark of woody plants are eaten, as well as many species of aquatic and terrestrial herbaceous vegetation. Food preferences may vary seasonally, or from year to year, as a result of variation in the nutritional value of food sources (Jenkins 1979).

An adequate and accessible supply of food must be present for the establishment of a beaver colony (Slough and Sadleir 1977). The actual biomass of herbaceous vegetation will probably not limit the potential of an area to support a beaver colony (Boyce 1981). However, total biomass of winter food cache plants (woody plants) may be limiting. Low marshy areas and streams flowing in and out of lakes allow the channelization and damming of water, allowing access to, and transportation of, food materials. Steep topography prevents the establishment of a food transportation system (Williams 1965; Slough and Sadleir 1977). Trees and shrubs closest to the pond or stream periphery are generally utilized first (Brenner 1962; Rue 1964). Jenkins (1980) reported that most of the trees utilized by beaver in his Massachusetts study area were within 30 m (98.4 ft) of the water's edge. However, some foraging did extend up to 100 m (328 ft). Foraging distances of up to 200 m (656 ft) have been reported (Bradt 1938). In a California study, 90 percent of all cutting of woody material was within 30 m (98.4 ft) of the water's edge (Hall 1970).

Woody stems cut by beavers are usually less than 7.6 to 10.1 cm (3 to 4 inches) DBH (Bradt 1947; Hodgdon and Hunt 1953; Longley and Moyle 1963; Nixon and Ely 1969). Jenkins (1980) reported a decrease in mean stem size cut and greater selectivity for size and species with increasing distance from the water's edge. Trees of all size classes were felled close to the water's edge, while only smaller diameter trees were felled farther from the shore.

Beavers rely largely on herbaceous vegetation, or on the leaves and twigs of woody vegetation, during the summer (Bradt 1938, 1947; Brenner 1962; Longley and Moyle 1963; Brenner 1967; Aleksiuk 1970; Jenkins 1981). Forbs and grasses comprised 30 percent of the summer diet in Wyoming (Collins 1976a). Beavers appear to prefer herbaceous vegetation over woody vegetation during all seasons of the year, if it is available (Jenkins 1981).

Cover. Lodges or burrows, or both, may be used by beavers for cover (Rue 1964). Lodges may be surrounded by water or constructed against a bank or over the entrance to a bank burrow. Water protects the lodges from predators and provides concealment for the beaver when traveling to and from food gathering areas and caches.

The lodge is the major source of escape, resting, thermal, and reproductive cover (Jenkins and Busher 1979). Mud and debarked tree stems and limbs are the major materials used in lodge construction although lesser amounts of other woody, as well as herbaceous vegetation, may be used (Rue 1964). If an unexploited food source is available, beavers will reoccupy abandoned lodges rather than build new ones (Slough and Sadleir 1977). On lakes and ponds, lodges are frequently situated in areas that provide shelter from wind, wave, and ice action. A convoluted shoreline, which prevents the buildup of large waves or provides refuge from waves, is a habitat requirement for beaver colony sites on large lakes.

Captive Breeding Programs, Transplants, Introductions

Historic. In the 1930s live trapping and restocking of depleted areas became a widespread practice which, when coupled with adequate protection, has made it possible for the animals to make a spectacular comeback in many sections.

Current. No data is available.

Population and Distribution

Population

Historic. Historically, beaver populations were more expansive until populations were reduced by unregulated trapping, as they were throughout much of the western United States (P. Fowler, WDFW, personal communications, 2003).

Current. Data not provided.

Distribution

Historic. No data is available.

Current. The beaver is found throughout most of North America except in the Arctic tundra, peninsular Florida, and the Southwestern deserts (Allen 1983; VanGelden 1982; Zeveloff 1988). In Oregon, the American beaver can be found in suitable habitats throughout the state (Verts and Carraway 1998).

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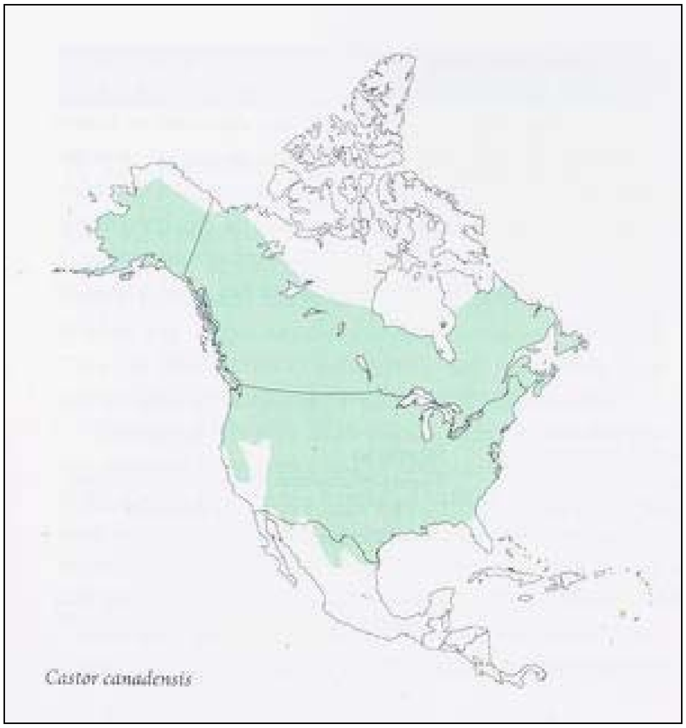

Geographic distribution of American beaver (*Castor canadensis*) (From Linzey and Brecht 2002).

Status and Abundance Trends

<u>Status</u>

Data not provided.

<u>Trends</u>

Data not provided.

Factors Affecting American Beaver Population Status

Agriculture. Riparian habitat along many water ways has been removed in order to plant agricultural crops, thus removing important habitat and food sources for beaver in southeast Washington.

Agricultural Conflict. Beaver may be removed when complaints are received from farmers about blocked irrigation canals or pumps.

Conflict with Fisheries. Beaver sometimes create dams that restrict fish passage, and are removed in order to restore fish passage. Beaver cutting tree planted to improve riparian habitat have also been removed.

Key Factors Inhibiting Populations and Ecological Processes
No data is available.

Appendix D

California Bighorn Sheep *(Ovis canadensis californicus)*

Introduction

Historically, California bighorn sheep were the most abundant wild mountain sheep in Oregon (Toweill and Geist 1999) Their distribution included the steeper terrain of southeast Oregon and the non-timbered portions of the Deschutes and John Day River drainages (ODFW 2003b).

California bighorn populations declined significantly during the settlement of Oregon due to indiscriminate hunting, habitat loss caused by unregulated domestic livestock grazing, and disease mortality caused by exposure to domestic livestock parasites and diseases. The species was extirpated from Oregon by 1915 (ODFW 2003b).

California bighorn sheep were reintroduced into Oregon beginning in 1954. Efforts to restore them into suitable, historic range have continued to the present time. The species is again viable in Oregon and currently occupies a large percentage of existing suitable habitat. However, much of the historic California bighorn range in Oregon is presently unsuitable for occupancy due to land uses and habitat conditions that are not compatible with wild sheep.

Taxonomy, Oregon Distribution, Selected Physical and Behavioral Characteristics, Life History, Habitat Requirements, Key Environmental Correlates

<u>Taxonomy, Oregon Distribution, Selected Physical and Behavioral Characteristics</u>

Wild sheep are members of the Bovidae family, sub-family Caprinae (Nowak 1999). North American bighorn sheep include three subspecies: Rocky Mountain (*Ovis canadensis canadensis*), California *(O. c. californicus*), and Desert (*O. c. nelsoni*) bighorn.

The California and Rocky Mountain bighorn subspecies are native to Oregon (Bailey 1936) and currently are extant in the state. The ranges of the two subspecies are separated by the Blue and Umatilla mountains. The California subspecies historically ranged over most of southeast and central Oregon and presently occurs in suitable habitat within the same range (Figure 1).

California bighorns have large bodies, thick coats and comparatively small ears. Both sexes have horns. Mature rams have heavy robust horns that rarely exceed 36 inches in length and 16 inches in basal circumference. Ewe horns are typically eight to 10 inches long.

Bighorn sheep are gregarious and spend most of the year in distinct group associations. Except for the breeding season, adult ram groups live separate from ewe-lamb-subadult groups. Ram groups are frequently called "bachelor groups" and usually occupy different habitats than females and young. Ram groups maintain a social hierarchy established and maintained primarily through head butting rituals.

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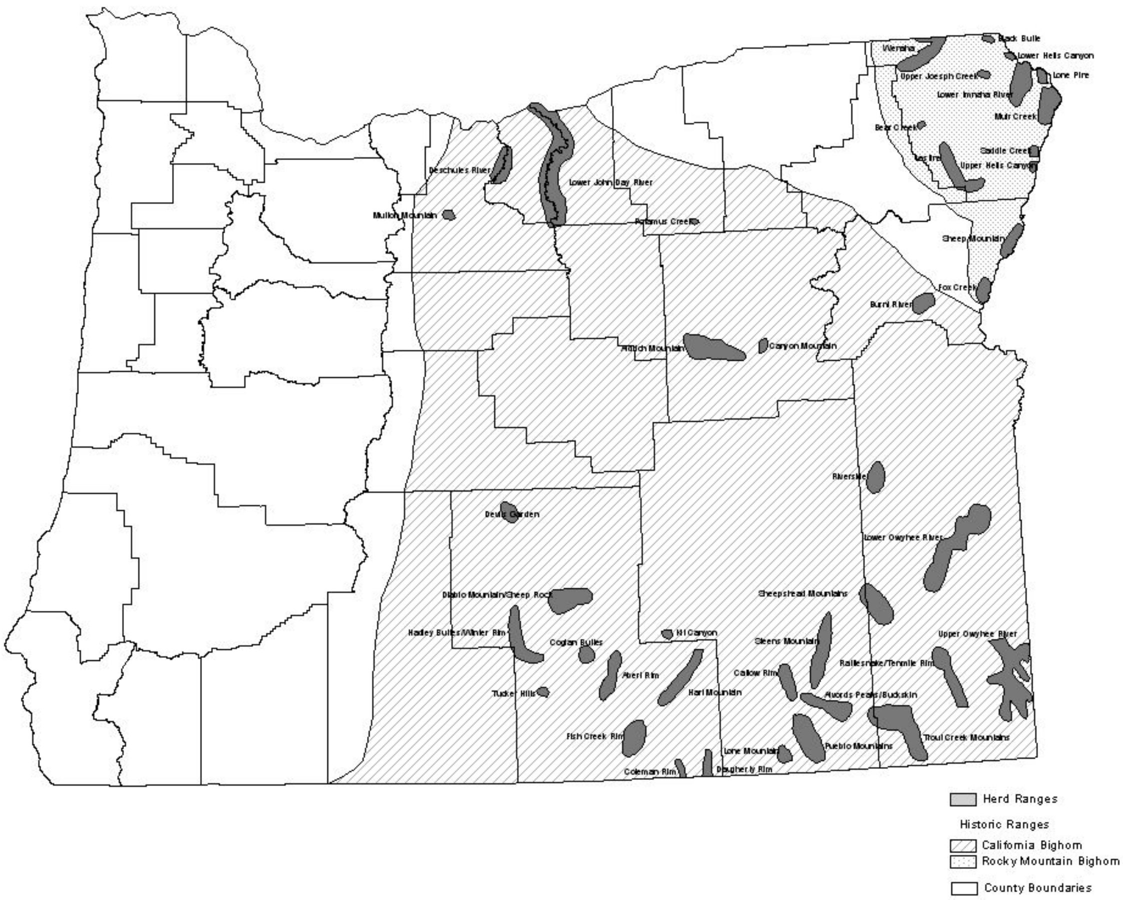

Figure 1. Historic and current distribution of Rocky Mountain and California bighorn sheep in Oregon (adapted from Williams and Schommer 2001).

Reproduction. Bighorns are polygamous. A small number of dominant rams do most of the breeding within a herd or subpopulation. Ewes usually become reproductively active at two years old. However, in Oregon's highest quality habitats, such as the John Day and Deschutes river canyons of north-central Oregon, there is evidence that some yearling ewes may breed (ODFW, unpublished data). They remain reproductively active throughout their life span but are in their prime from ages three through 10.

In Oregon, the rut (breeding season) usually begins in October and ends by early December. Breeding typically occurs in late October through early November.

Gestation is approximately 180 days and a single lamb is usually born. California bighorn lambs are typically born in late April and early May. Shortly before lambing, ewes become solitary and seek a secluded place in rugged terrain. After about one week, the ewe and lamb join other ewes and newborn lambs to re-form the ewe-lamb-subadult groups they will associate with for most of the year (ODFW 2003b).

Diet. Grasses are the major item in bighorn diets throughout most of the year. Forbs and shrubs are also seasonally important depending on type and availability (ODFW 2003b).

Movements. California bighorn sheep herds are non-migratory in Oregon. They are generally year-long residents of contiguous summer and winter range areas on the landscape. The non-migratory nature of Oregon's California bighorns and fragmentation of suitable habitat contributes to limited dispersal of individual animals, and therefore, colonization of unoccupied areas.

Mortality. Ages of bighorn sheep are determined by counting growth rings on the horns. Bighorn sheep are relatively long-lived animals. Those surviving their first year commonly live 10 to 12 years. Ewes tend to live longer than rams even in the absence of ram hunting. In Oregon, the oldest known ram age is 15½ years old while the oldest known ewe age is 19½ years old (ODFW 2003b).

Young-of-the-year animals (lambs) typically experience a higher mortality rate than adult sheep. Mortality factors for young-of-the-year bighorn include predation, disease, malnutrition and accidents.

Once recruited to the adult age classes, bighorn sheep typically have low mortality rates until they reach old age. However, occasional disease outbreaks can cause catastrophic die-offs, resulting in significant all-age mortality.

Predators of bighorn sheep in Oregon include golden eagle, mountain lion, coyote and bobcat. Golden eagle, coyote, and bobcat are typically only effective as predators of very young bighorn lambs (ODFW 2003). Harvest by human hunters is another significant mortality factor of California bighorn sheep in Oregon.

Harvest. Hunting is the greatest intentional human-caused form of mortality for California bighorn sheep. Hunting mortality in the late 19th century was not constrained by conservation considerations and harvest was generally detrimental to populations. Since sheep were re-introduced to Oregon, harvest has been restricted to rams.

The first modern-day California bighorn sheep hunting seasons in Oregon occurred in 1965 when two hunts with three tags each were authorized on Hart Mountain National Antelope Refuge. Since this first hunting season, the number of California bighorn hunts and tags authorized increased to a high of 98 in 1995. However, tag numbers steadily declined to 44 in 2002. Most of the increase during the early 1990s was due to skewed ram ratios as high as 140 rams:100 ewes on Hart Mountain (a result of captures). Tag numbers were increased to bring ram ratios down. Subsequent tag numbers decreased as ratios were aligned. An additional cause for decreased tag numbers is a sheep population decline in parts of southeast Oregon (ODFW 2003b).

Although tag numbers have declined, the number of hunts available has increased as the number of herds has increased. In 1991 there were 16 California bighorn hunts; in 2002 there were 31 hunts. Through 2002, a total of 1315 tag holders have taken 1125 California bighorn rams for an overall hunter success rate of 85 percent (Table 1).

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Table 1. California bighorn sheep ram harvest in Oregon, 1965-2002.

Hunt Area	# Rams Harvested	# Years Hunted
Aldrich-McClellan- Murderers Cr	48	17
Pueblos-Alvord Peak	6	3
East Beatys Butte	56	12
Catlow Rim	7	4
Alvord-Buckskin	51	12
Burnt River	7	7
Deschutes River	12	5
East Trout Creek Mtn.	11	7
Hart Mountain-Poker Jim	379	37
John Day River	23	7
Owyhee	195	29
Riverside	12	9
South Central	34	14
Steens Mountain	227	35
Warner/Abert Rim	57	20
Total	1125	

Habitat Requirements

Characteristics. Typical California bighorn sheep habitat is rugged, open areas with unrestricted views of the surrounding area. This habitat can be canyons characterized by rim rocks with grass and shrub components interspersed in the steep slopes between the rocky outcrops, or steep grass-covered slopes that contain a shrub component as winter habitat. ODFW (2003b) suggests lack of water in parts of the California bighorn range may limit distribution.

Threats. Substantial amounts of historic habitat are not currently suitable for California bighorns because of long-term habitat change. Civilization has occupied and converted some historic ranges to other land use. These land uses, and the intolerance for and incompatibility of natural fires in settled, developed land have contributed to plant community structure and composition changes that are not favorable to bighorn sheep.

Livestock grazing has reduced range quality and increased inter-specific competition for resources such as space, water and forage. Grazing practices over time could have contributed to the introduction and distribution expansion of exotic, noxious plants.

Exotic, noxious plants are a serious threat to bighorn sheep habitat. Medusahead rye, downy brome, yellow starthistle, knapweed, dalmation toadflax, and leafy spurge are either present on or proximate to most California bighorn ranges across the state. The presence of these exotic plants affects the distribution, composition and vigor of native plant communities. Diminished quantity and quality of native plant communities has negative effects on quantify and quality of bighorn sheep forage. In the Aldrich Mountains of the John Day Subbasin, the presence of downy brome and medusa-head rye on historic winter ranges is a limiting the population of the Aldrich Mountain sub-population of California bighorn sheep (Darren Bruning, ODFW, personal communication, April 2004).

Natural fire suppression throughout the last 100 years has contributed to changes in the vegetative structure on some bighorn ranges in Oregon. Western juniper and other conifers have increased in density on some bighorn ranges due to lack of periodic natural fire in these areas. This increase in density of large woody plants has altered the vegetative structure and composition of some wild sheep ranges that in turn has made these ranges less suitable. Water intake by large woody plants can also reduce water availability from springs and seeps.

Enhancement. Management techniques used to enhance California bighorn sheep habitat include: prescription grazing, prescribed fire, herbaceous and woody plant seeding/planting, spring developments, guzzler installations and noxious weed treatment. Salt with added selenium is introduced to some bighorn ranges to address low selenium levels in natural forage (ODFW 2003b).

Population Distribution

<u>Population</u>

Historic. One and a half to 2 million wild mountain sheep were estimated to occur in western North America in the mid-1800s. A portion of these wild sheep were California bighorns (Seton 1953, Buechner 1960). The distribution of California bighorn in Oregon included all suitable habitat south and west of the Umatilla and Blue Mountains to the east slope of the Cascade mountain range (Figure 1).

Wild sheep populations dramatically declined with the settling of western North America. Total numbers were reduced to thousands by 1900. The California bighorn was extirpated from Oregon by 1915 (ODFW 2003b).

Reintroduction of California bighorn sheep began in 1954. Twenty California bighorns from Williams Lake, British Columbia were translocated to Hart Mountain, Lake County, Oregon. These 20 sheep were the source stock for translocations/reintroductions in Oregon from 1960 through 1992 (ODFW 2003b).

Current. Three thousand seven hundred California bighorn in 37 sub-populations are reported to occur in Oregon in 2003 (Table 2). Twenty four of these sub-populations are either stable or increasing (ODFW 2003b).

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Table 2. Current status and 2003 population estimate for California bighorn sheep herds in Oregon.

Herd Range	Sub-herds	# Releases (# animals)	2003 Estimate	Current Status
Abert	Abert Rim	3 (10)	150	Stable
	Rehart Rim		30	Stable
Alvord Peaks	Alvord		140	Stable
	Buckskin Mt.			
Burnt River		2 (24)	80	Stable
Catlow Rim	N. Catlow Rim	2 (35)	160	Stable
	S Catlow-Lone Mtn.	1 (15)	90	Stable
Coleman Rim		1 (15)	50	Stable
Daugherty Rim		1 (20)	60	Stable
Deschutes River	Lower River	3 (65)	200	Increasing
	Mutton Mtn.	1 (20)	20	New
Devils Garden	Devils Garden	3 (29)	40	Declining
	East Lava Field	3 (33)		
Fish Creek Rim		2 (14)	100	Stable
Hart Mountain-Poker Jim		1 (20)	300	Stable
John Day River	Lower River	4 (66)	450	Increasing
	Philippi-Blalock		50	Increasing
	Aldrich Mt.	3 (18)	90	Stable
	McClellan	2 (22)	140	Stable
	Canyon Mtn.	1 (21)	8	Not Viable
	Potamus Creek	1 (21)	25	New
Kit Canyon		1 (18)	17	New
Malheur River	Riverside	2 (17)	100	Increasing
Owyhee River	Upper Owyhee	4 (107)	100	Declining
	Lower Owyhee	7 (124)	200	Declining
	Rattlesnake	1 (19)	100	Stable
Pueblo Mtn.		3 (40)	150	Stable
Steens Mountain	East Steens	4 (46)	275	Stable
Sheepsheads	Mickey Butte	4 (71)	140	Increasing
	Wildcat			
Summer Lake	Coglan Butte	1 (17)	150	Stable
	Diablo-Sheep Rk.	2 (26)	170	Stable
	Hadley	2 (26)	50	Declining
	Tucker Hills		15	Stable
	Winter Ridge	2 (22)	8	Not Viable
Trout Creek Mt	E. Trout Creeks	3 (50)	150	Increasing
	Ten Mile Rim	1 (15)	30	Not Viable
		Total	3,706	

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Captive Breeding Programs, Transplants, Introductions

California bighorn sheep were extirpated from Oregon by 1915. Reintroduction of the species was accomplished by translocation of animals from British Columbia, Canada, and subsequent transplants throughout Oregon.

In November 1954, 20 California bighorn sheep were trapped near Williams Lake, British Columbia (B.C.) and released in a 1000-acre holding pasture on the west face of Hart Mountain. This population thrived and, through 1992, was the source of most California bighorn transplants in Oregon. Several herds started in the 1980s also increased to levels where bighorns could be removed to start new herds or supplement existing herds. Through January 2003, a total of 1314 California bighorn have been trapped in Oregon and transplanted to 50 Oregon and other out-of-state sites (Tables 3 and 4). Although 11 different sub-populations of California bighorn have been used as a source of animals, the majority of Oregon captures have been conducted in three populations: Hart Mountain, Lower John Day River, and Steens Mountain.

In 1990, 1997, 2000 and 2001, California bighorns from British Columbia and Nevada were translocated to Oregon (Table 3). These sheep supplemented the John Day River, Burnt River, Steens Mountain, and Leslie Gulch herds. Supplements to the Steens Mountain and Leslie Gulch herds were specifically to increase genetic variability with the ultimate goal of improving lamb recruitment. The source herd for the Nevada sheep brought into Oregon was originally from Penticton, B.C. and therefore different stock than the Williams Lake/Hart Mountain stock used to establish the Steens Mountain and Leslie Gulch herds (ODFW 2003b).

Table 3. Transplant history of California bighorn sheep into and within Oregon, 1954 to 2003.

Year	Capture site	Release site	County	Total
1954	Williams Lake, BC	Hart Mountain	Lake	20
1960	Hart Mountain	Steens Mountain	Harney	4
1961	Hart Mountain	Steens Mountain	Harney	7
1965	Hart Mountain	Leslie Gulch	Malheur	17
1971	Hart Mountain	Strawberry Mtns	Grant	21
1975	Hart Mountain	Abert Rim	Lake	3
1976	Hart Mountain	Pueblo Mountains	Harney	16
1976	Hart Mountain	Abert Rim	Lake	2
1977	Hart Mountain	Abert Rim	Lake	5
1978	Hart Mountain	Aldrich Mountain	Grant	14[a]
1980	Hart Mountain	Pueblo Mountain	Harney	7
1980	Hart Mountain	Fish Creek Rim	Lake	2
1981	Hart Mountain	Aldrich Mountain	Grant	4
1983	Hart Mountain	Iron Point	Malheur	21
1983	Hart Mountain	Deary Pasture	Malheur	14
1983	Hart Mountain	Pueblo Mountain	Harney	17
1984	Hart Mountain	Hadley Creek	Lake	8
1987	Leslie Gulch	Burnt River	Baker	15
1987	Hart Mountain	Painted Canyon	Malheur	15
1987	Hart Mountain	Riverside	Malheur	8
1987	Hart Mountain	Oregon Canyon	Malheur	27
1987	Hart Mountain	Red Butte	Malheur	16
1988	Steens/Alvord	McClellan Mtn	Grant	15
1988	Steens/Alvord	Fish Creek Rim	Lake	12
1988	Leslie Gulch	Riverside	Malheur	9
1989	Hart Mountain	L John Day River	Gilliam	14
1989	Hart Mountain	Coglan Butte	Lake	17
1989	Hart Mountain	North Catlow Rim	Harney	17

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1990	Hart Mountain	Cottonwood Creek	Malheur	14
1990	Hart Mountain	Sheepshead Mtns	Harney	16
1990	Hart Mountain	Whitehorse Creek	Malheur	19
1990	Williams Lake, B.C.	L John Day River	Gilliam	15
1991	Hart Mountain	Diablo Rim	Lake	15
1991	Hart Mountain	Sheep Rock	Lake	11
1991	Hart Mountain	Sheepshead Mtns	Harney	17
1991	Steens/Alvord	Coleman Rim	Lake	15
1992	Aldrich Mountain	Winter Ridge	Lake	16
1992	Hart Mountain	Lone Mountain	Harney	15
1992	Hart Mountain	McClellan Mtn	Grant	7
1992	Hart Mountain	Rattlesnake Creek	Malheur	19
1993	Steens Mountain	Ten Mile Rim	Malheur	15
1993	Steens Mountain	Sharon Creek	Malheur	36
1993	Hart Mountain	Squaw Creek	Harney	17
1993	Hart Mountain	Three Mile Creek	Harney	18
1993	Up Owyhee - Idaho	East L Deschutes	Sherman	35
1993	Hart Mountain	Winter Ridge	Lake	6
1994	Leslie Gulch	Middle Owyhee	Malheur	21
1994	Hart Mountain	Daugherty Rim	Lake	20
1994	Steens Mountains	North Table	Malheur	20
1995	Hart Mountain	Mill Creek	Lake	18
1995	Hart Mountain	N Fork Owyhee	Malheur	17
1995	Steens Mountains	West L Deschutes	Wasco	18
1995	Iron Point	Jacknife Creek	Sherman	21
1995	McIntyre Ridge	Devils Garden	Lake	16
Year	Capture site	Release site	County	Total
1996	Hart Mountain	Sheepshead Mtns	Harney	17
1996	L John Day River	Stonehouse Cnyn	Harney	18
1997	McGee - Nevada	Burnt River	Baker	9
1999	L John Day River	West L Deschutes	Wasco	12
1999	L John Day River	East Garden	Lake	8
1999	East L Deschutes	East Garden	Lake	12
1999	East L Deschutes	Little Ferry Cnyn	Sherman	15
2000	Santa Rosa Mts. NV	Steens Mountains	Harney	16
2001	Santa Rosa Mts. NV	Leslie Gulch	Malheur	15
2001	Abert Rim	East Lava Field	Lake	5
2001	McClellan Mtn	Devils Garden	Lake	2
2002	McClellan Mtn	Mutton Mountains	Wasco	20
2002	East L Deschutes	Sheepshead Mtns	Harney	21
2002	L John Day River	Birch Creek	Malheur	20
2002	L John Day River	East Lava Field	Lake	8
2002	L John Day River	Devils Garden	Lake	13
2003	Abert Rim	Potamus Creek	Morrow	21
2003	L John Day River	Kit Canyon	Lake	16
Total				1052

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Table 4. California bighorn sheep captured in Oregon and released in other states, 1968–2003.

Year	• Capture site	• Release site	State	#
1968	Hart Mtn	Sheldon NWR	NV	8
1984	Hart Mtn	Jackson Mtns	NV	13
1987	Leslie Gulch	Jackson Mtns	NV	17
1987	Hart Mtn	Sheldon NWR.	NV	15
1987	Hart Mtn	Santa Rosa Mtns	NV	5
1990	Aldrich Mtn	Various Herds	WA	13
1991	Steens/Alvord	Montana Mtns	NV	15
1991	Hart Mtn	Sheldon NWR	NV	14
1994	Hart Mtn	Trout Creek Mtns	NV	20
1996	Hart Mtn	South Badger	NV	18
2000	L John Day R	Jim Sage Mtn	ID	20
2000	Aldrich Mtn	Jim Sage Mtn	ID	10
2001	L John Day R	Teiton	WA	14
2001	Hart Mtn	Jim Sage Mtn	ID	15
2003	Coglan Buttes	Double-H Mtns	NV	20
2003	L John Day R	Various Herds	WA	20
2003	L John Day R	Little MO Badlands	ND	6
2003	L Deschutes R	Little MO Badlands	ND	19
Total				262

There are 65 proposed transplant sites for California bighorn sheep in Oregon (Table 5). Seven of these sites are located within the John Day Subbasin.

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Table 5. Proposed transplant sites for California bighorn sheep in Oregon.

Herd Range	Habitat Quality	Site Name (Class)[a]	District	Limitations
Abert	High	Abert Rim (S2)	Lake	Juniper/Cougar
	Medium	Rehart Rim (S2)	Lake	
Alvord	High	Alvord Peaks(S2)	Harney	
Burnt River	High	Burnt River (S2)	Baker	Cougar
Catlow Rim	High	N. Catlow Rim (S2)	Harney	
Coleman Rim	High	Coleman Rim (S2)	Lake	
Daugherty R.	High	Daugherty Rim (S2)	Lake	
Deschutes Riv.	High	Mutton Mt. (S1)	Warm Spg Res.	
	High	Lower Deschutes (S2)	Columbia	
	High	Buck Hollow (N)	Columbia	Access
	High	Upper Deschutes (N)	Deschutes	Exotics
	High	Criterion (N)	Columbia	Domestics Pvt.
Devils Garden	Low	Devils Garden (S2)	Deschutes	Juniper/Cougar/ WSA
Glass Butte	Low	Glass Butte (S2)	Lake	
Fish Creek R.	High	Fish Creek Rim (S2)	Lake	Juniper/Cougar
Hart Mt.	High	Hart Mt. (S2)	Lake	
John Day Riv.	High	Lower River (S1)	Col./ Hepp.	
	High	Pine Hollow (S1)	Columbia	
	Medium	North Fork (S1)	Heppner	
	Medium	Canyon Mt. (S1)	Grant	Conifer
	High	Aldrich (S2)	Grant	
	High	McClellan (S2)	Grant	
	High	Upper River (N)	Grant/Hepp.	Domestics/Access
	High	Black Canyon (S1)	Ochoco	Domestics Publ.
	Medium	Sutton Mt. (N)	Heppner	Domestic Pvt.
Juniper	Low	Buzzard Ck. (N)	Harney	
	Low	Kit Canyon (S1)	Lake	
Malheur Riv.	High	Riverside (S2)	Harney	
	High	Cottonwood Cr. (N)	Malheur	Domestics Publ.
	High	Black Canyon (N)	Malheur	Domestics Publ.
	High	Calf Creek (N)	Malheur	Domestics Publ
	High	Hog Creek (N)	Malheur	Domestics Publ
Owyhee River	High	Soldier Creek (S1)	Malheur	
	High	Iron Point (S1)	Malheur	Cougar
	High	W. Little Owyhee (N)	Malheur	Cougar
	High	Painted Canyon (S1)	Malheur	Cougar
	High	Deary Pasture (S1)	Malheur	Cougar
	Medium	Dry Cr. Buttes (S1)	Malheur	Guzzler
	Medium	Red Butte (S1)	Malheur	Cougar/Guzzler
	High	Leslie Gulch (S2)	Malheur	
	Medium	North Table Mt. (S2)	Malheur	
	High	Succor Creek (N)	Malheur	Domestics Publ.
	High	West L Owyhee Res. (N)	Malheur	Domestics
	High	East L Owyhee Res. (N)	Malheur	Domestics Pvt.
	High	Lower Owyhee R. (N)	Malheur	Domestics Pvt.
Pueblo Mt.	High	Pueblo Mt. (S2)	Harney	
Steens Mt.	Medium	Frenchglen Rim (N)	Harney	
	High	East Steens (S2)	Harney	
	High	Kiger Canyon (N)	Harney	Access
	High	Little Blitzen (N)	Harney	Domestics Pvt.
	High	Big Indian (N)	Harney	Domestics Pvt.
	High	Lower Blitzen (N)	Harney	Domestics Pvt.
Sheepsheads	High	Table Mt. (S1)	Harney	Guzzler

	High	Folly Farm (S1)	Harney	Guzzler
	High	Sheepshead Mt. (S2)	Harney	
Summer Lake	Medium	Coffee Pot Rim (S1)	Lake	
	Medium	Diablo (S2)	Lake	
	Medium	Coglan Butte (S2)	Lake	
	Medium	Sheep Rock (S2)	Lake	
	Medium	Hadley (S2)	Lake	Juniper/Cougar
	Low	Winter Ridge (S1)	Lake	Cougar/Water
Trout Creeks	High	Indian/Cottonwood (S1)	Malheur	Cougar
	High	Oregon Canyon (S1)	Malheur	Cougar
	High	Whitehorse Ck (S1)	Malheur	Cougar
	Medium	Red Mountain (N)	Harney	Domestic Publ.
[a] N = New Site; S1 = Supplement for range expansion; S2 = Supplement for management of genetic variability.				

Status and Abundance Trends:

Status

California bighorn sheep are classified as game mammals in the State of Oregon and are under the administrative management of the Oregon Department of Fish and Wildlife.

Trend

The California bighorn sheep population in Oregon has increased since reintroduction of the species in 1954. One thousand nine hundred and fifty California bighorn in 18 sub-populations were estimated to occur in Oregon in 1992 (ODFW 1992). The 2003 population estimate is 3700 animals in 37 sub-populations. Twenty four of these sub-populations are either stable or increasing. Four of the six sub-California bighorn sub-populations in the John Day Subbasin are either stable or increasing (Table 2)

Factors Affecting Population Status

Key Factors Inhibiting Populations and Ecological Processes

Historical. Minimal detailed biological information about California bighorn was recorded or shared during the specie's decline in the late 1800s. As a result, the relationship between diseases carried by domestic sheep and declines in bighorn sheep populations was not realized or understood. However, it is generally accepted that the expansion of civilization to the western portion of North America and the domestic livestock that accompanied that settlement was a major factor in the decline and localized extirpation of California bighorn sheep. Unregulated harvest also contributed to the decline and extirpation of this species in many parts of its historic range.

Current. Three key factors inhibit and/or threaten the welfare, vigor, and viability of established California bighorn populations and the re-introduction of sheep into unoccupied habitat in the John Day subbasin of Oregon. They are: 1) the continuing threat of disease transmission from domestic and exotic sheep and goats; 2) the presence of noxious plants on and proximate to bighorn sheep range; and 3) the suppression of natural fires and lack of prescribed fires on bighorn sheep range to rejuvenate/manipulate plant communities and reduce the density of large woody plants.

Disease. Disease transmission from domestic sheep and goats is a considerable threat to wild bighorn sheep populations in Oregon. Pasteurellosis, a bacterial disease, was responsible for significant mortality in the Aldrich Mountain sub-population of California bighorn sheep in 1991. Contact with domestic sheep was the most likely cause of the disease expression (ODFW 2003b). Oregon's Bighorn Sheep and Rocky Mountain Goat Management Plan (December 2003) provides an explanation of the threat of disease in bighorn sheep. As bracketed, it is as follows:

[Bighorn sheep are a big game species where disease is a management priority. Bighorns are susceptible to several diseases and parasites which have caused both acute and chronic herd reductions. Although most other big game species are susceptible to various diseases and parasites, they generally are not impacted to the level observed in bighorns.

When bighorn sheep come in contact with domestic sheep, bighorns usually die of pneumonia within 3-7 days of contact (Foryet *et al*. 1994, Martin *et al*. 1996, Schommer and Woolever 2001). Because exposed bighorns do not die immediately infected individuals may return to their herd and infect other individuals, which can cause 70–100% of the herd to die. For this reason the Oregon Department of Fish and Wildlife will not release bighorns in locations where with a known potential to contact domestic sheep.]

The amount of separation necessary to protect bighorn sheep from interaction with domestic sheep and/or goats is variable based on each location's specific circumstances. After a pasteurellosis outbeak in 1991 in the Aldrich Mountain California bighorn herd, trailing practices of a domestic sheep band were modified to provide five miles of separation in the spring and 20 miles of separation in the fall. No other die-offs in the Aldrich Mountains have occurred since this change (ODFW, 2003b). In Hells Canyon a 25-mile separation between Rocky Mountain bighorn sheep and domestic sheep has proven ineffective at insulating bighorns from pasteurella transmission (Schommer and Woolever 2001).

Land in Protected Status. A large percentage of California bighorn sheep habitat in the John Day Subbasin is publicly owned and is in some level of protected status. Bighorn sheep in the Lower John Day River canyon exist primarily on public land that is surrounded by a significant area of privately owned land. Access across this private land to the public land where sheep occur is limited. Therefore, it is difficult for hunters and others who have values for bighorn sheep to personally experience these sheep.

Noxious Weeds. Exotic, noxious plants are detrimental to California bighorn sheep habitat in the John Day Subbasin. Medusahead rye, downy brome, yellow starthistle, knapweed, dalmation toadflax and leafy spurge are either present on or proximate to most California bighorn ranges in the subbasin, primarily at the lower elevations. Land management agencies have directed specific treatment projects at yellow starthistle, knapweed, dalmation toadflax, and leafy spurge. Monitoring and treatment of these plants is ongoing. Total eradication is rarely achieved. Downy brome and medusahead rye are widely distributed throughout the subbasin. Efforts to control these grasses are currently minimal. Most direct efforts to treat or reduce medusahead rye in the Upper John Day watershed is occurring on privately owned land. The primary goal of the private land efforts is to improve livestock forage, but overlapping and proximate bighorn habitat could benefit as well (Darren Bruning, Oregon Department of Fish and Wildlife, personal communication, 2004). Downy brome is a naturalized exotic grass, and minimal effort is directed toward reducing the density and distribution of the species in the John Day Subbasin. However, the presence of downy brome in the lower elevations of the Aldrich Mountain California bighorn range contributes to limiting this sub-population of wild sheep (Darren Bruning, Oregon Department of Fish and Wildlife, personal communication, 2004).

Appendix D

Columbia Spotted Frog (*Rana luteiventris*)

The Columbia spotted frog (CSF) is olive green to brown in color, with irregular black spots. They may have white, yellow, or salmon coloration on the underside of the belly and legs (Engle 2004). The hind legs are relatively short relative to body length and there is extensive webbing between the toes on the hind feet. The eyes are upturned (Amphibia Web 2004). Tadpoles are black when small, changing to a dark then light brown as they increase in size. CSFs are about one inch in body length at metamorphosis (Engle 2004). Females may grow to approximately 100 mm (4 inches) snout-to-vent length, while males may reach approximately 75 mm (3 inches) snout-vent length (Nussbaum *et al*. 1983; Stebbins 1985; Leonard *et al*. 1993).

Life History, Key Environmental Correlates, and Habitat Requirements

<u>Life History</u>

Diet. The CSF eats a variety of food including arthropods (e.g., spiders, insects), earthworms and other invertebrate prey (Whitaker *et al*. 1982). Adult CSFs are opportunistic feeders and feed primarily on invertebrates (Nussbaum *et al*. 1983). Larval frogs feed on aquatic algae and vascular plants, and scavenged plant and animal materials (Morris and Tanner 1969).

Breeding. Reproducing populations have been found in habitats characterized by springs, floating vegetation, and larger bodies of pooled water (e.g., oxbows, lakes, stock ponds, beaver-created ponds, seeps in wet meadows, backwaters) (IDFG *et al*. 1995; Reaser 1997). Breeding habitat is the temporarily flooded margins of wetlands, ponds, and lakes (Hallock and McAllister 2002). Breeding habitats include a variety of relatively exposed, shallow-water (<60 cm), emergent wetlands such as sedge fens, riverine over-bank pools, beaver ponds, and the wetland fringes of ponds and small lakes. Vegetation in the breeding pools generally is dominated by herbaceous species such as grasses, sedges (Cares spp.) and rushes (Juncus spp.) (Amphibia Web 2004).

Reproduction. The timing of breeding varies widely across the species range owing to differences in weather and climate, but the first visible activity begins in late winter or spring shortly after areas of ice-free water appear at breeding sites (Licht 1975; Turner 1958; Leonard *et al.* 1996). Breeding typically occurs in late March or April, but at higher elevations, breeding may not occur until late May or early June (Amphibia Web 2004). Great Basin population CSFs emerge from wintering sites soon after breeding sites thaw (Engle 2001).

Adults exhibit a strong fidelity to breeding sites, with oviposition typically occurring in the same areas in successive years. Males arrive first, congregating around breeding sites, periodically vocalizing “advertisement calls” in a rapid series of three to 12 “tapping” notes that have little carrying power (Davidson 1995; Leonard *et al*. 1996). As a female enters the breeding area, she is approached by and subsequently pairs with a male in a nuptial embrace referred to as amplexus. From several hours to possibly days later, the female releases her complement of eggs into the water while the male, still clinging to the female, releases sperm upon the ova (Amphibia Web 2004). Breeding is explosive (as opposed to season-long), occurring only in the first few weeks following emergence (USFWS 2002a). After breeding is completed, adults often disperse into adjacent wetland, riverine and lacustrine habitats (Amphibia Web 2004).

CSF's have a strong tendency to lay their eggs communally and it is not uncommon to find 25 or more egg masses piled atop one another in the shallows (Amphibia Web 2004). Softball-sized egg masses are usually found in groups, typically along northeast edges of slack water amongst emergent vegetation (USFWS 2002a). After a few weeks thousands of small tadpoles emerge and cling to the remains of the gelatinous egg masses. Newly-hatched larvae remain clustered for several days before moving throughout their natal site (USFWS 2002a). In the Columbia Basin tadpoles may grow to 100 mm (4 in) total length prior to metamorphosing into froglets in their first summer or fall. At high-elevation montane sites, however, tadpoles barely reach 45 mm (1.77 in) in total length prior to the onset of metamorphosis in late fall (Amphibia Web 2004). As young-of-the-year transform, many leave their natal sites and can be found in nearby riparian corridors (USFWS 2002a).

Females may lay only one egg mass per year; yearly fluctuations in the sizes of egg masses are extreme (Utah Division of Wildlife Resources 1998). Successful egg production and the viability and metamorphosis of CSF's are susceptible to habitat variables such as temperature, depth, and pH of water, cover, and the presence/absence of predators (e.g., fishes and bullfrogs) (Morris and Tanner 1969; Munger *et al*. 1996; Reaser 1996).

Migration. David Pilliod observed movements of approximately 2,000 m (6,562 ft) linear distance within a basin in montane habitats (Reaser and Pilliod, in press). Pilliod *et al*. 1996 (in Koch *et al*. 1997) reported that individual high mountain lake populations of *R. luteiventris* in Idaho are actually interdependent and are part of a larger contiguous metapopulation that includes all the lakes in the basin. In Nevada, Reaser (1996; in Koch *et al*. 1997) determined that one individual of R. luteiventris traveled over 5 km (3.11 mi) in a year. (NatureServe 2003)

In a three-year study of R. luteiventris movement within the Owyhee Mountain subpopulation of the Great Basin population in southwestern Idaho, Engle (2000) PIT-tagged over 1800 individuals but documented only five (of 468) recaptures over 1,000 m (3,281 ft) from their original capture point. All recaptures were along riparian corridors and the longest distance between capture points was 1,765 m (5,791). Although gender differences were observed, 88 percent of all movement documented was less than 300 m (984 ft) from the original capture point. (NatureServe 2003)

Though movements exceeding 1 km (0.62 mi) and up 5 km (3.11 mi) have been recorded, these frogs generally stay in wetlands and along streams within 0.6 km (0.37 mi) of their breeding pond (Turner 1960, Hollenbeck 1974, Bull and Hayes 2001). Frogs in isolated ponds may not leave those sites (Bull and Hayes 2001). (NatureServe 2003)

In the Toiyabe Range in Nevada, Reaser (2000) captured 887 individuals over three years, with average mid-season density ranging from two to 24 frogs per 150 m (492 ft) of habitat. (NatureServe 2003)

Mortality. Based on recapture rates in the Owyhee Mountains, some individuals live for at least five years. Skeletochronological analysis in 1998 revealed a nine year old female (Engle and Munger 2000).

Mortality of eggs, tadpoles, and newly metamorphosed frogs is high, with approximately 5% surviving the first winter (David Pilliod, personal communication, cited in Amphibia Web 2004).

Habitat Requirements

This species is relatively aquatic and is rarely found far from water. It occupies a variety of still water habitats and can also be found in streams and creeks (Hallock and McAllister 2002). CSF's are found closely associated with clear, slow-moving or ponded surface waters, with little shade (Reaser 1997). CSF's are found in aquatic sites with a variety of vegetation types, from grasslands to forests (Csuti 1997). A deep silt or muck substrate may be required for hibernation and torpor (Morris and Tanner 1969). In colder portions of their range, CSF's will use areas where water does not freeze, such as spring heads and undercut streambanks with overhanging vegetation (IDFG *et al*. 1995). CSF's may disperse into forest, grassland, and brushland during wet weather (NatureServe 2003). They will use stream-side small mammal burrows as shelter. Overwintering sites in the Great Basin include undercut banks and spring heads (Blomquist and Tull 2002).

Population and Distribution

Distribution

Populations of the CSF are found from Alaska and British Columbia to Washington east of the Cascades, eastern Oregon, Idaho, the Bighorn Mountains of Wyoming, the Mary's, Reese, and Owyhee River systems of Nevada, the Wasatch Mountains, and the western desert of Utah (Green *et al*. 1997). Genetic evidence (Green *et al*. 1996) indicates that Columbia spotted frogs may be a single species with three subspecies, or may be several weakly-differentiated species.

The FWS recognizes four distinct population segments (DPS) based on disjunct distribution: the Wasatch Front DPS (Utah), West Desert DPS (White Pine County, NV and Toole County Utah), Great Basin DPS (southeast Oregon, southwest Idaho, and northcentral/northeast Nevada), and the Northern DPS (includes northeastern Oregon, eastern Washington, central and northern parts of Idaho, western Montana, northwestern Wyoming, British Columbia and Alaska) (C. Mellison, J. Engle, pers. comm., 2004).

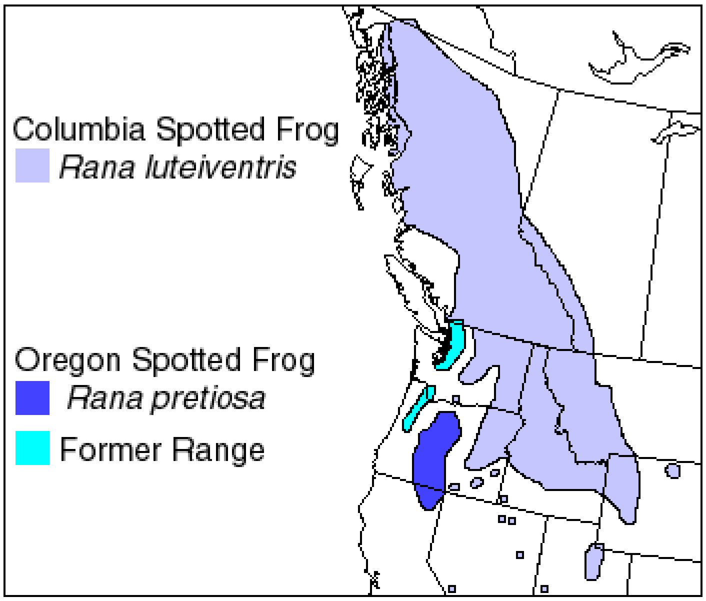
There is still some uncertainty about whether the northeast Oregon frogs and the southeastern Washington frogs are part of the Great Basin or Northern population. This group of frogs (Blue and Wallowa Mountains) is isolated from the Great Basin population based on geography, and the habitat in the Anthony Lakes area is more like that of the Northern population (montane) than the Great Basin (high desert). It has been considered to make the Snake River a boundary between the Northern and Great Basin populations, but further genetics work will need to be done to clarify the issue (J. Engle, pers. comm., 2004).

Two populations of CSFs are found within the Columbia River Basin: Northern DPS and Great Basin DPS. The Great Basin DPS is further divided into five subpopulations: southeastern Oregon, Owyhee, Jarbidge-Independence, Ruby Mountains, and Toiyabe (J. Engle, C. Mellison, pers. comm., 2004). Of the five subpopulations, only the eastern Oregon, Owyhee, and the Jarbidge-Independence occur in the Columbia River subbasin.

Historic. Historic range of the Northern population is most likely similar to that of the current range. Moving south into the southern populations (Great Basin, Wasatch Front, and West Desert) the range was most likely larger in size. Due to habitat loss and alteration, fragmentation, water diversion, dams, and loss of beaver the current distribution and abundance of CSF and suitable habitat has dramatically decreased.

Current.

Current distribution for the Columbia spotted frog is shown in the figure below.



Distibution of the Columbia spotted frog. (USGS, Northern Prairie Wildlife Research Center; range acquired from Green *et al*. 1997).

Wasatch Front DPS

Spotted frog populations in Utah represent the southern extent of the species range (Stebbins 1985). The Wasatch Front population occurs in isolated springs or riparian wetlands in Juab, Sanpete, Summit, Utah, and Wasatch counties in Utah. These counties are located within the Bonneville Basin of Utah. The Bonneville Basin encompasses the area that was covered by ancient Lake Bonneville and which, today, lies within the Great Basin province. The largest known concentration is currently in the Heber Valley; the remaining six locations are Jordanelle/Francis, Springville Hatchery, Holladay Springs, Mona Springs Complex/Burraston Ponds, Fairview, and Vernon. (USFWS 2002b)

West Desert DPS

The West Desert spotted frog population occurs mainly in four large spring complexes. One new population, Vernon, was recently discovered in the eastern-most portion of the West Desert geographic management unit (GMU). CSFs in the West Desert DPS can be found along the eastern border of White Pine County, NV and Toole County, Utah. Populations have been extirpated from the northern portions of the West Desert range. (USFWS 2002b)

Appendix D

Northern DPS
The Northern DPS includes northeastern Oregon, eastern Washington, central and northern parts of Idaho, western Montana, northwestern Wyoming, British Columbia and Alaska (J. Engle, C. Mellison, pers. comm., 2004). Populations within the Blue and Wallowa Mountains are found within this DPS.

Great Basin DPS
Nevada. The Great Basin population of Columbia spotted frogs in Nevada is geographically separated into three distinct subpopulations; the Jarbidge-Independence Range, Ruby Mountains, and Toiyabe Mountains subpopulations (USFWS 2002c).

The largest of Nevada's three subpopulation areas is the Jarbidge-Independence Range in Elko and Eureka counties. This subpopulation area is formed by the headwaters of streams in two major hydrographic basins. The South Fork Owyhee, Owyhee, Bruneau, and Salmon Falls drainages flow north into the Snake River basin. Mary's River, North Fork of the Humboldt, and Maggie Creek drain into the interior Humboldt River basin. The Jarbidge-Independence Range subpopulation is considered to be genetically and geographically most closely associated with Columbia spotted frogs in southern Idaho (Reaser 1997). (USFWS 2002c)

Columbia spotted frogs occur in the Ruby Mountains in the areas of Green Mountain, Smith, and Rattlesnake creeks on lands in Elko County managed by the U.S. Forest Service (Forest Service). Although geographically, Ruby Mountains spotted frogs are close to the Jarbidge-Independence Range subpopulation, preliminary allozyme evidence suggests they are genotypically different (J. Reaser, pers. comm., 1998). The Ruby Mountains subpopulation is considered discrete because of this difference (J. Reaser, pers. comm., 1998) and because it is geographically isolated from the Jarbidge-Independence Range subpopulation area to the north by an undetermined barrier (e.g., lack of suitable habitat, connectivity, and/or predators), and from the Toiyabe Mountains subpopulation area to the southwest by a large gap in suitable Humboldt River drainage habitat. (USFWS 2002c)

In the Toiyabe Range, spotted frogs are found in seven drainages in Nye County, Nevada; the Reese River (Upper and Lower), Cow and Ledbetter Canyons, and Cloverdale, Stewart, Illinois, and Indian Valley Creeks. Although historically they also occurred in Lander County, preliminary surveys have found them absent from this area (J. Tull, Forest Service, pers. comm., 1998). Toiyabe Range spotted frogs are geographically isolated from the Ruby Mountains and Jarbidge-Independence Range subpopulations by a large gap in suitable habitat and they represent R. luteiventris in the southern-most extremity of its range. Genetic analyses of Great Basin Columbia spotted frogs from the Toiyabe Range suggest that these frogs are distinctive in comparison to frogs from the Ruby Mountains and Jarbidge-Independence Range subpopulation areas (Green *et al*. 1996, 1997; J. Reaser, pers. comm., 1998). Genetic (mtDNA) differences between the Toiyabe Range frogs and the Ruby Mountains frogs are less than those between the Toiyabe Range frogs and the Jarbidge-Independence Range frogs, but this may be because of similar temporal and spatial isolation (J. Reaser, pers. comm., 1998). (USFWS 2002c)

Idaho and Oregon
Surveys conducted in the Raft River and Goose Creek drainages in Idaho failed to relocate spotted frogs (Reaser 1997; Shipman and Anderson 1997; Turner 1962). In 1994 and 1995, the Bureau of Land Management (BLM) conducted surveys in the Jarbidge and Snake River

Resource Areas in Twin Falls County, Idaho. These efforts were also unsuccessful in locating spotted frogs (McDonald 1996). Only six historical sites were known in the Owyhee Mountain range in Idaho, and only 11 sites were known in southeastern Oregon in Malheur County prior to 1995 (Munger *et al*. 1996). (USFWS 2002c)

Currently, Columbia spotted frogs appear to be widely distributed throughout southwestern Idaho (mainly in Owyhee County) and eastern Oregon, but local populations within this general area appear to be isolated from each other by either natural or human induced habitat disruptions. The largest local population of spotted frogs in Idaho occurs in Owyhee County in the Rock Creek drainage. The largest local population of spotted frogs in Oregon occurs in Malheur County in the Dry Creek Drainage (USFWS 2002c).

Population, Status, and Abundance Trends

Nevada. Declines of Columbia spotted frog populations in Nevada have been recorded since 1962 when it was observed that in many Elko County localities where spotted frogs were once numerous, the species was nearly extirpated (Turner 1962). Extensive loss of habitat was found to have occurred from conversion of wetland habitats to irrigated pasture and spring and stream dewatering by mining and irrigation practices. In addition, there was evidence of extensive impacts on riparian habitats due to intensive livestock grazing. Recent work by researchers in Nevada have documented the loss of historically known sites, reduced numbers of individuals within local populations, and declines in the reproduction of those individuals (Hovingh 1990; Reaser 1996a, 1996b, 1997). Surveys in Nevada between 1994 and 1996 indicated that 54 percent of surveyed sites known to have frogs before 1993 no longer supported individuals (Reaser 1997). (USFWS 2002c)

Little historical or recent data are available for the largest subpopulation area in Nevada, the Jarbidge-Independence Range. Presence/absence surveys have been conducted by Stanford University researchers and the Forest Service, but dependable information on numbers of breeding adults and trends is unavailable. Between 1993 and 1998, 976 sites were surveyed for the presence of spotted frogs in northeastern Nevada, including the Ruby Mountains subpopulation area (Shipman and Anderson 1997; Reaser 2000). Of these, 746 sites (76 percent) that were believed to have characteristics suitable for frogs were unoccupied. For these particular sites there is no information on historical presence of spotted frogs. Of 212 sites that were known to support frogs before 1992, 107 (50 percent) sites no longer had frogs, while 105 sites did support frogs. At the occupied sites, surveyors observed more than 10 adults at only 13 sites (12 percent). Frogs in this area appear widely distributed (Reaser 1997). No monitoring or surveying has taken place in northeastern Nevada since 1998. The Forest Service is planning on surveying the area during the summer of 2002. (USFWS 2002c)

Between 1993 and 1998, 339 sites were surveyed for the presence of Columbia spotted frogs in the Toiyabe Range. Surveyors visited 118 sites (35 percent) with suitable habitat characteristics where no frogs were present. Ten historical frog sites no longer had frogs when surveyed by Reaser between 1993 and 1996 (Reaser 1997). However, at 211 other historical sites, frogs were still present during this survey period. Of these 211 sites, surveyors reported greater than 10 adult frogs at 133 sites (63 percent) (Reaser 1997). In 2000, frog mark-recapture surveys of the Toiyabe Range subpopulation was conducted by the University of Nevada, Reno. Preliminary estimates of frog numbers in the Indian Valley Creek drainage were around 5,000 breeding individuals, which is greater than previously believed (K. Hatch, pers. comm., 2001). However, during the 2000-2001 winter, Hatch (2002) noted a large population decrease, ranging between 66 and 86.5 percent at several sites. Research is currently being conducted to help understand this apparent winterkill. Lack of standardized or extensive monitoring and routine surveying has prevented dependable determinations of frog population numbers or trends in Nevada. (USFWS 2002c)

Idaho and Oregon. Extensive surveys since 1996 throughout southern Idaho and eastern Oregon, have led to increases in the number of known spotted frog sites. Although efforts to survey for spotted frogs have increased the available information regarding known species locations, most of these data suggest the sites support small numbers of frogs. Of the 49 known local populations in southern Idaho, 61 percent had 10 or fewer adult frogs and 37 percent had 100 or fewer adult frogs (Engle 2000; Idaho Conservation Data Center (IDCDC) 2000). The largest known local population of spotted frogs occurs in the Rock Creek drainage of Owyhee County and supports under 250 adult frogs (Engle 2000). Extensive monitoring at 10 of the 46 occupied sites since 1997 indicates a general decline in the number of adult spotted frogs encountered (Engle 2000; Engle and Munger 2000; Engle 2002). All known local populations in southern Idaho appear to be functionally isolated (Engle 2000; Engle and Munger 2000). (USFWS 2002c)

Of the16 sites that are known to support Columbia spotted frogs in eastern Oregon, 81 percent of these sites appear to support fewer than 10 adult spotted frogs. In southeastern Oregon, surveys conducted in 1997 found a single population of spotted frogs in the Dry Creek drainage of Malheur County. Population estimates for this site are under 300 adult frogs (Munger *et al*. 1996). Monitoring (since 1998) of spotted frogs in northeastern Oregon in Wallowa County indicates relatively stable, small local populations (less than five adults encountered) (Pearl 2000). All of the known local populations of spotted frogs in eastern Oregon appear to be functionally isolated. (USFWS 2002c)

<u>Legal Status</u>

In 1989, the U.S. Fish and Wildlife Service (USFWS) was petitioned to list the spotted frog (referred to as *Rana pretiosa*) under ESA (Federal Register 54[1989]:42529). The USFWS ruled on April 23, 1993, that the listing of the spotted frog was warranted and designated it a candidate for listing with a priority 3 for the Great Basin population, but was precluded from listing due to higher priority species (Federal Register 58[87]:27260). The major impetus behind the petition was the reduction in distribution apparently associated with impacts from water developments and the introduction of nonnative species.

On September 19, 1997 (Federal Register 62[182]:49401), the USFWS downgraded the priority status for the Great Basin population of Columbia spotted frogs to a priority nine, thus relieving the pressure to list the population while efforts to develop and implement specific conservation measures were ongoing. As of January 8, 2001 (Federal Register 66[5]:1295- 1300), however, the priority ranking has been raised back to a priority 3 due to increased threats to the species. This includes the Great Basin DPS Columbia spotted frog populations

Appendix D

Factors Affecting Population Status

Key Factors Inhibiting Populations and Ecological Processes

The present or threatened destruction, modification, or curtailment of its habitat or range. Spotted frog habitat degradation and fragmentation is probably a combined result of past and current influences of heavy livestock grazing, spring development, agricultural development, urbanization, and mining activities. These activities eliminate vegetation necessary to protect frogs from predators and UV-B radiation; reduce soil moisture; create undesirable changes in water temperature, chemistry and water availability; and can cause restructuring of habitat zones through trampling, rechanneling, or degradation which in turn can negatively affect the available invertebrate food source (IDFG *et al*. 1995; Munger *et al*. 1997; Reaser 1997; Engle and Munger 2000; Engle 2002). Spotted frog habitat occurs in the same areas where these activities are likely to take place or where these activities occurred in the past and resulting habitat degradation has not improved over time. Natural fluctuations in environmental conditions tend to magnify the detrimental effects of these activities, just as the activities may also magnify the detrimental effects of natural environmental events. (USFWS 2002c)

Springs provide a stable, permanent source of water for frog breeding, feeding, and winter refugia (IDFG *et al*. 1995). Springs provide deep, protected areas which serve as hibernacula for spotted frogs in cold climates. Springs also provide protection from predation through underground openings (IDFG *et al*. 1995; Patla and Peterson 1996). Most spring developments result in the installation of a pipe or box to fully capture the water source and direct water to another location such as a livestock watering trough. Loss of this permanent source of water in desert ecosystems can also lead to the loss of associated riparian habitats and wetlands used by spotted frogs. Developed spring pools could be functioning as attractive nuisances for frogs, concentrating them into isolated groups, increasing the risk of disease and predation (Engle 2001). Many of the springs in southern Idaho, eastern Oregon, and Nevada have been developed. (USFWS 2002c)

The reduction of beaver populations has been noted as an important feature in the reduction of suitable habitat for spotted frogs. Beaver are important in the creation of small pools with slow-moving water that function as habitat for frog reproduction and create wet meadows that provide foraging habitat and protective vegetation cover, especially in the dry interior western United States (St. John 1994). Beaver trapping is still common in Idaho and harvest is unregulated in most areas (IDFG *et al*. 1995). In some areas, beavers are removed because of a perceived threat to water for agriculture or horticultural plantings. As indicated above, permanent ponded waters are important in maintaining spotted frog habitats during severe drought or winter periods. Removal of a beaver dam in Stoneman Creek in Idaho is believed to be directly related to the decline of a spotted frog subpopulation there. Intensive surveying of the historical site where frogs were known to have occurred has documented only one adult spotted frog (Engle 2000). (USFWS 2002c)

Fragmentation of habitat may be one of the most significant barriers to spotted frog recovery and population persistence. Recent studies in Idaho indicate that spotted frogs exhibit breeding site fidelity (Patla and Peterson 1996; Engle 2000; Munger and Engle 2000; J. Engle, IDFG, pers. comm., 2001). Movement of frogs from hibernation ponds to breeding ponds may be impeded by zones of unsuitable habitat. As movement corridors become more fragmented due to loss of flows within riparian or meadow habitats, local populations will become more isolated (Engle 2000; Engle 2001). Vegetation and surface water along movement corridors provide relief from high temperatures and arid environmental conditions, as well as protection from predators. Loss of vegetation and/or lowering of the water table as a result of the above mentioned activities can pose a significant threat to frogs moving from one area to another. Likewise, fragmentation and loss of habitat can prevent frogs from colonizing suitable sites elsewhere. (USFWS 2002c)

Though direct correlation between spotted frog declines and livestock grazing has not been studied, the effects of heavy grazing on riparian areas are well documented (Kauffman *et al*. 1982; Kauffman and Kreuger 1984; Skovlin 1984; Kauffman *et al*. 1985; Schulz and Leininger 1990). Heavy grazing in riparian areas on state and private lands is a chronic problem throughout the Great Basin. Efforts to protect spotted frog habitat on state lands in Idaho have been largely unsuccessful because of lack of cooperation from the State. In northeast Nevada, the Forest Service has completed three riparian area protection projects in areas where spotted frogs occur. These projects include altering stocking rates or changing the grazing season in two allotments known to have frogs and constructing riparian fencing on one allotment. However, these three sites have not been monitored to determine whether efforts to protect riparian habitat and spotted frogs have been successful. In the Toiyabe Range, a proposal to fence 3.2 kilometers (km) (2 miles (mi)) of damaged riparian area along Cloverdale Creek to protect it from grazing is scheduled to occur in the summer of 2002. In addition to the riparian exclosure, BLM biologists located a diversion dam in 1998 on Cloverdale Creek which was completely de- watering approximately 1.6 km (1 mi) of stream. During the summer of 2000, this area was reclaimed and water was put back into the stream. This area of the stream is not currently occupied by spotted frogs but it is historical habitat. (USFWS 2002c)

The effects of mining on Great Basin Columbia spotted frogs, specifically, have not been studied, but the adverse effects of mining activities on water quality and quantity, other wildlife species, and amphibians in particular have been addressed in professional scientific forums (Chang *et al*. 1974; Birge *et al*. 1975; Greenhouse 1976; Khangarot *et al*. 1985). (USFWS 2002c)

Disease or Predation. Predation by fishes is likely an important threat to spotted frogs. The introduction of nonnative salmonid and bass species for recreational fishing may have negatively affected frog species throughout the United States. The negative effects of predation of this kind are difficult to document, particularly in stream systems. However, significant negative effects of predation on frog populations in lacustrine systems have been documented (Hayes and Jennings 1986; Pilliod *et al*. 1996, Knapp and Matthews 2000). One historic site in southern Idaho no longer supports spotted frog although suitable habitat is available. This may be related to the presence of introduced bass in the Owyhee River (IDCDC 2000). The stocking of nonnative fishes is common throughout waters of the Great Basin. The Nevada Division of Wildlife (NDOW) has committed to conducting stomach sampling of stocked nonnative and native species to determine the effects of predation on spotted frogs. However, this commitment will not be fulfilled until the spotted frog conservation agreements are signed. To date, NDOW has not altered fish stocking rates or locations in order to benefit spotted frogs. (USFWS 2002c)

The bull frog (Rana catesbeiana), a nonnative ranid species, occurs within the range of the spotted frog in the Great Basin. Bullfrogs are known to prey on other frogs (Hayes and Jennings

1986). They are rarely found to co-occur with spotted frogs, but whether this is an artifact of competitive exclusion is unknown at this time. (USFWS 2002c)

Although a diversity of microbial species is naturally associated with amphibians, it is generally accepted that they are rarely pathogenic to amphibians except under stressful environmental conditions. Chytridiomycosis (chytrid) is an emerging panzootic fungal disease in the United States (Fellers *et al*. 2001). Clinical signs of amphibian chytrid include abnormal posture, lethargy, and loss of righting reflex. Gross lesions, which are usually not apparent, consist of abnormal epidermal sloughing and ulceration; hemorrhages in the skin, muscle, or eye; hyperemia of digital and ventrum skin, and congestion of viscera. Diagnosis is by identification of characteristic intracellular flask-shaped sporangia and septate thalli within the epidermis. Chytrid can be identified in some species of frogs by examining the oral discs of tadpoles which may be abnormally formed or lacking pigment (Fellers *et al*. 2001). (USFWS 2002c)

Chytrid was confirmed in the Circle Pond site, Idaho, where long term monitoring since 1998 has indicated a general decline in the population (Engle 2002). It is unclear whether the presence of this disease will eventually result in the loss of this subpopulation. Two additional sites may have chytrid, but this has yet to be determined (J. Engle, pers. comm., 2001). Protocols to prevent further spread of the disease by researchers were instituted in 2001. Chytrid has also been found in the Wasatch Columbia spotted frog distinct population segment (K. Wilson, pers comm., 2002). Chytrid has not been found in Nevada populations of spotted frogs. (USFWS 2002c)

The inadequacy of existing regulatory mechanisms

Spotted frog occurrence sites and potential habitats occur on both public and private lands. This species is included on the Forest Service sensitive species list; as such, its management must be considered during forest planning processes. However, little habitat restoration, monitoring or surveying has occurred on Forest Service lands. (USFWS 2002c)

In the fall of 2000, 250 head of cattle were allowed to graze for 45 days on one pasture in the Indian Valley Creek drainage of the Humboldt-Toiyabe National Forest in central Nevada for the first time in six years (M. Croxen, pers. comm., 2002). Grazing was not allowed in this allotment in 2001. Recent mark-recapture data indicated that this drainage supports more frogs than previously presumed, potentially around 5,000 individuals (K. Hatch, pers. comm., 2000). Perceived improvements in the status of frog populations in the Indian Valley Creek area may be a result of past removal of livestock grazing. The reintroduction of grazing disturbance into this relatively dense area of frogs has yet to be determined. (USFWS 2002c)

BLM policies direct management to consider candidate species on public lands under their jurisdiction. To date, BLM efforts to conserve spotted frogs and their habitat in Idaho, Oregon, and Nevada have not been adequate to address threats. (USFWS 2002c)

The southernmost known population of spotted frogs can be found on the BLM San Antone Allotment south of Indian Valley Creek in the Toiyabe Range. Grazing is allowed in this area from November until June (L. Brown, pers. comm., 2002). The season of use is a very sensitive portion of the spotted frog annual life cycle which includes migration from winter hibernacula to breeding ponds, breeding, egg laying and hatching, and metamorphosing of young.

Additionally, the riparian Standards and Guidelines were not met in 1996, the last time the allotment was evaluated. (USFWS 2002c)

The status of local populations of spotted frogs on Yomba-Shoshone or Duck Valley Tribal lands is unknown. Tribal governments do not have regulatory or protective mechanisms in place to protect spotted frogs. (USFWS 2002c)

The Nevada Division of Wildlife classifies the spotted frog as a protected species, but they are not afforded official protection and populations are not monitored. Though the spotted frog is on the sensitive species list for the State of Idaho, this species is not given any special protection by the State. Columbia spotted frogs are not on the sensitive species list for the State of Oregon. Protection of wetland habitat from loss of water to irrigation or spring development is difficult because most water in the Great Basin has been allocated to water rights applicants based on historical use and spring development has already occurred within much of the known habitat of spotted frogs. Federal lands may have water rights that are approved for wildlife use, but these rights are often superceded by historic rights upstream or downstream that do not provide for minimum flows. Also, most public lands are managed for multiple uses and are subject to livestock grazing, silvicultural activities, and recreation uses that may be incompatible with spotted frog conservation without adequate mitigation measures. (USFWS 2002c)

<u>Other natural or manmade factors affecting its continued existence</u>

Multiple consecutive years of less than average precipitation may result in a reduction in the number of suitable sites available to spotted frogs. Local extirpations eliminate source populations from habitats that in normal years are available as frog habitat (Lande and Barrowclough 1987; Schaffer 1987; Gotelli 1995). These climate events are likely to exacerbate the effects of other threats, thus increasing the possibility of stochastic extinction of subpopulations by reducing their size and connectedness to other subpopulations (see Factor A for additional information). As movement corridors become more fragmented, due to loss of flows within riparian or meadow habitats, local populations will become more isolated (Engle 2000). Increased fragmentation of the habitat can lead to greater loss of populations due to demographic and/or environmental stochasticity. (USFWS 2002c)

Appendix D

Ferruginous Hawk (Buteo regalis) (Gray 1844)

Ferruginous hawks have a rusty back and shoulders, paler head, and white tail washed with pale rust; white patch at the base of the flight feathers on the upper wing surface; dark legs of adult contrast with whitish underparts; uncommon dark phase lacks dark tail bands; averages 58 cm long, 135 cm wingspan (NGS 1983). Dark phase differs from dark-phase rough-legged hawk (BUTEO LAGOPUS) by absence of dark tail bands in the former. Immature resembles Great Plains form of red-tailed hawk (BUTEO JAMAICENSIS) but has larger white wing patches and lacks dark bar on leading edge of underwing (NGS 1983).

Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet. Mammals are the primary prey during the breeding season, although birds, amphibians, reptiles, and insects also are taken (Weston 1968, Howard 1975, Fitzner *et. al.* 1977, Blair 1978, Smith and Murphy 1978, Gilmer and Stewart 1983, Palmer 1988, De Smet and Conrad 1991, Atkinson 1992). Primary prey in central grasslands are ground squirrels (SPERMOPHILUS SPP.), followed by pocket gophers (THOMOMYS SPP.) and white-tailed jackrabbits (LEPUS TOWNSENDII) (Bechard and Schmutz 1995). Primary prey in western shrubsteppe are jackrabbits (LEPUS SPP.), followed by ground squirrels and pocket gophers (Smith and Murphy 1978, Bechard and Schmutz 1995). White-tailed (CYNOMYS LEUCURUS) and black-tailed prairie dogs(CYNOMYS LUDOVICIANUS)also serve as prey items (Powers and Craig 1976, MacLaren *et. al.* 1988).

In Oregon, Janes (1985) found that the highest abundance of major prey species (white-tailed jackrabbits, Townsend's ground squirrels [SPERMOPHILUS TOWNSENDII], and northern pocket gophers [THOMOMYS TALPOIDES]) occurred in native grasslands.

Adult and immature phenologies are both diurnal and the ferruginous hawks hunt most near sunrise and sunset (Evans 1982). Vulnerability of prey also is an important factor in habitat suitability, such that Ferruginous Hawks avoid dense vegetation that reduces their ability to see prey (Howard and Wolfe 1976, Wakeley 1978, Schmutz 1987). Prey vulnerability decreases where taller small-grain crops replace shorter grasses (Houston and Bechard 1984). Intensive agricultural practices, such as annual plowing and biennial fallowing, exclude many prey species (Wakeley 1978, Houston and Bechard 1984). In Alberta, prey abundance increases as the area of cultivation increases up to 30 percent, but abundance is reduced where agriculture is extensive, e.g., more than 30 percent (Schmutz 1989).

Migration. Arrives in northern breeding range (South Dakota) by March-early April, in Utah and Colorado mostly in late February-early March; yearlings arrive later. Adults depart northern end of breeding range by late October; young depart in August. Wintering areas of grassland and desert shrub breeders are mainly separate. (Schmutz and Fyfe 1987). Alberta populations winter mainly in Texas. In southern breeding range, may be short-distance migrant or possibly sedentary (Palmer 1988).

Nesting. Nest site selection depends upon available substrates and surrounding land use. Ground nests typically are located far from human activities and on elevated landforms in large grassland areas (Lokemoen and Duebbert 1976, Blair 1978, Blair and Schitoskey 1982, Gilmer and Stewart 1983, Atkinson 1992, Black 1992). Lone or peripheral trees are preferred over densely wooded areas when trees are selected as the nesting substrate (Weston 1968, Lokemoen and Duebbert 1976, Gilmer and Stewart 1983, Woffinden and Murphy 1983, Palmer 1988, Bechard *et. al.* 1990). Tree-nesting hawks seem to be less sensitive to surrounding land use, but they still avoid areas of intensive agriculture or high human disturbance (Gilmer and Stewart 1983; Schmutz 1984, 1987, 1991a; Bechard *et. al.* 1990). In Oregon shrubsteppe, nests were in relatively short western juniper trees, were less than 10 meters from the ground, and had large support branches (Green and Morrison 1983).

Habitat Requirements

Minimum Habitat Area.

Foraging. Density and productivity are closely associated with cycles of prey abundance (Woffinden 1975; Powers and Craig 1976; Smith and Murphy 1978, Smith *et. al.* 1981; Gilmer and Stewart 1983; Houston and Bechard 1984; White and Thurow 1985; Palmer 1988; Schmutz 1989, 1991a; Schmutz and Hungle 1989; Bechard and Schmutz 1995). Estimates of home range size vary from 3.14 to 8.09 square kilometers in the Columbia River Basin and Great Basin regions of the western U.S. (Janes 1985). The average home range was 90.3 square kilometers in Washington, and the variability in home range was significantly related to distance from the nest to the nearest irrigated agricultural field (Leary *et. al.* 1998). One male that nested closest to the surrounding agricultural fields had the smallest home range, whereas another male nesting farthest from the agricultural fields had the largest home range.

When prey densities were low in big sagebrush (ARTEMISIA TRIDENTATA)/grassland habitat, agricultural fields served as important foraging areas (Leary *et. al.* 1998). Foraged extensively in alfalfa (MEDICAGO SATIVA) and irrigated potato fields in Washington and in alfalfa fields in Idaho during the breeding season presumably because of high prey densities (Wakeley 1978, Leary *et. al.* 1998

Cover. Prefer open grasslands and shrub steppe communities. Uses native and tame grasslands, pastures, hayland, cropland, and shrubsteppe (Stewart 1975, Woffinden 1975, Powers and Craig 1976, Fitzner *et. al.* 1977, Blair 1978, Wakeley 1978, Lardy 1980, Schmidt 1981, Gilmer and Stewart 1983, Green and Morrison 1983, Konrad and Gilmer 1986, MacLaren *et. al.* 1988, Palmer 1988, Roth and Marzluff 1989, Bechard *et. al.* 1990, Black 1992, Niemuth 1992, Bechard and Schmutz 1995, Faanes and Lingle 1995, Houston 1995, Zelenak and Rotella 1997, Leary *et. al.* 1998). Usually occupy rolling or rugged terrain (Blair 1978, Palmer 1988, Black 1992). High elevations, forest interiors, narrow canyons, and cliff areas are avoided (Janes 1985, Palmer 1988, Black 1992), as is parkland habitat in Canada (Schmutz 1991a).

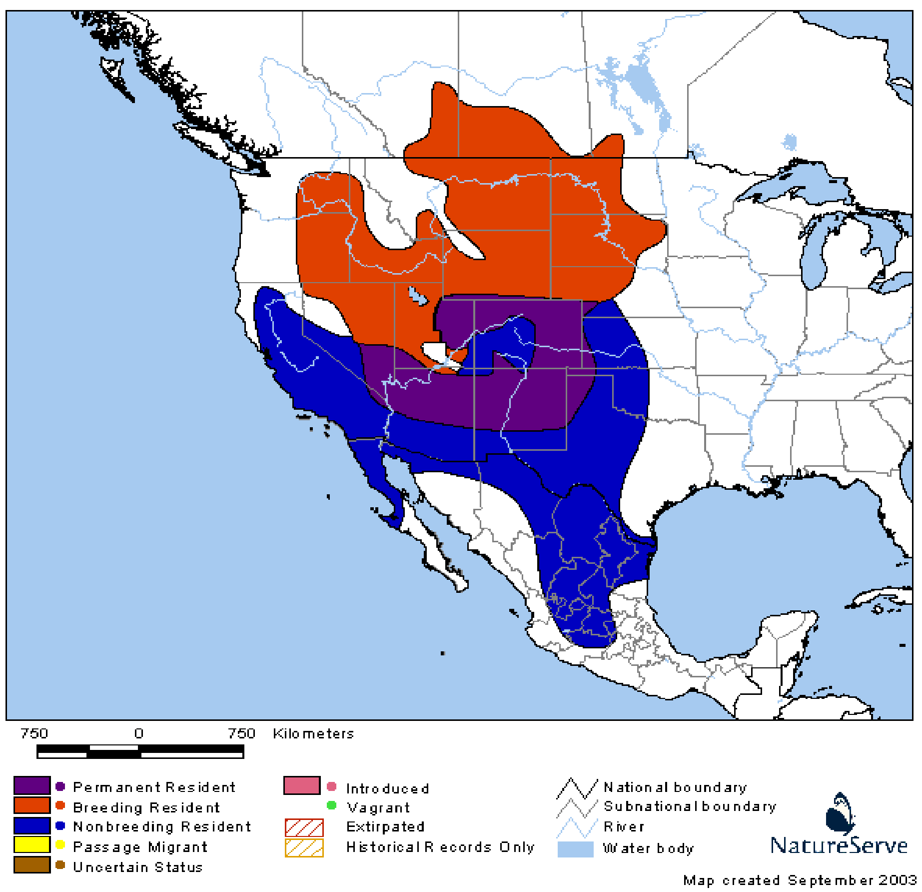
Reproduction. Occur on breeding areas from late February through early October (Weston 1968, Olendorff 1973, Maher 1974, Blair 1978, Smith and Murphy 1978, Gilmer and Stewart 1983, Schmutz and Fyfe 1987, Palmer 1988, Bechard and Schmutz 1995). See Palmer (1988) and Hall *et. al.* (1988) for egg dates in different areas. Clutch size usually is two to four. Incubation lasts about 32-33 days, mostly by female; male provides food. Young fledge in 35-50 days (males before females), depend on parents for several weeks more. No evidence that yearlings breed. Renesting within the same year is rare (Woffinden 1975, Palmer 1988) even when clutch is lost. Territory and nest site reoccupancy is common and one of several nests within a territory may be used in alternate years (Davy 1930, Weston 1968, Olendorff 1973, Blair 1978, Smith and Murphy 1978, Palmer 1988, Roth and Marzluff 1989, Schmutz 1991b, Atkinson 1992, Houston 1995). Mate fidelity also is common. (Schmutz 1991b). Clutch size, fledging rate, and/or breeding density tend to vary with prey (especially jackrabbit [LEPUS SPP.] or ground squirrel [SPERMOPHILUS SPP.]) availability.

Population and Distribution

<u>Population</u>

Historic. No data was found.

Current. Range Map
Note: Range depicted for New World only. The scale of the maps may cause narrow coastal ranges or ranges on small islands not to appear. Not all vagrant or small disjunct occurrences are depicted. For migratory birds, some individuals occur outside of the passage migrant range depicted. A shapefile of this map is available for download at [www.natureserve.org/getData/animalData.jsp.](www.natureserve.org/getData/animalData.jsp)



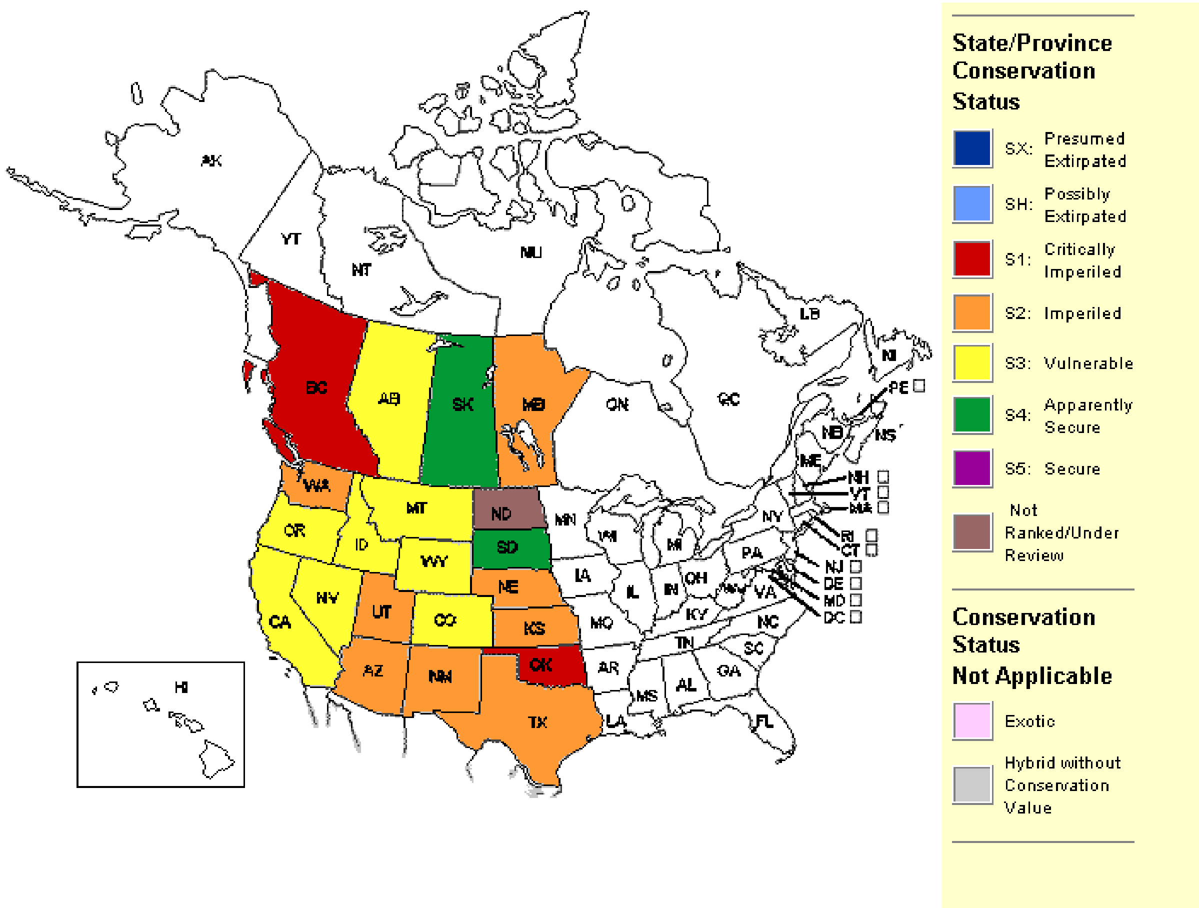
Appendix D

Distribution

Historic. No data was found.

Current. U.S. States and Canadian Provinces

U.S. & Canada State/Province Distribution	
United States	AZ, CA, CO, ID, KS, MN, MT, ND, NE, NM, NN, NV, OK, OR, SD, TX, UT, WA, WY
Canada	AB, BC, MB, SK



NOTE: The maps for birds represent the breeding status by state and province. In some jurisdictions, the subnational statuses for common species have not been assessed and the status is shown as not-assessed (SNR). In some jurisdictions, the subnational status refers to the status as a non-breeder; these errors will be corrected in future versions of these maps. A species is not shown in a jurisdiction if it is not known to breed in the jurisdiction or if it occurs only accidentally or casually in the jurisdiction. Thus, the species may occur in a jurisdiction as a seasonal non-breeding resident or as a migratory transient but this will not be indicated on these maps. See other maps on this web site that depict the Western Hemisphere ranges of these species at all seasons of the year.

Appendix D

Status and Abundance Trends

Status

See current Distribution map for Oregon status.

Trends

Global Short Term Trend Comments. Local declines have been noted (e.g., Woffinden and Murphy 1989), but a widespread decline was not evident as of the early-1990s (USFWS 1992, Olendorff 1993). North American Breeding Bird Survey (BBS) data for the U.S. and Canada indicate a 13.5 percent increase from 1988 to 1989 and an average annual 0.5 percent increase for 1966-1989 (Droege and Sauer 1990). Wintering data from Christmas Bird Counts also indicate an increase in numbers from 1952-1984 (USFWS 1992). Schmutz (1995) reported that the range in Canada has been reduced by half, and that habitat within the range has been severely depleted and total numbers reduced by about 95 percent. Kirk *et. al.* (1995) indicated that populations in Canada apparently are stable in available habitat. Jensen (1995) reported a recent range re-expansion in south-central Canada. Historically, very abundant in eastern Montana but numbers were lowered by the early 1900's (Allen 1874, Cameron 1914).

Factors Affecting Population Status

Key Factors Inhibiting Populations and Ecological Processes

Habitat Loss. Some habitat has been lost due to agricultural development. Schmutz and Schmutz (1980) reported that habitat in the breeding range in Canada has been severely depleted by agriculture, disturbance, and forest invasion (see also Jensen 1995), though recent trends suggest relative stability (Schmutz 1995). Loss of grassland is not regarded as an immediate threat (USFWS 1992), but is likely a long-term threat (Olendorff 1993). Ability of native grasslands and shrublands to support viable populations may be compromised by the invasion of exotic annuals, especially cheatgrass (BROMUS TECTORUM) and Russian thistle (SALSOLA IBERICA). However, conversion of large areas of dense shrublands to grasslands may locally benefit Ferruginous Hawks.

Human Disturbance. Easily disturbed during the breeding season (Olendorff 1973, Gilmer and Stewart 1983, Schmutz 1984, White and Thurow 1985, Bechard *et. al.* 1990). Abandonment of nests occurs particularly in the early stages of nesting (Davy 1930, Weston 1968, Fitzner *et. al.* 1977, Gilmer and Stewart 1983, White and Thurow 1985). In eastern Colorado, nests in remote locations had greater productivity compared to more accessible nests (Olendorff 1973). In South Dakota, the probability of fledging young was 11.4 percent greater in more remote nests than in nests within 2.47 kilometers of occupied buildings (Blair 1978). In North Dakota, avoided cropland and nesting within 0.7 kilometers of occupied buildings (Gaines 1985). In Alberta, rarely nested within 0.5 kilometers of farmyards (Schmutz 1984). In other instances, more tolerant of human disturbance. Nesting has occurred near active railroads and gravel roads (Rolfe 1896, Gilmer and Stewart 1983, MacLaren *et. al.* 1988). Sensitivity to disturbance may be heightened in years of low prey abundance (White and Thurow 1985). Shooting may also be a threat, especially on the wintering grounds (Harmata 1981, Gilmer *et. al.* 1985). Poisoning of prey species may be a threat both directly to hawks eating poisoned animals and indirectly through reduction of prey base, especially at prey concentration areas such as prairie dog colonies. Noted as an accidental but unsuitable host of the Brown-headed Cowbird (MOLOTHRUS ATER), an obligate brood parasite (Friedmann 1963).

Grasshopper Sparrow (*Ammodramus savannarum perpallidus*)

The following species account was prepared by: Paul Ashley, Stacy Stoval of the Southeast Washington Ecoregional Assessment in January 2004.

Grassland ecosystems that were prominent in the Columbia Basin have suffered the greatest losses of any habitats in the Columbia Plateau (Kagan *et al*. 1999). The Palouse Prairie has been identified as the most endangered ecosystem in the United States (Noss *et al.* 1995). Land conversion and livestock grazing coupled with the rapid spread of cheatgrass (*Bromus tectorum*) and a resulting change in the natural fire regime has effectively altered much of the grassland habitats to the effect that it is difficult to find stands which are still in relatively natural condition (Altman and Holmes 2000).

As a result, many of these steppe, grassland, species are declining in our area. BBS data (Robbins *et al*. 1986) have shown a decreasing long term trend for the grasshopper sparrow (1966-1998) (Sauer *et al.* 1999). Throughout the U.S., this sparrow has experienced population declines throughout most of its breeding range (Brauning 1992, Brewer *et al.* 1991, Garrett and Dunn 1981). In 1996, Vickery (1996) reported that grasshopper sparrow populations have declined by 69% across the U.S. since the late 1960s. In Washington, the grasshopper sparrow is considered a state candidate species (http://wdfw.wa.gov/wlm/diversity/soc/candidat.htm). In Oregon it is considered as a naturally rare, vulnerable species, and a state Heritage program status as imperiled.

Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet. Grasshopper sparrows are active ground or low shrub searchers. Vickery (1996) states that exposed bare ground is the critical microhabitat type for effective foraging. Bent (1968) observed that grasshopper sparrows search for prey on the ground, in low foliage within relatively dense grasslands, and sometimes scratch in the litter.

They eat mostly insects, primarily grasshoppers, but also other invertebrates and seeds. In one study, grasshoppers formed 23% of the grasshopper sparrows' diet during 8 months of the year; 60% of their diet in Jan., and 37% from May to Aug. From Feb. to Oct., 63% of food taken was animals, 37% vegetable. Insects comprised 57% total food; spiders, myriapods, snails and earthworms made up 6%. Of the insects, "harmful" beetles (click beetles (Clateridae), weevils (Sitones et. al), and smaller leaf beetles (Systens spp.) made up 8%, caterpillars (cutworms) made up 14%. Vegetable matter eaten included waste grain, grass, weed and sedge seeds (Smith 1968, Terres 1980).

Their diet varies by season. Spring diet 60% invertebrates, 40% seeds (n=28); summer diet 61% invertebrates, 39% seeds (n=100); fall diet 29% invertebrates, 71% seeds (n=17), and no data for winter (Martin *et al.* 1951 in Vickery 1996).

Reproduction. Grasshopper sparrows are monogamous throughout the breeding season (Ehrlich 1988). Grasshopper sparrows nest in semi-colonial groups of three to 12 pairs (Ehrlich 1988). Smith (1963) recorded breeding densities that ranged from 0.12 to 0.74 males per hectare in Pennsylvania and Collier (1994) observed breeding densities of 0.55 males per hectare in California.

Clutch size ranges from two to six, with four most frequently (Smith 1963). The female alone has a brood patch and incubates eggs (Smith 1963, Ehrlich 1988, Harrison 1975). During incubation, the male defends the pair's territory (Smith 1963).

Incubation period is from 11 to 13 days (Smith 1963, Ehrlich 1988, Harrison 1975), with a nestling period of six to nine days after hatching (Harrison 1975, Hill 1976, Kaspari and O'Leary 1988). Hatchlings are blind and covered with grayish-brown down (Smith 1968).

Throughout most of their range, grasshopper sparrows can produce two broods, one in late May and a second in early July (George 1952, Smith 1968, Vickery 1996). However, in the northern part of its range, one brood is probably most common (Vickery *et al*. 1992, Wiens 1969). grasshopper sparrows frequently renest after nest failure, and if unsuccessful in previous attempts, may renest 3-4 times during the breeding season (Vickery 1996).

After the young hatch, both parents share the responsibilities of tending the hatchlings and seem more concerned over human intrusion into their territory than before (Smith 1963). Kaspari and O'Leary (1988) observed cooperative breeding by non-parental attendants ("defined as birds bringing food to the nest"). Unrelated juveniles and adults from adjacent territories made 9-50% of the provisioning visits to four of twenty-three nests. Parents facilitated visits from non-parental attendants by moving off the nest yet unrelated birds that did not bring food to the nest were vigorously chased away. Kaspari and O'Leary (1988) suggested that non-parental attendants, rare among the population observed, are likely cases of "misdirected parental care".

Nesting. Grasshopper sparrows arrive on the breeding grounds in mid-April and depart for the wintering grounds in mid-September (George 1952, Bent 1968, Smith 1968, Harrison 1975, Stewart 1975, Laubach 1984, Vickery 1996). In Saskatchewan and Manitoba, they arrive later (mid-May) and leave earlier (August) (Knapton 1979). Grasshopper sparrows may be site faithful (Skipper 1998).

With few exceptions, nests are built on the ground, near a clump of grass or base of a shrub, "domed" with overhanging vegetation (Vickery 1996). Female grasshopper sparrows build a cup nest in two or three days time. Domed with overhanging grasses and accessed from one side, the rim of the nest is flush with the ground; the slight depression inside fashioned such that the female's back is nearly flush with the ground while brooding (Dixon 1916, Pemberton 1917, Harrison 1975, Ehrlich 1988, and Vickery 1996).

Male grasshopper sparrows establish territories promptly upon arrival to the breeding grounds and rigidly maintain them until the young hatch. Territorial defense then declines and considerable movement across territory boundaries may occur. It appears that fledglings frequently flutter into adjoining territories and the parent birds follow in answer to the feeding call. A sharp increase in territorial behavior is exhibited during the two or three days prior to re-nesting (Smith 1963). Collier (1994 in Vickery 1996) observed grasshopper sparrow territory sizes of 0.37   0.16 (SD) ha (n=41) in southern California. In other states, territories have been observed to range in size from 1.4 ha (n=6) in Michigan (Kendeigh 1941) to 0.19   0.13 (SD) ha (n=20: Piehler 1987) in western Pennsylvania.

Although average territory size for grasshopper sparrows is small (<2 ha) (George 1952, Wiens 1969, 1970, Ducey and Miller 1980, Laubach 1984, Delisle 1995), grasshopper sparrows are area sensitive, preferring large grassland areas over small areas (Herkert 1994a,b, Vickery *et al*. 1994, Helzer 1996). In Illinois, the minimum area on which grasshopper sparrows were found was 10-30 ha (Herkert 1991), and the minimum area needed to support a breeding population may be >30 ha (Herkert 1994b). In Nebraska, the minimum area in which grasshopper sparrows were found was 8-12 ha, with a perimeter-area ratio of 0.018 (Helzer 1996, Helzer and Jelinski 1999). Occurrence of grasshopper sparrows was positively correlated with patch area and inversely correlated with perimeter-area ratio (Helzer and Jelinski 1999).

Migration. In spring, the grasshopper sparrow is a notably late migrant, arriving in southern B.C. in early to late May (Vickery 1996). Grasshopper sparrows arrive in Colorado in mid May and remain through September. They initiate nesting in early June, and most young fledge by the end of July. They winter across the southern tier of states, south into Central America.

This species generally migrates at night, sometimes continuing into morning. Mechanisms surrounding migration are not known but probably involve similar mechanisms as in savannah Sparrow, which include magnetic, stellar, and solar compasses (Moore 1980, Able and Able 1990a, b). While in migration the grasshopper sparrow does not form large conspecific flocks; individuals are found in mixed-species flocks with other sparrows and appear to migrate in small numbers, travelling more as individuals (Vickery 1996).

Data regarding the movements of grasshopper sparrows outside of the breeding season is scarce due to their normally secretive nature (Zeiner *et al*. 1990). Although diurnally active, grasshopper sparrows are easily overlooked as "they seldom fly, preferring to run along the ground between and beneath tufts of grass" (Pemberton 1917). Because of their secretive nature the northern limits of their winter range is poorly known. Migratory individuals have been recorded casually south to w. Panama (Ridgely and Gwynne 1989) and (in winter) north to Maine (PDV), New Brunswick, Minnesota (Eckert 1990), and w. Oregon (Vickery 1996).

Mortality. Nest predators cited include: Raccoons (Procyon lotor), Red Fox (Vulpes vulpes), Northern Black Racers (Coluber constrictor constrictor), Blue Jays (Cyanocitta cristata), and Common Crows (Corvus brachyrhynchos) (Johnson and Temple 1990, Wray et. al 1982). Loggerhead Shrikes (Lanius ludovicianus) commonly take grasshopper sparrows as prey in Oklahoma and Florida (Stewart 1990, Vickery 1996). Many other species, especially those not dependent upon sight to find nests, are likely to be predators. Seasonal flooding in some areas may be a source of mortality during the nesting season (Vickery 1996).

Mowing and haying operations be the source of mortality for grasshopper sparrows directly and indirectly. Haying may reduce height and cover of herbaceous vegetation, destroy active nests, kill nestlings and fledglings, cause nest abandonment, and increase nest exposure and predation levels (Bollinger *et al.* 1990).

Appendix D

<u>Habitat Requirements</u>

Grasshopper sparrows prefer grasslands of intermediate height and are often associated with clumped vegetation interspersed with patches of bare ground (Bent 1968, Blankespoor 1980, Vickery 1996). Other habitat requirements include moderately deep litter and sparse coverage of woody vegetation (Smith 1963; Bent 1968; Wiens 1969, 1970; Kahl *et al*. 1985; Arnold and Higgins 1986). In east central Oregon grasshopper sparrows occupied relatively undisturbed native bunchgrass communities dominated by *Agropyron spicatum* and/or *Festuca idahoensis*, particularly north-facing slopes on the Boardman Bombing Range, Columbia Basin (Holmes and Geupel 1998). Vander Haegen *et al.* (2000) found no significant relationship with vegetation type (i.e., shrubs, perennial grasses, or annual grasses), but did find one with the percent cover perennial grass.

In portions of Colorado, Kansas, Montana, Nebraska, Oklahoma, South Dakota, Texas, Wisconsin, and Wyoming, abundance of grasshopper sparrows was positively correlated with percent grass cover, percent litter cover, total number of vertical vegetation hits, effective vegetation height, and litter depth; abundance was negatively correlated with percent bare ground, amount of variation in litter depth, amount of variation in forb or shrub height, and the amount of variation in forb and shrub heights (Rotenberry and Wiens 1980).

Grasshopper sparrows have also been found breeding in Conservation Reserve Program (CRP) fields, pasture, hayland, airports, and reclaimed surface mines (Wiens 1970, 1973; Harrison 1974; Ducey and Miller 1980; Whitmore 1980; Kantrud 1981; Renken 1983; Laubach 1984; Renken and Dinsmore 1987; Bollinger 1988; Frawley and Best 1991; Johnson and Schwartz 1993; Klute 1994; Berthelsen and Smith 1995; Hull *et al*. 1996; Patterson and Best 1996; Delisle and Savidge 1997; Prescott 1997; Koford 1999; Jensen 1999; Horn and Koford 2000). In Alberta, Manitoba, and Saskatchewan, grasshopper sparrows are more common in grasslands enrolled in the Permanent Cover Program (PCP) than in cropland (McMaster and Davis 1998). PCP was a Canadian program that paid farmers to seed highly erodible land to perennial cover; it differed from CRP in that haying and grazing were allowed annually in PCP.

Grasshopper sparrows occasionally inhabit cropland, such as corn and oats, but at a fraction of the densities found in grassland habitats (Smith 1963, Smith 1968, Ducey and Miller 1980, Basore *et al*. 1986, Faanes and Lingle 1995, Best *et al.* 1997).

Grasshopper sparrows are also included as members of shrub-steppe communities, occupying the steppe habitats having the habitat features shown in Table 1 (Altman and Holmes 2000).

Table 1. Key habitat relationships required for breeding grasshopper sparrows (Altman and Holmes 2000).

Conservation Focus	Key Habitat Relationships			
	Vegetative Composition	Vegetation Structure	Landscape/ Patch Size	Special Considerations
native bunchgrass cover	native bunchgrasses	bunchgrass cover >15% and >60% total grass cover; bunchgrass >25 cm tall; shrub cover <10%	>40 ha (100 ac)	larger tracts better; exotic grass detrimental; vulnerable in agricultural habitats from mowing, spraying, etc.

Population and Distribution

Population

Historic. According to the ICBEMP terrestrial vertebrate habitat analyses, historical source habitats for grasshopper sparrow within our planning unit occurred primarily along the eastern portions of the Columbia Plateau Ecological Reporting Unit (ERU) and the northern portion of the Owyhee Uplands ERU with a small amount in the northern portion of the Great Basin (Wisdom *et al*. 2000). Within this core of historical habitat, the current amount of source habitat has been reduced dramatically from historical levels by 91% in the Columbia Plateau and 85% in the Owyhee Uplands. Within the entire Interior Columbia Basin, overall decline in source habitats for this species (71%) was third greatest among 91 species of vertebrates analyzed (Wisdom *et al.* 2000).

Wing (1941) described the grasshopper sparrow as occupies the edge between the Agropyron-Poa type and the Festuca-Agropyron type. Jewett *et al.* (1953) gave its distribution in summer as north to Sprague, east to Pullman, south to Anatone and Prescott, and west to Toppenish.

Current. No data is available

Appendix D

Distribution

Grasshopper sparrows are found from North to South America, Ecuador, and in the West Indies

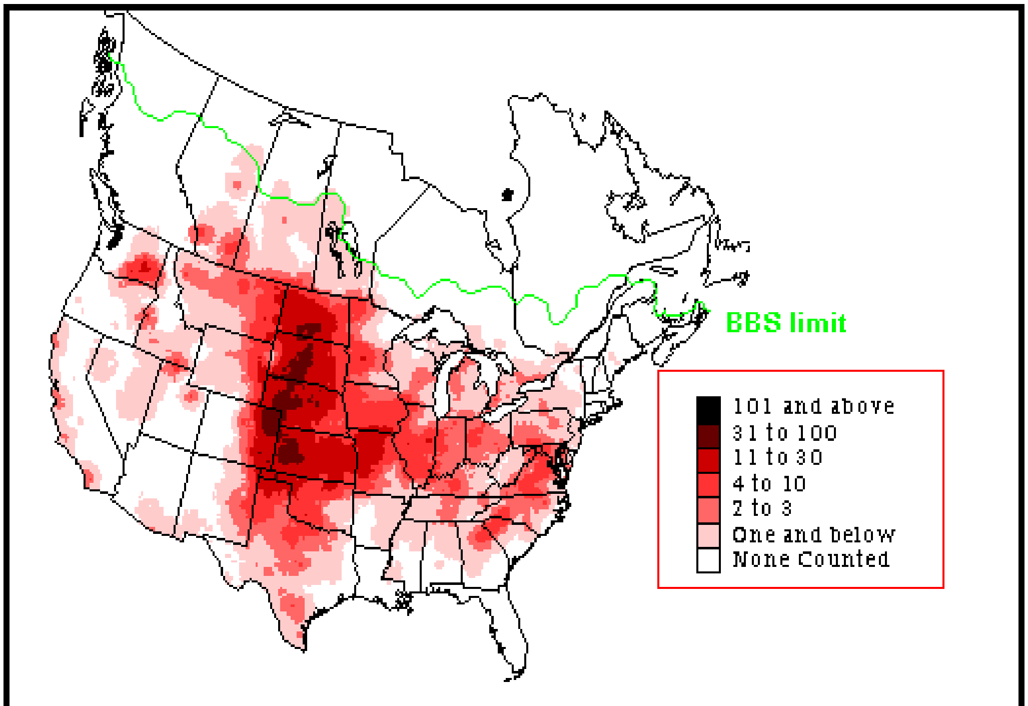


Figure 1. Breeding Range and Abudance of grasshopper sparrow in the U.S. based on Breeding Bird Survey data 1985-2001. Scale represents average number of individuals detected per route per year (Sauer 2003).

(Vickery 1996, AOU 1957). They are common breeders throughout much of the continental United States, ranging from southern Canada south to Florida, Texas, and California. Additional populations are locally distributed from Mexico to Colombia and in the West Indies (Delany *et al*. 1985, Delany 1996a, Vickery 1996) (see Figure 1).

The subspecies breeding in eastern Washington is Ammodramus savannarum perpallidus (Coues) which breeds from northwest California, where it is uncommon, into eastern Washington, northeast and southwest Oregon, where it is rare and local, into southeast B.C., where it is considered endangered, east into Nevada, Utah, Colorado, Oklahoma, Texas, and possibly to Illinois and Indiana (Vickery 1996).

Historic. Larrison (1981) called it a local irregular summer resident and/or migrant mostly through the arid interior of the Northwest and rare west of the Cascades in southwestern B.C. and Oregon. In Idaho, it was considered an uncommon irregular summer resident and migrant in the northern portion (Larrison 1981).

Jewett *et al.* (1953) classified the grasshopper sparrow as a rare summer resident between May and probably August or September locally in the bunch-grass associations of the lower Transition Zone of eastern Washington, occurring locally in the Upper Sonoran also.

Current. Grasshopper sparrows have a spotty distribution at best across eastern Washington.

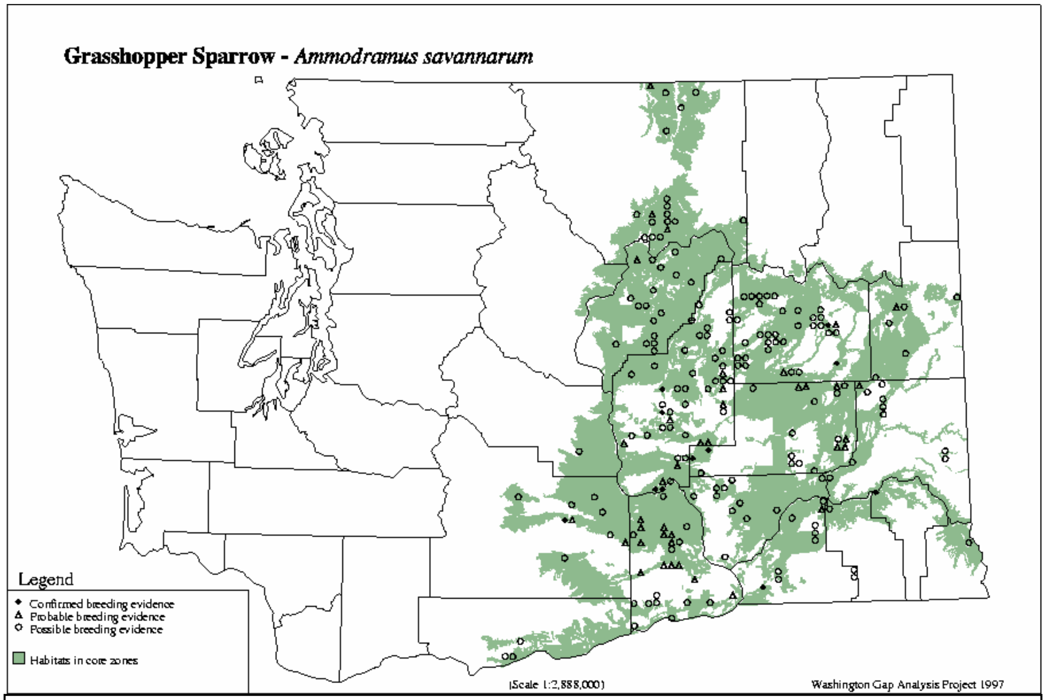


Figure 2. Current distribution of grasshopper sparrow in Washington from GAP analysis (Smith et al. 1997).

Over the years they have been found in various locales including CRP. They appear to utilize CRP on a consistent basis in southeast Washington (Mike Denny pers. Comm). See Figure 2 for current distribution map.

Status and Abundance Trends

<u>Status</u>

No data is available.

<u>Trends</u>

Throughout the U.S., this sparrow has experienced population declines throughout most of its breeding range (Brauning 1992, Brewer *et al.* 1991, Garrett and Dunn 1981). In 1996, Vickery (1996) reported that grasshopper sparrow populations have declined by 69% across the U.S. since the late 1960s.

Approximately 6 million hectares of shrub-steppe have been converted to wheat fields, row crops, and orchards in the interior Columbia Basin (Quigley and Arbelbide 1997). In Washington over 50% of historic shrub-steppe has been converted to agriculture (Dobler *et al*. 1996).

Table 2 Trends for grasshpper sparrow from BBS data 1980-2002 (Sauer *et al*. 2003).

State	1996- 2002 Trend	1980-2002 Trend
Washington	-4.9	-3.0
Idaho	-7.4	-10.7
Oregon	-4.4	-1.6
Intermountain Grassland	-13.0	-12.4

Accordingly, Breeding Bird Survey data show long term declines from 1980 through 2002 of –3.0, -1.6 and –10.7 for Washington, Oregon and Idaho, respectively (see Table 2) (see http://www.mbr-pwrc.usgs.gov/cgi-bin/atlasa02.pl?05460 for this data online). The entire Intermountain Grassland area shows large decrease of –12.4 over this same time period.

Washington, Oregon and the entire Intermountain Grassland area show an increasing negative trend when looking at the more recent time period 1996-2002 time period indicating the populations have increase even more over this time period (Sauer *et al*. 2003).

Factors Affecting Focal Species Population Status

Key Factors Inhibiting Populations and Ecological Processes

Habitat Loss and Fragmentation. The principal post-settlement conservation issues affecting bird populations include: habitat loss and fragmentation resulting from conversion to agriculture; and habitat degradation and alteration from livestock grazing, invasion of exotic vegetation, and alteration of historic fire regimes. Conversion of shrub-steppe lands to agriculture adversely affects landbirds in two ways: 1.) native habitat is in most instances permanently lost, and 2.) remaining shrub-steppe is isolated and embedded in a highly fragmented landscape of multiple land uses, particularly agriculture. Fragmentation resulting from agricultural development or large fires fueled by cheatgrass can have several negative effects on landbirds. These include: insufficient patch size for area-dependent species, and increases in edges and adjacent hostile landscapes, which can result in reduced productivity through increased nest predation, nest parasitism, and reduced pairing success of males. Additionally, fragmentation of shrub-steppe has likely altered the dynamics of dispersal and immigration necessary for maintenance of some populations at a regional scale. In a recent analysis of neotropical migratory birds within the Interior Columbia Basin, most species identified as being of "high management concern" were shrub-steppe species (Saab and Rich 1997) which includes the grasshopper sparrow.

Approximately 6 million hectares of shrub-steppe have been converted to wheat fields, row crops, and orchards in the interior Columbia Basin (Quigley and Arbelbide 1997). In Washington over 50% of historic shrub-steppe has been converted to agriculture (Dobler *et al*. 1996).

Large scale reduction and fragmentation of sagebrush habitats have occurred due to a number of activities, including land conversion to tilled agriculture, urban and suburban development, and road and power-line rights of way. Range improvement programs remove sagebrush by burning, herbicide application, and mechanical treatment, replacing sagebrush with annual grassland to promote forage for livestock.

Making this loss of habitat even more severe is that the grasshopper sparrow like other grassland species shows a sensitivity to the grassland patch size (e.g. Herkert 1994, Samson 1980, Vickery 1994a b, Bock *et al*. 1999). Herkert (1991) in Illinois, found that grasshopper sparrows were not present in grassland patches smaller than 30 hectares (74 acres) despite the fact that their published average territory size is only about 0.3 ha (0.75 acres). Vickery *et al*. (1994) found the minimum requirement to be 100 hectares and Samson (1980) found the minimum to be 20 ha. in Missouri. Differences in minimum area requirements may be explained by the effect of relative population level on the selectivity of individuals, as has been shown for many species of birds (Vickery *et al*. 1994). Minimum requirement size in the Northwest is unknown.

Grazing. Grazing can trigger a cascade of ecological changes, the most dramatic of which is the invasion of non-native grasses escalating the fire cycle and converting sagebrush shrublands to annual grasslands. Historical heavy livestock grazing altered much of the sagebrush range, changing plant composition and densities. West (1988, 1996) estimates less than one percent of sagebrush steppe habitats remain untouched by livestock; 20 percent is lightly grazed, 30 percent moderately grazed with native understory remaining, and 30 percent heavily grazed with understory replaced by invasive annuals. The effects of grazing in sagebrush habitats is complex, depending on intensity, season, duration and extent of alteration to native vegetation.

Extensive and intensive grazing in w. North America has had negative impacts on this species (Bock and Webb 1984).

The legacy of livestock grazing in the Columbia Plateau has had widespread and severe impacts on vegetation structure and composition. One of the most severe impacts in shrub-steppe has been the increased spread of exotic plants (Altman and Holmes 2000, Weddell 2001)

For instance, the grasshopper sparrow has been found to respond positively to light or moderate grazing in tallgrass prairie (Risser *et al.* 1981). However, it responds negatively to grazing in shortgrass, semidesert, and mixed grass areas (Bock *et al*. 1984).

Invasive Grasses. Cheatgrass readily invades disturbed sites, and has come to dominate the grass-forb community of more than half the sagebrush region in the West, replacing native bunchgrasses (Rich 1996). Crested wheatgrass and other non-native annuals have also fundamentally altered the grass-forb community in many areas of sagebrush shrub-steppe, altering shrubland habitats.

The degree of degradation of terrestrial ecosystems is often diagnosed by the presence and extent of alien plant species (e.g., Andreas and Lichvar 1995); frequently their presence is related to soil disturbance and overgrazing. Increasingly, however, aggressive aliens are becoming established even in ostensibly undisturbed bunchgrass vegetation, wherever their seed can reach. The most notorious alien species in the Palouse region are upland species that can dominate and exclude perennial grasses over a wide range of elevations and substrate types (Weddell 2001).

Fire. Cheatgrass has altered the natural fire regime in the western range, increasing the frequency, intensity, and size of range fires. Fire kills sagebrush and where non-native grasses dominate, the landscape can be converted to annual grassland as the fire cycle escalates, removing preferred habitat (Paige and Ritter 1998).

The historical role of fire in the steppe and meadow steppe vegetation of the Palouse region is less clear (Weddell 2001). Daubenmire (1970) dismissed it as relatively unimportant, whereas others conclude that fires were probably more prevalent in the recent past than at present (Morgan *et al*. 1996). The lack of information about the presettlement fire frequency of steppe and meadow steppe ecosystems makes it difficult to emulate the natural fire regime in restored communities.

Studies on the effects of burns on grassland birds in North American grasslands have shown similar results as grazing studies: namely, bird response is highly variable. Confounding factors include timing of burn, intensity of burn, previous land history, type of pre-burn vegetation, presence of fire-tolerant exotic vegetation (that may take advantage of the post-burn circumstances and spread even more quickly) and grassland bird species present in the area. It should be emphasized that much of the variation in response to grassland fires lies at the level of species, but that even at this level results are often difficult to generalize. For instance, Mourning Doves have been found to experience positive (Bock and Bock 1992, Johnson 1997) and negative (Zimmerman 1997) effects by fire in different studies. Similarly, grasshopper sparrow have been found to experience positive (Johnson 1997), negative (Bock and Bock 1992, Zimmerman 1997, Vickery *et al*. 1999), and no significant (Rohrbaugh 1999) effects of fire. Species associated with short and/or open grass areas will most likely experience short-term benefits from fires. Species that prefer taller and denser grasslands most likely will demonstrate a negative response to fire. (CPIF 2000).

Avoid burning during breeding season. Encroachment of woody vegetation in grassland areas will be detrimental to most grassland species. For instance, grasshopper sparrows have been found to be absent from areas with greater than 30% shrub cover. In areas of good grassland bird diversity and productivity, efforts should be made to keep woody vegetation from reducing open grassland habitat. (CPIF 2000).

Mowing/Haying. Mowing and haying affects grassland birds directly and indirectly. It may reduce height and cover of herbaceous vegetation, destroy active nests, kill nestlings and fledglings, cause nest abandonment, and increase nest exposure and predation levels (Bollinger *et al*. 1990). Studies on grasshopper sparrow have indicated higher densities and nest success in areas not mowed until after July 15 (Shugaart and James 1973, Warner 1992). Grasshopper sparrows are vulnerable to early mowing of fields, while light grazing, infrequent and post-season burning or mowing can be beneficial (Vickery 1996).

Brood Parasitism. Grasshopper sparrows may be multiply-parasitized (Elliott 1976, 1978; Davis and Sealy 2000). In Kansas, cowbird parasitism cost grasshopper sparrows about two young/parasitized nest, and there was a low likelihood of nest abandonment occurring due to cowbird parasitism (Elliott 1976, 1978). In Manitoba, mean number of host young fledged from successful, unparasitized nests was significantly higher than from successful, parasitized nests; cowbird parasitism cost Grasshopper Sparrows about 1.3 young/successful nest (Davis and Sealy 2000).

Predators. Predators of the grasshopper sparrow are hawks, Loggerhead Shrikes, mammals and snakes (Vickery 1996).

Appendix D

Out-of-Subbasin Effects and Assumptions

No data is available.

Appendix D

Great Blue Heron (*Ardea herodias*)

The following species account was prepared by: Paul Ashley, Stacy Stoval of the Southeast Washington Ecoregional Assessment in January 2004.

The great blue heron (*Ardea herodias*) is the largest, most widely distributed, and best known of the American herons (Henny 1972). Great blue herons occur in a variety of habitats from freshwater lakes and rivers to brackish marshes, lagoons, mangrove areas, and coastal wetlands (Spendelow and Patton in prep.).

Life History, Key Environmental Correlates, and Habitat Requirements

<u>Life History</u>

Diet. Fish are preferred food items of the great blue heron in both inland and coastal waters (Kirkpatrick 1940; Palmer 1962; Kelsall and Simpson 1980), although a large variety of dietary items has been recorded. Frogs and toads, tadpoles and newts, snakes, lizards, crocodilians, rodents and other mammals, birds, aquatic and land insects, crabs, crayfish, snails, freshwater and marine fish, and carrion have all been reported as dietary items for the great blue heron (Bent 1926; Roberts 1936; Martin *et. al.* 1951; Krebs 1974; Kushlan1978). Fish up to about 20 cm in length dominated the diet of herons foraging in southwestern Lake Erie (Hoffman 1978). Ninety-five percent of the fish eaten in a Wisconsin study were 25 cm in length (Kirkpatrick 1940).

Great blue herons feed alone or occasionally in flocks. Solitary feeders may actively defend a much larger feeding territory than do feeders in a flock (Meyerriecks 1962; Kushlan 1978). Flock feeding may increase the likelihood of successful foraging (Krebs 1974; Kushlan 1978) and usually occurs in areas of high prey density where food resources cannot effectively be defended.

In southeast Washington, blue herons are often seen hunting along rivers and streams. In the winter months they are often seen hunting rodents in alfalfa fields (P. Fowler, WDFW, pers. comm.. 2003).

Reproduction. The great blue heron typically breeds during the months of March - May in its northern range and November through April in the southern hemisphere. The nest usually consists of an egg clutch between three to seven eggs, with clutch size increasing from south to north. Chicks fledge at about two months.

Nesting. Great blue herons normally nest near the tree tops. Usually, nests are about one meter in diameter and have a central cavity 10 cm deep with a radius of 15 cm. This internal cavity is sometimes lined with twigs, moss, lichens, or conifer needles. Great blue herons are inclined to renest in the same area year after year. Old nests may be enlarged and reused (Eckert 1981).

The male gathers nest-building materials around the nest site, from live or dead trees, from neighboring nests, or along the ground, and the female works them into the nest. Ordinarily, a pair takes less than a week to build a nest solid enough for eggs to be laid and incubated. Construction continues during almost the entire nesting period. Twigs are added mostly when the eggs are being laid or when they hatch. Incubation, which is shared by both partners, starts with the laying of the first egg and lasts about 28 days. Males incubate during the days and females at night.

Herons are particularly sensitive to disturbance while nesting. Scientists suggest as a general rule that there should be no development within 300 m of the edge of a heron colony and no disturbance in or near colonies from March to August.

Mortality. The great blue heron lives as long as 17 years. The adult birds have few natural enemies. Birds of prey occasionally attack them, but these predators are not an important limiting factor on the heron population. Draining of marshes and destruction of wetland habitat is the most serious threat. The number of herons breeding in a local area is directly related to the amount of feeding habitat.

Mortality of the young is high: both the eggs and young are preyed upon by crows, ravens, gulls, birds of prey, and raccoons. Heavy rains and cold weather at the time of hatching also take a heavy toll. Pesticides are suspected of causing reproductive failures and deaths, although data obtained up to this time suggest that toxic chemicals have not caused any decline in overall population levels.

<u>Habitat Requirements</u>

Minimum Habitat Area. Minimum habitat area is defined as the minimum amount of contiguous habitat that is required before a species will live and reproduce in an area. Minimum habitat area for the great blue heron includes wooded areas suitable for colonial nesting and wetlands within a specified distance of the heronry where foraging can occur. A heronry frequently consists of a relatively small area of suitable habitat. For example, heronries in the Chippewa National Forest, Minnesota, ranged from 0.4 t o 4.8 ha in size and averaged 1.2 ha (Mathisen and Richards 1978). Twelve heronries in western Oregon ranged from 0.12 t o 1.2 ha in size and averaged 0.4 ha (Werschkul *et. al.* 1977).

Foraging. Short and Cooper (1985) provide criteria for suitable great blue heron foraging habitat. Suitable great blue heron foraging habitats are within 1.0 km of heronries or potential heronries. The suitability of herbaceous wetland, scrub-shrub wetland, forested wetland, riverine, lacustrine or estuarine habitats as foraging areas for the great blue heron is ideal if these potential foraging habitats have shallow, clear water with a firm substrate and a huntable population of small fish. A potential foraging area needs to be free from human disturbances several hours a day while the herons are feeding. Suitable great blue heron foraging areas are those in which there is no human disturbance near the foraging zone during the four hours following sunrise or preceding sunset or the foraging zone is generally about 100m from human activities and habitation or about 50m from roads with occasional, slow-moving traffic.

A smaller energy expenditure by adult herons is required to support fledglings if an abundant source of food is close to the nest site than if the source of food is distant. Nest sites frequently are located near suitable foraging habitats. Social feeding is strongly correlated with colonial nesting (Krebs 1978), and a potential feeding site is valuable only if it is within "commuting" distance of an active heronry. For example, 24 of 31 heronries along the Willamette River in Oregon were located within 100m of known feeding areas (English 1978). Most heronries along the North Carolina coast were located near inlets, which have large concentrations of fish (Parnell and Soots 1978). The average distance from heronries to inlets was seven to eight kilometers. The average distance of heronries to possible feeding areas (lakes 140 ha in area) varied from 0 to 4.2 km and averaged 1.8 km on the Chippewa National Forest in Minnesota (Mathisen and Richards 1978). Collazo (1981) reported the distance from the nearest feeding grounds to a heronry site as 0.4 and 0.7 km. The maximum observed flight distance from an active heronry to a foraging area was 29 km in Ohio (Parris and Grau 1979).

Great blue herons feed anywhere they can locate prey (Burleigh 1958). This includes the terrestrial surface but primarily involves catching fish in shallow water, usually 150m deep (Bent 1926; Meyerriecks 1960; Bayer 1978).

Thompson (1979b) reported that great blue herons along the Mississippi River commonly foraged in water containing emergent or submergent vegetation, in scattered marshy ponds, sloughs, and forested wetlands away from the main channel. He noted that river banks, jetties, levees, rip-rapped banks, mudflats, sandbars, and open ponds were used to a lesser extent. Herons near southwestern Lake Erie fed intensively in densely vegetated areas (Hoffman 1978).

Other studies, however, have emphasized foraging activities in open water (Longley 1960; Edison Electric Institute 1980). Exposed mud flats and sandbars are particularly desirable foraging sites at low tides in coastal areas in Oregon (Bayer 1978), North Carolina (Custer and Osborn 1978), and elsewhere (Kushlan 1978). Cooling ponds (Edison Electric Institute 1980) and dredge spoil settling ponds (Cooper *et. al.* in prep.) also are used extensively by foraging great blue herons.

Water. The great blue heron routinely feeds on soft animal tissues from an aquatic environment, which provides ample opportunity for the bird to satisfy its physiological requirements for water.

Cover. Cover for concealment does not seem to be a limiting factor for the great blue heron. Heron nests often are conspicuous, although heronries frequently are isolated. Herons often feed in marshes and areas of open water, where there is no concealing cover.

Reproduction: Short and Cooper (1985) describe suitable great blue heron nesting habitat as a grove of trees at least 0.4 ha in area located over water or within 250m of water. These potential nest sites may be on an island with a river or lake, within a woodland dominated swamp, or in vegetation near a river or lake. Trees used as nest sites are at least five meters high and have many branches at least 2.5 cm in diameter that are capable of supporting nests. Trees may be alive or dead but must have an "open canopy" that allows an easy access to the nest. The suitability of potential heronries diminishes as their distance from current or former heronry sites increases because herons develop new heronries in suitable vegetation close to old heronries.

A wide variety of nesting habitats is used by the great blue heron throughout its range in North America. Trees are preferred heronry sites, with nests commonly placed from five to 15 m above ground (Burleigh 1958; Cottrille and Cottrille 1958; Vermeer 1969; McAloney 1973). Smaller trees, shrubs, reeds (*Phragmites communis*), the ground surface, rock ledges along coastal cliffs, and artificial structures may be utilized in the absence of large trees, particularly on islands (Lahrman 1957; Behle 1958; Vermeer 1969; Soots and Landin 1978; Wiese 1978). Most great blue heron colonies along the Atlantic coast are located in riparian swamps (Ogden 1978). Most colonies along the northern Gulf coast are in cypress - tupelo (*Taxodium Nyssa*) swamps (Portnoy 1977). Spendelow and Patton (in prep.) state that many birds in coastal Maine nest on spruce (*Picea spp*.) trees on islands. Spruce trees also are used on the Pacific coast (Bayer 1978), and black cottonwood (*Populus trichocarpa*) trees frequently are used as nest sites along the Willamette River in Oregon (English 1978). Miller (1943) stated that the type of tree was not as important as its height and distance from human activity. Dead trees are commonly used as nest sites (McAloney 1973). Nests usually consist of a platform of sticks, sometimes lined with smaller twigs (Bent 1926; McAloney 1973), reed stems (Roberts 1936), and grasses (Cottrille and Cottrille 1958).

Heron nest colony sites vary, but are usually near water. These areas often are flooded (Sprunt 1954; Burleigh 1958; English 1978). Islands are common nest colony sites in most of the great blue heron's range (Vermeer 1969; English 1978; Markham and Brechtel 1979). Many colony sites are isolated from human habitation and disturbance (Mosely 1936; Burleigh 1958). Mathisen and Richards (1978) recorded all existing heronries in Minnesota as at least 3.3 km from human dwellings, with an average distance of 1.3 km to the nearest surfaced road. Nesting great blue herons may become habituated to noise (Grubb 1979), traffic (Anderson 1978), and other human activity (Kelsall and Simpson 1980). Colony sites usually remain active until the site is disrupted by land use changes.

A few colony sites have been abandoned because the birds depleted the available nest building material and possibly because their excrement altered the chemical composition of the soil and the water. Heron exretia can have an adverse effect on nest trees (Kerns and Howe 19667; Wiese 1978).

Population and Distribution

Population

Historic. In the past, herons and egrets were shot for their feathers, which were used as cooking utensils and to adorn hats and garments, and they also provided large, accessible targets. The slaughter of these birds went relatively unchecked until 1900 when the federal government passed the Lacey Act, which prohibits the foreign and interstate commercial trade of feathers. Greater protection was afforded in 1918 with the Migratory Bird Treaty Act, which empowered the federal government to set seasons and bag limits on the hunting of waterfowl and waterbirds. With this protection, herons and other birds have made dramatic comebacks.
In southeast Washington, few historical colonies have been reported. The Foundation Island colony is the oldest, but has been taken over by cormorants. It appears blue herons numbers in the colony have declined significantly.

One colony was observed from a helicopter in 1995 on the Touchet River just upriver from Harsha, but that colony appears to have been destroyed by a wind storm (trees blown down), and no current nesting has been observed in the area (Fowler per. com.)

Current. The great blue heron breeds throughout the U.S. and winters as far north as New England and southern Alaska (Bull and Farrand 1977). The nationwide population is estimated at 83,000 individuals (NACWCP 2001).

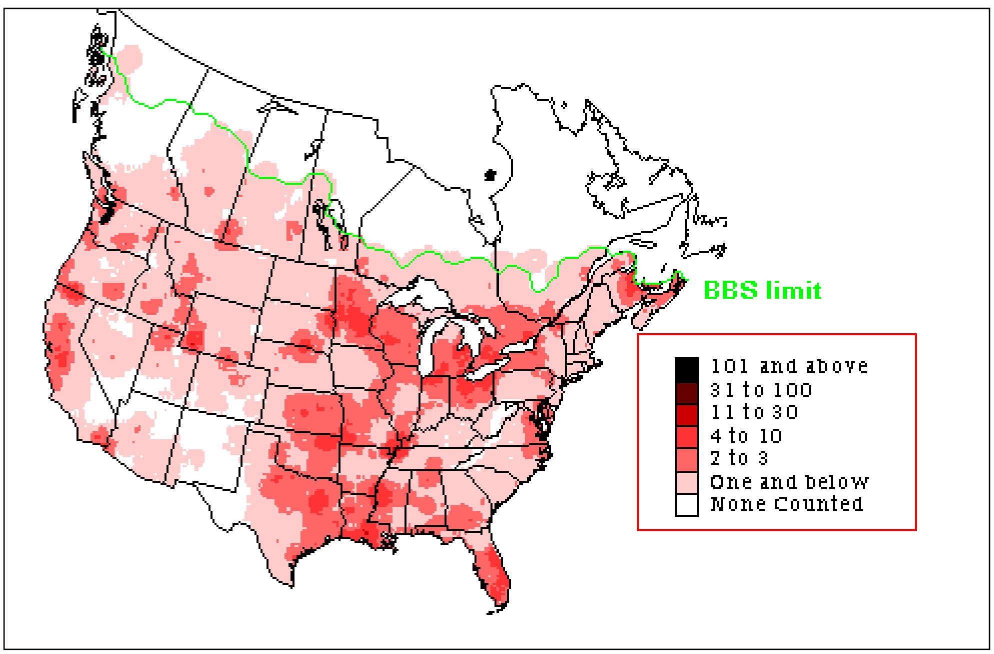
In southeast Washington, three new colonies have been discovered over the last few years. One colony on the Walla Walla River contains approximately 24 nests. This colony has been active for approximately 12 years. Two new colonies were discovered in 2003, one on a railroad bridge over the Snake River at Lyons Ferry, and one near Chief Timothy Park on the Snake River. The Lyons Ferry colony contained approximately 11 nests, and the Chief Timothy colony five nests (P. Fowler, WDFW, personal communication, 2003).

<u>Distribution</u>

Two known heron rookeries occur within the Walla Walla subbasin, one on the Walla Walla and one on the Touchet River (NPPC 2001). The Walla Walla River rookery contains approximately 13 active nests. The Touchet River rookery contains approximately 8-10 active nests. Blue herons are observed throughout the lowlands of southeast Washington near rivers or streams (P. Fowler, WDFW, personal communication, 2003).

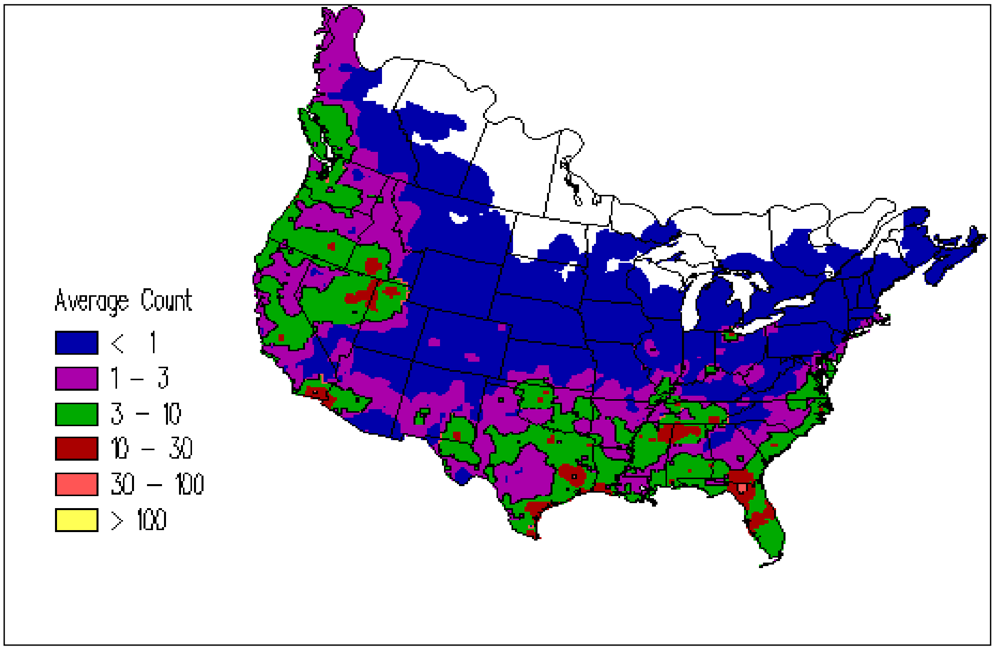
Historic. No data are available.

Current.

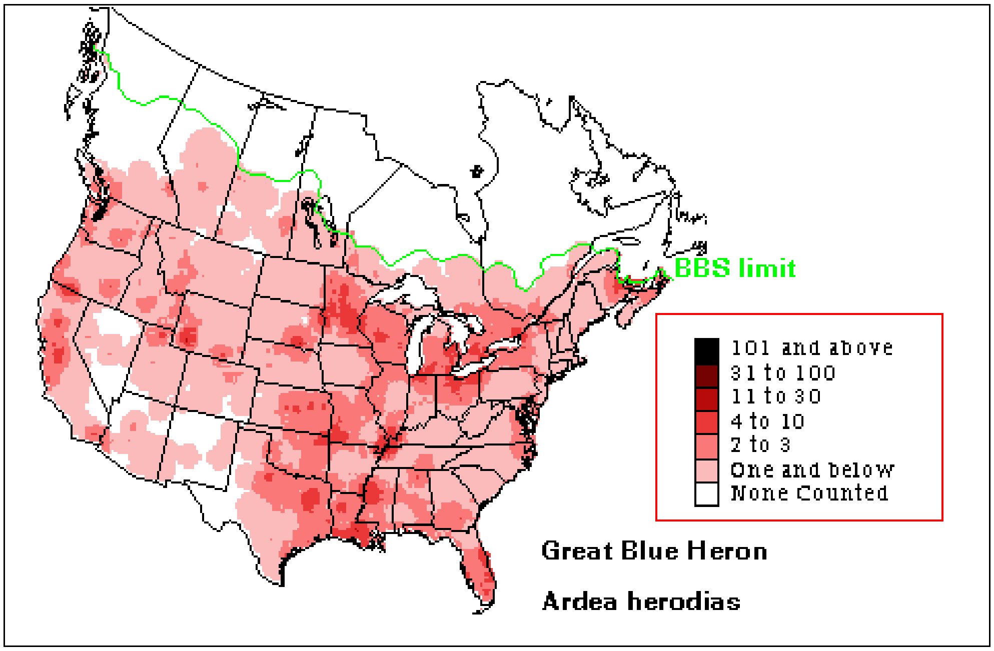


Great blue heron summer distribution from Breeding Bird Survey (BBS) data (Sauer *et. al.* 2003).

Appendix D



Great blue heron breeding distribution from Breeding Bird Survey (BBS) data (Sauer *et. al.* 2003).



Great blue heron winter distribution from Christmas Bird Count (CBC) data (Sauer *et. al.* 2003).

Appendix D

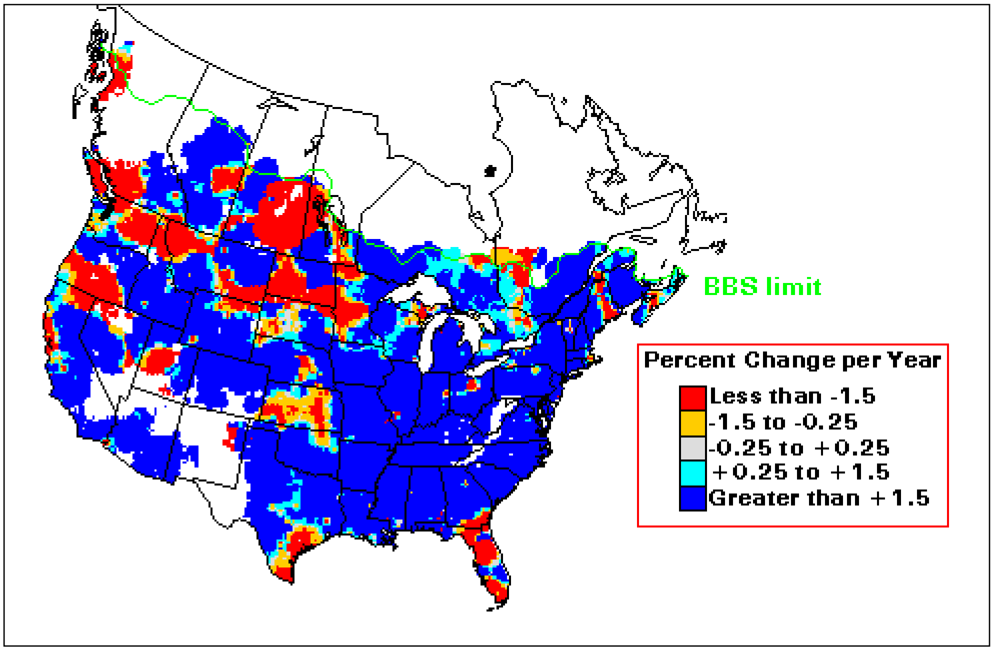
Status and Abundance Trends

<u>Status</u>

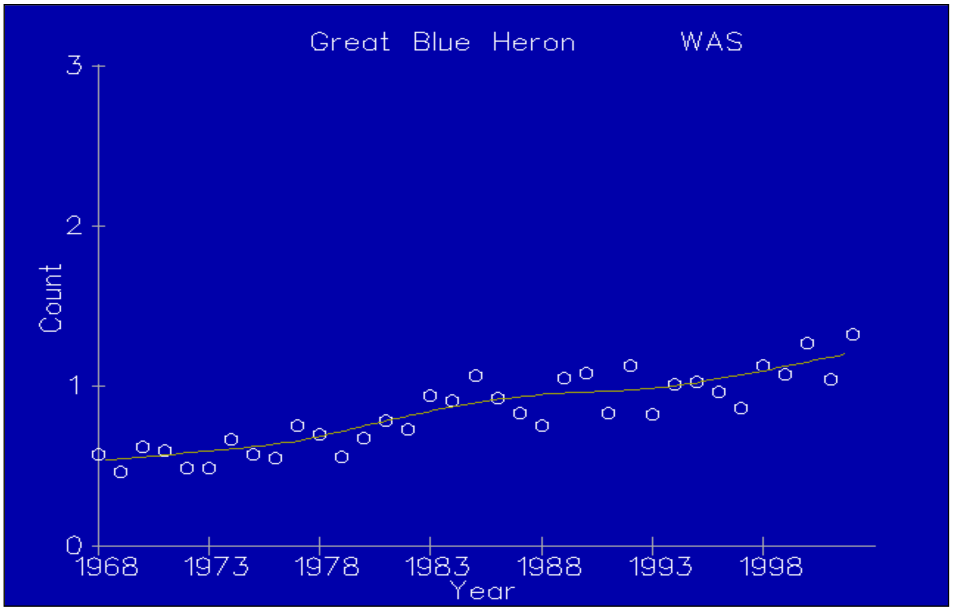
Surveys of blue heron populations are not conducted. However, populations appear to be stable and possibly expanding in some areas. Two new nesting colonies have been found in on the Lower Snake River (P. Fowler, WDFW, personal communication, 2003).

<u>Trends</u>

Populations in southeast Washington appear to be stable, and may actually be increasing.



Great blue heron Breeding Bird Survey (BBS) trend results: 1966-1996 (Sauer *et. al.* 2003).



Geat blue heron Breeding Bird Survey (BBS) Washington trend results: 1966-2002 (Sauer *et. al.* 2003).

Factors Affecting Population Status

Key Factors Inhibiting Populations and Ecological Processes
Habitat destruction and the resulting loss of nesting and foraging sites, and human disturbance probably have been the most important factors contributing to declines in some great blue heron populations in recent years (Thompson 1979a; Kelsall and Simpson 1980; McCrimmon 1981).

Habitat Loss. Natural generation of new nesting islands, created when old islands and headlands erode, has decreased due to artificial hardening of shorelines with bulkheads. Loss of nesting habitat in certain coastal sites may be partially mitigated by the creation of dredge spoil islands (Soots and Landin 1978). Several species of wading birds, including the great blue heron, use coastal spoil islands (Buckley and McCaffrey 1978; Parnell and Soots 1978; Soots and Landin 1978). The amount o f usage may depend on the stage of plant succession (Soots and Parnell 1975; Parnell and Soots 1978), although great blue herons have been observed nesting in shrubs (Wiese 1978), herbaceous vegetation (Soots and Landin 1978), and on the ground on spoil islands.

Water Quality. Poor water quality reduces the amount of large fish and invertebrate species available in wetland areas. Toxic chemicals from runoff and industrial discharges pose yet another threat. Although great blue herons currently appear to tolerate low levels of pollutants, these chemicals can move through the food chain, accumulate in the tissues of prey and may eventually cause reproductive failure in the herons.

Several authors have observed eggshell thinning in great blue heron eggs, presumably as a result of the ingestion of prey containing high levels of organochlorines (Graber *et. al.* 1978; Ohlendorf *et. al.* 1980). Konermann *et. al.* (1978) blamed high levels of dieldrin and DDE use for reproductive failure, followed by colony abandonment in Iowa. Vermeer and Reynolds (1970) recorded high levels of DDE in great blue herons in the prairie provinces of Canada, but felt that reproductive success was not diminished as a result. Thompson (1979a) believed that it was too early to tell if organochlorine residues were contributing to heron population declines in the Great Lakes region.

Human Disturbance. Heronries often are abandoned as a result of human disturbance (Markham and Brechtel 1979). Werschkul *et. al.* (1976) reported more active nests in undisturbed areas than in areas that were being logged. Tree cutting and draining resulted in the abandonment of a mixed-species heronry in Illionois (Bjorkland 1975). Housing and industrial development (Simpson and Kelsall 1979) and water recreation and highway construction (Ryder *et. al.* 1980) also have resulted in the abandonment of heronries. Grubb (1979) felt that airport noise levels could potentially disturb a heronry during the breeding season.

Appendix D

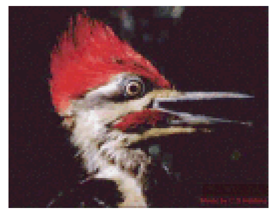
Pileated Woodpecker (*Dryocopus pileatus*) (Linnaeus, 1758)

Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Migration Status. Permanent resident

Breeding Habitat. Woodland



Nest Type. Cavity

Clutch Size. Three to Five

Length of Incubation. 15-18 days

Days to Fledge. 26-28

Number of Broods. One

Diet. Feeds extensively on carpenter ants (CAMPONOTUS spp.) and beetle larvae obtained by chiseling into standing trees, stumps, and logs; also digs into anthills on ground and eats other insects, fruits, and seeds (Hoyt 1957). In Wisconsin, Nicholls (1994) found the cerambycid wood borer, TRIGONARTHRIS, to be the major prey of pileated woodpeckers feeding at dead American elms (ULMUS AMERICANA). The preference of the birds for feeding at larger trees seemed related to the requirement of the beetles for larger trees as their habitat. There tends to be seasonal variation in the diet and foraging strategy to take advantage of available foods. More fruit and seeds are taken in late summer and fall (Conner 1979, Hoyt 1948, Sprunt and Chamberlain 1970); more excavation for arthropods is done in winter (Conner 1979, Hoyt 1948, Pfitzenmeyer 1956, Tanner 1942). Quantitative studies of diet include stomach content and scat analysis. In a range-wide, year-round study, Beal (1911) found 80 stomachs to include 22% beetles (Cerambycidae, Buprestidae, Elateridae, Lucanidae, Scarabaeidae, Carabidae), 40% ants (CAMPONOTUS sp., CREMATOGASTER sp.), 11% other insects, and 27% vegetable (numerous fruits, see Bull and Jackson 1995). Analyses of 330 scats in Oregon revealed 68% carpenter ants, 29% thatching ants (FORMICA), 0.4% beetles, and 2% other. The species is opportunistic, known to take advantage of insect outbreaks (e.g., western spruce budworm (CHORISTONEURA OCCIDENTALIS) Bull and Jackson 1995), the progression of fruiting trees in an area (Stoddard 1978), and to visit suet feeders in many areas of eastern North America (Connecticut, Hardy 1958; Mississippi, Jackson, pers. obs.; Tennessee, Spofford 1947; Georgia, Stoddard 1978; Minnesota, Tusler 1958).

Logs and stumps are important foraging substrates in many areas (e.g., Mannan 1984, Renken and Wiggers 1989, Schardien and Jackson 1978), but Aubry and Raley (1992) rarely observed foraging on logs in closed canopy forests of western Washington. Mannan (1984) found the pileated to forage on dead wood substrates 96% of the time.

Reproduction. Pairs share a territory year round (Bull and Jackson 1995). On warm days of February and early March in the southeastern U.S. and March through early April in northern areas there is an increase in vocalizations and drumming associated with pair formation and increased territoriality. Vocalizations and drumming take place with greatest frequency in early morning and late afternoon (Hoyt 1941). Courtship behavior is described in detail by Kilham (1979, 1983), with additional details and circumstances by Arthur (1934), Hoyt (1944), and Oberman (1989). Nest construction, egg-laying, hatching, and fledging are also progressively later from south to north (Bull and Jackson 1995) and likely from lower to higher altitudes (at least in California, Harris 1982).

Early egg dates in the southern U.S. are in early March; late egg dates, from northern areas, are in mid-June. Similarly, nestlings have been found from mid-May in the southeast to mid-July in the north (Bull and Jackson 1995, Peterjohn 1989). Young remain with adults at least through late summer or early fall. Clutch size is usually three to four throughout the range (Bent 1939, Christy 1939); a clutch of six was reported by Audubon and Chevalier (1842). Incubation takes 15-19 days (Bendire 1895, Hoyt 1944, Kilham 1979), by both sexes. Young are tended by both parents, leave nest at 22-26 days (Hoyt 1944, Bull and Jackson 1995).

Longevity records thus far include several birds surviving for nine years (Bull and Jackson 1995, Bull and Meslow 1988, Hoyt and Hoyt 1951, Hoyt 1952). However, through 1981, there had only been 15 recoveries from a total of 670 banded (Clapp *et. al.* 1983), thus it is quite possible that this species could live much longer.

Migration. Although generally considered to be a resident species, there is evidence of some migratory movement in the northern part of its range. Hall (1983) reported a small southward movement of pileated woodpeckers in fall along the Allegheny Front of West Virginia. Sutton (1930) also noted gradual southward movement in fall through New York State. In British Columbia, the paucity of winter records in the northern half of the province indicates that many breeding individuals there move considerable distances to the south (Campbell *et. al.* 1990).

Threats. Major threats are (from greatest to least): (1) conversion of forest habitats to non-forest habitats, (2) short rotation, even-age forestry, (3) monoculture forestry, (4) forest fragmentation, (5) removal of logging residue, downed wood, and pine straw that would ultimately put nutrients back into the ecosystem and provide foraging substrate, (6) lightning striking cavity/roost trees because they are the oldest, tallest trees around as a result of cutting priorities, (7) deliberate killing by humans, and (8) toxic chemicals. The first four threats are ones that have been a major concern for some time. As an example of habitat losses, nonfederal forested wetlands decreased by five million acres in the continental U.S. between 1982 and 1987 (Cubbage and Flather 1992). Forest fragmentation has been recognized as a major problem for many wildlife species (e.g., Wilcove 1990), but it results in habitat changes within as well as between fragments. In the southeast, smaller fragments tend to become drier (hence less conducive to conditions favorable to the pileated) and also change in plant species composition and tend towards younger successional stages (Rudis 1992). Removal of logging residue, downed wood, and pine straw from forested areas is becoming increasingly common. Considerable research directed at finding ways to maximize economic returns from the forest through such actions is being conducted by the U.S. Forest Service and others (e.g., Howard and Setzer 1989) and pine straw is currently sold on some southern forests. Removing these materials not only removes the nutrients they contain and foraging substrates for pileated woodpeckers and others, but also changes the water balance of the forest floor, making the forest a drier environment less suitable for the arthropod fauna the woodpecker is dependent on. Shooting by humans was a serious problem in the past (e.g., Sclater 1912, Stoddard 1947) and continues in some areas (Jackson, pers.obs.). The birds are an impressive and easy target and in some quarters are considered to harm trees. Becker (1942) offered one of the most detailed accounts of the disappearance of the species. Toxic chemicals can affect woodpeckers in two ways: (1) by direct poisoning and (2) by killing their arthropod prey. Careless use of agricultural chemicals and widespread control programs such as have been conducted in the past against the imported fire ant can have both affects. In addition, when woodpeckers nest in chemically treated utility poles, embryos or chicks can be killed by the fumes (Rumsey 1970). In the eastern U.S., rat snakes (ELAPHE OBSOLETA) have been reported as nestling predators (Gress and Wiens 1983, Kilham 1959, Moore 1984). Both sharp-shinned (ACCIPITER STRIATUS; Smith 1983) and Cooper's (A. COOPERI; Michael 1921) hawks are known as potential predators on pileated woodpeckers. Erdman (pers. comm.) has found remains of adults and juveniles at goshawk (A. GENTILIS) nests in Wisconsin. The sharp-shinned hawk is certainly more of a threat to fledglings than to adults. Todd (1944) reported predation by a gray fox (UROCYON CINEREOARGENTEUS) on a ground-feeding pileated in Tennessee. Because they feed extensively on the ground, woodpeckers are vulnerable to being killed by vehicles as they approach or leave feeding sites (e.g., Eifrig 1944), an argument for keeping downed wood away from highway rights-of-ways.

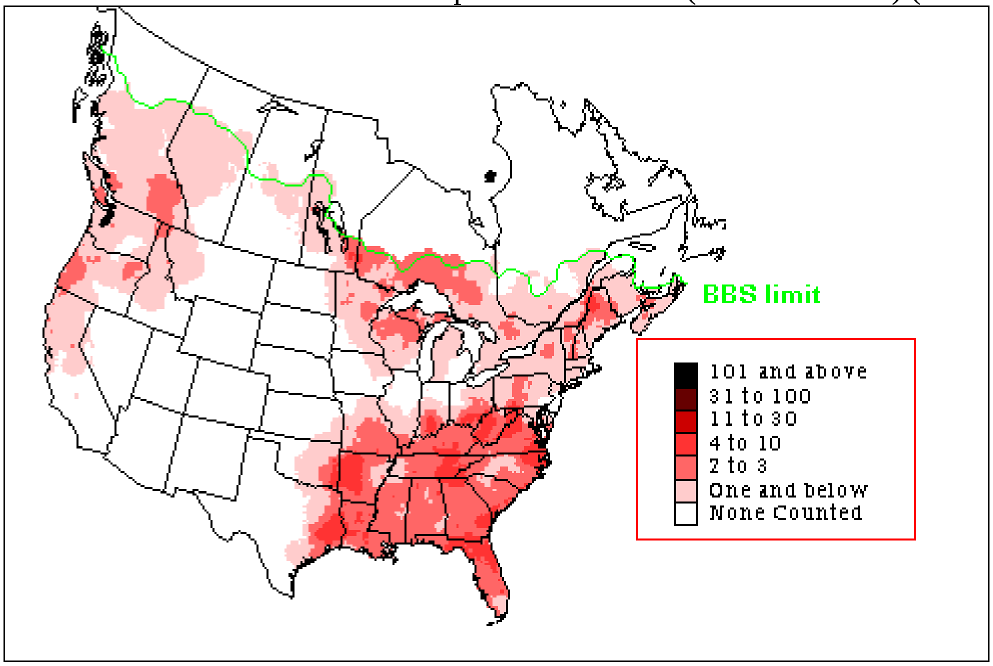
Habitat Requirements (Nesting, Breeding, Non-breeding):

General. Dense deciduous (favored in southeast), coniferous (favored in north, northwest and west), or mixed forest, open woodland, second growth, and (locally) parks and wooded residential areas of towns. Prefers woods with a tall closed canopy and a high basal area. Most often in areas of extensive forest or minimal isolation from extensive forest. Uses a minimum of four cavities per year (only one for raising brood).

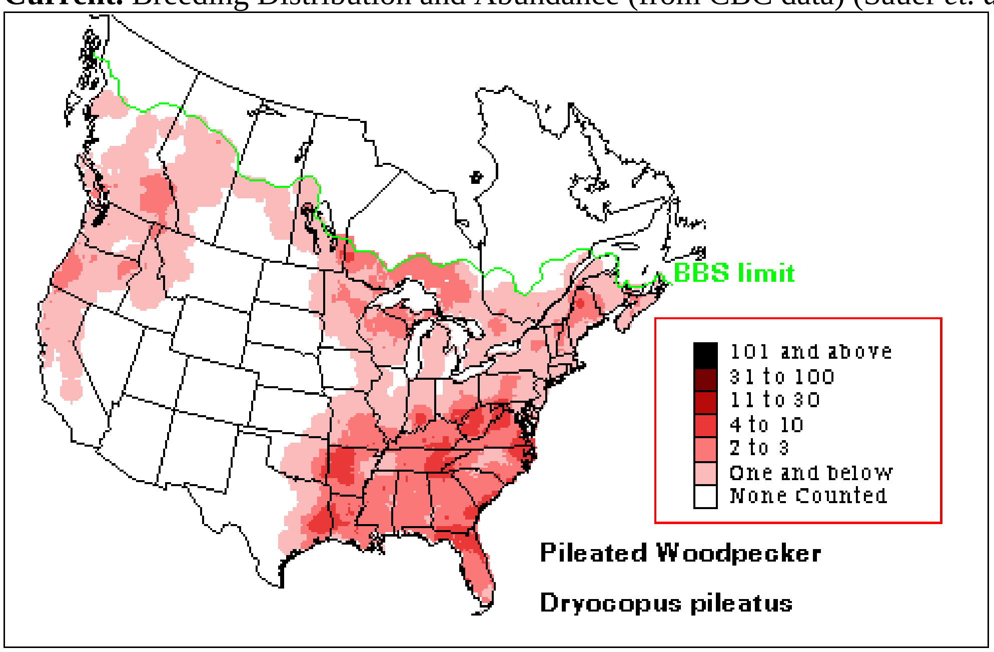
Nesting. Nests are in cavities excavated by both sexes usually in dead stubs in shaded places; cavity entrance averages about 14 m above ground (see photos and descriptions in Harrison 1975, 1979). Usually digs a new hole for each year's brood, but the same cavity may be used for several years. Nest tree species and size varies among regions and even within regions depending on site and availability. In southern British Columbia, preferred nest sites were in live aspen with heartwood decay, in trees larger than 40 cm dbh (Harestad and Keisker 1989). In northwest Montana, most of 54 nest trees were large western larch (LARIX OCCIDENTALIS) and nest trees averaged 74.9 cm dbh (McClelland 1979). In northeast Oregon, 75% of nest trees were ponderosa pine (PINUS PONDEROSA) and mean dbh of nest trees was 84 cm (Bull 1987). In western Oregon, 73% of nest trees were Douglas-fir (PSEUDOTSUGA MENZIESII) and nest trees averaged 69 cm dbh (Mellen 1987). In Virginia, 28% of nest trees were hickory (CARYA spp.), 22% red oak (QUERCUS RUBRA), 17% chestnut oak (Q. PRINUS) and nest trees averaged 54.6 cm dbh (Conner *et. al.* 1975). Most studies report nests 5-17 m above ground in wood softened by fungal rot, in trees usually 100-180 years old, over 51 cm DBH, 12-21 m tall, and often near permanent water (Bushman and Therres 1988).

Population and Distribution

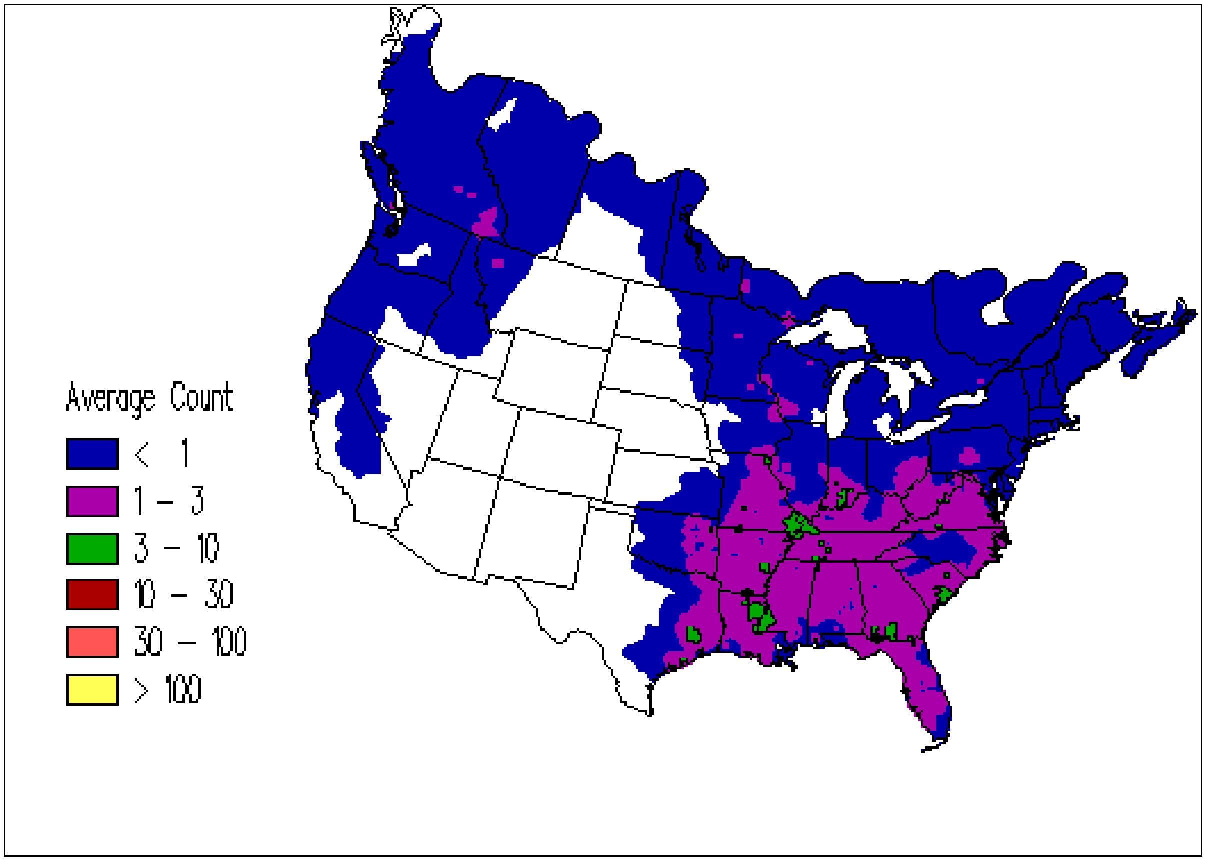
Current. Summer Distribution Map and Abundance (from CBC data) (Sauer *et. al.* 2003)

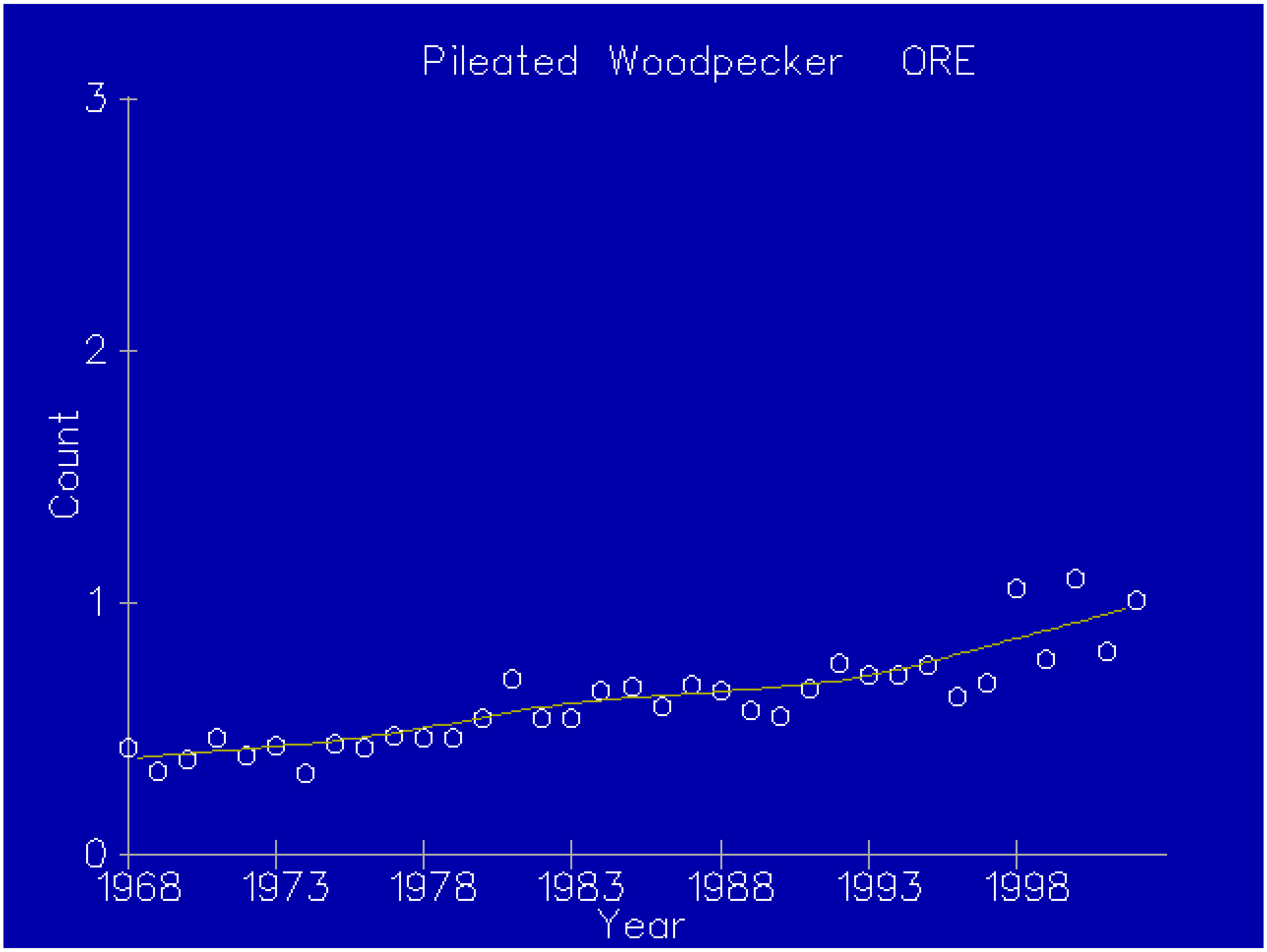


Current. Breeding Distribution and Abundance (from CBC data) (Sauer *et. al.* 2003)



Current. Winter distribution from CBC





Pileated Woodpecker Population Trend Data, Oregon (From BBS)

Red-Naped Sapsucker (*Sphyrapicus nuchalis*)

The red-naped sapsucker (*Sphyrapicus nuchalis*) occurs in the inland West, inhabiting montane coniferous forests mixed with deciduous groves of aspen (*Populus spp*.), cottonwood (*Populus spp.*), and willow (*Salix spp*.). The sapsucker creates nest cavities and sap wells that are used by other birds, mammals and insects. Considered a double key stone species as its nest cavities are sued by secondary cavity-nesters and its sp wells provide food for a variety of other animal, from insects to other birds to squirrels (Daily *et. al*. 1993). Locally common, populations are generally stable to increasing, but there is concern over loss of aspen and cottonwood nesting habitat and large snags for nest cavities.

Life History, Key Environmental Correlates, and Habitat Requirements

<u>Life History</u>

Diet. In general, the sapsucker diet includes sap, cambium and soft parts beneath the bark. Neat rows of holes are drilled in the bark or the bark may be removed in strips to collect the oozing sap and insects attracted to it (Marshall *et. al*. Eds. 2003). Rows of small holes are drilled in conifer and broad-leaved trees and the sapsucker. The amount of sap taken and tree species used vary seasonally (Scott *et. al.* 1977). Sap is most important in seasons when insects are not abundant. The sapsucker also feeds on insects caught in the sap. Other foods items the bird feeds on include tree cambium, ants, larvae, beetles, wasps, caterpillars, and small amounts of fruit and berries (Scott *et. al*. 1977, Marshall *et. al*. Eds. 2003). (NatureServe 2003)

Reproduction. Courtship and territorial displays may involve drumming and posturing and calling during the breeding season. Territories for red naped sapsucker range from 1.6 to greater than 14.6 acres (Marshall *et. al*. Eds. 2003). In the Pacific Northwest, territory size reported to be about 10 acres (Bull 1978 in NatureServe 2003) in size. In California, defends territories 0.6 to 6.0 hectares in size (USDA Forest Service 1994 in NatureServe 2003). Both sexes begin excavating a nest cavity before copulating. Three to seven eggs are laid and young are in the nest cavity from mid-May to late July (Gabrielson and Jewett 1970, and Anderson 1988e, Anderson 1989d, and Spencer 2000b in Marshall *et. al*. Eds. 2003)

The red-naped sapsucker is known to hybridize with red-breasted sapsucker (*Sphyrapicus ruber*) and yellow-bellied sapsucker (*Sphyrapicus varius*) where distributions overlap. The outcome may produce viable hybrid offspring; hybrid and backcross mating (Scott *et. al*. 1976, Johnson and Johnson 1985 *in* NatureServe 2003).

Nesting. Typically, four to five eggs are laid and incubated by both female and male sapsuckers. Eggs are incubated 12-13 days and fledging occurs in 25-26 day; both sexes attend young (Ehrlich *et. al*. 1988 *in* NatureServe 2003). In Colorado, nests with eggs were recorded throughout June. Nestlings were noted from late June to mid-July in Montana and Wyoming (Johnsgard 1986 *in* NatureServe 2003). In central Arizona, 100 percent of 18 nests monitored successfully fledged young (Li and Martin 1991 *in* NatureServe 2003). Re-use of same nest tree, but with a new cavity, each year suggests strong site fidelity (USDA Forest Service 1994 *in* NatureServe 2003).

Migration. The red-naped sapsucker is a local migrant and a long distance migrant. Arrives in northern Rocky Mountains mainly April-May, with peak arrival from late April to early May. Fall migration occurs from mid August o mid October (Gabrielson and Jewett 1970). The red-naped woodpecker is a transient and winter visitor in northwestern Mexico from late September to mid-April (Howell and Webb 1995 *in* NatureServe 2003).

Mortality. No information is available on survival rates.

Harvest. Not applicable.

<u>Habitat Requirements</u>

The red-naped sapsucker responds to habitat mosaic that includes broad-leaved trees (e.g. aspen, birch, and cottonwood) for nesting and adjacent coniferous forest and/or willows for foraging (Ehrlich and Daily 1988 *in* NatureServe 2003, Tobalske 1992). Typically found in riparian habitats especially aspen, as well as cottonwoods, alders, and pine forest, and less frequently in mixed conifer forests (Marshall *et. al*. Eds. 2003). Known to use natural edges of mature conifer and deciduous hardwood habitats. Gabrielson and Jewett (1970) and Browning (1973b *in* Marshall *et. al*. Eds. 2003) found sapsucker nests more abundant between 6,000 and 7,000 feet in the Blue Mountains. Numerous nests were found in two area of south-central Oregon, at elevations from 5,200-6,600 feet and 6,650-7,550 feet (Dobkin *et. al*. 1995 and Trombino 1998 *in* Marshall *et. al*. Eds. 2003).

In a Colorado study, abundance did not vary with differences in understory (herbaceous, short shrub, tall shrub) of mature aspen stands (Finch and Reynolds 1987 *in* NatureServe 2003). In a study of Idaho cottonwoods gallery forest, there appeared to be no significant sensitivity to patch size, although birds were more often detected in large patches (more than 25-495 ac. 0.21 birds per point count visit) than in small patches (less than 2-7 acres; 0.12 birds per point count visit; Saab 1998).

Will use forest edges and logged forests, but extensive clearcuts or the removal of snags and preferred tree species would be detrimental. Also will use burns, partially cut forests and small clearcuts where snags and live hardwood trees remain and adjacent forest is available for foraging (Bock and Lynch 1970,and Tobalske 1992 *in* NatureServe 2003).

Nesting. A primary cavity nester, excavates a nest hole in a snag or a living tree with a dead or rotten interior, and shows a strong preference for aspen (Johnsgard 1986, Li and Martin 1991, and Daily *et. al*. 1993 *in* NatureServe 2003). The red-naped sapsucker will also use cottonwood (*Populus spp.*), alder (*Alnus spp.*), western larch (*Larix occidentalis*), ponderosa pine, lodgepole pine ((*Pinus contorta*); USDA 1991. Aspen nest trees often have heartwood decay brought about by shelf fungus (*Fomes igniarius var. populinus*), a heart rot that infects roots and dead branch stubs and spreads from the base of trees upward, but leaves the sapwood intact (Kilham 1971, Crockett and Hadow 1975, Daily *et. al*. 1993, and Dobkin *et. al*. 1995 *in* NatureServe 2003). Seventy-two percent of live aspen with woodpecker-excavated cavities at Hart Mountain had visible fungi. Of the 25 nests in riparian and snowpocket aspen woodlands on Hart Mountain, 92-100 percent were in aspens. Dead trees (8%) and live trees (92%) were used in proportion to availability (Dobkin *et. al*. 1995).

In a Colorado study; sapsuckers placed the first nest cavity close to ground and then excavated progressively higher cavities in subsequent years. Nest cavities were usually freshly excavated during the season of use and most nests were in trees bearing nest cavities excavated during previous years. Nest height averaged 8.8 feet in trees with no other cavities and 19.7 feet in trees with more than one cavity (Daily *et. al*. 1993). In a study in Colorado and Wyoming, sapsuckers used both healthy aspen and aspen infected by shelf fungus, nested in trees 6.7 to 16.5 inches dbh (mean 12.2 inches dbh) and used cavities that were 3.3 to 36 feet high (mean 16.4 feet; Crockett and Hadow 1975).

In the Hart Mountain study (Dobkin *et. al*. 1995 *in* NatureServe 2003) mean diameter at breast height was 10.8 inches, tree height was 47.9 feet, cavity height was 13.8 feet and entrance diameter was 1.7 inches. Less than 4 percent of all aspens were greater than 33 feet in height and greater than nine inches in diameter at breast height, yet were preferred as nest trees. No nests were located along the riparian woodland edge nor were any oriented in that direction. Nest trees on average were located 65.6 feet from edges, and the mean canopy cover was 76 percent (Dobkin *et. al*. 1995 *in* Marshall *et. al*. Eds. 2003).

In Oregon and Washington, the red-naped was reported to nest in snags greater than or equal to 10 inches diameter breast height and nest heights at least 15 feet in height (Thomas *et. al*. 1979). In the Blue Mountains of northeast Oregon, of eight nests, seven (88%) were within 330 feet of open water. Nests were in western larch, lodgepole pine, Douglas-fir, grand fir, and ponderosa pine; two were in live trees. Trees retained 70-100 percent of original bark and were likely dead less than 10 years. Mean diameter at breast height was 20 inches, trees height was 66 feet, and cavity height was 30 feet (Bull 1980 *in* Marshall *et. al*. Eds. 2003). In western larch/Douglas-fir (Pseudotsuga *menziesii*) forests of northwestern Montana, red-naped sapsuckers nested in both small and large trees, ranging from 22 to 46.8 inches diameter at breast height and averaging 22.8 inches diameter at breast height (McClelland *et. al*. 1979 *in* NatureServe 2003).

In mixed coniferous forest in northeast Oregon, densities per 100 acres were 0-0.5 in old growth (Mannan 1982 *in* Marshall *et. al*. Eds. 2003). In mixed coniferous and aspen forest (six sights ranging from one to 98 percent aspen) at 9,000 feet on the west slope of the Rocky Mountains, in Colorado densities ranged 0-3 birds per 100 acres (Scott and Crouch *in* Marshall *et. al*. Eds. 2003).

Breeding. The red-naped sapsucker primarily breeds in coniferous forests that include aspen and other hardwoods vegetation types. In the Northern Rockies, most abundant in cottonwood and aspen forests, also observed in other riparian cover types and in harvested conifer forests. Of harvest types, most observations were in patch cuts, seed-tree cuts, clearcuts and older clearcuts. Birds in harvested stands and in drier conifer forests were probably associated with patches of deciduous trees (Hutto and Young 1999 *in* NatureServe 2003). In the Centennial Mountains, Idaho, the sapsucker uses xeric tall willow (*Salix spp*.) communities (Douglas *et. al*. 1992). In Wyoming and Colorado, closely associated with aspen and mixed habitats (Finch and Reynolds 1988 *in* NatureServe 2003). In Colorado subalpine forests, significantly associated with habitats where aspen occurs near (less than 164 feet) willow, and used the willow for foraging (Ehrlich and Daily 1988, Daily *et. al*. 1993). In the Pacific Northwest, typically breeds in aspen, riparian cottonwood, ponderosa pine, mixed conifer, and white fir (*Abies concolor*) forests (Bull 1978 *in* NatureServe 2003).

Foraging. The sapsucker drills for sap in conifer (e.g., western larch, pine) and deciduous trees (e.g. aspen, willow, cottonwood and birch (*Betula spp.*). In Oregon, aspen, willow, elm, apple, and ornamental pine trees are used often for foraging. In California, the red-naped drilled in and around pitchy bole wounds on ponderosa pine that were the result of earlier overstory removal and porcupine feeding (Oliver 1970 *in* NatureServe 2003). Sap well attract insects and are used for drinking sap.

Non-breeding. During migration and winter the sapsucker tends to use various forest and open woodland habitats, parks, orchards, and gardens (AOU 1998). In northwestern Mexico found in forests and edge feeding at mid- to upper levels; may overlap with wintering yellow-bellied sapsuckers in north-central Mexico and red-breasted sapsuckers in northern Baja California (Howell and Webb 1995 *in* NatureServe 2003). In western Mexico, Hutto (1992 *in* NatureServe 2003) found red-naped sapsucker only in pine-oak-fir forests.

Management. Sustaining populations of red-naped sapsuckers requires maintaining, enhancing, and restoring snags, riparian woodlands, and hardwood stands of aspen or cottonwood adjacent to coniferous forest. Both snags and live trees retained for the species should include a mix of hardwood and conifer species, particularly near riparian areas and mesic sites (USDA Forest Service 1994 *in* NatureServe 2003). Aspen and other trees with shelf fungus (*Fomes ignlarius populinus*) should be retained to provide optimal conditions for nest cavities. Access to conifer sap in adjacent forest is also important in the early spring, and to birches and aspens after bud-break (Tobalske 1992).

Partners in Flight have established biological objectives for this species in riparian woodland habitat for the Northern Rocky Mountains of Eastern Oregon and Washington (Altman 2000). These include providing and maintaining habitats that meet the following definition: large trees and snags, especially aspen and cottonwood, with adequate representation of younger seral stages for replacement (i.e., greater than 10 percent cover of sapling in the understory); greater than 1.5 trees (live) per acre and greater than 1.5 snags per acre, greater than 39 feet in height and 10 inches in diameter at breast height; and mean canopy cover between 30 to 70 percent, either clumped with patches and openings or relatively evenly distributed (Altman 2000). In addition, were ecologically appropriate, initiate actions in aspen habitat to provide areas with natural (e.g., fire) or mechanical disturbance to provide successional development in the stand (Altman 2000). Sustaining populations requires maintaining, enhancing, and restoring snags, riparian woodland, and hardwood stands of aspen, birch, and cottonwood adjacent to coniferous forest.

Population and Distribution

Population

Historic. Historic population data was not available for this species.

Current. The red-naped populations appear to be stable to increasing overall, with areas of local declines, perhaps related to loss of cottonwood, and aspen nesting habitats. However, North American Breeding Bird Surveys (BBS) trend estimates confounded because of changes in sapsucker taxonomy splitting red-naped from yellow-bellied sapsucker (*Sphyrapicus varius*) and BBS sampling and sample size are minimal for analysis for most states and physiographic regions. The BBS data indicates a nonsignificant population increase in North America Between 1966 and 1996 (1.3 percent average increase per year), and a steep and significant increase between 1980 and 1996 (4.5 percent average increase per year (Sauer *et. al*. 2003).

Most likely including yellow-bellied sapsucker data (vs. only red-naped data), Thomas, *et al*. (1979) estimated that 150 snags per 100 acres, greater than or equal to 10 diameter at breast height were necessary to support the "maximum population" in Blue Mountain forests of Oregon and southeast Washington.

Captive Breeding Programs, Transplants, Introductions. Not applicable for this species.

Distribution

Historic. Historic distribution data was not available or extremely limited for this species. The species is noted in Gabrielson and Jewett (1970) as regular but not a common resident and breeding bird of eastern slope of Cascades, Blue Mountains and timbered parts of isolated ranges of eastern Oregon.

Current. The red-naped sapsucker breeds in the Rock Mountain region from southwest Canada, west and central Montana, and southwest South Dakota south, east of the Cascades and Sierra Nevada, to east-central California, southern Nevada, central Arizona, southern New Mexico, and extreme western Texas ((AOU 1983 *in* NatureServe and *in* Marshall *et. al*. Eds. 2003). The current distribution of red-naped sapsucker is shown in Figure 1.

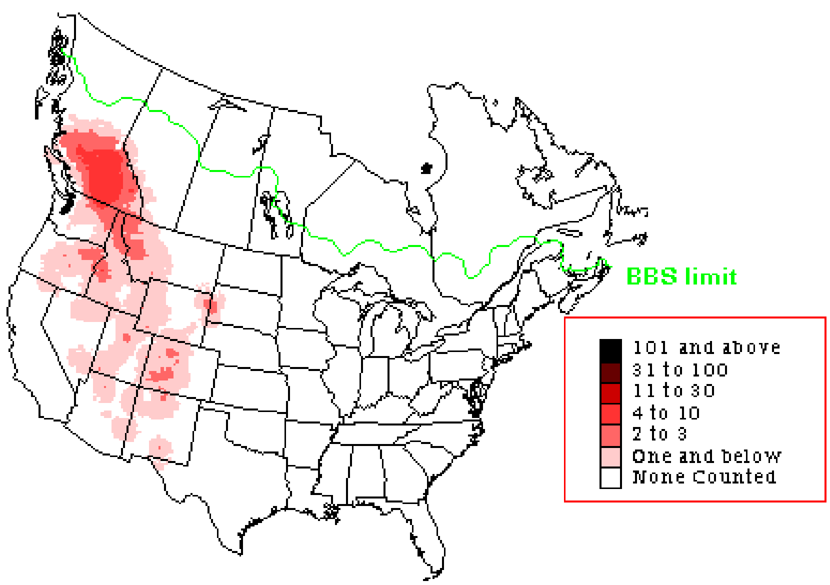


Figure 1: Red-naped sapsucker summer distribution based on Breeding Bird Surveys (Sauer *et. al*. 2003).

Breeding. In Oregon, the sapsucker is a common summer resident throughout the eastern slope of the Cascades eastward throughout the Blue Mts., Wallowa Mtn., and lesser mountains, such as Mahogany Mtn. (Malheur Co.), Steens Mtn. (Harney Co.), and Hart Mtn. (Lake Co.) (Gilligan *et. al*. 1994).

Non-Breeding. Winters in southern California (casually in Oregon, southern Nevada, central Arizona, and central New Mexico south to southern Baja California, and northwest and north-central Mexico, including Jalisco, Durango, Coahuila and Nuevo Leon ((AOU 1983) *in* NatureServe and *in* Marshall *et. al*. Eds. 2003).

A common spring and fall transient through the mountains of eastern Oregon, and at lower elevations along rivers, in town, and at desert oases. Occurs rarely in winter along the east slope of the Cascades and very rare elsewhere east of the Cascades.

Status and Abundance Trends

Status

Red-naped sapsuckers are demonstrably secure globally. In Oregon the species in not identified as threatened, endangered, or sensitive species (ODFW 1997). Within the state of Oregon, red-naped sapsuckers are apparently secure and are not of conservation concern (Altman 2000).

Trends

Trend estimates for other states and physiographic regions for these periods showed not statistically significant change. Mapped trends for 1966-1996 show population declines in parts of British Columbia and Alberta, central Oregon, and the central Rockies (eastern Idaho to Utah and n. Colorado), and marked increases in the Northern Rockies, southern Colorado, and northern New Mexico (Sauer *et. al*. 2003 *in* NatureServe 2003). BBS data for Oregon showed a non-significant increase of 0.5 percent increase per year, in the population from 1966-2000 (Sauer *et. al*. 2003).

Factors Affecting Red-naped Sapsucker Population Status

Key Factors Inhibiting Populations and Ecological Processes

Threats are largely unknown, but sapsuckers dependency on aspen and mature riparian woodland is cause for concern because of impacts on these habitats by land management activities throughout its range (NatureServe 2003).

Loss of aspen stands and a decline in aspen regeneration has occurred throughout the mountain west due to fire suppression, conifer invasion, cutting, and development. For example aspen has declined 100 percent (about 1,800 acres) when comparing historical and current conditions in the Umatilla sub basin (NWHI 2004). In addition, many of the aspen forest in the Blue Mountains are over 100 years old and decadent or declining in vigor. Lack of tree regeneration may lead to inevitable loss of large tees, which could result in significant declines in cavity –nesting (Dobkin *et. al*. 1995) and affect the species in the long term.

Grazing can have detrimental effects where the health and regeneration of aspen, cottonwood, and other preferred species is compromised. Studies of grazing impacts show mixed effects in the short term. In an Idaho cottonwood gallery forest where moderate to heavy grazing reduced understory shrub cover, Saab (1998) found no significant difference between grazed and unmanaged sites, although sapsucker abundances were slightly higher in unmanaged forest. On the other hand, in western Montana cottonwood/ponderosa pine riparian habitat, were significantly more abundant on lightly grazed sites than on heavily grazed sites, where ground cover, bush cover, mid-canopy cover, and number of small trees (less than 10 centimeter dbh) were significantly reduced in the heavily grazed sites (Mosconi and Hutto 1982 *in* NatureServe 2003). In California/Nevada aspen habitat, Page *et. al*. (1978, cited in Saab *et. al.* 1995) also observed a negative response to grazing.

Out-of-Sub basin Effects and Assumptions

No data could be found on the migration and wintering grounds of the red-naped sapsucker. It is a long distance migrant and as a result faces a complex set of potential effects during it annual cycle. Habitat loss or conversions could be occurring along its entire migration route and winter range.

Sage Sparrow (*Amphispiza belli*)

The following species account was prepared by: Paul Ashley, Stacy Stoval of the Southeast Washington Ecoregional Assessment in January 2004.

Sage sparrow (*Amphispiza belli*) is a species of concern in the West due to population decline in some regions and the degradation and loss of breeding and wintering habitats. Vulnerable to loss and fragmentation of sagebrush habitat, sage sparrows may require large patches for breeding. Sage sparrow can likely persist with moderate grazing and other land management activities that maintain sagebrush cover and the integrity of native vegetation. Sagebrush habitats may be very difficult to restore where non-native grasses and other invasive species are pervasive, leading to an escalation of fire cycles that permanently convert sagebrush habitats to annual grassland.

Sage sparrows are still common throughout much of sagebrush country and have a high probability of being sustained wherever large areas (e.g., 130 hectares observed in Washington, Vader Haegen, pers. comm.) of sagebrush and other preferred native shrubs exist for breeding. Sage sparrows are likely to return to areas where sagebrush and other native vegetation have been restored. However, sagebrush habitats can be very difficult to reclaim once invaded by cheatgrass and other noxious non-native vegetation, leading to an escalation of fire frequency and fire intensity that permanently converts shrubsteppe to annual grassland.

Life History, Key Environmental Correlates, and Habitat Requirements

<u>Life History</u>

Diet. Sage sparrows eat insects, spiders, seeds, small fruits, and succulent vegetation. They forage on the ground, usually under or near shrubs. They may occasionally be observed gleaning prey items from main stems and leaves. Consumed vegetation and insect prey provide most water requirements (Martin and Carlson 1998).

Reproduction. Sage sparrow clutch size usually is three to four, sometimes five. Incubation lasts about 13 days. Nestlings are altricial. Individual females produce one to three broods annually. Reproductive success is greater in wetter years (Rotenberry and Wiens 1991). In eastern Washington, 70 percent (n = 53) of clutches examined had three eggs (Rotenberry and Wiens 1989). Annual reproductive success in Idaho was 1.3 fledglings/nest and probability of nest success was 40 percent (Reynolds 1981). Estimate of nest success in eastern Washington is 32 percent (M. Vander Haegen, unpub. data in Altman and Holmes 2000).

Nesting. Sage sparrows form monogamous pair bonds in early spring; nesting behavior occurs from March to July. Nests are constructed by females in or under sagebrush shrubs and pairs raise 1-2 broods a season (Martin and Carlson 1998).

Brown-headed cowbirds will parasitize sage sparrow nests; parasitized nests are often abandoned (Rich 1978).

Chicks are altricial and fledge when nine to 10 days of age. Both parents feed young for more than two weeks after fledging. Fledglings often sit low in shrubs or on the ground under shrubs (Martin and Carlson 1998).

Migration. Sage sparrow populations in Washington are migratory. Sage sparrows are present only during the breeding season, arriving in late February-early March. Birds winter in shrubsteppe habitats of the southwestern United States and northwestern Mexico.

Mortality. Little information is available on estimates of annual survival rates (Martin and Carlson 1998). Typical nest predators include, common raven (*Corvus corax*), Townsend's ground squirrel (*Spermophilus townsendi*), and gopher snakes (*Pituophis catenifer*) (Martin and Carlson 1998, Rotenberry and Wiens 1989). Predators of juvenile and adult birds include loggerhead shrike (*Lanius ludovicianus*) and raptors (Martin and Carlson 1998).

<u>Habitat Requirements</u>

Similar to other shrubsteppe obligate species, sage sparrows are associated with habitats dominated by big sagebrush (*Artemisia tridentata*) and perennial bunchgrasses (Paige and Ritter 1999). In shrubsteppe habitat in southwestern Idaho, habitat occupancy by sage sparrows increased with increasing spatial similarity of sites, shrub patch size, and sagebrush cover; landscape features were more important in predicting presence of sage sparrows than cover values of shrub species and presence of sagebrush was more important than shadscale (Knick and Rotenberry 1995).

Nesting. Habitat in the vicinity of sage sparrow nests in southwestern Idaho was characterized by lower sagebrush cover (23 percent), greater shrub dispersion (clumped vs. uniform), and taller shrub height (18 in.) than surrounding areas. Sage sparrows preferred nesting in large, live sagebrush plants; birds frequently nested in shrubs 16-39 in. tall, shrubs less than 6 in. or greater than 39 in. were rarely used (Petersen and Best 1985). In eastern Washington, height of sagebrush nest shrubs averaged 90 cm (35 in.) (Vander Haegen 2003). In Idaho, nests were constructed an average distance of 34 cm (13 in.) above ground, 11 in. from the top, and eight in. from the shrub perimeter (Petersen and Best 1985). Although sage sparrows generally place nests in sagebrush shrubs they frequently nest on the ground (Vander Haegen 2003).

Breeding. Washington breeders represent the northern subspecies *A. b. nevadensis.*
In the northern Great Basin, sage sparrow is associated with low and tall sagebrush/bunchgrass, juniper/sagebrush, mountain mahogany/shrub, and aspen/sagebrush/bunchgrass communities for breeding and foraging (Maser *et. al.* 1984). In Idaho, sage sparrows are found in sagebrush of 11 to 14 percent cover (Rich 1980). Martin and Carlson (1998) report a preference for evenly spaced shrubs; other authors (Rotenberry and Wiens 1980; Peterson and Best 1985) report association where sagebrush is clumped or patchy. Sage sparrows prefer semi-open habitats, shrubs 1-2 meters tall (Martin and Carlson 1998). Habitat structure (vertical structure, shrub density, and habitat patchiness) is important to habitat selection (Martin and Carlson 1998). Sage sparrow is positively correlated with big sagebrush (A*rtemisia tridentata*), shrub cover, bare ground, above-average shrub height, and horizontal patchiness; it is negatively correlated with grass cover (Rotenberry and Wiens 1980; Wiens and Rotenberry 1981; Larson and Bock 1984).

The subspecies *nevadensis* breeds in brushland dominated by big sagebrush or sagebrush-saltbush (Johnson and Marten 1992). Sage sparrows nest on the ground or in a shrub, up to about one meter above ground (Terres 1980). In the Great Basin, nests are located in living sagebrush where cover is sparse but shrubs are clumped (Petersen and Best 1985). Nest placement may be related to the density of vegetative cover over the nest, and will nest higher in a taller shrub (Rich 1980).

Breeding territory size in eastern Washington averages 1.5-3.9 ac but may vary among sites and years (Wiens *et. al.* 1985). Territories are located in relatively large tracts of continuous sagebrush-dominated habitats. Territory size can vary with plant community composition and structure, increasing with horizontal patchiness (see Wiens *et. al.* 1985). Sage sparrows are absent on sagebrush patches less than 325 ac (Vander Haegen *et. al.* 2000; M. Vander Haegen unpub. data in Altman and Holmes 2000).

Non-breeding. In migration and winter, sage sparrows are found in arid plains with sparse bushes, grasslands and open areas with scattered brush, mesquite, and riparian scrub, preferring to feed near woody cover (Martin and Carlson 1998; Meents *et. al.* 1982; Repasky and Schluter 1994). Flocks of sage sparrows in the Mojave Desert appear to follow water courses (Eichinger and Moriarty 1985). Wintering birds in honey mesquite of lower Colorado River select areas of higher inkweed (*Suaeda torreyana*) density (Meents *et. al.* 1982).

Population and Distribution

Population

Historic. No data is available.

Current. Sage sparrow populations are most abundant in areas of deep loamy soil and continuous sagebrush cover 3.3-6.6 feet high (Vander Haegen *et. al.* 2000). In south-central Washington sage sparrows are one of the most common shrubsteppe birds (Vander Haegen *et. al.* 2001). Sage sparrow breeding density was estimated at 121-207 individuals/km^2 over a two-year study at the Arid Lands Ecology Reservation in southern Washington (Wiens *et. al.* 1987). Density estimates ranged from 33-90 birds/km^2 in sagebrush habitat on the Yakima Training Center (Shapiro and Associates 1996), whereas Schuler *et. al.* (1993) on Hanford Reservation, reported density from 0.23-21.03 birds/km^2.

The sedentary subspecies *belli* is found in the foothills of the Coast Ranges (northern California to northwestern Baja California) and the western slope of the central Sierra Nevada in California (Johnson and Marten 1992).

The subspecies *canescens* breeds in the San Joaquin Valley and northern Mohave Desert in California and extreme western Nevada, winters in the southwestern U.S. (Johnson and Marten 1992).

The subspecies *nevadensis* breeds from central interior Washington eastward to southwestern Wyoming and northwestern Colorado, south to east-central California, central Nevada, northeastern Arizona, and northwestern New Mexico. *Nevadensis* winters in the southwestern U.S. and northern Mexico (Johnson and Marten 1992).

Appendix D

Distribution

Historic. Jewett *et. al.* (1953) described the distribution of the sage sparrow as a common summer resident probably at least from March to September in portions of the sagebrush of the Upper Sonoran Zone and of the neighboring bunchgrass areas of the Transition zone in eastern Washington. They describe its summer range as north to Wilbur and Waterville, Grand Coulee; east to Connell and Wilbur; south to Kiona, Kennewick, and Lower Flat, Walla Walla County; and west to Waterville, Moxee City, Sunnyside, Yakima, and Soap Lake. Jewett *et. al.* (1953) also note that the sage sparrow was found practically throughout the sagebrush of eastern Washington, and in a few places, notably in the vicinity of Wilbur, Waterville, Prescott, and Horse Heaven, it ranges into the bunch grass as well. Jewett *et. al.* (1953) report that Snodgrass found it the predominant sparrow in the sagebrush west of Connell. Hudson and Yocom (1954) described the sage sparrow as a summer resident and migrant in sagebrush areas of Adams, Franklin, and Grant counties. They report that Snodgrass reported it as common in western Walla Walla County.

Current. Data is not available.

Breeding. During the breeding season, sage sparrows are found in central Washington, eastern Oregon, southern Idaho, southwestern Wyoming, and northwestern Colorado south to southern California, central Baja California, southern Nevada, southwestern Utah, northeastern Arizona, and northwestern New Mexico (AOU 1983; Martin and Carlson 1998) (Figure 1).

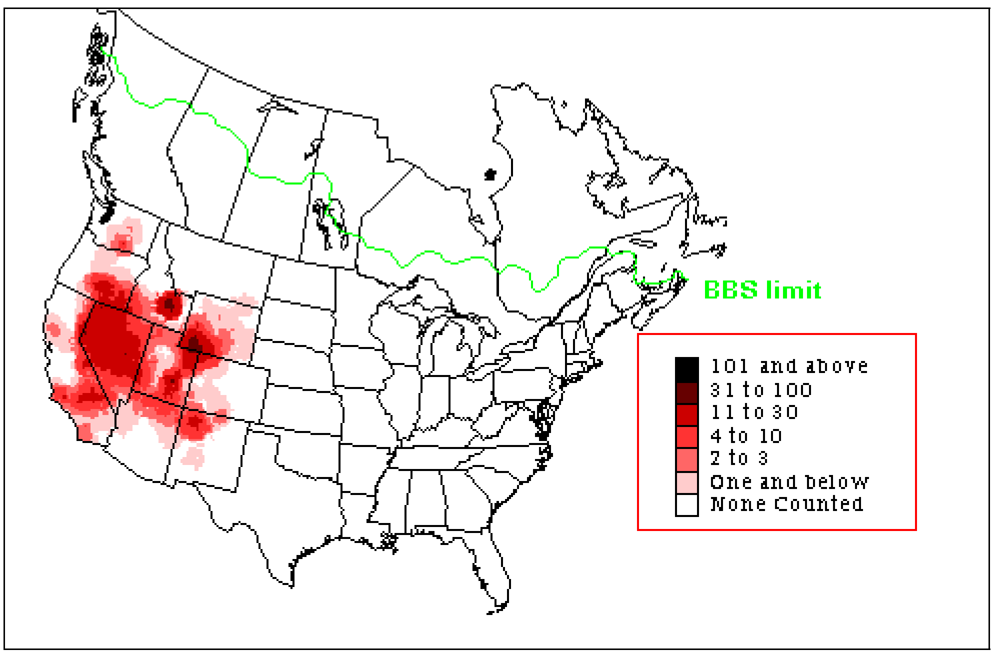


Figure 1. Sage sparrow breeding season abundance (from BBS data) (Sauer *et. al.* 2003).

Non-breeding. Sage sparrows are found in central California, central Nevada, southwestern Utah, northern Arizona, and central New Mexico south to central Baja California, northwestern mainland of Mexico, and western Texas (AOU 1983; Martin and Carlson 1998) (Figure 2).

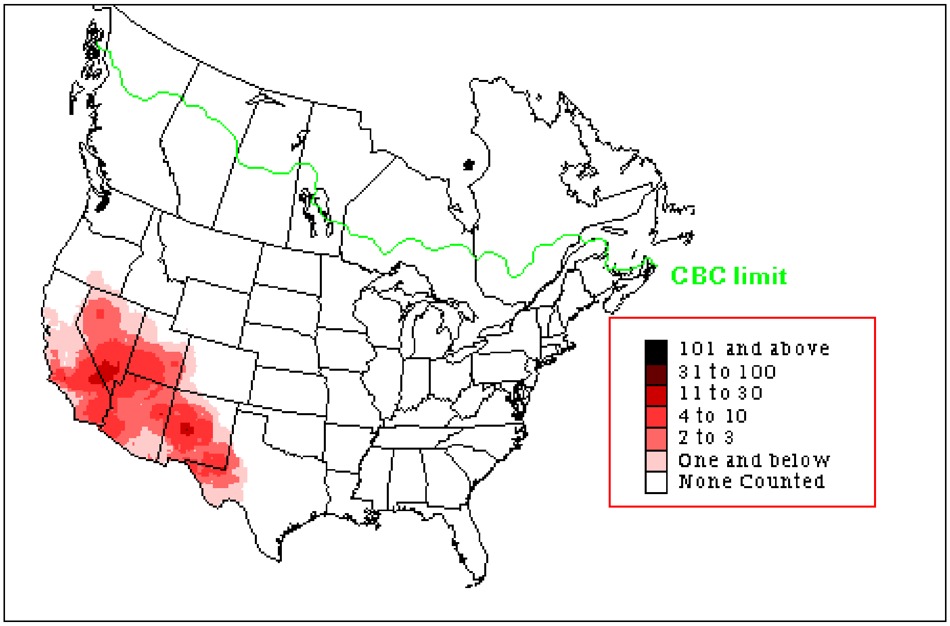


Figure 2. Sage sparrow winter season abundance (from CBC data) (Sauer *et. al.* 2003).

Status and Abundance Trends

<u>Status</u>

North American Breeding Bird Survey (BBS) data indicate that sage sparrows have declined one to 2.3 percent in recent decades (1966-1991); greatest declines have occurred in Arizona, Idaho, and Washington (Martin and Carlson 1998). Sage sparrows are listed as a 'candidate' species (potentially threatened or endangered) by the Washington Department of Fish and Wildlife and are listed by the Oregon-Washington chapter of Partners in Flight as a priority species, and on the National Audubon Society Watch List. Based on genetic and morphometric differences, the subspecies *A. b. nevadensis* (currently found in east-central Washington) may be reclassified as a distinct species. Such an action would likely prompt increased conservation interest at the federal level.

<u>Trends</u>

The BBS data (1966-1996) for Washington State show a non-significant 0.3 percent average annual increase in sage sparrow survey-wide (n = 187 survey routes) (Figure 3). There has been a significant decline of -4.8 percent average per year for 1966-1979 (n = 73), and a recent significant increase of two percent average per year, 1980-1996 (n = 154; Sauer *et. al.* 1997). BBS data indicate recent non-significant declines in California and Wyoming, 1980-1995. Generally, low sample sizes make trend estimates unreliable for most states and physiographic regions. Highest sage sparrow summer densities occur in the Great Basin, particularly Nevada, southeastern Oregon, southern Idaho, and Wyoming (Sauer *et. al.* 1997). The BBS data (1966-1996) for the Columbia Plateau are illustrated in Figure 4.

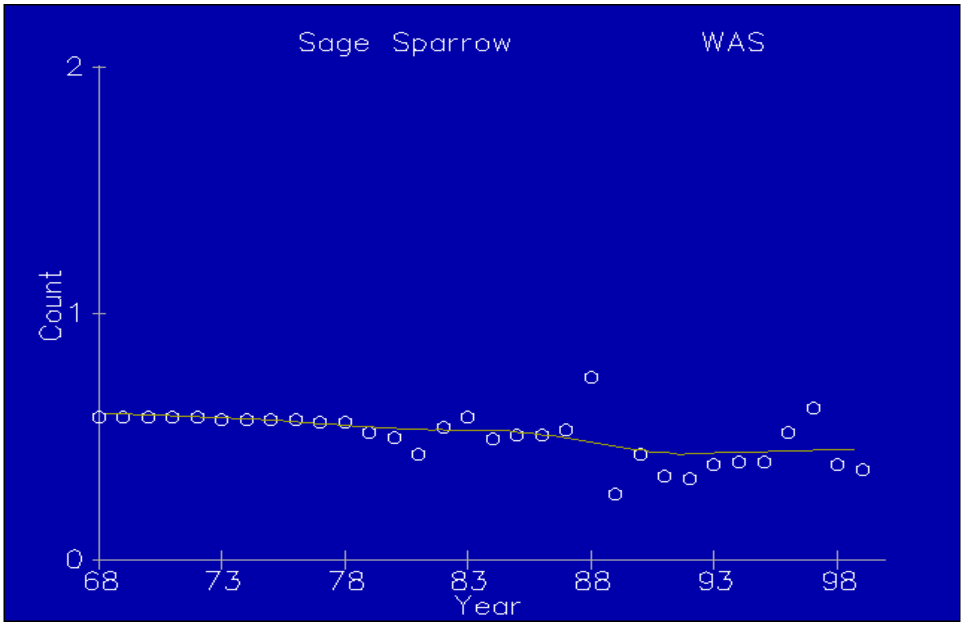


Figure 3._Sage sparrow population trend data(from BBS), Washington (Sauer *et. al.* 2003).

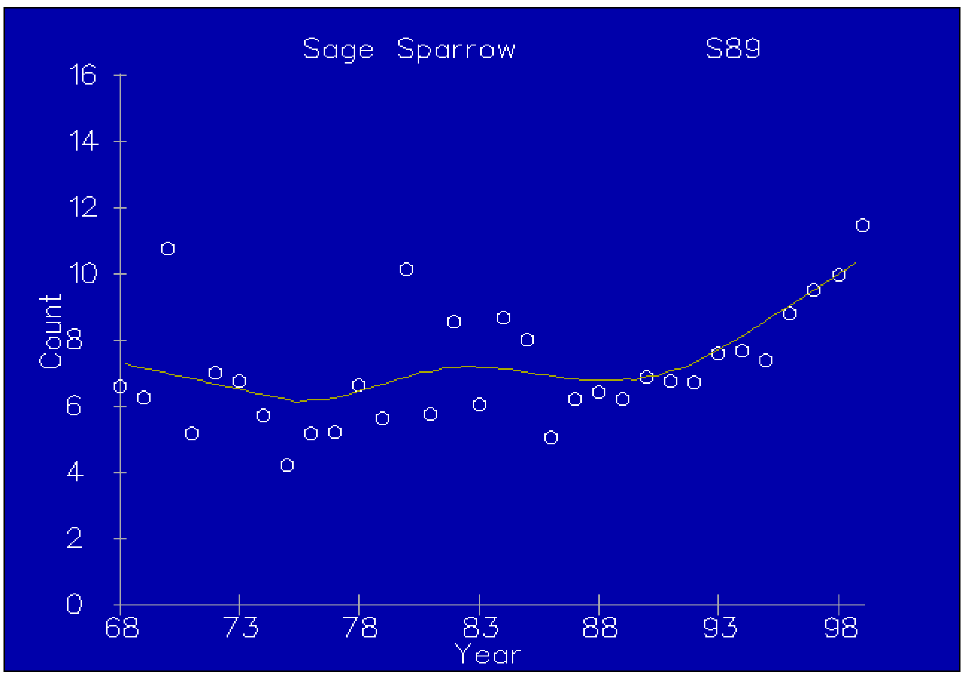


Figure 4. Sage sparrow trend results (from BBS data), Columbia Plateau (Sauer *et. al.* 2003).

Christmas Bird Count (CBC) data show a significant decline in sage sparrows (-2.1 percent average per year; n = 160 survey circles) survey-wide for the period from 1959-1988. Sage sparrow trend estimates show declines in Arizona, New Mexico, and a significant decline in Texas (-2.2 percent average per year; n = 16). The highest sage sparrow winter counts occur in southern Nevada, southern California, Arizona, New Mexico, and west Texas (Sauer *et. al.* 1996).

According to the ICBEMP terrestrial vertebrate habitat analysis, historical source habitats for sage sparrow occurred throughout most of the three ERUs within our planning unit (Wisdom *et.*

al. in press). Declines in source habitats were moderately high in the Columbia Plateau (40 percent), but relatively low in the Owyhee Uplands (13 percent) and Northern Great Basin (7 percent). However, declines in big sagebrush (e.g., 50 percent in Columbia Plateau ERU), which is likely higher quality habitat, are masked by an increase in juniper sagebrush (>50 percent in Columbia Plateau ERU), which is likely reduced quality habitat. Within the entire Interior Columbia Basin, over 48 percent of watersheds show moderately or strongly declining trends in source habitats for this species (Wisdom *et. al.* in press) (from Altman and Holmes 2000).

Factors Affecting Sage Sparrow Population Status

Key Factors Inhibiting Populations and Ecological Processes

Habitat Loss. Because sage sparrows are shrubsteppe obligates. Sagebrush shrublands are vulnerable to a number of activities that reduce or fragment sagebrush habitat, including land conversion to tilled agriculture, urban and suburban development, and road and powerline rights of way. Range improvement programs remove sagebrush by burning, herbicide application, and mechanical treatment, replacing sagebrush with annual grassland to promote forage for livestock.

Agricultural set-aside programs (such as the Conservation Reserve Program [CRP]) may eventually increase the quantity of potential breeding habitat for sage sparrows but it is not clear how long this will take. Habitat objectives recommended for sage sparrows include; dominant sagebrush canopy with 10 - 25 percent sagebrush cover, mean sagebrush height greater than 50 cm, high foliage density, mean native grass cover less than 10 percent, mean exotic annual grass cover less than 10 percent, mean open ground cover greater than 10 percent, and where appropriate provide suitable habitat conditions in patches greater than1000 ha (400ac) (Altman and Holmes 2000).

Fragmentation. The presence of relatively large tracts of sagebrush-dominated habitats is important as research in Washington indicates a negative relationship between sage sparrow occurrence and habitat fragmentation (Vander Haegen *et. al.* 2000). Additionally, fragmentation of shrubsteppe habitat may increase vulnerability of sage sparrows to nest predation by generalist predators such as the common raven (*Corvus corax*) and black-billed magpie (*Pica hudsonia*) (Vander Haegen *et. al.* 2002).

Livestock Management. Response to variation in grazing intensity is mixed. Sage sparrows respond negatively to heavy grazing of greasewood/Great Basin wild rye and shadscale/Indian ricegrass communities. They respond positively to heavy grazing of Nevada bluegrass/sedge communities, moderate grazing of big sage/bluebunch wheatgrass community, and to unspecified grazing intensity of big sage communities (see review by Saab *et. al.* 1995). Because sage sparrows nest on the ground in early spring, and forage on the ground, maintenance of greater than 50 percent of annual vegetative herbaceous growth of perennial bunchgrasses through the following season is recommended (Altman and Holmes 2000).

Pesticides/Herbicides. Large scale (16 km^2) aerial spraying of sagebrush habitat with the herbicide 2,4-D resulted in a significant decline in sage sparrow abundance two years post treatment. Because sage sparrows display high site fidelity to breeding areas birds may occupy areas that have been rendered unsuitable (Wiens and Rotenberry 1985).

Fire. Cheatgrass has altered the natural fire regime in the western range, increasing the frequency, intensity, and size of range fires. Fire kills sagebrush and where non-native grasses dominate, the landscape can be converted to annual grassland as the fire cycle escalates, removing habitat for sage sparrow (Paige and Ritter 1998).

Invasive Grasses. Cheatgrass readily invades disturbed sites, and has come to dominate the grass-forb community of more than half the sagebrush region in the West, replacing native bunchgrasses (Rich 1996). Crested wheatgrass, medusahead rye and other non-native annuals have also fundamentally altered the grass-forb community in many areas of sagebrush shrubsteppe.

Brood Parasitism. Sage sparrow is an occasional host for brown-headed cowbird (*Molothrus ater*), and may abandon the nest (e.g., see Reynolds 1981). Prior to European-American settlement, sage sparrow was probably largely isolated from cowbird brood parasitism, but is now vulnerable where the presence of livestock, land conversion to agriculture, and fragmentation of shrublands creates a contact zone between the species (Rich 1978).

Predation. In Oregon, predation by Townsend ground squirrel (*Spermophilus townsendi*) affected sage sparrow reproductive success when squirrel densities were high. Sage sparrow populations in southeastern Washington and northern Nevada incurred high rates of nest predation, probably mainly by gopher snakes (*Pituophis melanoleucus*) (Rotenberry and Wiens 1989). Loggerhead shrikes (*Lanius ludovicianus*) prey on both adults and altricial young in nest, and can significantly reduce nest production (Reynolds 1979). Feral cats near human habitations may increase predation (Martin and Carlson 1998).

Out-of-Subbasin Effects and Assumptions. No data could be found on the migration and wintering grounds of the sage sparrow. It is a short distance migrant, wintering in the southwestern U.S. and northern Mexico, and as a result faces a complex set of potential effects during it annual cycle. Habitat loss or conversions is likely happening along its entire migration route (H. Ferguson, WDFW, pers. comm., 2003). Management requires the protection shrub, shrubsteppe, desert scrub habitats, and the elimination or control of noxious weeds. Migration routes, corridors, and wintering grounds need to be identified and protected just as its breeding areas.

Appendix D

White-headed Woodpecker (*Picoides albolarvatus*)

The following species account was prepared by: Paul Ashley, Stacy Stoval of the Southeast Washington Ecoregional Assessment in January 2004.

The white-headed woodpecker (*Picoides albolarvatus*) is a year round resident in the Ponderosa pine (*Pinus ponderosa*) forests found at the lower elevations (generally below 950m). White-headed woodpeckers are particularly vulnerable due to their highly specialized winter diet of ponderosa pine seeds and the lack of alternate, large cone producing, pine species.

Nesting and foraging requirements are the two critical habitat attributes limiting the population growth of this species of woodpecker. Both of these limiting factors are very closely linked to the habitat attributes contained within mature open stands of Ponderosa pine. Past land use practices, including logging and fire suppression, have resulted in significant changes to the forest structure within the Ponderosa pine ecosystem.

Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet. White-headed woodpeckers feed primarily on the seeds of large Ponderosa pines. This is makes the white-headed woodpecker quite different from other species of woodpeckers who feed primarily on wood boring insects (Blood 1997; Cannings 1987 and 1995). The existence of only one suitable large pine (ponderosa pine) is likely the key limiting factor to the white-headed woodpecker's distribution and abundance.

Other food sources include insects (on the ground as well as hawking), mullein seeds and suet feeders (Blood 1997; Joe *et. al.* 1995). These secondary food sources are used throughout the spring and summer. By late summer, white-headed woodpeckers shift to their exclusive winter diet of ponderosa pine seeds.

Reproduction. White-headed woodpeckers are monogamous and may remain associated with their mate throughout the year. They build their nests in old trees, snags or fallen logs but always in dead wood. Every year the pair bond constructs a new nest. This may take three to four weeks. The nests are, on average 3m off the ground. The old nests are used for overnight roosting by the birds.

The woodpeckers fledge about three to five birds every year. During the breeding season (May to July) the male roosts in the cavity with the young until they are fledged. The incubation period usually lasts for 14 days and the young leave the nest after about 26 days. White-headed woodpeckers have one brood per breeding season and there is no replacement brood if the first brood is lost.

The woodpeckers are not very territorial except during the breeding season. They are not especially social birds outside of family groups and pair bonds and generally do not have very dense populations (about one pair bond per eight ha).

Nesting. Generally large ponderosa pine snags consisting of hard outer wood with soft heartwood are preferred by nesting white-headed woodpeckers. In British Columbia 80 percent of reported nests have been in ponderosa pine snags, while the remaining 20 percent have been recorded in Douglas-fir snags. Excavation activities have also been recorded in Trembling Aspen, live Ponderosa pine trees and fence posts (Cannings *et. al.* 1987).

In general, nesting locations in the South Okanagan, British Columbia have ranged between 450 - 600m (Blood 1997), with large diameter snags being the preferred nesting tree. Their nesting cavities range from 2.4 to 9 m above ground, with the average being about 5m. New nests are excavated each year and only rarely are previous cavities re-used (Garrett *et. al.* 1996).

Migration. The white-headed woodpecker is a non-migratory bird.

<u>Habitat Requirements</u>

Breeding. White-headed woodpeckers live in montane, coniferous forests from British Columbia to California and seem to prefer a forest with a relatively open canopy (50-70 percent cover) and an availability of snags (a partially collapsed, dead tree) and stumps for nesting. The birds prefer to build nests in trees with large diameters with preference increasing with diameter. The understory vegetation is usually very sparse within the preferred habitat and local populations are abundant in burned or cut forest where residual large diameter live and dead trees are present.

Highest abundances of white-headed woodpeckers occur in old-growth stands, particularly ones with a mix of two or more pine species. They are uncommon or absent in monospecific ponderosa pine forests and stands dominated by small-coned or closed-cone conifers (e.g., lodgepole pine or knobcone pine).

Where food availability is at a maximum such as in the Sierra Nevadas, breeding territories may be as low as 10ha (Milne and Hejl 1989). Breeding territories in Oregon are 104 ha in continuous forest and 321 ha in fragmented forests (Dixon 1995b). In general, open Ponderosa pine stands with canopy closures between 30 - 50 percent are preferred. The openness however, is not as important as the presence of mature or veteran cone producing pines within a stand (Milne and Hejl 1989). In the South Okanagan, British Columbia, Ponderosa pine stands in age classes 8 -9 are considered optimal for white-headed woodpeckers (Haney 1997). Milne and Hejl (1989) found 68 percent of nest trees to be on southern aspects, this may be true in the South Okanagan as well, especially, towards the upper elevational limits of Ponderosa pine (800 - 1000m).

Population and Distribution

<u>Population</u>

Historic. No data is available.

Current. No data is available.

Distribution

Historic. No data is available.

Current. These woodpeckers live in montane, coniferous forests from southern British Columbia in Canada, to eastern Washington, southern California and Nevada and Northern Idaho in the United States. The exact population of the white-headed woodpecker is unknown but there are thought to be less than 100 of the birds in British Columbia. See Figures 1 through 3 for current distribution.

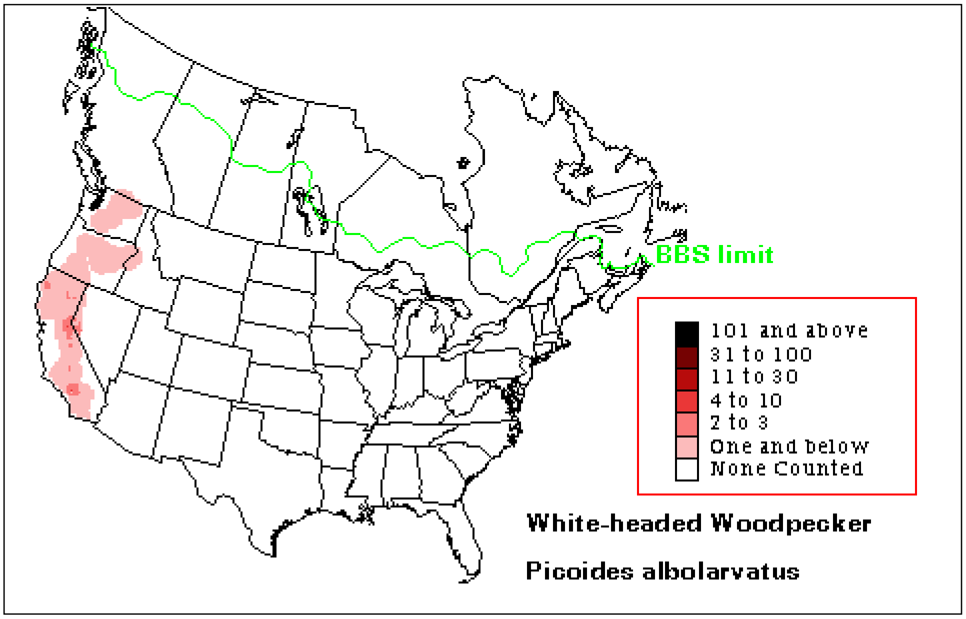


Figure 1. White-headed woodpecker year-round range (Sauer *et. al.* 2003).

Woodpecker abundance appears to decrease north of California. They are uncommon in Washington and Idaho and rare in British Columbia. However, they are still common in most of their original range in the Sierra Nevada and mountains of southern California. The birds are non-migratory but do wander out of their range sometimes in search of food.

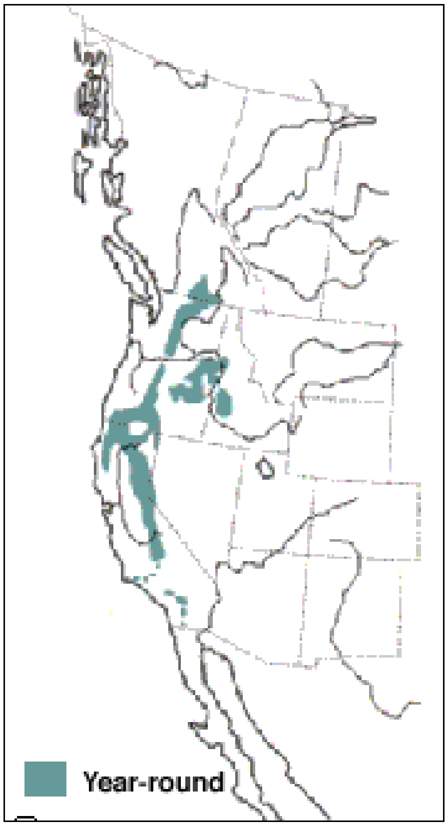


Figure 2. White-headed woodpecker breeding distribution (from BBS data) (Sauer *et. al.* 2003).

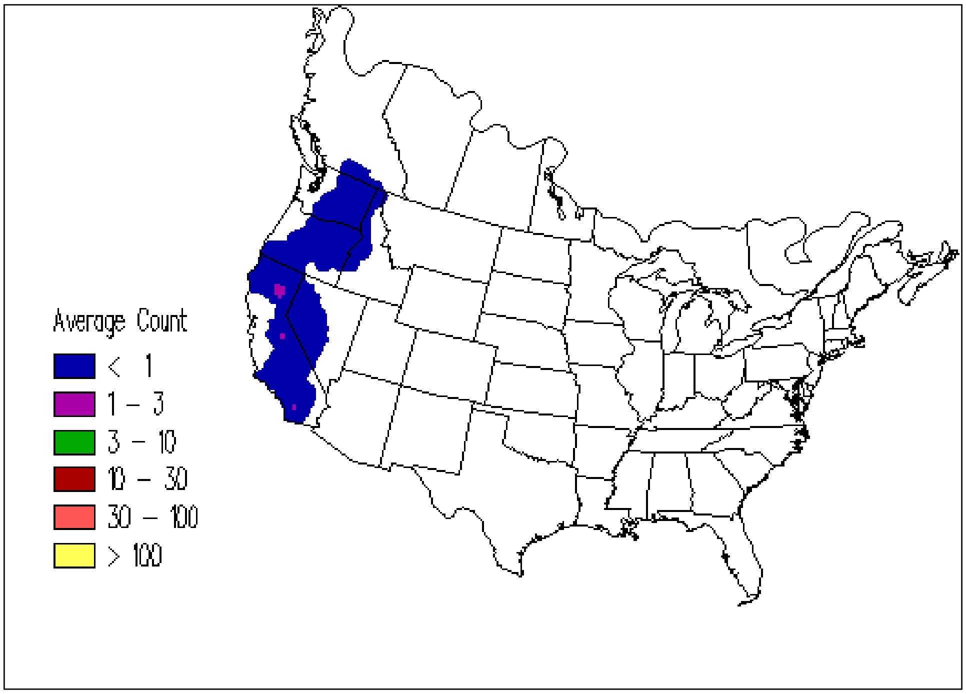


Figure 3. White-headed woodpecker winter distribution (from CBC data) (Sauer *et. al.* 2003).

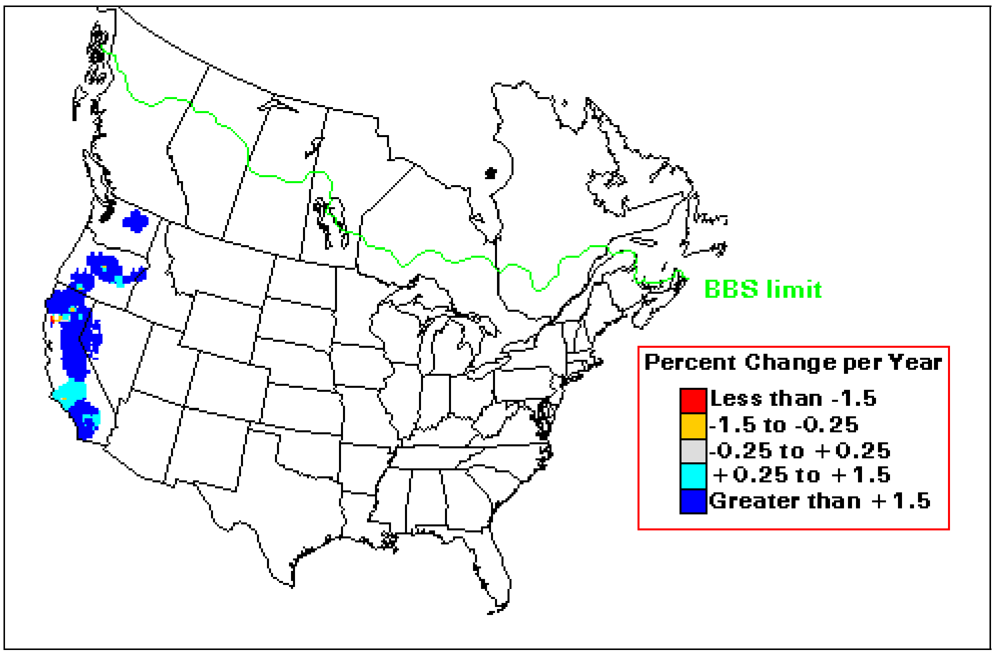
Appendix D

Status and Abundance Trends

Status

Although populations appear to be stable at present, this species is of moderate conservation importance because of its relatively small and patchy year-round range and its dependence on mature, montane coniferous forests in the West. Knowledge of this woodpecker's tolerance of forest fragmentation and silvicultural practices will be important in conserving future populations.

Trends



White-headed woodpecker Breeding Bird Survey (BBS) population trend: 1966-1996 (Sauer *et. al.* 2003).

Factors Affecting Population Status

Key Factors Inhibiting Populations and Ecological Processes

Logging. Logging has removed much of the old cone producing pines throughout the South Okanagan. Approximately 27,500 ha of ponderosa pine forest remain in the South Okanagan and 34.5 percent of this is classed as old growth forest (Ministry of Environment Lands and Parks 1998). This is a significant reduction from the estimated 75 percent in the mid 1800s (Cannings 2000). The 34.5 percent old growth estimate may in fact be even less since some of the forest cover information is incomplete and needs to be ground truthed to verify the age classes present. The impact from the decrease in old cone producing ponderosa pines is even more exaggerated in the South Okanagan because there are no alternate pine species for the white-headed woodpecker to utilize. This is especially true over the winter when other major food sources such as insects are not available. Suitable snags (DBH>60cm) are in short supply in the South Okanagan.

Fire Suppression. Fire suppression has altered the stand structure in many of the forests in the South Okanagan. Lack of fire has allowed dense stands of immature ponderosa pine as well as the more shade tolerant Douglas-fir to establish. This has led to increased fuel loads resulting in more severe stand replacing fires where both the mature cone producing trees and the large suitable snags are destroyed. These dense stands of immature trees has also led to increased competition for nutrients as well as a slow change from a Ponderosa pine climax forest to a Douglas-fir dominated climax forest.

Predation. There are a few threats to white-headed woodpeckers such as predation and the destruction of its habitat. Chipmunks are known to prey on the eggs and nestlings of white-headed woodpeckers. There is also predation by the great horned owl on adult white-headed woodpeckers. However, predation does not appreciably affect the woodpecker population.

Yellow Warbler (*Dendroica petechia*)

The following species account was prepared by: Paul Ashley, Stacy Stoval of the Southeast Washington Ecoregional Assessment in January 2004.

The yellow warbler (*Dendroica petechia*) is a common species strongly associated with riparian and wet deciduous habitats throughout its North American range. In Washington it is found in many areas, generally at lower elevations. It occurs along most riverine systems, including the Columbia River, where appropriate riparian habitats have been protected. The yellow warbler is a good indicator of functional subcanopy/shrub habitats in riparian areas.

Life History, Key Environmental Correlates, and Habitat Requirements

Life History

Diet. Yellow warblers capture and consume a variety of insect and arthropod species. The species taken vary geographically. Yellow warblers consume insects and occasionally wild berries (Lowther *et. al.* 1999). Food is obtained by gleaning from subcanopy vegetation; the species also sallies and hovers to a much lesser extent (Lowther *et. al.* 1999) capturing a variety of flying insects.

Reproduction. Although little is known about yellow warbler breeding behavior in Washington, substantial information is available from other parts of its range. Pair formation and nest construction may begin within a few days of arrival at the breeding site (Lowther *et. al.* 1999). The reproductive process begins with a fairly elaborate courtship performed by the male who may sing up to 3,240 songs in a day to attract a mate. The responsibility of incubation, construction of the nest and most feeding of the young lies with the female, while the male contributes more as the young develop. In most cases only one clutch of eggs is laid; renesting may occur, however, following nest failure or nest parasitism by brown-headed cowbirds (Lowther *et. al.* 1999). The typical clutch size ranges between four and five eggs in most research studies of the species (Lowther *et. al.* 1999). Egg dates have been reported from British Columbia, and range between 10 May and 16 August; the peak period of activity there was between seven and 23 June (Campbell *et. al.* in press). The incubation period lasts about 11 days and young birds fledge eight to10 days after hatching (Lowther *et. al.* 1999). Young of the year may associate with the parents for up to three weeks following fledging (Lowther *et. al.* 1999).

Nesting. Results of research on breeding activities indicate variable rates of hatching and fledging. Two studies cited by Lowther *et. al.* (1999) had hatching rates of 56 percent and 67 percent. Of the eggs that hatched, 62 percent and 81 percent fledged; this represented 35 percent and 54 percent, respectively, of all eggs laid. Two other studies found that 42 percent and 72 percent of nests fledged at least one young (Lowther *et. al.* 1999); the latter study was from British Columbia (Campbell *et. al.* in press).

Migration. The yellow warbler is a long-distance neotropical migrant. Spring migrants begin to arrive in the region in April. Early dates of second of April and 10th of April have been reported from Oregon and British Columbia, respectively (Gilligan *et. al.* 1994, Campbell *et. al.* in press).

Average arrival dates are somewhat later, the average for south-central British Columbia being 11th of May (Campbell *et. al.* in press). The peak of spring migration in the region is in late May (Gilligan *et. al.* 1994). Southward migration begins in late July, and peaks in late August to early September; very few migrants remain in the region in October (Lowther *et. al.* 1999).

Mortality. Little has been published on annual survival rates. Roberts (1971) estimated annual survival rates of adults at 0.526 ±0.077 SE, although Lowther *et. al.* (1999) felt this value underestimated survival because it did not account for dispersal. The oldest yellow warbler on record lived to be nearly nine years old (Klimkiewicz *et. al.* 1983).

Yellow warblers have developed effective responses to nest parasitism by the brown-headed cowbird (*Molothrus ater*). The brown-headed cowbird is an obligate nest brood parasite that does not build a nest and instead lays eggs in the nests of other species. When cowbird eggs are recognized in the nest the yellow warbler female will often build a new nest directly on top of the original. In some cases, particularly early in the incubation phase, the female yellow warbler will bury the cowbird egg within the nest. Some nests are completely abandoned after a cowbird egg is laid (Lowther *et. al.* 1999). Up to 40 percent of yellow warbler nests in some studies have been parasitized (Lowther *et. al.* 1999).

<u>Habitat Requirements</u>

The yellow warbler is a riparian obligate species most strongly associated with wetland habitats and deciduous tree cover. Yellow warbler abundance is positively associated with deciduous tree basal area, and bare ground; abundance is negatively associated with mean canopy cover, and cover of Douglas-fir (*Pseudotsuga menziesii*), Oregon grape (*Berberis nervosa*), mosses, swordfern (*Polystuchum munitum*), blackberry (*Rubus discolor*), hazel (*Corylus cornuta*), and oceanspray (*Holodiscus discolor*) (Rolph 1998).

Partners in Flight have established biological objectives for this species in the lowlands of western Oregon and western Washington. These include providing habitats that meet the following definition: greater than 70 percent cover in shrub layer (<3 m) and subcanopy layer (>3 m and below the canopy foliage) with subcanopy layer contributing greater than 40 percent of the total; shrub layer cover 30-60 percent (includes shrubs and small saplings); and a shrub layer height greater than two meters. At the landscape level, the biological objectives for habitat included high degree of deciduous riparian heterogeneity within or among wetland, shrub, and woodland patches; and a low percentage of agricultural land use (Altman 2001).

Nesting. Radke (1984) found that nesting yellow warblers occurred more in isolated patches or small areas of willows adjacent to open habitats or large, dense thickets (i.e., scattered cover) rather than in the dense thickets themselves. At Malheur National Wildlife Refuge, in the northern Great Basin, nest success 44 percent (n = 27), however, cowbird eggs and young removed; cowbird parasitism 33 percent (n = 9) (Radke 1984).

Breeding. Breeding yellow warblers are closely associated with riparian hardwood trees, specifically willows, alders, or cottonwood. They are most abundant in riparian areas in the lowlands of eastern Washington, but also occur in west-side riparian zones, in the lowlands of the western Olympic Peninsula, where high rainfall limits hardwood riparian habitat. Yellow warblers are less common (Sharpe 1993). There are no BBA records at the probable or confirmed level from subalpine habitats in the Cascades, but Sharpe (1993) reports them nesting at 4000 feet in the Olympics. Numbers decline in the center of the Columbia Basin, but this species can be found commonly along most rivers and creeks at the margins of the Basin. A local breeding population exists in the Potholes area.

Non-breeding. Fall migration is somewhat inconspicuous for the yellow warbler. It most probably begins to migrate the first of August and is generally finished by the end of September. The yellow warbler winters south to the Bahamas, northern Mexico, south to Peru, Bolivia and the Brazilian Amazon.

Population and Distribution

Population

Historic. No historic data could be found for this species.

Current. No current data could be found for this species.

Distribution

Historic. Jewett *et. al.* (1953) described the distribution of the yellow warbler as a common migrant and summer resident from April 30 to September 20 in the deciduous growth of Upper Sonoran and Transition Zones in eastern Washington and in the prairies and along streams in southwestern Washington. They describe its summer range as north to Neah Bay, Blaine, San Juan Islands, Monument 83; east to Conconully, Swan Lake, Sprague, Dalkena, and Pullman; south to Cathlamet, Vancouver and Bly, Blue Mts., Prescott, Richland, and Rogersburg; and west to Neah Bay, Grays Harbor, and Long Beach. Jewett *et. al. (*1953) also note that the yellow warbler was common in the willows and alders along the streamsof southeastern Washington and occurs also in brushy thickets. They state that its breeding range follows the deciduous timber into the mountains, where it porbably nests in suitable habitat to 3,500 or perhaps even to 4,000 feet – being common at Hart Lake in the Chelan region around 4,000 feet. They noted it was a common nester along the Grande Ronde River, around the vicinity of Spokane, around Sylvan Lake, and along the shade trees along the streets of Walla Walla.

Current. The yellow warbler breeds across much of the North American continent, from Alaska to Newfoundland, south to western South Carolina and northern Georgia, and west through parts of the southwest to the Pacific coast (AOU 1998). Browning (1994) recognized 43 subspecies; two of these occur in Washington, and one of them, *D.p. brewsteri,* is found in western Washington. This species is a long-distance migrant and has a winter range extending from western Mexico south to the Amazon lowlands in Brazil (AOU 1998). Neither the breeding nor winter ranges appear to have changed (Lowther *et. al.* 1999).

The yellow warbler is a common breeder in riparian habitats with hardwood trees throughout the state at lower elevations. It is a locally common breeder along rivers and creeks in the Columbia Basin, where it is declining in some areas. Core zones of distribution in Washington are the forested zones below the subalpine fir and mountain hemlock zones, plus steppe zones other than the central arid steppe and canyon grassland zones, which are peripheral. Figure 1 shows the distribution of the yellow warbler in Washington (Smith *et. al.* 1997).

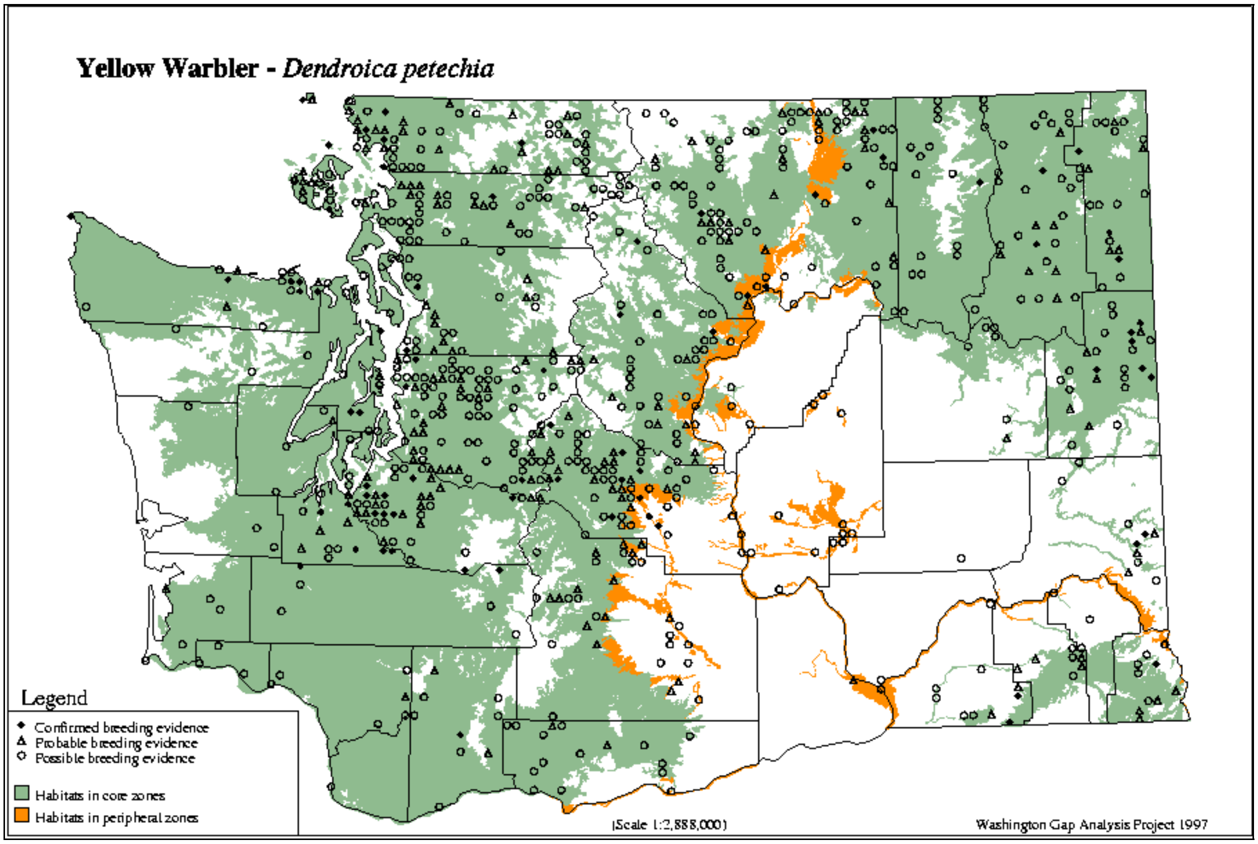


Figure 1. Breeding bird atlas data (1987-1995) and species distribution for yellow warbler (Washington GAP Analysis Project 1997).

Breeding.

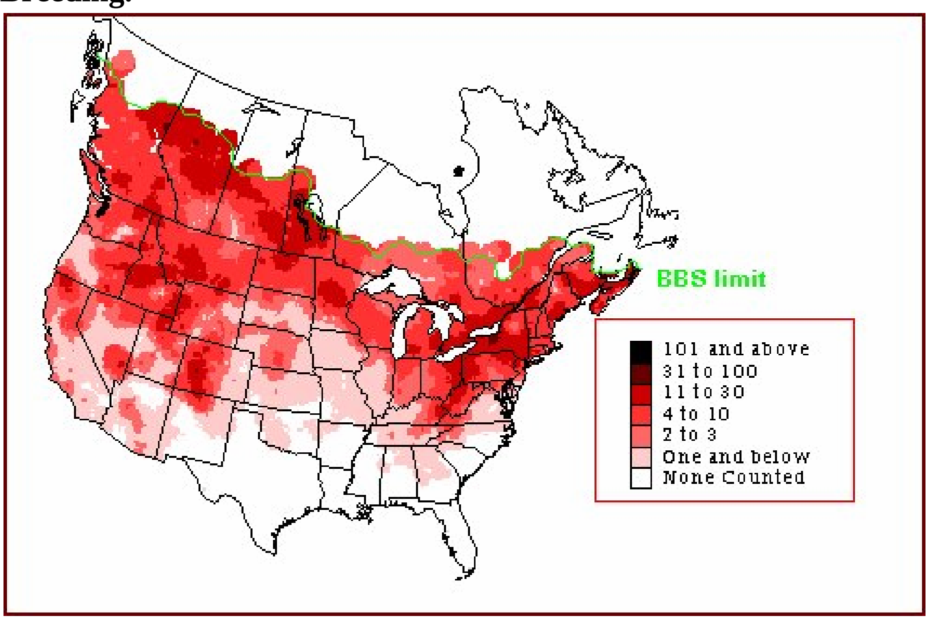


Figure 2. Yellow warbler breeding season abundance (from BBS data) (Sauer *et. al.* 2003).

The yellow warbler breeds across much of the North American continent, from Alaska to Newfoundland, south to western South Carolina and northern Georgia, and west through parts of the southwest to the Pacific coast (AOU 1998) (Figure 2).

Non-Breeding. This data is not readily available; however, the yellow warbler is a long-range neotropical migrant. Its winter range is from Northern Mexico south to Northern Peru.

Status and Abundance Trends

Status

Yellow warblers are demonstrably secure globally. Within the state of Washington, yellow warblers are apparently secure and are not of conservation concern (Altman 1999).

Trends

Yellow warbler is one of the more common warblers in North America (Lowther *et. al.* 1999). Information from Breeding Bird Surveys indicates that the population is stable in most areas. Some subspecies, particularly in southwestern North America, have been impacted by degradation or destruction of riparian habitats (Lowther *et. al.* 1999). Because the Breeding Bird Survey dates back only about 30 years, population declines in Washington resulting from habitat loss dating prior to the survey would not be accounted for by that effort (Figure 3).

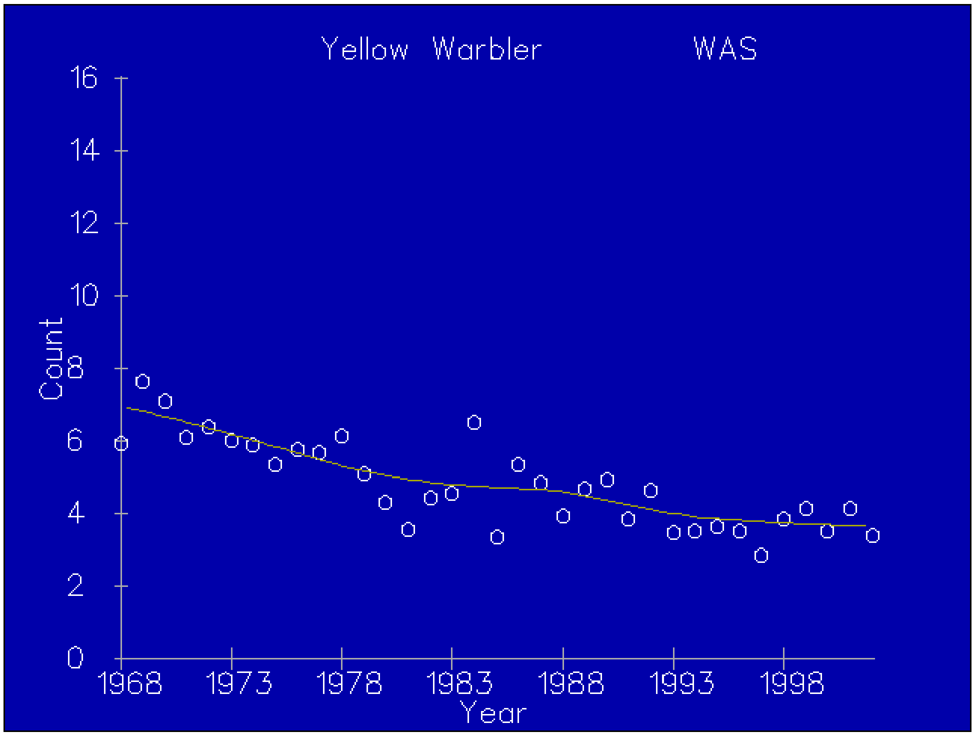


Figure 3. Breeding Bird Survey data for Washington State show a significant population decline of 2.9 percent per year (p < .1) from 1966 to 1991 (Peterjohn 1991).

Factors Affecting Population Status

Key Factors Inhibiting Populations and Ecological Processes

Habitat loss due to hydrological diversions and control of natural flooding regimes (e.g., dams) resulting in reduction of overall area of riparian habitat, conversion of riparian habitats, inundation from impoundments, cutting and spraying for ease of access to water courses, gravel mining, etc.

Habitat degradation. Losses of vertical stratification in riparian vegetation, lack of recruitment of young cottonwoods, ash, willows, and other subcanopy species and stream bank stabilization (e.g., riprap) which narrows stream channel, reduces the flood zone, and reduces extent of riparian vegetation; invasion of exotic species such as reed canary grass and blackberry. Overgrazing which can reduce understory cover; reductions in riparian corridor widths which may decrease suitability of the habitat and may increase encroachment of nest predators and nest parasites to the interior of the stand.

Other Factors. Hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird) and domestic predators (cats), and be subject to high levels of human disturbance. Recreational disturbances, particularly during nesting season, and particularly in high-use recreation areas. Increased use of pesticide and herbicides associated with agricultural practices may reduce insect food base.

Out-of-Subbasin Effects and Assumptions. No data could be found on the migration and wintering grounds of the yellow warbler. It is a long-distance migrant and as a result faces a complex set of potential effects during it annual cycle. Habitat loss or conversions is likely happening along its entire migration route (H. Ferguson, WDFW, pers. comm. 2003). Riparian management requires the protection of riparian shrubs and understory and the elimination of noxious weeds. Migration routes, corridors and wintering grounds need to be identified and protected just as its breeding areas. In addition to loss of habitat, the yellow warbler, like many wetland or riparian associated birds, faces increased pesticide use in the metropolitan areas, especially with the outbreak of mosquito born viruses like West Nile Virus.

Appendix E

Terrestial Focal Habitats

Quaking Aspen

Geographic Distribution. Quaking aspen (*Populus tremuloides*) is the most widely distributed tree species in North America. In the Pacific Northwest, aspen is on the western fringe of its overall range and has limited distribution in eastern Washington and Oregon.

Physical Setting. Aspen habitat generally occurs where soil moisture exceeds evapotranspiration. In the Blue Mountains, aspen is found almost exclusively along riparian corridors, wet meadows, seeps, moist draws, and areas where a high water table is present. Occasionally aspen occurs on talus slopes, rock outcroppings, or other upland sites. Access to available soil moisture appears to be the limiting factor. Aspen grow best on well-drained soils, yet stands exist on a wide variety of soil types. Aspen stands in the Blue Mountains are found from 3000 to 6000 feet in elevation.

Landscape Setting. Aspen stands exist as small clumps or stringers along stream channels, moist draws and wet meadows. They occasionally occur as self-perpetuating, pure stands of aspen, but more commonly are found growing in association with conifers. Aspen is found along stream courses in the valley grasslands zone and the woodland/shrubland zone. As one moves up the elevational gradient into the dry forest zone, the moist forest zone, and eventually the cold forest zone, aspen stands exist in moist draws, wetlands, and riparian corridors adjacent to stands of ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga menziesii*), western larch (*Larix occidentalis*), grand fir (*Abies grandis*), lodgepole pine (*Pinus contorta*), Englemann spruce (*Picea englemanii*) and subalpine fir (*Abies lasiocarpa*). Crowe and Clausnitzer (1997) have described eight plant community types of quaking aspen on the Malheur, Umatilla and Wallowa-Whitman National Forests.

Structure. Most stands are two-storied, with an even-aged overstory of mature trees and understory of uneven-aged regeneration. Mature trees rarely live beyond 150 years or reach a height of more than 100 feet. The root system, however, may persist for thousands of years when an overstory is present to supply carbohydrates. Aspen stands in the Blue Mountains usually consist of a single clone, but larger stands may have multiple clones. Conifer encroachment is common in aspen stands. The understory vegetation may consist of aquatic sedges, forbs, grasses or shrubs.

Composition. Quaking aspen is the characteristic and dominant tree in this habitat. In the absence of disturbance, conifers – including ponderosa pine, Douglas-fir, western larch, grand fir, lodgepole pine, Englemann spruce and subalpine fir – may be present and even codominant. Snowberry (*Symphoricarpos oreophilus)* is the most common dominant shrub. Occasionally, aspen will grow in association with red-osier dogwood (*Cornus stolonifera*), mountain alder (*Alnus incana*), common chokecherry (*Prunis virginiana*) and Nootka rose (*Rosa nutkana*). Continuous overgrazing by ungulates may result in an understory dominance of Kentucky bluegrass (*Poa pratensis*). Other common grasses are blue wildrye (*Elymus glaucus*), pine grass (*Calamagrostis rubescens*), bluejoint reedgrass (*Calamagrostis Canadensis*) and common timothy (*Phleum pratense*). Sedges and rushes commonly represented are elk sedge (*Carex geyeri*), woolly sedge (*Carex lanuginosa*), small-winged sedge (*Carex microptera*), Nebraska sedge (*Carex nebraskensis*), Dewey's sedge (*Carex deweyana*), aquatic sedge (*Carex aquatilis*) and Baltic rush (*Juncus balticus*). Characteristic perennial forbs include Starry false-Solomon's seal (*Smilacina stellata*), aster (*Aster spp*.), strawberry (*Fragaria spp*.), Oregon checkermallow (*Sidalcea oregana*), large-leaf avens (*Geum macraphyll*um), sticky geranium (Geranium viscosissimum), false-hellebore (Veratrum spp.) yarrow (*Achillea millefolium*), western meadowrue (*Thalictrum occidentale*), field mint (*Mentha arvensis*), western blue flag (*Iris missouriensis*), long-stalked clover (*Trifolium longipes*), coneflower (*Rudbeckia* spp.), meadowrue (*Thalictrum* spp.), bedstraw (*Galium* spp.), and sweet cicely (*Osmorhiza* spp.).

Other Classifications and Key References. This habitat is called "Aspen" by the Society of American Foresters and "Aspen woodland" by the Society of Range Management. Eight quaking aspen plant associations are described in Mid-Montane Wetland Plant Associations of the Malheur, Umatilla and Wallowa-Whitman National Forests (Crowe and Clausnitzer 1997). The Oregon Gap II Project (Kiilsgaard 1999) and Oregon Vegetation Landscape-Level Cover Type [127] that would represent this type is aspen groves. Other references describe this habitat [2, 88, 119, 161, 222].

Natural Disturbance Regime. Fire plays an important role in maintenance of this habitat. Quaking aspen will colonize sites after fire or other stand disturbances through seed dispersal or root sprouting. Root suckering following fire is most important as a mechanism for an aspen stand to maintain dominance on a given site. Browsing by livestock and native ungulates plays a detrimental role in aspen habitat. Ungulates severely inhibit tree regeneration by consuming aspen sprouts on most sites, but may have little influence in some stands.

Succession and Stand Dynamics. In self-perpetuating stands, aspen persists as the dominant species on a site with little, or no, invasion by other species. This type is more common in the Rocky Mountain range but has been described on wetter sites in the Blue Mountains. Aspen sprouts after fire and spreads vegetatively into large clonal or multiclonal stands. Because aspen is shade intolerant and reproduces poorly under its own canopy, conifers can invade most aspen habitat. In the absence of further disturbance, conifers will choke out aspen and dominate the site.

Effects of Management and Anthropogenic Impacts. Domestic sheep reportedly consume 4 times more aspen sprouts than do cattle. Heavy livestock browsing can adversely impact aspen growth and regeneration. In the fall, native ungulates severely browse aspen suckers when other sources of forage have cured out and become less palatable. With fire suppression and alteration of fine fuels, fire rejuvenation of aspen habitat has been greatly reduced since about 1900. Conifers now dominate many aspen stands and extensive stands of young aspen are uncommon.

Use of Aspen Habitat by Wildlife. Aspen provide an important source of winter forage for deer, elk, rabbits, hare, and bear. The dense regeneration provides rearing habitat for young grouse. Mature aspen trees are used by cavity nesters such as woodpeckers and flickers. Other bird species use aspen for nesting and foraging. Streamside stands are important beaver habitat and provide food and building material for lodges and dams.

Status and Trends. Fire suppression and severe browsing by livestock and native ungulates have prevented aspen stands from successfully regenerating. Studies have shown a 60 to 95% reduction in aspen habitat across the western United States. No figures have been determined for the Pacific Northwest.

Appendix E

Eastside (Interior) Grasslands

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (**http://ibis.nwhi.org**). It was written by Rex. C. Crawford and Jimmy Kagan.

Geographic Distribution. This habitat is found primarily in the Columbia Basin of Idaho, Oregon, and Washington, at mid- to low elevations and on plateaus in the Blue Mountains, usually within the ponderosa pine zone in Oregon.

Idaho fescue grassland habitats were formerly widespread in the Palouse region of southeastern Washington and adjacent Idaho; most of this habitat has been converted to agriculture. Idaho fescue grasslands still occur in isolated, moist sites near lower tree-line in the foothills of the Blue Mountains, the Northern Rockies, and east Cascades near the Columbia River Gorge. Bluebunch wheatgrass grassland habitats are common throughout the Columbia Basin, both as modified native grasslands in deep canyons and the dry Palouse and as fire-induced representatives in the shrub-steppe. Similar grasslands appear on the High Lava Plains ecoregion, where they occur in a matrix with big sagebrush or juniper woodlands. In Oregon, they are also found in burned shrub-steppe and canyons in the Basin and Range and Owyhee Uplands. Sand dropseed and three-awn needlegrass grassland habitats are restricted to river terraces in the Columbia Basin, Blue Mountains, and Owyhee Uplands of Oregon and Washington. Primary location of this habitat extends along the Snake River from Lewiston south to the Owyhee River.

Physical Setting. This habitat develops in hot, dry climates in the Pacific Northwest. Annual precipitation totals eight to 20 inches (20-51 cm); only 10% falls in the hottest months, July through September. Snow accumulation is low (1-6 inches [3-15 cm]) and occurs only in January and February in eastern portions of its range and November through March in the west. More snow accumulates in grasslands within the forest matrix. Soils are variable: (1) highly productive loess soils up to 51 inches (130 cm) deep, (2) rocky flats, (3) steep slopes, and (4) sandy, gravel or cobble soils. An important variant of this habitat occurs on sandy, gravelly, or silty river terraces or seasonally exposed river gravel or Spokane flood deposits. The grassland habitat is typically upland vegetation but it may also include riparian bottomlands dominated by non-native grasses. This habitat is found from 500 to 6,000 ft (152-1,830 m) in elevation.

Landscape Setting. Eastside grassland habitats appear well below and in a matrix with lower tree-line Ponderosa Pine Forests and Woodlands or western Juniper and Mountain Mahogany Woodlands. It can also be part of the lower elevation forest matrix. Most grassland habitat occurs in two distinct large landscapes: plateau and canyon grasslands. Several rivers flow through narrow basalt canyons below plateaus supporting prairies or shrub-steppe. The canyons can be some 2,132 ft (650 m) deep below the plateau. The plateau above is composed of gentle slopes with deep silty loess soils in an expansive rolling dune-like landscape. Grasslands may occur in a patchwork with shallow soil scablands or within biscuit scablands or mounded topography. Naturally occurring grasslands are beyond the range of bitterbrush and sagebrush species. This habitat exists today in the shrub-steppe landscape where grasslands are created by brush removal, chaining or spraying, or by fire. Agricultural uses and introduced perennial plants on abandoned or planted fields are common throughout the current distribution of eastside grassland habitats.

Structure. This habitat is dominated by short to medium-tall grasses (<3.3 ft [1 m]). Total herbaceous cover can be closed to only sparsely vegetated. In general, this habitat is an open and irregular arrangement of grass clumps rather than a continuous sod cover. These medium-tall grasslands often have scattered and diverse patches of low shrubs, but few or no medium-tall shrubs (<10% cover of shrubs are taller than the grass layer). Native forbs may contribute significant cover or they may be absent. Grasslands in canyons are dominated by bunchgrasses growing in lower densities than on deep-soil prairie sites. The soil surface between perennial plants can be covered with a diverse cryptogamic or microbiotic layer of mosses, lichens, and various soil bacteria and algae. Moister environments can support a dense sod of rhizomatous perennial grasses. Annual plants are a common spring and early summer feature of this habitat.

Composition. Bluebunch wheatgrass (*Pseudoroegneria spicata*) and Idaho fescue (*Festuca idahoensis*) are the characteristic native bunchgrasses of this habitat and either or both can be dominant. Idaho fescue is common in more moist areas and bluebunch wheatgrass more abundant in drier areas. Rough fescue (*F. campestris*) is a characteristic dominant on moist sites in northeastern Washington. Sand dropseed (*Sporobolus cryptandrus*) or three-awn (*Aristida longiseta*) are native dominant grasses on hot dry sites in deep canyons. Sandberg bluegrass (*Poa sandbergii*) is usually present and occasionally codominant in drier areas. Bottlebrush squirreltail (*Elymus elymoides*) and Thurber needlegrass (*Stipa thurberiana*) can be locally dominant. Annual grasses are usually present; cheatgrass (*Bromus tectorum*) is the most widespread. In addition, medusahead (*Taeniatherum caput-medusae*), and other annual bromes (*Bromus commutatus, B. mollis, B. japonicus*) may be present to co-dominant. Moist environments, including riparian bottomlands, are often co-dominated by Kentucky bluegrass (*Poa pratensis*).

A dense and diverse forb layer can be present or entirely absent; greater than 40 species of native forbs can grow in this habitat including balsamroots (*Balsamorhiza* spp.), biscuitroots (*Lomatium* spp.), buckwheat (*Eriogonum* spp.), fleabane (*Erigeron* spp.), lupines (*Lupinus* spp.), and milkvetches (*Astragalus* spp.). Common exotic forbs that can grow in this habitat are knapweeds (*Centaurea solstitialis*, *C. diffusa*, *C. maculosa*), tall tumblemustard (*Sisymbrium altissimum*), and Russian thistle (*Salsola kali*).

Smooth sumac (*Rhus glabra*) is a deciduous shrub locally found in combination with these grassland species. Rabbitbrushes (*Chrysothamnus nauseosus*, *C. viscidiflorus*) can occur in this habitat in small amounts, especially where grazed by livestock. In moist Palouse regions, common snowberry (*Symphoricarpos albus*) or Nootka rose (*Rosa nutkana*) may be present, but is shorter than the bunchgrasses. Dry sites contain low succulent pricklypear (*Opuntia polyacantha*). Big sagebrush (*Artemisia tridentata*) is occasional and may be increasing in grasslands on former shrub-steppe sites. Black hawthorn (*Crataegus douglasii*) and other tall shrubs can form dense thickets near Idaho fescue grasslands. Rarely, ponderosa pine (*Pinus ponderosa*) or western juniper (*Juniperus occidentalis*) can occur as isolated trees.

Other Classifications and Key References. This habitat is called Palouse Prairie, Pacific Northwest grassland, steppe vegetation, or bunchgrass prairie in general ecological literature. Quigley and Arbelbide[181] called this habitat Fescue-Bunchgrass and Wheatgrass Bunchgrass and the dry Grass cover type. The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Types [127] that would represent this type are northeast Oregon canyon grassland, forest-grassland mosaic, and modified grassland; Washington Gap[37] types 13, 21, 22, 24, 29-31, 82, and 99 map this habitat. Kuchler[136] includes this within Fescue-wheatgrass and wheatgrass-bluegrass. Franklin and Dyrness [88] include this habitat in steppe zones of Washington and Oregon. Other references describe this habitat [28, 60, 159, 166, 206, 207].

Natural Disturbance Regime. The fire-return interval for sagebrush and bunchgrass is estimated at 25 years[22]. The native bunchgrass habitat apparently lacked extensive herds of large grazing and browsing animals until the late 1800's. Burrowing animals and their predators likely played important roles in creating small-scale patch patterns.

Succession and Stand Dynamics. Currently fires burn less frequently in the Palouse grasslands than historically because of fire suppression, roads, and conversions to cropland[159]. Without fire, black hawthorn shrubland patches expand on slopes along with common snowberry and rose. Fires covering large areas of shrub-steppe habitat can eliminate shrubs and their seed sources and create eastside grassland habitat. Fires that follow heavy grazing or repeated early season fires can result in annual grasslands of cheatgrass, medusahead, knapweed, or yellow star-thistle. Annual exotic grasslands are common in dry grasslands and are included in modified grasslands as part of the Agriculture habitat.

Effects of Management and Anthropogenic Impacts. Large expanses of grasslands are currently used for livestock ranching. Deep soil Palouse sites are mostly converted to agriculture. Drier grasslands and canyon grasslands, those with shallower soils, steeper topography, or hotter, drier environments, were more intensively grazed and for longer periods than were deep-soil grasslands [207]. Evidently, these drier native bunchgrass grasslands changed irreversibly to persistent annual grass and forblands. Some annual grassland, native bunchgrass, and shrub-steppe habitats were converted to intermediate wheatgrass, or more commonly, crested wheatgrass (*Agropyron cristatum*)-dominated areas. Apparently, these form persistent grasslands and are included as modified grasslands in the Agriculture habitat. With intense livestock use, some riparian bottomlands become dominated by non-native grasses. Many native dropseed grasslands have been submerged by dam reservoirs.

Status and Trends. Most of the Palouse prairie of southeastern Washington and adjacent Idaho and Oregon has been converted to agriculture. Remnants still occur in the foothills of the Blue Mountains and in isolated, moist Columbia Basin sites. The Palouse is one of the most endangered ecosystems in the U.S. (Noss 1995) [166] with only one percent of the original habitat remaining; it is highly fragmented with most sites less than 10 acres. All these areas are subject to weed invasions and drift of aerial biocides. Since 1900, 94% of the Palouse grasslands have been converted to crop, hay, or pasture lands. Quigley and Arbelbide (1997) [181] concluded that Fescue-Bunchgrass and Wheatgrass bunchgrass cover types have significantly decreased in area since pre-1900, while exotic forbs and annual grasses have significantly increased since pre-1900. Fifty percent of the plant associations recognized as components of eastside grassland habitat listed in the National Vegetation Classification are considered imperiled or critically imperiled (Anderson 1998) [10].

Appendix E

Herbaceous Wetlands

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (**http://ibis.nwhi.org**). It was written by Rex. C. Crawford and Jimmy Kagan and Christopher B. Chappell.

Geographic Distribution. Herbaceous wetlands are found throughout the world and are represented in Oregon and Washington wherever local hydrologic conditions promote their development. This habitat includes all those except bogs and those within Subalpine Parkland and Alpine.

Freshwater aquatic bed habitats are found throughout the Pacific Northwest, usually in isolated sites. They are more widespread in valley bottoms and high rainfall areas (e.g., Willamette Valley, Puget Trough, coastal terraces, coastal dunes), but are present in montane and arid climates as well. Hardstem bulrush-cattail-burreed marshes occur in wet areas throughout Oregon and Washington. Large marshes are common in the lake basins of Klamath, Lake, and Harney counties, Oregon. Sedge meadows and montane meadows are common in the Blue and Ochoco Mountains of central and northeastern Oregon, and in the valleys of the Olympic and Cascade Mountains and Okanogan Highlands. Extensive wet meadow habitats occur in Klamath, Deschutes, and western Lake Counties in Oregon.

Physical Setting. This habitat is found on permanently flooded sites that are usually associated with oxbow lakes, dune lakes, or potholes. Seasonally to semi-permanently flooded wetlands are found where standing freshwater is present through part of the growing season and the soils stay saturated throughout the season. Some sites are temporarily to seasonally flooded meadows and generally occur on clay, pluvial, or alluvial deposits within montane meadows, or along stream channels in shrubland or woodland riparian vegetation. In general, this habitat is flat, usually with stream or river channels or open water present. Elevation varies between sea level to 10,000 ft (3,048 m), although infrequently above 6,000 ft (1,830 m).

Landscape Setting. Herbaceous wetlands are found in all terrestrial habitats except Subalpine Parkland, Alpine Grasslands, and Shrublands habitats. Herbaceous wetlands commonly form a pattern with Westside and Eastside Riparian-Wetlands and Montane Coniferous Wetlands habitats along stream corridors. These marshes and wetlands also occur in closed basins in a mosaic with open water by lakeshores or ponds. Extensive deflation plain wetlands have developed between Coastal Dunes and Beaches habitat and the Pacific Ocean. Herbaceous wetlands are found in a mosaic with alkali grasslands in the Desert Playa and Salt Scrub habitat.

Structure. The herbaceous wetland habitat is generally a mix of emergent herbaceous plants with a grass-like life form (graminoids). These meadows often occur with deep or shallow water habitats with floating or rooting aquatic forbs. Various wetland communities are found in mosaics or in nearly pure stands of single species. Herbaceous cover is open to dense. The habitat can be comprised of tule marshes greater than 6.6 ft (2 m) tall or sedge meadows and wetlands less than 3.3 ft (1 m) tall. It can be a dense, rhizomatous sward or a tufted graminoid wetland. Graminoid wetland vegetation generally lacks many forbs, although the open extreme of this type contains a diverse forb component between widely spaced tall tufted grasses.

Composition. Various grasses or grass-like plants dominate or co-dominate these habitats. Cattails (*Typha latifolia*) occur widely, sometimes adjacent to open water with aquatic bed plants. Several bulrush species (*Scirpus acutus, S. tabernaemontani, S. maritimus, S. americanus and S. nevadensis*) occur in nearly pure stands or in mosaics with cattails or sedges (*Carex* spp.). Burreed (*Sparganium angustifolium* , *S. eurycarpum*) are the most important graminoids in areas with up to 3.3 ft (1m) of deep standing water. A variety of sedges characterize this habitat. Some sedges (*Carex aquatilis, C. lasiocarpa, C. scopulorum, C. simulata, C. utriculata, C. vesicaria*) tend to occur in cold to cool environments. Other sedges (*C. aquatilis* var. *dives, C. angustata, C. interior, C. micropter*a, *C. nebrascensis*) tend to be at lower elevations in milder or warmer environments. Slough sedge (*C. obnupta*), and several rush species (*Juncus falcatus, J. effusus, J. balticus*) are characteristic of coastal dune wetlands that are included in this habitat. Several spike rush species (*Eleocharis* spp.) and rush species can be important. Common grasses that can be local dominants and indicators of this habitat are American sloughgrass (*Beckmannia syzigachne*), bluejoint reedgrass (*Calamagrostis canadensis*), mannagrass (*Glyceria* spp.) and tufted hairgrass (*Deschampsia caespitosa*). Important introduced grasses that increase and can dominate with disturbance in this wetland habitat include reed canary grass (*Phalaris arundinacea*), tall fescue (*Festuca arundinacea)* and Kentucky bluegrass (*Poa pratensis*).

Aquatic beds are part of this habitat and support a number of rooted aquatic plants, such as, yellow pond lily (*Nuphar lutea*) and unrooted, floating plants such as pondweeds (*Potamogeton* spp.), duckweed (*Lemna minor*), or water-meals (*Wolffia* spp.). Emergent herbaceous broadleaf plants, such as Pacific water parsley (*Oenanthe sarmentosa*), buckbean (*Menyanthes trifoliata*), water star-warts (*Callitriche* spp.), or bladderworts (*Utricularia* spp.) grow in permanent and semi-permanent standing water. Pacific silverweed (*Argentina egedii*) is common in coastal dune wetlands. Montane meadows occasionally are forb dominated with plants such as arrowleaf groundsel (*Senecio triangularis*) or ladyfern (*Athyrium filix-femina*). Climbing nightshade (*Solanum dulcamara*), purple loosestrife (*Lythrum salicaria*), and poison hemlock (*Conium maculatum*) are common non-native forbs in wetland habitats.

Shrubs or trees are not a common part of this herbaceous habitat although willow (*Salix* spp.) or other woody plants occasionally occur along margins, in patches or along streams running through these meadows.

Other Classifications and Key References. This habitat is called Palustrine emergent wetlands in Cowardin *et al*.[53]. Other references describe this habitat [43, 44, 57, 71, 131, 132, 138, 147, 219]. This habitat occurs in both lotic and lentic systems. The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Types [127] that would represent this type are wet meadow, palustrine emergent, and National Wetland Inventory (NWI) palustrine shrubland.

Natural Disturbance Regime. This habitat is maintained through a variety of hydrologic regimes that limit or exclude invasion by large woody plants. Habitats are permanently flooded, semi-permanently flooded, or flooded seasonally and may remain saturated through most of the growing season. Most wetlands are resistant to fire and those that are dry enough to burn usually burn in the fall. Most plants are sprouting species and recover quickly. Beavers play an important role in creating ponds and other impoundments in this habitat. Trampling and grazing by large native mammals is a natural process that creates habitat patches and influences tree invasion and success.

Succession and Stand Dynamics. Herbaceous wetlands are often in a mosaic with shrub- or tree-dominated wetland habitat. Woody species can successfully invade emergent wetlands when this herbaceous habitat dries. Emergent wetland plants invade open-water habitat as soil substrate is exposed; e.g., aquatic sedge and Northwest Territory sedge (*Carex utriculata*) are pioneers following beaver dam breaks. As habitats flood, woody species decrease to patches on higher substrate (soil, organic matter, large woody debris) and emergent plants increase unless the flooding is permanent. Fire suppression can lead to woody species invasion in drier herbaceous wetland habitats; e.g., Willamette Valley wet prairies are invaded by Oregon ash (*Fraxinus latifolia*) with fire suppression.

Effects of Management and Anthropogenic Impacts. Direct alteration of hydrology (i.e., channeling, draining, damming) or indirect alteration (i.e., roading or removing vegetation on adjacent slopes) results in changes in amount and pattern of herbaceous wetland habitat. If the alteration is long term, wetland systems may reestablish to reflect new hydrology, e.g., cattail is an aggressive invader in roadside ditches. Severe livestock grazing and trampling decreases aquatic sedge, Northwest Territory sedge (*Carex utriculata*), bluejoint reedgrass, and tufted hairgrass. Native species, however, such as Nebraska sedge, Baltic and jointed rush (*Juncus nodosus*), marsh cinquefoil (*Comarum palustris*), and introduced species dandelion (*Taraxacum officinale*), Kentucky bluegrass, spreading bentgrass (*Agrostis stolonifera*), and fowl bluegrass (*Poa palustris*) generally increase with grazing.

Status and Trends. Nationally, herbaceous wetlands have declined and the Pacific Northwest is no exception. These wetlands receive regulatory protection at the national, state, and county level; still, herbaceous wetlands have been filled, drained, grazed, and farmed extensively in the lowlands of Oregon and Washington. Montane wetland habitats are less altered than lowland habitats even though they have undergone modification as well. A keystone species, the beaver, has been trapped to near extirpation in parts of the Pacific Northwest and its population has been regulated in others. Herbaceous wetlands have decreased along with the diminished influence of beavers on the landscape. Quigley and Arbelbide[181] concluded that herbaceous wetlands are susceptible to exotic, noxious plant invasions.

Appendix E

Eastside (Interior) Canyon Shrublands

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (**http://ibis.nwhi.org**). It was written by Rex. C. Crawford and Jimmy Kagan.

Geographic Distribution. This habitat occurs primarily on steep canyon slopes in the Blue Mountains and the margins of the Columbia Basin in Idaho, Oregon, and Washington. This habitat also appears as isolated patches across Washington's Columbia Basin.

Physical Setting. This habitat develops in hot dry climates in the Pacific Northwest. Annual precipitation totals 12-20 inches (31-51 cm); only 10% falls in the hottest months, July through September. Snow accumulation is low (1-6 inches [3-15 cm]), persisting only a few weeks. Sites are generally steep (>60%) on all aspects but most common on northerly aspects in deep, dry canyons. Columbia River basalt is the major geologic substrate although many sites are underlain with loess deposits mixed with colluviums. Steep northerly aspects in the Palouse Hills can also support this habitat. This habitat is found from 500 to 5,000 ft (152 to 1,524 m) in elevation.

Landscape Setting. This habitat is generally found in steep canyons surrounded by the Eastside Grassland Habitat and below or in a mosaic with the Ponderosa Pine Forest and Woodlands habitat. This habitat can develop near talus slopes, at the heads of dry drainages, and toe slopes in moist shrub-steppe and steppe zones. At lower elevation sites, these are more often in a mix with bluebunch wheatgrass, dry rocky grasslands, and low-elevation riparian habitats. The primary surrounding land use is livestock grazing.

Structure. The Eastside Canyon Shrubland habitat is generally a mix of tall (5 ft [1.5 m]) to medium (1.6 ft [0.5 m]) deciduous shrublands in a mosaic with bunchgrass or annual grasslands. Shrub canopies are almost always closed (>60% cover), forming a thicket of interwoven stems and branches. Shrub layers can be one or two-tiered but often are so dense they restrict the herbaceous layer to shade-tolerant rhizomatous species.

Composition. Mallowleaf ninebark (*Physocarpus malvaceus*), a major dominant, bitter cherry (*Prunus emarginata*), chokecherry (*Prunus virginiana*), oceanspray (*Holodiscus discolor*) or Rocky Mountain maple (*Acer glabrum*) are the most common tall shrubs in this habitat. In moist areas, black hawthorn (*Crataegus douglasii*) may appear and can dominate some sites as a tall shrub or small tree. Other tall shrubs such as syringa (*Philadelphus lewisii*) or serviceberry (*Amelanchier alnifolia*) often dominate sites associated with talus. Common medium-tall shrubs are common snowberry (*Symphoricarpos albus*), rose (*Rosa nutkana, R. woodsii*), smooth sumac (*Rhus glabra*), and currants (*Ribes* spp.). Basin or Wyoming big sagebrush (*Artemisia tridentata* ssp. *tridentata* or *A. t.* ssp. *wyomingensis*), along with rabbitbrush (*Chrysothamnus* spp.), may be important members of these thickets in weedy sites, dry areas, or transitions with grasslands. Scattered ponderosa pine (*Pinus ponderosa*), black cottonwood (*Populus balsamifera* ssp. *trichocarpa*) and rarely Douglas-fir (*Pseudotsuga menziesii*) trees may be found in and adjacent to this habitat.

Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Thurber's needlegrass (*Stipa thurberiana),* and Sandberg's bluegrass (*Poa sandbergii*) found in the surrounding steppe or shrub-steppe are common but never abundant in these thickets. Basin wildrye (*Leymus cinereus*) can be locally important. Kentucky bluegrass (*Poa pratensis*) is a common introduced grass and, where grazed by livestock, is a dominant undergrowth species. Annual grasses (*Bromus tectorum, B. briziformis*) can be abundant especially on disturbed dry sites. Cleavers (*Galium aparine*) is a frequent member of the herbaceous component of this habitat. Other common forbs include red avens (*Geum triflorum*), horsemint (*Agastache urticifolia*), sticky cinquefoil (*Potentilla gracilis*), balsamroots (*Balsamorhiza* spp.), and fleabanes (*Erigeron* spp.).

Other Classifications and Key References. This habitat is called shrub garland [88] or talus thickets. The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Type [127] that would represent this type is eastside big sagebrush shrubland. Other references describe this habitat are [60, 122, 123, 207].

Natural Disturbance Regime. This habitat is within the sagebrush and bunchgrass vegetation type of Barrett *et al*.[22] who concluded it had a fire-return interval of 25 years. Canyon shrublands associated with talus burn less frequently but are subject to talus movement. Similar shrubfields are associated with forest landscapes and are early seral stages of the Eastside Mixed Conifer Forest Habitat.

Succession and Stand Dynamics. Many of the major shrubs sprout following fire and will be maintained with moderate fire frequency. Most thickets will increase in size without fire. This habitat has increased primarily in moist steppe and shrub-steppe habitat with fire suppression and restricted grazing. Prolonged fire suppression may lead to invasions by tree species. Apparently, some representatives of this habitat could potentially support Douglas-fir or ponderosa pine woodlands after a long fire-free period.

Effects of Management and Anthropogenic Impacts. Livestock grazing in adjacent grassland or shrub-steppe habitat changes the surrounding fine-fuel matrix for fire. That, combined with fire suppression, leads to a change in habitat patch size, structure, and composition. In response to fire suppression, shrub thickets on northerly aspects near lower treeline tend to increase in patch size and height and are invaded by tree species. With heavy livestock grazing, shrubs are browsed, broken, and trampled, which eventually creates a more open shrubland with a more abundant herbaceous layer.

Status and Trends. The Eastside Canyon Shrubland habitat is restricted in range and probably has increased locally in area. Johnson and Simon[123] reported increases in common snowberry-rose communities as a response to fire suppression and heavy grazing that depleted bunchgrass cover. One of the three Eastside Canyon Shrubland community types in the National Vegetation Classification is considered imperiled (Anderson 1998) [10].

Appendix E

Eastside (Interior) Riparian-Wetlands

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (http://ibis.nwhi.org). It was written by Rex. C. Crawford and Jimmy Kagan.

Geographic Distribution. Riparian and wetland habitats dominated by woody plants are found throughout eastern Oregon and eastern Washington. Mountain alder-willow riparian shrublands are major habitats in the forested zones of eastern Oregon and eastern Washington. Eastside lowland willow and other riparian shrublands are the major riparian types throughout eastern Oregon and Washington at lower elevations. Black cottonwood riparian habitats occur throughout eastern Oregon and Washington, at low to middle elevations. White alder riparian habitats are restricted to perennial streams at low elevations, in drier climatic zones in Hells Canyon at the border of Oregon, Washington, and Idaho, in the Malheur River drainage and in western Klickitat and south central Yakima counties, Washington. Quaking aspen wetlands and riparian habitats are widespread but rarely a major component throughout eastern Washington and Oregon. Ponderosa pine-Douglas-fir riparian habitat occurs only around the periphery of the Columbia Basin in Washington and up into lower montane forests.

Physical Setting. Riparian habitats appear along perennial and intermittent rivers and streams. This habitat also appears in impounded wetlands and along lakes and ponds. Their associated streams flow along low to high gradients. The riparian and wetland forests are usually in fairly narrow bands along the moving water that follows a corridor along montane or valley streams. The most typical stand is limited to 100-200 ft (31-61 m) from streams. Riparian forests also appear on sites subject to temporary flooding during spring runoff. Irrigation of streamsides and toeslopes provides more water than precipitation and is important in the development of this habitat, particularly in drier climatic regions. Hydro geomorphic surfaces along streams supporting this habitat have seasonally to temporarily flooded hydrologic regimes. Eastside riparian and wetland habitats are found from 100- 9,500 ft (31-2,896 m) in elevation.

Landscape Setting. Eastside riparian habitats occur along streams, seeps, and lakes within the Eastside Mixed Conifer Forest, Ponderosa Pine Forest and Woodlands, Western Juniper and Mountain Mahogany Woodlands, and part of the Shrub-steppe habitat. This habitat may be described as occupying warm montane and adjacent valley and plain riparian environments.

Structure. The Eastside riparian and wetland habitat contains shrublands, woodlands, and forest communities. Stands are closed to open canopies and often multilayered. A typical riparian habitat would be a mosaic of forest, woodland, and shrubland patches along a stream course. The tree layer can be dominated by broadleaf, conifer, or mixed canopies. Tall shrub layers, with and without trees, are deciduous and often nearly completely closed thickets. These woody riparian habitats have an undergrowth of low shrubs or dense patches of grasses, sedges, or forbs. Tall shrub communities (20-98 ft [6-30 m], occasionally tall enough to be considered woodlands or forests) can be interspersed with sedge meadows or moist, forb-rich grasslands. Intermittently flooded riparian habitat has ground cover composed of steppe grasses and forbs. Rocks and boulders may be a prominent feature in this habitat.

Composition. Black cottonwood (*Populus balsamifera* ssp. *trichocarpa*), quaking aspen (*P. tremuloides*), white alder (*Alnus rhombifolia*), peachleaf willow (*Salix amygdaloides*) and, in northeast Washington, paper birch (*Betula papyrifera*) are dominant and characteristic tall deciduous trees. Water birch (*B. occidentalis*), shining willow (*Salix lucida* ssp. *caudata*) and, rarely, mountain alder (*Alnus incana*) are co-dominant to dominant mid-size deciduous trees. Each can be the sole dominant in stands. Conifers can occur in this habitat, rarely in abundance, more often as individual trees. The exception is ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) that characterize a conifer-riparian habitat in portions of the shrubsteppe zones.

A wide variety of shrubs are found in association with forest/woodland versions of this habitat. Red-osier dogwood (*Cornus sericea*), mountain alder, gooseberry (*Ribes* spp.), rose (*Rosa* spp.), common snowberry (*Symphoricarpos albus*) and Drummonds willow (*Salix drummondii*) are important shrubs in this habitat. Bog birch (*B. nana*) and Douglas spiraea (*Spiraea douglasii*) can occur in wetter stands. Red-osier dogwood and common snowberry are shade-tolerant and dominate stand interiors, while these and other shrubs occur along forest or woodland edges and openings. Mountain alder is frequently a prominent shrub, especially at middle elevations. Tall shrubs (or small trees) often growing under or with white alder include chokecherry (*Prunus virginiana*), water birch, shining willow, and netleaf hackberry (*Celtis reticulata*).

Shrub-dominated communities contain most of the species associated with tree communities. Willow species (*Salix bebbiana, S. boothii, S. exigua, S geyeriana,* or *S. lemmonii*) dominate many sites. Mountain alder can be dominant and is at least codominant at many sites. Chokecherry, water birch, serviceberry (*Amelanchier alnifolia*), black hawthorn (*Crataegus douglasii*), and red-osier dogwood can also be codominant to dominant. Shorter shrubs, Woods rose, spiraea, snowberry and gooseberry are usually present in the undergrowth.

The herb layer is highly variable and is composed of an assortment of graminoids and broadleaf herbs. Native grasses (*Calamagrostis canadensis, Elymus glaucus, Glyceria* spp., and *Agrostis* spp.) and sedges (*Carex aquatilis, C. angustata, C. lanuginosa, C. lasiocarpa, C. nebrascensis, C. microptera*, and *C. utriculata*) are significant in many habitats. Kentucky bluegrass (*Poa pratensis*) can be abundant where heavily grazed in the past. Other weedy grasses, such as orchard grass *(Dactylis glomerata)*, reed canarygrass (*Phalaris arundinacea*), timothy (*Phleum pratense*), bluegrass (*Poa bulbosa, P. compressa*), and tall fescue (*Festuca arundinacea*) often dominate disturbed areas. A short list of the great variety of forbs that grow in this habitat includes Columbian monkshood (*Aconitum columbianum*), alpine leafybract aster (*Aster foliaceus*), ladyfern (*Athyrium filix-femina*), field horsetail (*Equisetum arvense*), cow parsnip (*Heracleum maximum*), skunkcabbage (*Lysichiton americanus*), arrowleaf groundsel (*Senecio triangularis*), stinging nettle (*Urtica dioica*), California false hellebore (*Veratrum californicum*), American speedwell (*Veronica americana*), and pioneer violet (*Viola glabella*).

Other Classifications and Key References. This habitat is called Palustrine scrub-shrub and forest in Cowardin *et al*.[53]. Other references describe this habitat [44, 57, 60, 131, 132, 147, 156]. This habitat occurs in both lotic and lentic systems. The Oregon Gap II Project [126] and Oregon Vegetation Landscape-Level Cover Types [127] that would represent this type are eastside cottonwood riparian gallery, palustrine forest, palustrine shrubland, and National Wetland Inventory (NWI) palustrine emergent.

Natural Disturbance Regime. This habitat is tightly associated with stream dynamics and hydrology. Flood cycles occur within 20-30 years in most riparian shrublands although flood regimes vary among stream types. Fires recur typically every 25-50 years but fire can be nearly absent in colder regions or on topographically protected streams. Rafted ice and logs in freshets may cause considerable damage to tree boles in mountain habitats. Beavers crop younger cottonwood and willows and frequently dam side channels in these stands. These forests and woodlands require various flooding regimes and specific substrate conditions for reestablishment. Grazing and trampling is a major influence in altering structure, composition, and function of this habitat; some portions are very sensitive to heavy grazing.

Succession and Stand Dynamics. Riparian vegetation undergoes "typical" stand development that is strongly controlled by the site's initial conditions following flooding and shifts in hydrology. The initial condition of any hydro geomorphic surface is a sum of the plants that survived the disturbance, plants that can get to the site and the amount of unoccupied habitat available for invasions. Subsequent or repeated floods or other influence on the initial vegetation selects species that can survive or grow in particular life forms. A typical woody riparian habitat dynamic is the invasion of woody and herbaceous plants onto a new alluvial bar away from the main channel. If the bar is not scoured in 20 years, a tall shrub and small deciduous tree stand will develop. Approximately 30 years without disturbance or change in hydrology will allow trees to overtop shrubs and form woodland. Another 50 years without disturbance will allow conifers to invade and in another 50 years, a mixed hardwood-conifer stand will develop. Many deciduous tall shrubs and trees cannot be invaded by conifers. Each stage can be reinitiated, held in place, or shunted into different vegetation by changes in stream or wetland hydrology, fire, grazing, or an interaction of those factors.

Effects of Management and Anthropogenic Impacts. Management effects on woody riparian vegetation can be obvious, e.g., removal of vegetation by dam construction, roads, logging, or they can be subtle, e.g., removing beavers from a watershed, removing large woody debris, or construction of a weir dam for fish habitat. In general, excessive livestock or native ungulate use leads to less woody cover and an increase in sod-forming grasses particularly on fine-textured soils. Undesirable forb species, such as stinging nettle and horsetail, increase with livestock use.

Status and Trends. Quigley and Arbelbide[181] concluded that the Cottonwood-Willow cover type covers significantly less in area now than before 1900 in the Inland Pacific Northwest. The authors concluded that although riparian shrubland was a minor part of the landscape, occupying two percent, they estimated it to have declined to 0.5% of the landscape. Approximately 40% of riparian shrublands occurred above 3,280 ft (1,000 m) in elevation pre-1900; now nearly 80% is found above that elevation. This change reflects losses to agricultural development, roading, dams and other flood-control activities. The current riparian shrublands contain many exotic plant species and generally are less productive than historically. Quigley and Arbelbide[181] found that riparian woodlands were always rare and the change in extent from the past is substantial.

Appendix E

Montane Mixed Conifer Forest

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (http://ibis.nwhi.org). It was written by Christopher B. Chappell.

Geographic Distribution. These forests occur in mountains throughout Washington and Oregon, excepting the Basin and Range of southeastern Oregon. These include the Cascade Range, Olympic Mountains, Okanogan Highlands, Coast Range (rarely), Blue and Wallowa Mountains, and Siskiyou Mountains.

Physical Setting. This habitat is typified by a moderate to deep winter snow pack that persists for three to nine months. The climate is moderately cool and wet to moderately dry and very cold. Mean annual precipitation ranges from about 40 inches (102 cm) to greater than 200 inches (508 cm). Elevation is mid to upper montane, as low as 2,000 ft (610 m) in northern Washington, to as high as 7,500 ft (2,287 m) in southern Oregon. On the Westside, it occupies an elevational zone of about 2,500 to 3,000 vertical feet (762 to 914 m), and on the eastside it occupies a narrower zone of about 1,500 vertical feet (457 m). Topography is generally mountainous. Soils are typically not well developed, but varied in their parent material: glacial till, volcanic ash, residuum, or colluvium. Spodosols are common.

Landscape Setting. This habitat is found adjacent to Westside Lowlands Conifer-Hardwood Forest, Eastside Mixed Conifer Forests, or Southwest Oregon Mixed Conifer-Hardwood Forest at its lower elevation limits and to Subalpine Parkland at its upper elevation limits. Inclusions of Montane Forested Wetlands, Westside Riparian Wetlands, and less commonly Open Water or Herbaceous Wetlands occur within the matrix of montane forest habitat. The typical land use is forestry or recreation. Most of this type is found on public lands managed for timber values and much of it has been harvested in a dispersed-patch pattern.

Structure. This is a forest, or rarely woodland, dominated by evergreen conifers. Canopy structure varies from single- to multi-storied. Tree size also varies from small to very large. Large snags and logs vary from abundant to uncommon. Understories vary in structure: shrubs, forbs, ferns, graminoids or some combination of these usually dominate, but they can be depauperate as well. Deciduous broadleaf shrubs are most typical as understory dominants. Early successional structure after logging or fire varies depending on understory species present. Mosses are a major ground cover and epiphytie lichens are typically abundant in the canopy.

Composition. This forest habitat is recognized by the dominance or prominence of one of the following species: Pacific silver fir (*Abies amabilis*), mountain hemlock (*Tsuga mertensiana*), subalpine fir (*A. lasiocarpa*), Shasta red fir (*A. magnific var. shastensi*), Engelmann spruce (*Picea engelmannii*), noble fir (*A. procera*), or Alaska yellow-cedar (*Chamaecyparis nootkatensis*). Several other trees may co-dominate: Douglas-fir (*Pseudotsuga menziesii*), lodgepole pine (*Pinus contorta*), western hemlock (*Tsuga heterophylla*), western redcedar (*Thuja plicata*), or white fir (*A. concolor*). Tree regeneration is typically dominated by Pacific silver fir in moist Westside middle-elevation zones; by mountain hemlock, sometimes with silver fir, in cool, very snowy zones on the Westside and along the Cascade Crest; by subalpine fir in cold, drier eastside zones; and by Shasta red fir in the snowy mid- to upper-elevation zone of southwestern and south-central Oregon.

Subalpine fir and Engelmann spruce are major species only east of the Cascade Crest in Washington, in the Blue Mountains ecoregion, and in the northeastern Olympic Mountains (spruce is largely absent in the Olympic Mountains). Lodgepole pine is important east of the Cascade Crest throughout and in central and southern Oregon. Douglas-fir is important east of the Cascade Crest and at lower elevations on the Westside. Pacific silver fir is a major species on the Westside as far south as central Oregon. Noble fir, as a native species, is found primarily in the western Cascades from central Washington to central Oregon. Mountain hemlock is a common dominant at higher elevations along the Cascade Crest and to the west. Western hemlock, and to a lesser degree western redcedar, occur as dominants primarily with silver fir at lower elevations on the Westside. Alaska yellow-cedar occurs as a co-dominant west of the Cascade Crest in Washington, rarely in northern Oregon. Shasta red fir and white fir occur only from central Oregon south, the latter mainly at lower elevations.

Deciduous shrubs that commonly dominate or co-dominate the understory are oval-leaf huckleberry (*Vaccinium ovalifolium*), big huckleberry (*V. membranaceum*), grouseberry (*V. scoparium*), dwarf huckleberry (*V. cespitosum*), fools huckleberry (*Menziesia ferruginea*), Cascade azalea (*Rhododendron albiflorum*), copperbush (*Elliottia pyroliflorus*), devil's-club (*Oplopanax horridus*), and, in the far south only, baldhip rose (*Rosa gymnocarpa*), currants (*Ribes* spp.), and creeping snowberry (*Symphoricarpos mollis*). Important evergreen shrubs include salal (*Gaultheria shallon*), dwarf Oregongrape (*Mahonia nervosa*), Pacific rhododendron (*Rhododendron macrophyllum*), deer oak (*Quercus sadleriana*), pinemat manzanita (*Arctostaphylos nevadensis*), beargrass (*Xerophyllum tenax*), and Oregon boxwood (*Paxistima myrsinites*).

Graminoid dominants are found primarily just along the Cascade Crest and to the east and include pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), smooth woodrush (*Luzula glabrata* var. *hitchcockii*), and long-stolon sedge (*Carex inops*). Deerfern (*Blechnum spicant*) and western oakfern (*Gymnocarpium dryopteris*) are commonly co-dominant. The most abundant forbs include Oregon oxalis (*Oxalis oregana*), single-leaf foamflower (*Tiarella trifoliata* var. *unifoliata*), rosy twisted-stalk (*Streptopus roseus*), queen's cup (*Clintonia uniflora*), western bunchberry (*Cornus unalaschkensis*), twinflower (*Linnaea borealis*), prince's pine (*Chimaphila umbellata*), five-leaved bramble (*Rubus pedatus*), and dwarf bramble (*R. lasiococcus*), sidebells (*Orthilia secunda*), avalanche lily (*Erythronium montanum*), Sitka valerian (*Valeriana sitchensis*), false lily-of-the-valley (*Maianthemum dilatatum*), and Idaho goldthread (*Coptis occidentalis*).

Other Classifications and Key References. This habitat includes most of the upland forests and their successional stages, except lodgepole pine dominated forests, in the *Tsuga mertensiana*, *Abies amabilis*, *A. magnifica* var. *shastensis*, *A. lasiocarpa* zones of Franklin and Dyrness [88]. Portions of this habitat have also been referred to as *A. amabilis-Tsuga heterophylla* forests, *A. magnifica* var. *shastensis* forests, and *Tsuga mertensiana* forests [87]. It is equivalent to Silver fir-Douglas-fir forest No. 3, closed portion of Fir-hemlock forest No. 4, Red fir forest No. 7, and closed portion of Western spruce-fir forest No. 15[136]; The Oregon Gap II Project [126] and

Oregon Vegetation Landscape-Level Cover Types [127] that would represent this type are mountain hemlock montane forest, true fir-hemlock montane forest, montane mixed conifer forest, Shasta red fir-mountain hemlock forest, and subalpine fir-lodgepole pine montane conifer; also most of the conifer forest in the Silver Fir, Mountain Hemlock, and Subalpine Fir Zones of Washington Gap[37]. A number of other references describe this habitat [13, 15, 17, 25, 26, 36, 38, 90, 108, 111, 114, 115, 118, 144, 148, 158, 212, 221].

Natural Disturbance Regime. Fire is the major natural disturbance in this habitat. Fire regimes are primarily of the high-severity type[1], but also include the moderate-severity regime (moderately frequent and highly variable) for Shasta red fir forests [39]. Mean fire-return intervals vary greatly, from ³800 years for some mountain hemlock-silver fir forests to about 40 years for red fir forests. Windstorms are a common small-scale disturbance and occasionally result in stand replacement. Insects and fungi are often important small-scale disturbances. However, they may affect larger areas also, for example, laminated root rot (*Phellinus weirii*) is a major natural disturbance, affecting large areas of mountain hemlock forests in the Oregon Cascades[72].

Succession and Stand Dynamics. After fire, a typical stand will briefly be occupied by annual and perennial ruderal forbs and grasses, as well as predisturbance understory shrubs and herbs that resprout. Stand initiation can take a long time, especially at higher elevations, resulting in shrub/herb dominance (with or without a scattered tree layer) for extended periods [3, 109]. Early seral tree species can be any of the potential dominants for the habitat, or lodgepole pine, depending on the environment, type of disturbance, and seed source. Fires tend to favor early seral dominance of lodgepole pine, Douglas-fir, noble fir, or Shasta red fir, if their seeds are present [1]. In some areas, large stand-replacement fires will result in conversion of this habitat to the Lodgepole Pine Forest and Woodland habitat, distinguished by dominance of lodgepole. After the tree canopy closes, the understory typically becomes sparse for a time. Eventually tree density will decrease and the understory will begin to flourish again, but this process takes longer than in lower elevation forests, generally at least 100 years after the disturbance, sometimes much longer(Agee 1993) [1]. As stand development proceeds, relatively shade-intolerant trees (lodgepole pine, Douglas-fir, western hemlock, noble fir, Engelmann spruce) typically decrease in importance and more shade-tolerant species (Pacific silver fir, subalpine fir, Shasta red fir, mountain hemlock) increase. Complex multi-layered canopies with large trees will typically take at least 300 years to develop, often much longer, and on some sites may never develop. Tree growth rates, and therefore the potential to develop these structural features, tend to decrease with increasing elevation.

Effects of Management and Anthropogenic Impacts. Forest management practices, such as clearcutting and plantations, have in many cases resulted in less diverse tree canopies with an emphasis on Douglas-fir. They also reduce coarse woody debris compared to natural levels, and truncate succession well before late-seral characteristics are expressed. Post-harvest regeneration of trees has been a perpetual problem for forest managers in much of this habitat [16, 97]. Planting of Douglas-fir has often failed at higher elevations, even where old Douglas-fir were present in the unmanaged stand [115]. Slash burning often has negative impacts on productivity and regeneration [186]. Management has since shifted away from burning and toward planting noble fir or native species, natural regeneration, and advance regeneration [16, 103]. Noble fir plantations are now fairly common in managed landscapes, even outside the natural range of the species. Advance regeneration management tends to simulate wind disturbance but without the abundant downed wood component. Shelterwood cuts are a common management strategy in Engelmann spruce or subalpine fir stands[221].

Status and Trends. This habitat occupies large areas of the region. There has probably been little or no decline in the extent of this type over time. Large areas of this habitat are relatively undisturbed by human impacts and include significant old-growth stands. Other areas have been extensively affected by logging, especially dispersed patch clearcuts. The habitat is stable in area, but is probably still declining in condition because of continued logging. This habitat is one of the best protected, with large areas represented in national parks and wilderness areas. The only threat is continued road building and clearcutting in unprotected areas. None of the 81 plant associations representing this habitat listed in the National Vegetation Classification is considered imperiled[10].

Appendix E

Ponderosa Pine Forest and Woodlands
(includes Eastside Oak)

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (**http://ibis.nwhi.org**). It was written by Rex C. Crawford and Jimmy Kagan.

Geographic Distribution. This habitat occurs in much of eastern Washington and eastern Oregon, including the eastern slopes of the Cascades, the Blue Mountains and foothills, and the Okanogan Highlands. Variants of it also occur in the Rocky Mountains, the eastern Sierra Nevada, and mountains within the Great Basin. It extends into south-central British Columbia as well.

In the Pacific Northwest, ponderosa pine-Douglas-fir woodland habitats occur along the eastern slope of the Cascades, the Okanogan Highlands, and in the Blue Mountains. Ponderosa pine woodland and savanna habitats occur in the foothills of the Blue Mountains, along the eastern base of the Cascade Range, the Okanogan Highlands, and in the Columbia Basin in northeastern Washington. Ponderosa pine is widespread in the pumice zone of south-central Oregon between Bend and Crater Lake east of the Cascade Crest. Ponderosa pine-Oregon white oak habitat appears east of the Cascades near Mt. Hood near the Columbia River Gorge north to the Yakama Nation and south to the Warm Springs Nation. Oak dominated woodlands follow a similar distribution as Ponderosa Pine-White Oak habitat but are more restricted and less common.

Physical Setting. This habitat generally occurs on the driest sites supporting conifers in the Pacific Northwest. It is widespread and variable, appearing on moderate to steep slopes in canyons, foothills, and on plateaus or plains near mountains. In Oregon, this habitat can be maintained by the dry pumice soils, and in Washington, it can be associated with serpentine soils. Average annual precipitation ranges from about 14 to 30 inches (36 to 76 cm) on ponderosa pine sites in Oregon and Washington and often as snow. This habitat can be found at elevations of 100 ft (30m) in the Columbia River Gorge to dry, warm areas over 6,000 ft (1,829 m). Timber harvest, livestock grazing, and pockets of urban development are major land uses.

Landscape Setting. This woodland habitat typifies the lower treeline zone forming transitions with Eastside Mixed Conifer Forest and Western Juniper and Mountain Mahogany Woodland, Shrub-Steppe, Eastside Grassland, or Agriculture habitats. Douglas-fir ponderosa pine woodlands are found near or within the Eastside Mixed Conifer Forest habitat. Oregon oak woodlands appear in the driest most restricted landscapes in transition to Eastside Grassland or Shrub-Steppe.

Structure. This habitat is typically a woodland or savanna with tree canopy coverage of 10-60%, although closed-canopy stands are possible. The tree layer is usually composed of widely spaced large conifer trees. Many stands tend towards a multilayered condition with encroaching conifer regeneration. Isolated taller conifers above broadleaf deciduous trees characterize part of this habitat. Deciduous woodlands or forests are an important part of the structural variety of this habitat. Clonal deciduous trees can create dense patches across a grassy landscape rather than scattered individual trees. The undergrowth may include dense stands of shrubs or, more often, be dominated by grasses, sedges, or forbs. Shrub-Steppe shrubs may be prominent in some stands and create a distinct tree-shrub-sparse-grassland habitat.

Composition. Ponderosa pine (*Pinus ponderosa*) and Douglas-fir (*Pseudotsuga menziesii*) are the most common evergreen trees in this habitat. The deciduous conifer, western larch (*Larix occidentalis*), can be a co-dominant with the evergreen conifers in the Blue Mountains of Oregon, but seldom as a canopy dominant. Grand fir (*Abies grandis*) may be frequent in the undergrowth on more productive sites giving stands a multilayer structure. In rare instances, grand fir can be co-dominant in the upper canopy. Tall ponderosa pine over Oregon white oak (*Quercus garryana*) trees form stands along part of the east Cascades. These stands usually have younger cohorts of pines. Oregon white oak dominates open woodlands or savannas in limited areas.

The undergrowth can include dense stands of shrubs or, more often, be dominated by grasses, sedges, and/or forbs. Some Douglas-fir and ponderosa pine stands have a tall to medium-tall deciduous shrub layer of mallowleaf ninebark (*Physocarpus malvaceus*) or common snowberry (*Symphoricarpos albus*). Grand fir seedlings or saplings may be present in the undergrowth. Pumice soils support a shrub layer represented by green-leaf or white-leaf manzanita (*Arctostaphylos patula* or *A. viscida*). Short shrubs, pinemat manzanita (*Arctostaphylos nevadensis*) and kinnikinnick (*A. uva-ursi*) are found across the range of this habitat. Antelope bitterbrush (*Purshia tridentata*), big sagebrush (*Artemisia tridentata*), black sagebrush (*A. nova*), green rabbitbrush (*Chrysothamnus viscidiflorus*), and in southern Oregon, curl-leaf mountain mahogany (*Cercocarpus ledifolius*) often grow with Douglas-fir, ponderosa pine and/or Oregon white oak, which typically have a bunchgrass and shrub-Steppe ground cover.

Undergrowth is generally dominated by herbaceous species, especially graminoids. Within a forest matrix, these woodland habitats have an open to closed sodgrass undergrowth dominated by pinegrass (*Calamagrostis rubescens*), Geyer's sedge (*Carex geyeri*), Ross' sedge (*C. rossii*), long-stolon sedge (*C. inops*), or blue wildrye (*Elymus glaucus*). Drier savanna and woodland undergrowth typically contains bunchgrass steppe species, such as Idaho fescue (*Festuca idahoensis*), rough fescue (*F. campestris*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Indian ricegrass (*Oryzopsis hymenoides*), or needlegrasses (*Stipa comata, S. occidentalis*). Common exotic grasses that may appear in abundance are cheatgrass (*Bromus tectorum*), and bulbous bluegrass (*Poa bulbosa*). Forbs are common associates in this habitat and are too numerous to be listed.

Other Classifications and Key References. This habitat is referred to as Merriam's Arid Transition Zone, Western ponderosa forest (*Pinus*), and Oregon Oak wood (*Quercus*) in Kuchler [136], and as Pacific ponderosa pine Douglas-fir and Pacific ponderosa pine, and Oregon white oak by the Society of American Foresters. The Oregon Gap II Project [126] and Oregon Vegetation Landscape-Level Cover Types [127] that would represent this type are ponderosa pine forest and woodland, ponderosa pine-white oak forest and woodland, and ponderosa pine-lodgepole pine on pumice. Other references describe elements of this habitat [45, 62, 88, 117, 118, 121, 122, 123, 144, 148, 209, 212, 221, 222].

Natural Disturbance Regime. Fire plays an important role in creating vegetation structure and composition in this habitat. Most of the habitat has experienced frequent low-severity fires that maintained woodland or savanna conditions. A mean fire interval of 20 years for ponderosa pine is the shortest of the vegetation types listed by Barrett et. al. [22]. Soil drought plays a role in maintaining an open tree canopy in part of this dry woodland habitat.

Succession and Stand Dynamics. This habitat is climax on sites near the dry limits of each of the dominant conifer species and is more seral as the environment becomes more favorable for tree growth. Open seral stands are gradually replaced by more closed shade-tolerant climax stands. Oregon white oak can reproduce under its own shade but is intolerant of overtopping by conifers. Oregon white oak woodlands are considered fire climax and are seral to conifers. In drier conditions, unfavorable to conifers, oak is climax. Oregon white oak sprouts from the trunk and root crown following cutting or burning and form clonal patches of trees.

Effects of Management and Anthropogenic Impacts. Pre-1900, this habitat was mostly open and park like with relatively few undergrowth trees. Currently, much of this habitat has a younger tree cohort of more shade-tolerant species that gives the habitat a more closed, multilayered canopy. For example, this habitat includes previously natural fire-maintained stands in which grand fir can eventually become the canopy dominant. Fire suppression has lead to a buildup of fuels that in turn increase the likelihood of stand-replacing fires. Heavy grazing, in contrast to fire, removes the grass cover and tends to favor shrub and conifer species. Fire suppression combined with grazing creates conditions that support cloning of oak and invasion by conifers. Large late-seral ponderosa pine, Douglas-fir, and Oregon white oak are harvested in much of this habitat. Under most management regimes, typical tree size decreases and tree density increases in this habitat. Ponderosa pine-Oregon white oak habitat is now denser than in the past and may contain more shrubs than in presettlement habitats. In some areas, new woodlands have been created by patchy tree establishment at the forest-steppe boundary.

Status and Trends. Quigley and Arbelbide[181] concluded that the Interior Ponderosa Pine cover type is significantly less in extent than pre-1900 and that the Oregon White Oak cover type is greater in extent than pre-1900. They included much of this habitat in their Dry Forest potential vegetation group[181], which they concluded has departed from natural succession and disturbance conditions. The greatest structural change in this habitat is the reduced extent of the late-seral, single-layer condition. This habitat is generally degraded because of increased exotic plants and decreased native bunchgrasses. One third of Pacific Northwest Oregon white oak, ponderosa pine, and dry Douglas-fir or grand fir community types listed in the National Vegetation Classification are considered imperiled or critically imperiled [10].

Appendix E

Shrub-steppe

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (**http://ibis.nwhi.org**). It was written by Rex. C. Crawford and Jimmy Kagan.

Geographic Distribution. Shrub-steppe habitats are common across the Columbia Plateau of Washington, Oregon, Idaho, and adjacent Wyoming, Utah and Nevada. It extends up into the cold, dry environments of surrounding mountains.

Basin big sagebrush shrub-steppe occurs along stream channels, in valley bottoms and flats throughout eastern Oregon and Washington. Wyoming sagebrush shrub-steppe is the most widespread habitat in eastern Oregon and Washington, occurring throughout the Columbia Plateau and the northern Great Basin. Mountain big sagebrush shrub-steppe habitat occurs throughout the mountains of the eastern Oregon and Washington. Bitterbrush shrub-steppe habitat appears primarily along the eastern slope of the Cascades, from north-central Washington to California and occasionally in the Blue Mountains. Three-tip sagebrush shrub-steppe occurs mostly along the northern and western Columbia Basin in Washington and occasionally appears in the lower valleys of the Blue Mountains and in the Owyhee Upland ecoregions of Oregon. Interior shrub dunes and sandy steppe and shrub-steppe habitat is concentrated at low elevations near the Columbia River and in isolated pockets in the Northern Basin and Range and Owyhee Uplands. Bolander silver sagebrush shrub-steppe is common in southeastern Oregon. Mountain silver sagebrush is more prevalent in the Oregon East Cascades and in montane meadows in the southern Ochoco and Blue Mountains.

Physical Setting. Generally, this habitat is associated with dry, hot environments in the Pacific Northwest although variants are in cool, moist areas with some snow accumulation in climatically dry mountains. Elevation range is wide (300-9,000 ft [91-2,743 m]) with most habitat occurring between 2,000 and 6,000 ft (610-1,830 m). Habitat occurs on deep alluvial, loess, silty or sandy-silty soils, stony flats, ridges, mountain slopes, and slopes of lake beds with ash or pumice soils.

Landscape Setting. Shrub-steppe habitat defines a biogeographic region and is the major vegetation on average sites in the Columbia Plateau, usually below Ponderosa Pine Forest and Woodlands, and Western Juniper and Mountain Mahogany Woodlands habitats. It forms mosaic landscapes with these woodland habitats and Eastside Grasslands, Dwarf Shrub-steppe, and Desert Playa and Salt Scrub habitats. Mountain sagebrush shrub-steppe occurs at high elevations occasionally within the dry Eastside Mixed Conifer Forest and Montane Mixed Conifer Forest habitats. Shrub-steppe habitat can appear in large landscape patches. Livestock grazing is the primary land use in the shrub-steppe although much has been converted to irrigation or dry land agriculture. Large areas occur in military training areas and wildlife refuges.

Structure. This habitat is a shrub savanna or shrubland with shrub coverage of 10-60%. In an undisturbed condition, shrub cover varies between 10 and 30%. Shrubs are generally evergreen although deciduous shrubs are prominent in many habitats. Shrub height typically is medium-tall (1.6-3.3 ft [0.5-1.0 m]) although some sites support shrubs approaching nine feet (2.7 m) tall.

Vegetation structure in this habitat is characteristically an open shrub layer over a moderately open to closed bunchgrass layer. The more northern or productive sites generally have a denser grass layer and sparser shrub layer than southern or more xeric sites. In fact, the rare good-condition site is better characterized as grassland with shrubs than a shrubland. The bunchgrass layer may contain a variety of forbs. Good-condition habitat has very little exposed bare ground, and has mosses and lichens carpeting the area between taller plants. However, heavily grazed sites have dense shrubs making up greater than 40% cover, with introduced annual grasses and little or no moss or lichen cover. Moist sites may support tall bunchgrasses (>3.3 ft [1 m]) or rhizomatous grasses. More southern shrub-steppe may have native low shrubs dominating with bunchgrasses.

Composition. Characteristic and dominant mid-tall shrubs in the shrub-steppe habitat include all three subspecies of big sagebrush, basin (*Artemisia tridentata* ssp. *tridentata*), Wyoming (*A. t.* ssp. *wyomingensis*) or mountain (*A. t.* ssp. *vaseyana*), antelope bitterbrush (*Purshia tridentata*), and two shorter sagebrushes, silver (*A. cana*) and three-tip (*A. tripartita*). Each of these species can be the only shrub or appear in complex seral conditions with other shrubs. Common shrub complexes are bitterbrush and Wyoming big sagebrush, bitterbrush and three-tip sagebrush, Wyoming big sagebrush and three-tip sagebrush, and mountain big sagebrush and silver sagebrush. Wyoming and mountain big sagebrush can codominate areas with tobacco brush (*Ceanothus velutinus)*. Rabbitbrush (*Chrysothamnus viscidiflorus*) and short-spine horsebrush (*Tetradymia spinosa*) are common associates and often dominate sites after disturbance. Big sagebrush occurs with the shorter stiff sagebrush (*A. rigida*) or low sagebrush (*A. arbuscula*) on shallow soils or high elevation sites. Many sandy areas are shrub-free or are open to patchy shrublands of bitterbrush and/or rabbitbrush. Silver sagebrush is the dominant and characteristic shrub along the edges of stream courses, moist meadows, and ponds. Silver sagebrush and rabbitbrush are associates in disturbed areas.

When this habitat is in good or better ecological condition, a bunchgrass steppe layer is characteristic. Diagnostic native bunchgrasses that often dominate different shrub-steppe habitats are (1) mid-grasses: bluebunch wheatgrass (*Pseudoroegneria spicata),* Idaho fescue (*Festuca idahoensis*), bottlebrush squirreltail (*Elymus elymoides*), and Thurber needlegrass (*Stipa thurberiana*); (2) short grasses: threadleaf sedge (*Carex filifolia*) and Sandberg bluegrass (*Poa sandbergii*); and (3) the tall grass, basin wildrye (*Leymus cinereus*). Idaho fescue is characteristic of the most productive shrub-steppe vegetation. Bluebunch wheatgrass is codominant at xeric locations, whereas western needlegrass (*Stipa occidentalis*), long-stolon *(Carex inops)* or Geyer's sedge (*C. geyeri*) increase in abundance in higher elevation shrubsteppe habitats. Needle-and-thread (*Stipa comata*) is the characteristic native bunchgrass on stabilized sandy soils. Indian ricegrass (*Oryzopsis hymenoides*) characterizes dunes. Grass layers on montane sites contain slender wheatgrass (*Elymus trachycaulus*), mountain fescue (*F. brachyphylla*), green fescue (*F. viridula*), Geyer's sedge, or tall bluegrasses *(Poa* spp.). Bottlebrush squirreltail can be locally important in the Columbia Basin, sand dropseed (*Sporobolus cryptandrus*) is important in the Basin and Range and basin wildrye is common in the more alkaline areas. Nevada bluegrass (*Poa secunda*), Richardson muhly *(Muhlenbergia richardsonis*), or alkali grass (*Puccinella* spp.) can dominate silver sagebrush flats. Many sites support non-native plants, primarily cheatgrass (*Bromus tectorum*) or crested wheatgrass *(Agropyron cristatum*) with or without native grasses. Shrub-steppe habitat, depending on site potential and disturbance history, can be rich in forbs or have little forb cover. Trees may be present in some shrub-steppe habitats, usually as isolated individuals from adjacent forest or woodland habitats.

Other Classifications and Key References. This habitat is called Sagebrush steppe and Great Basin sagebrush by Kuchler[136]. The Oregon Gap II Project [126] and Oregon Vegetation Landscape-Level Cover Types [127] that would represent this type are big sagebrush shrubland, sagebrush steppe, and bitterbrush-big sagebrush shrubland. Franklin and Dyrness [88] discussed this habitat in shrub-steppe zones of Washington and Oregon. Other references describe this habitat [60, 116, 122, 123, 212, 224, 225].

Natural Disturbance Regime. Barrett *et al.*[22] concluded that the fire-return interval for this habitat is 25 years. The native shrub-steppe habitat apparently lacked extensive herds of large grazing and browsing animals until the late 1800's. Burrowing animals and their predators likely played important roles in creating small-scale patch patterns.

Succession and Stand Dynamics. With disturbance, mature stands of big sagebrush are reinvaded through soil-stored or windborne seeds. Invasion can be slow because sagebrush is not disseminated over long distances. Site dominance by big sagebrush usually takes a decade or more depending on fire severity and season, seed rain, postfire moisture, and plant competition. Three-tip sagebrush is a climax species that reestablishes (from seeds or commonly from sprouts) within five to 10 years following a disturbance. Certain disturbance regimes promote three-tip sagebrush and it can out-compete herbaceous species. Bitterbrush is a climax species that plays a seral role colonizing by seed onto rocky and/or pumice soils. Bitterbrush may be declining and may be replaced by woodlands in the absence of fire. Silver sagebrush is a climax species that establishes during early seral stages and coexists with later arriving species. Big sagebrush, rabbitbrush, and short-spine horsebrush invade and can form dense stands after fire or livestock grazing. Frequent or high-intensity fire can create a patchy shrub cover or can eliminate shrub cover and create Eastside Grasslands habitat.

Effects of Management and Anthropogenic Impacts. Shrub density and annual cover increase, whereas bunchgrass density decreases with livestock use. Repeated or intense disturbance, particularly on drier sites, leads to cheatgrass dominance and replacement of native bunchgrasses. Dry and sandy soils are sensitive to grazing, with needle-and-thread replaced by cheatgrass at most sites. These disturbed sites can be converted to modified grasslands in the Agriculture habitat.

Status and Trends. Shrub-steppe habitat still dominates most of southeastern Oregon although half of its original distribution in the Columbia Basin has been converted to agriculture. Alteration of fire regimes, fragmentation, livestock grazing, and the addition of greater than 800 exotic plant species have changed the character of shrub-steppe habitat. Quigley and Arbelbide[181] concluded that Big Sagebrush and Mountain Sagebrush cover types are significantly smaller in area than before 1900, and that Bitterbrush/Bluebunch Wheatgrass cover type is similar to the pre-1900 extent. They concluded that Basin Big Sagebrush and Big sagebrush-Warm potential vegetation type's successional pathways are altered, that some pathways of Antelope Bitterbrush are altered and that most pathways for Big Sagebrush-Cool are unaltered. This habitat overall has seen an increase in exotic plant importance and a decrease in native bunchgrasses. More than half of the Pacific Northwest shrub-steppe habitat community types listed in the National Vegetation Classification are considered imperiled or critically imperiled[10].

Appendix E

Western Juniper and Mountain Mahogany Woodlands

This habitat description was taken from the Interactive Biodiversity Information System (IBIS) web page (**http://ibis.nwhi.org**). It was written by Rex. C. Crawford and Jimmy Kagan.

Geographic Distribution. This habitat is distributed from the Pacific Northwest south into Southern California and east to Western Montana and Utah, where it often occurs with pinyon-juniper habitat. In Oregon and Washington, this dry woodland habitat appears primarily in the Owyhee Uplands, High Lava Plains, and Northern Basin and Range ecoregions. Secondarily, it develops in the foothills of the Blue Mountains and East Cascades ecoregions, and seems to be expanding into the southern Columbia Basin ecoregions, where it was naturally found in outlier stands.

Western juniper woodlands with shrub-steppe species appear throughout the range of the habitat primarily in central and southern Oregon. Many isolated mahogany communities occur throughout canyons and mountains of eastern Oregon. Juniper-mountain mahogany communities are found in the Ochoco and Blue Mountains.

Physical Setting. This habitat is widespread and variable, occurring in basins and canyons, and on slopes and valley margins in the southern Columbia Plateau, and on fire-protected sites in the northern Basin and Range province. It may be found on benches and foothills. Western juniper and/or mountain mahogany woodlands are often found on shallow soils, on flats at mid- to high elevations, usually on basalts. Other sites range from deep, loess soils and sandy slopes to very stony canyon slopes. At lower elevations, or in areas outside of shrub-steppe, this habitat occurs on slopes and in areas with shallow soils. Mountain mahogany can occur on steep rimrock slopes, usually in areas of shallow soils or protected slopes. This habitat can be found at elevations of 1,500- 8,000 ft (457-2,438 m), mostly between 4,000-6,000 ft (1,220-1,830 m). Average annual precipitation ranges from approximately 10 to 13 inches (25 to 33 cm), with most occurring as winter snow.

Landscape Setting. This habitat reflects a transition between Ponderosa Pine Forest and Woodlands and Shrub-steppe, Eastside Grasslands, and rarely Desert Playa and Salt Desert Scrub habitats. Western juniper generally occurs on higher topography, whereas the shrub communities are more common in depressions or steep slopes with bunchgrass undergrowth. In the Great Basin, mountain mahogany may form a distinct belt on mountain slopes and ridgetops above pinyon-juniper woodland. Mountain-mahogany can occur in isolated, pure patches that are often very dense. The primary land use is livestock grazing.

Structure. This habitat is made up of savannas, woodlands, or open forests with 10-60% canopy cover. The tallest layer is composed of short (6.6-40 ft [2-12 m] tall) evergreen trees. Dominant plants may assume a tall-shrub growth form on some sites. The short trees appear in a mosaic pattern with areas of low or medium-tall (usually evergreen) shrubs alternating with areas of tree layers and widely spaced low or medium-tall shrubs. The herbaceous layer is usually composed of short or medium tall bunchgrass or, rarely, rhizomatous grass-forb undergrowth. These vegetated areas can be interspersed with rimrock or scree. A well-developed cryptogam layer often covers the ground, although bare rock can make up much of the ground cover.

Composition. Western juniper and/or mountain mahogany dominate these woodlands either with bunchgrass or shrub-steppe undergrowth. Western juniper (*occidentalis*) is the most common dominant tree in these woodlands. Part of this habitat will have curl-leaf mountain mahogany (*Cercocarpus ledifolius*) as the only dominant tall shrub or small tree. Mahogany may be co-dominant with western juniper. Ponderosa pine (*Pinus ponderosa*) can grow in this habitat and in some rare instances may be an important part of the canopy.

The most common shrubs in this habitat are basin, Wyoming, or mountain big sagebrush (*Artemisia tridentata* ssp. *tridentata,* ssp. *wyomingensis,* and ssp. *vaseyana*) and/or bitterbrush (*Purshia tridentata*). They usually provide significant cover in juniper stands. Low or stiff sagebrush (*Artemisia arbuscula* or *A. rigida*) are dominant dwarf shrubs in some juniper stands. Mountain big sagebrush appears most commonly with mountain mahogany and mountain mahogany mixed with juniper. Snowbank shrubland patches in mountain mahogany woodlands are composed of mountain big sagebrush with bitter cherry (*Prunus emarginata*), quaking aspen (*Populus tremuloides*), and serviceberry (*Amelanchier alnifolia*). Shorter shrubs such as mountain snowberry (*Symphoricarpos oreophilus*) or creeping Oregongrape (*Mahonia repens*) can be dominant in the undergrowth. Rabbitbrush (*Chrysothamnus nauseosus* and *C. viscidiflorus*) will increase with grazing.

Part of this woodland habitat lacks a shrub layer. Various native bunchgrasses dominate different aspects of this habitat. Sandberg bluegrass (*Poa sandbergii*), a short bunchgrass, is the dominant and most common grass throughout many juniper sites. Medium-tall bunchgrasses such as Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), needlegrasses (*Stipa occidentalis, S. thurberiana, S. lemmonii*), bottlebrush squirreltail (*Elymus elymoides*) can dominate undergrowth. Threadleaf sedge (*Carex filifolia*) and basin wildrye (*Leymus cinereus*) are found in lowlands and Geyer's and Ross' sedge (*Carex geyeri, C. rossii*), pinegrass (*Calamagrostis rubescens*), and blue wildrye (*E. glaucus)* appear on mountain foothills. Sandy sites typically have needle-and-thread (*Stipa comata)* and Indian ricegrass *(Oryzopsis hymenoides*). Cheatgrass *(Bromus tectorum)* or bulbous bluegrass *(Poa bulbosa)* often dominates overgrazed or disturbed sites. In good condition, this habitat may have mosses growing under the trees.

Other Classifications and Key References. This habitat is also called Juniper Steppe Woodland[136]. The Oregon Gap II Project[126] and Oregon Vegetation Landscape-Level Cover Types [127] that would represent this type are ponderosa pine-western juniper woodland, western juniper woodland, and mountain mahogany shrubland. Other references describe this habitat [64, 79, 122, 207].

Natural Disturbance Regime. Both mountain mahogany and western juniper are fire intolerant. Under natural high-frequency fire regimes, both species formed savannas or occurred as isolated patches on fire-resistant sites in shrub-steppe or steppe habitat. Western juniper is considered a topographic climax tree in a number of sagebrush-grassland, shrub-steppe, and drier conifer sites. It is an increaser in many earlier seral communities in these zones and invades without fires. Most trees >13 ft (4 m) tall can survive low-intensity fires. The historic fire regime of mountain mahogany communities varies with community type and structure. The fire-return interval for mountain mahogany (along the Salmon River in Idaho) was 13-22 years until the early 1900's and has increased ever since. Mountain mahogany can live to 1,350 years in western and central Nevada. Some old-growth mountain mahogany stands avoid fire by growing on extremely rocky sites.

Succession and Stand Dynamics. Juniper invades shrub-steppe and steppe and reduces undergrowth productivity. Although slow seed dispersal delays recovery time, western juniper can regain dominance in 30-50 years following fire. A fire-return interval of 30-50 years typically arrests juniper invasion. The successional role of curl-leaf mountain mahogany varies with community type. Mountain brush communities where curl-leaf mountain mahogany is either dominant or co-dominant are generally stable and successional rates are slow.

Effects of Management and Anthropogenic Impacts. Over the past 150 years, with fire suppression, overgrazing, and changing climatic factors, western juniper has increased its range into adjacent shrub-steppe, grasslands, and savannas. Increased density of juniper and reduced fine fuels from an interaction of grazing and shading result in high severity fires that eliminate woody plants and promote herbaceous cover, primarily annual grasses. Diverse mosses and lichens occur on the ground in this type if it has not been too disturbed by grazing. Excessive grazing will decrease bunchgrasses and increase exotic annual grasses plus various native and exotic forbs. Animals seeking shade under trees decrease or eliminate bunchgrasses and contribute to increasing cheatgrass cover.

Status and Trends. This habitat is dominated by fire-sensitive species, and therefore, the range of western juniper and mountain mahogany has expanded because of an interaction of livestock grazing and fire suppression. Quigley and Arbelbide[181] concluded that in the Inland Pacific Northwest, Juniper/Sagebrush, Juniper Woodlands, and Mountain Mahogany cover types now are significantly greater in extent than before 1900. Although it covers more area, this habitat is generally in degraded condition because of increased exotic plants and decreased native bunchgrasses. One third of Pacific Northwest juniper and mountain mahogany community types listed in the National Vegetation Classification are considered imperiled or critically imperiled (Anderson 1998) [10]

The 46 Attributes Required for Rating in the EDT Model

Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Alkalinity	Very low (average value typically would be 0-5 mg/l)	Moderately low (average value typically would be 5-25 mg/l)	Moderately high (average value typically would be 25-50 mg/l)	High (average value typically would be 50-150 mg/l)	High (average value typically would be 150-250 mg/l)
Bed scour	Pool tailouts and riffles generally very stable, characteristic of conditions prevailing in largely spring fed streams.	Infrequent scour, averaging depths < 10 cm	Frequent scour, averaging depths < 10 cm	Frequent scour, averaging depths > 10 cm and < 25 cm	Frequent scour, averaging depths exceeding 25 cm
Benthos diversity and production	Macroinvertebrates abundant, multiple species of families Emphemeroptera, Plecoptera, and Trichoptera are present.	Intermediate	Macroinvertebrates common or abundant but 1-2 families among Emphemeroptera, Plecoptera, and Trichoptera are not present.	Intermediate	Macroinvertebrates are present only at extremely low densities and/or biomass.
Channel length (miles)	**Length of reach in miles**				
Channel month Maximum width (ft)	**Typical maximum width of channel in feet**				
Channel month Minimum width (ft)	**Typical minimum width of channel in feet**				
Confinement - Hydromodifications	The stream channel within the reach is essentially fully connected to its floodplain. Very minor structures may exist in the re	Some portion of the stream channel, though less than 10%, is disconnected from its floodplain along one or both banks due to ma	More than 10% and less than 40% of the entire length of the stream channel within the reach is disconnected from its floodplain	More than 40% and less than 80% of the entire length of the stream channel within the reach is disconnected from its floodplain	Greater than 80% of the entire length of the stream channel within the reach is disconnected from its floodplain along one or b

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Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Confinement - natural	Reach mostly unconfined by natural features -- Average valley width > 4 channel widths.	Reach comprised approximately equally of unconfined and moderately confined sections.	Reach mostly moderately confined by natural features -- Average valley width 2 - 4 channel widths.	Reach comprised approximately equally of moderately confined and confined sections.	Reach mostly confined by natural features -- Average valley width < 2 channel widths.
Dissolved oxygen	> 8 mg/L (allows for all biological functions for salmonids without impairment at temperatures ranging from 0-25 C)	> 6 mg/L and < 8 mg/L (causes initial stress symptoms for some salmonids at temperatures ranging from 0-25 C)	> 4 and < 6 mg/L (stress increased, biological function impaired)	> 3 and < 4 mg/L (growth, food conversion efficiency, swimming performance adversely affected)	< 3 mg/L
Embeddedness	< 10% of surface covered by fine sediment	> 10 and < 25 % covered by fine sediment	> 25 and < 50 % covered by fine sediment	> 50 and < 90 % covered by fine sediment	> 90% covered by fine sediment
Fine sediment	< 6% fines < 0.85 mm particle size	> 6% and < 11% fines < 0.85 mm particle size	> 11% and < 18% fines < 0.85 mm particle size	> 18% and < 30% fines < 0.85 mm particle size	> 30% fines < 0.85 mm particle size
Fish community richness	2 or fewer fish taxa	3-7 fish taxa	8-17 fish taxa	18-25 fish taxa	> 25 fish taxa
Fish pathogens	No historic or recent fish stocking in drainage and no known incidences of whirling disease, C. shasta, IHN, or IPN	Historic fish stocking, but no fish stocking records within the past decade, or sockeye population currently existing in draina	On-going periodic, frequent, or annual fish stocking in drainage or known viral incidents within sockeye population in the wate	Operating hatchery within the reach or in the reach immediately downstream or upstream	Known presence of whirling disease or C. shasta within the watershed.
Fish species introductions	No non-native species reported or known to be in the sub-drainage of interest.	1-2 non-native species reported or known to be in the sub-drainage of interest.	3-7 non-native species reported or known to be in the sub-drainage of interest.	8-14 non-native species reported or known to be in the sub-drainage of interest.	15 or more non-native species reported or known to be in the sub-drainage of interest.

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Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Flow - change in interannual variability in high flows	Pronounced decreases in high flow levels and/or amount of between year variation in high flow levels relative to an undisturbed	Some evidence of decreases in high flow levels and/or amount of between year variation in high flow levels relative to an undis	Typical high flow levels and amount of variation in high flows between years relative to an undisturbed watershed of similar s	Some evidence of increases in high flow levels and/or amount of between year variation in high flow levels relative to an undis	Pronounced increases in high flow levels and/or amount of between year variation in high flow levels relative to an undisturbed
Flow - changes in interannual variability in low flows	Pronounced increases in low flow levels and between year stability in low flow levels relative to an undisturbed watershed of s	Some evidence of increased low flow levels and between year stability in low flow levels relative to an undisturbed watershed o	Typical low flows and between year variation in low flows relative to an undisturbed watershed of similar size, geology, and ge	Some evidence of reduced low flows and/or between year variation in low flow levels relative to an undisturbed watershed of sim	Pronounced reductions in low flows and/or between year variation in low flow levels relative to an undisturbed watershed of sim
Flow - Intra daily (diel) variation	Essentially no variation in discharge during a 24-hr period. During a month, this condition would characterize most flow patter	Little variation, on average, in discharge during a 24-hr period--typical of natural runoff pattern during relatively small rai	Moderate variation, on average, in discharge during a 24-hr period--typical of low ramping rate associated with hydro facilitie	Some evidence of increased variation in discharge during a 24-hr period compared to natural runoff pattern. This pattern typica	Extreme variation on average over a 24-hr period during month. This pattern typical of severe ramping condition associated with
Flow - intra-annual flow pattern	Pronounced decreases in variation in daily flow during a month (intra-annual) relative to an undisturbed watershed of similar s	Some evidence of decreased variation in daily flow during a month (intra-annual) relative to an undisturbed watershed of simila	Typical variation in flow variation during a month (intra-annual) in an undisturbed watershed of similar size, geology, and geo	Some evidence of increased variation in daily flow during a month (intra-annual) relative to an undisturbed watershed of simila	Pronounced increases in variation in daily flow during a month (intra-annual) relative to an undisturbed watershed of similar s
Gradient	**Proportional gradient over the reach (<1.0)**				
Habitat type - backwater pools	0 - <0.25% of wetted surface area encompasses this habitat type	>0.25% and <5% of wetted surface area encompasses this habitat type	>5% and <25% of wetted surface area encompasses this habitat type	>25% and <50% of wetted surface area encompasses this habitat type	>50% of wetted surface area encompasses this habitat type

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Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Habitat type - beaver ponds	0 - <0.25% of wetted surface area encompasses this habitat type	>0.25% and <5% of wetted surface area encompasses this habitat type	>5% and <25% of wetted surface area encompasses this habitat type	>25% and <50% of wetted surface area encompasses this habitat type	>50% of wetted surface area encompasses this habitat type
Habitat type - Glides	0 - <0.25% of wetted surface area encompasses this habitat type	>0.25% and <5% of wetted surface area encompasses this habitat type	>5% and <25% of wetted surface area encompasses this habitat type	>25% and <50% of wetted surface area encompasses this habitat type	>50% of wetted surface area encompasses this habitat type
Habitat type - large cobble/boulder riffles	0 - <0.25% of wetted surface area encompasses this habitat type	>0.25% and <5% of wetted surface area encompasses this habitat type	>5% and <25% of wetted surface area encompasses this habitat type	>25% and <50% of wetted surface area encompasses this habitat type	>50% of wetted surface area encompasses this habitat type
Habitat type - off-channel habitat factor	No off-channel habitat present	>0 X and < 0.05 X	>0.05 X and < 0.25 X	>0.25 X and < 0.5 X	>0.5 X
Habitat type - pool tailouts	0 - <0.25% of wetted surface area encompasses this habitat type	>0.25% and <5% of wetted surface area encompasses this habitat type	>5% and <25% of wetted surface area encompasses this habitat type	>25% and <50% of wetted surface area encompasses this habitat type	>50% of wetted surface area encompasses this habitat type
Habitat type - primary pools	0 - <0.25% of wetted surface area encompasses this habitat type	>0.25% and <5% of wetted surface area encompasses this habitat type	>5% and <25% of wetted surface area encompasses this habitat type	>25% and <50% of wetted surface area encompasses this habitat type	>50% of wetted surface area encompasses this habitat type
Habitat type - small cobble/gravel riffles	0 - <0.25% of wetted surface area encompasses this habitat type	>0.25% and <5% of wetted surface area encompasses this habitat type	>5% and <25% of wetted surface area encompasses this habitat type	>25% and <50% of wetted surface area encompasses this habitat type	>50% of wetted surface area encompasses this habitat type
Harassment	Reach is distant from human population centers, no road access or no local concentration of human activity.	Reach is distant from human population centers, but with partial road access or little local concentration of human activity.	Reach is near human population center, but has limited public access (through roads or boat launching sites).	Extensive road and/or boat access to the reach with localized concentrations of human activity.	Reach is near human population center or has extensive recreational activities, and has extensive road access and/or opportunit

Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Hatchery fish outplants	No stocking records in the past decade.	No more than two instances of fish releases in the past decade in the drainage.	Fish releases made into the drainage every 1-3 years at isolated locations within the drainage.	Fish releases made at multiple sites in the drainage, but only in 1-3 years during the past decade. When the species released i	Fish releases made every 1-3 years and at multiple sites in the drainage. When the species released is the same as focus specie
Hydrologic regime - natural	Groundwater-source-dominated; strongly buffered peak flows (as in a springbrook or in river like the Metolius in central Oregon	Spring snowmelt dominated, non-glacial; temporally consistent and moderate peak and low flows	Rain-on-snow transitional; consistent spring peak and low flows with inconsistent and flashy winter or early spring rain-on-sno	Rainfall-dominated; flashy winter and early spring peaks, consistently low summer flows and variable spring and fall flows.	Glacial runoff system; high, turbid low flows, generally buffered peak flows except with occasional outburst floods and infrequ
Hydrologic regime - regulated	The project is located off the main channel. The project diverts on average less than 50% of the river/stream in any given mont	The project is located off the main channel. The project diverts on average more than 50% of the river/stream in any given mont	The project is located in the channel, is operated in run-of –river mode, and therefore has little storage or flood control cap	The project is located in the channel, operated as a run-of-river project under flood control constraints. Median monthly flow	Project operations have resulted in a major shift in median flows between months or seasons. Typically spring flows (in snow me
Icing	Anchor ice and icing events occur rarely, having little or no impact to physical structure of stream, in-stream structure, and	Intermediate to codes 0 and 1.	Some anchor ice and/or icing events that have a moderate to high probability of occurrence but effects on stream, in-stream str	Intermediate to codes 2 and 4.	Likelihood of severe anchor ice or overbank ice jams is high, having major effects on stream, in-stream structure, and stream b
Metals - in water column	No toxicity expected due to dissolved heavy metals to salmonids under prolonged exposure (1 month exposure assumed).	May exert some low level chronic toxicity to salmonids (1 month exposure assumed).	Consistently chronic toxicity expected to salmonids(1 month exposure assumed).	Usually acutely toxic to salmonids (1 month exposure assumed).	Always acutely toxic to salmonids (1 month exposure assumed).

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Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Metals/Pollutants - in sediments/soils	Metals/pollutants at natural (background) levels with no or negligible effects on benthic dwelling organisms or riparian vegeta	Deposition of metals/pollutants in low concentrations such that some stress symptoms occur to benthic dwelling organisms or rip	Stress symptoms increased or biological functions moderately impaired to benthic dwelling organisms; or few areas within the ri	Growth, food conversion, reproduction, or mobility of benthic organisms severely affected; or large areas of the riparian zone	Metals/pollutant concentrations in sediments/soils are lethal to large numbers of the benthic species and/or riparian zone is p
Miscellaneous toxic pollutants - water column	No substances present that may periodically be at or near chronic toxicity levels to salmonids.	One substance present that may only periodically rise to near chronic toxicity levels (may exert some chronic toxicity) to salm	More than one substance present that may periodically rise to near chronic toxicity levels or one substance present > chronic t	One or more substances present > acute toxicity threshold but < 3X acute toxicity threshold (usually acutely toxic) to salmonid	One or more substances present with > 3X acute toxicity (always acutely toxic) to salmonids.
Nutrient enrichment	No enrichment.	Intermediate	Some enrichment with possible positive production response for some species (possibly negative for others).	Intermediate	Super enrichment (e.g., discharge of sewage in the summer with high densities of grazing animals)
Obstructions to fish migration	None documented or inferred.	One or barriers to juvenile migrants at certain flow levels.	One or barriers to juvenile migrants at all flow levels.	One or barriers to juvenile migrants at all flow levels and barrier(s) to adult migration at certain flow levels.	One or more barriers to all fish migration at all flow levels.
Predation risk	"Many or most native predators are depressd or rare, none are greatly increased over natural levels, and there may be some nume"	Intermediate	Diversity and per-capita abundance of predators exists so that predation risk is at near-natural level and distribution.	Intermediate	Excessive population density or concentrated population of predator species exists due to artifacts of human alteration of the

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Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Riparian function	Strong linkages with no anthropogenic influences.	>75-90% of functional attributes present (overbank flows, vegetated streambanks, groundwater interactions typically present).	50-75% functional attribute rating- significant loss of riparian functioning- minor channel incision, diminished riparian veget	25-50% similarity to natural conditions in functional attributes- many linkages between the stream and its floodplain are sever	< 25% functional attribute rating: complete severing of floodplain-stream linkages
Salmon Carcasses	Super abundant -- an average number of carcasses per total miles of main channel habitat >800.	Very abundant -- an average number of carcasses per total miles of main channel habitat >400 and < 800.	Moderately abundant -- an average number of carcasses per total miles of main channel habitat >200 and < 400.	Not abundant -- an average number of carcasses per total miles of main channel habitat >25 and <200.	Very few or none -- an average number of carcasses per total miles of main channel habitat <25.
Temperature - daily maximum (by month)	Warmest day < 10 C	Warmest day >10 C and <16 C	> 1 d with warmest day 22-25 C or 1-12 d with >16 C	> 1 d with warmest day 25-27.5 C or > 4 d (non-consecutive) with warmest day 22-25 C or >12 d with >16 C	> 1 d with warmest day 27.5 C or 3 d (consecutive) >25 C or >24 d with >21 C
Temperature - daily minimum (by month)	Coldest day >4 C	< 7 d with <4 C and minimum >1 C	1 to 7 d < 1 C	8 to 15 days < 1 C	> 15 winter days < 1 C
Temperature - spatial variation	Groundwater discharge into surface waters is the major source of flow in reach.	Abundant sites of groundwater discharge into surface waters.	Intermittent sites of groundwater discharge into surface waters and total quantity of groundwater discharge not a major source	Infrequent sites of groundwater discharge into surface waters and total quantity of groundwater discharge not a major source of	No evidence of concentrated groundwater inputs.

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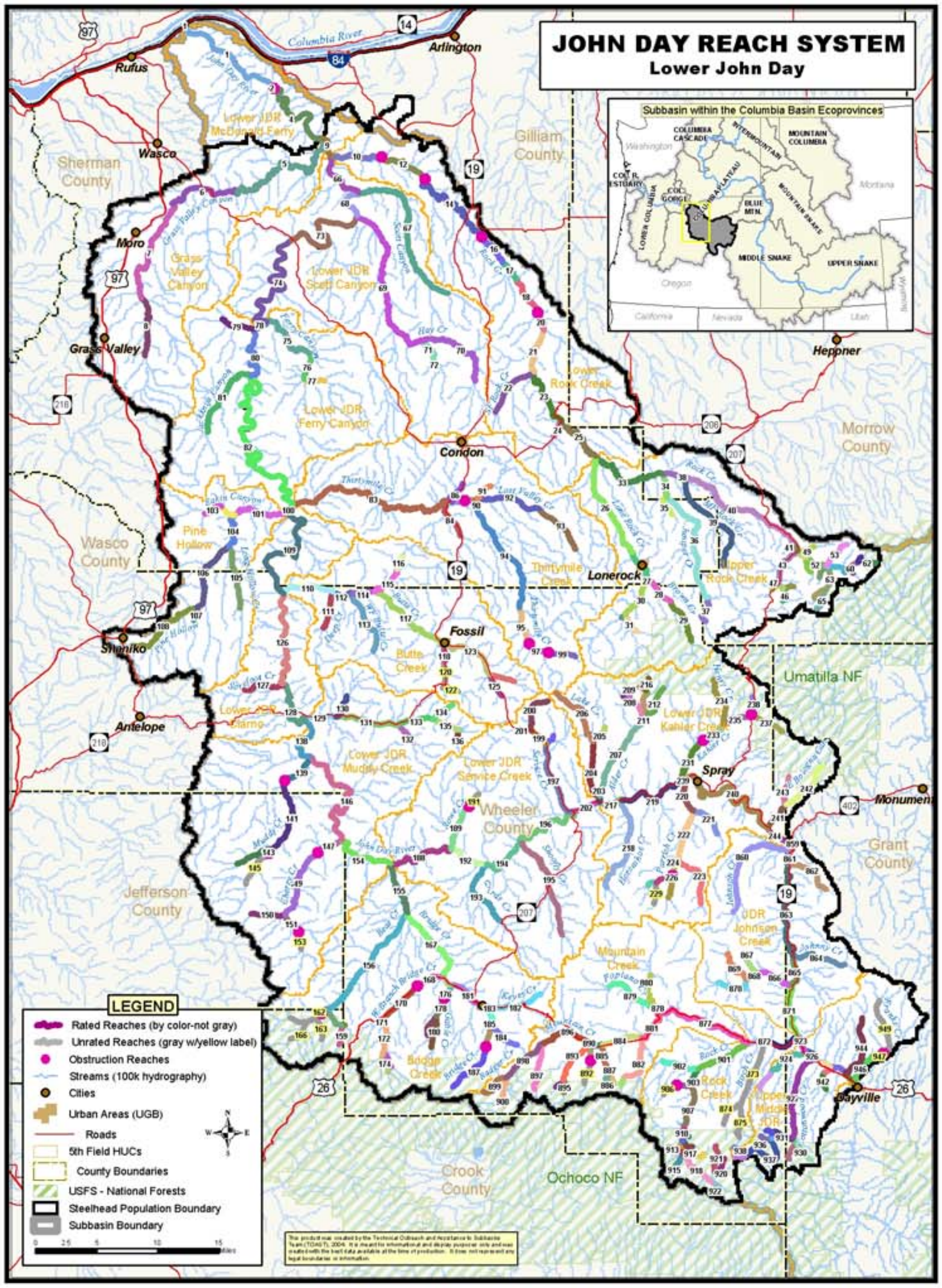
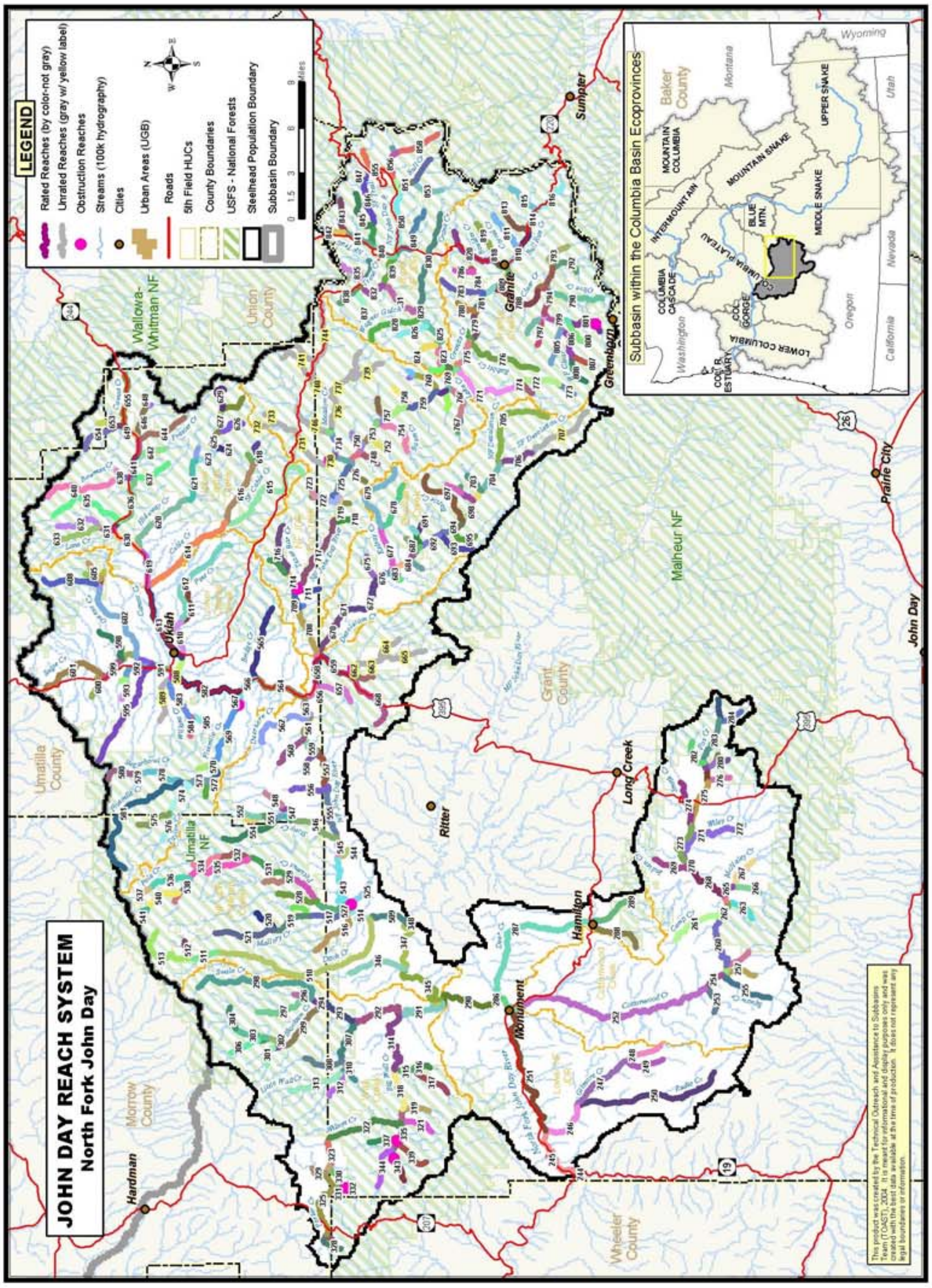
Attribute Name	Index Value 0 Definition	Index Value 1 Definition	Index Value 2 Definition	Index Value 3 Definition	Index Value 4 Definition
Turbidity	Clear with infrequent (short duration-- several days per year) concentrations of suspended sediment (i.3., <50 mg/L) (a spring	Occasional episodes (days to several weeks--not continuous--annually) of low to moderate concentrations (<500 mg/L), though sho	Occasional episodes (days to several weeks) of moderate to relatively high concentrations (>500 and <1000 mg/L), though short d	On-going or occasional episodes (periodic events annually lasting several weeks at a time)) of high concentrations of suspended	Extended periods (months) of very high concentrations (>4000 and <8000 mg/L) or shorter durations exceeding 8000 mg/L. These re
Water withdrawals	No withdrawals.	Very minor water withdrawals with or without screening (entrainment probability considered very low).	Several of significant water withdrawals along reach though all sites known or believed to be screened with effective screening	Several sites of significant water withdrawals along reach without screening or screening believed to be ineffective. (Note: on	Frequent sites of significant water withdrawals along reach without screening or screening believed to be ineffective.

Appendix G

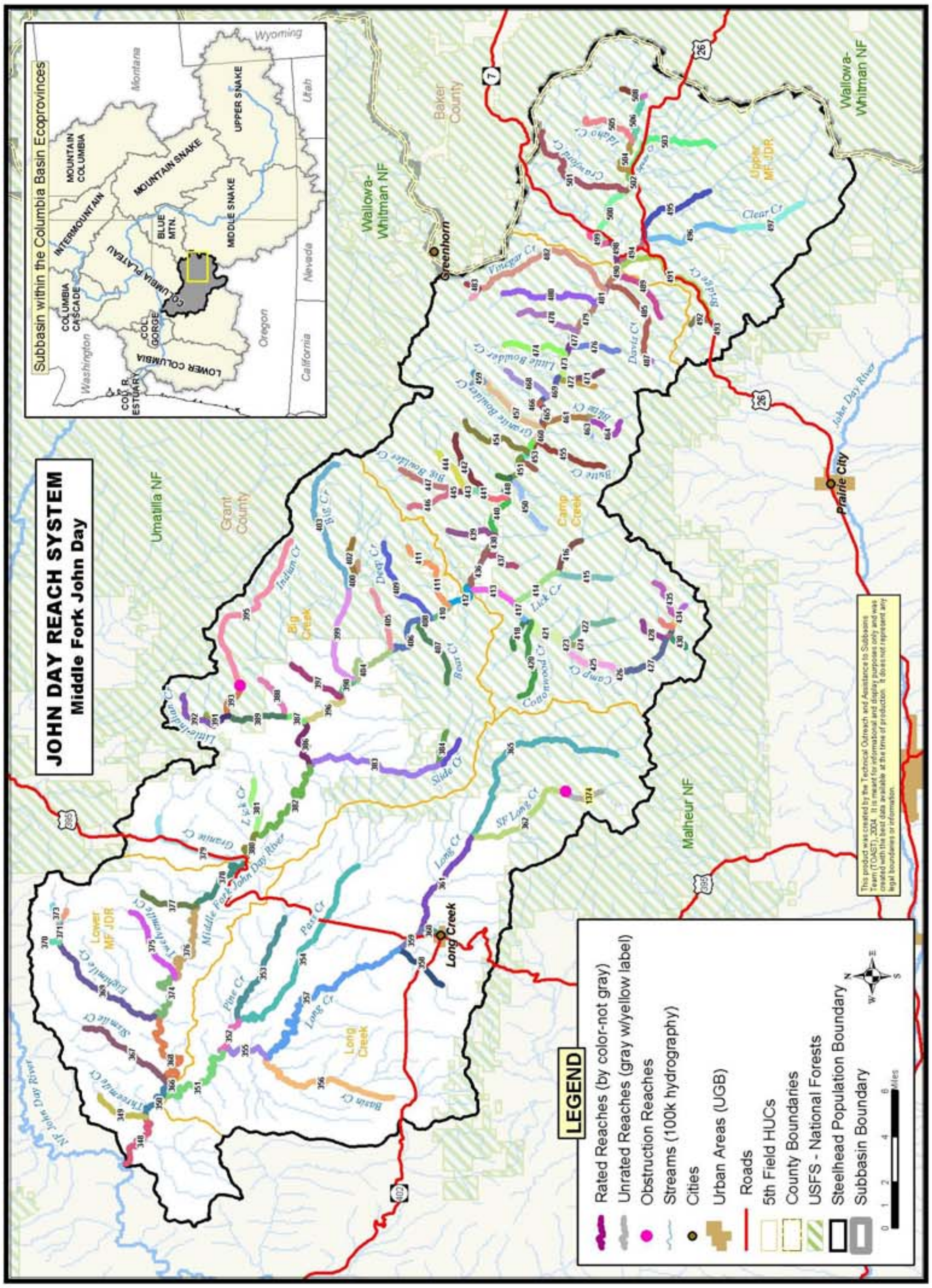
Stream Reach Maps by Steelhead Population Area



Appendix G

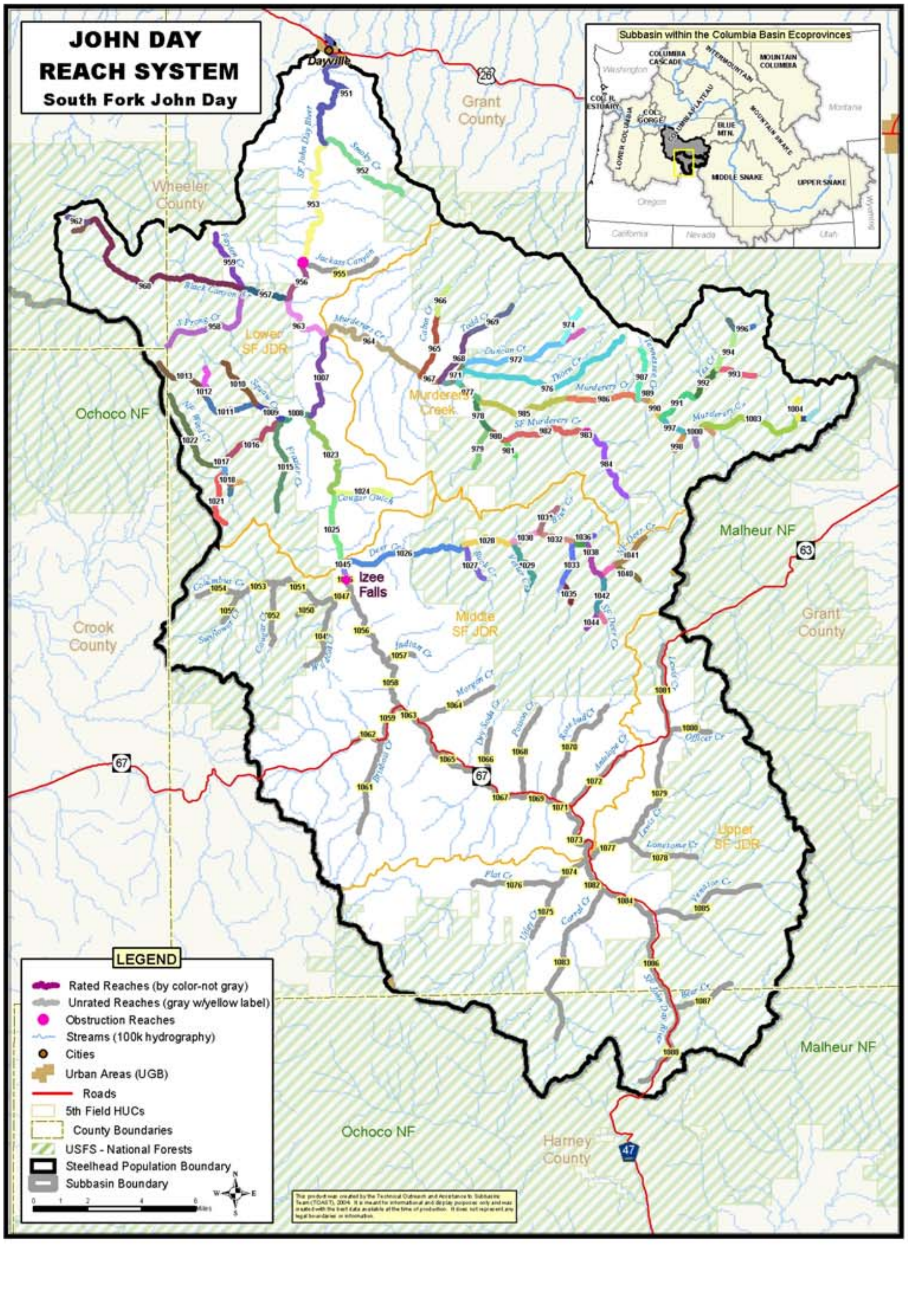

JOHN DAY REACH SYSTEM
North Fork John Day
LEGEND
Rated Reaches (by color-not gray)
Unrated Reaches (gray w/ yellow label)
Obstruction Reaches
Streams (100k hydrography)
Cities
Urban Areas (UGB)
Roads
5th Field HUCs
County Boundaries
USFS - National Forests
Steelhead Population Boundary
Subbasin Boundary
Subbasin within the Columbia Basin Ecoprovinces
Malheur NF
Umatilla NF
Wallowa-Whitman NF
Ukiah
Granite
Greenhorn
Sumpter
Long Creek
Ritter
Hamilton
Monument
Hardman
Prairie City
John Day
Grant County
Umatilla County
Morrow County
Wheeler County
Union County
Baker County

Appendix G



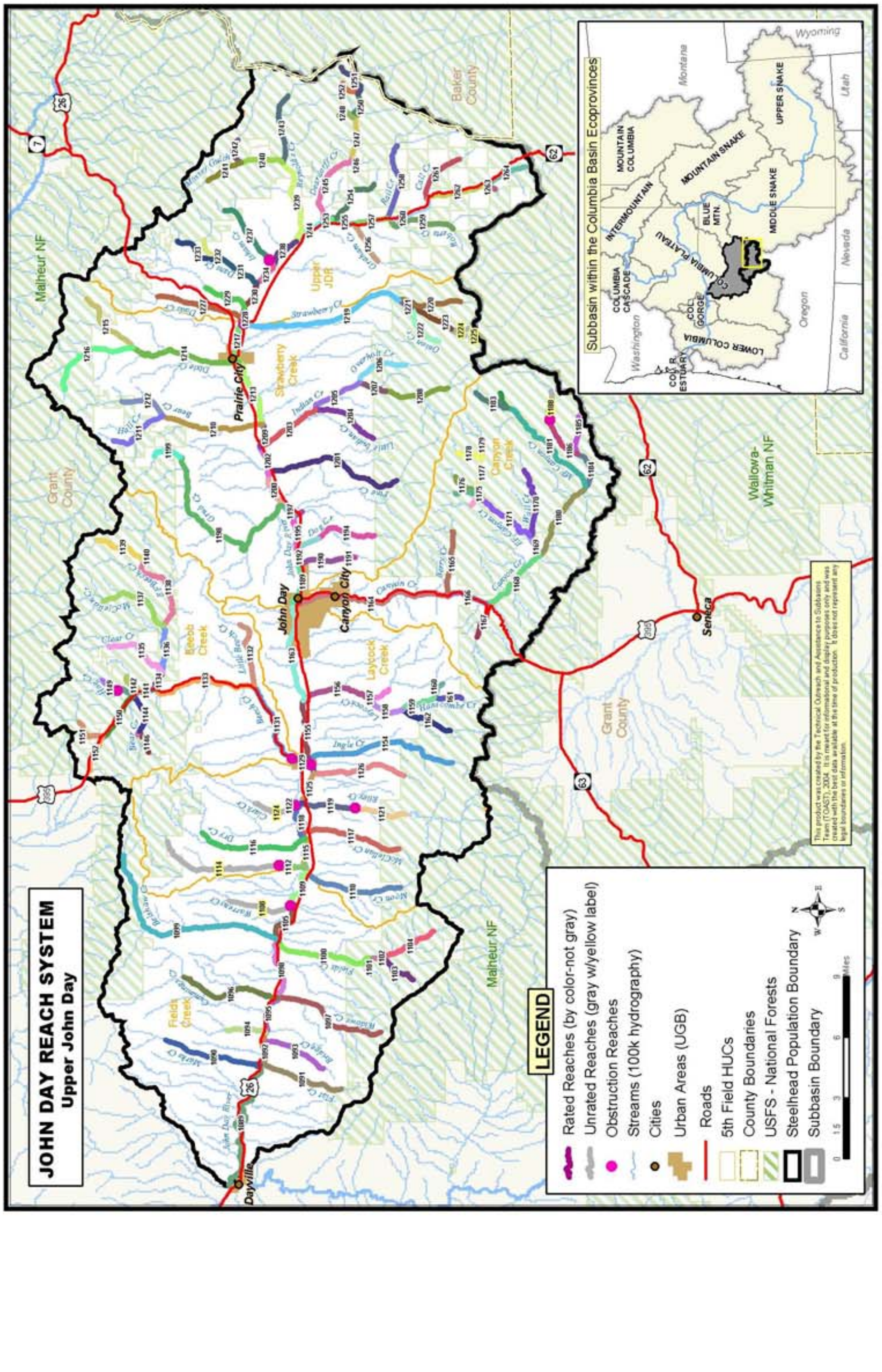
JOHN DAY REACH SYSTEM
Middle Fork John Day
Subbasin within the Columbia Basin Ecoprovinces
LEGEND
Rated Reaches (by color-not gray)
Unrated Reaches (gray w/yellow label)
Obstruction Reaches
Streams (100k hydrography)
Cities
Urban Areas (UGB)
Roads
5th Field HUCs
County Boundaries
USFS - National Forests
Steelhead Population Boundary
Subbasin Boundary

Appendix G



JOHN DAY
REACH SYSTEM
South Fork John Day
Subbasin within the Columbia Basin Ecoprovinces
Dayville
Grant County
Wheeler County
Ochoco NF
Crook County
Malheur NF
Harney County
Lower SF JDR
Murderers Creek
Middle SF JDR
Upper SF JDR
Izee Falls
LEGEND
Rated Reaches (by color-not gray)
Unrated Reaches (gray w/yellow label)
Obstruction Reaches
Streams (100k hydrography)
Cities
Urban Areas (UGB)
Roads
5th Field HUCs
County Boundaries
USFS - National Forests
Steelhead Population Boundary
Subbasin Boundary

Appendix G



JOHN DAY REACH SYSTEM
Upper John Day
LEGEND
Rated Reaches (by color-not gray)
Unrated Reaches (gray w/yellow label)
Obstruction Reaches
Streams (100k hydrography)
Cities
Urban Areas (UGB)
Roads
5th Field HUCs
County Boundaries
USFS - National Forests
Steelhead Population Boundary
Subbasin Boundary
Subbasin within the Columbia Basin Ecoprovinces
Prairie City
John Day
Canyon City
Seneca
Dayville
Malheur NF
Wallowa-Whitman NF
Grant County
Baker County

Appendix H

List of Reaches Created for EDT in the John Day Subbasin (Map ID# corresponds to the reach number on the reach maps in Appendix G)

Map ID#	EDT ID#	ReachName	Description	Used In EDT	Comments	P Length (mi)
1	1	JD-1	From mouth at Columbia R to the Narrows	yes		10.05
2	2	JD-2	From the Narrows to Tumwater Falls at section line 13/18	yes		0.39
3	3	JD-3	Tumwater Falls at section line 13/18	yes	Obstruction	0.00
4	4	JD-4	From Tumwater Falls at section line 13/18 to Grass Valley Canyon	yes		8.94
5	5	Grass Valley Canyon-1	From mouth at John Day R to Beavertail Butte	yes		13.49
6	6	Grass Valley Canyon-2	From Beavertail Butte to (Barnum Canyon) Moss Springs input	yes		7.32
7	7	Grass Valley Canyon-3	From Moss Springs (Barnum Canyon) input to Rosebush Canyon	yes		9.98
8	8	Rosebush Canyon	From mouth at Grass Valley Canyon to Draw Cr	yes		5.41
9	9	JD-5	From Grass Valley Canyon to Rock Cr	yes		2.03
10	10	Rock Cr-1 (1st JD)	From mouth at John Day R to Ramsey Dam ID # 53102 at section line 9/16	yes		4.87
11	11	Rock Cr-2 (1st JD)	Ramsey Dam ID # 53102 at section line 9/16	yes	Obstruction	0.00
12	12	Rock Cr-3 (1st JD)	From Ramsey Dam ID # 53102 at section line 9/16 to Marricks Dam ID # 53103 at the bend in the SW corner of section 19	yes		4.72
13	13	Rock Cr-4 (1st JD)	Marricks Dam ID # 53103 at the bend in the SW corner of section 19	yes	Obstruction	0.00
14	14	Rock Cr-5 (1st JD)	From Marricks Dam ID # 53103 at the bend in the SW corner of section 19 to Olson Dam ID # 50303 Diversion Dam in section 14	yes		10.56
15	15	Rock Cr-6 (1st JD)	Olson Dam ID # 50303 Diversion Dam in section 14	yes	Obstruction	0.00
16	16	Rock Cr-7 (1st JD)	From Olson Dam ID # 50303 Diversion Dam in section 14 to Lower Harper Diversion Barrier ID #50304 in section 30	yes		3.34
17	17	Rock Cr-8 (1st JD)	From Lower Harper Diversion Barrier ID #50304 in section 30 to Upper Harper Diversion Barrier ID #50305 in section 5	yes		2.17
18	18	Rock Cr-9 (1st JD)	From Upper Harper Diversion Barrier ID #50305 in section 5 to Wolf Hollow Dam ID #50306 at Wolf Hollow	yes		3.99
19	19	Rock Cr-10 (1st JD)	Wolf Hollow Dam ID #50306 at Wolf Hollow	yes	Obstruction	0.00
20	20	Rock Cr-11 (1st JD)	From Wolf Hollow Dam ID #50306 at Wolf Hollow to Dry Cr	yes		1.79
21	21	Rock Cr-12 (1st JD)	From Dry Cr to SF Rock Cr	yes		4.15
22	22	Rock Cr SF (1st JD)	From mouth at Rock Cr to Unnamed Trib at section line 36/31	yes		5.01
23	23	Rock Cr-13 (1st JD)	From SF to Sixmile Canyon	yes		6.16
24	24	Sixmile Canyon	From mouth at Rock Cr to trib from the W near section line 2/11	yes		1.52
25	25	Rock Cr-14 (1st JD)	From Sixmile Canyon to Lone Rock Cr	yes		5.95
26	26	Lone Rock Cr-1	From mouth at Rock Cr to falls at 2720 ft level	yes		10.14
27	27	Lone Rock Cr-2	From Falls at 2720 ft level to confluence of Brown Cr/Buckhorn Canyon	yes		2.83
28	28	Brown Cr-1	From mouth at Lone Rock Cr to canyon at 3380 ft level	yes		2.81
29	29	Brown Cr-2	From canyon at 3380 ft level to trib out of Long Prairie	yes		3.94
30	30	Buckhorn Canyon-1	From mouth at Lone Rock Cr to Stahl Canyon	yes		3.88
31	31	Stahl Canyon	From mouth at Buckhorn Canyon to trib at 3555 ft level	yes		1.81
32	32	Buckhorn Canyon-2	From Stahl Canyon to trib at 3340 ft level	yes		0.45
33	33	Rock Cr-15 (1st JD)	From Lone Rock Cr to Juniper Canyon	yes		8.34

34	34	Juniper Canyon-1	From mouth at Rock Cr to Hahn Canyon	yes		2.19
35	35	Hahn Canyon	From mouth at Juniper Canyon to trib at 3040 ft level	yes		1.91
36	36	Juniper Canyon-2	From Hahn Canyon to Juniper Canyon WF/EF confluence	yes		10.89
37	37	Juniper Canyon WF	From mouth at Juniper Canyon to end of Scot Prairie at 4235 ft level	yes		2.49
38	38	Rock Cr-16 (1st JD)	From Juniper Canyon to MF Rock Cr	yes		1.96
39	39	Rock Cr MF (1st JD)	From mouth at Rock Cr to confluence at 3830 ft level	yes		9.88
40	40	Rock Cr-17 (1st JD)	From MF to Robinson Canyon	yes		12.58
41	41	Robinson Canyon (Rock 1st JD)	From mouth at Rock Cr to 3700 ft level	yes		0.79
42	42	Rock Cr-18 (1st JD)	From Robinson Canyon to Chapin Cr	yes		0.87
43	43	Chapin Cr-1	From mouth at Rock Cr to Indian Cr	yes		3.50
44	44	Indian Cr-1 (Chapin)	From mouth at Chapin Cr to Tree Root Canyon	yes		0.71
45	45	Tree Root Canyon	From mouth at Indian Cr to road at 4075 ft level	yes		0.90
46	46	Indian Cr-2 (Chapin)	From Tree Root Canyon to Miller Spring in section 18	yes		1.04
47	47	Chapin Cr-2	From Indian Cr to trib at 3830 ft level	yes		0.81
48	48	Rock Cr-19 (1st JD)	From Chapin Cr to Allen Canyon	yes		0.22
49	49	Allen Canyon	From mouth at Rock Cr to section line 29/28	yes		1.42
50	50	Rock Cr-20 (1st JD)	From Allen Canyon to John Z Canyon	yes		0.80
51	51	John Z Canyon	From mouth at Rock Cr to 3900 ft level	yes		1.37
52	52	Rock Cr-21 (1st JD)	From John Z Canyon to confluence of Harris/Board Canyon	yes		1.91
53	53	Board Canyon	From mouth at Rock Cr to 3900 ft level	yes		2.55
54	54	Harris Canyon	From mouth at Rock Cr to benchmark 3784 and road crossing	yes		1.20
55	55	Rock Cr-22 (1st JD)	From Harris/Board Canyon to Tupper Cr	yes		0.10
56	56	Tupper Cr-1	From mouth at Rock Cr to Unnamed trib at 3685 ft level	yes		1.43
57	57	Tupper 1st Unnamed Trib	From mouth at Tupper Cr to road crossing at 3740 ft level	yes		0.36
58	58	Tupper Cr-2	From Unnamed trib (at 3680 ft level) to 2nd Unnamed Trib at 3740 ft level	yes		0.49
59	59	Tupper 2nd Unnamed Trib	From mouth at Tupper Cr to road crossing at 3840 ft level	yes		0.51
60	60	Tupper Cr-3	From 2nd Unnamed Trib (at 3740 ft level) to Hollywood Cr	yes		0.93
61	61	Hollywood Cr	From mouth at Tupper Cr to section line 36/25	yes		0.49
62	62	Tupper Cr-4	From Hollywood Cr to headwaters at section line 31/32	yes		1.67
63	63	Rock Cr-23 (1st JD)	From Tupper Cr to Davidson Canyon	yes		2.15
64	64	Davidson Canyon	From mouth at Rock Cr to 4000 ft level	yes		1.30
65	65	Rock Cr-24 (1st JD)	From Davidson Canyon to 4000 ft level	yes		1.89
66	66	JD-6	From Rock Cr to Scott Canyon	yes		4.63
67	67	Scott Canyon	From mouth at John Day R to trib just below town of Clem	yes		15.24
68	68	JD-7	From Scott Canyon to Hay Cr	yes		3.23
69	69	Hay Cr-1	From mouth at John Day R to Dry Fork Hay Cr	yes		15.27
70	70	Dry Fork Hay Cr	From mouth at Hay Cr to Johnson Hollow	yes		7.75
71	71	Hay Cr-2	From Dry Fork Hay to 1840 ft level	yes		1.94
72	72	Hay Cr-3	From 1840 ft level to trib at 1975 ft level	yes		0.99
73	73	JD-8	From Hay Cr to Cottonwood Canyon (Sherman CO)	yes		10.08
74	74	JD-9	From Cottonwood Canyon (Sherman CO) to Ferry Canyon	yes		13.41
75	75	Ferry Canyon	From mouth at John Day R to Indian Springs Canyon	yes		6.16
76	76	Indian Springs	From mouth at Ferry Canyon to Juniper Canyon	yes		2.44
77	77	Lamberson Canyon	From end of Indian Springs Canyon at Juniper Canyon to trib from the N in section 14	yes		1.79
78	78	JD-10	From Ferry Canyon to Little Ferry Canyon	yes		1.60
79	79	Little Ferry Canyon	From mouth at John Day R to trib with Horseshoe Falls	yes		3.01

80	80	JD-11	From Little Ferry Canyon to Jackknife Canyon	yes		5.86
81	81	Jackknife Canyon	From mouth at John Day R to Kelsay Canyon	yes		7.56
82	82	JD-12	From Jackknife Canyon to Thirtymile Cr	yes		22.02
83	83	Thirtymile Cr-1	From mouth at John Day R to Patill Canyon	yes		17.00
84	84	Patill Canyon	From mouth at Thirtymile Cr to Ramsey Canyon	yes		3.45
85	85	Thirtymile Cr-2	From Patill Canyon to Condon Canyon	yes		0.54
86	86	Condon Canyon	From mouth at Thirtymile Cr to trib at Borrow Pit section 27	yes		2.13
87	87	Thirtymile Cr-3	From Condon Canyon to Falls at bench mark 2038 in section 3	yes		1.17
88	88	Thirtymile Cr-4	Falls at bench mark 2038 in section 3	yes	Obstruction	0.00
89	89	Thirtymile Cr-5	From Falls at bench mark 2038 in section 3 to Thirtymile Cr EF	yes		0.86
90	90	Thirtymile Cr EF-1	From mouth at Thirtymile Cr to Dry Fork Thirtymile Cr	yes		0.38
91	91	Dry Fork Thirtymile Cr	From mouth at Thirtymile Cr EF to section line 36/25	yes		1.63
92	92	Thirtymile Cr EF-2	From Dry Fork Thirtymile Cr to Lost Valley Cr	yes		5.80
93	93	Lost Valley Cr	From mouth at Thirtymile Cr EF to just inside section 30	yes		4.90
94	94	Thirtymile Cr-6	From Thirtymile Cr EF to gradient break in section 16	yes		11.42
95	95	Thirtymile Cr-7	From Gradient break section 16 to weir/culvert at county road section 34	yes		3.50
96	96	Thirtymile Cr-8	Culvert/weir combination at county road section 34	yes	Obstruction	0.00
97	97	Thirtymile Cr-9	From culvert/weir at county road section 34 to 1st culvert in section 1 at road	yes		1.91
98	98	Thirtymile Cr-10	Culverts - Many, represented by 1st road culvert in section 1	yes	Obstruction	0.00
99	99	Thirtymile Cr-11	From multi-culvert barrier represented by 1st road culvert in section 1 to meadow in headwaters in section 5	yes		2.44
100	100	JD-13	From Thirtymile Cr to Pine Hollow	yes		0.79
101	101	Pine Hollow-1 (JD)	From mouth at John Day R to Eakin Canyon	yes		5.17
102	102	Eakin Canyon	From mouth at Pine Hollow to Hannafin Canyon	yes		1.44
103	103	Hannafin Canyon	From mouth at Eakin Canyon to Daugherty Canyon	yes		1.71
104	104	Pine Hollow-2 (JD)	From Eakin Canyon to Long Hollow Cr	yes		3.75
105	105	Long Hollow Cr	From mouth at Pine Hollow to Whitten Canyon	yes		5.59
106	106	Pine Hollow-3 (JD)	From Long Hollow Cr to Brush Canyon	yes		6.79
107	107	Brush Canyon	From mouth at Pine Hollow to section line 24/25	yes		1.20
108	108	Pine Hollow-4 (JD)	From Brush Canyon to Shaniko Ranch Dam ID #53100 in section 6	yes		7.25
109	109	JD-14	From Pine Hollow to Butte Cr	yes		12.29
110	110	Butte Cr-1 (JD)	From mouth at John Day R to Deep Cr	yes		4.67
111	111	Deep Cr (Butte JD)	From mouth at Butte Cr to Harvey Canyon	yes		3.21
112	112	Butte Cr-2 (JD)	From Deep Cr to Butte Cr WF	yes		1.97
113	113	Butte Cr WF (JD)	From mouth at Butte Cr to Cripple Cr	yes		6.06
114	114	Butte Cr-3 (JD)	From Butte Cr WF to Butte Cr NF	yes		2.07
115	115	Butte Cr NF (JD)	From mouth at Butte Cr to Hunt Canyon	yes		3.28
116	116	Hunt Canyon	From mouth at Butte Cr NF to road crossing in SE corner of section 26	yes		1.31
117	117	Butte Cr-4 (JD)	From Butte Cr NF to Cottonwood Cr	yes		8.18
118	118	Cottonwood Cr-1 (Butte JD)	From mouth at Butte Cr to Dam ID #53207 just upstream of Quarry in section 5	yes		1.37
119	1349	Cottonwood Cr-2 (Butte JD)	Dam ID #53207 just upstream of Quarry in section 5	no	Obstruction	0.00
120	1350	Cottonwood Cr-3 (Butte JD)	From Dam ID #53207 just upstream of Quarry in section 5 to Morris Canyon	no		2.39
121	1351	Morris Canyon	From mouth at Cottonwood Cr to sharp bend just above 3200 ft level	no		0.38
122	1352	Cottonwood Cr-4 (Butte JD)	From Morris Canyon to section line 21/22	no		1.28

123	123	Butte Cr-5 (JD)	From Cottonwood Cr to Straw Fork	yes		5.83
124	124	Straw Fork	From mouth at Butte Cr to Bledsoe Cr	yes		2.07
125	125	Butte Cr-6 (JD)	From Straw Fork to just beyond Bear Hollow County Park	yes		2.10
126	126	JD-15	From Butte Cr to Sorefoot Cr	yes		9.32
127	127	Sorefoot Cr	From mouth at John Day R to trib at 2300 ft level	yes		3.72
128	128	JD-16	From Sorefoot Cr to Pine Cr	yes		5.44
129	129	Pine Cr-1 (1st JD)	From mouth at John Day R to Cove Cr	yes		2.76
130	130	Cove Cr	From mouth at Pine Cr to trib near section line 19	yes		2.15
131	131	Pine Cr-2 (1st JD)	From Cove Cr to Robinson Canyon	yes		5.84
132	132	Robinson Canyon (Pine 1st JD)	From mouth at Pine Cr to Little Pine Cr	yes		2.03
133	133	Pine Cr-3 (1st JD)	From Robinson Canyon to Steers Canyon	yes		3.11
134	134	Steers Canyon	From mouth at Pine Cr to Leonard Canyon	yes		2.09
135	135	Pine Cr-4 (1st JD)	From Steers Canyon to Clubfoot Hollow	yes		2.22
136	136	Clubfoot Hollow	From mouth at Pine Cr to Lords Trail	yes		0.60
137	137	Pine Cr-5 (1st JD)	From Clubfoot Hollow to road crossing near section line 2/3	yes		0.34
138	138	JD-17	From Pine Cr to Muddy Cr	yes		4.59
139	139	Muddy Cr-1	From mouth at John Day R to Muddy Station Rsv Dam ID# 50296 just below Muddy Ranch	yes		3.50
140	140	Muddy Cr-2	Muddy Station Rsv Dam ID# 50296 just below Muddy Ranch	yes	Obstruction	0.00
141	141	Muddy Cr-3	From Muddy Station Rsv Dam ID# 50296 just below Muddy Ranch to Little Muddy Cr	yes		7.13
142	142	Little Muddy Cr	From mouth at Muddy Cr to 2800 ft level	yes		3.13
143	143	Muddy Cr-4	From Little Muddy Cr to Mays Rsv Dam ID # 50297	yes		0.36
144	1353	Muddy Cr-5	Mays Rsv Dam ID # 50297	no	Obstruction	0.00
145	1354	Muddy Cr-6	From Mays Rsv Dam ID # 50297 to 2700 ft level	no		3.48
146	146	JD-18	From Muddy Cr to Cherry Cr	yes		12.70
147	147	Cherry Cr-1	From mouth at John Day R to irrigation dam in NE corner of section 34	yes		2.40
148	148	Cherry Cr-2	Irrigation Dam in NE corner of section 34	yes	Obstruction	0.00
149	149	Cherry Cr-3	From Irrigation Dam in NE corner of section 34 to Dry Cr	yes		6.95
150	150	Dry Cr (Cherry JD)	From mouth at Cherry Cr to 3400 ft level	yes		3.06
151	151	Cherry Cr-4	From Dry Cr to Cherry Cr Rsv Dam ID # 50298 at 2840 ft level	yes		1.94
152	1355	Cherry Cr-5	Cherry Cr Rsv Dam ID # 50298 at 2840 ft level	no	Obstruction	0.00
153	1356	Cherry Cr-6	From Cherry Cr Rsv Dam ID # 50298 at 2840 ft level to Horse Cr	no		1.53
154	154	JD-19	From Cherry Cr to Bridge Cr	yes		5.85
155	155	Bridge Cr-1 (1st JD)	From mouth at John Day R to Bear Cr	yes		5.42
156	156	Bear Cr-1 (Bridge 1st JD)	From mouth at Bridge Cr to Dodds Cr	yes		11.71
157	157	Dodds Cr-1	From mouth at Bear Cr to Heflin Cr	yes		2.01
158	158	Heflin Cr	From mouth at Dodds Cr to first bend and spring	yes		0.22
159	159	Dodds Cr-2	From Heflin Cr to road crossing just above 4200 ft level	yes		1.62
160	160	Bear Cr-2 (Bridge 1st JD)	From Dodds Cr to natural gradient barrier ID # 53196 at 3200 ft level	yes		0.85
161	1357	Bear Cr-3 (Bridge 1st JD)	Natural gradient barrier ID # 53196 at 3200 ft level	no	Obstruction	0.00
162	1358	Bear Cr-4 (Bridge 1st JD)	From Natural gradient barrier ID # 53196 at 3200 ft level to Cougar Cr	no		0.57
163	1359	Cougar Cr (Bridge 1st JD)	From mouth at Bear Cr to just below 4200 ft level	no		1.96
164	1360	Bear Cr-5 (Bridge 1st JD)	From Cougar Cr to Bear Cr NF	no		0.99
165	1361	Bear Cr NF (Bridge 1st JD)	From mouth at Bear Cr to Lake Fork	no		1.45
166	1362	Bear Cr-6 (Bridge 1st JD)	From Bear Cr NF to about 3900 ft level	no		2.18
167	167	Bridge Cr-2 (1st JD)	From Bear Cr to Bridge Cr W Branch	yes		7.46
168	168	Bridge Cr W Branch-1 (1st JD)	From mouth at Bridge Cr to Habecker Dam at 2600 ft level	yes		2.64

169	169	Bridge Cr W Branch-2 (1st JD)	Habecker Dam at 2600 ft level	yes	Obstruction	0.00
170	170	Bridge Cr W Branch-3 (1st JD)	From Habecker Dam at 2600 ft level to Carroll Cr	yes		3.98
171	171	Carroll Cr	From mouth at Bridge Cr W Branch to just below 3200 ft level	yes		0.51
172	172	Bridge Cr W Branch-4 (1st JD)	From Carroll Cr to Slide Cr	yes		3.04
173	173	Slide Cr (Bridge 1st JD)	From mouth at Bridge Cr W Branch to section line of 27/26	yes		1.35
174	174	Bridge Cr W Branch-5 (1st JD)	From Slide Cr to just below 4400 ft level	yes		1.68
175	175	Bridge Cr-3 (1st JD)	From Bridge Cr W Branch to Gable Cr	yes		1.22
176	176	Gable Cr-1	From mouth at Bridge Cr to natural falls barrier ID # 55453 at 2600 ft level	yes		1.30
177	177	Gable Cr-2	Natural falls barrier ID # 55453 at 2600 ft level	yes	Obstruction	0.00
178	178	Gable Cr-3	From Natural falls barrier ID # 55453 at 2600 ft level to Thompson Cr	yes		1.72
179	179	Thompson Cr	From mouth at Gable Cr to 3540 ft level	yes		1.90
180	180	Gable Cr-4	From Thompson Cr to trib due W of White Butte	yes		2.72
181	181	Bridge Cr-4 (1st JD)	From Gable Cr to Keyes Cr	yes		3.96
182	182	Keyes Cr	From mouth at Bridge Cr to Hwy 26	yes		4.79
183	183	Bridge Cr-5 (1st JD)	From Keyes Cr to Johnson Cr	yes		1.26
184	184	Johnson Cr (Bridge 1st JD)	From mouth at Bridge Cr to about 3800 ft level	yes		3.08
185	185	Bridge Cr-6 (1st JD)	From Johnson Cr to Shoemaker Ditch	yes		2.24
186	186	Bridge Cr-7 (1st JD)	Shoemaker Ditch	yes	Obstruction	0.00
187	187	Bridge Cr-8 (1st JD)	From Shoemaker Ditch to natural gradient barrier ID # 53195 at 5800 ft level	yes		5.07
188	188	JD-20	From Bridge Cr to Rowe Cr	yes		6.37
189	189	Rowe Cr-1	From mouth at John Day R to Rowe Cr Reservoir Dam ID # 50300	yes		4.18
190	1363	Rowe Cr-2	Rowe Cr Reservoir Dam ID # 50300	no	Obstruction	0.00
191	1364	Rowe Cr-3	From Rowe Cr Reservoir Dam ID # 50300 to Sugarloaf Canyon	no		1.40
192	192	JD-21	From Rowe Cr to Girds Cr	yes		3.44
193	193	Girds Cr	From mouth at John Day R to trib below Hwy 207	yes		6.37
194	194	JD-22	From Girds Cr to Shoofly Cr	yes		5.36
195	195	Shoofly Cr	From mouth at John Day R to Limekiln Cr	yes		10.09
196	196	JD-23	From Shoofly Cr to Service Cr	yes		6.95
197	197	Service Cr-1	From mouth at John Day R to Little Service Cr	yes		6.72
198	198	Little Service Cr	From mouth at Service Cr to 3050 ft level	yes		0.97
199	199	Service Cr-2	From Little Service Cr to Big Service Cr	yes		1.63
200	200	Big Service Cr	From mouth at Service Cr to headwaters at 4400 ft level	yes		3.59
201	201	Service Cr-3	From Big Service Cr to Shelton State Wayside	yes		0.99
202	202	JD-24	From Service Cr to Alder Cr	yes		2.32
203	203	Alder Cr-1 (JD)	From mouth at John Day R to Lake Cr	yes		0.57
204	204	Lake Cr-1 (Alder)	From mouth at Alder Cr to Camp Cr	yes		5.16
205	205	Camp Cr (Alder JD)	From mouth at Lake Cr to 3200 ft level	yes		1.71
206	206	Lake Cr-2 (Alder)	From Camp Cr to headwaters at section line 24/19	yes		5.85
207	207	Alder Cr-2 (JD)	From Lake Cr to Unnamed Trib near section line 5/32	yes		7.96
208	208	Alder 1st Unnamed Trib-1 (JD)	From mouth at Alder Cr near section line 5/32 to Unnamed Trib in W side of section 30	yes		1.93
209	209	Alder 1st Unnamed Trib Trib (JD)	From mouth at Alder Unnamed Trib to section line 24/19	yes		0.82
210	210	Alder 1st Unnamed Trib-2 (JD)	From Unnamed Trib in W side of section 30 to 3840 ft level	yes		0.79
211	211	Alder Cr-3 (JD)	From Unnamed Trib near section line 5/32 to Wheeler Cr	yes		0.57
212	212	Wheeler Cr	From mouth at Alder Cr to section line 21/22	yes		2.88
213	213	Alder Cr-4 (JD)	From Wheeler Cr to Unnamed Trib near section line 29/20	yes		1.94

214	214	Alder 2nd Unnamed Trib-1 (JD)	From mouth at Alder Cr to Unnamed Trib in section 20	yes		0.29
215	215	Alder 2nd Unnamed Trib Trib (JD)	From mouth at 2nd Alder Unnamed Trib to section line 20/19	yes		0.65
216	216	Alder 2nd Unnamed Trib-2 (JD)	From Unnamed trib in section 20 to road crossing in section 17	yes		1.02
217	217	JD-25	From Alder Cr to Horseshoe Cr	yes		2.26
218	218	Horseshoe Cr	From mouth at John Day R to county road in section 15	yes		8.75
219	219	JD-26	From Horseshoe Cr to Parrish/Kahler Cr	yes		6.33
220	220	Parrish Cr-1	From mouth at John Day R to Left Hand Parrish	yes		3.48
221	221	Left Hand Parrish	From mouth at Parrish Cr to section line 19/30	yes		3.26
222	222	Parrish Cr-2	From Left Hand Parrish to Tamarack Cr	yes		4.76
223	223	Tamarack Cr (Parrish)	From mouth at Parrish Cr to forks in section 24	yes		4.79
224	224	Parrish Cr-3	From Tamarack Cr to culvert barrier ID #55454 at Hardscrabble confluence	yes		1.44
225	1365	Parrish Cr-4	Culvert barrier ID #55454 at Hardscrabble confluence	yes	Obstruction	0.00
226	1366	Parrish Cr-5	From culvert barrier ID #55454 at Hardscrabble confluence to fork in section 21	yes		1.94
227	1367	Hardscrabble Cr-1	Culvert/mouth ID #55454 at Parrish Cr	yes	Obstruction	0.00
228	1368	Hardscrabble Cr-2	From culvert/mouth ID #55454 at Parrish Cr to Happy Camp Cr	yes		1.49
229	1369	Happy Camp Cr	From mouth at Hardscrabble Cr to 4130 ft level	no		1.79
230	1370	Hardscrabble Cr-3	From Happy Camp Cr to Hogan Cr	yes		0.80
231	231	Kahler Cr-1	From mouth at John Day R to culvert at county road on section line 18/7	yes		5.07
232	232	Kahler Cr-2	Culvert at county road on section line 18/7	yes	Obstruction	0.00
233	233	Kahler Cr-3	From Culvert at county road on section line 18/7 to Henry Cr	yes		2.80
234	234	Henry Cr	From mouth at Kahler Cr to 3465 ft level	yes		4.27
235	235	Kahler Cr-4	From Henry Cr to Tamarack Cr	yes		2.69
236	236	Tamarack Cr-1 (Kahler)	Culvert ID # 53192/mouth at Kahler Cr	yes	Obstruction	0.00
237	237	Tamarack Cr-2 (Kahler)	From culvert ID # 53192/mouth at Kahler Cr to section line 7/8	yes		3.03
238	238	Kahler Cr-5	From Tamarack Cr to 3380 ft level	yes		1.53
239	239	JD-27	From Parrish/Kahler Cr to eddy just downstream from Spray RM 170	yes		1.32
240	240	JD-28	From eddy just downstream from Spray RM 170 to Bologna Canyon	yes		11.97
241	241	Bologna Canyon	From mouth at John Day R to Bologna Canyon EF/WF confluence	yes		2.65
242	242	Bologna Canyon EF	From mouth at Bologna Canyon WF/mainstem Bologna Canyon confluence to 3400 ft level	yes		4.78
243	243	Bologna Canyon WF	From mouth at Bologna Canyon EF/mainstem Bologna Canyon confluence to section line 32/29	yes		2.73
244	244	JD-29	From Bologna Canyon to NF John Day R	yes		2.55
245	245	JD NF-1	From mouth at John Day R to Rudio Cr	yes		5.09
246	246	Rudio Cr-1	From mouth at NF John Day R to Gilmore Cr	yes		3.41
247	247	Gilmore Cr-1	From mouth at Rudio Cr to Straight Cr	yes		4.85
248	248	Straight Cr	From mouth at Gilmore Cr to section line 28/27	yes		2.65
249	249	Gilmore Cr-2	From Straight Cr to 4560 ft level	yes		2.67
250	250	Rudio Cr-2	From Gilmore Cr to road crossing in Rudio Meadows, section 8	yes		10.81
251	251	JD NF-2	From Rudio Cr to Cottonwood Cr	yes		10.40
252	252	Cottonwood Cr-1 (JD NF)	From mouth at NF John Day R to Cougar Cr	yes		15.64
253	253	Cougar Cr (Cottonwood JD NF)	From mouth at Cottonwood Cr to 2nd trib in section 12	yes		2.08
254	254	Cottonwood Cr-2 (JD NF)	From Cougar Cr to Squaw Cr	yes		1.92
255	255	Squaw Cr (Cottonwood JD NF)	From mouth at Cottonwood Cr to 1st trib in section 31	yes		3.79
256	256	Cottonwood Cr-3 (JD NF)	From Squaw Cr to Board Cr	yes		0.22

Appendix H

257	257	Board Cr	From mouth at Cottonwood Cr to trib near 4wd in section 29	yes		2.19
258	258	Cottonwood Cr-4 (JD NF)	From Board Cr to Donaldson Cr	yes		0.58
259	259	Donaldson Cr	From mouth at Cottonwood Cr to just past fork at 4040 ft level	yes		1.91
260	260	Cottonwood Cr-5 (JD NF)	From Donaldson Cr to Fox/Camp Cr confluence	yes		4.13
261	261	Camp Cr (Cottonwood JD NF)	From mouth at Cottonwood/Fox Cr confluence to trib in section 34	yes		3.87
262	262	Fox Cr-1	From mouth at Cottonwood/Camp confluence to Boulder Cr	yes		1.09
263	263	Boulder Cr (Fox)	From mouth at Fox Cr to 4650 ft level	yes		2.20
264	264	Fox Cr-2	From Boulder Cr to McHaley Cr	yes		0.82
265	265	McHaley Cr-1	From mouth at Fox Cr to Beck Cr	yes		0.91
266	266	Beck Cr	From mouth at McHaley Cr to multi-confluence in section 30	yes		1.94
267	267	McHaley Cr-2	From Beck Cr to trib near section line 28/27	yes		2.53
268	268	Fox Cr-3	From McHaley Cr to Indian Cr	yes		3.99
269	269	Indian Cr (Fox)	From mouth at Fox Cr to 4500 ft level	yes		2.72
270	270	Fox Cr-4	From Indian Cr to Wiley Cr	yes		0.69
271	271	Wiley Cr (Fox)	From mouth at Fox Cr to Mine Cr	yes		5.75
272	272	Mine Cr	From mouth at Wiley Cr to Stewart Cr	yes		0.80
273	273	Fox Cr-5	From Wiley Cr to Smith Cr	yes		3.67
274	274	Smith Cr (Fox)	From mouth at Fox Cr to 4650 ft level	yes		3.29
275	275	Fox Cr-6	From Smith Cr to Murphy Cr	yes		3.26
276	276	Murphy Cr	From mouth at Fox Cr to road crossing at section line 16/21	yes		1.54
277	277	Fox Cr-7	From Murphy Cr to Mill Cr	yes		0.93
278	278	Mill Cr-1 (Fox)	From mouth at Fox Cr to Unnamed Trib at 4720 ft level	yes		0.72
279	279	Mill Cr Unnamed Trib (Fox)	From mouth at Mill Cr to section line 14/15	yes		0.59
280	280	Mill Cr-2 (Fox)	From Unnamed Trib at 4720 ft level to road crossing in section 15	yes		0.87
281	281	Fox Cr-8	From Mill Cr to Dunning Cr	yes		0.45
282	282	Dunning Cr	From mouth at Fox Cr to falls/cascade barrier ID # 55448 near section line 2/1	yes		1.99
283	283	Fox Cr-9	From Dunning Cr to Day Cr	yes		3.13
284	284	Day Cr	From mouth at Fox Cr to road crossing in section 19	yes		1.66
285	285	Fox Cr-10	From Day Cr to 5500 ft level below road crossing	yes		1.42
286	286	JD NF-3	From Cottonwood Cr to Deer Cr	yes		1.60
287	287	Deer Cr (JD NF)	From mouth at NF John Day R to Deer Cr EF/WF confluence	yes		11.07
288	288	Deer Cr WF (JD NF)	From mouth at EF/mainstem Deer Cr confluence to middle of section 15	yes		4.06
289	289	Deer Cr EF (JD NF)	From mouth at WF/mainstem Deer Cr confluence to trib just below 4400 ft level	yes		3.44
290	290	JD NF-4	From Deer Cr to Big Wall Cr	yes		5.01
291	291	Big Wall Cr-1	From mouth at NF John Day R to Little Wall Cr	yes		4.57
292	292	Little Wall Cr-1	From mouth at Big Wall Cr to Skookum Cr	yes		4.45
293	293	Skookum Cr-1	From mouth at Little Wall Cr to Swale Cr	yes		2.80
294	294	Swale Cr-1	From mouth at Skookum Cr to Bear Cr	yes		0.91
295	295	Bear Cr-1 (Skookum)	From mouth at Swale Cr to Two Spring Cr	yes		0.08
296	296	Two Spring Cr	From mouth at Bear Cr to 20/29 section line	yes		1.18
297	297	Bear Cr-2 (Skookum)	From Two Spring Cr to road crossing in section 7	yes		4.20
298	298	Swale Cr-2	From Bear Cr to Hallock Spring	yes		9.55
299	299	Skookum Cr-2	From Swale Cr to Hog Cr	yes		4.29
300	300	Hog Cr-1 (Skookum)	From mouth at Skookum Cr to 3600 ft level	yes		0.68
301	301	Hog Cr-2 (Skookum)	From 3600 ft level to forks in section 16	yes		1.51

302	302	Skookum Cr-3	From Hog Cr to Alder Cr	yes		1.08
303	303	Alder Cr (Skookum)	From mouth at Skookum Cr to Alder Cr EF	yes		2.36
304	304	Alder Cr EF (Skookum)	From mouth at Alder Cr to spring in section 36	yes		1.63
305	305	Skookum Cr-4	From Alder Cr to upper end of constricted gradient just below 3800 ft level	yes		0.59
306	306	Skookum Cr-5	From upper end of constricted gradient just below 3800 ft level to section line 32/33	yes		2.25
307	307	Little Wall Cr-2	From Skookum Cr to Bacon Cr	yes		3.55
308	308	Bacon Cr	From mouth at Little Wall Cr to trib in section 27	yes		2.78
309	309	Little Wall Cr-3	From Bacon Cr to Lovlett Cr	yes		0.51
310	310	Lovlett Cr	From mouth at Little Wall Cr to 16/17 section line	yes		1.22
311	311	Little Wall Cr-4	From Lovlett Cr to Three Tough Cr	yes		0.67
312	312	Three Trough Cr	From mouth at Little Wall Cr to 5/6 section line	yes		2.06
313	313	Little Wall Cr-5	From Three Tough Cr to section line 19/20	yes		3.92
314	314	Big Wall Cr-2	From Little Wall Cr to Indian Cr	yes		5.71
315	315	Indian Cr-1 (Big Wall)	From mouth at Big Wall Cr to Indian Cr EF	yes		1.39
316	316	Indian Cr EF (Big Wall)	From mouth at Indian Cr to section line 4/9	yes		1.23
317	317	Indian Cr-2 (Big Wall)	From Indian Cr EF to 1st road crossing in section 17	yes		2.85
318	318	Big Wall Cr-3	From Indian Cr to Little Wilson Cr	yes		3.12
319	319	Little Wilson Cr	From mouth at Big Wall Cr to trib in SE corner of section 1	yes		1.89
320	320	Big Wall Cr-4	From Little Wilson Cr to Wilson/Happy Jack Cr confluence	yes		1.07
321	321	Happy Jack Cr	From mouth at Big Wall Cr to section line 2/11	yes		2.39
322	322	Wilson Cr-1 (Big Wall)	From mouth at Big Wall Cr to Harrigton Cr/gradient break	yes		5.93
323	323	Wilson Cr-2 (Big Wall)	From Harrigton Cr/gradient break to Johnson Cr	yes		1.80
324	324	Johnson Cr-1 (Wilson)	From mouth at Wilson Cr to Porter Cr	yes		0.53
325	325	Porter Cr-1	From mouth at Johnson Cr to Unnamed Trib at 4345 ft level	yes		5.56
326	326	Porter Cr 1st Unnamed Trib	From mouth at Porter Cr to 4400 ft level	yes		0.47
327	327	Porter Cr-2	From Unnamed Trib at 4345 ft level to Unnamed Trib at 4360 ft level	yes		0.58
328	328	Porter Cr 2nd Unnamed Trib	From mouth at Porter Cr to headwaters at 4520 ft level	yes		1.23
329	329	Johnson Cr-2 (Wilson)	From Porter Cr to section line 29/32	yes		1.15
330	330	Wilson Cr-3 (Big Wall)	From Johnson Cr to Unnamed Trib at 3840 ft level	yes		1.59
331	331	Wilson Cr Unnamed Trib (Big Wall)	From mouth at Wilson Cr to 4100 ft level	yes		0.81
332	332	Wilson Cr-4 (Big Wall)	From Unnamed trib at 3840 ft level to cascade barrier ID # 55434 at 3940 ft level	yes		0.54
333	333	Wilson Cr-5 (Big Wall)	Cascade barrier ID #55434 at 3940 ft level	yes	Obstruction	0.00
334	334	Wilson Cr-6 (Big Wall)	From Cascade barrier ID # 55434 at 3940 ft level to Bull Prairie Rsv Dam	yes		0.39
335	335	Big Wall Cr-5	From Wilson/Happy Jack Cr confluence to Willow Springs Cr	yes		1.59
336	336	Willow Spring Cr-1	Mouth/culvert barrier at Big Wall Cr	yes	Obstruction	0.00
337	337	Willow Spring Cr-2	From mouth/culvert barrier at Big Wall Cr to 3700 ft level	yes		1.92
338	338	Big Wall Cr-6	From Willow Springs Cr to Dark Canyon	yes		0.23
339	339	Dark Canyon	From mouth at Big Wall Cr to 3760 ft level	yes		2.61
340	340	Big Wall Cr-7	From Dark Canyon to Big Wall SF	yes		0.49
341	341	Big Wall Cr SF-1	From mouth at Big Wall Cr to culvert barrier ID # 55433 at 3300 ft level	yes		0.72
342	342	Big Wall Cr SF-2	Culvert barrier ID # 55433 at 3300 ft level	yes	Obstruction	0.00
343	343	Big Wall Cr SF-3	From Culvert barrier ID # 55433 at 3300 ft level to 3650 ft level	yes		1.68
344	344	Big Wall Cr-8	From Big Wall SF to road crossing in section 19	yes		2.98

345	345	JD NF-5	From Big Wall Cr to Cabin Cr	yes		5.46
346	1371	Cabin Cr (JD NF)	From mouth at NF John Day R to section line 9/10	yes		4.18
347	347	JD NF-6	From Big Wall Cr to MF John Day	yes		4.15
348	348	JD MF-1	From mouth at NF John Day R to Threemile Cr	yes		3.39
349	1372	Threemile Cr	From mouth at MF John Day R to just inside of section 28	yes		2.46
350	350	JD MF-2	From Threemile Cr to Long Cr	yes		2.28
351	351	Long Cr-1	From mouth at MF John Day R to Pass Cr	yes		5.75
352	352	Pass Cr-1	From mouth at Long Cr to Pine Cr	yes		2.12
353	353	Pine Cr (Long)	From mouth at Pass Cr to forks E side of section 3	yes		5.66
354	354	Pass Cr-2	From Pine Cr to Pass Cr MF	yes		10.48
355	355	Long Cr-2	From Pass Cr to Basin Cr	yes		2.63
356	356	Basin Cr (Long)	From mouth at Long Cr to 3960 ft level	yes		6.98
357	357	Long Cr-3	From Basin Cr to Paul Cr	yes		10.75
358	358	Paul Cr	From mouth at Long Cr to County road in section 7	yes		2.58
359	359	Long Cr-4	From Paul Cr to Everett Cr	yes		1.39
360	360	Everett Cr	From mouth at Long Cr through Town of Long Creek to 3780 ft level (near High School)	yes		1.17
361	361	Long Cr-5	From Everett Cr to Long Cr SF	yes		5.04
362	362	Long Cr SF-1	From mouth at Long Cr to Falls ID# 52106 at trib in section 10	yes		5.20
363	1373	Long Cr SF-2	Falls ID# 52106 at trib in section 10	no	Obstruction	0.00
364	1374	Long Cr SF-3	From Falls ID# 52106 at trib in section 10 to forks in section 15	no		1.84
365	365	Long Cr-6	From Long Cr SF to road crossing in section 23	yes		9.85
366	366	JD MF-3	From Long Cr to Sixmile Cr	yes		0.36
367	1375	Sixmile Cr	From mouth at MF John Day R to road crossing in SW corner of section 24	yes		5.07
368	368	JD MF-4	From Sixmile Cr to Eightmile Cr	yes		5.73
369	1376	Eightmile Cr-1	From mouth at MF John Day R to Unnamed Trib at section line 15/16	yes		6.04
370	1377	Eightmile 1st Unnamed Trib	From mouth at Eightmile Cr to 3800 ft level	yes		0.42
371	1378	Eightmile Cr-2	From Unnamed Trib at section line 15/16 to Unnamed Trib at 3800 ft level	yes		1.04
372	1379	Eightmile 2nd Unnamed Trib	From mouth at Eightmile Cr to 4000 ft level	yes		0.60
373	1380	Eightmile Cr-3	From Unnamed Trib at 3800 ft level to 4000 ft level	yes		0.79
374	374	JD MF-5	From Eightmile Cr to Twelvemile Cr	yes		3.75
375	1381	Twelvemile Cr	From mouth at MF John Day R to section line 35/2	yes		3.77
376	376	JD MF-6	From Twelvemile Cr to Rush Cr	yes		5.67
377	1382	Rush Cr (JD MF)	From mouth at MF John Day R to 3400 ft level on trib in section 1	yes		2.62
378	378	JD MF-7	From Rush Cr to Granite Cr	yes		3.99
379	1383	Granite Cr (1st JD NF)	From mouth at MF John Day R to middle of section 9 on Barnes Cr	yes		4.89
380	380	JD MF-8	From Granite Cr to Lick Cr	yes		1.56
381	1384	Lick Cr (JD MF)	From mouth at MF John Day R to section line 34/35	yes		2.64
382	382	JD MF-9	From Lick Cr to Slide Cr	yes		5.49
383	1385	Slide Cr-1 (JD MF)	From mouth at MF John Day R to Rice Cr	yes		6.51
384	1386	Rice Cr	From mouth at Slide Cr to road crossing in SE corner of section 12	yes		1.52
385	1387	Slide Cr-2 (JD MF)	From Rice Cr to road crossing in section 13	yes		1.48
386	386	JD MF-10	From Slide Cr to Indian Cr	yes		2.75
387	1388	Indian Cr-1 (JD MF)	From mouth at MF John Day R to 1st Unnamed Trib in section 6	yes		0.93
388	1389	Indian Cr Unnamed Trib (JD MF)	From mouth at Indian Cr to SW corner of section 33	yes		2.11
389	1390	Indian Cr-2 (JD MF)	From 1st Unnamed Trib in section 6 to Little Indian Cr	yes		2.62

390	1391	Little Indian Cr-1 (Indian JD MF)	From mouth at Indian Cr to Unnamed Trib in Patterson Basin	yes		0.53
391	1392	Little Indian Unnamed Trib (Indian JD MF)	From mouth at Little Indian Cr to 4240 ft level	yes		0.72
392	1393	Little Indian Cr-2 (Indian JD MF)	From Unnamed Trib in Patterson Basin to 4600 ft level	yes		2.66
393	1394	Indian Cr-3 (JD MF)	From Little Indian Cr to culvert ID# 55446 at FS road 3990 near section line 28/33	yes		1.61
394	1395	Indian Cr-4 (JD MF)	Culvert ID# 55446 at FS road 3990 near section line 28/33	yes	Obstruction	0.00
395	1396	Indian Cr-5 (JD MF)	From Culvert ID# 55446 at FS road 3990 near section line 28/33 to headwaters at 6410 ft level	yes		8.20
396	396	JD MF-11	From Indian Cr to Huckleberry Cr	yes		2.39
397	1397	Huckleberry Cr	From mouth at MF John Day R to forks near section line 9/10	yes		2.70
398	398	JD MF-12	From Huckleberry Cr to Big Cr	yes		1.16
399	399	Big Cr-1 (JD MF)	From mouth at MF John Day R to Deadwood Cr	yes		4.62
400	400	Deadwood Cr-1	From mouth at Big Cr to Swamp Gulch	yes		0.70
401	401	Swamp Gulch	From mouth at Deadwood Cr to road crossing in section 29	yes		0.56
402	402	Deadwood Cr-2	From Swamp Gulch to section line 21/28	yes		1.63
403	403	Big Cr-2 (JD MF)	From Deadwood Cr to 6200 ft level	yes		6.43
404	404	JD MF-13	From Big Cr to Mosquito Cr	yes		3.18
405	1398	Mosquito Cr	From mouth at MF John Day R to 4410 ft level	yes		2.90
406	406	JD MF-14	From Mosquito Cr to Bear Cr	yes		2.83
407	1399	Bear Cr (JD MF)	From mouth at MF John Day R to road crossing at section line 9/16	yes		3.32
408	408	JD MF-15	From Bear Cr to Deep Cr	yes		0.32
409	1400	Deep Cr (JD MF)	From mouth at MF John Day R to 5260 ft level	yes		4.42
410	410	JD MF-16	From Deep Cr to Elk Cr	yes		1.06
411	1401	Elk Cr	From mouth at MF John Day R to section line 4/5 on the NF	yes		3.59
412	412	JD MF-17	From Elk Cr to Camp Cr	yes		1.61
413	413	Camp Cr-1 (JD MF)	From mouth at MF John Day R to Lick Cr	yes		2.22
414	414	Lick Cr-1 (Camp JD MF)	From mouth at Camp Cr to Lick Cr WF	yes		2.41
415	415	Lick Cr WF (Camp JD MF)	From mouth at Lick Cr to 4620 ft level	yes		2.42
416	416	Lick Cr-2 (Camp JD MF)	From Lick Cr WF to trib on section line 16/9	yes		1.87
417	417	Camp Cr-2 (JD MF)	From Lick Cr to Whiskey Cr	yes		0.95
418	418	Whiskey Cr	From mouth at Camp Cr to just below road crossing in section 27	yes		1.47
419	419	Camp Cr-3 (JD MF)	From Whiskey Cr to Cottonwood Cr	yes		0.34
420	420	Cottonwood Cr (Camp JD MF)	From mouth at Camp Cr to 4920 ft level	yes		3.81
421	421	Camp Cr-4 (JD MF)	From Cottonwood Cr to Cougar Cr	yes		1.74
422	422	Cougar Cr (Camp JD MF)	From mouth at Camp Cr to 4660 ft level	yes		2.62
423	423	Camp Cr-5 (JD MF)	From Cougar Cr to Trail Cr	yes		0.42
424	424	Trail Cr (Camp JD MF)	From mouth at Camp Cr to 4140 ft level	yes		0.41
425	425	Camp Cr-6 (JD MF)	From Trail Cr to Big Rock Cr	yes		2.86
426	426	Big Rock Cr	From mouth at Camp Cr to section line 20/21	yes		0.36
427	427	Camp Cr-7 (JD MF)	From Big Rock Cr to Charlie Cr	yes		2.76
428	428	Charlie Cr	From mouth at Camp Cr to headwater spring in section 26	yes		1.50
429	429	Camp Cr-8 (JD MF)	From Charlie Cr to Coxie Cr	yes		0.23
430	430	Coxie Cr	From mouth at Camp Cr to 5015 ft level on 1st trib of Coxie Cr	yes		0.97
431	431	Camp Cr-9 (JD MF)	From Coxie Cr to Eagle Cr	yes		0.37
432	432	Eagle Cr	From mouth at Camp Cr to 5000 ft level	yes		0.71
433	433	Camp Cr-10 (JD MF)	From Eagle Cr to Unnamed Trib in section 2	yes		0.59
434	434	Camp Cr Unnamed Trib (JD MF)	From mouth at Camp Cr to 5035 ft level	yes		0.64
435	435	Camp Cr-11 (JD MF)	From Unnamed Trib in section 2 to bend at 5300 ft level	yes		2.07

436	436	JD MF-18	From Camp Cr to Balance Cr	yes		2.12
437	1402	Balance Cr	From mouth at MF John Day R to lake in section 32	yes		1.64
438	438	JD MF-19	From Balance Cr to Coyote Cr	yes		0.83
439	1403	Coyote Cr	From mouth at MF John Day R to N edge of section 16	yes		2.23
440	440	JD MF-20	From Coyote Cr to Big Boulder Cr	yes		2.07
441	441	Big Boulder Cr-1	From mouth at MF John Day R to Wray Cr	yes		1.20
442	442	Wray Cr	From mouth at Big Boulder Cr to E edge of section 18	yes		3.04
443	443	Big Boulder Cr-2	From Wray Cr to Badger Cr	yes		0.79
444	444	Badger Cr (Big Boulder)	From mouth at Big Boulder Cr to forks in SW corner of section 7	yes		2.29
445	445	Big Boulder Cr-3	From Badger Cr to Myrtle Cr	yes		0.56
446	446	Myrtle Cr	From mouth at Big Boulder Cr to trib in middle of section 3	yes		2.19
447	447	Big Boulder Cr-4	From Myrtle Cr to forks near section line 1/36	yes		2.62
448	448	JD MF-21	From Big Boulder Cr to Dry/Sunshine Cr	yes		1.02
449	1404	Dry Cr (JD MF)	From mouth at MF John Day R to section line 26/25	yes		0.51
450	1405	Sunshine Cr	From mouth at MF John Day R to headwaters at 5080 ft level	yes		2.88
451	451	JD MF-22	From Dry/Sunshine Cr to Ragged Cr	yes		1.21
452	1406	Ragged Cr	From mouth at MF John Day R to road crossing at section line 36/1	yes		0.91
453	453	JD MF-23	From Ragged Cr to Beaver/Ruby Cr	yes		0.47
454	1407	Beaver Cr (JD MF)	From mouth at MF John Day R to section line 17/20	yes		3.51
455	1408	Ruby Cr (JD MF)	From mouth at MF John Day R to section line 13/24	yes		4.01
456	456	JD MF-24	From Beaver/Ruby Cr to Granite Boulder Cr	yes		0.73
457	1409	Granite Boulder Cr-1	From mouth at MF John Day R to Lemon Cr	yes		3.87
458	1410	Lemon Cr (Granite Boulder)	From mouth at Granite Boulder Cr to section line 21/22	yes		0.59
459	1411	Granite Boulder Cr-2	From Lemon Cr to Falls ID# 55427 near Lemon Cabin	yes		0.65
460	460	JD MF-25	From Granite Boulder Cr to Butte Cr	yes		0.76
461	1412	Butte Cr-1 (JD MF)	From mouth at MF John Day R to Bennet/Sulphur Cr	yes		1.96
462	1413	Bennett Cr	From mouth at Butte Cr to trib in section 17	yes		0.47
463	1414	Sulphur Cr	From mouth at Butte Cr to 4640 ft level	yes		0.84
464	1415	Butte Cr-2 (JD MF)	From Bennet/Sulphur confluence to 5240 ft level	yes		2.22
465	465	JD MF-26	From Butte Cr to Tincup Cr	yes		1.09
466	1416	Tincup Cr	From mouth at MF John Day R to 3900 ft level	yes		0.37
467	467	JD MF-27	From Tincup Cr to Windlass Cr	yes		0.43
468	1417	Windlass Cr	From mouth at MF John Day R to 4920 ft level	yes		2.32
469	469	JD MF-28	From Windlass Cr to Little Butte Cr	yes		1.09
470	1418	Little Butte Cr-1	From mouth at MF John Day R to Unnamed Trib in section 10	yes		0.48
471	1419	Little Butte Cr Unnamed Trib	From mouth at Little Butte Cr to forks in section 22	yes		1.63
472	1420	Little Butte Cr-2	From Unnamed Trib in section 10 to 4485 ft level	yes		1.24
473	473	JD MF-29	From Little Butte Cr to Little Boulder Cr	yes		1.17
474	1421	Little Boulder Cr	From mouth at MF John Day R to 5180 ft level	yes		2.95
475	475	JD MF-30	From Little Boulder Cr to Deerhorn Cr	yes		0.49
476	1422	Deerhorn Cr (JD MF)	From mouth at MF John Day R to 4500 ft level	yes		2.24
477	477	JD MF-31	From Deerhorn Cr to Caribou Cr	yes		0.86
478	1423	Caribou Cr	From mouth at MF John Day R to forks at section line 36/31	yes		3.02
479	479	JD MF-32	From Caribou Cr to Vincent Cr	yes		1.74
480	1424	Vincent Cr	From mouth at MF John Day R to section line 30/29	yes		4.57
481	481	JD MF-33	From Vincent Cr to Davis/Vinegar Cr	yes		0.92
482	482	Vinegar Cr-1	From mouth at MF John Day R to Blue Gulch	yes		7.17
483	483	Blue Gulch	From mouth at Vinegar Cr to road crossing in section 20	yes		0.65

484	484	Vinegar Cr-2	From Blue Gulch to Falls ID# 55428 at multi-tribs in section 19	yes		0.54
485	1425	Davis Cr-1 (JD MF)	From mouth at Vinegar Cr to Unnamed Trib at section line 27/34	yes		4.12
486	1426	Davis Unnamed Trib (JD MF)	From mouth at Davis Cr to 5120 ft level	yes		0.37
487	1427	Davis Cr-2 (JD MF)	From Unnamed Trib at section line 27/34 to 5160 ft level	yes		0.40
488	488	JD MF-34	From Davis/Vinegar Cr to Placer Gulch	yes		0.56
489	1428	Placer Gulch	From mouth at MF John Day R to 4580 ft level	yes		3.02
490	490	JD MF-35	From Placer Gulch to Bridge/Clear Cr confluence	yes		0.63
491	1429	Bridge Cr-1 (JD MF)	From mouth at MF John Day R to Bridge Cr NF	yes		5.98
492	1430	Bridge Cr NF (JD MF)	From mouth at Bridge Cr to section line 1/12	yes		0.99
493	1431	Bridge Cr-2 (JD MF)	From Bridge Cr NF to trib in NW corner of section 14	yes		0.78
494	494	Clear Cr-1 (Bridge JD MF)	From mouth at MF John Day R to Dry Fork Clear Cr	yes		1.58
495	495	Dry Fork Clear Cr	From mouth at Clear Cr to section line 12/13	yes		4.27
496	496	Clear Cr-2 (Bridge JD MF)	From Dry Fork Clear Cr to trib at section line 15/22	yes		4.51
497	497	Clear Cr-3 (Bridge JD MF)	From Trib at section line 15/22 to forks at section line 35/2	yes		3.41
498	498	JD MF-36	From Bridge/Clear Cr confluence to Mill Cr	yes		1.21
499	1432	Mill Cr (JD MF)	From mouth at MF John Day R to 4220 ft level	yes		1.19
500	500	JD MF-37	From Mill Cr to Crawford Cr	yes		3.03
501	1433	Crawford Cr	From mouth at MF John Day R to road crossing below 5200 ft level	yes		5.89
502	502	JD MF-38	From Crawford Cr to Summit/Squaw Cr confluence	yes		1.17
503	1434	Squaw Cr (JD MF)	From mouth at MF John Day R to trib between Sheep Cr and Squaw Meadow	yes		4.84
504	1435	Summit Cr-1	From mouth at MF John Day R to Idaho Cr	yes		1.96
505	1436	Idaho Cr	From mouth at Summit Cr to 5000 ft level on Fly Cr	yes		2.70
506	1437	Summit Cr-2	From Idaho Cr to Road Cr	yes		2.42
507	1438	Road Cr	From mouth at Summit Cr to 4600 ft level	yes		0.33
508	1439	Summit Cr-3	From Road Cr to 1st forks on NF	yes		0.89
509	509	JD NF-7	From MF John Day to Ditch Cr	yes		3.04
510	1440	Ditch Cr-1	From mouth at NF John Day R to just inside section 28	yes		13.66
511	1441	Ditch Cr-2	From just inside section 28 to Buther Bill	yes		2.13
512	1442	Butcher Bill	From mouth at Ditch Cr to 4840 ft level	yes		1.25
513	1443	Ditch Cr-3	From Butcher Bill to section line 2/11	yes		4.65
514	514	JD NF-8	From Ditch Cr to Mallory Cr	yes		2.34
515	1444	Mallory Cr-1	From mouth at NF John Day R to Graves Cr	yes		0.21
516	1445	Graves Cr	From mouth at Mallory Cr to Long Canyon on Jones Canyon	yes		4.21
517	1446	Mallory Cr-2	From Graves Cr to Wickiup Cr	yes		2.86
518	1447	Wickiup Cr (Malory JD NF)	From mouth at Mallory Cr to just inside section 19	yes		1.39
519	1448	Mallory Cr-3	From Wickiup Cr to Stalder Cr	yes		2.79
520	1449	Stalder Cr	From mouth at Mallory Cr to 4420 ft level	yes		1.90
521	1450	Mallory Cr-4	From Stalder Cr to road crossing in SE corner of section 27	yes		4.44
522	522	JD NF-9	From Mallory Cr to Wrightman Canyon	yes		0.61
523	1451	Wrightman Canyon-1	From mouth at NF John Day R to Culvert on Country Road 15	yes		0.05
524	1452	Wrightman Canyon-2	Culvert on County Road 15	yes	Obstruction	0.00
525	1453	Wrightman Canyon-3	From Culvert on Country Road 15 to road crossing near section line 20/21	yes		1.99
526	526	JD NF-10	From Wrightman Canyon to Potamus Cr	yes		0.33
527	527	Potamus Cr-1	From mouth at NF John Day R to Little Potamus Cr	yes		2.51
528	528	Little Potamus Cr	From mouth at Potamus Cr to falls at section line 17/20	yes		2.90
529	529	Potamus Cr-2	From Little Potamus Cr to Gilbert Cr	yes		2.84

530	530	Gilbert Cr	From mouth at Potamus Cr to 4100 ft level	yes		1.92
531	531	Potamus Cr-3	From Gilbert Cr to Ellis Cr	yes		3.12
532	532	Ellis Cr-1	From mouth at Potamus Cr to Deep Cr	yes		2.21
533	533	Deep Cr (Potamus)	From mouth at Ellis Cr to section line 27/34	yes		0.27
534	534	Ellis Cr-2	From Deep Cr to 4720 ft level	yes		1.99
535	535	Potamus Cr-4	From Ellis Cr to Pole Cr	yes		4.80
536	536	Pole Cr-1	From mouth at Potamus Cr to Hwy 53 in section 5	yes		3.02
537	537	Pole Cr-2	From Hwy 53 in section 5 to 5300 ft level	yes		0.90
538	538	Potamus Cr-5	From Pole Cr to Wilson Cr	yes		1.24
539	539	Wilson Cr (Potamus)	From mouth at Potamus Cr to section line 13/18	yes		0.69
540	540	Potamus Cr-6	From Wilson Cr to Hwy 53/Unnamed Trib above Kelly Prairie	yes		2.77
541	541	Potamus Cr Unnamed Trib	From mouth at Potamus Cr to 5150 ft level	yes		0.52
542	542	Potamus Cr-7	From Hwy 53/Unnamed Trib above Kelly Prairie to section line 1/36	yes		0.38
543	543	JD NF-11	From Potamus Cr to Skull Cr	yes		4.77
544	1454	Skull Cr	From mouth at NF John Day R to 2840 ft level	yes		0.95
545	545	JD NF-12	From Skull Cr to Stony Cr	yes		1.45
546	1455	Stony Cr-1	From mouth at NF John Day R to Rush Cr	yes		3.54
547	1456	Rush Cr-1 (JD NF)	From mouth at Stony Cr to top of canyon in section 20	yes		1.41
548	1457	Rush Cr-2 (JD NF)	From top of canyon in section 20 to road crossing 17/16 section line	yes		1.74
549	1458	Stony Cr-2	From Rush Cr to Matlock Cr	yes		0.95
550	1459	Matlock Cr-1	From mouth at Stony Cr to Scafold Cr	yes		0.64
551	1460	Scaffold Cr-1	From mouth at Matlock Cr to No Name Cr	yes		1.35
552	1461	No Name Cr	From mouth at Scaffold Cr to 4510 ft level	yes		1.31
553	1462	Scaffold Cr-2	From No Name Cr to road crossing near section line 7/6	yes		0.96
554	1463	Matlock Cr-2	From Scaffold Cr to road crossing 5320 in section 35	yes		4.33
555	555	JD NF-13	From Stony Cr to Buckaroo Cr	yes		3.82
556	1464	Buckaroo Cr	From mouth at NF John Day R to section line 21/28	yes		2.70
557	557	JD NF-14	From Buckaroo Cr to Hunter Cr	yes		3.08
558	1465	Hunter Cr	From mouth at NF John Day R to forks in section 27	yes		1.45
559	559	JD NF-15	From Hunter Cr to Jericho Cr	yes		1.49
560	1466	Jericho Cr	From mouth at NF John Day R to section line 22/23	yes		2.47
561	561	JD NF-16	From Jericho Cr to Deer Horn Cr	yes		1.96
562	1467	Deerhorn Cr (JD NF)	From mouth at NF John Day R to fork below 4200 ft level	yes		4.92
563	563	JD NF-17	From Deerhorn to Camas Cr	yes		1.44
564	564	Camas Cr-1	From mouth at NF John Day R to Bridge Cr	yes		3.89
565	565	Bridge Cr (Camas)	From mouth at Camas Cr to 4130 ft level	yes		5.15
566	566	Camas Cr-2	From Bridge Cr to Fivemile Cr	yes		1.45
567	567	Fivemile Cr-1	From mouth at Camas Cr to Falls ID# 55426 just inside section 5	yes		1.01
568	568	Fivemile Cr-2	Falls ID# 55426 just inside section 5	yes	Obstruction	0.00
569	569	Fivemile Cr-3	From Falls ID# 55426 just inside section 5 to Dry Fivemile Cr	yes		4.86
570	570	Dry Fivemile Cr	From mouth at Fivemile Cr to 4505 ft level	yes		1.02
571	571	Fivemile Cr-4	From Dry Fivemile Cr to Silver Cr	yes		1.48
572	572	Silver Cr (Fivemile)	From mouth at Fivemile Cr to forks in section 30	yes		1.53
573	573	Fivemile Cr-5	From Silver Cr to Taylor Cr	yes		2.11
574	574	Taylor Cr-1	From mouth at Fivemile Cr to Tribble Cr	yes		2.80
575	575	Tribble Cr	From mouth at Taylor Cr to section line 36/1	yes		2.65
576	576	Taylor Cr-2	From Tribble Cr to tribs W side of section 11	yes		2.12
577	577	Fivemile Cr-6	From Taylor Cr to Sugarbowl Cr	yes		0.43

578	578	Sugarbowl Cr-1	From mouth at Fivemile Cr to Morsay Cr	yes		3.35
579	579	Morsay Cr	From mouth at Sugarbowl Cr to pool at 4680 ft level	yes		0.20
580	580	Sugarbowl Cr-2	From Morsay Cr to NW corner of section 28 below 4800 ft level	yes		2.49
581	581	Fivemile Cr-7	From Sugarbowl Cr to 4960 ft level in Balsinger Prairie	yes		9.74
582	582	Camas Cr-3	From Fivemile Cr to Wilkins Cr	yes		5.43
583	583	Wilkins Cr	From mouth at Camas Cr to Wilkins Cr MF/SF confluence	yes		3.68
584	584	Wilkins Cr MF	From Wilkins Cr/SF confluence to section line 23/24	yes		1.54
585	585	Wilkins Cr SF	From Wilkins Cr/MF confluence to 4120 ft level	yes		0.92
586	586	Camas Cr-4	From Wilkins Cr to Deerlick Cr	yes		0.20
587	587	Deerlick Cr-1	From mouth to Gabion Basket Barrier just upstream of Hwy 395	yes		0.17
588	1468	Deerlick Cr-2	Gabion Basket Barrier just upstream of Hwy 395	no	Obstruction	0.00
589	1469	Deerlick Cr-3	From Gabion Basket Barrier just upstream of Hwy 395 to section line 12/7	no		3.73
590	590	Camas Cr-5	From Deerlick Cr to Owens Cr	yes		0.10
591	591	Owens Cr-1	From mouth at Camas Cr to Owens Cr NF/1st Unnamed Trib confluence	yes		1.86
592	592	Owens Cr NF-1	From mouth at Owens Cr to Unnamed Trib at 3440 ft level	yes		2.53
593	593	Owens Cr NF Unnamed Trib	From mouth at Owens Cr NF to headwaters at 3900 ft level	yes		1.45
594	594	Owens Cr NF-2	From Unnamed Trib at 3440 ft level to 3530 ft level	yes		0.41
595	595	Owens Cr 1st Unnamed Trib	From mouth at Owens Cr to 4590 ft level	yes		7.92
596	596	Owens Cr-2	From Owens Cr NF/1st Unnamed Trib confluence to Snipe Cr	yes		1.40
597	597	Snipe Cr-1	From mouth at Owens Cr to Unnamed Trib at 3420 ft level	yes		1.32
598	598	Snipe Cr Unnamed Trib	From mouth at Snipe Cr to E edge of section 24	yes		2.84
599	599	Snipe Cr-2	From Unnamed Trib at 3420 ft level to Cooper Cr	yes		2.63
600	600	Cooper Cr	From mouth at Snipe Cr to 3720 ft level	yes		1.76
601	601	Snipe Cr-3	From Cooper Cr to 4000 ft level at section line 31/32 and Hwy 395	yes		4.96
602	602	Owens Cr-3	From Snipe Cr to Unnamed Trib near section line 21/22	yes		6.52
603	603	Owens Cr 2nd Unnamed Trib-1	From mouth at Owens Cr to Unnamed Trib in the middle of section 22	yes		0.58
604	604	Owens Cr 2nd Unnamed Trib Trib	From mouth at Owens Cr 2nd Unnamed Trib to section line 22/27	yes		1.47
605	605	Owens Cr 2nd Unnamed Trib-2	From Unnamed Trib in the middle of section 22 to section line 14/23	yes		0.61
606	606	Owens Cr-4	From Unnamed Trib near section line 21/22 to Unnamed Trib in section 22	yes		0.30
607	607	Owens Cr 3rd Unnamed Trib	From mouth at Owens Cr in section 22 to 4270 ft level	yes		1.11
608	608	Owens Cr-5	From Unnamed Trib in section 22 to section line 34/3	yes		3.80
609	609	Camas Cr-6	From Owens Cr to Pine Cr	yes		1.22
610	610	Pine Cr-1 (Camas)	From mouth at Camas Cr to Unnamed Trib at section line 18/19	yes		2.83
611	611	Pine Cr Unnamed Trib (Camas)	From mouth at Pine Cr to 3660 ft level	yes		2.29
612	612	Pine Cr-2 (Camas)	From Unnamed Trib at section line 18/19 to 1st forks in section 6 on trib	yes		7.26
613	613	Camas Cr-7	From Pine Cr to Cable Cr	yes		5.54
614	614	Cable Cr	From mouth at Camas Cr to Cable Cr NF/SF confluence	yes		7.13
615	615	Cable Cr SF	From mouth at Cable Cr to headwaters in section 36	yes		8.45
616	616	Cable Cr NF-1	From mouth at Cable Cr to Unnamed Trib in NE corner of section 13	yes		4.61
617	617	Cable Cr NF Unnamed Trib	From mouth at Cable Cr NF to 4880 ft level	yes		0.82
618	618	Cable Cr NF-2	From Unnamed Trib in NE corner of section 13 to 4800 ft level on trib in section 17	yes		1.57
619	619	Camas Cr-8	From Cable Cr to Hidaway Cr	yes		2.79
620	620	Hidaway Cr-1	From mouth at Camas Cr to National Forest Boundary	yes		5.12

621	621	Hidaway Cr-2	From National Forest Boundary to Line Cr	yes		3.31
622	622	Line Cr	From mouth at Hidaway Cr to section line 25/27	yes		0.90
623	623	Hidaway Cr-3	From Line Cr to Unnamed Trib in section 36	yes		1.62
624	624	Hidaway 1st Unnamed Trib	From mouth at Hidaway Cr to 5200 ft level in section 6	yes		0.89
625	625	Hidaway Cr-4	From Unnamed Trib in section 36 to 2nd Unnamed Trib in section 35	yes		1.33
626	626	Hidaway 2nd Unnamed Trib	From mouth at Hidaway Cr to 5800 ft level	yes		2.07
627	627	Hidaway Cr-5	From 2nd Unnamed Trib in section 35 to Unnamed Trib in SW corner of section 31	yes		1.66
628	628	Hidaway 3rd Unnamed Trib	From mouth at Hidaway Cr to 5700 ft level	yes		1.75
629	629	Hidaway Cr-6	From Unnamed Trib in SW corner of section 31 to section line 32/2	yes		1.94
630	630	Camas Cr-9	From Hidaway Cr to Lane Cr	yes		2.20
631	631	Lane Cr-1	From mouth at Camas Cr to Unnamed Trib in section 19	yes		1.14
632	632	Lane Cr Unnamed Trib	From mouth at Lane Cr to 4725 ft level	yes		3.29
633	633	Lane Cr-2	From Unnamed Trib in section 19 to trib in section 6	yes		3.15
634	634	Camas Cr-10	From Lane Cr to Bear Wallow Cr	yes		0.71
635	635	Bear Wallow Cr	From mouth at Camas Cr to trib from Bear Wallow Spring	yes		5.62
636	636	Camas Cr-11	From Bear Wallow Cr to Butcherknife/Bowman Cr confluence	yes		3.82
637	637	Butcherknife Cr	From mouth at Camas Cr to headwaters at section line 14/13	yes		2.67
638	638	Bowman Cr-1	From mouth at Camas Cr to Unnamed Trib in section 35	yes		0.83
639	639	Bowman Unnamed Trib	From mouth at Bowman Cr to 4300 ft level at section line 26/35	yes		0.62
640	640	Bowman Cr-2	From Unnamed Trib in section 35 to headwaters just inside section 4	yes		5.61
641	641	Camas Cr-12	From Butcherknife/Bowman Cr confluence to Warm Spring Cr	yes		1.61
642	642	Warm Spring Cr	From mouth at Camas Cr to section line 13/15	yes		2.22
643	643	Camas Cr-13	From Warm Spring Cr to Fraizer Cr	yes		1.25
644	644	Frazier Cr (Camas)	From mouth at Camas Cr to 5220 ft level	yes		3.58
645	645	Camas Cr-14	From Fraizer Cr to Dry Camas Cr	yes		0.25
646	646	Dry Camas Cr-1	From mouth at Camas Cr to Unnamed Trib in section 6	yes		2.22
647	647	Dry Camas Cr Unnamed Trib	From mouth at Dry Camas Cr to forks in section 7	yes		0.36
648	648	Dry Camas Cr-2	From Unnamed Trib in section 6 to 4518 ft level	yes		0.65
649	649	Camas Cr-15	From Dry Camas Cr to Rancheria Cr	yes		1.10
650	650	Rancheria Cr-1	From mouth at Camas Cr to Salsbury Cr	yes		0.74
651	651	Salsbury Cr-1	From mouth at Rancheria Cr to Unnamed Trib at section 25	yes		0.41
652	652	Salsbury Unnamed Trib	From mouth at Salsbury Cr to 4440 ft level	yes		0.50
653	653	Salsbury Cr-2	From Unnamed Trib in section 25 to 4480 ft level	yes		0.88
654	654	Rancheria Cr-2	From Salsbury Cr to 4560 ft level	yes		2.74
655	655	Camas Cr-16	From Rancheria Cr to forks in the middle of section 33	yes		3.77
656	656	JD NF-18	From Camas Cr to Hinton Cr	yes		1.20
657	1470	Hinton Cr	From mouth at NF John Day R to 3720 ft level	yes		3.02
658	658	JD NF-19	From Hinton Cr to Meadow Brook Cr	yes		1.91
659	1471	Meadow Brook Cr-1	From mouth at NF John Day R to Meadow Brook Cr WF/EF confluence	yes		2.92
660	1472	Meadow Brook EF-1	From mouth at Meadow Brook Cr to Meadow Brooks Falls ID# 55452	yes		0.57
661	1473	Meadow Brook EF-2	Meadow Brooks Falls ID# 55452	no	Obstruction	0.00
662	1474	Meadow Brook EF-3	From Meadow Brooks Falls ID# 55452 to Bully Cr	no		0.50
663	1475	Bully Cr-1	From mouth at Meadow Brook EF to Brush Cr	no		1.90
664	1476	Brush Cr	From mouth at Bully Cr to section line 36/31	no		2.01
665	1477	Bully Cr-2	From Brush Cr to 4050 ft level	no		3.07
666	1478	Meadow Brook WF-1	From mouth at Meadow Brook Cr to Smith Cr	yes		0.53

667	1479	Smith Cr (Meadow Brook)	From mouth at Meadow Brook WF to middle of section 22	yes		1.42
668	1480	Meadow Brook WF-2	From Smith Cr to trib in the middle of section 19	yes		4.52
669	669	JD NF-20	From Meadow Brook Cr to Desolation Cr	yes		0.46
670	670	Desolation Cr-1	From mouth at NF John Day R to Mud Springs Cr	yes		3.51
671	671	Mud Springs Cr	From mouth at Desolation Cr to 3500 ft level in section 9	yes		0.58
672	672	Desolation Cr-2	From Mud Springs Cr to Peep Cr	yes		4.35
673	673	Peep Cr-1	From mouth at Desolation Cr to Unnamed Trib in section 23	yes		0.94
674	674	Peep Cr Unnamed Trib	From mouth at Peep Cr to 4500 ft level	yes		0.63
675	675	Peep Cr-2	From Unnamed Trib in section 23 to forks in section 24	yes		0.90
676	676	Desolation Cr-3	From Peep Cr to Kelsay Cr	yes		1.41
677	677	Kelsay Cr-1	From mouth at Desolation Cr to Little Kelsay Cr	yes		3.45
678	678	Little Kelsay Cr	From mouth at Kelsay Cr to headwaters near Kelsay Spring	yes		3.50
679	679	Kelsay Cr-2	From Little Kelsay Cr to headwaters at 5400 ft level	yes		5.57
680	680	Desolation Cr-4	From Kelsay Cr to 1st Unnamed Trib in section 35	yes		0.28
681	681	Desolation 1st Unnamed Trib	From mouth at Desolation Cr to 4200 ft level	yes		0.79
682	682	Desolation Cr-5	From 1st Unnamed Trib in section 35 to 2nd Unnamed Trib in section 35	yes		0.11
683	683	Desolation 2nd Unnamed Trib	From mouth at Desolation Cr to 4180 ft level in section 35	yes		0.27
684	684	Desolation Cr-6	From Unnamed Trib in section 35 to Starveout Cr	yes		1.24
685	685	Starveout Cr	From mouth at Desolation Cr to section line 2/11	yes		1.12
686	686	Desolation Cr-7	From Starveout Cr to Park Cr	yes		0.80
687	687	Park Cr	From mouth at Desolation Cr to 4700 ft level	yes		1.22
688	688	Desolation Cr-8	From Park Cr to Bruin Cr	yes		0.61
689	689	Bruin Cr-1	From mouth at Desolation Cr to Unnamed Trib at section line 6/5	yes		0.97
690	690	Bruin Cr Unnamed Trib	From mouth at Bruin Cr to road crossing in section 5	yes		0.51
691	691	Bruin Cr-2	From Unnamed Trib at section line 6/5 to road crossing in section 8	yes		1.05
692	692	Desolation Cr-9	From Bruin Cr to Junkens Cr	yes		1.83
693	693	Junkens Cr	From mouth at Desolation Cr to falls ID# 55447 at mouth of canyon in section 25	yes		2.54
694	694	Desolation Cr-10	From Junkens Cr to Beeman Cr	yes		1.24
695	695	Beeman Cr	From mouth at Desolation Cr to Falls at 5640 ft level	yes		2.01
696	696	Desolation Cr-11	From Beeman Cr to Battle Cr	yes		0.93
697	697	Battle Cr (Desolation)	From mouth at Desolation Cr to 5600 ft level	yes		4.66
698	698	Desolation Cr-12	From Battle Cr to Sponge Cr	yes		1.77
699	699	Sponge Cr-1	From mouth at Desolation Cr to Unnamed Trib in section 22	yes		1.05
700	700	Sponge Cr Unnamed Trib	From mouth at Sponge Cr to 5320 ft level	yes		1.21
701	701	Sponge Cr-2	From Unnamed Trib in section 22 to 5200 ft level	yes		0.38
702	702	Desolation Cr-13	From Sponge Cr to Howard Cr	yes		0.89
703	703	Howard Cr	From mouth at Desolation Cr to forks at Upper Howard Camp	yes		1.49
704	704	Desolation Cr-14	From Howard Cr to Desolation Cr NF/SF confluence	yes		2.18
705	705	Desolation Cr NF	From mouth at Desolation Cr to headwaters at 6680 ft level	yes		6.64
706	706	Desolation Cr SF-1	From mouth at Desolation Cr to Falls ID# 55437 at 5600 ft level	yes		2.52
707	1481	Desolation Cr SF-2	From Falls ID# 55437 at 5600 ft level to section line 33/4	no		5.02
708	708	JD NF-21	From Desolation Cr to Meengs Canyon	yes		3.52
709	1482	Meengs Canyon	From mouth at NF John Day R to start of canyon in section 33	yes		0.34
710	710	JD NF-22	From Meengs Canyon to Trough Cr	yes		1.29
711	1483	Trough Cr	From mouth at NF John Day R to 3700 ft level	yes		1.74
712	712	JD NF-23	From Trough Cr to Texas Bar Cr	yes		0.16

713	1484	Texas Bar Cr-1	Mouth/culvert ID# 55442 at NF John Day R	yes	Obstruction	0.00
714	1485	Texas Bar Cr-2	From mouth/culvert ID# 55442 at NF John Day R to Unnamed Trib in section 26	yes		1.46
715	1486	Texas Bar Unnamed Trib	From mouth at Texas Bar Cr to section line 13/24	yes		1.50
716	1487	Texas Bar Cr-3	From Unnamed Trib in section 26 to road crossing at section line 20/29	yes		3.77
717	717	JD NF-24	From Texas Bar Cr to Otter Cr	yes		5.74
718	1488	Otter Cr	From mouth at NF John Day R to 4000 ft level	yes		1.13
719	719	JD NF-25	From Otter Cr to Raspberry Cr	yes		1.34
720	1489	Raspberry Cr	From mouth at NF John Day R to section line 15/16	yes		0.67
721	721	JD NF-26	From Raspberry Cr to Oriental Cr	yes		0.56
722	1490	Oriental Cr-1	From mouth at NF John Day R to Unnamed Trib in section 3	yes		1.95
723	1491	Oriental Cr Unnamed Trib	From mouth at Oriental Cr to headwaters in section 35	yes		1.08
724	1492	Oriental Cr-2	From Unnamed Trib in section 3 to just inside section 34	yes		0.22
725	725	JD NF-27	From Oriental Cr to Bismark Cr	yes		2.80
726	1493	Bismark Cr	From mouth at NF John Day R to headwaters in section 23	yes		1.65
727	727	JD NF-28	From Bismark Cr to Big Cr	yes		0.28
728	1494	Big Cr-1 (JD NF)	From mouth at NF John Day R to Winom Cr	yes		1.30
729	1495	Winom Cr-1	From mouth at Big Cr to Falls ID# 55423 in NE corner of section 12	yes		0.49
730	1496	Winom Cr-2	Falls ID# 55423 in NE corner of section 12	no	Obstruction	0.00
731	1497	Winom Cr-3	From Falls ID# 55423 in NE corner of section 12 to Unnamed Trib near N edge of section 22	no		5.54
732	1498	Winom Unnamed Trib	From mouth at Winom Cr to middle of section 16	no		0.77
733	1499	Winom Cr-4	From Unnamed Trib near N edge of section 22 to 5560 ft level on EF	no		0.91
734	1500	Big Cr-2 (JD NF)	From Winom Cr to Meadow Cr	yes		1.80
735	1501	Meadow Cr-1	From mouth at Big Cr to Falls ID# 55424 at 4200 ft level	yes		0.16
736	1502	Meadow Cr-2	From Falls ID# 55424 at 4200 ft level to Meadow Cr SF	no		3.16
737	1503	Meadow Cr SF-1	From mouth at Meadow Cr to Martin Cr	no		1.93
738	1504	Martin Cr	From mouth at Meadow Cr SF to just inside section 20	no		2.20
739	1505	Meadow Cr SF-2	From Martin Cr to middle of section 30 at Moon Meadows	no		2.67
740	1506	Meadow Cr-3	From Meadow Cr SF to White Cr	no		1.86
741	1507	White Cr (Meadow)	From mouth at Meadow Cr to section line 20/29	no		3.02
742	1508	Meadow Cr-4	From White Cr to Squaw Cr	no		0.82
743	1509	Squaw Cr (Meadow)	From mouth at Meadow Cr to headwaters at section line 29/32	no		1.66
744	1510	Meadow Cr-5	From Squaw Cr to march in the middle of section 2	no		4.40
745	1511	Big Cr-3 (JD NF)	From Meadow Cr to falls near section line 5/8	yes		0.23
746	1512	Big Cr-4 (JD NF)	From falls near section line 5/8 to forks at section line 34/27	no		3.14
747	747	JD NF-29	From Big Cr to Simpson Cr	yes		1.08
748	1513	Simpson Cr	From mouth at NF John Day R to forks in section 25	yes		1.54
749	749	JD NF-30	From Simpson Cr to Corral Cr	yes		0.63
750	1514	Corral Cr (JD NF)	From mouth at NF John Day R to 2nd fork in section 17	yes		1.23
751	751	JD NF-31	From Corral Cr to Cougar Cr	yes		0.74
752	1515	Cougar Cr (JD NF)	From mouth at NF John Day R to 4470 ft level	yes		1.43
753	753	JD NF-32	From Cougar Cr to Basin Cr	yes		1.16
754	1516	Basin Cr (JD NF)	From mouth at NF John Day R to 2nd trib in section 6	yes		3.45
755	755	JD NF-33	From Basin Cr to Ryder Cr	yes		0.93
756	1517	Ryder Cr	From mouth at NF John Day R to forks at section line 27/26	yes		1.27
757	757	JD NF-34	From Ryder Cr to Paradise Cr	yes		1.67
758	1518	Paradise Cr	From mouth at NF John Day R to 5200 ft level	yes		1.62

759	759	JD NF-35	From Paradise Cr to Silver Cr	yes		2.62
760	1519	Silver Cr-1 (JD NF)	From mouth at NF John Day R to Unnamed Trib in section 1	yes		2.13
761	1520	Silver Unnamed Trib (JD NF)	From mouth at Silver Cr to 4960 ft level	yes		0.31
762	1521	Silver Cr-2 (JD NF)	From Unnamed Trib in section 1 to 4960 ft level	yes		0.38
763	763	JD NF-36	From Silver Cr to Oregon Gulch	yes		0.69
764	1522	Oregon Gulch	From mouth at NF John Day R to 4900 ft level	yes		1.35
765	765	JD NF-37	From Oregon Gulch to Backout Cr	yes		0.16
766	1523	Backout Cr-1	From mouth at NF John Day R to Unnamed Trib in section 21	yes		2.57
767	1524	Backout Unnamed Trib	From mouth at Backout Cr to middle of section 20 at 5400 ft level	yes		1.17
768	1525	Backout Cr-2	From Unnamed Trib in section 21 to 5000 ft level	yes		0.35
769	769	JD NF-38	From Backout Cr to Granite Cr	yes		1.28
770	770	Granite Cr-1 (2nd JD NF)	From mouth at NF John Day R to Lake Cr	yes		0.59
771	1526	Lake Cr-1 (Granite)	From mouth at Granite Cr to Lost Cr	yes		5.51
772	1527	Lost Cr-1	From mouth at Lake Cr to 6280 ft level	yes		3.31
773	1528	Lost Cr-2	From 6280 ft level to 6680 ft level	yes		1.26
774	1529	Lake Cr-2 (Granite)	From Lost Cr to culvert ID# 55438 at Road 10 in section 14	yes		1.41
775	775	Granite Cr-2 (2nd JD NF)	From Lake Cr to Rabbit Cr	yes		2.32
776	1530	Rabbit Cr	From mouth at Granite Cr to road crossing in section 13	yes		5.69
777	777	Granite Cr-3 (2nd JD NF)	From Rabbit Cr to Lick Cr	yes		0.25
778	778	Lick Cr (Granite 2nd JD NF)	From mouth at Granite Cr to section line 21/28	yes		0.79
779	779	Granite Cr-4 (2nd JD NF)	From Lick Cr to Squaw Cr	yes		2.39
780	780	Squaw Cr (Granite 2nd JD NF)	From mouth at Granite Cr to trib in section 23	yes		1.61
781	781	Granite Cr-5 (2nd JD NF)	From Squaw Cr to Ten Cent Cr	yes		1.44
782	782	Ten Cent Cr	From mouth at Granite Cr to Ten Cent Cr WF/EF confluence	yes		0.38
783	783	Ten Cent WF	From mouth at Ten Cent Cr to 1st trib in section 13	yes		2.83
784	784	Ten Cent EF-1	From mouth at Ten Cent Cr to Unnamed Trib in section 28	yes		1.45
785	785	Ten Cent Unnamed Trib	From mouth at Ten Cent EF to 4900 ft level	yes		0.34
786	786	Ten Cent EF-2	From Unnamed Trib in section 28 to 5400 ft level	yes		1.26
787	787	Granite Cr-6 (2nd JD NF)	From Ten Cent Cr to Clear Cr	yes		0.87
788	788	Clear Cr-1 (Granite 2nd JD NF)	From mouth at Granite Cr to Beaver Cr	yes		3.88
789	789	Beaver Cr-1 (Granite 2nd JD NF)	From mouth at Clear Cr to Olive Cr	yes		0.56
790	790	Olive Cr	From mouth at Beaver Cr to Irish Gulch	yes		4.51
791	791	Beaver Cr-2 (Granite 2nd JD NF)	From Olive Cr to Beaver Cr SF	yes		1.50
792	792	Beaver Cr SF (Granite 2nd JD NF)	From mouth at Beaver Cr to section line 36/33	yes		2.16
793	793	Beaver Cr-3 (Granite 2nd JD NF)	From Beaver Cr SF to trib in Beaver Meadows	yes		2.34
794	794	Clear Cr-2 (Granite 2nd JD NF)	From Beaver Cr to Ruby Cr	yes		2.47
795	795	Ruby Cr-1 (Granite 2nd JD NF)	From mouth at Clear Cr to Ruby Cr NF	yes		0.70
796	796	Ruby Cr NF (Granite 2nd JD NF)	From mouth at Ruby Cr to section line 16/17	yes		1.23
797	797	Ruby Cr-2 (Granite 2nd JD NF)	From Ruby Cr NF to just past trib in section 17	yes		1.82
798	798	Clear Cr-3 (Granite 2nd JD NF)	From Ruby Cr to Lightning Cr	yes		0.81
799	799	Lightening Cr-1	From mouth at Clear Cr to Dry Cr	yes		1.08
800	800	Dry Cr (Granite 2nd JD NF)	From mouth at Lightening Cr to Petemann Ditch	yes		1.65
801	801	Lightening Cr-2	From Dry Cr to Petemann Ditch	yes		1.97
802	802	Lightening Cr-3	Petemman Ditch	yes	Obstruction	0.00
803	803	Salmon Cr	From Petemann Ditch (U/S of Lightening Cr) to section line 4/5	yes		0.61
804	804	Clear Cr-4 (Granite 2nd JD NF)	From Lightning Cr to Wosley Cr/Clear Cr WF	yes		0.86
805	805	Wosley Cr	From mouth at Clear Cr to section line 19/24	yes		2.41
806	806	Clear Cr WF-1 (Granite 2nd JD NF)	From mouth at Clear Cr to Clear Cr EF	yes		2.16

807	807	Clear Cr EF (Granite 2nd JD NF)	From mouth at Clear Cr WF to section line 1/6	yes		1.19
808	808	Clear Cr WF-2 (Granite 2nd JD NF)	From Clear Cr EF to tribs at 6520 ft level	yes		2.10
809	809	Granite Cr-7 (2nd JD NF)	From Clear Cr to Bull Run	yes		1.78
810	810	Bull Run-1	From mouth at Granite Cr to Corral Cr	yes		1.71
811	811	Corral Cr (Granite 2nd JD NF)	From mouth at Bull Run to 5820 ft level	yes		2.89
812	812	Bull Run-2	From Corral Cr to Boundary Cr	yes		1.33
813	813	Boundary Cr	From mouth at Bull Run to Boundary Cr EF/WF confluence	yes		2.51
814	814	Bull Run-3	From Boundary Cr to Deep Cr	yes		1.46
815	815	Deep Cr (Granite 2nd JD NF)	From mouth at Bull Run to 5430 ft level just past forks	yes		2.44
816	816	Bull Run-4	From Deep Cr to Hull Cr	yes		2.76
817	817	Granite Cr-8 (2nd JD NF)	From Bull Run to Boulder Cr	yes		1.00
818	818	Boulder Cr-1 (Granite 2nd JD NF)	From mouth at Granite Cr to 4800 ft level	yes		1.06
819	819	Boulder Cr-2 (Granite 2nd JD NF)	From 4800 ft level to 5800 ft level	yes		2.07
820	820	Granite Cr-9 (2nd JD NF)	From Boulder Cr to forks just below 5600 ft level	yes		3.97
821	821	JD NF-39	From Granite Cr to First Gulch	yes		0.95
822	1531	First Gulch	From mouth at NF John Day R to 4700 ft level	yes		0.88
823	823	JD NF-40	From First Gulch to Bear Gulch	yes		2.13
824	1532	Bear Gulch	From mouth at NF John Day R to 4860 ft level	yes		1.68
825	825	JD NF-41	From Bear Gulch to McCarty Cr	yes		2.60
826	1533	McCarty Cr	From mouth at NF John Day R to 5220 ft level	yes		1.94
827	827	JD NF-42	From McCarty Cr to Wagner Gulch	yes		1.31
828	1534	Wagner Gulch	From mouth at NF John Day R to headwaters at 5950 ft level	yes		4.43
829	829	JD NF-43	From Wagner Gulch to Crane Cr	yes		0.32
830	1535	Crane Cr	From mouth at NF John Day R to 6160 ft level	yes		6.96
831	831	JD NF-44	From Crane Cr to Trout Cr	yes		3.45
832	1536	Trout Cr-1	From mouth at NF John Day R to Davis Cr	yes		2.08
833	1537	Davis Cr-1 (Trout JD NF)	From mouth at Trout Cr to Unnamed Trib, 2nd in section 24	yes		0.34
834	1538	Davis Unnamed Trib (Trout JD NF)	From mouth at Davis Cr to forks in section 22	yes		1.71
835	1539	Davis Cr-2 (Trout JD NF)	From Unnamed Trib, 2nd in section 24 to 5860 ft level	yes		1.89
836	1540	Trout Cr-2	From Davis Cr to Unnamed Trib in section 13	yes		0.50
837	1541	Trout Cr Unnamed Trib	From mouth at Trout Cr to 5510 ft level	yes		1.78
838	1542	Trout Cr-3	From Unnamed Trib in section 13 to 5465 ft level	yes		1.60
839	839	JD NF-45	From Trout Cr to Trail Cr	yes		2.46
840	840	Trail Cr (JD NF)	From mouth at NF John Day R to Trail Cr NF/SF confluence	yes		1.89
841	841	Trail Cr NF-1	From mouth at Trail Cr to Hoodoo Cr	yes		2.22
842	842	Hoodoo Cr	From mouth at Trail Cr NF to forks at section line 1/12	yes		0.96
843	843	Trail Cr NF-2	From Hoodoo Cr to forks just below headwater springs	yes		2.34
844	844	Trail Cr SF-1	From mouth at Trail Cr to Trail Cr MF	yes		1.52
845	845	Trail Cr MF	From mouth at Trail Cr SF to 6340 ft level	yes		3.00
846	846	Trail Cr SF-2	From Trail Cr MF to Long Meadow Cr	yes		3.79
847	847	Long Meadow Cr	From mouth at Trail Cr SF to 6700 ft level	yes		0.39
848	848	JD NF-46	From Trail Cr to Onion Cr	yes		0.37
849	1543	Onion Cr (JD NF)	From mouth at NF John Day R to road crossing in section 7	yes		4.19
850	850	JD NF-47	From Onion Cr to Baldy Cr	yes		4.79
851	851	Baldy Cr-1 (JD NF)	From mouth at NF John Day R to Bull Cr	yes		1.20
852	852	Bull Cr	From mouth at Baldy Cr to section line 10/11	yes		2.04
853	853	Baldy Cr-2 (JD NF)	From Bull Cr to forks in section 17	yes		2.14
854	854	JD NF-48	From Baldy Cr to Crawfish Cr	yes		1.10

855	1544	Crawfish Cr	From mouth at NF John Day R to forks below 6800 ft level	yes		3.07
856	856	JD NF-49	From Crawfish Cr to Cunningham Cr	yes		1.92
857	1545	Cunningham Cr	From mouth at NF John Day R to 6300 ft level	yes		0.45
858	858	JD NF-50	From Cunningham Cr to 6600 ft level	yes		3.11
859	859	JD-30	From NF John Day to Johnson Cr	yes		0.77
860	860	Johnson Cr (JD)	From mouth at John Day R to forks in section 29	yes		10.50
861	861	JD-31	From Johnson Cr to Holmes Cr	yes		1.38
862	1546	Holmes Cr	From mouth at John Day R to 4600 ft level on Burnt Corral Canyon	yes		4.42
863	863	JD-32	From Holmes Cr to Johnny Cr	yes		9.67
864	1547	Johnny Cr	From mouth at John Day R to trib in section 14	yes		4.80
865	865	JD-33	From Johnny Cr to Squaw Cr	yes		2.79
866	1548	Squaw Cr-1 (JD)	From mouth at John Day R to Frank Cr	yes		3.45
867	1549	Frank Cr	From mouth at Squaw Cr to 4200 ft level in section 9	yes		1.97
868	1550	Squaw Cr-2 (JD)	From Frank Cr to Buckhorn Cr	yes		0.90
869	1551	Buckhorn Cr	From mouth at Squaw Cr to road crossing at 4000 ft level	yes		3.07
870	1552	Squaw Cr-3 (JD)	From Buckhorn Cr to 1st trib in section 30 on Indian Cr	yes		3.59
871	871	JD-34	From Squaw Cr to Rock Cr	yes		4.90
872	872	Rock Cr-1 (2nd JD)	From mouth at John Day R to Birch Cr	yes		3.33
873	1553	Birch Cr (Rock 2nd JD)	From mouth at Rock Cr to Birch Cr WF/EF confluence	no		5.88
874	1554	Birch Cr WF (Rock 2nd JD)	From mouth at Birch Cr to forks in section 19	no		2.29
875	1555	Birch Cr EF (Rock 2nd JD)	From mouth at Birch Cr to 5400 ft level on the central trib (flowing N)	no		2.95
876	876	Rock Cr-2 (2nd JD)	From Birch Cr to Mountain Cr	yes		1.54
877	877	Mountain Cr-1	From mouth at Rock Cr to Willow Cr	yes		9.07
878	878	Willow Cr-1	From mouth at Mountain Cr to Fopiano Cr	yes		0.82
879	879	Fopiano Cr	From mouth at Willow Cr to Fopiano Rsv Dam ID # 50282	yes		4.78
880	880	Willow Cr-2	From Fopiano Cr to Wheeler Cr	yes		2.95
881	881	Mountain Cr-2	From Willow Cr to Fort Cr	yes		3.18
882	882	Fort Cr-1	From mouth at Mountain Cr to gradient change at section line 35/36	yes		4.45
883	883	Fort Cr-2	From gradient change at section line 35/36 to Buck Point Triangle	yes		0.80
884	884	Mountain Cr-3	From Fort Cr to Mac Cr	yes		3.55
885	885	Mac Cr-1	From mouth at Mountain Cr to Unnamed Trib in section 34	yes		2.49
886	886	Mac Cr Unnamed Trib	From mouth at Mac Cr to headwaters at 5300 ft level	yes		1.43
887	887	Mac Cr-2	From Unnamed Trib in section 34 to Barnhouse Springs in headwaters	yes		1.00
888	888	Mountain Cr-4	From Mac Cr to Keeton Cr	yes		0.91
889	889	Keeton Cr-1	From mouth at Mountain Cr to Fry Cr	yes		0.12
890	890	Fry Cr-1	From mouth at Keeton Cr to Collins Rsv Dam ID # 50291 in section 28	yes		1.20
891	1556	Fry Cr-2	Collins Rsv Dam ID # 50291 in section 28	no	Obstruction	0.00
892	1557	Fry Cr-3	From Collins Rsv Dam ID # 50291 in section 28 to trib at 4600 ft level	no		2.06
893	893	Keeton Cr-2	From Fry Cr to Unnamed Trib in SW corner of section 31	yes		3.98
894	894	Keeton Cr Unnamed Trib	From mouth in SW corner of section 31 at Keeton Cr to 4860 ft level	yes		0.91
895	895	Keeton Cr-3	From Unnamed Trib in SW corner of section 31 to 4880 ft level	yes		1.13
896	896	Mountain Cr-5	From Keeton Cr to Indian/Badger Cr	yes		5.06
897	897	Indian Cr (Mountain)	From mouth at Mountain Cr to section line 3/10	yes		4.06
898	898	Badger Cr-1 (Mountain)	From mouth at Mountain Cr to Milk Cr	yes		4.66
899	899	Milk Cr	From mouth at Badger Cr to road crossing at 5600 ft level	yes		2.58
900	900	Badger Cr-2 (Mountain)	From Milk Cr to just above Hoffman Cr	yes		2.40
901	901	Rock Cr-3 (2nd JD)	From Mountain Cr to Pine Hollow	yes		5.49
902	902	Pine Hollow (Rock 2nd JD)	From mouth at Rock Cr to W line of section 28	yes		3.30

903	903	Rock Cr-4 (2nd JD)	From Pine Hollow to Fred Cr	yes		1.49
904	904	Fred Cr-1	From mouth at Rock Cr to dam at Fred Lake	yes		1.32
905	1558	Fred Cr-2	Dam at Fred Lake	no	Obstruction	0.00
906	1559	Fred Cr-3	From Fred Lake Dam to W line of section 9	no		1.74
907	907	Rock Cr-5 (2nd JD)	From Fred Cr to Irrigation Dam ID # 50283/FirstCr	yes		4.73
908	908	Rock Cr-6 (2nd JD)	Irrigation Dam ID # 50283 at mouth of First Cr	yes	Obstruction	0.00
909	909	First Cr	From mouth at irrigation dam ID # 50283/First Cr to 4870 ft level	yes		0.55
910	910	Rock Cr-7 (2nd JD)	From irrigation Dam ID # 50283 to Second Cr	yes		0.72
911	911	Second Cr	From mouth at Rock Cr to 5200 ft level	yes		1.08
912	912	Rock Cr-8 (2nd JD)	From Second Cr to Balm Cr	yes		0.50
913	913	Balm Cr	From mouth at Rock Cr to 5400 ft level on Unnamed Trib, mouth at 5000 ft level	yes		1.08
914	914	Rock Cr-9 (2nd JD)	From Balm Cr to Bear Cr	yes		0.77
915	915	Bear Cr (Rock 2nd JD)	From mouth at Rock Cr to 5550 ft level	yes		1.84
916	916	Rock Cr-10 (2nd JD)	From Bear Cr to Fir Tree Cr	yes		0.16
917	917	Fir Tree Cr	From mouth at Rock Cr to 5700 ft level	yes		1.90
918	918	Rock Cr-11 (2nd JD)	From Fir Tree Cr to Baldy Cr	yes		3.44
919	919	Baldy Cr-1 (Rock 2nd JD)	From mouth at Rock Cr to Little Windy Cr	yes		0.80
920	920	Little Windy Cr	From mouth at Baldy Cr to 6040 ft level	yes		1.47
921	921	Baldy Cr-2 (Rock 2nd JD)	From Little Windy Cr to 6200 ft level	yes		2.42
922	922	Rock Cr-12 (2nd JD)	From Baldy Cr to section line 16/19	yes		0.83
923	923	JD-35	From Rock Cr to Rattlesnake Cr	yes		1.52
924	1560	Rattlesnake Cr-1	From mouth at John Day R to end of dewatered area at 3005 ft level	yes		3.66
925	1561	Rattlesnake Cr-2	From end of dewatered area at 3005 ft level to forks just inside section 3	yes		1.86
926	926	JD-36	From Rattlesnake Cr to Cottonwood Cr	yes		1.41
927	1562	Cottonwood Cr-1 (JD)	From mouth at John Day R to Cottonwood Cr EF	yes		7.85
928	1563	Cottonwood EF-1 (JD)	From mouth at Cottonwood Cr to 1st Unnamed Trib in section 31	yes		0.49
929	1564	Cottonwood EF Unnamed Trib (JD)	From mouth at Cottonwood Cr EF to 4800 ft level	yes		1.59
930	1565	Cottonwood EF-2 (JD)	From 1st Unnamed Trib in section 31 to section line 4/5	yes		1.96
931	1566	Cottonwood Cr-2 (JD)	From Cottonwood Cr EF to Black Cr	yes		2.18
932	1567	Black Cr	From mouth at Cottonwood Cr to 4480 ft level	yes		0.64
933	1568	Cottonwood Cr-3 (JD)	From Black Cr to Cougar Cr	yes		0.50
934	1569	Cougar Cr-1 (Cottonwood JD)	From mouth at Cottonwood Cr to 1st Unnamed Trib from the NW	yes		0.48
935	1570	Cougar Unnamed Trib (Cottonwood JD)	From mouth at Cougar Cr to 4920 ft level	yes		0.69
936	1571	Cougar Cr-2 (Cottonwood JD)	From 1st Unnamed Trib from the NW to headwaters at 5400 ft level	yes		1.20
937	1572	Cottonwood Cr-4 (JD)	From Cougar Cr to Unnamed Trib on section line 4/3	yes		4.66
938	1573	Cottonwood Cr Unnamed Trib (JD)	From mouth at Cottonwood Cr to 6260 ft level	yes		1.41
939	1574	Cottonwood Cr-5 (JD)	From Unnamed Trib on section line 4/3 to headwaters at 6300 ft level	yes		1.27
940	940	JD-37	From Cottonwood Cr to Battle Cr	yes		1.32
941	1575	Battle Cr-1 (JD)	From mouth at John Day R to upper end of dewatered area at 2400 ft level	yes		0.71
942	1576	Battle Cr-2 (JD)	From end of dewatered area at 2400 ft level to Long Hollow	yes		1.58
943	943	JD-38	From Battle Cr to Farris Cr	yes		1.49
944	1577	Ferris Cr	From mouth at John Day R to section line 6/7	yes		5.80
945	945	JD-39	From Ferris Cr to Franks Cr	yes		1.21
946	1578	Franks Cr-1	From mouth at John Day R to end of dewatered area at 2900 ft level	yes		3.17
947	1579	Franks Cr-2	From end of dewatered area at 2900 ft level to Falls barrier ID # 55435 at 3085 ft level	no		0.67

948	1580	Franks Cr-3	Falls (unnatural) barrier ID # 55435 at 3085 ft level	no	Obstruction	0.00
949	1581	Franks Cr-4	From Falls (unnatural) barrier ID # 55435 at 3085 ft level to forks at Timber Basin	no		5.11
950	950	JD-40	From Franks Cr to SF John Day	yes		0.15
951	951	JD SF-1	From mouth at John Day R to Smoky Cr	yes		6.42
952	1582	Smoky Cr	From mouth at SF John Day R to section line 33/4	yes		4.06
953	953	JD SF-2	From Smoky Cr to Jackass Canyon	yes		5.96
954	1583	Jackass Canyon-1	Culvert/mouth on SF Road at SF John Day R	no	Obstruction	0.00
955	1584	Jackass Canyon-2	From culvert at mouth to 4360 ft level	no		3.07
956	956	JD SF-3	From Jackass Canyon to Black Canyon	yes		1.88
957	957	Black Canyon-1	From mouth at SF John Day R to South Prong BC/Payten Cr	yes		1.91
958	958	South Prong BC	From mouth at Black Canyon to 4850 ft level	yes		4.38
959	959	Payten Cr	From mouth at Black Canyon to 5000 ft level	yes		2.46
960	960	Black Canyon-2	From South Prong BC/Payten Cr to Unnamed Trib just below Black Canyon Camp	yes		8.07
961	961	Black Canyon Unnamed Trib	From mouth at Black Canyon to road crossing middle of section 9	yes		0.66
962	962	Black Canyon-3	From Unnamed Trib just below Black Canyon Camp to headwaters springs at 6000 ft level	yes		0.81
963	963	JD SF-4	From Black Canyon to Murderers Cr	yes		2.40
964	964	Murderers Cr-1	From mouth at SF John Day R to Cabin Cr	yes		4.97
965	965	Cabin Cr-1 (Murderers)	From mouth at Murderers Cr to gradient change section line 27/26	yes		2.51
966	966	Cabin Cr-2 (Murderers)	From gradient change section line 27/26 to 4400 ft level	yes		1.14
967	967	Murderers Cr-2	From Cabin Cr to Todd Cr	yes		0.86
968	968	Todd Cr-1	From mouth at Murderers Cr to gradient change at 3800 ft level	yes		2.31
969	969	Todd Cr-2	From gradient change at 3800 ft level to 4550 ft level	yes		1.86
970	970	Murderers Cr-3	From Todd Cr to Duncan Cr	yes		0.57
971	971	Duncan Cr-1	From mouth at Murderers Cr to gradient change at section line 2/1	yes		0.81
972	972	Duncan Cr-2	From gradient change at section line 2/1 to Unnamed Trib in section 33	yes		4.01
973	973	Duncan Cr Unnamed Trib	From mouth at Duncan Cr to road crossing above 5000 ft level	yes		0.90
974	974	Duncan Cr-3	From Unnamed Trib in section 33 to 5200 ft level on Unnamed Trib, mouth at section line 33/28	yes		1.43
975	975	Murderers Cr-4	From Duncan Cr to Thorn Cr	yes		0.21
976	976	Thorn Cr	From mouth at Murderers Cr to road crossing just below headwater springs	yes		7.54
977	977	Murderers Cr-5	From Thorn Cr to Murderers Cr SF	yes		1.04
978	978	Murderers Cr SF-1	From mouth at Murderers Cr to Crazy Cr	yes		1.27
979	979	Crazy Cr (Murderers)	From mouth at Murderers Cr SF to 4400 ft level	yes		1.63
980	980	Murderers Cr SF-2	From Crazy Cr to Bark Cabin Cr	yes		0.81
981	981	Bark Cabin Cr	From mouth at Murderers Cr SF to section line 30/19	yes		0.73
982	982	Murderers Cr SF-3	From Bark Cabin Cr to rock weir in middle of section 22	yes		3.44
983	983	Murderers Cr SF-4	Rock Weir middle of section 22	yes	Obstruction	0.00
984	984	Murderers Cr SF-5	From Rock Weir in the middle of section 22 to tribs at the end of John Young Meadows in section 35	yes		3.18
985	985	Murderers Cr-6	From Murderers Cr SF to falls/gradient change at 4000 ft level	yes		3.86
986	986	Murderers Cr-7	From falls/gradient change at 4000 ft level to Tennessee Cr	yes		2.88
987	1585	Tennessee Cr	From mouth at Murderers Cr to 5100 ft level	yes		2.04
988	988	Murderers Cr-8	From Tennessee Cr to Oregon Mine Cr	yes		0.32
989	1586	Oregon Mine Cr	From mouth at Murderers Cr to 4420 ft level	yes		0.42

990	990	Murderers Cr-9	From Oregon Mine Cr to Tex Cr	yes		0.90
991	991	Tex Cr-1	From mouth at Murderers Cr to end of dewatered area at 4455 ft level	yes		1.91
992	992	Tex Cr-2	From end of dewatered area at 4455 ft level to Sugar Cr	yes		1.41
993	993	Sugar Cr	From mouth at Tex Cr to 5000 ft level	yes		1.47
994	994	Tex Cr-3	From Sugar Cr to Miner Cr	yes		1.70
995	995	Miner Cr	From mouth at Tex Cr to Happy Spring	yes		0.46
996	996	Tex Cr-4	From Miner Cr to 5350 ft level	yes		0.72
997	997	Murderers Cr-10	From Tex Cr to Dans Cr	yes		1.02
998	998	Dans Cr (Murderers)	From mouth at Murderers Cr to S edge of section 19	yes		0.85
999	999	Murderers Cr-11	From Dans Cr to Orange Cr	yes		0.42
1000	1000	Orange Cr	From mouth at Murderers Cr to 4550 ft level	yes		0.62
1001	1001	Murderers Cr-12	From Orange Cr to Lemon Cr	yes		0.44
1002	1002	Lemon Cr (Murderers)	From mouth at Murderers Cr to 4500 ft level	yes		0.47
1003	1003	Murderers Cr-13	From Lemon Cr to White Cr	yes		4.32
1004	1587	White Cr (Murderers)	From mouth at Murderers Cr to 4900 ft level	yes		0.82
1005	1005	Murderers Cr-14	From White Cr to Basin Cr	yes		0.37
1006	1588	Basin Cr (Murderers)	From mouth at Murderers Cr to second road crossing just inside section 18	yes		0.47
1007	1007	JD SF-5	From Murderers Cr to Wind Cr	yes		3.53
1008	1589	Wind Cr-1	From mouth at SF John Day R to Wind Cr NF	yes		1.32
1009	1590	Wind Cr NF-1	From mouth at Wind Cr to Squaw Cr	yes		1.20
1010	1591	Squaw Cr (Wind JD SF)	From mouth at Wind Cr NF to section line 4/5	yes		2.12
1011	1592	Wind Cr NF-2	From Squaw Cr to Unnamed Trib from the N at Three Forks	yes		2.32
1012	1593	Wind NF Unnamed Trib	From mouth at Wind Cr NF to 4700 ft level	yes		1.15
1013	1594	Wind Cr NF-3	From Unnamed Trib from the N at Three Forks to Mud Rsv	yes		2.39
1014	1595	Wind Cr-2	From Wind Cr NF to Frazier Cr	yes		0.10
1015	1596	Frazier Cr (Wind JD SF)	From mouth at Wind Cr to road crossing at Frazier Campground	yes		3.64
1016	1597	Wind Cr-3	From Frazier Cr to Wind Cr SF	yes		2.96
1017	1598	Wind Cr SF-1	From mouth at Wind Cr to Unnamed Trib, 2nd at section line 28/29	yes		0.36
1018	1599	Wind SF Unnamed Trib-1	From mouth at Wind Cr SF to Unnamed Trib near section 33/28	yes		0.57
1019	1600	Wind SF Unnamed Trib Trib	From mouth at Wind Cr SF Unnamed Trib to 4360 ft level	yes		0.38
1020	1601	Wind SF Unnamed Trib-2	From Unnamed Trib near section 33/28 to 4360 ft level	yes		0.41
1021	1602	Wind Cr SF-2	From Unnamed Trib, 2nd at section line 28/29 to 4700 ft level	yes		2.30
1022	1603	Wind Cr-4	From SF to road crossing at headwaters	yes		3.92
1023	1023	JD SF-6	From Wind Cr to Cougar Gulch	yes		3.81
1024	1604	Cougar Gulch	From mouth at SF John Day R to 4350 ft level	yes		2.27
1025	1025	JD SF-7	From Cougar Gulch to Deer Cr	yes		2.91
1026	1605	Deer Cr-1 (JD SF)	From mouth at SF John Day R to Buck Cr	yes		5.29
1027	1606	Buck Cr	From mouth at Deer Cr to forks in section 13	yes		1.58
1028	1607	Deer Cr-2 (JD SF)	From Buck Cr to Vester Cr	yes		2.06
1029	1608	Vester Cr	From mouth at Deer Cr to 4890 ft level	yes		2.24
1030	1609	Deer Cr-3 (JD SF)	From Vester Cr to Blue Cr	yes		1.15
1031	1610	Blue Cr	From mouth at Deer Cr to just inside section 33	yes		1.21
1032	1611	Deer Cr-4 (JD SF)	From Blue Cr to Corral Cr	yes		1.28
1033	1612	Corral Cr-1 (Deer JD SF)	From mouth at Deer Cr to Alder Cr	yes		1.68
1034	1613	Alder Cr (Deep JD SF)	From mouth at Corral Cr to 4880 ft level	yes		0.30
1035	1614	Corral Cr-2 (Deer JD SF)	From Alder Cr to 4970 ft level	yes		0.83
1036	1615	Deer Cr-5 (JD SF)	From Corral Cr to Thorpe Cr	yes		0.67

1037	1616	Thorpe Cr	From mouth at Deer Cr to road crossing in section 10	yes		0.39
1038	1617	Deer Cr-6 (JD SF)	From Thorpe Cr to Deer Cr SF/NF confluence	yes		1.48
1039	1618	Deer Cr NF-1 (JD SF)	From mouth at Deer Cr to Dead Injun Cr	yes		0.72
1040	1619	Dead Injun Cr	From mouth at Deer Cr NF to 5140 ft level	yes		1.06
1041	1620	Deer Cr NF-2 (JD SF)	From Dead Injun Cr to road crossing in section 12	yes		1.51
1042	1621	Deer Cr SF-1 (JD SF)	From mouth at Deer Cr to Unnamed Trib in SE corner of section 22	yes		1.45
1043	1622	Deer Cr SF Unnamed Trib (JD SF)	From mouth at Deer Cr SF to 5050 ft level	yes		0.50
1044	1623	Deer Cr SF-2 (JD SF)	From Unnamed Trib in SE corner of section 22 to 5065 ft level	yes		0.77
1045	1045	JD SF-8	From Deer Cr to Izee Falls barrier ID # 50284 (SF Falls) at 3557 Bench Mark	yes		0.60
1046	1624	JD SF-9	From Izee falls Barrier ID # 50284 (SF Falls) at 3557 Bench Mark to Sunflower Cr	no		0.59
1047	1625	Sunflower Cr-1	From mouth at SF John Day R to Wildcat Cr	no		0.74
1048	1626	Wildcat Cr	From mouth at Sunflower Cr to section line 35/36	no		3.08
1049	1627	Sunflower Cr-2	From Wildcat Cr to Porcupine Cr	no		0.71
1050	1628	Porcupine Cr	From mouth at Sunflower Cr to road crossing in section 23	no		0.96
1051	1629	Sunflower Cr-3	From Porcupine Cr to Cougar Cr	no		1.91
1052	1630	Cougar Cr (Sunflower)	From mouth at Sunflower Cr to S edge of section 27	no		2.45
1053	1631	Sunflower Cr-4	From Cougar Cr to Columbus Cr	no		1.57
1054	1632	Columbus Cr	From mouth at Sunflower Cr to 4875 ft level	no		1.89
1055	1633	Sunflower Cr-5	From Columbus Cr to section line 28/29	no		1.30
1056	1634	JD SF-10	From Sunflower Cr to Indian Cr	no		3.45
1057	1635	Indian Cr (JD SF)	From mouth at SF John Day R to 4160 ft level	no		1.16
1058	1636	JD SF-11	From Indian Cr to Pine Cr	no		2.10
1059	1637	Pine Cr-1 (JD SF)	From mouth at SF John Day R to Hwy culvert in section 16	no		1.30
1060	1638	Pine Cr-2 (JD SF)	From Hwy culvert in section 16 to Brisbois Cr	no		0.25
1061	1639	Brisbois Cr	From mouth at Pine Cr to 4535 ft level	no		3.78
1062	1640	Pine Cr-3 (JD SF)	From Brisbois Cr to Spring Cr	no		1.39
1063	1641	JD SF-12	From Pine Cr to Morgan Cr	no		1.07
1064	1642	Morgan Cr	From mouth at SF John Day R to section line 1/6	no		3.22
1065	1643	JD SF-13	From Morgan Cr to Dry Soda Cr	no		4.36
1066	1644	Dry Soda Cr	From mouth at SF John Day R to 4510 ft level	no		2.15
1067	1645	JD SF-14	From Dry Soda Cr to Poison Cr	no		2.00
1068	1646	Poison Cr	From mouth at SF John Day R to trib in section 8	no		3.59
1069	1647	JD SF-15	From Poison Cr to Rosebud Cr	no		1.05
1070	1648	Rosebud Cr	From mouth at SF John Day R to Road Gulch	no		4.75
1071	1649	JD SF-16	From Rosebud Cr to Antelope Cr	no		0.77
1072	1650	Antelope Cr	From mouth at SF John Day R to forks in NE corner section 23	no		3.09
1073	1651	JD SF-17	From Antelope Cr to Flat/Lewis Cr confluence	no		2.92
1074	1652	Flat Cr-1 (JD SF)	From mouth at SF John Day R to Utley Cr	no		1.55
1075	1653	Utley Cr	From mouth at Flat Cr to Officer Rsv Dam #50292	no		2.29
1076	1654	Flat Cr-2 (JD SF)	From Utley Cr to 4597 ft level	no		3.39
1077	1655	Lewis Cr-1	From mouth at SF John Day R to Lonesome Cr	no		1.76
1078	1656	Lonesome Cr	From mouth at Lewis Cr to Grasshopper Cr	no		2.86
1079	1657	Lewis Cr-2	From Lonesome Cr to Officer Cr	no		4.90
1080	1658	Officer Cr	From mouth at Lewis Cr to 4800 ft level	no		1.65
1081	1659	Lewis Cr-3	From Office Cr to road crossing in section 31 on Tamarack Cr	no		3.49
1082	1660	JD SF-18	From Flat/Lewis Cr confluence to Corral Cr	no		1.49

1083	1661	Corral Cr (JD SF)	From mouth at SF John Day R to road crossing in section 9 upstream of Muddy Springs	no		6.72
1084	1662	JD SF-19	From Corral Cr to Venator Cr	no		2.04
1085	1663	Venator Cr	From mouth at SF John Day R to trib in section 15	no		4.97
1086	1664	JD SF-20	From Venator Cr to Bear Cr	no		4.04
1087	1665	Bear Cr (JD SF)	From mouth at SF John Day R to 4980 ft level	no		2.37
1088	1666	JD SF-21	From Bear Cr to headwaters in middle of section 24	no		3.56
1089	1089	JD-41	From SF John Day to Marks/Flat Cr confluence	yes		8.37
1090	1667	Marks Cr	From mouth at John Day R to section line 19/20	yes		5.11
1091	1668	Flat Cr (JD)	From mouth at John Day R to Stewart Lake	yes		4.50
1092	1092	JD-42	From Marks/Flat Cr confluence to Bridge/Wiley Cr confluence	yes		1.58
1093	1669	Bridge Cr (2nd JD)	From mouth at John Day R to S edge of section 25	yes		3.51
1094	1670	Wiley Cr (Bridge 2nd JD)	From mouth at John Day R to fork at section 5	yes		2.10
1095	1095	JD-43	From Bridge/Wiley Cr confluence to Cummings/Widows Cr confluence	yes		2.21
1096	1671	Cummings Cr	From mouth at John Day R to forks in section 26	yes		5.40
1097	1672	Widows Cr	From mouth at John Day R to S edge of section 8	yes		6.08
1098	1098	JD-44	From Cummings/Widows Cr to Fields/Beshaw Cr confluence	yes		3.32
1099	1673	Belshaw Cr	From mouth at John Day R to forks in section 11	yes		11.23
1100	1100	Fields Cr-1	From mouth at John Day R to Wickiup Cr	yes		5.03
1101	1101	Wickiup Cr (Fields JD)	From mouth at Fields Cr to 3880 ft level	yes		0.90
1102	1102	Fields Cr-2	From Wickiup Cr to Buck Cabin Cr	yes		0.78
1103	1103	Buck Cabin Cr	From mouth at Fields Cr to 5000 ft level	yes		2.30
1104	1104	Fields Cr-3	From Buck Cabin Cr to 4640 ft level	yes		3.03
1105	1105	JD-45	From Fields/Beshaw Cr confluence to Warrens Cr	yes		2.73
1106	1674	Warrens Cr-1	From mouth at John Day R to irrigation dam on canal N of John Day	yes		0.14
1107	1675	Warrens Cr-2	Irrigation Dam on canal N of John Day	no	Obstruction	0.00
1108	1676	Warrens Cr-3	From Irrigation Dam on canal N of John Day to EF/WF	no		3.24
1109	1109	JD-46	From Warrens Cr to Moon Cr	yes		2.01
1110	1677	Moon Cr	From mouth at John Day R to section line 16/21	yes		4.99
1111	1111	JD-47	From Moon Cr to Birch Cr	yes		0.37
1112	1678	Birch Cr-1 (JD)	From mouth at John Day R to Dam ID# 50290 at Yokom Rsv	yes		1.34
1113	1679	Birch Cr-2 (JD)	Dam ID# 50290 at Yokom Rsv	no	Obstruction	0.00
1114	1680	Birch Cr-3 (JD)	From Dam ID# 50290 at Yokom Rsv to 4455 ft level	no		6.48
1115	1115	JD-48	From Birch Cr to Dry/McClellan Cr confluence	yes		1.59
1116	1681	Dry Cr (JD)	From mouth at John Day R to section line 25/36 on EF of Dry Cr	yes		5.73
1117	1682	McClellan Cr (JD)	From mouth at John Day R to 4475 ft level	yes		5.30
1118	1118	JD-49	From Dry/McClellan Cr confluence to Riley/Clark Cr confluence	yes		2.37
1119	1683	Riley Cr-1	From mouth at John Day R to Riley Cr Diversion Dam ID# 50285 in section 6	yes		2.73
1120	1684	Riley Cr-2	Riley Cr Diversion Dam ID# 50285 at trib at 3080 ft level	yes	Obstruction	0.00
1121	1685	Riley Cr-3	From Riley Cr Diversion Dam ID# 50285 at trib at 3080 ft level to falls ID# 55456 at 3965 ft level	yes		2.65
1122	1686	Clark Cr-1	From mouth at John Day R to Diversion Ditch at 2845 ft level	yes		0.39
1123	1687	Clark Cr-2	Diversion Ditch at 2845 ft level	no	Obstruction	0.00
1124	1688	Clark Cr-3	From Diversion Ditch at 2845 ft level to 3500 ft level	no		2.23
1125	1125	JD-50	From Riley/Clark Cr confluence to Harper Cr	yes		1.65
1126	1689	Harper Cr	From mouth at John Day R to trib inside section 21	yes		4.76
1127	1127	JD-51	From Harper Cr to Diversion Dam/Beech Cr	yes		0.46

1128	1128	JD-52	Diversion Dam at mouth of Beech Cr	yes	Obstruction	0.00
1129	1129	Beech Cr-1	From mouth at John Day R to Diversion Dam ID# 50289 at section line 21	yes		1.04
1130	1130	Beech Cr-2	Diversion Dam ID# 50289 at section line 21	yes	Obstruction	0.00
1131	1131	Beech Cr-3	From Diversion Dam ID# 50289 at section line 21 to Little Beech Cr	yes		4.48
1132	1132	Little Beech Cr	From mouth at Beech Cr to Big Springs in section 10	yes		3.55
1133	1133	Beech Cr-4	From Little Beech Cr to Beech Cr EF	yes		5.55
1134	1134	Beech Cr EF-1	From mouth at Beech Cr to Clear Cr	yes		0.97
1135	1135	Clear Cr (Beech EF)	From mouth at Beech Cr EF to forks in section 4	yes		3.53
1136	1136	Beech Cr EF-2	From Clear Cr to McClellan Cr	yes		2.74
1137	1137	McClellan Cr (Beech EF)	From mouth at Beech Cr EF to Nipple Cr	yes		3.99
1138	1138	Beech Cr EF-3	From McClellan Cr to Tinker Cr	yes		4.39
1139	1139	Tinker Cr	From mouth at Beech Cr EF to N edge of section 5	yes		2.73
1140	1140	Beech Cr EF-4	From Tinker Cr to trib just below 4600 ft level	yes		0.41
1141	1141	Beech Cr-5	From Beech Cr EF to Ennis Cr	yes		0.84
1142	1142	Ennis Cr	From mouth at Beech Cr to E edge of section 7	yes		1.13
1143	1143	Beech Cr-6	From Ennis Cr to Hog/Bear Cr confluence	yes		0.30
1144	1144	Bear Cr-1 (Beech 1st JD)	From mouth at Beech Cr to Unnamed Trib near section line 11/14	yes		2.03
1145	1145	Bear Unnamed Trib (Beech 1st JD)	From mouth at Bear Cr to forks in SE corner of section 10	yes		0.20
1146	1146	Bear Cr-2 (Beech 1st JD)	From Unnamed Trib near section line 11/14 to 4720 ft level	yes		1.26
1147	1147	Hog Cr-1 (Beech)	From mouth at Beech Cr to culvert ID# 55449 at 4000 ft level	yes		0.95
1148	1148	Hog Cr-2 (Beech)	Culvert ID# 55449 at 4000 ft level	yes	Obstruction	0.00
1149	1149	Hog Cr-3 (Beech)	From Culvert ID# 55449 at 4000 ft level to forks in NE corner of section 6	yes		0.97
1150	1150	Beech Cr-7	From Hog/Bear Cr confluence to Cottonwood Cr	yes		2.72
1151	1151	Cottonwood Cr (Beech)	From mouth at Beech Cr to forks in section 35	yes		1.65
1152	1152	Beech Cr-8	From Cottonwood Cr to trib in section 32 above old campground	yes		1.84
1153	1153	JD-53	From Diversion Dam/Beech Cr to Ingle Cr	yes		0.19
1154	1690	Ingle Cr	From mouth at John Day R to 5280 ft level	yes		7.91
1155	1155	JD-54	From Ingle Cr to Laycock Cr	yes		3.26
1156	1691	Laycock Cr-1	From mouth at John Day R to Fall Cr	yes		3.81
1157	1692	Fall Cr	From mouth at Laycock Cr to falls ID# 55457 at 3800 ft level	yes		1.21
1158	1693	Laycock Cr-2	From Fall Cr to Hanscombe Cr	yes		2.01
1159	1694	Hanscombe Cr-1	From mouth at Laycock Cr to Burke Cr	yes		1.91
1160	1695	Burke Cr	From mouth at Hanscombe Cr to spring in section 31	yes		0.85
1161	1696	Hanscombe Cr-2	From Burke Cr to section line 6/1	yes		1.39
1162	1697	Laycock Cr-3	From Hanscombe Cr to falls ID# 53108 at forks in section 35	yes		2.71
1163	1163	JD-55	From Laycock Cr to Canyon Cr	yes		4.95
1164	1164	Canyon Cr-1	From mouth at John Day R to Berry Cr	yes		8.50
1165	1165	Berry Cr	From mouth at Canyon Cr to trib in SW corner of section 33	yes		3.35
1166	1166	Canyon Cr-2	From Berry Cr to Vance Cr	yes		2.13
1167	1167	Vance Cr	From mouth at Canyon Cr to section line 4/3	yes		1.73
1168	1168	Canyon Cr-3	From Vance Cr to Canyon Cr EF	yes		3.97
1169	1169	Canyon Cr EF-1	From mouth at Canyon Cr to Wall Cr	yes		1.12
1170	1170	Wall Cr	From mouth at Canyon Cr EF to 5375 ft level	yes		3.68
1171	1171	Canyon Cr EF-2	From Wall Cr to Tamarack Cr	yes		3.41
1172	1172	Tamarack Cr (Canyon JD)	From mouth at Canyon Cr EF to trib in section 3	yes		0.77
1173	1173	Canyon Cr EF-3	From Tamarack Cr to Brookling Cr	yes		0.49

1174	1174	Brookling Cr-1	From mouth at Canyon Cr EF to Skin Shin Cr	yes		0.27
1175	1175	Skin Shin Cr	From mouth at Brookling Cr to section line 2/35	yes		1.10
1176	1176	Brookling Cr-2	From Skin Shin Cr to section line 2/35	yes		1.26
1177	1177	Canyon Cr EF-4	From Brookling Cr to E Brookling Cr	yes		1.91
1178	1178	E Brookling Cr	From mouth at Canyon Cr EF to 6065 ft level	yes		1.38
1179	1179	Canyon Cr EF-5	From E Brookling Cr to trib just above Miners Cr	yes		0.88
1180	1180	Canyon Cr-4	From Canyon Cr EF to Canyon Cr MF	yes		4.32
1181	1181	Canyon Cr MF-1	From mouth at Canyon Cr to Unnamed Trib in section 16	yes		5.94
1182	1182	Canyon Cr MF Unnamed Trib	From mouth at Canyon Cr MF to section 16/15	yes		0.83
1183	1183	Canyon Cr MF-2	From Unnamed Trib in section 16 to trib in section 9	yes		2.06
1184	1184	Canyon Cr-5	From Canyon Cr MF to Crazy Cr	yes		2.01
1185	1185	Crazy Cr (Canyon Cr)	From mouth at Canyon Cr to section line 4/5	yes		1.91
1186	1186	Canyon Cr-6	From Crazy Cr to Canyon Meadows Dam ID# 50287 at Rsv in section 27	yes		2.28
1187	1698	Canyon Cr-7	Canyon Meadows Dam ID# 50287 at Rsv in section 27	no	Obstruction	0.00
1188	1699	Canyon Cr-8	From Canyon Meadows Dam ID# 50287 at Rsv in section 27 to E edge of section 28	no		1.49
1189	1189	JD-56	From Canyon Cr to Little Pine Cr	yes		2.37
1190	1700	Little Pine Cr-1	From mouth at John Day R to road crossing in section 6	yes		2.20
1191	1701	Little Pine Cr-2	From road crossing in section 6 to section line 7/8	yes		0.72
1192	1192	JD-57	From Little Pine Cr to Dog Cr	yes		0.72
1193	1702	Dog Cr-1	From mouth at John Day R to Little Dog Cr	yes		1.26
1194	1703	Dog Cr-2	From Little Dog Cr to NF Boundary	yes		3.12
1195	1195	JD-58	From Dog Cr to Dissel Cr	yes		1.72
1196	1704	Dissel Cr	From mouth at John Day R to forks in NE corner of section 26	yes		0.48
1197	1197	JD-59	From Dissel Cr to Grub Cr	yes		0.93
1198	1705	Grub Cr-1	From mouth at John Day R to falls at 4550 ft level	yes		9.83
1199	1706	Grub Cr-2	From falls at 4550 ft level to section line 13/24	yes		1.51
1200	1200	JD-60	From Grub Cr to Pine Cr	yes		1.92
1201	1707	Pine Cr (2nd JD)	From mouth at John Day R to Norton Cr	yes		7.29
1202	1202	JD-61	From Pine Cr to Indian Cr	yes		1.46
1203	1203	Indian Cr-1 (JD)	From mouth at John Day R to Little Indian Cr	yes		3.43
1204	1204	Little Indian Cr (JD)	From mouth at Indian Cr to 4935 ft level on the WF	yes		3.49
1205	1205	Indian Cr-2 (JD)	From Little Indian Cr to Overholt Cr	yes		2.65
1206	1206	Overholt Cr	From mouth at Indian Cr to 5620 ft level	yes		2.76
1207	1207	Indian Cr-3 (JD)	From Overholt Cr to falls at 4480 ft level just above Sheep Cr	yes		1.44
1208	1208	Indian Cr-4 (JD)	From falls at 4480 ft level just above Sheep Cr to EF Indian	yes		3.24
1209	1209	JD-62	From Indian Cr to Bear Cr	yes		1.29
1210	1708	Bear Cr-1 (JD)	From mouth at John Day R to Hall Cr	yes		5.19
1211	1709	Hall Cr	From mouth at Bear Cr to Forest Boundary	yes		3.08
1212	1710	Bear Cr-2 (JD)	From Hall Cr to multiple tribs in section 9	yes		2.44
1213	1213	JD-63	From Bear Cr to Dixie Cr	yes		3.52
1214	1711	Dixie Cr-1	From mouth at John Day R to Standard Cr	yes		5.76
1215	1712	Standard Cr	From mouth at Dixie Cr to 5210 ft level	yes		3.59
1216	1713	Dixie Cr-2	From Standard Cr to 5180 ft level	yes		5.02
1217	1217	JD-64	From Dixie Cr to Strawberry Cr	yes		2.20
1218	1714	Strawberry Cr-1	Mouth/Ditch diversion at John Day R	yes	Obstruction	0.00
1219	1715	Strawberry Cr-2	From mouth/Ditch diversion at John Day R to Slide Cr	yes		8.47

1220	1716	Slide Cr (Strawberry)	From mouth at Strawberry Cr to falls ID# 55455 in middle of section 5	yes		3.17
1221	1717	Strawberry Cr-3	From Slide Cr to Onion Cr	yes		0.74
1222	1718	Onion Cr (Strawberry)	From mouth at Strawberry Cr to 7200 ft level	yes		2.37
1223	1719	Strawberry Cr-4	From Onion Cr to trib from Little Strawberry Lake	yes		2.28
1224	1720	Strawberry Cr Trib	From mouth at Strawberry Cr to Little Strawberry Lake	no		0.84
1225	1721	Strawberry Cr-5	From Trib from Little Strawberry Lake to Strawberry Falls in section 1	no		0.73
1226	1226	JD-65	From Strawberry Cr to Dads Cr	yes		0.23
1227	1722	Dads Cr	From mouth at John Day R to trib at 4200 ft level	yes		4.55
1228	1228	JD-66	From Dads Cr to Jeff Davis Cr	yes		0.63
1229	1723	Jeff Davis Cr	From mouth at John Day R to 3980 ft level	yes		2.41
1230	1230	JD-67	From Jeff Davis Cr to Dans Cr	yes		1.52
1231	1724	Dans Cr-1 (JD)	From mouth at John Day R to Eureka Gulch	yes		2.20
1232	1725	Eureka Gulch	From mouth at Dans Cr to NF Boundary	yes		1.40
1233	1726	Dans Cr-2 (JD)	From Eureka Gulch to section line 26/27	yes		2.67
1234	1234	JD-68	From Dans Cr to Isham Cr	yes		1.34
1235	1727	Isham Cr-1	From mouth at John Day R to Diversion Ditch at 3800 ft level	yes		0.35
1236	1728	Isham Cr-2	Diversion Ditch at 3800 ft level	yes	Obstruction	0.00
1237	1729	Isham Cr-3	From Diversion Ditch at 3800 ft level to 4600 ft level	yes		3.52
1238	1238	JD-69	From Isham Cr to Reynolds Cr	yes		1.79
1239	1239	Reynolds Cr-1	From mouth at John Day R to Reynolds Cr NF	yes		4.49
1240	1240	Reynolds Cr NF-1	From mouth at Reynolds Cr to Mossey Gulch	yes		2.13
1241	1241	Mossey Gulch	From mouth at Reynolds Cr NF to 5080 ft level	yes		1.94
1242	1242	Reynolds Cr NF-2	From Mossey Gulch to section line 9/10	yes		1.34
1243	1243	Reynolds Cr-2	From Reynolds Cr NF to section line 24/25	yes		3.56
1244	1244	JD-70	From Reynolds Cr to Deardorff Cr	yes		1.77
1245	1245	Deardorff Cr-1	From mouth at John Day R to Bogue Gulch	yes		3.89
1246	1246	Bogue Gulch	From mouth at Deardorff Cr to 4760 ft level	yes		0.43
1247	1247	Deardorff Cr-2	From Bogue Gulch to Escondia Gulch/Little Baldy Cr confluence	yes		2.30
1248	1248	Escondida Gulch	From mouth at Deardorff Cr to headwaters at 5500 ft level	yes		0.81
1249	1249	Little Baldy Cr	From mouth at Deardorff Cr to road crossing at 5200 ft level	yes		0.32
1250	1250	Deardorff Cr-3	From Escondia Gulch/Little Baldy Cr confluence to Deardorff Cr NF/SF	yes		1.31
1251	1251	Deardorff Cr SF	From mouth at Deardorff Cr to section line 4/9	yes		1.86
1252	1252	Deardorff Cr NF	From mouth at Deardorff Cr to section line 5/8	yes		1.01
1253	1253	JD-71	From Deardoff Cr to Thompson Gulch	yes		0.49
1254	1730	Thompson Gulch	From mouth at John Day R to 5000 ft level	yes		3.12
1255	1255	JD-72	From Thompson Gulch to Graham Cr	yes		1.23
1256	1731	Graham Cr	From mouth at John Day R to 4800 ft level	yes		2.23
1257	1257	JD-73	From Graham Cr to Rail/Roberts Cr confluence	yes		1.72
1258	1258	Rail Cr	From mouth at John Day R to trib in section 22	yes		3.85
1259	1259	Roberts Cr	From mouth at John Day R to 5480 ft level	yes		3.59
1260	1260	JD-74	From Rail/Roberts Cr confluence to Call Cr	yes		2.42
1261	1732	Call Cr	From mouth at John Day R to 6400 ft level	yes		2.84
1262	1262	JD-75	From Call Cr to Crescent Cr	yes		3.22
1263	1733	Crescent Cr	From mouth at John Day R to 5680 ft level	yes		0.52
1264	1264	JD-76	From Crescent Cr to headwaters at quarry	yes		2.15

Appendix I

Notes on Initial John Day Level 2 Attribute Ratings
Larry Lestelle
April 12, 2004

As requested, I reviewed the initial John Day ratings to learn why EDT modeling results for spring Chinook produce such poor population performance measures. With the ratings as entered into the registered SRE, two of four populations are shown to be unsustainable (Middle Fork and Upper John Day) while two are shown to be sustainable (North Fork and Granite Creek). Of the latter, the Granite Creek population is barely sustainable. For reference purposes, estimated run sizes between 1991-2000 for these four populations were approximately 500 fish for each of the Upper John Day, Middle Fork, and Granite Creek populations and about 1,000 fish for the North Fork population. The projected equilibrium run sizes back to the spawning grounds using EDT are approximately 1,000 for North Fork, 20 for Granite Creek, and 0 for the other two.

Based on my review of the John Day ratings I have concluded that several attributes appear to be rated too severely. I have also concluded that Tim and Errol did a very good job in terms of consistency within their ratings. I have no doubt that they gave a lot of thought to their ratings and worked very hard to maintain consistency throughout.

I'll cover the highlights in this summary. It appears that the attributes that are primarily responsible for causing the populations to be unsustainable are those affecting the habitat complexity and flow factors. These attributes are riparian function, LWD, and high flow. I also suspect that the low flow and max temperature attributes are rated somewhat too severely though I am less concerned with those. They might still need some reexamining however.

As part of our review, we compared John Day ratings to other east side subbasins that were recently characterized using EDT. These subbasins have experienced similar kinds of land use issues. They are the Asotin, Tuccannon, Trout (Deschutes), Crooked (Deschutes), and tributaries in the lower Yakima (e.g., Satus Creek).

IMPORTANT NOTE: I looked at five groupings of John Day ratings. One group is the entire John Day (i.e., all reaches that were rated). The other four groups encompass just the reaches that are utilized by the four spring Chinook populations, including ALL reaches used the population. So, for example, the Granite Creek group consists of all reaches from the mouth of the John Day to the most upstream reach used for spawning by the population (so all reaches in the group are encountered by this population). By looking at these groups, I examined the just the ratings affecting each of these populations.

Results of the comparison between John Day groups and the other watersheds are summarized in Table 1. Average ratings and ranges are shown for selected reaches. Bar charts for the four John Day populations and the attributes that I am most concerned about are shown in Figure 1.
Riparian Function – John Day ratings are substantially higher than ratings in Trout, Crooked, Yakima miscellaneous, Asotin, and Tuccannon. They are particularly severe in the reaches affecting the Middle Fork and Upper John Day populations. I conclude that enough credit is being given to the riparian conditions that do exist in the John Day despite the severity of past

land use abuses. There are many ratings of 4 being given or very high 3s. I would equate such conditions to streams in heavily urbanized areas. I have no doubt that John Day has suffered significant abuse but I would not equate it to conditions in heavily urbanized areas.

High Flow – This attribute was also rated much more severely than it was in other east side streams. I discussed this attribute with Errol on the phone last week. I do not question that changes have occurred in the system – the issue is to what extent have peak flows increased on average in the system. As part of the rating guidelines I had earlier analyzed this attribute for a variety of watersheds around the Northwest (see Figure 2 and Table 2). My analysis showed that the John Day has experienced an increase in peak flow – but not equivalent to the ratings that were entered into the database. Errol suggests that substantial changes occurred in the John Day basin prior to the beginning of the flow data record for that basin. I do not question that. The question is simply one of extent. If you look at the level of peak flow for this gauging station (McDonald Ferry – low in the subbasin), it is hard to imagine that there has been a big percentage increase in peak flow. This basin (7,500 square miles) shows peak flows in the neighborhood of 20,000 to 30,000 cfs – certainly it has not experienced percentage increases of 300-400% as occurs in urbanized streams (see Mercer Creek in Figure 2). I conclude therefore that maximum ratings for this attribute should be 3 or less in the John Day.

Temperature maximum – I only point out here the difference in how this attribute was rated for the John Day compared to the others. Frankly, I think the other drainages may have been rated too low. But, average rating of 3.9 may be too high for the reaches encountered by the Upper John Day population – that is very hot water. I have not had a chance to look at any of the data sets you sent. I hope that someone is able to do that and apply the temperature query to the data to generate some ratings using this quantitative procedure. My sense is that the ratings may be a bit too high in the John Day. I should point out that I believe our temperature rule may be hitting performance too harshly, especially at such high ratings. I have hoped to resolve this with the aid of Dale. This points out however that if anything, people need to be careful in rating this attribute.

LWD – I believe the ratings are too high, i.e., wood is not being given enough credit for being there. Part of the problem may be that Oregon aquatic inventory procedure uses a different definition for wood than we apply in our ratings.

Washington State procedures define LWD as pieces 10 cm in diameter and 2 meters long. Oregon defines it as 15 cm in diameter and 3 m long. That's a fair difference in volume. Large pieces are also bigger in Oregon's definitions than in Washington. Oregon also summarizes data as pieces per 100 m of stream, whereas our metric (and in Washington's procedures) uses pieces per channel width. I hope the conversions are being done properly because the Grande Ronde people are talking about incredibly low densities where I know there are substantial amounts of wood. I also noticed that Jim Newton's ratings for the Deschutes show very low quantities of wood. Some reaches looked ok but I was very surprised with others. I don't know if this is due to the difference in definition of LWD in Oregon or whether it has to do with an incorrect conversion to pieces per channel width. The Grande Ronde folks are revisiting there ratings. See the note that I sent you on this last week for more info on this.

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At this point, I would suggest some simple changes in the database to deal with these issues. For example, I think it might be appropriate to reduce John Day riparian ratings by 0.5 rating. I would reduce the high flow ratings by at least that much, perhaps by as much as 0.7 (keep in mind that this needs to be altered as the rating approaches 2). I believe the LWD ratings are also too high by at least a rating of 0.5, perhaps by slightly more. Finally, I think I would reduce the max temperature ratings by several tenths, unless someone is prepared to look at the data more closely using our query. I think it is likely these are biased slightly high.

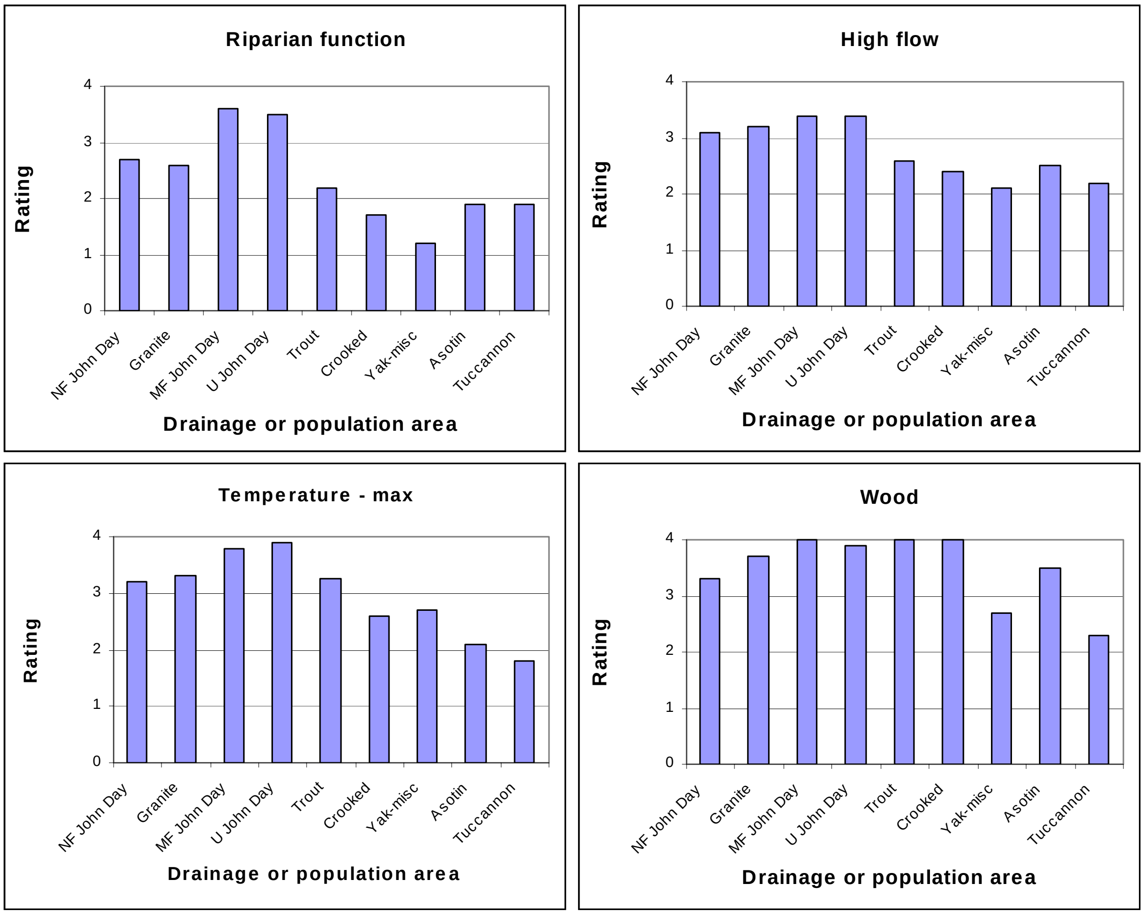

Figure 1. Comparison of ratings between subbasins (population reaches in the case of John Day).

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Table 1. Comparison of average ratings and ranges between subbasins (population grouped reaches in the case of John Day).

Attribute	All John D	North Fork	Granite	Mid Fork	Up John D	Trout	Crooked	Yak - misc	Asotin	Tuccannon
Riparian function	2.8 (0-4)	2.7 (0-4)	2.6 (1-3.9)	3.6 (0-4)	3.5 (0-4)	2.2 (0-3)	1.7 (0-3.5)	1.2 (0-3)	1.9 (1-4)	1.9 (0-4)
Flow - High	3.1 (1.5-3.9)	3.1 (2.1-3.8)	3.2 (2.4-3.8)	3.4 (2.5-3.8)	3.4 (2.2-3.8)	2.6 (NA)	2.4 (NA)	2.1 (1-2.5)	2.5 (2.1-3.5)	2.2 (2-2.5)
Flow - Low	3.1 (2-4)	3.1 (2.1-4)	3.2 (2.4-4)	3.4 (2.6-4)	3.6 (2.2-4)	3.4 (3-4)	NA	2.8 (1.5-4)	2.6 (2.1-4)	2.6 (2-3.5)
Flow - Intra annual var	3 (1.5-4)	2.9 (2-4)	3 (2-4)	3.3 (2-4)	3.2 (2-4)	NA	NA	2.1 (2-2.7)	2.5 (2.1-3.5)	2.3 (2-2.9)
Temp - max	2.6 (0-4)	3.2 (1.5-4)	3.3 (1.8-4)	3.8 (1.8-4)	3.9 (1.2-4)	3.25 (2-4)	2.6 (1-3)	2.7 (1-3.9)	2.1 (0-3)	1.8 (0-4)
LWD	3.3 (0-4)	3.3 (0.5-4)	3.7 (2.5-4)	4 (3.5-4)	3.9 (1.5-4)	4 (4-4)	4 (4-4)	2.7 (0-4)	3.5 (3-4)	2.3 (0-4)

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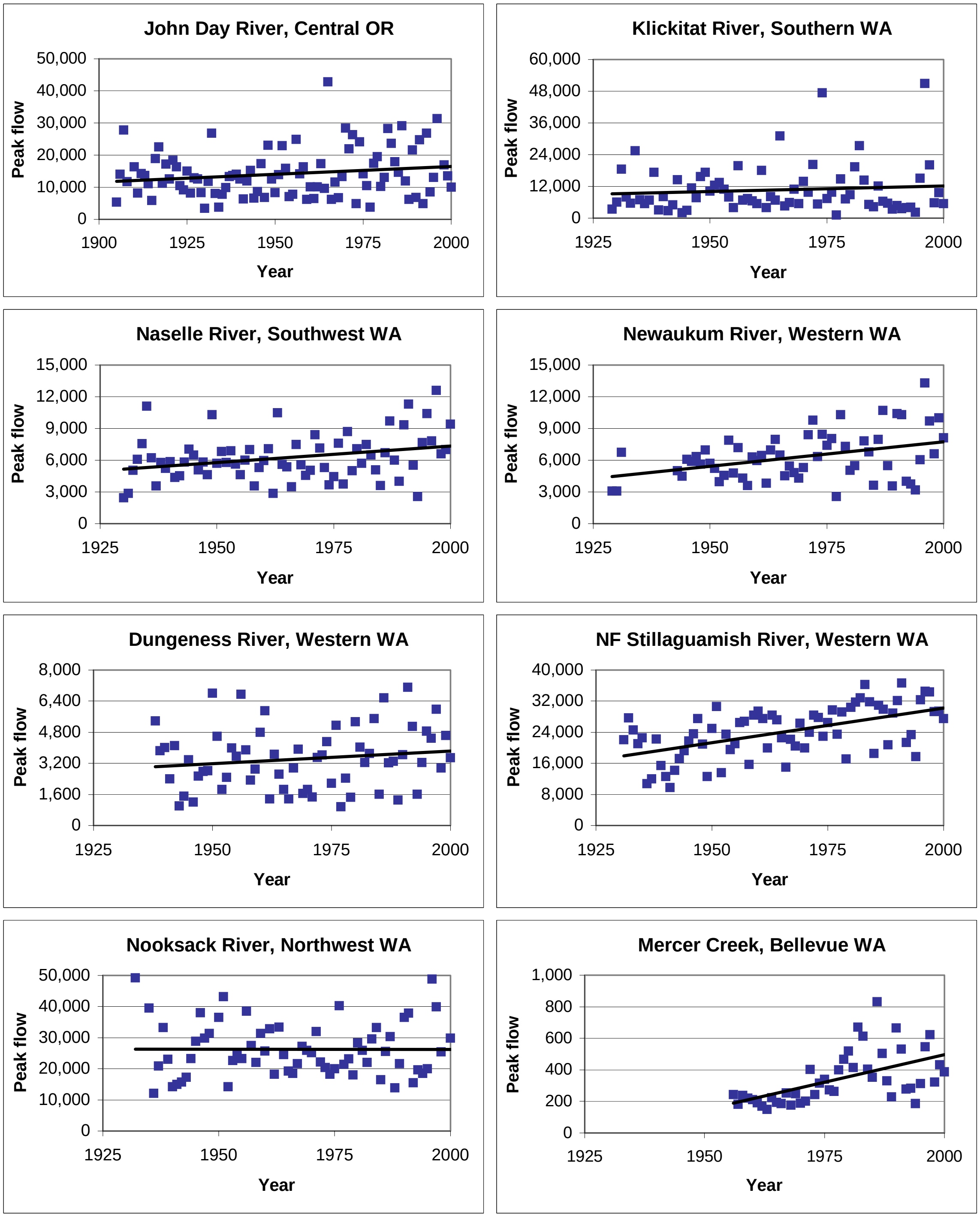

Figure 2. Peak flows in subbasins of the Pacific Northwest (see Table 2 for more information).

Table 2. Estimated percent change in peak flow expected once every two years in eight streams between periods of record. See Figure 2.

Stream	Period 1	Period 2	% change in Q_{2yr}	Attribute rating
John Day	**1905-1952**	**1953-2000**	**8%**	**2.2**
Klickitat	**1929-1964**	**1965-2000**	**-2%**	**2.0**
Naselle	**1930-1964**	**1965-2000**	**14%**	**2.4**
Newaukum	**1929-1969**	**1970-2000**	**33%**	**3.2**
Dungeness	**1938-1965**	**1966-2000**	**11%**	**2.3**
NF Stillaguamish	**1929-1964**	**1965-2000**	**30%**	**3.0**
Nooksack	**1932-1965**	**1966-2000**	**2%**	**2.0**
Mercer	**1956-1977**	**1978-2000**	**86%**	**3.8**

Appendix J

Conclusions Regarding Flow Attribute Ratings for John Day Subbasin
Larry Lestelle
10-28-04

Mobrand Biometrics, Inc
M E M O R A N D U M

TO: Tim Unterwegner, Errol Claire, Phil Roger

CC: Chip McConnaha, Betsy Torell, Greg Blair

FROM: Larry Lestelle

DATE: 10-28-04

RE: Conclusions regarding flow attribute ratings for John Day basin

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This note summarizes my conclusions regarding the flow attribute ratings that have until now been used in the John Day analysis. My recommendations are provided at the end.

I summarized my preliminary conclusions at an in-person meeting held in John Day on October 19. My analysis described here affirms those conclusions. My conclusions are listed below:

1. Ratings for two attributes, Flow-High and Flow-Intraannual variation, are too high and reflect conditions that would be more representative of urbanized streams. This is not to say that there have been no changes in flow conditions since the early 1800s—beaver trapping and extensive grazing suggest that some changes likely occurred prior to the start of water flow recording. My conclusion here is simply that these ratings were scored too high, i.e., conditions were characterized as being too severely degraded relative to some other watersheds in the PNW.
2. Flow data collected at a number of sites in the John Day watershed show relatively modest changes in runoff characteristics since the early part of the 20th century. I present these findings below. While these changes might be construed as more significant with a perspective aimed solely at the high desert region, the findings suggest that the changes are not nearly as dramatic as those that have occurred in urbanized streams or in high precipitation areas such as Western Washington. The amount of runoff that can occur from a single event in Western Washington is far greater than what occurs on severe events in the John Day watershed due simply to the difference in amount of precipitation. To illustrate this, the John Day watershed is 8,100 square miles in size. Since 1905, the highest peak instantaneous flow was recorded at approximately 43,000 cfs during the 1964 flood. By comparison, the highest peak flow measured since 1930 in the Queets River on the Olympic Peninsula, a 450 square mile watershed (<6% of the size of the John Day), has been in excess of 130,000 cfs, over 3 times the highest peak flow on the

John Day. Moreover, two separate events during that period have exceeded 130,000 cfs on the Queets. An event of that size in a watershed the size of the John Day would have a peak flow exceeding 2.3 million cfs. For comparison, the highest peak flow on record for the Columbia River at the Dalles occurred in 1894 with a flow of approximately 1.2 million cfs. The rating system for the flow attributes were developed to be applied to the full range of watershed types in the PNW, from desert to high precipitation areas.

My conclusions are based on my analysis of a wide range of watershed types and a comparison between different types to the John Day. I illustrate some of these comparisons here. In the John Day, I analyzed seven different flow data sets from USGS stations. I chose these stations because of their relatively long data series, each exceeds 60 years. The stations and the corresponding John Day reaches are shown below:

Station	Reach name	Begin	End	Years
14042500	Camas Cr-8	1914	1991	77
14044000	JD MF-5	1929	2001	72
14046000	JD NF-2	1928	2001	73
14046500	JD-23	1929	2001	72
14040500	JD-35	1926	1991	65
14048000	JD-5	1904	2001	97
14037500	Strawberry Cr-3	1930	1991	61

(For reference, JD-5 occurs at McDonald Ferry, JD-23 occurs at Service Creek, and JD-35 is at Picture Gorge.)

Figure 1 shows peak flow records at the seven John Day sites for the periods of record, together with peak flows in Mercer Creek, a heavily urbanized stream in Bellevue, WA, and the North Fork Stillaguamish River in northern Puget Sound. The Stillaguamish has been extensively logged and roaded over the past 60-70 years. The data show that peak flows have increased by approximately 300% in Mercer Creek. In the Stillaguamish, the rate of increase has been much less but nonetheless peaks have very clearly increased steadily during the period of record. (A small part of this might be due to increases in precipitation over this period, as I discussed in the rating guidelines document.)

Evidence of increases in peak flows in the John Day is weak over the periods of record, except in Strawberry Creek, a very small drainage. On a percentage basis, I concluded that peaks have changed on average at the various sites (excluding Strawberry) by <10%. The case that has been made that watershed changes prior to the advent of data recording would have already increased the peaks is not refuted. I argue though that it is hard to imagine that peaks could have increased significantly given the relatively small magnitude of flow levels that are recorded in the basin.
I then computed the increase in Q2year, i.e., the flood size that occurs on average once every two years (often called the channel forming flood size). I do not present the results here for the sake of brevity but they show less of an increase than the instantaneous peaks. Several sites showed no change over the period of record and several showed changes <10%. The highest change that I could construe from the data was approximately 20%.

I then computed the flow statistic called TQmean, a statistic that reflects the runoff rate for a stream. The statistic is based on research reported in Konrad (2000) done on a range of urbanized streams. As the amount of impervious surfaces increases in a watershed due to roading or urbanization, this statistic declines. I computed the statistic for all of the data, then averaged it in 10 year periods to see how it has changed over time in the various drainages. Results are shown in Figure 2. In Mercer Creek, TQmean has steadily declined during the period of urbanization. Similarly, it has declined noticeably in the NF Stillaguamish over the period of record. No site in the John Day shows any evidence of decline during the periods of record.

Recommendations:

1. I recommend reducing the FlowHigh ratings to give a maximum increase in peak flow (or Q2year) of 20%. This exceeds what the data record shows but to the extent that damage occurred prior to the start of data monitoring I believe it would be represented by such a rating. This increases corresponds to a rating of 2.5. I recommend that this be implemented by equating this 2.5 rating to the highest rating that had previously been assigned, then scaling all other ratings down according (earlier ratings of 2 would remain 2, therefore all ratings would be scaled between 2 and 2.5).

3. I recommend reducing the FlowIntraAnnual ratings to give an assumed decrease in TQmean that would equate to a rating of 2.4. I believe a slightly smaller rating than the 2.5 applied above is in order because it appears that flashiness has not increased commensurate with the change in peak flow. This exceeds what the data record shows but to the extent that damage occurred prior to the start of data monitoring I believe it would be represented by such a rating. I recommend that this be implemented by equating this 2.4 rating to the highest rating that had previously been assigned, then scaling all other ratings down according (earlier ratings of 2 would remain 2, therefore all ratings would be scaled between 2 and 2.4).

We have created a draft data set with these changes incorporated.

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Figure 1. Annual instantaneous peak flows in two Puget Sound streams (Mercer Cr and NF Stillaguamish R) and at seven sites in the John Day basin. Peaks based on water year.

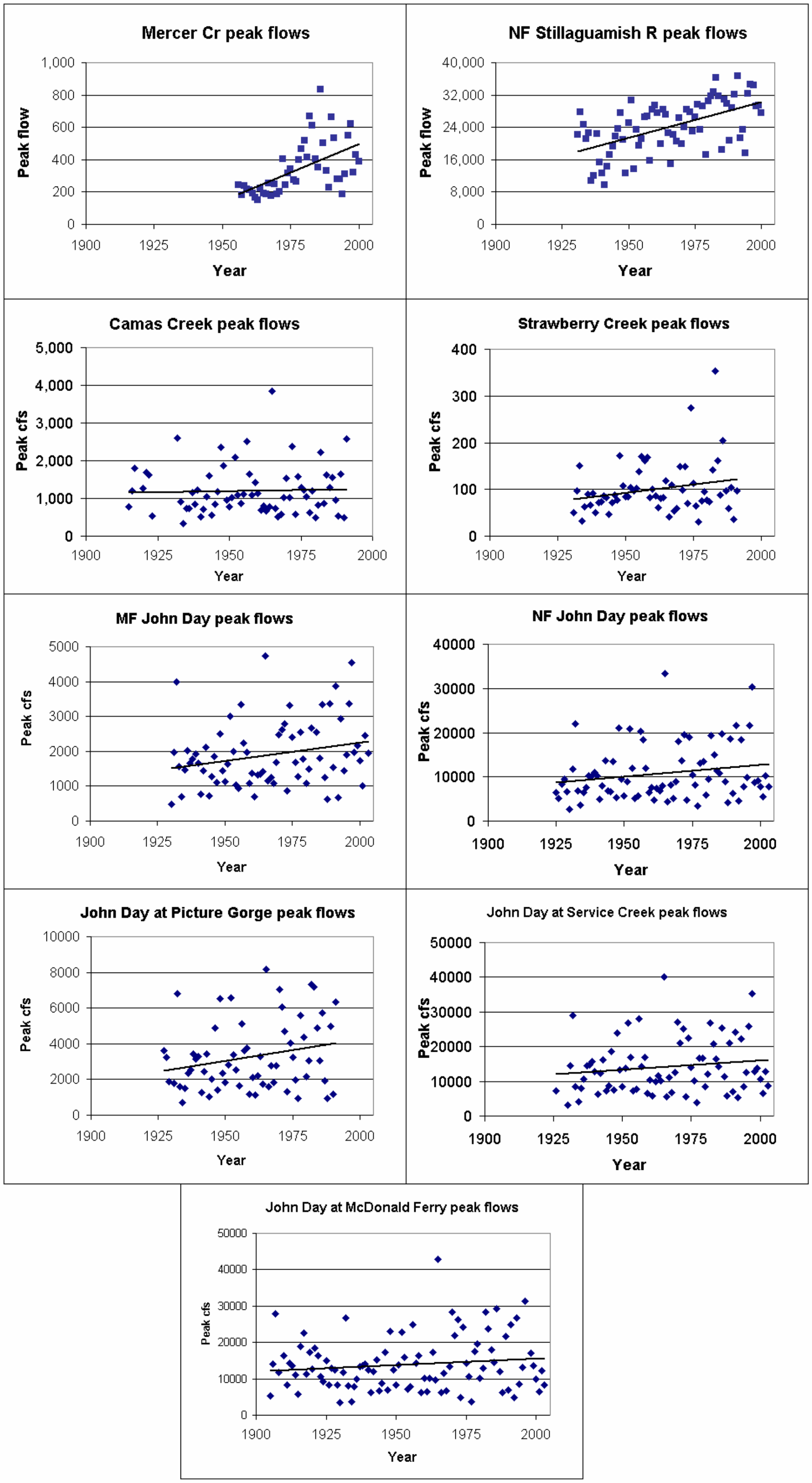

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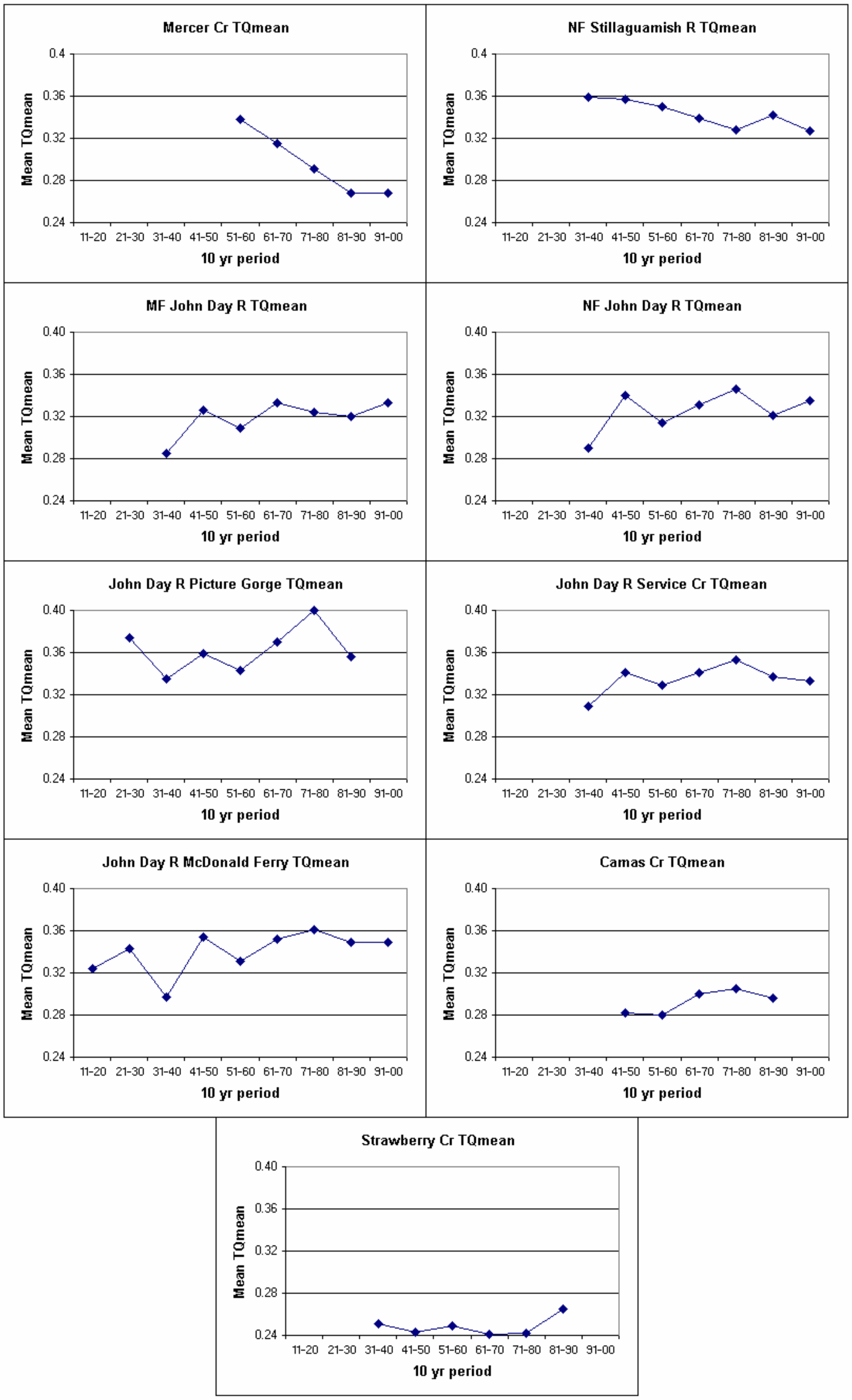
Figure 2. Flow statistic Tqmean (measure of flashiness or runoff rate) averaged across 10 year periods for Mercer Cr, NF Stillaguamish R, and seven sites in the John Day basin.



Appendix K

Recommendation to Finalize John Day Spring Chinook Analysis
Larry Lestelle
11-18-04

M E M O R A N D U M

TO: Chip McConnaha

FROM: Larry Lestelle

DATE: 11-18-04

RE: Recommendation to finalize John Day spring Chinook analysis

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This note summarizes my conclusions and recommendations regarding recent issues associated with the analysis of John Day spring Chinook using EDT. My overall conclusion is that the SRE database is now a reasonable characterization of the drainage for the purpose of recovery planning and that it is producing reasonable modeling results. *I recommend that the most recent update of the SRE database on the server be registered as the official data set.*

In mid October, Betsy Torell and I reviewed the SRE and came up with several questions that we felt needed to be resolved. I met with Tim Unterwegner, Errol Claire, and CRITFC staff in John Day on October 19 to discuss these issues. Other than these issues, I felt that the characterization of the John Day within the SRE database was adequate for the purposes at hand.

The issues that we addressed in that meeting and in follow-up are:

- Population delineation
- Width patterns
- Obstructions
- Flow attribute ratings
- Juvenile life history patterns
- Juvenile use of non-natal tributaries

I first provide a brief summary and comparison of modeling results associated with these issues. I then give a short summary of each issue and any associated recommendations.

<u>Summary of Modeling Results</u>

Table 1 summarizes baseline modeling results for four data sets, beginning with the SRE data as it existed at the end of May:

1. End of phase 1 SRE (data as it existed at the end of May)
2. Width pattern and obstruction rating update (based on 10-19-04 meeting)
3. Flow update (based on my 10-28-04 memo)
4. Incorporation of non-natal tributaries for rearing (with corresponding update in ratings)

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In reviewing the results, keep in mind the following:

- Historic is modeled with the same out of basin survival as for current conditions (i.e., mainstem Columbia and Columbia estuary are the same as those modeled for the current condition scenario); and
- Out of basin survival is a long term average value, probably fairly well represented by what has been seen since about 1990 (including the recent improved survivals).

Concerns existed that the current condition scenario seen in May modeling were much too low, particularly for the Upper John Day and Middle Fork populations. The Upper John Day was especially low, reflecting an extirpated population.

Modeling results with all of the issues addressed in this memo are now, in my view, reasonable reflections of reality, though the model's estimates are clearly underestimates for the Middle Fork and Upper John Day. The North Fork complex, including both Granite and North Fork, is particularly close to what is actually observed (Table 2). Modeling results are in the right relative order, comparing relative sizes from the model to what is actually seen (i.e., Granite is smallest, North Fork is largest, and so on). I comment further on the low estimates for the Middle Fork and Upper John Day as I cover the remaining issues.

Figure 1 shows trends in observed run sizes. Note that Middle Fork and Upper John Day have shown a very notable increase in recent years while Granite Creek has not.

Table 1. Baseline results for John Day spring Chinook with four data sets.

Current condition

	Productivity				
Dataset or issue modeled	Granite	NF	MF	UJD	
End Phase 1	1.9	4.5	1.6	1.1	
Width patterns; obstruct	1.8	4.7	1.6	2.5	
Flow updates	1.9	4.7	1.6	2.6	
Nonnatal RULES	2.2	5.4	2.2	2.7	
	Equilibrium abundance				
	Granite	NF	MF	UJD	Total
End Phase 1	63	1,391	88	14	1,555
Width patterns; obstruct	63	1,481	97	205	1,847
Flow updates	69	1,478	95	208	1,850
Nonnatal RULES	79	1,708	171	240	2,197

Historic condition

	Productivity				
Dataset or issue modeled	Granite	NF	MF	UJD	
End Phase 1	16.1	14.6	22.3	25.2	
Width patterns; obstruct	15.0	14.5	22.6	24.4	
Flow updates	16.0	14.4	22.7	24.8	

Nonnatal RULES	16.0	15.4	23.6	25.3	
	Equilibrium abundance				
	Granite	NF	MF	UJD	Total
End Phase 1	910	5,504	1,860	1,737	10,011
Width patterns; obstruct	998	5,787	2,094	1,852	10,731
Flow updates	1,034	5,816	2,049	1,811	10,710
Nonnatal RULES	1,027	6,098	2,100	2,152	11,377

Table 2. Comparison of modeling results for John Day spring Chinook (based on application of the Nonnatal Trib rules with four data sets) to average estimated run sizes for 1990-2004.

Population	Model	1990-2004
Granite	79	123
NF	1,708	1,498
MF	171	554
UJD	240	757
Total	2,197	2,932

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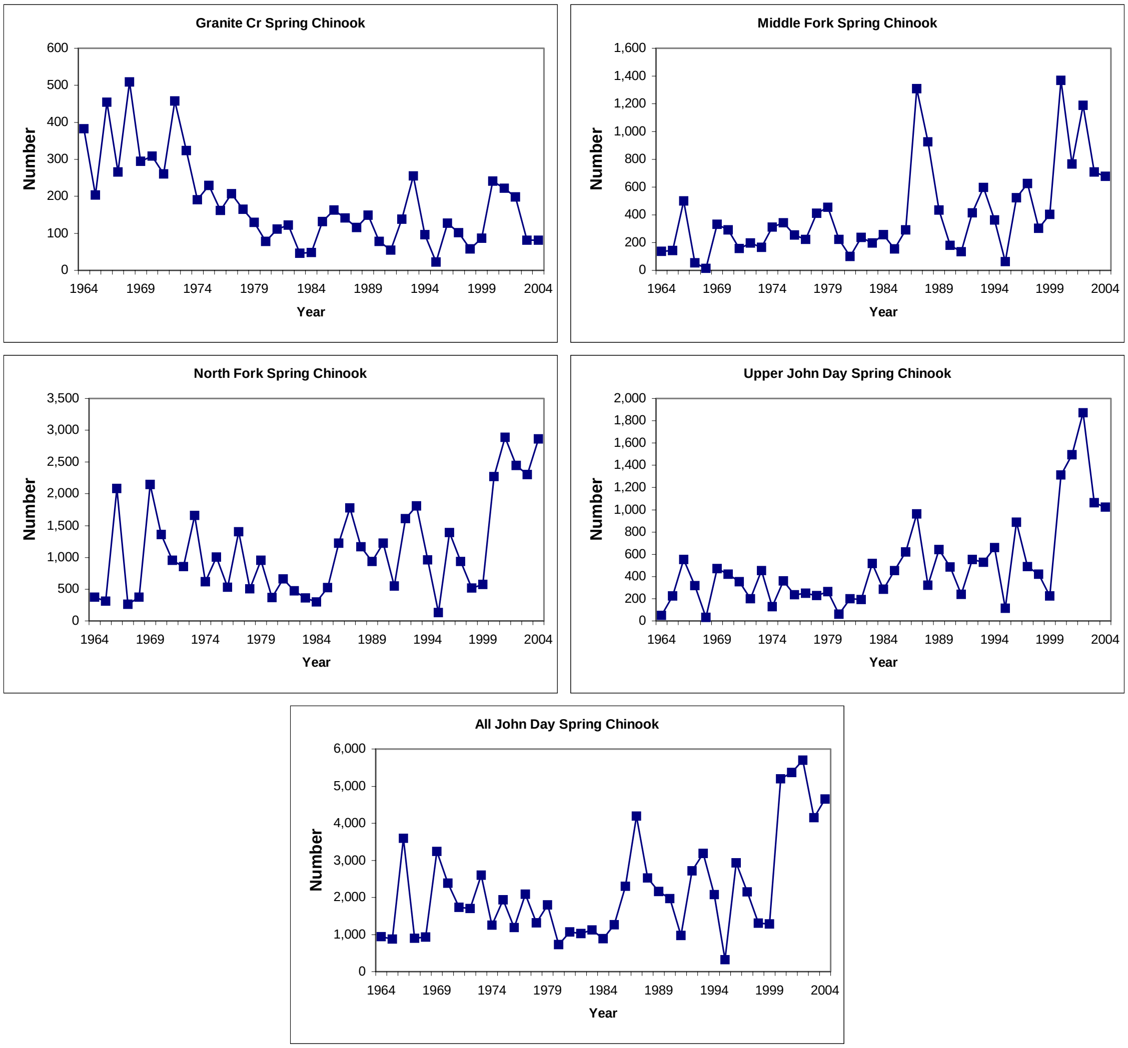
Figure 1. Observed (estimated) run sizes of spring Chinook in the John Day subbasin.



Population Delineation

At the meeting on October 19, I spoke to Tim and Errol about combining the Granite Creek and North Fork components. Granite Creek, a relatively small stream, flows into the North Fork in the middle of that streams spawning distribution. There had been concern that the modeling number for Granite Creek was too low, prompting us to consider issues affecting modeling results for that stream. I suggested that Granite Creek fish probably are part of what might be considered a North Fork-Granite complex. The proximity of the two areas suggests to me that North Fork fish probably move into Granite Creek to a variable degree in different years. Tim and Errol concurred. They do like to separate the components in tracking spawner estimates for the sake of management – but that is another matter.

We have created a North Fork-Granite population on the web for the sake of modeling. I have evaluated the results. The bottom line is that it has virtually no effect on the results. I therefore have elected to keep the four components here for the sake of seeing how Granite Creek contributes to the whole. I think the Granite Creek modeling results are actually pretty good. When you add the Granite Creek number to the North Fork number, the result is essentially right on to what is actually observed.

Width Patterns

Betsy looked carefully at the attribute patterns that existed in the SRE. She concluded that an error existed for width patterns throughout the database. Unlike FlowHigh and FlowLow, both Width Max and Width Min are to have the same pattern. The width pattern is not just a set of multipliers applied to the ratings. This single pattern shapes the wetted width throughout the year from Width Max to Width Min. The Width pattern should not be the same as the FlowHigh pattern. The FlowHigh pattern typically has values of zero for all the months where the average daily flow is less than the annual average daily flow. When this pattern is used, as done on the John Day, it underestimates the wetted widths for most months (Figure 2). As a result, the quantity of habitat is underestimated. I discussed this with Tim and Errol on October 18. They agreed that the database needed to be corrected, which we have done.

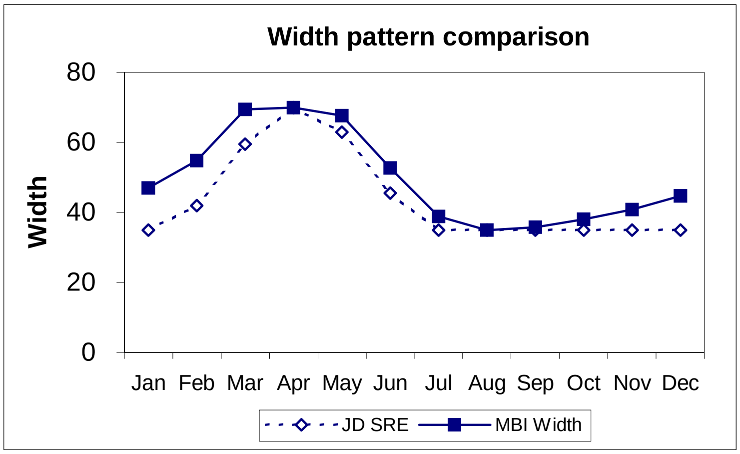


Figure 2. Comparison of width patterns.

Obstructions

Betsy reviewed obstruction ratings in the database and discovered one barrier reach that was likely in error, i.e., reach JD-53 (called Blue Mt. Dam). I discussed this with Tim and Errol and they concluded that it was in error. The correction has been incorporated into the database.

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Flow Attribute Ratings

See my memo of October 28. There is no need to repeat any of that here. Changes were agreed on by Tim and Errol and incorporated into the database.

Juvenile Life History Patterns

I discussed the possibility for much greater movement of juveniles in the basin that might be reflected in how we were modeling spring Chinook. We had been modeling a 50:50 split in life histories patterns between resident juveniles and migrants, i.e., juveniles that would move downstream significantly during their juvenile life history. They indicated that based strictly on conjecture a 25:75 split might be more appropriate (25% residents).

We therefore defined a set of populations with a 25:75 split. Results were mixed. Equilibrium run sizes tended to increase on North Fork and Granite Creek and to decrease somewhat on the Middle Fork and Upper John Day. Given that conditions deteriorate rapidly as you move downstream in the Middle Fork and Upper John Day, the results were not surprising. However the changes in estimated run sizes under these two life history configurations was very modest.

I decided to leave the mix at 50:50, believing that a change from this would be without sufficient rationale and understanding. *I recommend using 50:50 for the registered populations.*

Juvenile Use of Non-Natal Tributaries

Errol and Tim had previously expressed concerns that we might not be modeling Chinook life history correctly. It seemed to them that we were not capturing how juveniles move into non-natal tributaries for rearing, particularly during summer. I discussed this at some length with them at our meeting. They cited Lindsay et al. (1986) as evidence. That report provides excellent proof that juveniles do indeed make extensive use of non-natal tributaries as refuge from the harsh conditions that occur in the mainstems during summer (for example, see Tables 18-20 in that report). In one stream, juveniles had moved upstream at least 12 km from the mainstem. Both Errol and Tim indicated that they believed that juveniles also used non-natal tributaries for overwintering, though the major use, in their opinion, was during summer. I told both of them that I thought we could begin to capture some aspect of this through a modification of the rules, though it would only be rough at this point.

In follow-up discussion with Greg Blair and you (Chip), we decided to formulate a set of rules to incorporate some degree of the effect of use of non-natal tributaries. We would follow a similar procedure as used for coho and we would need to use the existing attribute of Off-Channel Factor as a surrogate for non-natal tributary use. The current database structure does not allow a simple addition of new attributes without some other work being involved.

I took one shot at developing a set of rules to accomplish this. Insufficient time and budget existed to spend more time on this. The rule set was developed and is now assigned to being used on the John Day; it can as deemed warranted be used on other systems.

The rules operate by using the Off-Channel Factor surrogate as a way of ameliorating both temperature and habitat diversity effects during summer, winter, and spring in reaches deemed sufficiently close to non-natal tributaries. I decided to put all of the benefit into the two survival factors Temperature and Habitat Diversity. I did not add Key Habitat, which I believe should be considered at some point in the future. I elected to leave Key Habitat out of it at this point because I felt I did not have sufficient information on sizes of streams and extent of penetration into each non-natal tributary.

I assumed that the non-natal tributaries (or reaches in extreme upper reaches of mainstems in some cases) were those identified by Tim and Errol at the beginning of Phase 1. Table 3 lists non-natal streams and reaches. It is important to note that both of them indicated to me on October 18 that this list is incomplete—they know of other streams that are not even listed in the database as being used in this manner. They also said that other streams, not specifically identified yet, serve this purpose.

Table 3. Non-natal reaches assumed to be used by juvenile spring Chinook.

Reach Name	Function
Eightmile Cr-1	Rearing
Granite Cr (1st JD NF)	Rearing
Slide Cr-1 (JD MF)	Rearing
Indian Cr-1 (JD MF)	Rearing
Huckleberry Cr	Rearing
Big Cr-1 (JD MF)	Rearing
Camp Cr-1 (JD MF)	Rearing
Camp Cr-2 (JD MF)	Rearing
Camp Cr-3 (JD MF)	Rearing
Camp Cr-4 (JD MF)	Rearing
Camp Cr-5 (JD MF)	Rearing
Camp Cr-6 (JD MF)	Rearing
Camp Cr-7 (JD MF)	Rearing
Coyote Cr	Rearing
Big Boulder Cr-1	Rearing
Beaver Cr (JD MF)	Rearing
Granite Boulder Cr-1	Rearing
Granite Boulder Cr-2	Rearing
Butte Cr-1 (JD MF)	Rearing
Vinegar Cr-1	Rearing
Squaw Cr (JD MF)	Rearing
Rudio Cr-1	Rearing
Deer Cr (JD NF)	Rearing

Reach Name	Function
Big Wall Cr-1	Rearing
Ditch Cr-1	Rearing
Mallory Cr-1	Rearing
Mallory Cr-2	Rearing
Potamus Cr-1	Rearing
Stony Cr-1	Rearing
Camas Cr-10	Rearing
Camas Cr-11	Rearing
Camas Cr-12	Rearing
Camas Cr-13	Rearing
Desolation Cr-1	Rearing
Desolation Cr NF	Rearing
Desolation Cr SF-1	Rearing
Big Cr-1 (JD NF)	Rearing
Winom Cr-1	Rearing
Basin Cr (JD NF)	Rearing
Trail Cr (JD NF)	Rearing
JD NF-48	Rearing
JD NF-49	Rearing
JD NF-50	Rearing
JD SF-4	Rearing

I then associated these reaches with adjoining or neighboring reaches in the mainstems to identify which reaches should be given ratings for the Off-Channel Factor to capture the benefits of the non-natal tributary use. I thought of the effect as sort of being at a landscape scale. Hence, the single reach either directly downstream or upstream would be assumed to benefit. Also, if these reaches were particularly short, then I assumed that neighboring reaches would also benefit. Generally, I considered approximately 4-7 miles in either direction as a benefit. Reaches assigned to benefit from these effects and the contributing non-natal reaches are shown in Table 4.

Table 4. Natal primary reaches assigned to benefit from nearby non-natal reaches used by juvenile spring Chinook. Non-natal reaches are identified as having been rated or not rated by Claire and Unterwegner.

Primary reach	Non-natal RATED	Non-natal NOT RATED
JD NF-1 sc	Rudio Cr-1	
JD NF-2 sc	Rudio Cr-1	
JD NF-3 sc	Deer Cr (JD NF)	
JD NF-4 sc	Big Wall Cr-1	
JD NF-5 sc	Big Wall Cr-1	
JD MF-4 sc		Eightmile Cr-1

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Primary reach	Non-natal RATED	Non-natal NOT RATED
JD MF-5 sc		Eightmile Cr-1
JD MF-7 sc		Granite Cr (1st JD NF)
JD MF-8 sc		Slide Cr-1 (JD MF)
JD MF-9 sc		Slide Cr-1 (JD MF)
JD MF-10 sc		Indian Cr-1 (JD MF)
JD MF-11 sc		Huckleberry Cr
JD MF-12 sc	Big Cr-1 (JD MF)	
JD MF-13 sc	Big Cr-1 (JD MF)	
JD MF-17 sc	Camp Cr-1 (JD MF)	
JD MF-18 sc	Camp Cr-1 (JD MF)	
JD MF-19 sc		Coyote Cr
JD MF-20 sc	Big Boulder Cr-1	Coyote Cr
JD MF-21 sc	Big Boulder Cr-1	
JD MF-23 sc		Beaver Cr (JD MF)
JD MF-24 sc		Granite Boulder Cr-1
JD MF-25 sc		Butte Cr-1 (JD MF)
JD MF-26 sc		Butte Cr-1 (JD MF)
JD MF-33 sc	Vinegar Cr-1	
JD MF-34 sc	Vinegar Cr-1	
JD MF-36 sc		Squaw Cr (JD MF)
JD MF-37 sc		Squaw Cr (JD MF)
JD MF-38 sc		Squaw Cr (JD MF)
JD NF-7 sc		Ditch Cr-1
JD NF-8 sc		Mallory Cr-1
JD NF-9 sc		Mallory Cr-1
JD NF-10 sc	Potamus Cr-1	
JD NF-11 sc	Potamus Cr-1	
JD NF-12 sc		Stony Cr-1
JD NF-13 sc		Stony Cr-1
Camas Cr-8 sc	Camas Cr-10	
Camas Cr-9 sc	Camas Cr-10	
Desolation Cr-13 sc	Desolation Cr NF	
Desolation Cr-14 sc	Desolation Cr NF	
JD NF-28 sc		Big Cr-1 (JD NF)
JD NF-29 sc		Winom Cr-1
JD NF-32 sc		Basin Cr (JD NF)
JD NF-33 sc		Basin Cr (JD NF)
JD NF-45 sc	Trail Cr (JD NF)	
JD NF-46 sc	Trail Cr (JD NF)	
JD NF-47 sc	Trail Cr (JD NF)	
JD-39 sc	JD SF-1-4	
JD-40 sc	JD SF-1-4	
JD-41 sc	JD SF-1-4	

Table 4 also identifies whether the non-natal reach had been characterized by Tim and Errol in their work on Phase 1. Approximately 300 reaches subbasin wide had been delineated but not rated during Phase 1. If they had been rated, then I had the benefit of seeing how those reaches were characterized with respect to temperature etc. If they had not, I was left with no alternative but to make some assumptions based on nearby streams. I also operated under the premise that if Tim and Errol had indicated usage, then conditions would generally be better in the tributary than in the mainstem. My ratings for historic and current conditions are given in Table 5. The values shown in this represent an index on a scale of 0-1, with 0 being no usage and 1 being full benefit. Table 6 provides my definition of these conditions associated with these – which, as usual, correspond to a 0-4 rating.

I recommend that the rules be applied without further changes at this time. I considered that I possibly had not given enough credit in the rules for non-natal stream use. I considered increasing the effect – but elected to not do so at this time. Note that the North Fork population is also benefiting from the effect. If the rules were adjusted to gain a significantly greater effect – such that both Middle Fork and Upper John Day are benefited to a much greater extent – then it is likely that the North Fork and Granite complex will be increased to an unrealistic abundance. I concluded that at this point the rules capture the effect to the degree needed. I believe, however, that if further work on this is deemed needed, it would be better to put it into better identifying reaches and corresponding ratings for the effect. My overall conclusion is that incorporation of these rules was a major improvement in how we are modeling spring Chinook. A future improvement in the rules can be made when we incorporate one or more new attributes into the conceptual structure.

Table 5. Index values of benefit (corresponding to Table 6) assigned to the historic and current conditions for reaches in Table 4.

Primary reach	Current	Historic
JD NF-1 sc	0.05	0.25
JD NF-2 sc	0.05	0.25
JD NF-3 sc	0.5	0.75
JD NF-4 sc	0.05	0.25
JD NF-5 sc	0.05	0.25
JD MF-4 sc	0.5	0.75
JD MF-5 sc	0.5	0.75
JD MF-7 sc	0.5	0.75
JD MF-8 sc	0.5	0.75
JD MF-9 sc	0.5	0.75
JD MF-10 sc	0.5	0.75
JD MF-11 sc	0.5	0.75
JD MF-12 sc	0.75	0.75
JD MF-13 sc	0.75	0.75
JD MF-17 sc	0.25	0.5
JD MF-18 sc	0.25	0.5
JD MF-19 sc	0.5	0.75

Primary reach	Current	Historic
JD MF-20 sc	0.75	0.75
JD MF-21 sc	0.75	0.75
JD MF-23 sc	0.5	0.75
JD MF-24 sc	0.5	0.75
JD MF-25 sc	0.5	0.75
JD MF-26 sc	0.5	0.75
JD MF-33 sc	0.25	0.5
JD MF-34 sc	0.25	0.5
JD MF-36 sc	0	0
JD MF-37 sc	0	0
JD MF-38 sc	0.5	0.75
JD NF-7 sc	0.5	0.75
JD NF-8 sc	0.5	0.75
JD NF-9 sc	0.5	0.75
JD NF-10 sc	0.75	0.75
JD NF-11 sc	0.75	0.75
JD NF-12 sc	0.5	0.75
JD NF-13 sc	0.5	0.75
Camas Cr-8 sc	0.05	0.25
Camas Cr-9 sc	0.05	0.25
Desolation Cr-13 sc	0.25	0.5
Desolation Cr-14 sc	0.75	0.75
JD NF-28 sc	0.5	0.75
JD NF-29 sc	0.5	0.75
JD NF-32 sc	0.5	0.75
JD NF-33 sc	0.5	0.75
JD NF-45 sc	0.75	0.75
JD NF-46 sc	0.75	0.75
JD NF-47 sc	0.5	0.75
JD-39 sc	0.5	0.75
JD-40 sc	0.5	0.75
JD-41 sc	0.5	0.75

Table 6. Definitions of conditions associated with index values for attribute "Non-natal tributary utilization" – used with the surrogate Off-channel Habitat Factor.

Rating with 0-4 scale	Index value (input into SRE)	Definition
0	0.0	No habitat available in nearby non-natal tributaries within a distance able to be reached by small salmonid juveniles.
1	0.05	Quantity of habitat available in nearby non-natal tributaries is semi-abundant within a distance able to be reached by small salmonid juveniles; its quality is slightly better than habitat quality in the primary reach.

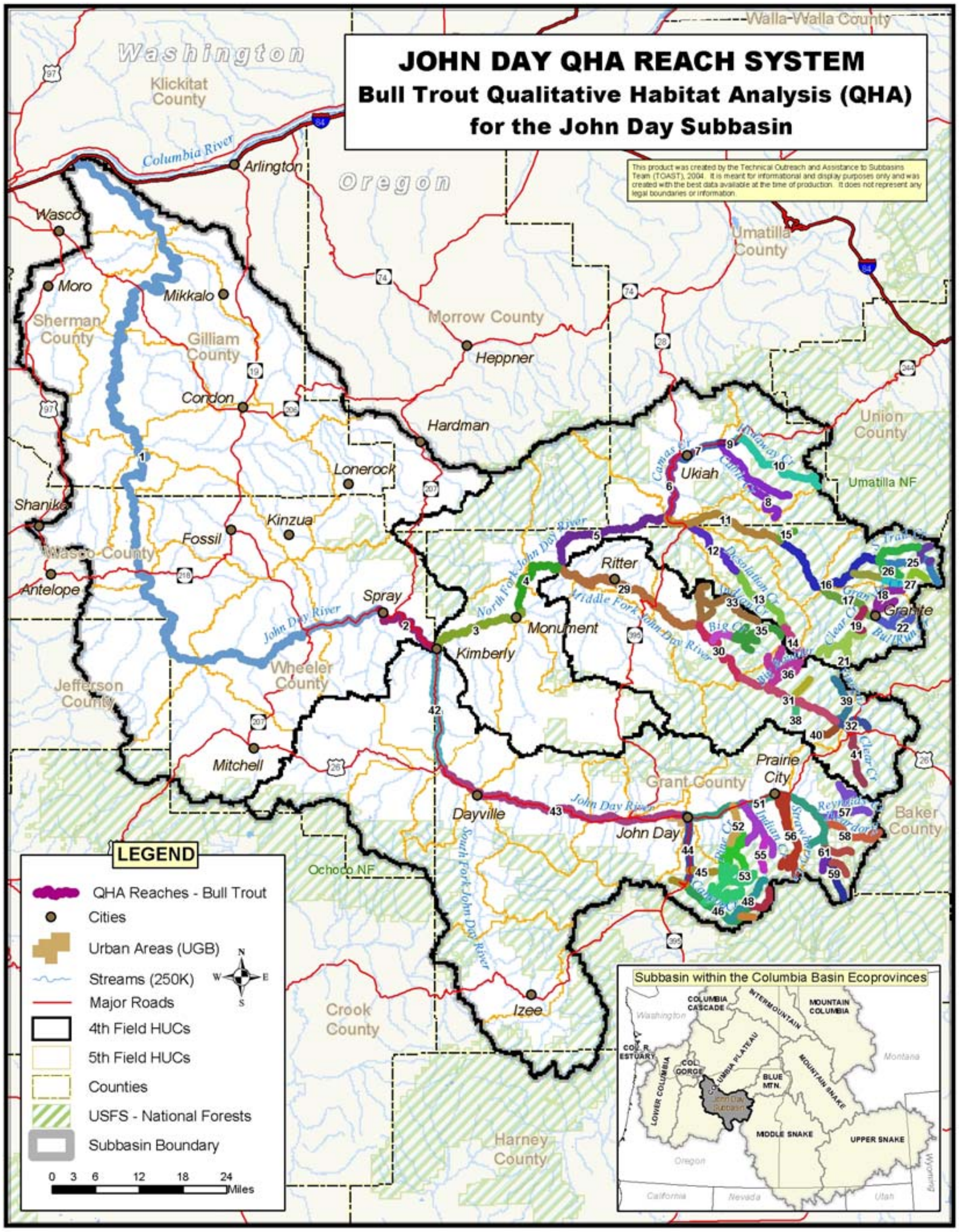
2	0.25	Quantity of habitat available in nearby non-natal tributaries is abundant within a distance able to be reached by small salmonid juveniles; its quality is slightly better than habitat quality in the primary reach.
3	0.50	Quantity of habitat available in nearby non-natal tributaries is semi-abundant within a distance able to be reached by small salmonid juveniles; its quality is markedly better than habitat quality in the primary reach.
4	0.75	Quantity of habitat available in nearby non-natal tributaries is abundant within a distance able to be reached by small salmonid juveniles; its quality is markedly better than habitat quality in the primary reach.

Literature Cited

Lindsay, R.B., W.J. Knox, M.W. Flesher, B.J. Smith, E.A.. Olsen, and L.S. Lutz. 1986. Study of wild spring Chinook salmon in the John Day River system. 1985 Final Report to BPA.

Appendix L

John Day Bull Trout Reach System Used in QHA



Appendix M

List of Reaches Created for QHA and Bull Trout in the John Day Subbasin
(QHA reach ID corresponds to the reach ID number on the reach maps in Appendix L)

QHA Reach ID	QHA ReachName	QHA Descriptions	Assessment Area	Length (miles)
1	JD-1	From mouth at Columbia R to Spray (Rivermile 170 marked at North border of section 36)	Lower-Middle John Day	167.58
2	JD-2	From Spray (Rivermile 170 marked at North border of section 36) to NF John Day River at Kimberly	Lower-Middle John Day	14.51
3	NF-1	From mouth at John Day River to Deer Cr	North Fork	17.09
4	NF-2	From Deer Cr to MF John Day River	North Fork	14.62
5	MF-1	From mouth at NF John Day River to Indian Cr	Middle Fork	34.97
6	Indian System (MF)	From mouth at MF John Day to headwaters at 6480' incl. lowest unnamed trib to 4200' in section 33, Little Indian Cr to 4600', and Little Indian unnamed trib to 4240' in section 19 (follow ODFW StS distribution)	Middle Fork	19.49
7	MF-2	From Indian Cr to Camp Cr	Middle Fork	12.55
8	Big Cr (MF)-1	From mouth at MF John Day River to EF Big Cr	Middle Fork	3.63
9	Big Cr (MF)-2	From EF Big Cr to 6200' incl. EF Big to headwaters at pond in NE corner of section 18, Deadwood Cr to 4960', and Onion Gulch to 4880'	Middle Fork	13.97
10	MF-3	From Camp Cr to Vinegar Cr	Middle Fork	16.78
11	Big Boulder System	From mouth at MF John Day River to 6800', incl. Myrtle Cr to 5760', Wray Cr to 7160' , and Badger to 6640'	Middle Fork	19.14
12	Granite Boulder	From mouth at MF John Day River to falls (ODFW barrier 55427) near Lemon cabin at 4840'	Middle Fork	4.52
13	Butte Cr	From mouth at MF John Day River to the 4520' contour (end of ODFW StS spawning)	Middle Fork	2.87
14	Davis Cr	From mouth at MF John Day River to 4920' contour (end of ODFW StS spawning)	Middle Fork	4.88
15	Vinegar Cr	From mouth at MF John Day River to falls at the 5520' contour (ODFW barrier 55428)	Middle Fork	7.69
16	MF-4	From Vinegar Cr to Crawford Cr	Middle Fork	5.63
17	Clear Cr (MF)	From mouth at MF John Day River to unnamed 100k trib at the 5360' contour near headwaters	Middle Fork	9.48
18	NF-3	From MF John Day River to Camas Cr	North Fork	24.31
19	Camas Cr-1	From mouth at NF John Day River to Owens Cr	North Fork	11.06

20	Camas Cr-2	From Owens Cr to Cable Cr	North Fork	6.77
21	Cable Cr	From mouth at Camas Cr to headwaters incl. North Fork to the 4800' contour and South Fork to the 5460' contour	North Fork	21.75
22	Camas Cr-3	From Cable Cr to Hidaway Cr	North Fork	2.79
23	Hidaway Cr	From mouth at Camas Cr to headwaters just below the 6200' contour	North Fork	16.19
24	NF-4	From Camas Cr to Big Cr, incl. lower Big Cr to falls barrier just above the 3440' contour (ODFW barrier 55440)	North Fork	19.66
25	Desolation Cr-1	From mouth at NF John Day River to Park Cr	North Fork	11.70
26	Desolation Cr-2	From Park Cr to falls barrier on South Fork Desolation Cr at the 5600' contour (ODFW barrier 55437)	North Fork	11.97
27	Desolation Cr-3	From falls barrier at 5600' contour (ODFW barrier 55437) on South Fork Desolation Cr to the section 33/4 border	North Fork	5.02
28	Big Cr (NF)	From 9' falls (ODFW barrier 55440) just above the 3440' contour to Meadow Cr	North Fork	2.71
29	NF-5	From Big Cr to Trail Cr	North Fork	24.18
30	Granite Cr-1	From mouth at North Fork John Day River to Bull Run Cr	North Fork	9.63
31	Clear Cr (granite)-1	From mouth at Granite Cr to Beaver Cr (called Olive Cr in 100k hydro)	North Fork	3.89
32	Clear Cr (granite)-2	From Beaver Cr (called Olive Cr in 100k hydro) to headwaters incl. West Fork to the section 2/35 border, East Fork to the section 1/6 border, and lower Lightning Cr to Petemann Ditch crossing at the 6080' contour	North Fork	12.63
33	Salmon Cr	From Petemann Ditch crossing at the 6080' contour to the section 4/5 border	North Fork	0.61
34	Bull Run	From mouth at Granite Cr to Deep Cr incl. Deep Cr to trib at the 5420' contour and Boundary Cr to forks near the center of section 6	North Fork	9.46
35	Granite Cr-2	From Bull Run Cr to the headwaters at the 6820' contour, incl. lower 2/3 of Boulder Cr. to the 5800' contour	North Fork	9.77
36	Crane Cr-1	From mouth at NF John Day River to the wilderness boundary in section 10	North Fork	3.85
37	Crane Cr-2	From the wilderness boundary in section 10 to the 6160' contour	North Fork	3.11
38	Trail Cr	From mouth at NF John Day River to the forks at the 5400' contour, incl. South Trail Cr to Long Meadow Cr and Onion Cr from mouth at NF John Day River to the forks at the 6360' contour	North Fork	11.35
39	NF-6	From Trail Cr to the headwaters at the 6600' contour	North Fork	11.30
40	Baldy Drainage	From mouth at NF John Day River to unnamed trib at the 6200' contour incl. Bull Cr to the 6480' contour	North Fork	5.37
41	Crawfish-Cunningham	From Cunningham Cr at mouth NF John Day River to the 6280'	North Fork	3.52

		contour, and Crawfish Cr from mouth at NF John Day River to the 6680' contour		
42	JD-3	From confluence with NF John Day River to Rock Cr	Lower-Middle John Day	19.51
43	JD-4	From Rock Cr to Canyon Cr	Upper John Day	42.16
44	Canyon Cr (JD)-1	From mouth at John Day River to Vance Cr	Upper John Day	10.63
45	Vance-Berry	Includes Vance Cr from mouth at John Day River to forks at 4200', and Berry Cr from mouth at John Day River to 5200' (end of ODFW StS dist)	Upper John Day	5.86
46	Canyon Cr (JD)-2	From Vance Cr to Canyon Meadows Reservoir Dam in section 29 (ODFW dam 282)	Upper John Day	12.58
47	Canyon EF System	From mouth at Canyon Cr to headwater Springs at 6800' incl. all 100k tribs to 100k headwaters (Wall, NF Wall, Three Rocks, Tamarack, Skin Shin, Miners, Brookling, East Brookling and unnamed 100k tribs)	Upper John Day	31.42
48	Canyon Cr MF	From mouth at Canyon Cr to headwaters at 7800'	Upper John Day	8.27
49	Crazy Cr	From mouth at Canyon Cr to end of ODFW StS distribution near the section 4/5 border (5220' elevation)	Upper John Day	1.91
50	Canyon Cr-3	From Canyon Meadows Dam to headwaters at the 6320' contour	Upper John Day	4.36
51	JD-5	From Canyon Cr to Rail Cr, incl. lower half of Graham Cr to the 4800' contour	Upper John Day	29.02
52	Pine Cr-1	From mouth at John Day River to national forest/wilderness boundary	Upper John Day	5.91
53	Pine Cr-2	From national forest/wilderness boundary to headwaters at the 7640' contour, incl. Norton Fork to 7120', Lost Fork to 6840', Bear Cr to 5400', and Gwyn Cr to 5400'	Upper John Day	13.07
54	Indian Cr (JD)-1	From mouth at John Day River to Overholt Cr, incl. West Fork Little Indian Cr to 4920' and Overholt Cr to 5640'	Upper John Day	12.30
55	Indian Cr (JD)-2	From Overholt Cr to East Fork Indian Cr (end of ODFW StS spawning dist)	Upper John Day	4.66
56	Strawberry System	From mouth at John Day River to headwaters at 6200', incl. Strawberry braid and Slyge Cr to confluence with Strawberry, Onion Cr to 7200', Slide Cr to falls at 6640' (ODFW barrier 55455) (similar to ODFW StS dist)	Upper John Day	25.27
57	Reynolds Cr	From mouth at John Day River to headwaters at 5440', incl. North Reynolds Cr to 4920' and Mossy Gulch to 5080'	Upper John Day	13.44
58	Deardorff Cr	From mouth at John Day River to forks, incl. South Fork Deardorff to 6280' and North Fork Deardorff to 5560'	Upper John Day	10.37
59	JD-6	From Rail Cr to headwaters at quarry at 6680'	Upper John Day	7.83
60	Rail-Call	Includes Rail Cr from mouth at John Day River to unnamed trib at	Upper John Day	6.67

		5240' and Call Cr from mouth at John Day River to 6400'		
61	Roberts Cr	From mouth at John Day River to unnamed trib at 5280' (end of ODFW StS distribution)	Upper John Day	3.27

Appendix N

Qualitative Habitat Analysis (QHA) Attributes and Definitions

Attribute (abbreviation)	Definition
Riparian Condition	Condition of the stream-side vegetation, land form and subsurface water flow
Channel stability	The condition of the channel in regard to bed scour and artificial confinement. Measures how the channel can move laterally and vertically and to form a "normal" sequence of stream unit types.
Habitat Diversity	Diversity and complexity of the channel including amount of large woody debris (LWD) and multiple channels
Fine Sediment	Amount of fine sediment within the stream, especially in spawning riffles
High Flow	Frequency and amount of high flow events
Low Flow	Frequency and amount of low flow events
Oxygen	Dissolved oxygen in water column and stream substrate
High Temperature	Duration and amount of high summer water temperatures that can be limiting to fish survival
Low Temperature	Duration and amount of low winter temperatures that can be limiting to fish survival
Pollutants	Introduction of toxic (acute and chronic) substances into the stream
Obstructions	Impediments to fish passage

Appendix O

QHA Ratings Under Current Conditions for Bull Trout Reaches

Attribute Confidence	1.90	1.75	1.75	1.75	1.50	1.75	1.50	1.50	2.00	1.50	1.90	
Attribute Toggle	1	1	1	1	1	1	1	1	1	1	1	
Reach Name	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions	Reach Confidence
JD-1	1.0	2.0	1.5	1.0	2.0	2.0	3.0	3.0	0.5	3.5	3.9	1.75
JD-2	1.5	2.5	1.5	1.0	2.2	2.1	3.0	2.9	0.7	3.5	4.0	1.75
NF-1	1.0	2.0	1.6	1.5	2.5	2.5	3.2	2.6	1.2	3.8	4.0	1.75
NF-2	1.0	3.0	1.8	1.6	2.5	2.5	3.2	2.6	1.2	4.0	4.0	1.75
NF-3	1.1	3.5	2.0	1.7	2.8	2.5	3.3	2.6	1.5	4.0	4.0	1.75
CAMAS CR-1	1.5	2.5	2.0	2.0	2.0	2.1	3.0	2.6	1.3	4.0	4.0	1.75
CAMAS CR-2	1.0	2.7	2.0	2.2	2.2	2.0	3.0	2.8	1.5	4.0	4.0	1.75
CABLE CR	3.0	3.2	3.5	3.0	3.0	3.5	4.0	3.0	2.5	4.0	4.0	1.75
CAMAS CR-3	1.0	3.0	2.0	2.2	2.5	2.5	3.0	2.5	1.5	4.0	4.0	1.75
HIDAWAY CR	2.8	3.2	3.2	3.0	3.0	3.2	4.0	3.0	2.4	4.0	4.0	1.75
NF-4	1.2	3.6	2.8	2.5	3.2	3.5	3.5	2.5	1.7	4.0	4.0	1.75
DESOLATION CR-1	2.0	3.5	2.5	3.0	3.0	3.7	3.8	2.8	2.4	4.0	4.0	1.75
DESOLATION CR-2	3.0	3.5	3.0	3.2	3.2	3.8	4.0	3.2	3.0	4.0	4.0	1.75
DESOLATION CR-3	3.5	3.8	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.75
BIG CR (NF)	3.8	3.8	3.8	3.5	3.5	3.9	4.0	4.0	3.8	4.0	4.0	1.75
NF-5	4.0	4.0	3.5	3.0	3.5	3.7	4.0	3.0	3.0	4.0	4.0	2
GRANITE CR-1	1.5	1.5	2.0	2.0	2.5	3.2	3.5	3.0	2.8	3.0	4.0	2
GRANITE CR-2	2.0	1.5	2.0	2.0	2.7	3.2	3.7	3.5	3.0	3.2	3.8	2
CLEAR CR (GRANITE)-1	1.0	1.5	1.5	1.8	2.7	3.7	3.7	2.8	2.8	2.8	4.0	2
CLEAR CR (GRANITE)-2	2.5	2.5	2.0	2.5	3.0	3.8	4.0	3.5	3.5	3.5	4.0	2
SALMON CR	3.2	3.0	3.0	3.0	3.5	3.9	4.0	3.8	3.8	4.0	4.0	1.75
BULL RUN	2.8	2.8	2.5	2.5	2.8	3.2	4.0	3.0	3.0	3.8	3.8	1.75
CRANE CR-1	3.8	3.9	3.5	3.0	3.5	3.8	4.0	3.5	3.0	4.0	4.0	1.75
CRANE CR-2	3.0	3.5	3.2	2.8	3.5	3.8	4.0	3.8	3.0	4.0	4.0	1.75
NF-6	4.0	4.0	4.0	3.9	3.8	4.0	4.0	4.0	4.0	4.0	4.0	2
TRAIL CR	3.8	3.5	3.2	3.0	3.8	3.7	4.0	3.8	3.5	3.9	4.0	1.75
BALDY DRAINAGE	4.0	4.0	4.0	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.75
CRAWFISH-CUNNINGHAM	4.0	3.9	3.8	3.6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.75
MF-1	1.7	3.0	2.5	2.5	2.5	3.0	3.5	3.0	2.5	3.9	4.0	1.75
MF-2	2.0	2.5	2.3	2.5	2.5	3.0	3.5	3.0	2.5	3.9	4.0	1.75
MF-3	2.1	2.7	2.4	2.4	2.5	3.3	3.5	3.0	2.8	3.9	4.0	1.75
MF-4	1.5	1.5	1.7	1.5	3.0	3.3	3.8	3.5	2.8	4.0	4.0	1.75
INDIAN SYSTEM (MF)	2.5	2.8	2.0	2.0	2.5	2.8	3.8	3.0	2.5	4.0	4.0	1.75
BIG CR (MF)-1	3.0	3.5	2.8	2.5	2.8	3.5	4.0	3.5	2.8	4.0	4.0	1.75
BIG CR (MF)-2	3.5	3.8	3.5	3.2	3.5	3.9	4.0	3.9	3.8	4.0	4.0	1.75
BIG BOULDER SYSTEM	3.5	3.5	3.5	3.5	3.5	3.8	4.0	3.8	3.6	4.0	3.8	1.75
GRANITE BOULDER	3.7	3.8	3.8	3.7	3.6	3.8	4.0	3.9	3.8	4.0	4.0	1.75
BUTTE CR	3.3	3.2	3.3	3.2	3.5	3.6	4.0	3.7	3.5	4.0	4.0	1.75
VINEGAR CR	3.0	3.0	2.8	3.0	3.3	3.1	4.0	3.5	3.0	4.0	4.0	1.75
DAVIS CR	3.5	3.6	3.5	3.3	3.6	3.8	4.0	3.8	3.3	4.0	4.0	1.75
CLEAR CR (MF)	3.5	3.5	3.5	3.0	3.6	3.8	4.0	3.8	3.6	4.0	3.8	1.75
JD-3	1.5	1.5	1.0	1.2	2.0	2.0	3.0	2.9	1.0	3.5	4.0	1.75
JD-4	1.0	0.5	0.5	1.2	2.0	1.8	3.1	3.0	1.2	3.5	4.0	1.75
CANYON CR (JD)-1	2.8	0.5	0.8	2.5	3.0	2.5	3.8	3.5	2.0	3.8	4.0	1.75
VANCE-BERRY	3.5	3.5	3.3	3.0	3.7	3.8	4.0	3.8	3.7	4.0	4.0	1.75
CANYON CR (JD)-2	2.8	2.8	2.8	3.2	3.5	3.7	4.0	3.6	3.3	4.0	4.0	1.75
CANYON EF SYSTEM	3.5	3.7	3.7	3.8	3.8	3.8	4.0	3.9	3.7	4.0	4.0	1.75
CANYON CR MF	3.5	3.7	3.7	3.9	3.8	3.9	4.0	3.9	3.8	4.0	4.0	1.75
CRAZY CR	3.8	3.9	3.8	3.8	3.9	3.9	4.0	4.0	3.9	4.0	4.0	1.75
CANYON CR-3	3.8	4.0	3.9	3.9	4.0	4.0	4.0	4.0	3.9	4.0	4.0	1.75
JD-5	1.5	1.2	1.0	2.0	2.8	2.5	3.7	3.5	2.5	3.8	4.0	1.75
PINE CR-1	1.8	0.5	0.8	3.5	3.5	0.3	3.8	3.8	1.8	4.0	3.5	1.75
PINE CR-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.75
INDIAN CR (JD)-1	2.0	1.0	1.5	3.6	3.5	0.5	3.8	3.8	1.8	4.0	1.0	1.75
INDIAN CR (JD)-2	3.8	3.8	3.9	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.75
STRAWBERRY SYSTEM	3.0	3.2	2.5	3.8	4.0	2.0	4.0	4.0	2.8	4.0	0.0	1.75
REYNOLDS CR	3.0	3.0	3.0	2.8	3.8	3.8	4.0	4.0	3.2	4.0	1.8	1.75
DEARDORFF CR	3.7	3.7	3.8	3.6	4.0	3.9	4.0	4.0	3.8	4.0	4.0	1.75
JD-6	3.8	4.0	3.8	3.7	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.75
RAIL-CALL	4.0	3.9	4.0	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.75
ROBERTS CR	3.8	3.8	3.8	3.6	4.0	3.9	4.0	4.0	4.0	4.0	3.6	1.75

Appendix P

QHA Ratings Under Reference Conditions for Bull Trout Reaches

Reach Name	Riparian Condition	Channel stability	Habitat Diversity	Fine sediment	High Flow	Low Flow	Oxygen	Low Temperature	High Temperature	Pollutants	Obstructions	Reach Confidence
Attribute Confidence	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	
Attribute Toggle	0	0	0	0	1	0	0	0	0	0	1	
JD-1	4.0	3.5	3.5	3.5	3.5	3.5	4.0	3.8	3.0	4.0	3.9	1.1
JD-2	4.0	3.6	3.5	3.5	3.5	3.5	4.0	3.8	3.0	4.0	4.0	1.1
NF-1	4.0	3.8	3.8	3.8	3.8	3.9	4.0	3.8	3.5	4.0	4.0	1.1
NF-2	4.0	3.9	3.8	3.8	3.8	3.9	4.0	3.8	3.5	4.0	4.0	1.1
NF-3	4.0	3.9	3.8	3.8	3.8	3.9	4.0	3.8	3.5	4.0	4.0	1.1
CAMAS CR-1	4.0	4.0	4.0	3.9	3.8	3.9	4.0	3.8	3.8	4.0	4.0	1.1
CAMAS CR-2	4.0	4.0	4.0	3.9	3.9	3.9	4.0	4.0	4.0	4.0	4.0	1.2
CABLE CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CAMAS CR-3	4.0	4.0	4.0	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
HIDAWAY CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.9	4.0	4.0	1.1
NF-4	4.0	3.9	3.9	3.9	3.8	3.9	4.0	3.6	3.6	4.0	4.0	1.1
DESOLATION CR-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
DESOLATION CR-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
DESOLATION CR-3	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
BIG CR (NF)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
NF-5	4.0	4.0	3.9	3.9	3.8	3.9	4.0	3.7	3.8	4.0	4.0	1.1
GRANITE CR-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
GRANITE CR-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CLEAR CR (GRANITE)-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CLEAR CR (GRANITE)-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
SALMON CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
BULL RUN	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CRANE CR-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CRANE CR-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
NF-6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
TRAIL CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
BALDY DRAINAGE	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CRAWFISH-CUNNINGHAM	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
MF-1	4.0	4.0	3.6	4.0	4.0	4.0	4.0	4.0	3.8	4.0	4.0	1.1
MF-2	4.0	4.0	3.7	4.0	4.0	4.0	4.0	4.0	3.9	4.0	4.0	1.1
MF-3	4.0	4.0	3.8	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
MF-4	4.0	4.0	3.6	3.8	4.0	4.0	4.0	4.0	3.6	4.0	4.0	1.1
INDIAN SYSTEM (MF)	4.0	4.0	4.0	3.9	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
BIG CR (MF)-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
BIG CR (MF)-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
BIG BOULDER SYSTEM	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
GRANITE BOULDER	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
BUTTE CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
VINEGAR CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
DAVIS CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CLEAR CR (MF)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
JD-3	4.0	3.8	3.7	3.6	3.7	3.7	4.0	3.9	3.0	4.0	4.0	1.1
JD-4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	3.8	4.0	4.0	1.1
CANYON CR (JD)-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
VANCE-BERRY	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CANYON CR (JD)-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CANYON EF SYSTEM	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CANYON CR MF	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CRAZY CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
CANYON CR-3	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
JD-5	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
PINE CR-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
PINE CR-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
INDIAN CR (JD)-1	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
INDIAN CR (JD)-2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
STRAWBERRY SYSTEM	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
REYNOLDS CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
DEARDORFF CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
JD-6	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
RAIL-CALL	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1
ROBERTS CR	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	1.1

Appendix Q

QHA Species Habitat Hypothesis Worksheet

Species habitat hypothesis

Focal Species: Bull Trout in John Day

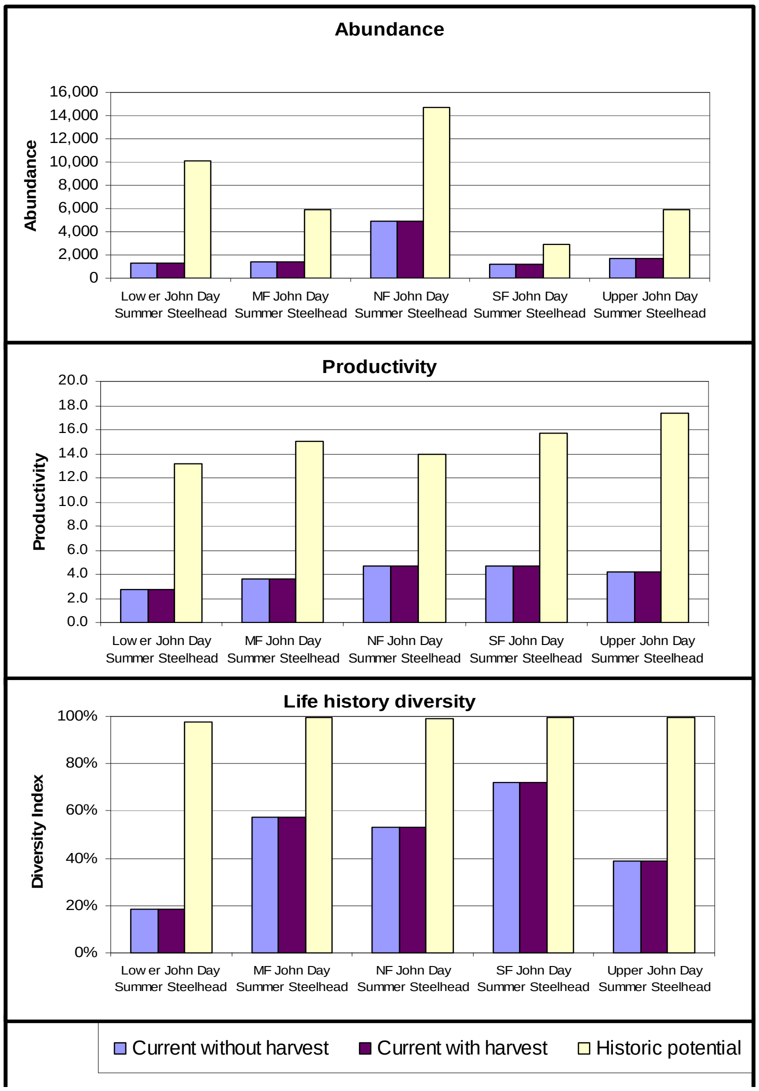
	Spawning/incubation	Summer Rearing	Winter Rearing	Migration
Life Stage Rank (1-4)	4.0	3.5	2.5	3.0
Assign a weight to each attribute (0-2) relative to its importance to the life stage				
Riparian Condition	1.5	2.0	1.3	0.5
Channel stability	1.5	2.0	1.5	0.5
Habitat Diversity	1.0	2.0	1.3	0.5
Fine sediment	2.0	2.0	1.5	0.0
High Flow	2.0	1.0	2.0	0.0
Low Flow	0.8	2.0	0.5	2.0
Oxygen	2.0	2.0	2.0	2.0
Low Temp	2.0	0.0	2.0	0.5
High Temp	1.0	2.0	0.0	2.0
Pollutants	2.0	2.0	2.0	2.0
Obstructions	0.0	0.0	0.0	2.0

Appendix R

Adult Baseline Report Results (~1160 Reaches) for Summer Steelhead Populations

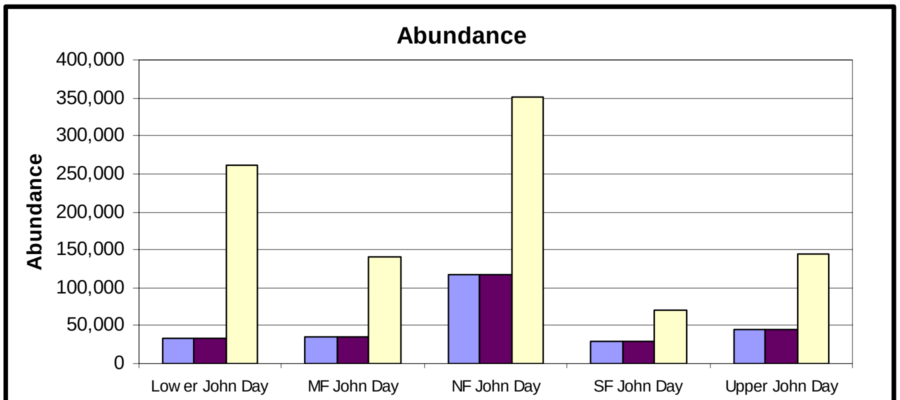
Baseline Report
Adult Summer Steelhead in the John Day Subbasin

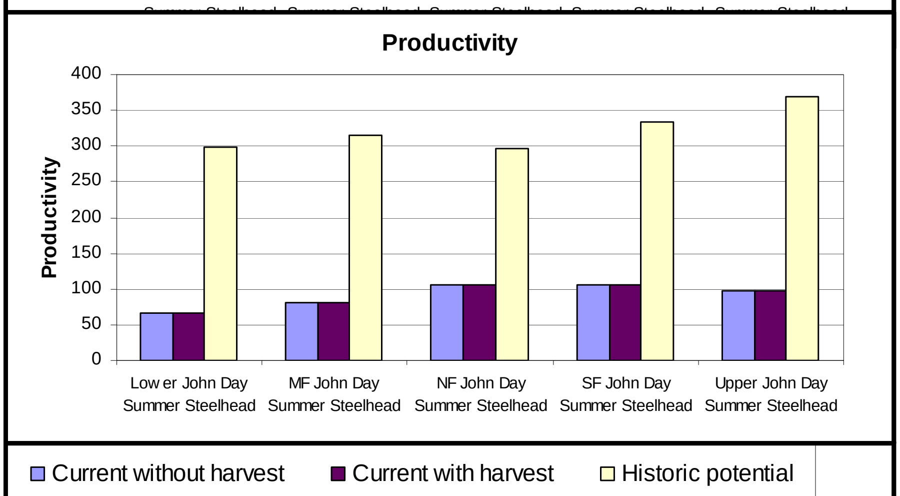
Population	Scenario	Diversity index	Productivity	Capacity	Abundance
Lower John Day Summer Steelhead	Current without harvest	18%	2.8	2,028	1,292
	Current with harvest	18%	2.8	2,028	1,292
	Historic potential	98%	13.1	10,942	10,108
MF John Day Summer Steelhead	Current without harvest	57%	3.6	2,010	1,448
	Current with harvest	57%	3.6	2,010	1,448
	Historic potential	100%	15.0	6,353	5,930
NF John Day Summer Steelhead	Current without harvest	53%	4.7	6,202	4,870
	Current with harvest	53%	4.7	6,202	4,870
	Historic potential	99%	13.9	15,833	14,698
SF John Day Summer Steelhead	Current without harvest	72%	4.7	1,553	1,221
	Current with harvest	72%	4.7	1,553	1,221
	Historic potential	99%	15.7	3,140	2,941
Upper John Day Summer Steelhead	Current without harvest	39%	4.2	2,283	1,737
	Current with harvest	39%	4.2	2,283	1,737
	Historic potential	100%	17.4	6,272	5,912



<u>Juvenile</u> Baseline Report Results (~1186 Reaches) for Summer Steelhead Populations

Baseline Report Juvenile Summer Steelhead in the John Day Subbasin				
Population	**Scenario**	**Productivity**	**Capacity**	**Abundance**
Lower John Day Summer Steelhead	Current without harvest	67	55,857	33,919
	Current with harvest	67	55,857	33,919
	Historic potential	299	285,751	261,079
MF John Day Summer Steelhead	Current without harvest	80	49,885	34,842
	Current with harvest	80	49,885	34,842
	Historic potential	315	152,194	140,736
NF John Day Summer Steelhead	Current without harvest	105	153,404	117,980
	Current with harvest	105	153,404	117,980
	Historic potential	297	382,009	351,305
SF John Day Summer Steelhead	Current without harvest	106	38,912	29,898
	Current with harvest	106	38,912	29,898
	Historic potential	333	75,823	70,378
Upper John Day Summer Steelhead	Current without harvest	98	59,533	44,156
	Current with harvest	98	59,533	44,156
	Historic potential	370	153,911	143,785

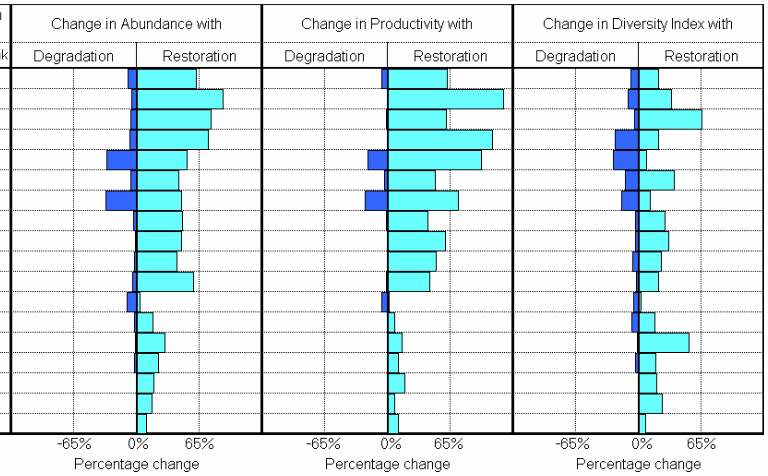




Diagnostic Reports (~1160 Reaches) for Summer Steelhead Populations

5th HUC of Lower John Day Summer Steelhead

Geographic Area	Protection benefit Category	Protection benefit rank	Restoration benefit Category	Restoration benefit rank
JDR Johnson Creek	A	2	A	4
Bridge Creek	B	6	A	1
Lower JDR Kahler Creek	B	6	A	2
Mountain Creek	B	5	A	3
Rock Creek	A	1	B	7
Lower JDR Muddy Creek	A	3	B	6
Upper Middle JDR	A	1	C	9
Lower JDR Service Creek	B	7	B	7
Thirtymile Creek	C	10	B	5
Butte Creek	B	7	C	9
Lower JDR Scott Canyon	B	8	B	8
Lower JDR McDonald Ferry	A	4	D	15
Lower JDR Clarno	B	7	D	13
Upper Rock Creek	C	11	C	9
Lower JDR Ferry Canyon	C	9	C	12
Pine Hollow	C	12	C	10
Lower Rock Cr	D	13	C	11
Grass Valley Canyon	D	13	D	14



Geographic area priority / **Attribute class priority for restoration**

Geographic area	Protection benefit	Restoration benefit	Channel stability/landsc.1/	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Bridge Creek	○	◯	•				•		●		⬤				⬤	●		⬤
Butte Creek	○	∘	•				•		●				•		⬤	●		⬤
Grass Valley Canyon			•				●		•				•	•	⬤	●		●
JDR Johnson Creek	◯	◯	•				●		●				•	•	●	●		●
Lower JDR Clarno	○		•		•				●				•	•	•	●		●
Lower JDR Ferry Canyon	∘	∘	•		•		●		●				•	•	●	●		●
Lower JDR Kahler Creek	○	◯	•				●		●		⬤		•		●	●		⬤
Lower JDR McDonald Ferry	◯				•				⬤					●	⬤	•		●
Lower JDR Muddy Creek	◯	○	•				●		●		⬤		•	•	⬤	●		●
Lower JDR Scott Canyon	○	○	•		•		●		●				•	•	⬤	●		●
Lower JDR Service Creek	○	○	•				●		●				•	•	●	●		⬤
Lower Rock Cr		∘	•				●		●		⬤				⬤	●		●
Mountain Creek	○	◯	●				•		●				•		●	●		●
Pine Hollow	∘	∘	•				●		●	•			•		⬤	●		⬤
Rock Creek	◯	○	•				•		•		●				●	•		●
Thirtymile Creek	∘	○	•				●		●		⬤		•	•	⬤	⬤		⬤
Upper Middle JDR	◯	∘	•				•		●				•		●	●		●
Upper Rock Creek	∘	∘	•				●		●						⬤	●		⬤

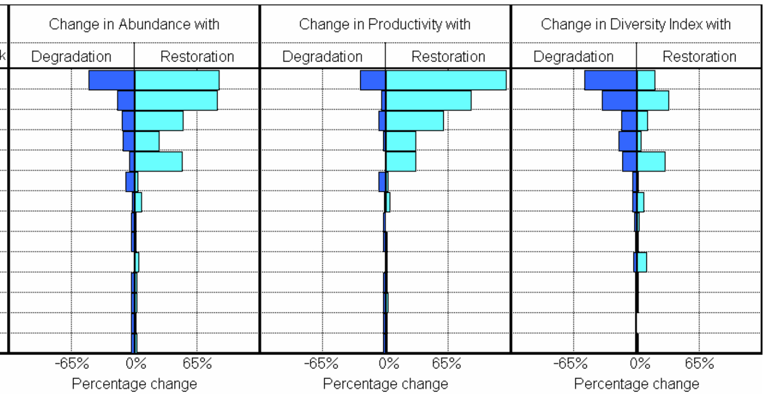
1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

Key to strategic priority (corresponding Benefit Category letter also shown)

A	B	C	D & E
◯ / ⬤ High	○ / ● Medium	∘ / • Low	Indirect or General

5th HUC of Middle Fork John Day Summer Steelhead

Geographic Area	Protection benefit Category	Protection benefit rank	Restoration benefit Category	Restoration benefit rank
Camp Creek	A	1	A	1
Big Creek	A	2	A	1
Long Creek	A	3	A	2
Upper MF JDR	A	4	A	4
Lower MF JDR	B	7	A	3
Lower JDR McDonald Ferry	B	5	B	7
Lower NF JDR	C	10	B	5
Lower JDR Kahler Creek	B	6	D	11
Lower JDR Service Creek	B	7	C	10
NF JDR Potamus Creek	D	11	B	6
Lower JDR Clarno	C	9	C	10
Lower JDR Ferry Canyon	D	12	C	8
Lower JDR Muddy Creek	C	8	D	12
Lower JDR Scott Canyon	D	11	C	9



Geographic area	Protection benefit	Restoration benefit	Channel stability/landsc.1/	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Big Creek	◯	◯	•				•		•						●	•		●
Camp Creek	◯	◯					•		•						●	•		●
Long Creek	◯	◯	•				●		●						●	•		⬤
Lower JDR Clarno	∘	∘							•					•				●
Lower JDR Ferry Canyon		∘							•					•				●
Lower JDR Kahler Creek	○								⬤					•		•		●
Lower JDR McDonald Ferry	○	○							•					●				
Lower JDR Muddy Creek	∘								●					•		•		●
Lower JDR Scott Canyon		∘							•					•				●
Lower JDR Service Creek	○	∘							●					•	•	•		●
Lower MF JDR	○	◯	•				•		●						●	●		●
Lower NF JDR	∘	○							•							●		●
NF JDR Potamus Creek		○							●							●		•
Upper MF JDR	◯	◯	•				•		•						●			●

1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

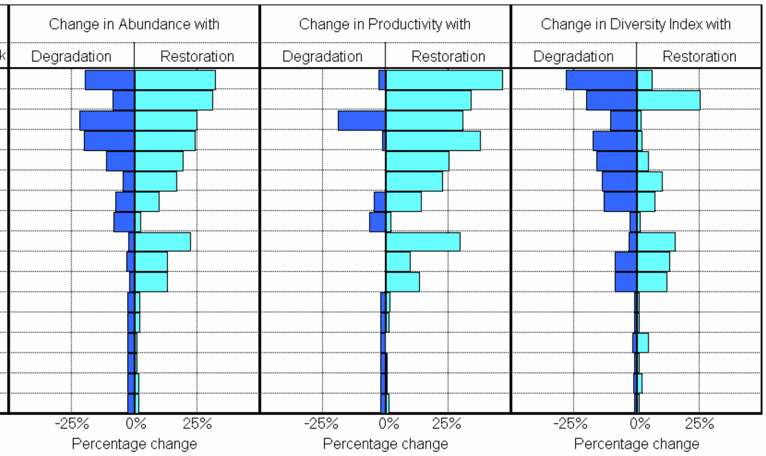
Key to strategic priority (corresponding Benefit Category letter also shown)

A	B	C	D & E
◯ / ⬤ High	○ / ● Medium	∘ / • Low	(blank) Indirect or General

Appendix S

5th HUC of North Fork John Day Summer Steelhead

Geographic Area	Protection benefit Category/rank		Restoration benefit Category/rank	
NF JDR Big Creek	A	1	A	2
NF JDR Potamus Creek	A	4	A	1
Desolation Creek	A	2	B	5
Upper NF JDR	A	3	A	4
Granite Creek	B	5	B	7
Wall Creek	B	6	B	6
Upper Camas Creek	A	3	C	10
Lower JDR McDonald Ferry	A	4	C	11
Cottonwood Creek	D	13	A	3
Lower NF JDR	B	8	B	8
Lower Camas Creek	C	12	C	9
Lower JDR Ferry Canyon	C	11	C	12
Lower JDR Scott Canyon	C	10	D	13
Lower JDR Kahler Creek	C	9	D	15
Lower JDR Muddy Creek	B	7	D	17
Lower JDR Service Creek	C	10	D	14
Lower JDR Clarno	C	9	D	16



Geographic area	Protection benefit	Restoration benefit	Channel stability/landsc.1/	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Cottonwood Creek		High	Low				Medium		Medium				Low		High	High		High
Desolation Creek	High	Medium													Medium	Low		Medium
Granite Creek	Medium	Medium	Low				Low		Low						Medium			Medium
Lower Camas Creek	Low	Low	Low				Low		Medium						Medium	Low		Medium
Lower JDR Clarno	Low								Low					Low				Medium
Lower JDR Ferry Canyon	Low	Low							Low					Low				Medium
Lower JDR Kahler Creek	Low								High					Low		Low		Medium
Lower JDR McDonald Ferry	High	Low							Low					Medium				
Lower JDR Muddy Creek	Medium								Medium					Low		Low		Medium
Lower JDR Scott Canyon	Low								Low					Low				Medium
Lower JDR Service Creek	Low								Medium					Low	Low	Low		Medium
Lower NF JDR	Medium	Medium	Low				Low		Medium				Low		Medium	Medium		Medium
NF JDR Big Creek	High	High	Low						Low		Medium				Low	Low		Medium
NF JDR Potamus Creek	High	High					Low		Medium						Medium	Medium		Medium
Upper Camas Creek	High	Low	Low				Low		Low						Medium	Low		Medium
Upper NF JDR	High	High	Low						Low						Medium	Low		Medium
Wall Creek	Medium	Medium					Medium		Low						Medium	Medium		Medium

1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

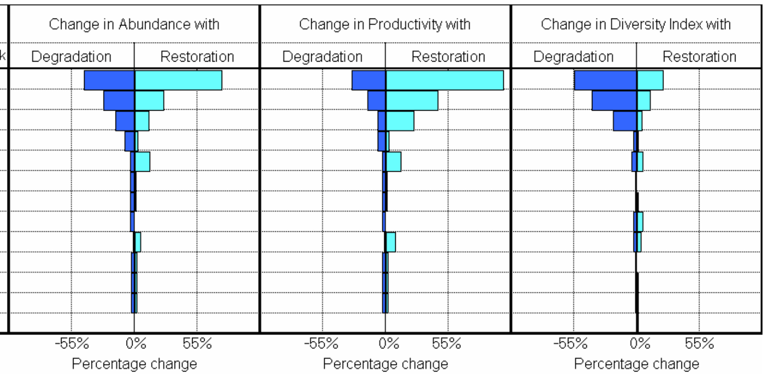
Key to strategic priority (corresponding Benefit Category letter also shown)

A High; B Medium; C Low; D & E Indirect or General

Appendix S

5th HUC of South Fork John Day Summer Steelhead

Geographic Area	Protection benefit Category	Protection benefit rank	Restoration benefit Category	Restoration benefit rank
Lower SF JDR	A	1	A	1
Murderers Creek	A	2	A	2
Middle SF JDR	A	3	B	4
Lower JDR McDonald Ferry	B	4	B	6
JDR Johnson Creek	C	8	A	3
Lower JDR Muddy Creek	B	5	D	10
Lower JDR Service Creek	B	6	C	9
Lower JDR Kahler Creek	C	7	C	9
Upper Middle JDR	D	11	B	5
Lower JDR Clarno	C	9	C	9
Lower JDR Ferry Canyon	D	11	C	7
Lower JDR Scott Canyon	D	10	C	8
Fields Creek	D	12	D	11



Geographic area	Protection benefit	Restoration benefit	Channel stability/landsc.1/	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Fields Creek									● B					● C	● C	● C		● A
JDR Johnson Creek	○ C	○ A							● C					● C	● C	● C		● B
Lower JDR Clarno	○ C	○ C							● C					● C				● B
Lower JDR Ferry Canyon		○ C							● C					● C				● B
Lower JDR Kahler Creek	○ C	○ C							● A					● C		● C		● B
Lower JDR McDonald Ferry	○ B	○ B							● C					● B				
Lower JDR Muddy Creek	○ B								● C					● C				● B
Lower JDR Scott Canyon		○ C							● C					● C				● B
Lower JDR Service Creek	○ B	○ C							● B					● C	● C	● C		● B
Lower SF JDR	○ A	○ A					● C		● C						● B	● B		● B
Middle SF JDR	○ A	○ B					● C		● C						● B	● C		● B
Murderers Creek	○ A	○ A					● C		● C						● B	● C		● B
Upper Middle JDR		○ B							● C					● C	● C	● C		● B

1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

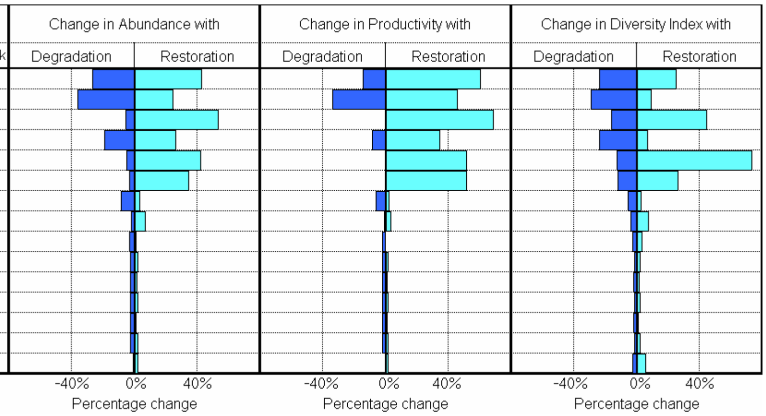
Key to strategic priority (corresponding Benefit Category letter also shown)

A	B	C	D & E
○ / ● High	○ / ● Medium	○ / ● Low	Indirect or General

Appendix S

5th HUC of Upper John Day Summer Steelhead

Geographic Area	Protection benefit Category	Protection benefit rank	Restoration benefit Category	Restoration benefit rank
Strawberry Creek	A	2	A	2
Upper JDR	A	1	B	4
Fields Creek	B	6	A	1
Canyon Creek	A	3	B	5
Laycock Creek	B	6	A	2
Beech Creek	C	8	A	3
Lower JDR McDonald Ferry	B	4	B	7
JDR Johnson Creek	C	9	B	6
Lower JDR Kahler Creek	B	5	C	11
Lower JDR Ferry Canyon	C	10	C	8
Lower JDR Service Creek	B	7	C	11
Lower JDR Clarno	C	9	C	10
Lower JDR Muddy Creek	C	8	D	12
Lower JDR Scott Canyon	C	11	C	9
Upper Middle JDR	D	12	C	9



Geographic area	Protection benefit	Restoration benefit	*Channel stability/landsc.1/*	*Chemicals*	*Competition (w/ hatch)*	*Competition (other sp)*	*Flow*	*Food*	*Habitat diversity*	*Harassment/poaching*	*Obstructions*	*Oxygen*	*Pathogens*	*Predation*	*Sediment load*	*Temperature*	*Withdrawals*	*Key habitat quantity*
	Geographic area priority		**Attribute class priority for restoration**															
Beech Creek	∘	◯	•				●		●		⬤				⬤	●		●
Canyon Creek	◯	○	•				•		•						•	•		●
Fields Creek	○	◯	•				•		●						●	•		⬤
JDR Johnson Creek	∘	○							•					•	•	•		●
Laycock Creek	○	◯	•				•		●		⬤				●	•		⬤
Lower JDR Clarno	∘	∘							•					•				●
Lower JDR Ferry Canyon	∘	∘							•					•				●
Lower JDR Kahler Creek	○	∘							⬤					•		•		●
Lower JDR McDonald Ferry	○	○							•					●				
Lower JDR Muddy Creek	∘								•					•				●
Lower JDR Scott Canyon	∘	∘							•					•				●
Lower JDR Service Creek	○	∘							●					•	•	•		●
Strawberry Creek	◯	◯	•				•		●						●	●		●
Upper JDR	◯	○					•		•						●	•		●
Upper Middle JDR		∘							•					•	•	•		●

1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

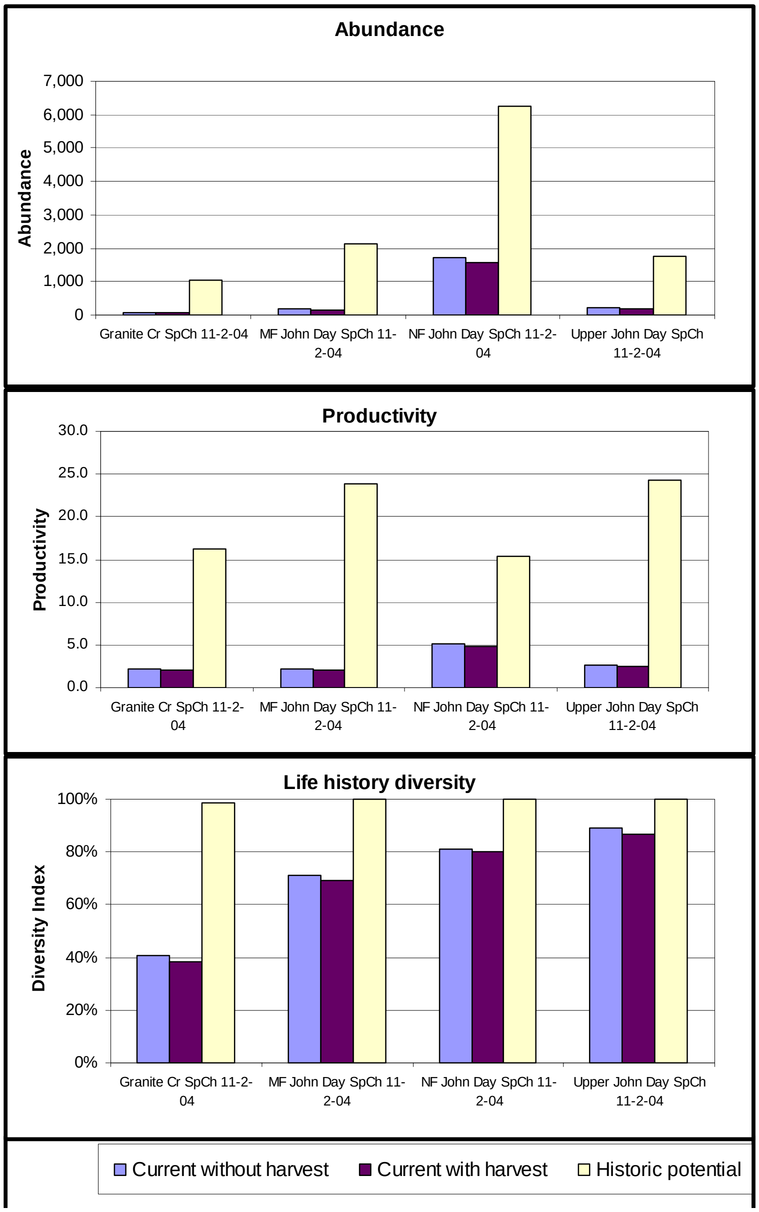
Key to strategic priority (corresponding Benefit Category letter also shown)

A	B	C	D & E
◯ / ⬤ High	○ / ● Medium	∘ / • Low	Indirect or General

Appendix T

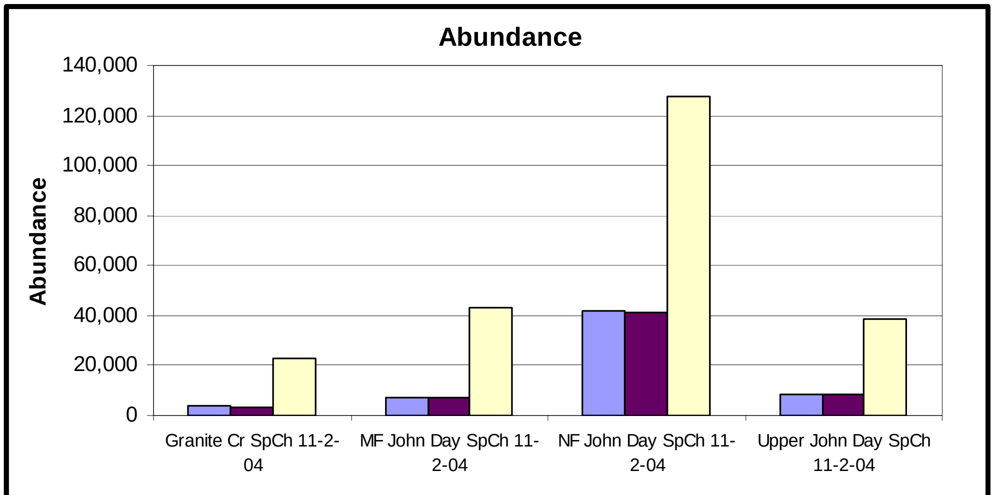
Adult Baseline Report Results (~1160 Reaches) for Spring Chinook Populations

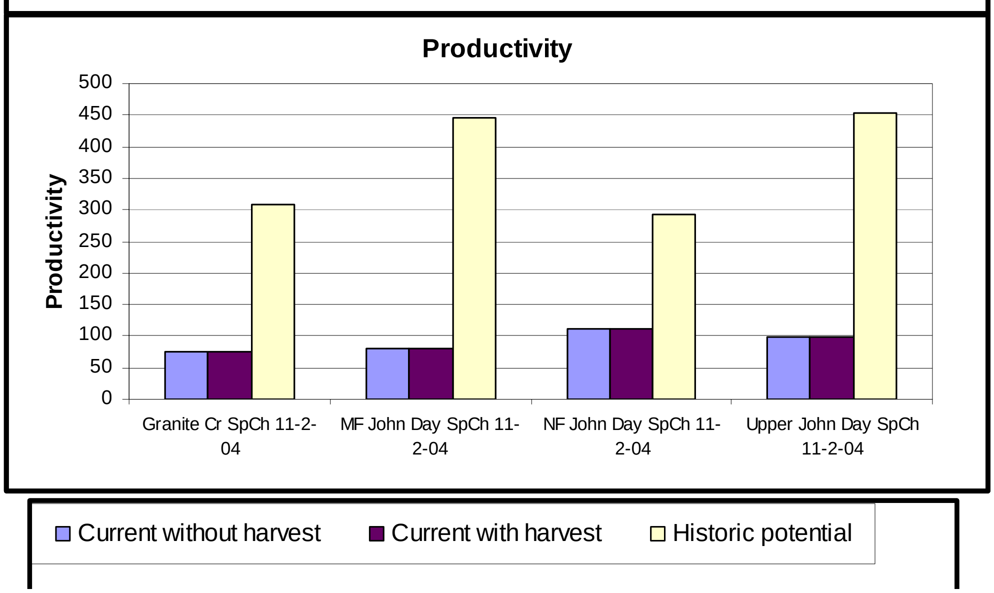
Baseline Report Adult Spring Chinook in the John Day Subbasin					
Population	**Scenario**	**Diversity index**	**Productivity**	**Capacity**	**Abundance**
Granite Cr SpCh 11-2-04	Current without harvest	41%	2.2	157	85
	Current with harvest	38%	2.0	147	74
	Historic potential	98%	16.2	1,128	1,059
MF John Day SpCh 11-2-04	Current without harvest	71%	2.2	328	177
	Current with harvest	69%	2.0	306	155
	Historic potential	100%	23.8	2,246	2,152
NF John Day SpCh 11-2-04	Current without harvest	81%	5.2	2,145	1,731
	Current with harvest	80%	4.8	1,999	1,585
	Historic potential	100%	15.4	6,687	6,252
Upper John Day SpCh 11-2-04	Current without harvest	89%	2.7	345	217
	Current with harvest	87%	2.5	321	194
	Historic potential	100%	24.3	1,842	1,767



<u>Juvenile</u> Baseline Report Results (~1160 Reaches) for Spring Chinook Populations

Baseline Report Juvenile Spring Chinook in the John Day Subbasin				
Population	**Scenario**	**Productivity**	**Capacity**	**Abundance**
Granite Cr SpCh 11-2-04	Current without harvest	76	9,252	3,806
	Current with harvest	76	9,252	3,507
	Historic potential	308	24,378	22,682
MF John Day SpCh 11-2-04	Current without harvest	81	15,376	7,416
	Current with harvest	81	15,378	6,903
	Historic potential	446	45,044	43,025
NF John Day SpCh 11-2-04	Current without harvest	110	54,078	42,130
	Current with harvest	110	54,081	41,294
	Historic potential	294	136,919	127,427
Upper John Day SpCh 11-2-04	Current without harvest	98	14,426	8,601
	Current with harvest	98	14,428	8,201
	Historic potential	453	40,524	38,570





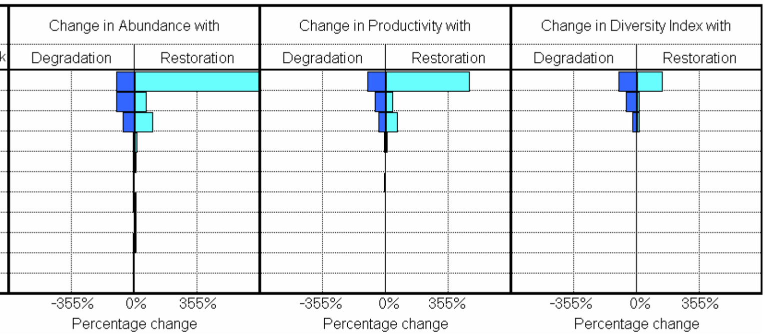
Appendix U

Diagnostic Reports (~1160 Reaches) for Spring Chinook Populations

5th HUC of Granite Creek John Day Spring Chinook

Relative Importance Of Geographic Areas For Protection and Restoration Measures

Geographic Area	Protection benefit Category	Protection benefit rank	Restoration benefit Category	Restoration benefit rank
Granite Creek	A	1	A	1
NF JDR Big Creek	A	2	A	3
NF JDR Potamus Creek	A	3	A	2
Lower NF JDR	B	4	B	4
Lower JDR Clarno	B	6	C	7
Lower JDR Kahler Creek	B	5	C	8
Lower JDR Ferry Canyon	C	9	B	6
Lower JDR McDonald Ferry	E	11	B	4
Lower JDR Scott Canyon	E	10	B	5
Lower JDR Service Creek	C	7	C	9
Lower JDR Muddy Creek	C	8	E	10



Protection and Restoration Strategic Priority Summary

Geographic area	Protection benefit	Restoration benefit	Channel stability/landsc.1/	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Granite Creek	◯	◯	•				•		⬤	•					●			●
Lower JDR Clarno	○	∘							•					•				●
Lower JDR Ferry Canyon	∘	○							•					•				●
Lower JDR Kahler Creek	○	∘							•									●
Lower JDR McDonald Ferry		○							•					●				
Lower JDR Muddy Creek	∘								•									●
Lower JDR Scott Canyon		○							•					•				●
Lower JDR Service Creek	∘	∘							•									●
Lower NF JDR	○	○							•							•		●
NF JDR Big Creek	◯	◯	•				•		•							•		●
NF JDR Potamus Creek	◯	◯							●							•		●

Geographic area priority / Attribute class priority for restoration

1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

Key to strategic priority (corresponding Benefit Category letter also shown)

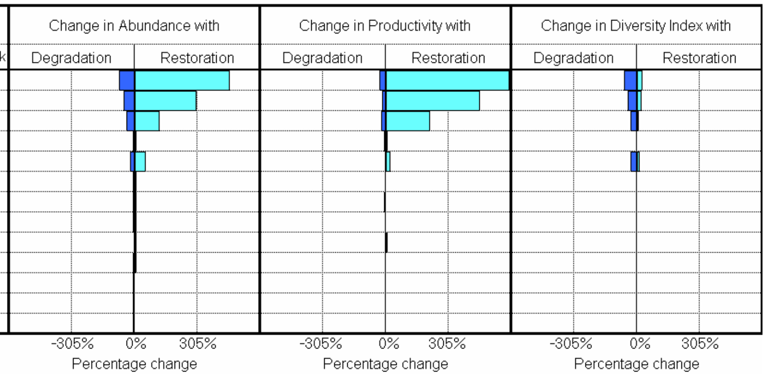
A	B	C	D & E
◯ / ⬤ High	○ / ● Medium	∘ / • Low	(blank) Indirect or General

Appendix U

5th HUC of Middle Fork John Day Spring Chinook

Relative Importance Of Geographic Areas For Protection and Restoration Measures

Geographic Area	Protection benefit Category	Protection benefit rank	Restoration benefit Category	Restoration benefit rank
Camp Creek	A	1	A	1
Big Creek	A	2	A	2
Upper MF JDR	A	3	A	3
Lower NF JDR	B	4	B	5
Lower MF JDR	B	6	B	4
Lower JDR Clarno	B	6	C	9
Lower JDR Kahler Creek	B	5	D	10
Lower JDR Ferry Canyon	C	9	C	7
Lower JDR McDonald Ferry	D	12	B	6
Lower JDR Scott Canyon	D	10	C	8
Lower JDR Service Creek	C	7	D	12
Lower JDR Muddy Creek	C	8	D	13
NF JDR Potamus Creek	D	11	D	11



Protection and Restoration Strategic Priority Summary

Geographic area	Protection benefit	Restoration benefit	Channel stability/landsc.1/	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Big Creek	◯	◯	•				•	•	●						•	●		●
Camp Creek	◯	◯	•				•		●						●	⬤		⬤
Lower JDR Clarno	○	∘							•					•				●
Lower JDR Ferry Canyon	∘	∘							•					•				●
Lower JDR Kahler Creek	○								•									●
Lower JDR McDonald Ferry		○							•					•				
Lower JDR Muddy Creek	∘								•									●
Lower JDR Scott Canyon		∘							•					•				●
Lower JDR Service Creek	∘								•									●
Lower MF JDR	○	○							●							•		•
Lower NF JDR	○	○							•							•		●
NF JDR Potamus Creek									●							•		●
Upper MF JDR	◯	◯	•				•		●						●	•		●

(Geographic area priority: Protection benefit, Restoration benefit. Attribute class priority for restoration: remaining columns.)

1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

Key to strategic priority (corresponding Benefit Category letter also shown)

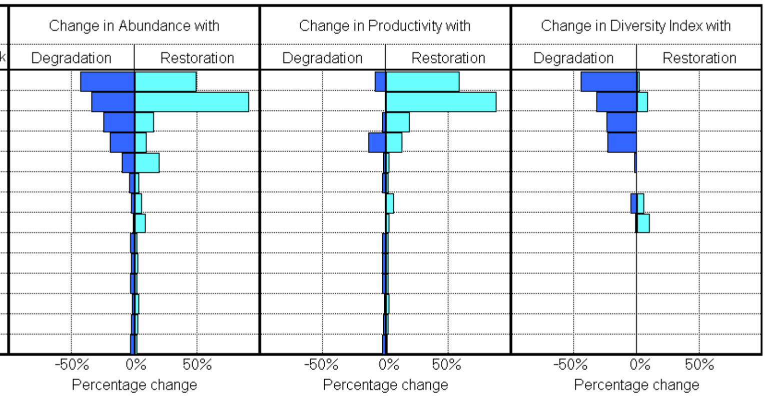
A	B	C	D & E
◯ / ⬤ High	○ / ● Medium	∘ / • Low	(blank) Indirect or General

Appendix U

5th HUC of North Fork John Day Spring Chinook

Relative Importance Of Geographic Areas For Protection and Restoration Measures

Geographic Area	Protection benefit Category/rank		Restoration benefit Category/rank	
NF JDR Big Creek	A	1	A	2
NF JDR Potamus Creek	A	3	A	1
Upper NF JDR	A	2	B	4
Desolation Creek	A	2	B	5
Lower NF JDR	B	5	B	4
Lower JDR Kahler Creek	B	4	C	8
Upper Camas Creek	D	10	B	4
Lower Camas Creek	D	12	A	3
Lower JDR Clarno	B	6	C	9
Lower JDR Ferry Canyon	C	8	C	7
Lower JDR Service Creek	B	5	D	10
Lower JDR McDonald Ferry	D	11	B	6
Lower JDR Scott Canyon	C	9	C	8
Lower JDR Muddy Creek	C	7	D	11



Protection and Restoration Strategic Priority Summary

Geographic area	Protection benefit	Restoration benefit	Channel stability/landsc.1/	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/poaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Desolation Creek	◯	○					•		●							•		●
Lower Camas Creek		◯	•				•		⬤							●		●
Lower JDR Clarno	○	◦							•					•				●
Lower JDR Ferry Canyon	◦	◦							•					•				●
Lower JDR Kahler Creek	○	◦							•									●
Lower JDR McDonald Ferry		○							•					•				
Lower JDR Muddy Creek	◦								•									●
Lower JDR Scott Canyon	◦	◦							•					•				●
Lower JDR Service Creek	○								•									●
Lower NF JDR	○	○							•							•		●
NF JDR Big Creek	◯	◯	•				•		●							●		●
NF JDR Potamus Creek	◯	◯	•				•		●						•	●		●
Upper Camas Creek		○	•				•		●						●	⬤		●
Upper NF JDR	◯	○							•						•	•		●

1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

Key to strategic priority (corresponding Benefit Category letter also shown)

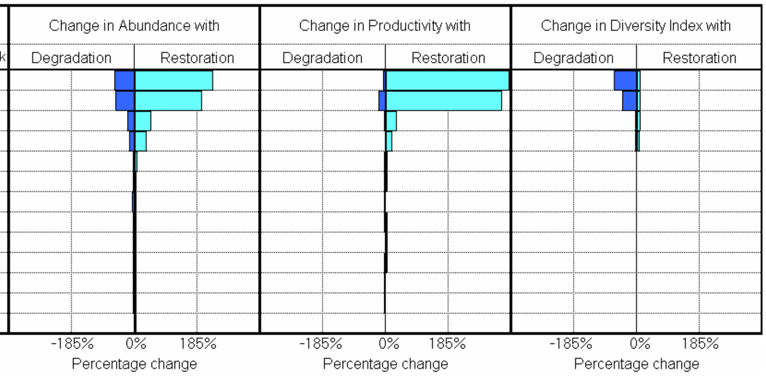
A	B	C	D & E
◯ / ⬤ High	○ / ● Medium	◦ / • Low	Indirect or General

Appendix U

5th HUC of Upper John Day Spring Chinook

Relative Importance Of Geographic Areas For Protection and Restoration Measures

Geographic Area	Protection benefit Category	Protection benefit rank	Restoration benefit Category	Restoration benefit rank
Upper JDR	A	1	A	1
Strawberry Creek	A	2	A	2
Laycock Creek	A	3	A	3
Fields Creek	C	7	B	4
JDR Johnson Creek	B	6	B	5
Lower JDR Clarno	B	5	C	9
Lower JDR Kahler Creek	B	4	D	10
Lower JDR Ferry Canyon	C	9	C	7
Lower JDR McDonald Ferry	D	11	B	6
Lower JDR Scott Canyon	D	10	C	8
Lower JDR Service Creek	C	7	D	11
Lower JDR Muddy Creek	C	8	D	12
Upper Middle JDR	D	12	C	9



Protection and Restoration Strategic Priority Summary

Geographic area priority			Attribute class priority for restoration															
Geographic area	**Protection benefit**	**Restoration benefit**	***Channel stability/landsc.1/***	***Chemicals***	***Competition (w/ hatch)***	***Competition (other sp)***	***Flow***	***Food***	***Habitat diversity***	***Harassment/poaching***	***Obstructions***	***Oxygen***	***Pathogens***	***Predation***	***Sediment load***	***Temperature***	***Withdrawals***	***Key habitat quantity***
Fields Creek	∘	○							•						•			⬤
JDR Johnson Creek	○	○							•					•	•			●
Laycock Creek	◯	◯	•				•		●		•				•	•		⬤
Lower JDR Clarno	○	∘							•					•				●
Lower JDR Ferry Canyon	∘	∘							•					•				●
Lower JDR Kahler Creek	○								•									●
Lower JDR McDonald Ferry		○							•					•				
Lower JDR Muddy Creek	∘								•									●
Lower JDR Scott Canyon		∘							•					•				●
Lower JDR Service Creek	∘								•									●
Strawberry Creek	◯	◯	•				•		●							●		⬤
Upper JDR	◯	◯					•		●							⬤		⬤
Upper Middle JDR		∘							•						•			●

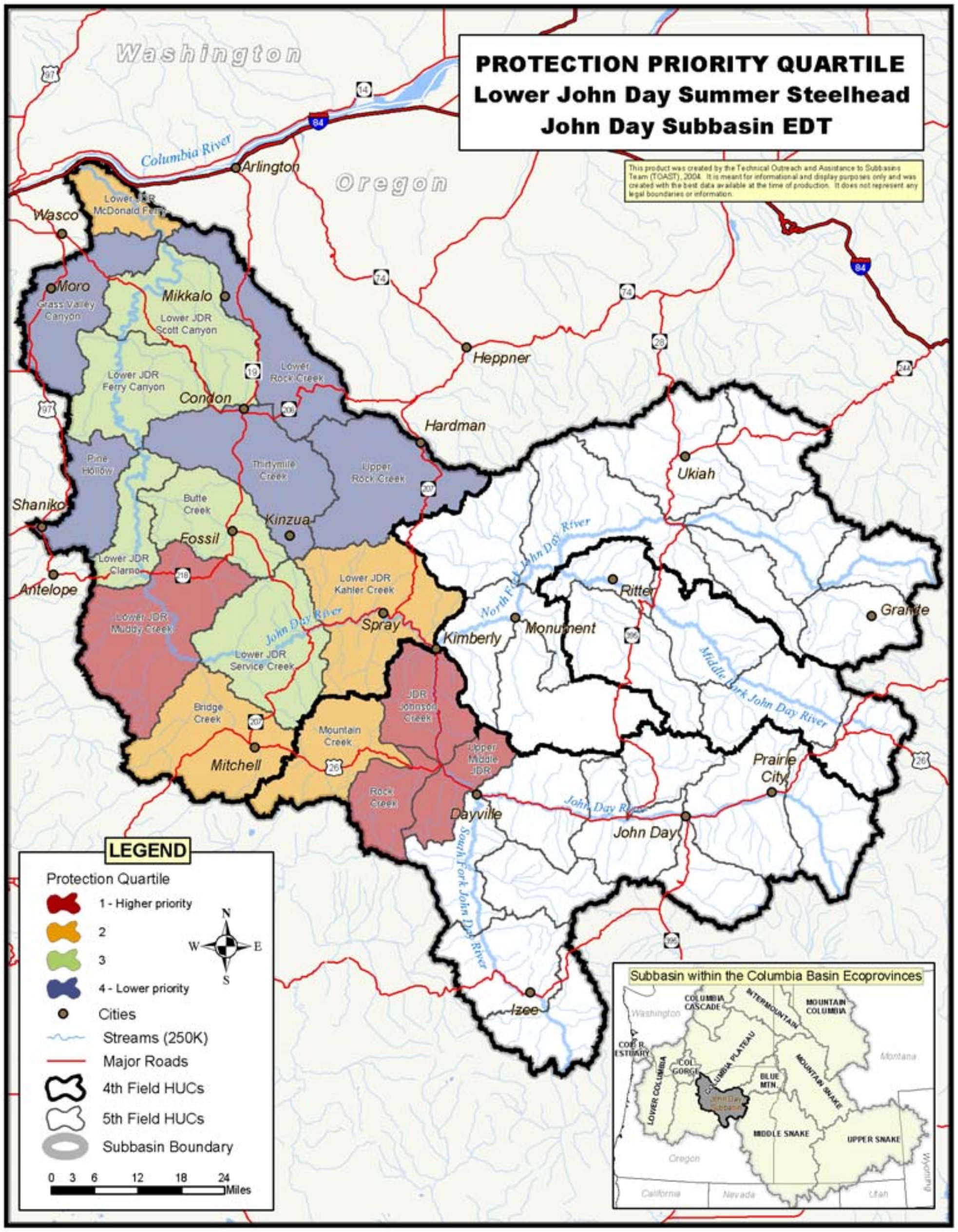
1/ "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.

Key to strategic priority (corresponding Benefit Category letter also shown)

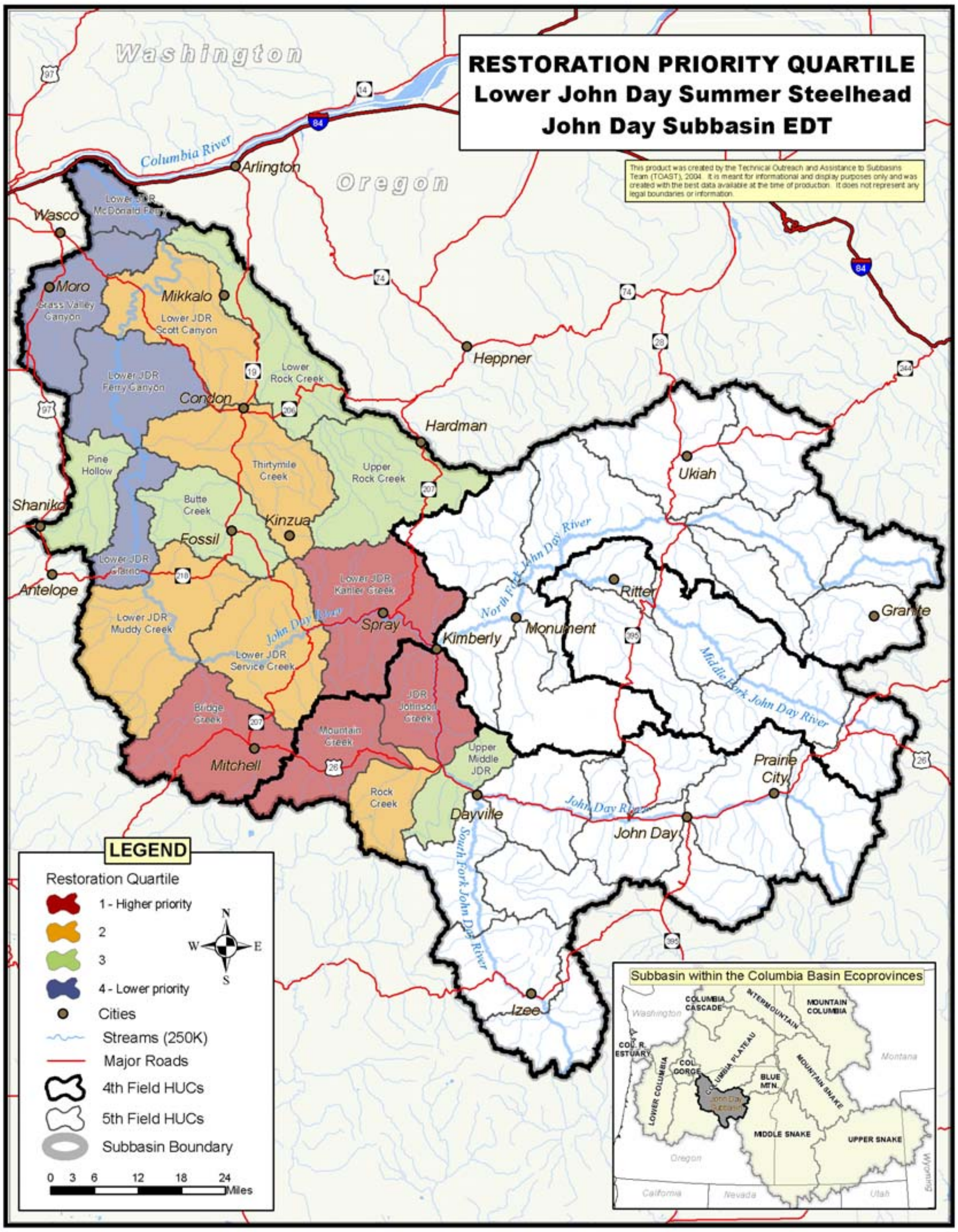
Category	Symbols	Priority
A	◯ / ⬤	High
B	○ / ●	Medium
C	∘ / •	Low
D & E	(blank)	Indirect or General

Appendix V

Maps of EDT Top Quartiles for Protection and Restoration for Both Summer Steelhead and Spring Chinook in the John Day Subbasin

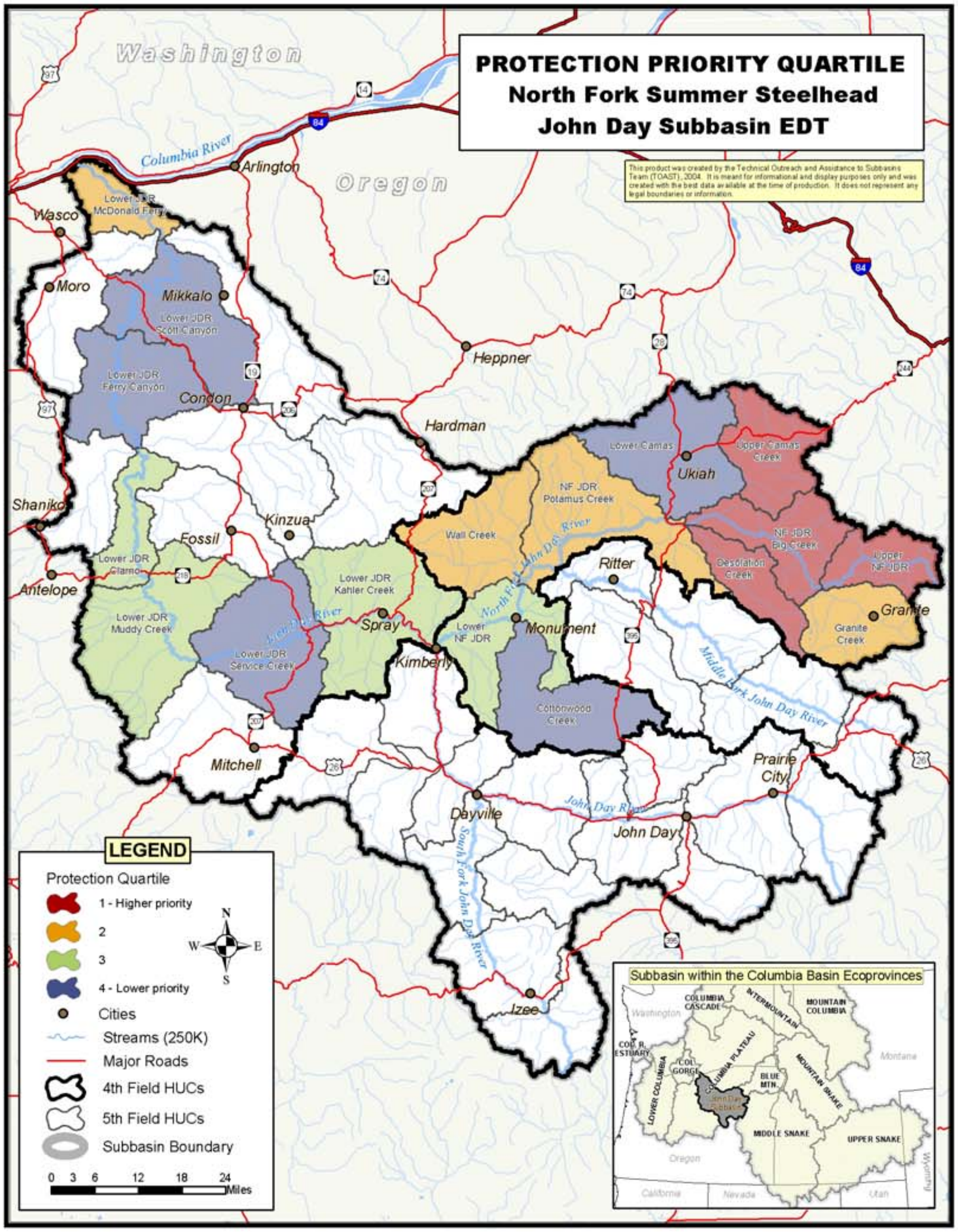


Appendix V



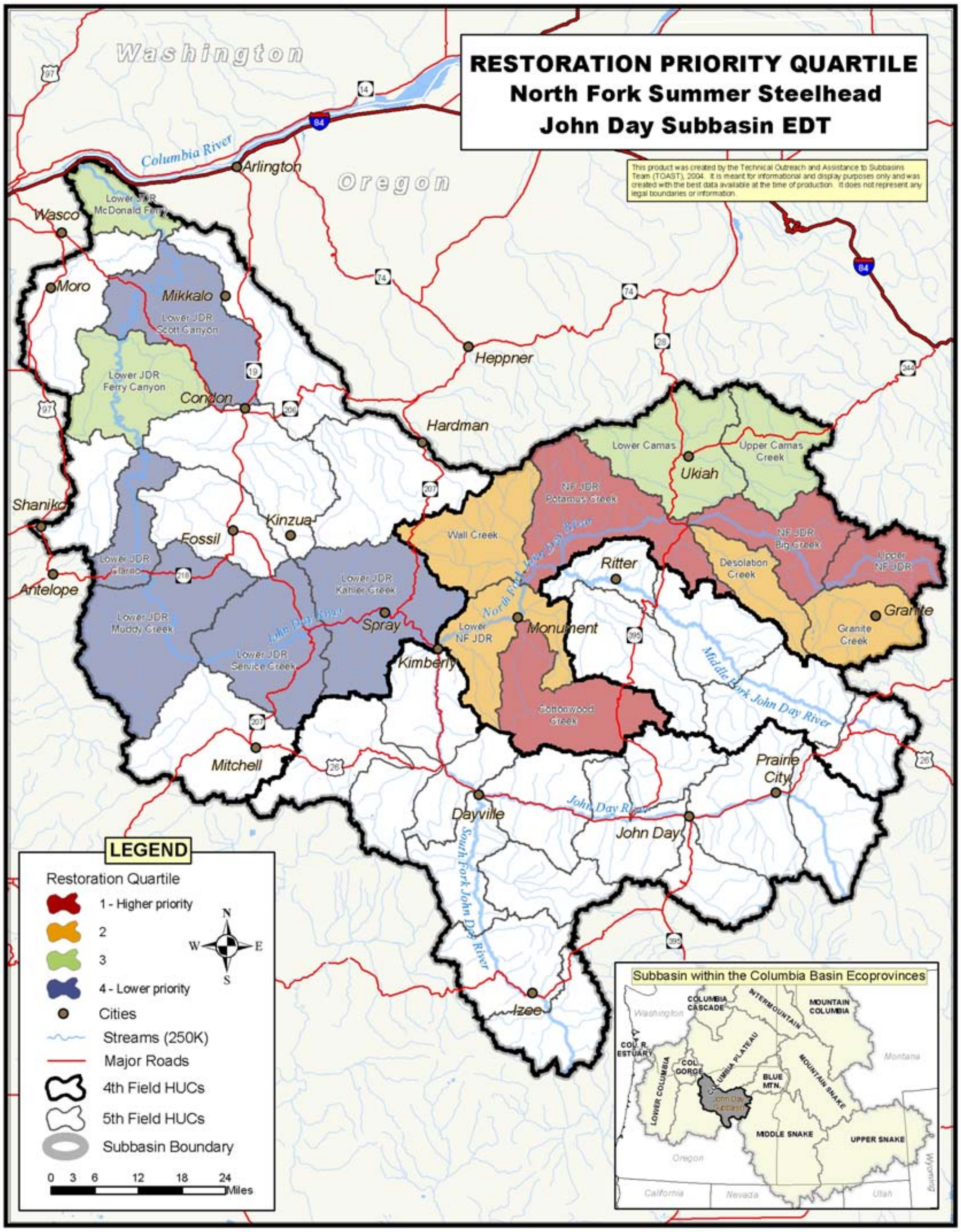
RESTORATION PRIORITY QUARTILE
Lower John Day Summer Steelhead
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Condon
Heppner
Hardman
Ukiah
Shaniko
Antelope
Fossil
Kinzua
Spray
Kimberly
Monument
Ritter
Granite
Mitchell
Dayville
John Day
Prairie City
Izee
North Fork John Day River
Middle Fork John Day River
South Fork John Day River
John Day River
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix V



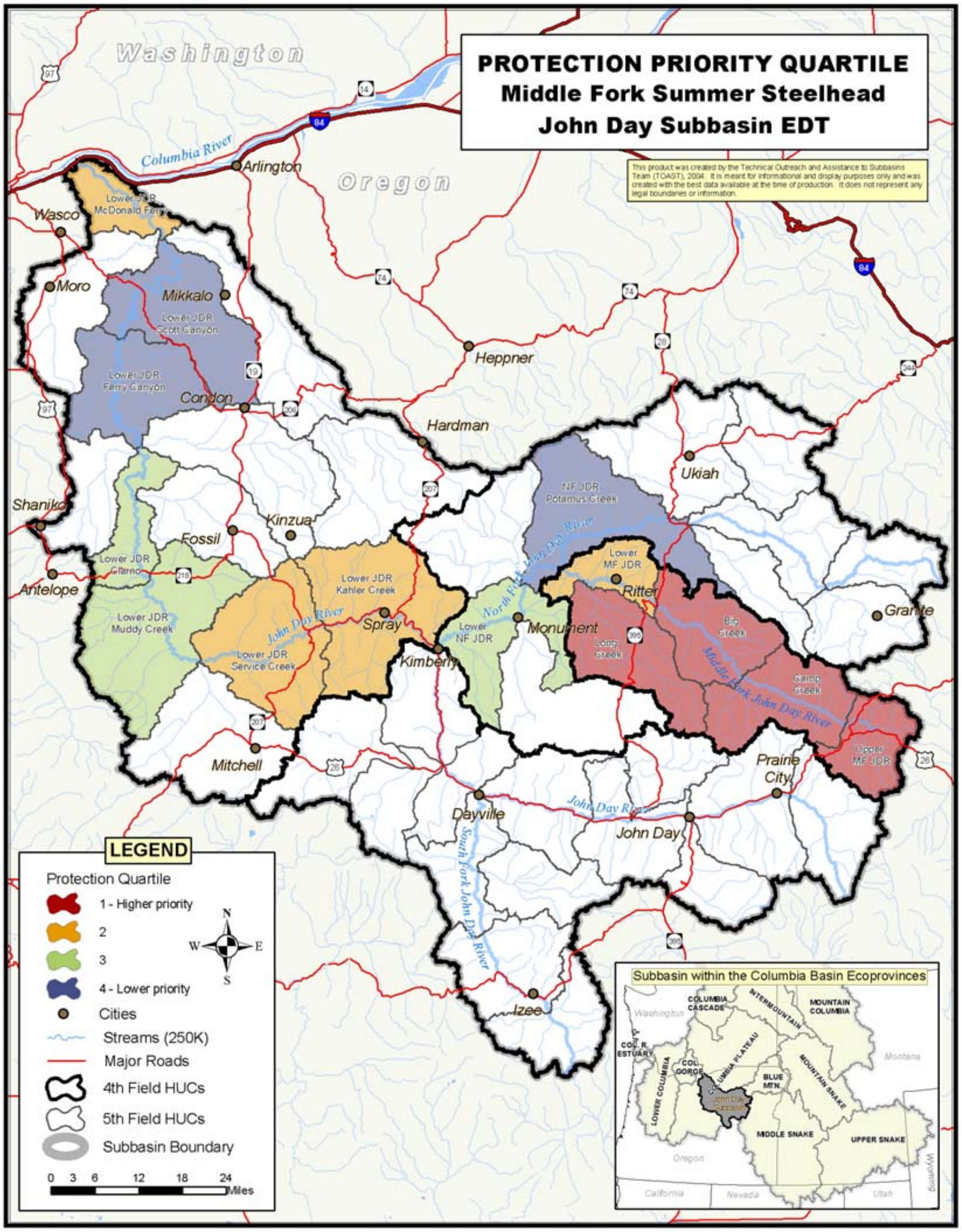
PROTECTION PRIORITY QUARTILE
North Fork Summer Steelhead
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Condon
Heppner
Hardman
Shaniko
Fossil
Kinzua
Antelope
Spray
Kimberly
Monument
Ritter
Ukiah
Granite
Mitchell
Dayville
John Day
Prairie City
Izee
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Clarno
Lower JDR Muddy Creek
Lower JDR Service Creek
Lower JDR Kahler Creek
Wall Creek
NF JDR Potamus Creek
Lower Camas
Upper Camas Creek
NF JDR Big Creek
Desolation Creek
Upper NF JDR
Granite Creek
Lower NF JDR
Cottonwood Creek
North Fork John Day River
Middle Fork John Day River
John Day River
South Fork John Day River
LEGEND
Protection Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix V

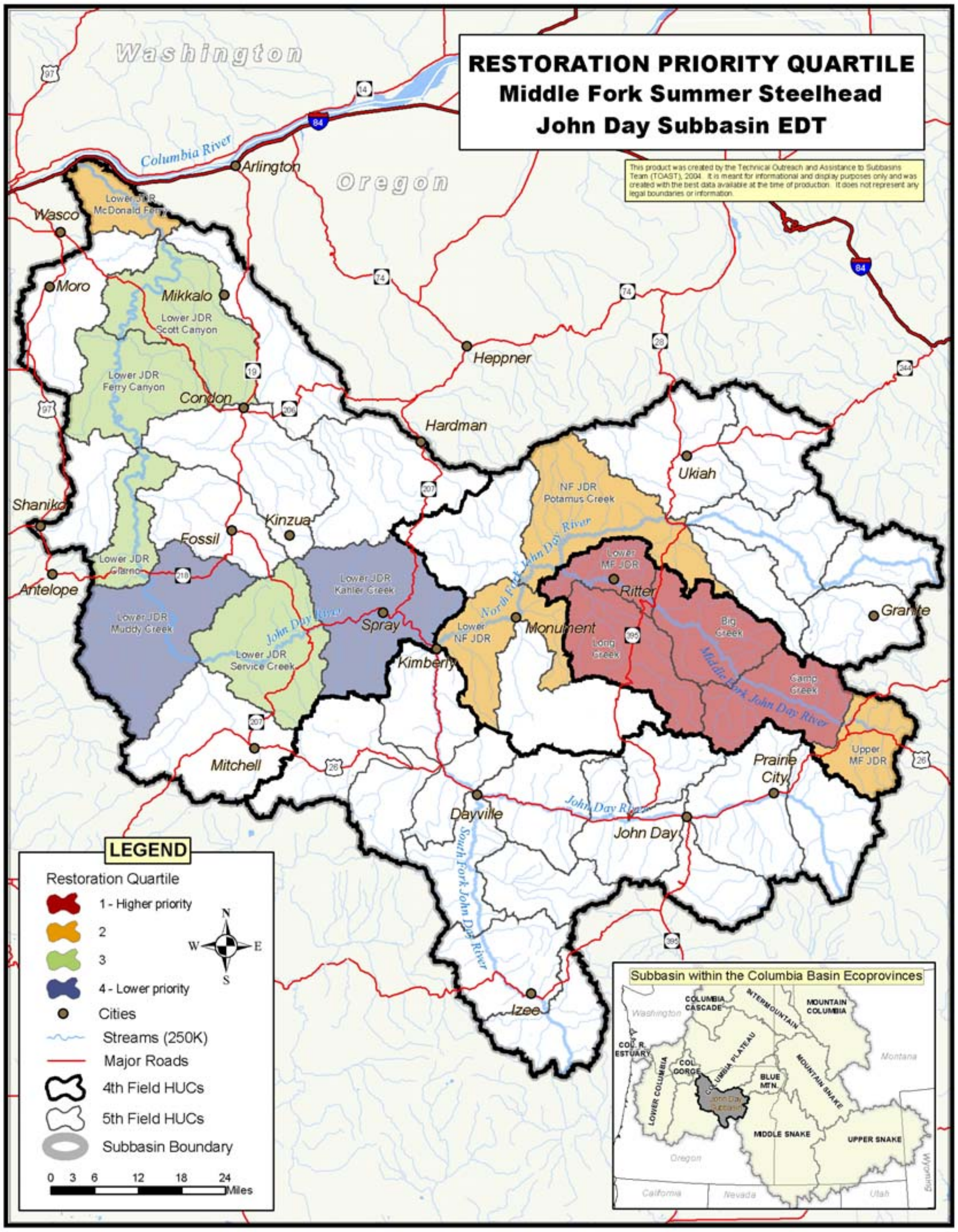


RESTORATION PRIORITY QUARTILE
North Fork Summer Steelhead
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Spray
Ritter
Monument
Granite
Kimberly
Mitchell
Dayville
Prairie City
John Day
Izee
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower Camas
Upper Camas Creek
NF JDR Potamus Creek
Wall Creek
NF JDR Big Creek
Desolation Creek
Upper NF JDR
Granite Creek
Lower JDR Kahler Creek
Lower JDR Muddy Creek
Lower JDR Service Creek
Lower NF JDR
Cottonwood Creek
North Fork John Day River
John Day River
Middle Fork John Day River
South Fork John Day River
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

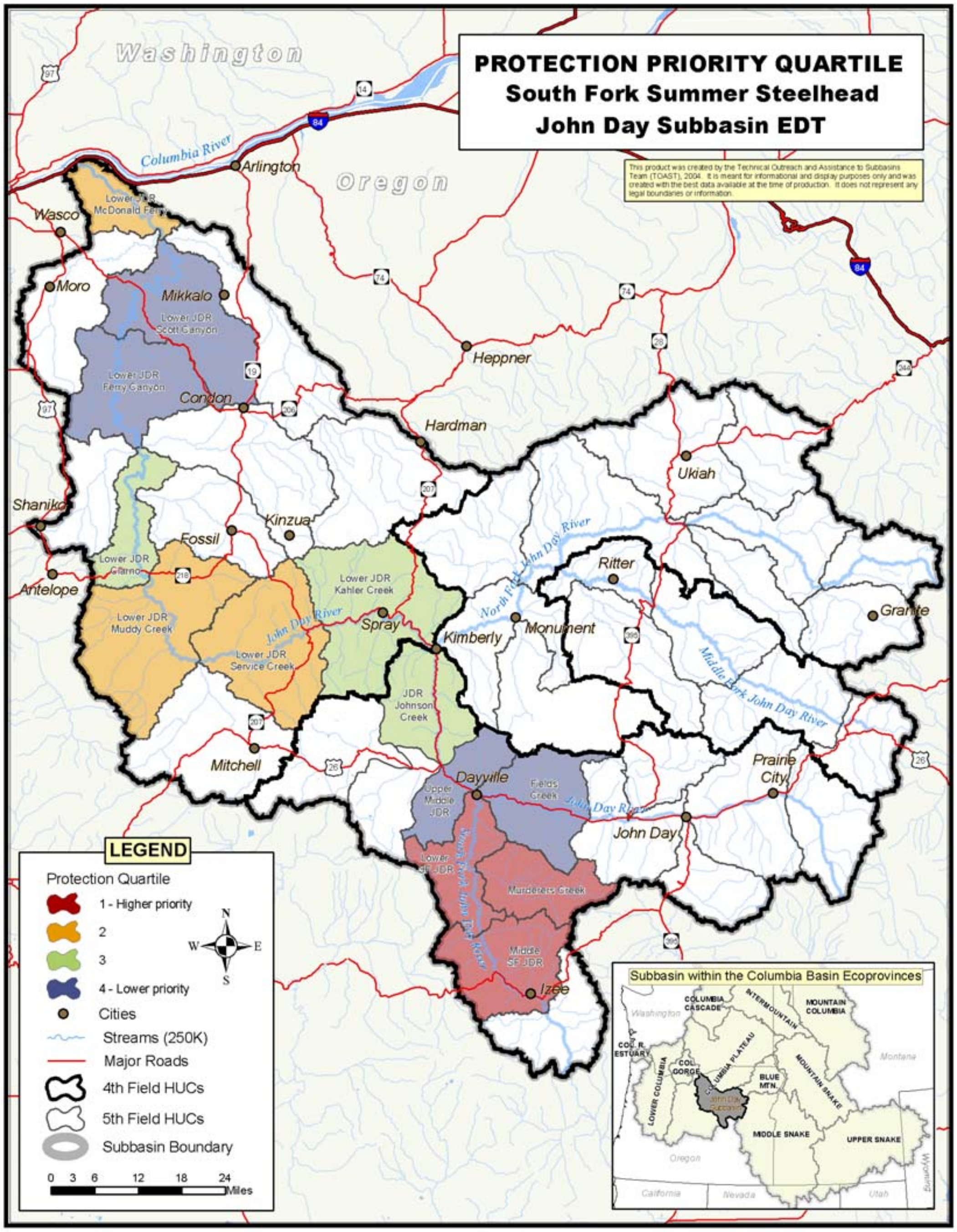
Appendix V


PROTECTION PRIORITY QUARTILE
Middle Fork Summer Steelhead
John Day Subbasin EDT
This product was created by the Technical Outreach and Assistance to Subbasins Team (TOAST), 2004. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information.
Washington
Oregon
Columbia River
John Day River
North Fork John Day River
Middle Fork John Day River
South Fork John Day River
Arlington
Wasco
Moro
Mikkalo
Condon
Heppner
Hardman
Ukiah
Shaniko
Antelope
Fossil
Kinzua
Spray
Kimberly
Monument
Ritter
Granite
Mitchell
Dayville
Prairie City
John Day
Izee
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Clarno
Lower JDR Muddy Creek
Lower JDR Kahler Creek
Lower JDR Service Creek
Lower NF JDR
NF JDR Potamus Creek
Lower MF JDR
Long Creek
Big Creek
Camp Creek
Upper MF JDR
LEGEND
Protection Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COLUMBIA PLATEAU
MOUNTAIN SNAKE
BLUE MTN.
MIDDLE SNAKE
UPPER SNAKE
LOWER COLUMBIA
COL. R. ESTUARY
COL. GORGE
Washington
Montana
Oregon
California
Nevada
Utah
Wyoming

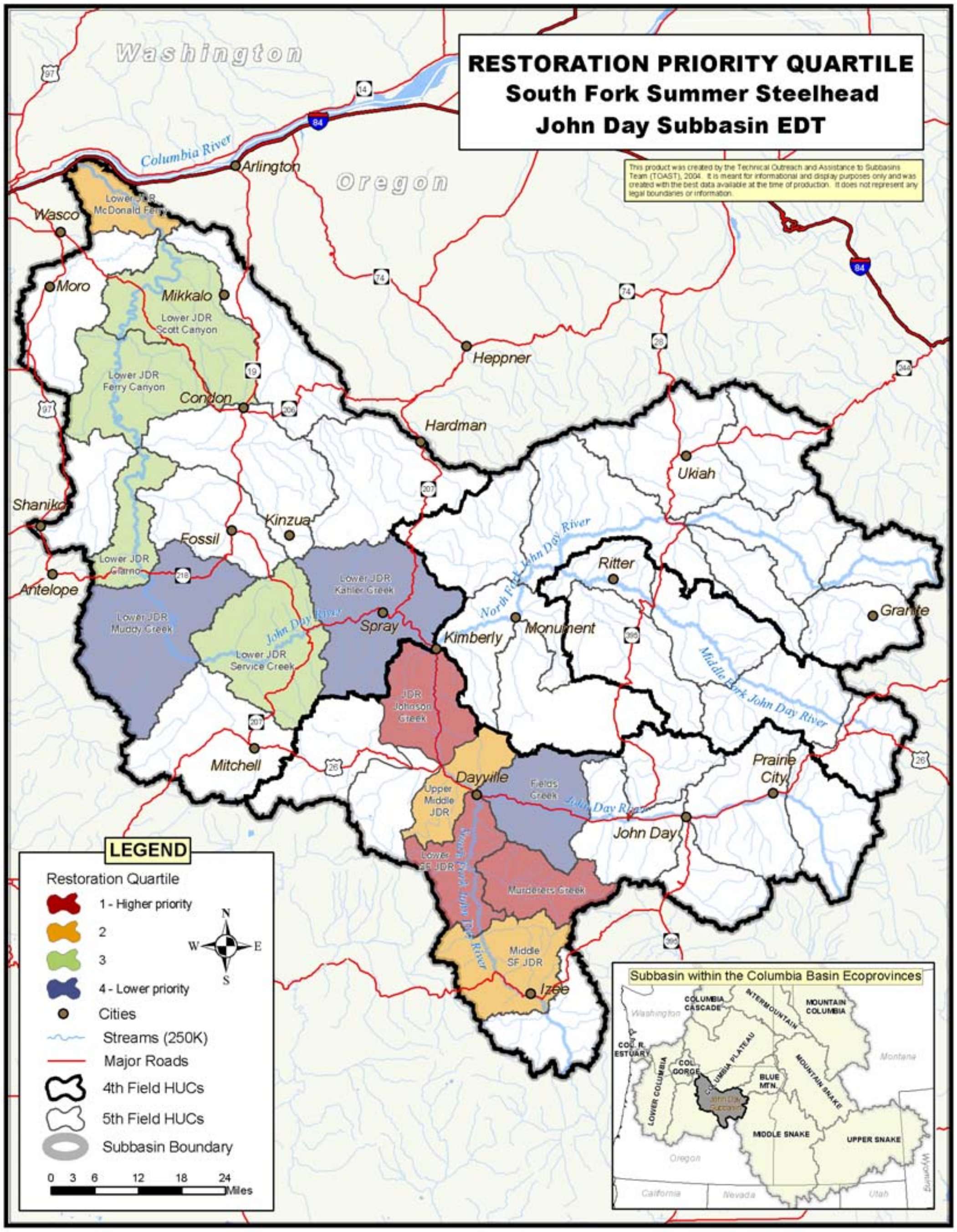
Appendix V


RESTORATION PRIORITY QUARTILE
Middle Fork Summer Steelhead
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Condon
Heppner
Hardman
Ukiah
NF JDR Potamus Creek
Shaniko
Fossil
Kinzua
Antelope
Lower JDR Muddy Creek
Lower JDR Kahler Creek
Lower JDR Service Creek
Spray
Kimberly
Lower NF JDR
Monument
Ritter
Lower MF JDR
Long Creek
Big Creek
Camp Creek
Granite
Upper MF JDR
Prairie City
Mitchell
Dayville
John Day
John Day River
South Fork John Day River
Middle Fork John Day River
North Fork John Day River
Izee
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COLUMBIA PLATEAU
BLUE MTN
MOUNTAIN SNAKE
MIDDLE SNAKE
UPPER SNAKE
LOWER COLUMBIA
COL GORGE
COL R. ESTUARY

Appendix V

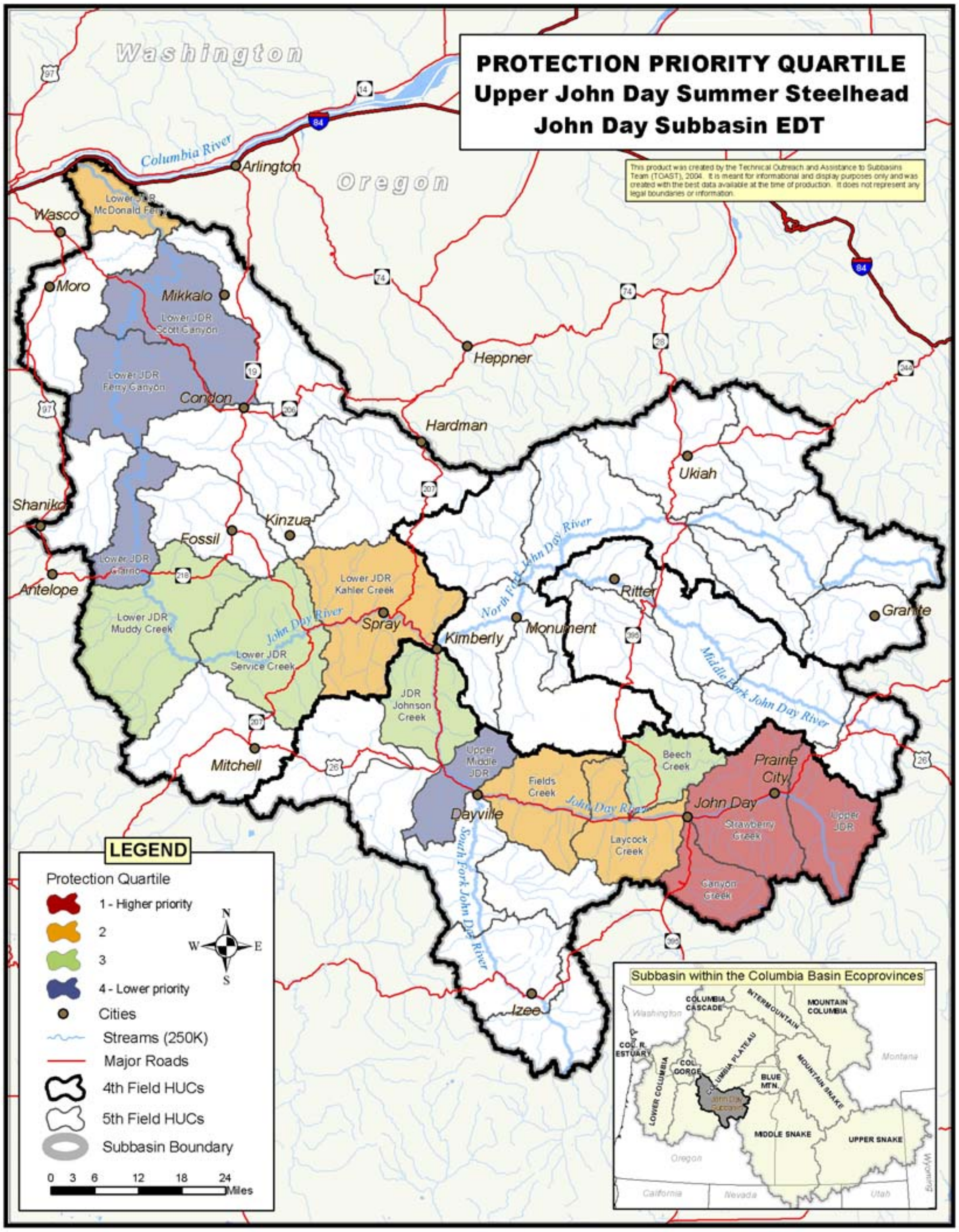

PROTECTION PRIORITY QUARTILE
South Fork Summer Steelhead
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Ritter
Spray
Kimberly
Monument
Granite
Mitchell
Dayville
Prairie City
John Day
Izee
North Fork John Day River
Middle Fork John Day River
John Day River
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Clarno
Lower JDR Muddy Creek
Lower JDR Service Creek
Lower JDR Kahler Creek
JDR Johnson Creek
Upper Middle JDR
Fields Creek
Lower SFJDR
Murderers Creek
Middle SFJDR
LEGEND
Protection Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COLUMBIA PLATEAU
BLUE MTN.
MOUNTAIN SNAKE
MIDDLE SNAKE
UPPER SNAKE
LOWER COLUMBIA
COL. GORGE

Appendix V



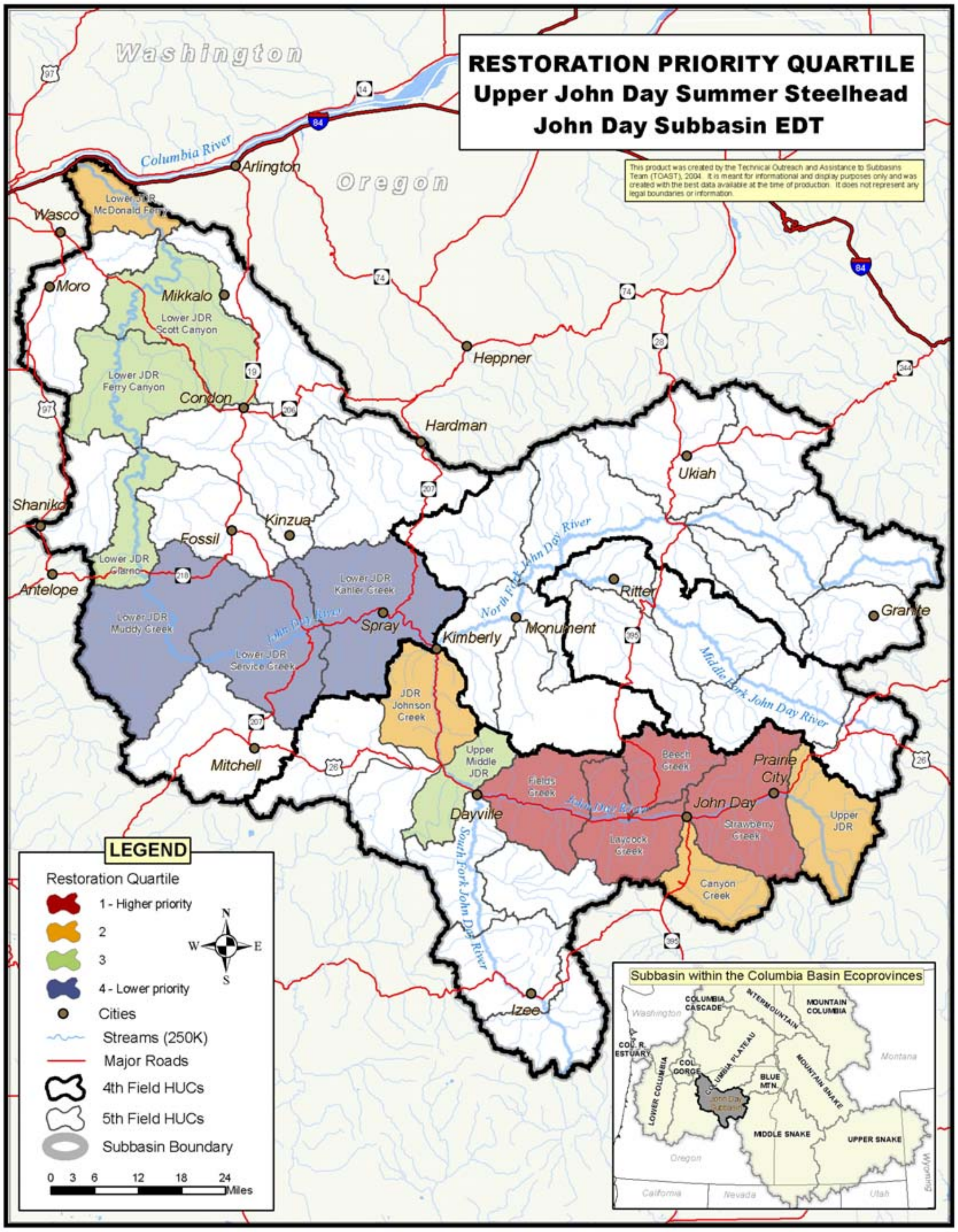
RESTORATION PRIORITY QUARTILE
South Fork Summer Steelhead
John Day Subbasin EDT
This product was created by the Technical Outreach and Assistance to Subbasins Team (TOAST), 2004. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information.
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Condon
Heppner
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Lower JDR Clarno
Lower JDR Muddy Creek
Lower JDR Kahler Creek
Lower JDR Service Creek
Spray
Kimberly
Monument
Ritter
Granite
North Fork John Day River
Middle Fork John Day River
John Day River
JDR Johnson Creek
Mitchell
Dayville
Upper Middle JDR
Fields Creek
John Day
Prairie City
Lower SF JDR
Murderers Creek
Middle SF JDR
South Fork John Day River
Izee
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
N
S
E
W
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COLUMBIA PLATEAU
MOUNTAIN SNAKE
BLUE MTN.
LOWER COLUMBIA
COL. GORGE
COL. R. ESTUARY
MIDDLE SNAKE
UPPER SNAKE

Appendix V

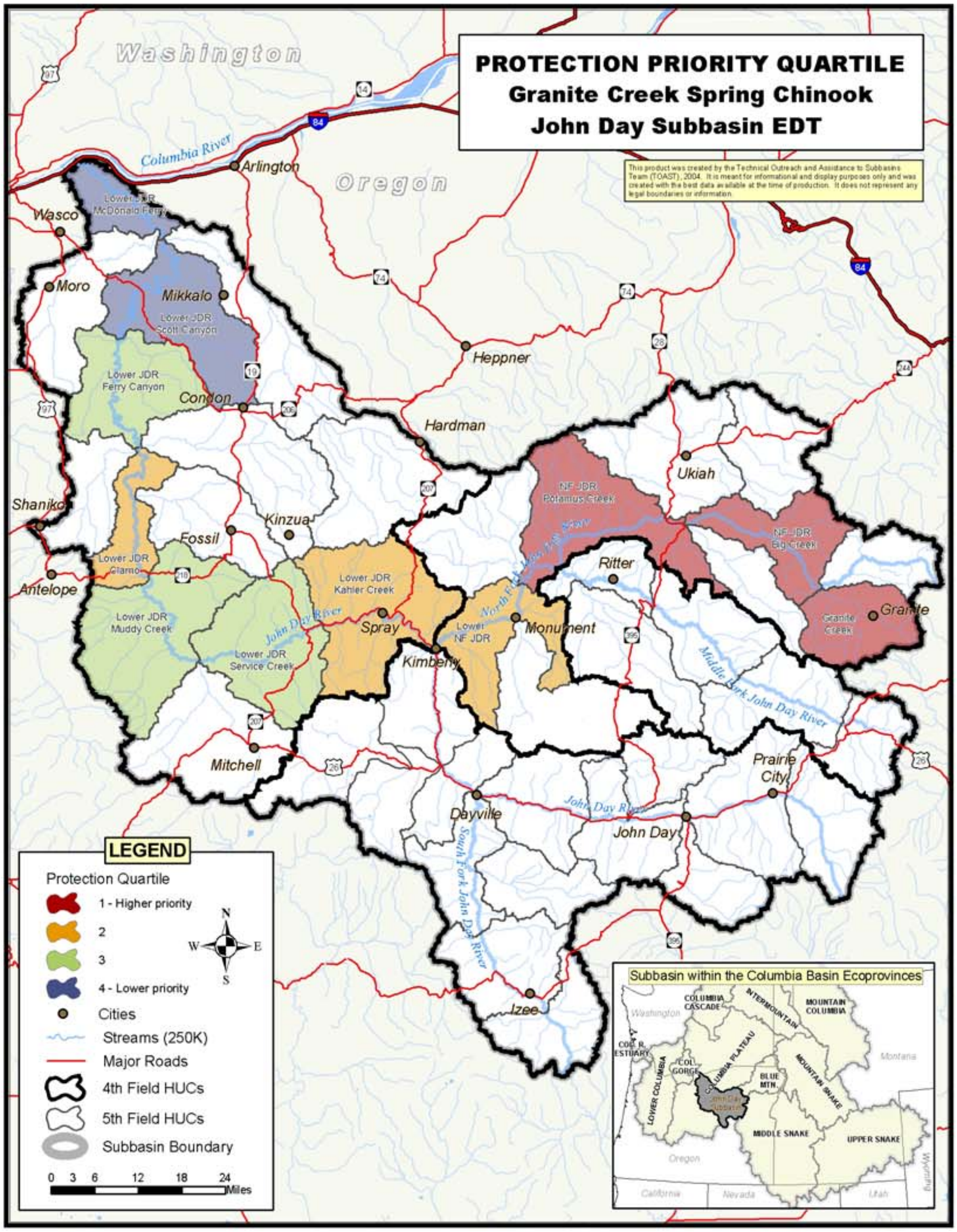


PROTECTION PRIORITY QUARTILE
Upper John Day Summer Steelhead
John Day Subbasin EDT
This product was created by the Technical Outreach and Assistance to Subbasins Team (TOAST), 2004. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information.
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Condon
Heppner
Hardman
Ukiah
Shaniko
Antelope
Fossil
Kinzua
Spray
Kimberly
Monument
Ritter
Granite
Mitchell
Dayville
John Day
Prairie City
Izee
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Muddy Creek
Lower JDR Service Creek
Lower JDR Kahler Creek
JDR Johnson Creek
Upper Middle JDR
Fields Creek
Beech Creek
Laycock Creek
Strawberry Creek
Upper JDR
Canyon Creek
John Day River
North Fork John Day River
Middle Fork John Day River
South Fork John Day River
LEGEND
Protection Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
N
S
E
W
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COL. R. ESTUARY
LOWER COLUMBIA
COL. GORGE
COLUMBIA PLATEAU
BLUE MTN.
MOUNTAIN SNAKE
MIDDLE SNAKE
UPPER SNAKE
Washington
Montana
Oregon
California
Nevada
Utah
Wyoming

Appendix V

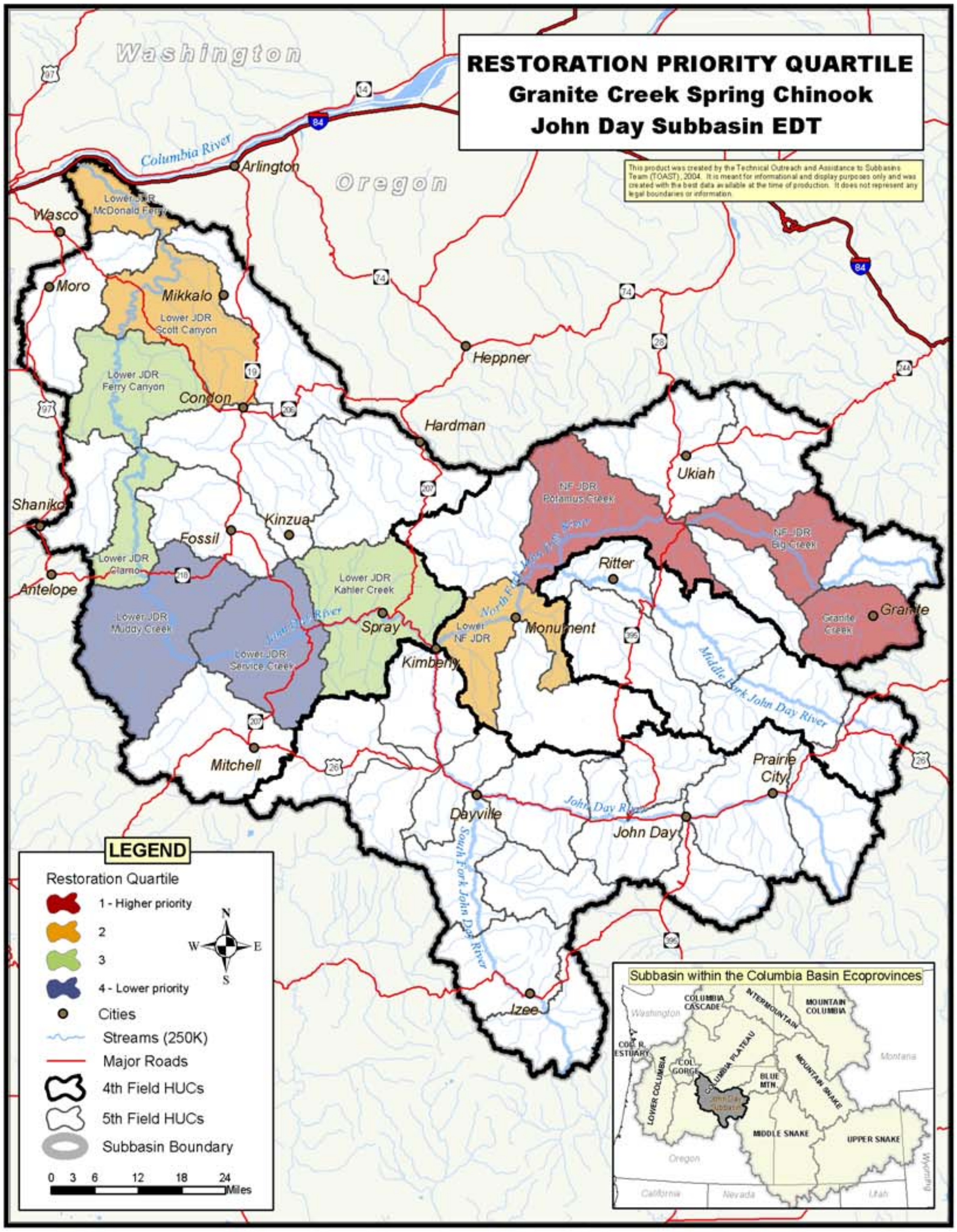

RESTORATION PRIORITY QUARTILE
Upper John Day Summer Steelhead
John Day Subbasin EDT
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Condon
Heppner
Hardman
Ukiah
Shaniko
Kinzua
Fossil
Antelope
Ritter
Granite
Monument
Spray
Kimberly
Mitchell
Prairie City
John Day
Dayville
Izee
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Kahler Creek
Lower JDR Muddy Creek
Lower JDR Service Creek
JDR Johnson Creek
Upper Middle JDR
Fields Creek
Beech Creek
Laycock Creek
Strawberry Creek
Upper JDR
Canyon Creek
North Fork John Day River
Middle Fork John Day River
South Fork John Day River

Appendix V



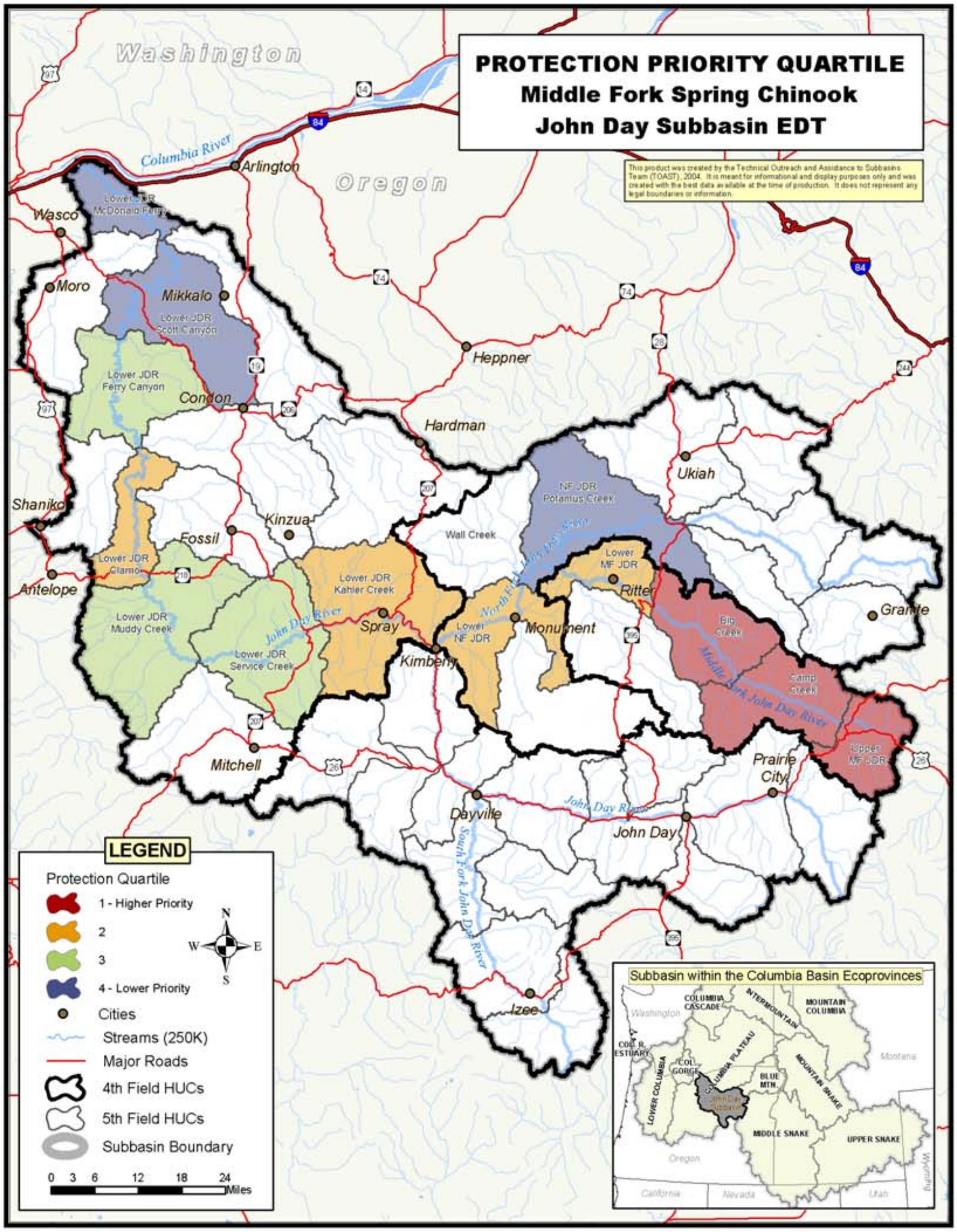
PROTECTION PRIORITY QUARTILE
Granite Creek Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Condon
Heppner
Hardman
Ukiah
NF JDR Potamus Creek
NF JDR Big Creek
Granite Creek
Granite
Shaniko
Fossil
Kinzua
Lower JDR Clarno
Antelope
Lower JDR Muddy Creek
Lower JDR Kahler Creek
Lower JDR Service Creek
Spray
Kimberly
Lower NF JDR
Monument
Ritter
Middle Fork John Day River
Mitchell
Prairie City
Dayville
John Day
South Fork John Day River
Izee
LEGEND
Protection Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix V



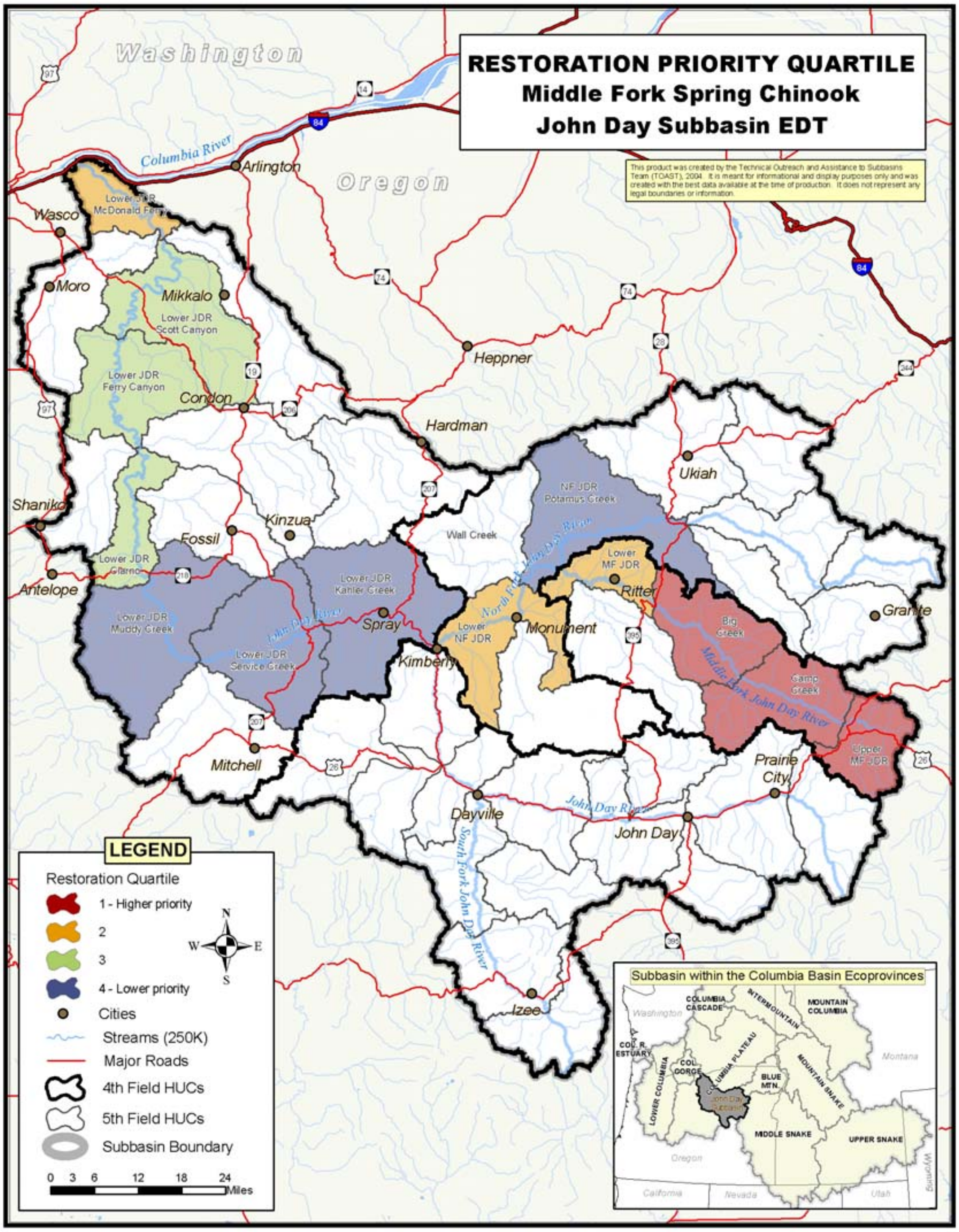
RESTORATION PRIORITY QUARTILE
Granite Creek Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Ritter
Spray
Monument
Granite
Kimberly
Mitchell
Prairie City
Dayville
John Day
Izee
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Clarno
Lower JDR Muddy Creek
Lower JDR Service Creek
Lower JDR Kahler Creek
Lower NF JDR
NF JDR Potamus Creek
NF JDR Big Creek
Granite Creek
Middle Fork John Day River
John Day River
South Fork John Day River
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix V



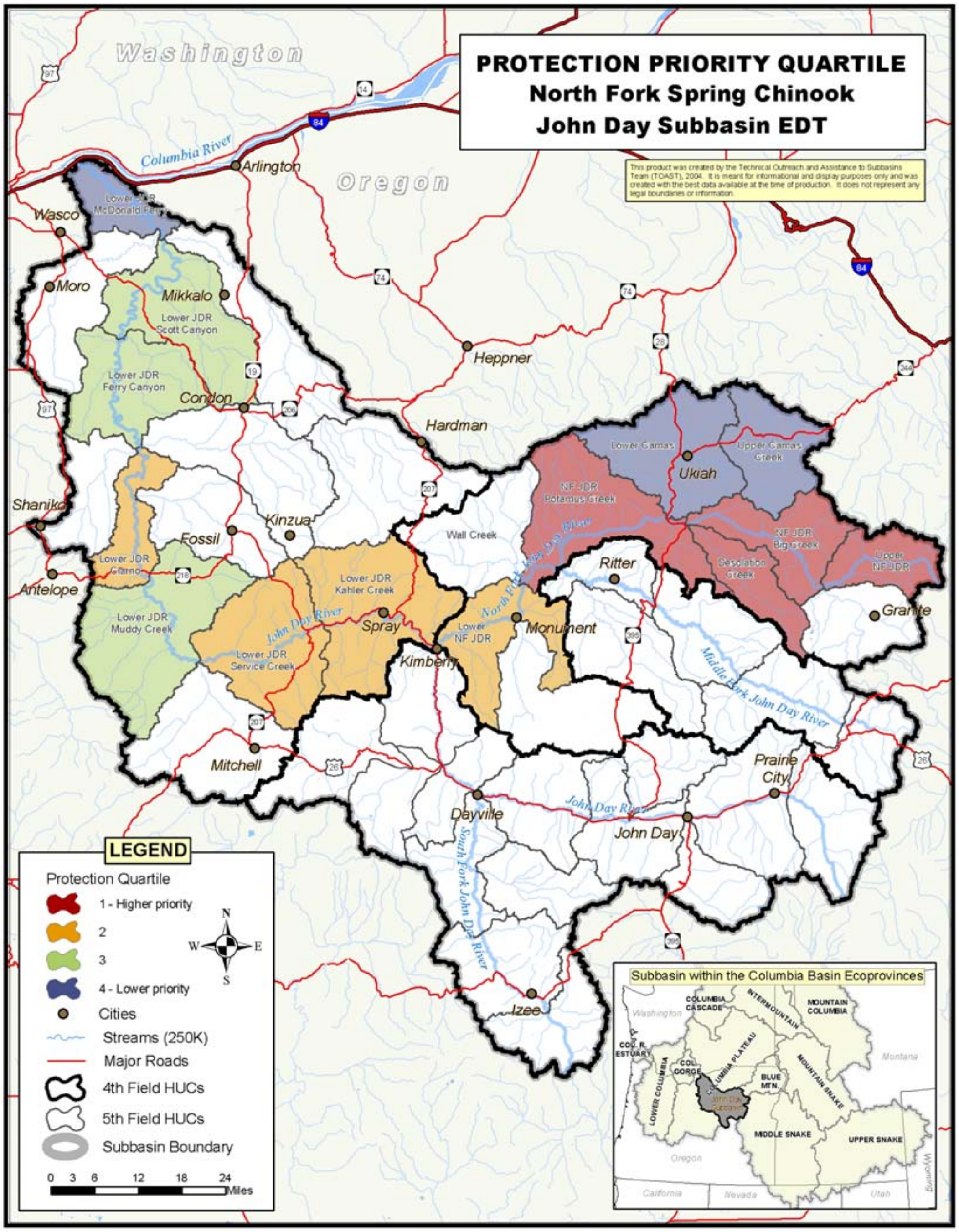
PROTECTION PRIORITY QUARTILE
Middle Fork Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Condon
Heppner
Hardman
Ukiah
NF JDR Potamus Creek
Shaniko
Kinzua
Fossil
Wall Creek
Lower JDR Clarno
Antelope
Lower JDR Kahler Creek
Lower MF JDR
Ritter
Granite
Lower JDR Muddy Creek
Spray
Lower NF JDR
Monument
Big Creek
Lower JDR Service Creek
Kimberly
Camp Creek
Upper MF JDR
Mitchell
Prairie City
Dayville
John Day
John Day River
North Fork John Day River
Middle Fork John Day River
South Fork John Day River
Izee
LEGEND
Protection Quartile
1 - Higher Priority
2
3
4 - Lower Priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COLUMBIA PLATEAU
BLUE MTN.
MOUNTAIN SNAKE
MIDDLE SNAKE
UPPER SNAKE
LOWER COLUMBIA

Appendix V

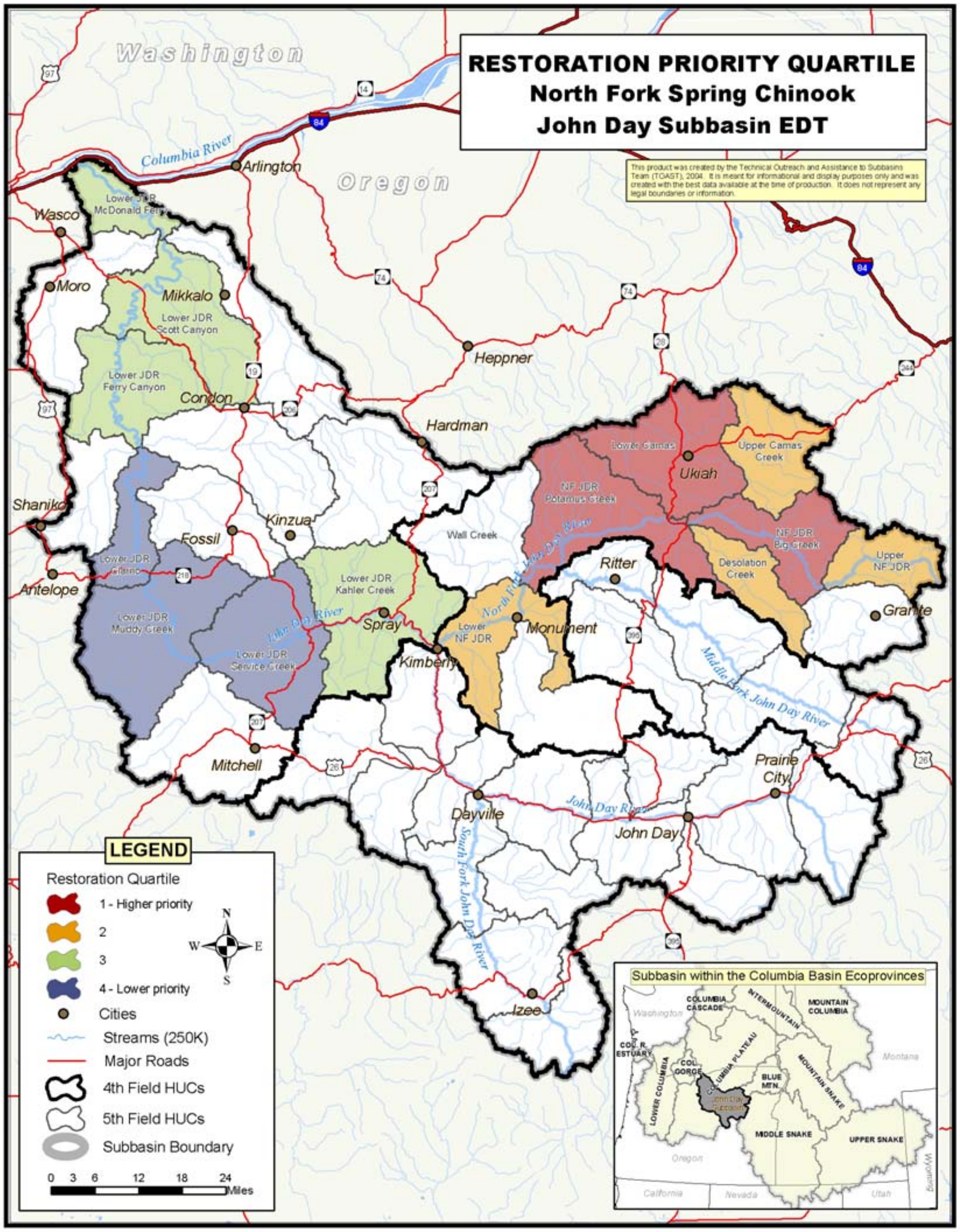


RESTORATION PRIORITY QUARTILE
Middle Fork Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Condon
Heppner
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Spray
Kimberly
Monument
Ritter
Granite
Mitchell
Dayville
John Day
Prairie City
Izee
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Clarno
Lower JDR Muddy Creek
Lower JDR Service Creek
Lower JDR Kahler Creek
Wall Creek
NF JDR Potamus Creek
Lower MF JDR
Lower NF JDR
Big Creek
Camp Creek
Upper MF JDR
Middle Fork John Day River
North Fork John Day River
John Day River
South Fork John Day River
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

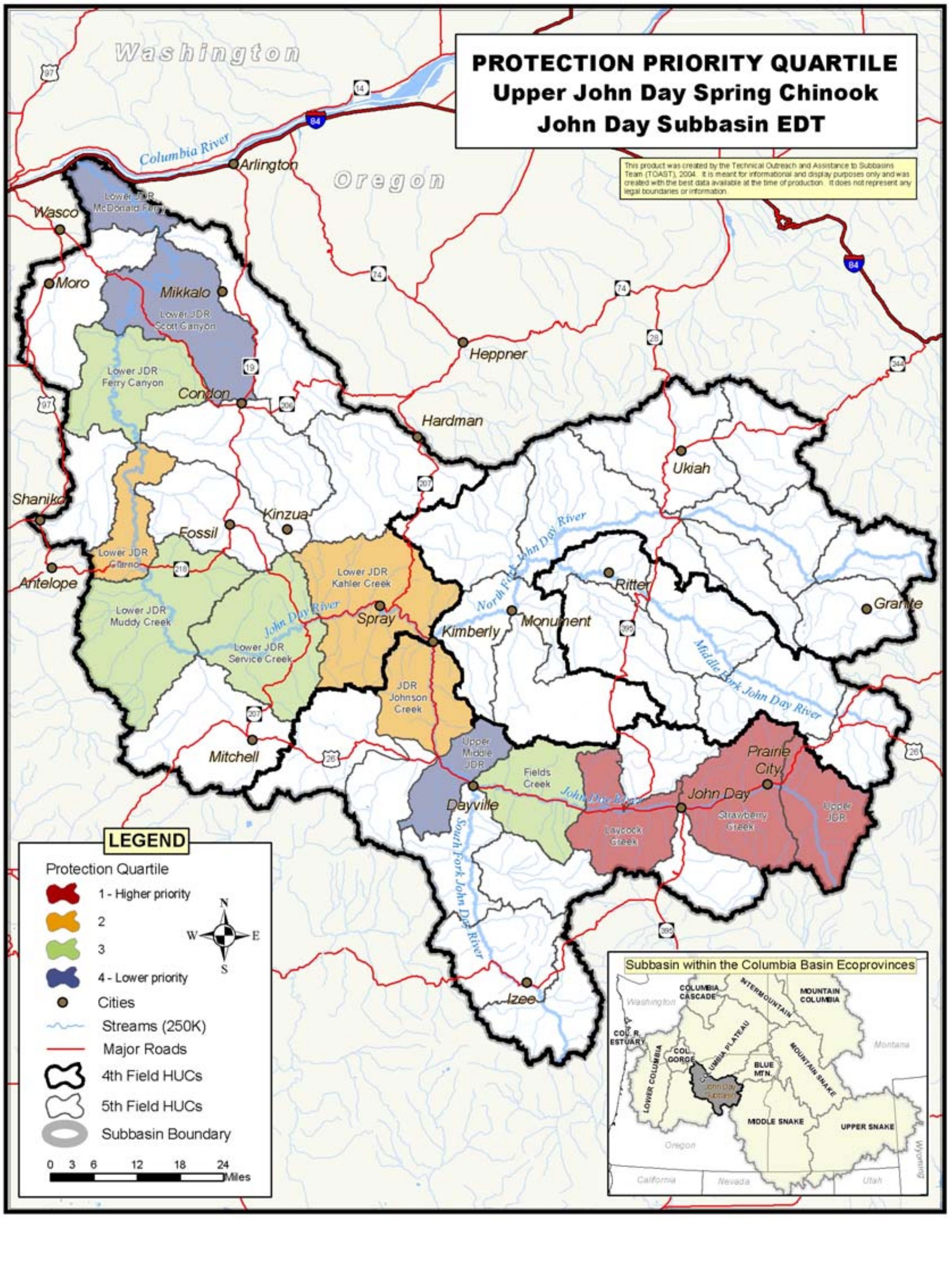
Appendix V


PROTECTION PRIORITY QUARTILE
North Fork Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Condon
Heppner
Hardman
Lower Camas
Upper Camas Creek
Ukiah
NF JDR Potamus Creek
NF JDR Big Creek
Desolation Creek
Upper NF JDR
Wall Creek
Shaniko
Kinzua
Fossil
Lower JDR Girano
Antelope
Lower JDR Muddy Creek
Lower JDR Kahler Creek
Spray
Lower JDR Service Creek
Lower NF JDR
Monument
Ritter
Granite
Kimberly
Middle Fork John Day River
Mitchell
Prairie City
Dayville
John Day River
John Day
South Fork John Day River
Izee
LEGEND
Protection Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COLUMBIA PLATEAU
MOUNTAIN SNAKE
BLUE MTN.
MIDDLE SNAKE
UPPER SNAKE
LOWER COLUMBIA
COL. GORGE
COL. R. ESTUARY

Appendix V

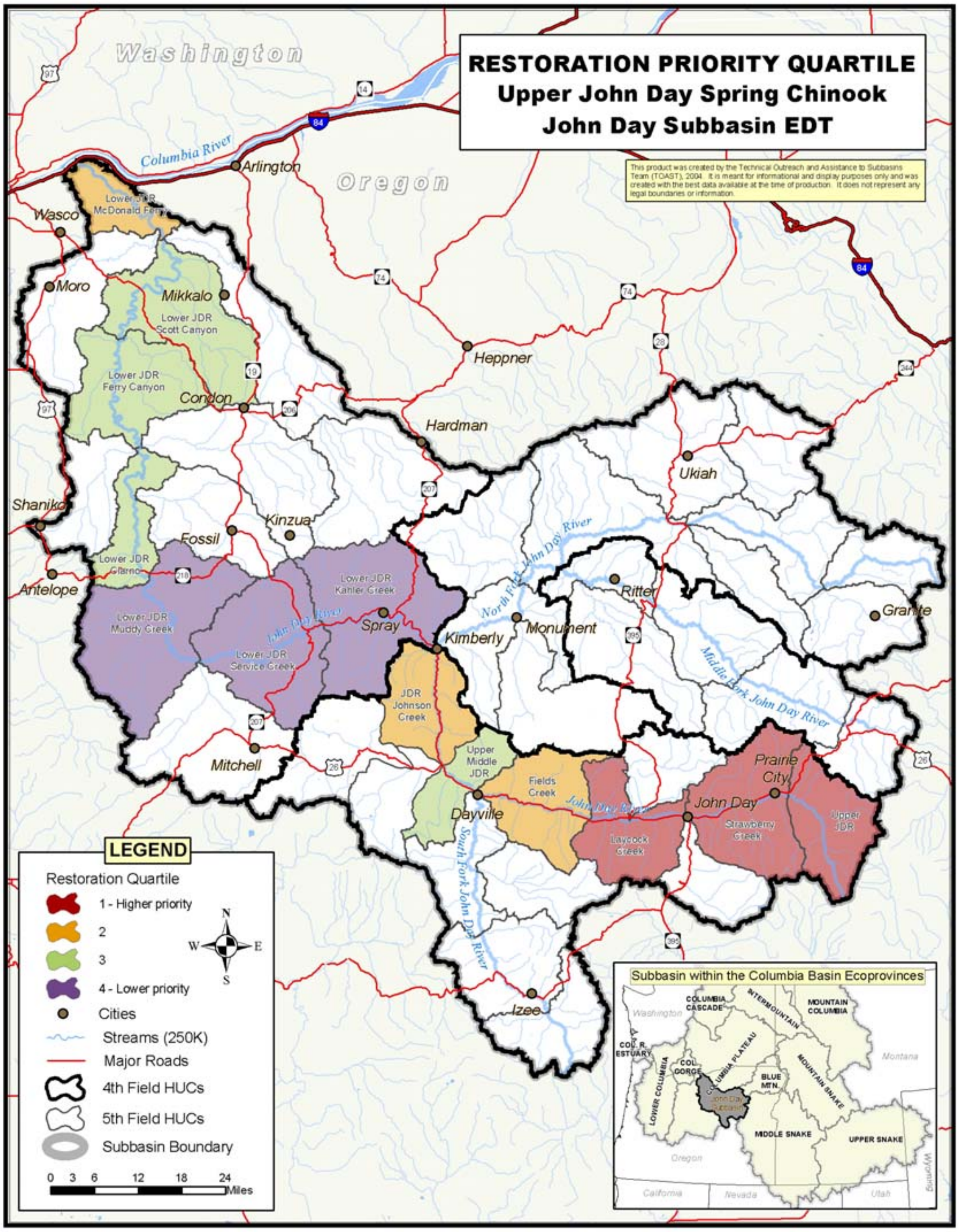

RESTORATION PRIORITY QUARTILE
North Fork Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Condon
Heppner
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Ritter
Spray
Monument
Kimberly
Granite
Mitchell
Prairie City
Dayville
John Day
Izee
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower Camas
Upper Camas Creek
NF JDR Potamus Creek
NF JDR Big Creek
Wall Creek
Desolation Creek
Upper NF JDR
Lower JDR Kahler Creek
Lower NF JDR
Lower JDR Muddy Creek
Lower JDR Service Creek
John Day River
Middle Fork John Day River
South Fork John Day River
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces
COLUMBIA CASCADE
INTERMOUNTAIN
MOUNTAIN COLUMBIA
COLUMBIA PLATEAU
BLUE MTN.
MOUNTAIN SNAKE
MIDDLE SNAKE
UPPER SNAKE
LOWER COLUMBIA
Montana
Oregon
California
Nevada
Utah

Appendix V



PROTECTION PRIORITY QUARTILE
Upper John Day Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Spray
Kimberly
Monument
Ritter
Granite
Mitchell
Dayville
John Day
Prairie City
Izee
Lower JDR McDonald Ferry
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Lower JDR Clarno
Lower JDR Muddy Creek
Lower JDR Kahler Creek
Lower JDR Service Creek
JDR Johnson Creek
Upper Middle JDR
Fields Creek
Laycock Creek
Strawberry Creek
Upper JDR
North Fork John Day River
Middle Fork John Day River
South Fork John Day River
John Day River
LEGEND
Protection Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

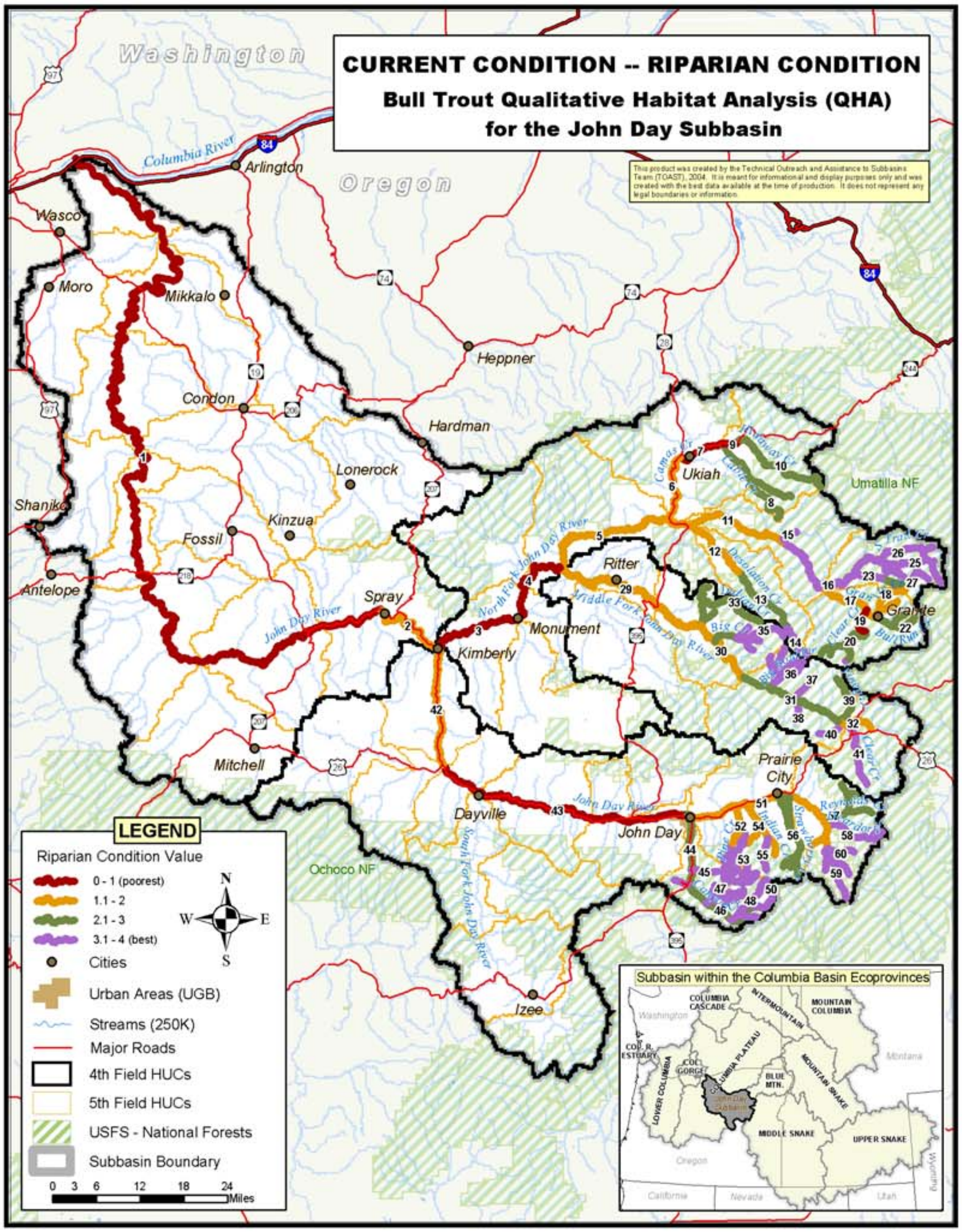
Appendix V



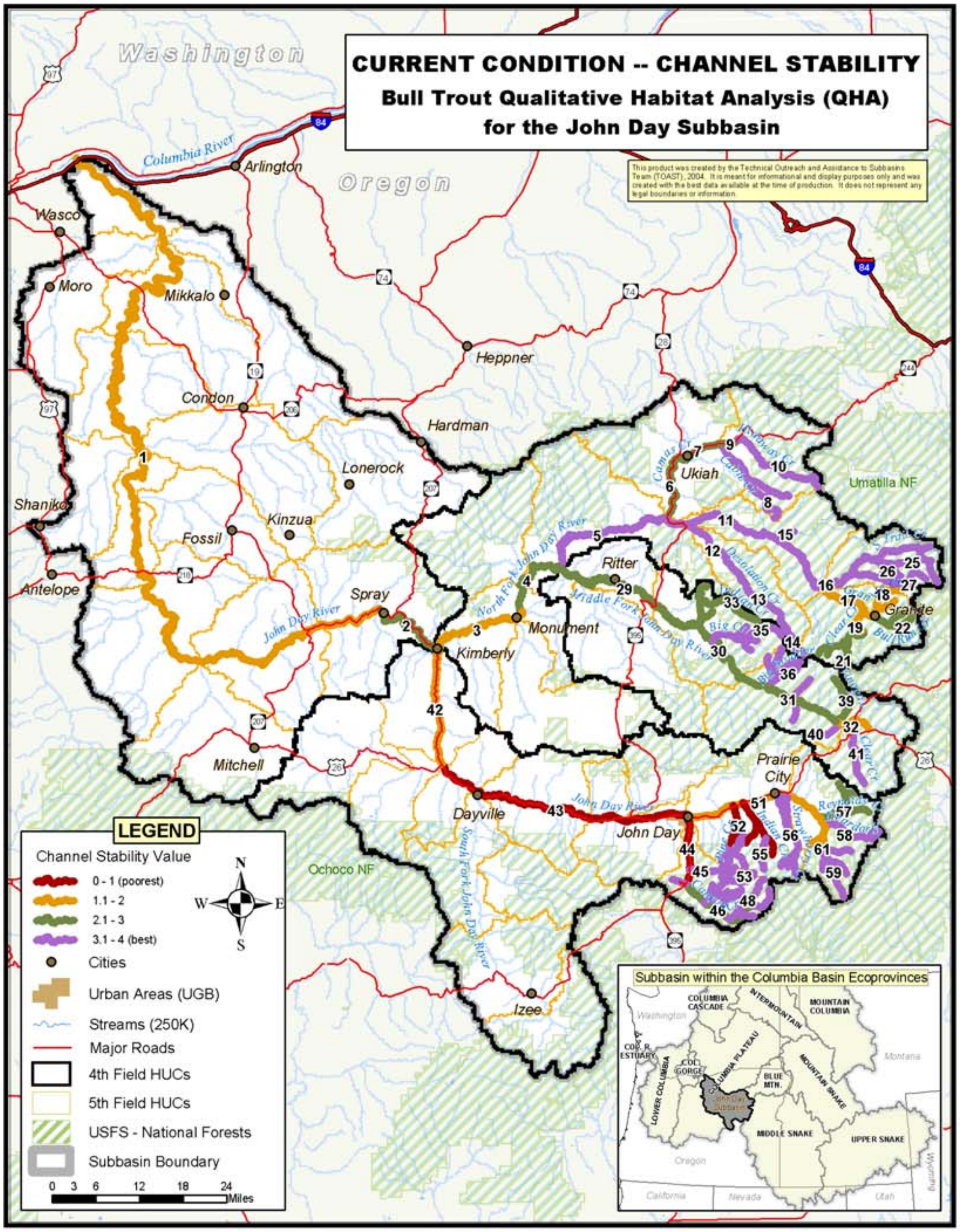
RESTORATION PRIORITY QUARTILE
Upper John Day Spring Chinook
John Day Subbasin EDT
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Lower JDR Scott Canyon
Lower JDR Ferry Canyon
Condon
Heppner
Hardman
Ukiah
Shaniko
Fossil
Kinzua
Antelope
Lower JDR Kahler Creek
Lower JDR Muddy Creek
Lower JDR Service Creek
Spray
Kimberly
Monument
Ritter
Granite
North Fork John Day River
Middle Fork John Day River
John Day River
JDR Johnson Creek
Upper Middle JDR
Fields Creek
Mitchell
Dayville
Prairie City
John Day
Strawberry Creek
Upper JDR
Laycock Creek
South Fork John Day River
Izee
LEGEND
Restoration Quartile
1 - Higher priority
2
3
4 - Lower priority
Cities
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W

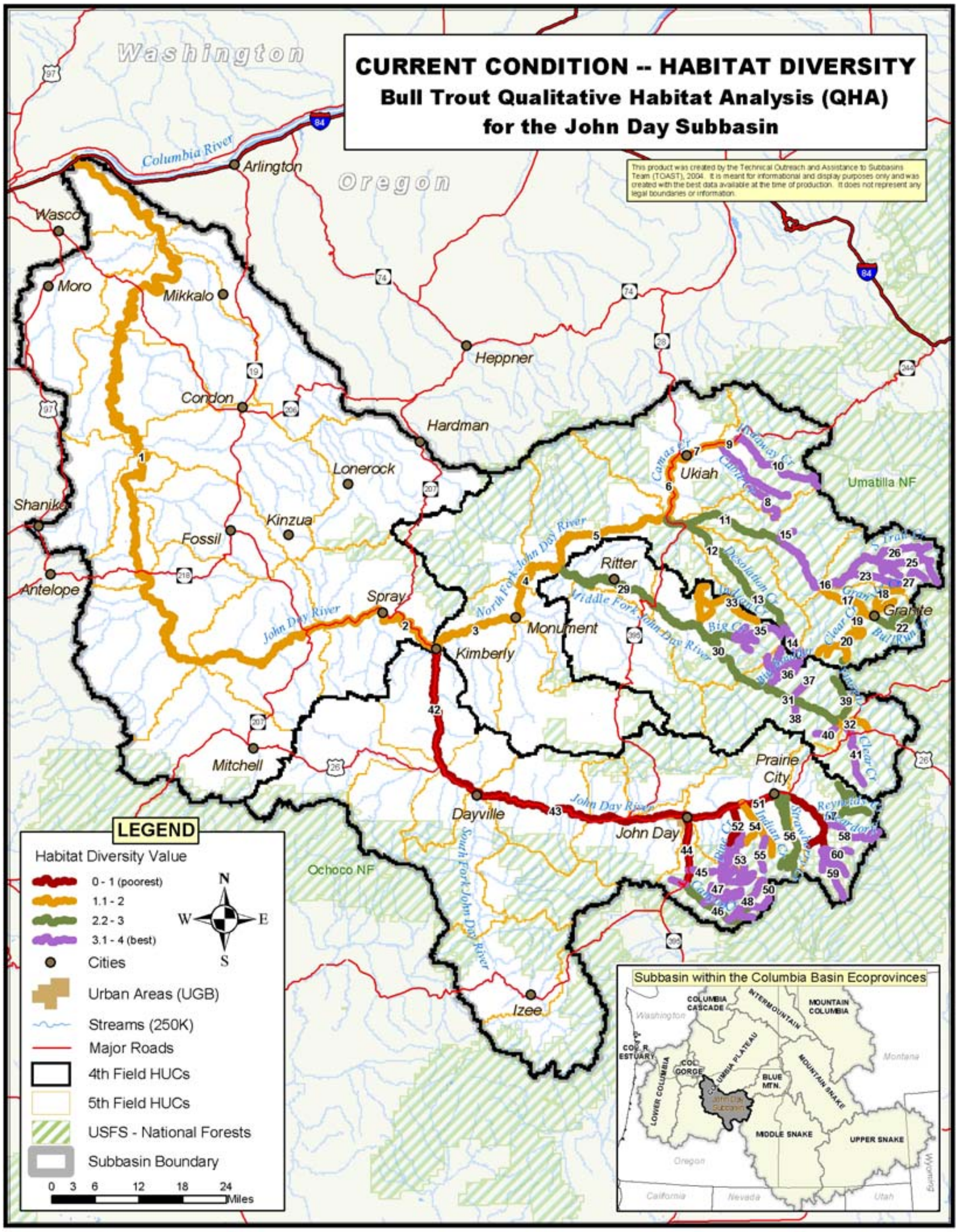
QHA Attribute Ratings



Appendix W

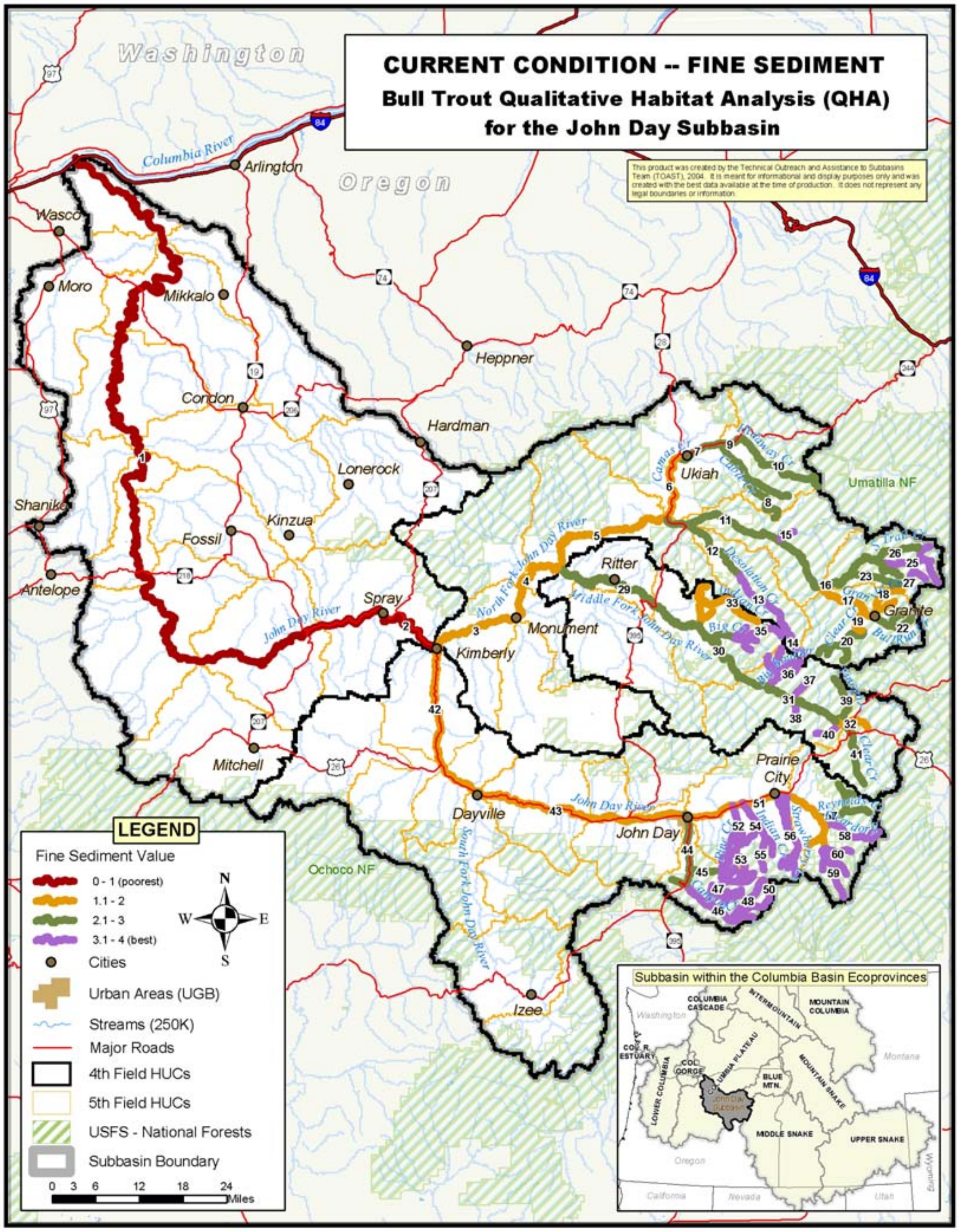

CURRENT CONDITION -- CHANNEL STABILITY
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
This product was created by the Technical Outreach and Assistance to Subbasins Team (TOAST), 2004. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information.
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Lonerock
Ukiah
Umatilla NF
Shaniko
Kinzua
Fossil
Antelope
Ritter
Spray
John Day River
Monument
Kimberly
Granite
Prairie City
Mitchell
Dayville
John Day
Ochoco NF
Izee
LEGEND
Channel Stability Value
0 - 1 (poorest)
1.1 - 2
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W



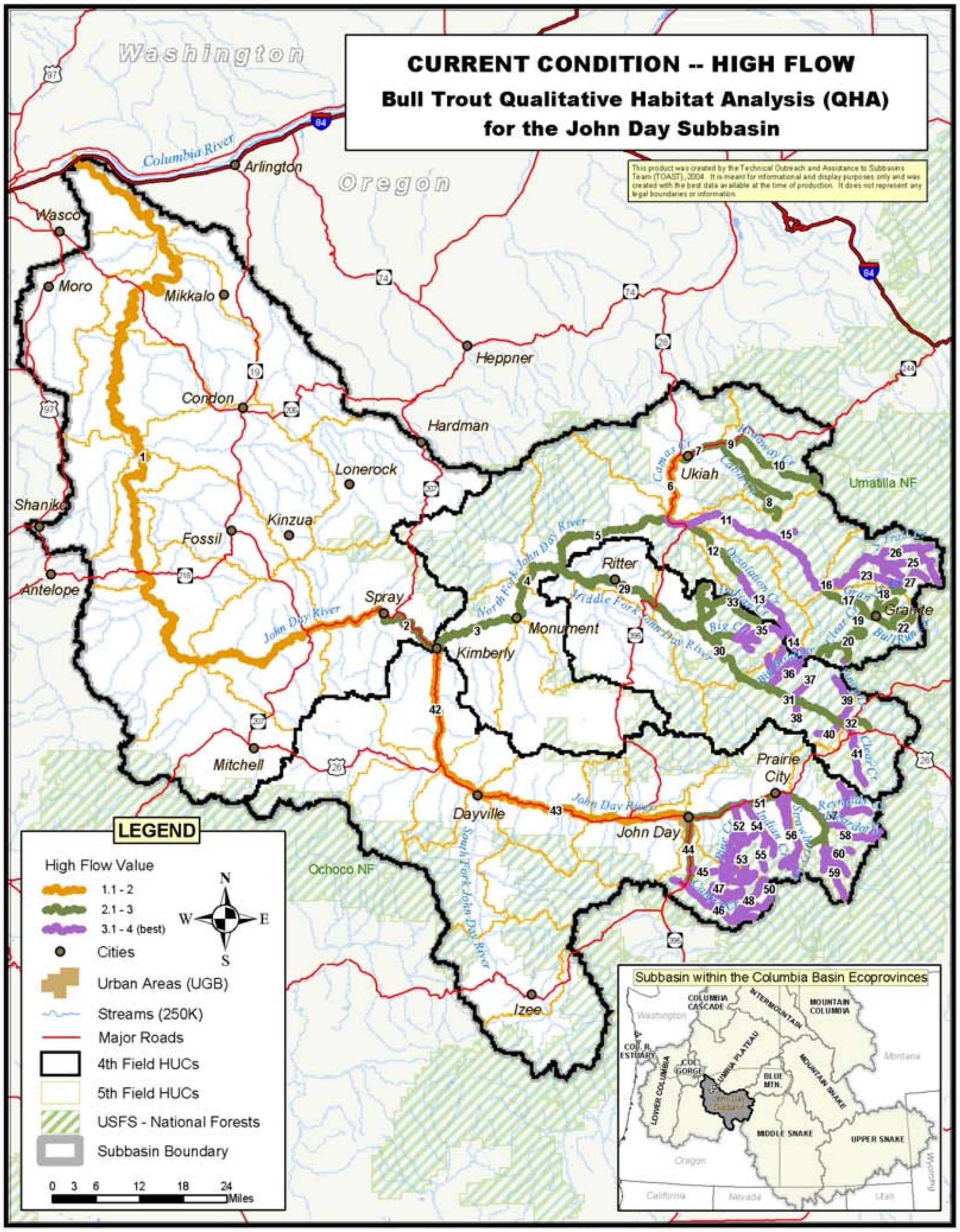
CURRENT CONDITION -- HABITAT DIVERSITY
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
This product was created by the Technical Outreach and Assistance to Subbasins Team (TOAST), 2004. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information.
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Lonerock
Kinzua
Fossil
Shaniko
Antelope
Ukiah
Umatilla NF
Ritter
Spray
Monument
Kimberly
John Day River
North Fork John Day River
Middle Fork John Day River
Granite
Prairie City
Mitchell
Dayville
John Day
South Fork John Day River
Ochoco NF
Izee
LEGEND
Habitat Diversity Value
0 - 1 (poorest)
1.1 - 2
2.2 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W



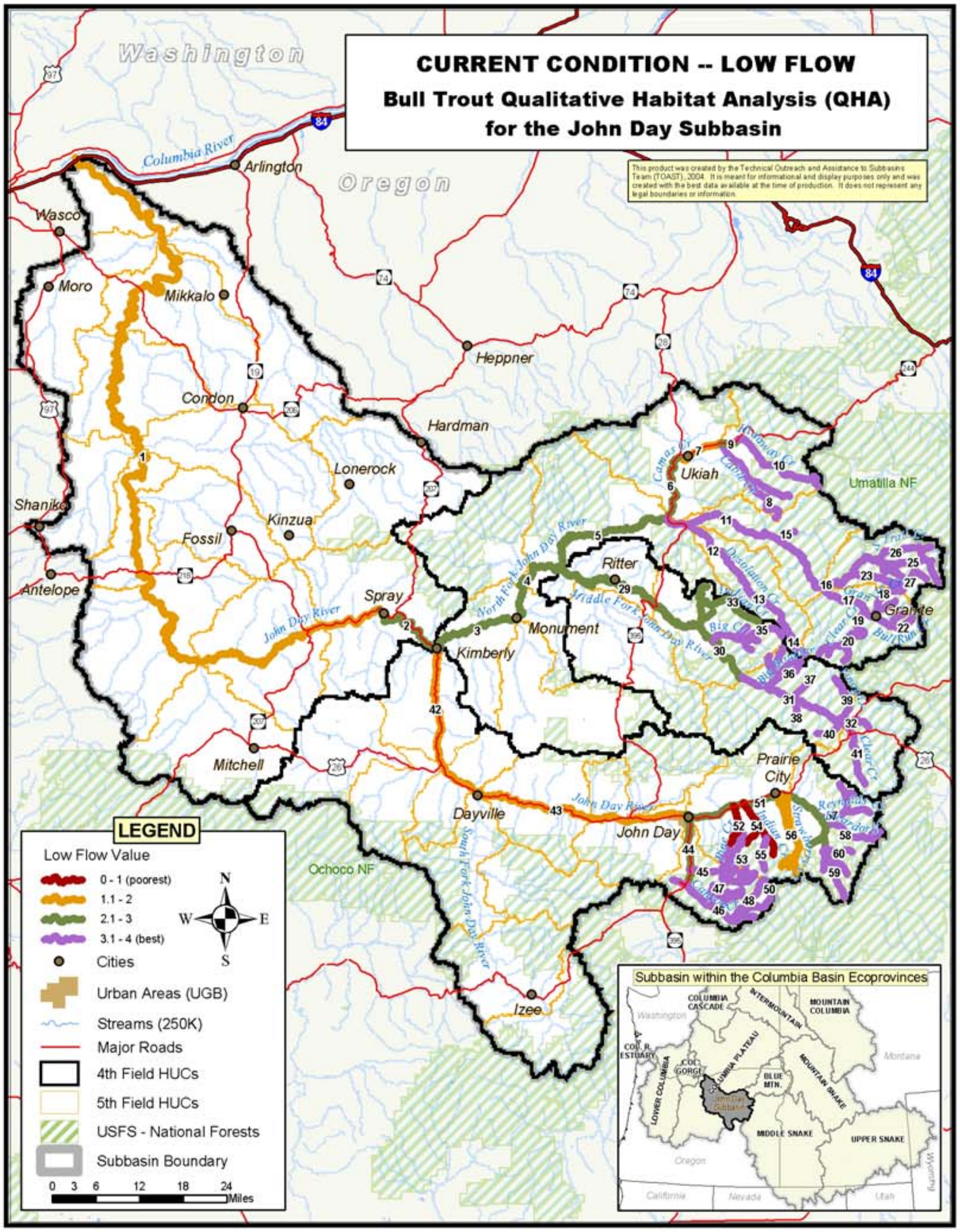
CURRENT CONDITION -- FINE SEDIMENT
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
This product was created by the Technical Outreach and Assistance to Subbasins Team (TOAST), 2004. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information.
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Lonerock
Ukiah
Umatilla NF
Shaniko
Kinzua
Fossil
Antelope
Spray
John Day River
Ritter
North Fork John Day River
Middle Fork John Day River
Monument
Kimberly
Granite
Mitchell
Prairie City
Dayville
John Day
Ochoco NF
South Fork John Day River
Izee
LEGEND
Fine Sediment Value
0 - 1 (poorest)
1.1 - 2
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
0 3 6 12 18 24 Miles
N
S
E
W
Subbasin within the Columbia Basin Ecoprovinces

Appendix W



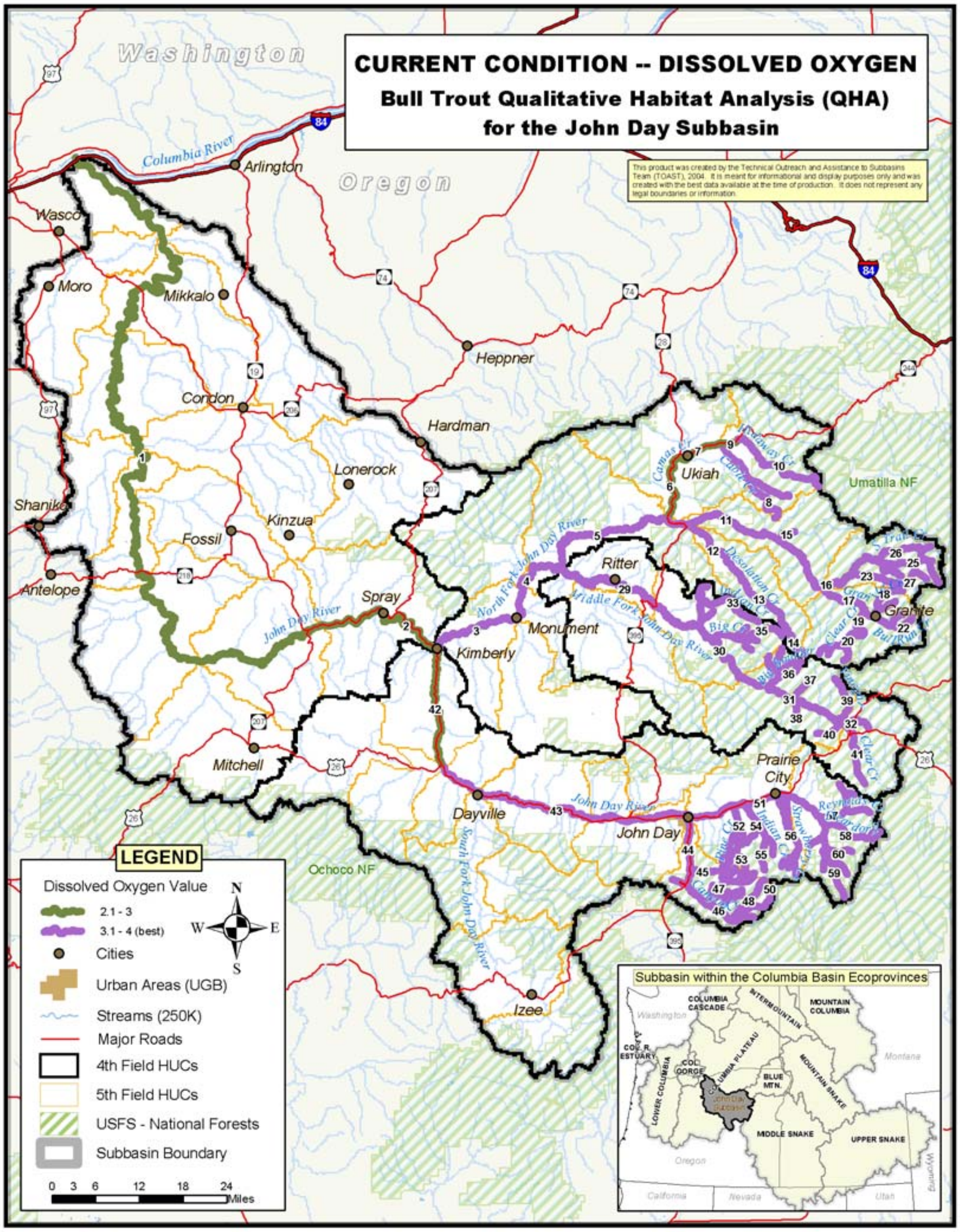
CURRENT CONDITION -- HIGH FLOW
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Lonerock
Shaniko
Kinzua
Fossil
Antelope
Spray
Kimberly
Monument
Ritter
Ukiah
Umatilla NF
Granite
Prairie City
John Day
Dayville
Mitchell
Izee
Ochoco NF
John Day River
North Fork John Day River
Middle Fork John Day River
South Fork John Day River
LEGEND
High Flow Value
1.1 - 2
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W



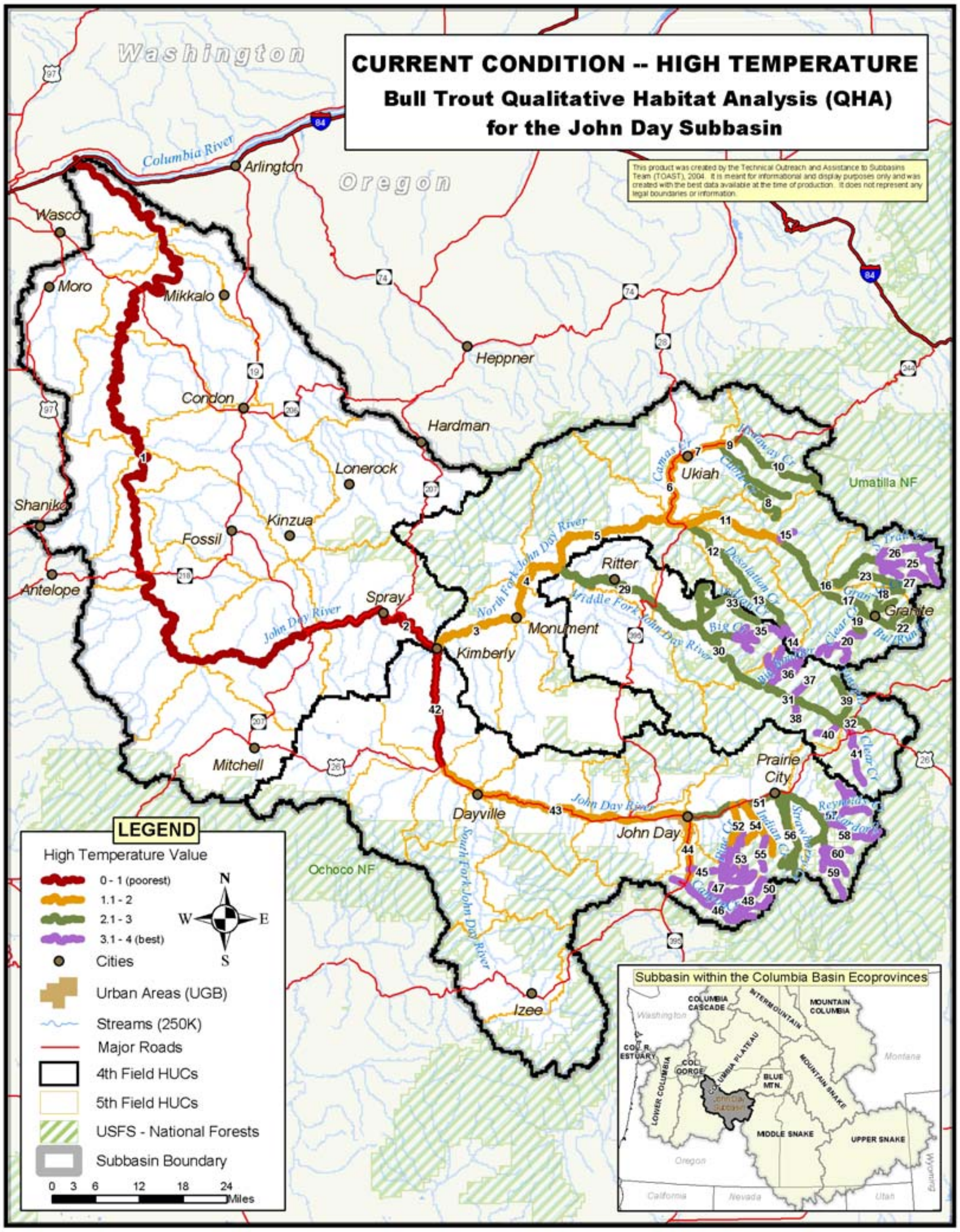
CURRENT CONDITION -- LOW FLOW
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Lonerock
Ukiah
Umatilla NF
Shaniko
Kinzua
Fossil
Antelope
Spray
Ritter
Monument
Kimberly
Granite
John Day River
Prairie City
Mitchell
Dayville
John Day
Ochoco NF
Izee
LEGEND
Low Flow Value
0 - 1 (poorest)
1.1 - 2
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W



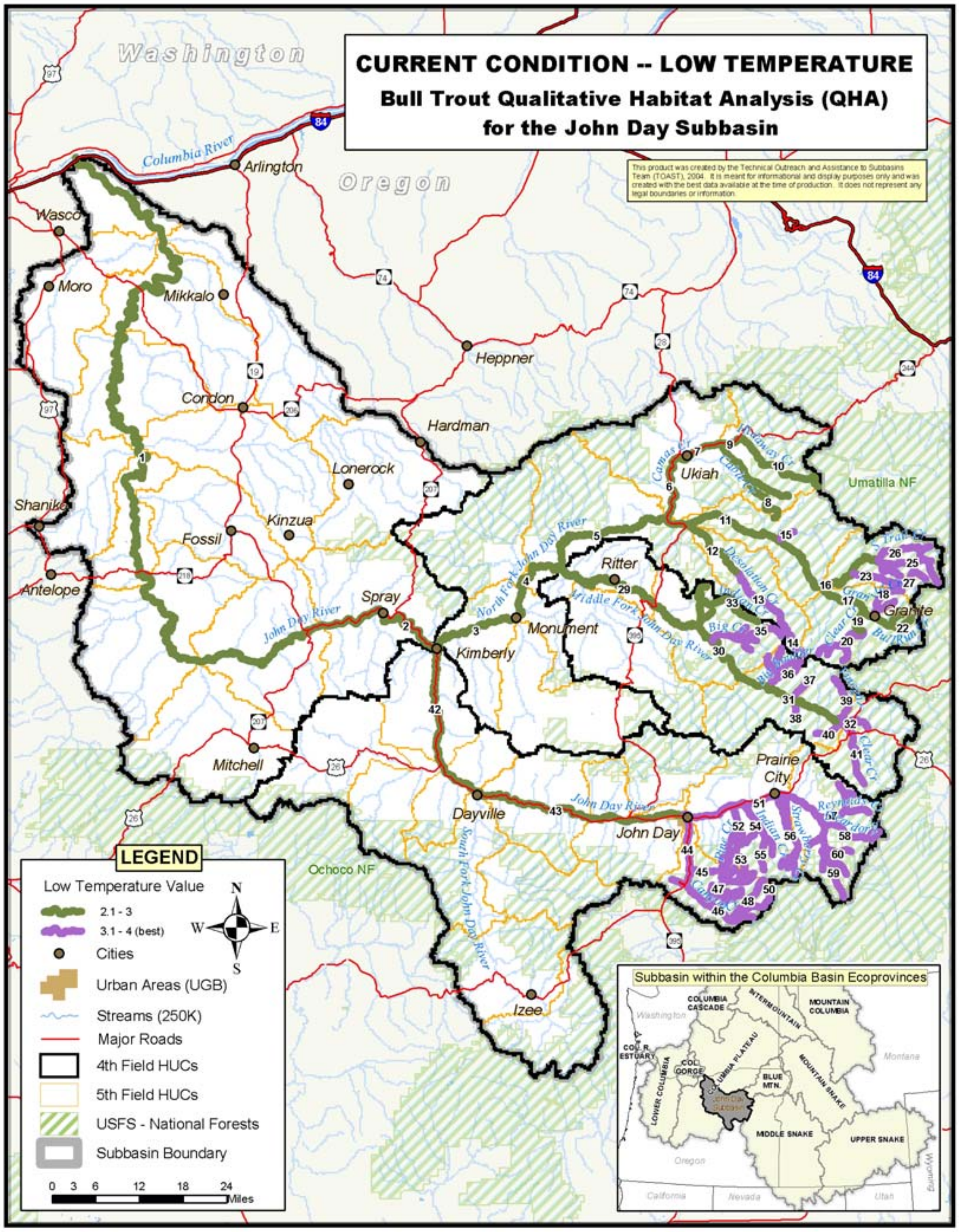
CURRENT CONDITION -- DISSOLVED OXYGEN
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
LEGEND
Dissolved Oxygen Value
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
Subbasin within the Columbia Basin Ecoprovinces

Appendix W



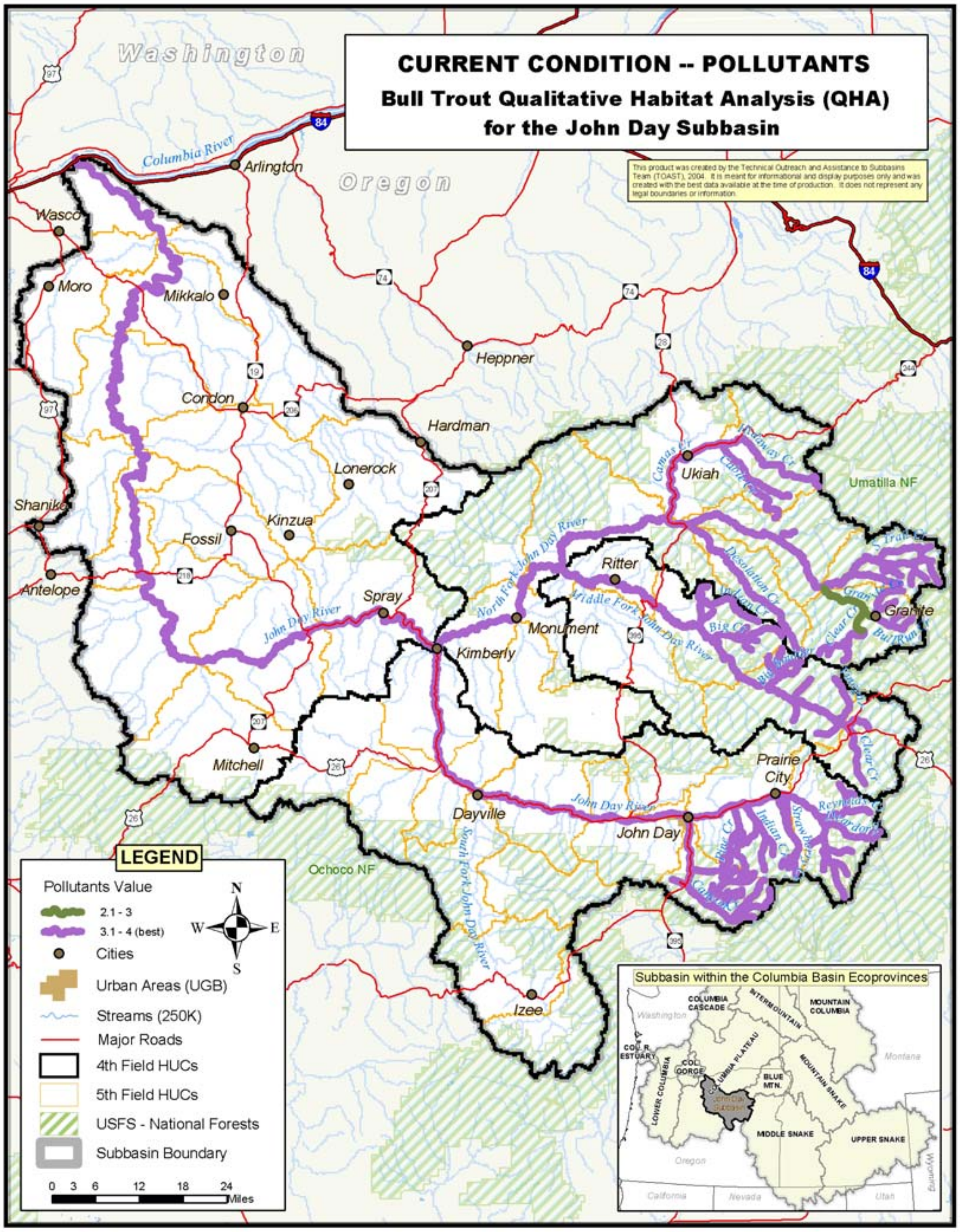
CURRENT CONDITION -- HIGH TEMPERATURE
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
This product was created by the Technical Outreach and Assistance to Subbasins Team (TOAST), 2004. It is meant for informational and display purposes only and was created with the best data available at the time of production. It does not represent any legal boundaries or information.
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Lonerock
Ukiah
Umatilla NF
Shaniko
Kinzua
Fossil
Antelope
Spray
John Day River
North Fork John Day River
Ritter
Middle Fork John Day River
Monument
Kimberly
Granite
Mitchell
Prairie City
Dayville
John Day
Ochoco NF
South Fork John Day River
Izee
LEGEND
High Temperature Value
0 - 1 (poorest)
1.1 - 2
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W

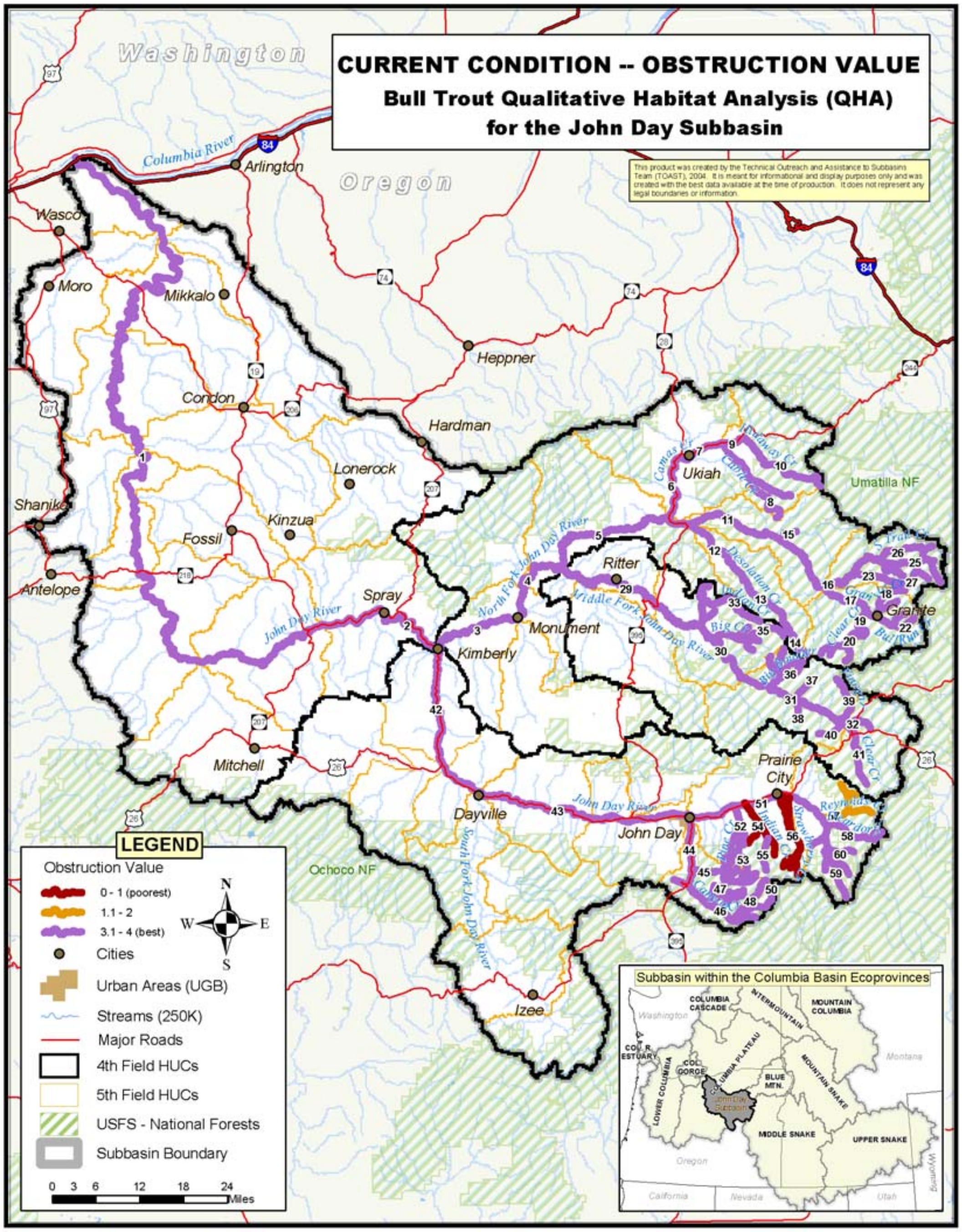


CURRENT CONDITION -- LOW TEMPERATURE
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
LEGEND
Low Temperature Value
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W


CURRENT CONDITION -- POLLUTANTS
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
Washington
Oregon
Columbia River
Arlington
Wasco
Moro
Mikkalo
Heppner
Condon
Hardman
Lonerock
Ukiah
Umatilla NF
Shaniko
Kinzua
Fossil
Antelope
Spray
John Day River
North Fork John Day River
Ritter
Middle Fork John Day River
Monument
Kimberly
Granite
Mitchell
Prairie City
Dayville
John Day
Ochoco NF
South Fork John Day River
Izee
LEGEND
Pollutants Value
2.1 - 3
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
0 3 6 12 18 24 Miles
Subbasin within the Columbia Basin Ecoprovinces

Appendix W



CURRENT CONDITION -- OBSTRUCTION VALUE
Bull Trout Qualitative Habitat Analysis (QHA)
for the John Day Subbasin
LEGEND
Obstruction Value
0 - 1 (poorest)
1.1 - 2
3.1 - 4 (best)
Cities
Urban Areas (UGB)
Streams (250K)
Major Roads
4th Field HUCs
5th Field HUCs
USFS - National Forests
Subbasin Boundary
Subbasin within the Columbia Basin Ecoprovinces

Existing Restoration and Conservation Projects

Pool habitat increase and improvement
\# 45

Description: Construction of log weirs and placement of rock.

Focus
Fisheries

Project Type(s):
Weirs and other structures

Dates: Begun in ,
Location: Murderers, Deer, and Tex creeks

Results: Smolt habitat capability was reportedly increased by 300 percent.

Production Area(s)
South Fork

5th Field Name
MURDERERS CREEK
MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
USFS

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Improve spawning habitat
\# 46

Description: Screening gravel from gold dredge tailings and placing it in 138 spawning sites.

Focus
Fisheries

Project Type(s):

Dates: Begun in ,
Location: Clear and Granite creeks

Results: An increase in spawning area, thereby reducing crowding of spring chinook redds; increased survival of deposited eggs; and improved spawning and spawning habitat.

Production Area(s)

5th Field Name

Organizations
USFS

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Habitat improvement
\# 47

Description: Constructed side channels, strategically placed boulders, and constructed boulder weirs to repair rearing habitat degraded by historic gold dredging.

Focus
Fisheries

Project Type(s):

Dates: Begun in ,
Location: North Fork John Day

Results: Activities have improved rearing habitat and provided potential for increased survival from egg to smolt.

Production Area(s)

5th Field Name

Organizations
USFS

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

48

Improvement of areas devastated by gold dredging

Description: Tributary surveys, restoration of salmonid habitat in selected stream by riparian fencing and in-stream work, opening of side channels and reclamation of dredged areas, and solutions to toxic mine drainage.

Focus **Project Type(s):**

Fisheries

Dates: Begun in 1999, still in progress

Location: North Fork John Day

Results: Improved stream conditions, increased number of pools, and increased riparian vegetation. An O&M contract for 50 miles of barbwire fence and 900 in-stream structural improvements.

Production Area(s) **5th Field Name**

Organizations

USFS

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Increased wild chinook and steelhead production, improved riparian habitat, water quality, and seasonal flow distribution

49

Description: In-stream work on about 25 tributaries: structural improvements for adult and juvenile passage, riparian protection, structural streambank stabilization, and structural rearing habitat improvements.

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location: Middle Fork and upper mainstem John Day River Basin

Results: Work is ongoing with several installations completed and working.

Production Area(s) **5th Field Name**

Organizations
USFS

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

50

Sites of previous gold dredging are being restored

Description: Redeposit tailings, allowing the river to flow over floodplain previously unavailable. Channel complexity and fish habitat quality and quantity increase as the river reclaims its floodplain, dissipating the energy of high flow events and depositing

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location: North Fork John Day

Results: Reshaped 220,000 yd3 of dredge tailings along 1.8 mi of Granite Creek, planted 5,000 lbs of native grass/hardwood seed, and completed photographic and geomorphic baseline data collection.

Production Area(s) **5th Field Name**

Organizations
ODFW USFS

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Habitat improvement

\# 51

Description: Construction of a series of log weirs to slow water velocities and improve limited spawning and rearing habitat for steelhead. Weirs and boulders were designed to encourage gravel recruitment and increase natural steelhead production.

Focus	Project Type(s):
Fisheries	Weirs and other structures

Dates: Begun in ,
Location: Cottonwood Creek

Results: The weirs provide additional spawning and rearing habitat and add more in-stream cover for fish.

Production Area(s)	5th Field Name
Upper Mainstem	UPPER MIDDLE JOHN DAY

Organizations
BLM

Limiting Factor(s)

For more information, contact:
BLM

Entry updated by:
on

Summer steelhead habitat improvement

\# 52

Description: Increase the amount of usable habitat, particularly rearing habitat.

Focus	Project Type(s):
Fisheries	Large Woody Debris placement

Dates: Begun in ,
Location: South Fork John Day River and mainstem

Results: Unknown

Production Area(s)	5th Field Name
South Fork	LOWER SOUTH FORK JOHN DAY RIVER

Organizations
BLM

Limiting Factor(s)

For more information, contact:
BLM

Entry updated by:
on

CREP/CCRP Habitat Improvement

\# 54

Description: Installing riparian fencing, developing off-stream water sources. 13 projects that include 389.7 acres and 20 miles of riparian restoration.

Focus	Project Type(s):
Fisheries	Riparian Fencing
Wildlife	Riparian Plantings

Dates: Begun in 2002, completed in 2003
Location: Lower John Day in Gilliam County

Results: Unknown

Production Area(s)	5th Field Name
Lower Mainstem	UPPER ROCK CREEK
	LOWER ROCK CREEK
	THIRTYMILE CREEK
	LOWER JOHN DAY RIVER/FERRY CANYON
	LOWER JOHN DAY RIVER/SCOTT CANYON

Organizations
Gilliam SWCD
Farm Service Agency
OWEB
BPA
NRCS

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

55

Pine Hollow Watershed Project

Description: Mitigate peak flow events, enhance summer flows, reduce summer stream temperatures, reduce soil erosion and sediment delivery to streams, improve grazing management, control weeds.

Focus	**Project Type(s):**
Fisheries	Riparian Fencing
Wildlife	Riparian Plantings
	Riparian Weed Control
	Control of Non-Point Pollution Sources
	Fencing to improve grazing management
	Water developments to improve grazing management
	Prescribed burning
	Sediment catchment systems
	Grassed waterways, filter strips, other buffers

Dates: Begun in 1998, completed in 2004
Location: Sherman County

Results: Approximately 5 miles of fence, 5 spring/water developments, 90 acres of range seeding, 30 acres of brush and juniper

Production Area(s)	**5th Field Name**
Lower Mainstem	PINE HOLLOW
	LOWER JOHN DAY RIVER/FERRY CANYON

Organizations

Landowner/Manager	NRCS
ODA	OWEB
Pacific Gas Transmission	Sherman County SWCD
USFWS	BPA
BLM	

Limiting Factor(s)
Low Flows (Secondary)
Temperature Extremes (Primary)
Riparian Function (Primary)
Excessive sediment and cobble embeddedness (Primary)

For more information, contact:
Elizabeth Cranston
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

56

Technical Assistance Funding

Description: Provides leadership and technical expertise for watershed organization and implementation of projects focused on improving overall watershed health and water quality.

Focus	Project Type(s):
Fisheries	Riparian Fencing
Wildlife	Riparian Plantings
	Riparian Weed Control
	Control of Non-Point Pollution Sources
	OtherRiparian Habitat Improvements
	Fencing to improve grazing management
	Changes to cropping systems
	Grassed waterways, filter strips, other buffers
	Sediment catchment systems

Dates: Begun in 2002, still in progress
Location: Sherman County

Results: One technician is fully funded, and a watershed coordinator and one technician are partially funded by this contract. All three work to promote watershed health by promoting programs such as CREP and assisting with best management practices.

Production Area(s)	5th Field Name
Lower Mainstem	GRASS VALLEY CANYON
	LOWER JOHN DAY RIVER/FERRY CANYON
	LOWER JOHN DAY RIVER/SCOTT CANYON
	LOWER JOHN DAY RIVER/MCDONALD FERRY

Organizations
Sherman County SWCD BPA

Limiting Factor(s)
Temperature Extremes (Primary)
Low Flows (Secondary)
Excessive sediment and cobble embeddedness (Primary)
Riparian Function (Primary)

For more information, contact:
Jason Faucera
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

58

Stream flow restoration prioritization

Description: Prioritized stream flow restoration needs based on: physical/biological factors, water use patterns and restoration optimism. Identified measures include: transfers and leases to in-stream uses, cancelled water rights, enforcement and monitoring, improv

Focus	Project Type(s):
Fisheries	Other Flow Restoration Efforts

Dates: Begun in 1999, completed in 1999
Location: Entire John Day Basin

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
ODFW

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

59

Enforce laws and regulations

Description: Actions include monitoring anglers for illegal harvest and licensing requirements and responding to natural resource

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location: Oregon

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Oregon State Police

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

60

Habitat improvement

Description: Improving riparian vegetation through fence construction, water quality monitoring, and placement of juniper riprap to stabilize stream banks.

Focus **Project Type(s):**
Fisheries Bank Protection
Riparian Fencing

Dates: Begun in 2003, still in progress
Location: South Fork John Day

Results: Project is ongoing through 2006. It is too soon to evaluate early work.

Production Area(s)	5th Field Name
South Fork	UPPER SOUTH FORK JOHN DAY RIVER
	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
OWEB SWCD

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
on

61

Habitat improvement

Description: Grazing management, seeding, fencing, brush control, riprap and stream jetties.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1986, still in progress
Location: Cottonwood Creek, Fox Creek

Results: MSWCD OYCC crew planted willows and grasses along a 2.5 mile stretch of lower Cottonwood creek in 1990. NRCS with help from the OYCC crew installed a combination of juniper and rock riprap and jetties along with soft gabions and live crib walls. They also developed an improved grazing plan for the pasture that includes this stretch of the creek.

Production Area(s)	5th Field Name
North Fork	COTTONWOOD CREEK

Organizations
Landowner/Manager ODFW
OWEB SWCD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 62

Recovery of in-stream and riparian habitat

Description: Mitigating high runoff events from uplands. Some BPA funding was involved.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Lower John Day Watershed

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
ODA
Pine Hollow Watershed Council

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 63

Improve upland range condition

Description: To benefit both wildlife and livestock 3 fencing projects, 4 ranch management plans, 3 water and sediment control basins, 1 spring development, and 3 critical area grass seedings were accomplished. Some BPA funding was involved.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Lower John Day Watershed

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
ODA
Pine Hollow Watershed Council

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 64

Paul Creek riparian fencing

Description: This project included corridor fencing along Paul Creek, one upland water development, and a small calving shelter
meant to replace riparian cover previously used as shelter by calving cows. Note: fence materials were provided by ODFW

Focus	Project Type(s):
Fisheries	Riparian Fencing Water developments to improve grazing management OtherUpland Improvement Activities

Dates: Begun in 1998, completed in 2002
Location: Middle Fork John Day Watershed

Results: Riparian vegetation along Paul Creek is protected in a manner that benefits the rancher's grazing system.

Monitoring: Yes: Two photopoints have been established in the fenced riparian area and are being read annually.

Production Area(s)	5th Field Name
Middle Fork	LONG CREEK

Organizations
BPA
North Fork John Day Watershed Council
USFWS
Landowner/Manager
ODFW

Limiting Factor(s)
Low Flows (Primary)
Temperature Extremes (Primary)
Riparian Function (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

\# 66

Schultz Ranches pushup dam elimination

Description: A long lateral push up dam and diversion channel were abandoned after installation of a permanent pump station at a deep hole nearby facilitated irrigation without instream modifications.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 1998, completed in 1998
Location: North Fork John Day

Results: The need for extensive annual disturbance of the river bed and adjacent riparian areas has been eliminated through installation of a permanent, screened pump station.

Monitoring: Yes: Photomonitoring was initiated in 2003; fragmentary temperature data exists.

Production Area(s)	5th Field Name
North Fork	LOWER NORTH FORK JOHN DAY RIVER

Organizations
BPA
North Fork John Day Watershed Council
Landowner/Manager

Limiting Factor(s)
Physical Fish Passage Barriers (Secondary)
Temperature Extremes (Primary)
Riparian Function (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

67

River Meadows pushup dam elimination

Description: A permanent pump sump was installed in a stable hole, allowing a cross-river pussh-up dam to be removed.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1998, completed in 1998
Location: North Fork John Day below Rudio Bridge

Results: The need for extensive annual disturbance of the river bed and adjacent riparian areas has been eliminated through installation of a permanent, screened pump station.

Monitoring: Yes: Photomonitoring was intitiated in 2003; fragmentary temperature data exists.

Production Area(s)
North Fork

5th Field Name
LOWER NORTH FORK JOHN DAY RIVER

Organizations
BPA
North Fork John Day Watershed Council
Landowner/Manager

Limiting Factor(s)
Physical Fish Passage Barriers (Primary)
Temperature Extremes (Secondary)
Riparian Function (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

68

Smith pushup dam elimination

Description: A permanent pump station was installed in order to eliminate the need for a push-up dam and associated artificial side channel.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 2001, completed in 2001
Location: North Fork John Day

Results: The need for extensive annual disturbance of the river bed and adjacent riparian areas has been eliminated through installation of a permanent, screened pump station.

Monitoring: Yes: Photomonitoring was initiated in 2003

Production Area(s)
North Fork

5th Field Name
LOWER NORTH FORK JOHN DAY RIVER

Organizations
BPA
North Fork John Day Watershed Council
Landowner/Manager

Limiting Factor(s)
Physical Fish Passage Barriers (Secondary)
Temperature Extremes (Primary)
Riparian Function (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

69

Trophy-Antler Ranch pushup dam elimination

Description: This project installed a permanent pump station that eliminated the need for construction of a push-up dam and associated side channel

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 2001, completed in 2001
Location: North Fork John Day

Results: The need for extensive annual disturbance of the river bed and adjacent riparian areas has been eliminated through installation of a permanent, screened pump station.

Monitoring: Yes: Photomonitoring was intiated in 2003

Production Area(s)
North Fork

5th Field Name
LOWER NORTH FORK JOHN DAY RIVER

Organizations
BPA
Landowner/Manager
North Fork John Day Watershed Council

Limiting Factor(s)
Physical Fish Passage Barriers (Secondary)
Temperature Extremes (Primary)
Riparian Function (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

70

Andersen erosion control

Description: Installed a small pond to capture sediment and slow runoff contributing to downstream gully development.

Focus
Fisheries

Project Type(s):
Sediment catchment systems
Grassed waterways, filter strips, other buffers

Dates: Begun in 1999, completed in 2001
Location: North Fork John Day

Results: Pond has reduced erosion significantly, allowing gully below to revegetate.

Monitoring: Yes: Limited photo monitoring exists

Production Area(s)
North Fork

5th Field Name
LOWER NORTH FORK JOHN DAY RIVER

Organizations
Landowner/Manager
North Fork John Day Watershed Council
OWEB

Limiting Factor(s)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

71

Rudio Creek streamflow restoration

Description: The first phase of this project installed a pipeline that allowed one ranch to access stored water and leave all of Rudio Creek's natural flows in-stream after June 1st. Phase II involves installing a pump and pipeline to allow a second ranch to replace Rusio water with water pumped from the North Fork

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination Instream water right leases and acquisitions Irrigation efficiency projects Other Flow Restoration Efforts

Dates: Begun in 1998, still in progress
Location: North Fork John Day

Results: Phase I is nearing completio, while phase II is in the design stage. Late summer diversions from Rudio Creek are reduced and may be largely eliminated, increasing streamflow and improving rearing conditions for steelhead and chinook in the stream.

Monitoring: Yes: Development of monitoring protocols is in progress, and may include photomonitoring, stream flow measurements and temperature measurements

Production Area(s)	5th Field Name
North Fork	LOWER NORTH FORK JOHN DAY RIVER

Organizations
BPA
North Fork John Day Watershed Council
OWEB
Landowner/Manager
Oregon Water Trust

Limiting Factor(s)
Low Flows (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

72

Wilson Wall Creek riparian fencing

Description: Installed ~11 miles of riparian fencing along Big Wall and Wilson creeks and developed one upland water source.

Focus	Project Type(s):
Fisheries	Riparian Fencing Water developments to improve grazing management

Dates: Begun in 2001, completed in 2003
Location: North Fork John Day

Results: This project is facilitating ongoing riparian improvement along Big Wall and Wilson creeks, while improving the grazing permittee's ability to manage upland grazing distribution.

Monitoring: Yes: 8 Photomonitoring sites are being maintained. USFS also undertakes temperature, fish use and vegetation monitoring in the project area.

Production Area(s)	5th Field Name
North Fork	WALL CREEK

Organizations
Grazing Permittee
OWEB
North Fork John Day Watershed Council
Umatilla National Forest

Limiting Factor(s)
Low Flows (Primary)
Temperature Extremes (Primary)
Riparian Function (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

73

Skookum Little Wall riparian fencing

Description: 5.5 miles of riparian fencing have been completed, with another 10.5 scheduled for completion in 2004.

Focus
Fisheries

Project Type(s):
Riparian Fencing

Dates: Begun in 2002, still in progress
Location: North Fork John Day

Results: This project is facilitating ongoing riparian improvement along Little Wall, Skookum and Alder creeks, while improving the grazing permittees' ability to manage upland grazing distribution.

Monitoring: Yes: Photopoints are being established.

Production Area(s)
North Fork

5th Field Name
WALL CREEK

Organizations
Grazing Permittee
North Fork John Day Watershed Council
OWEB
Umatilla National Forest

Limiting Factor(s)
Riparian Function (Primary)
Temperature Extremes (Secondary)
Low Flows (Secondary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council, 541 934-2188

Entry updated by:
Alex Conley on 5/6/04

74

Pass Creek upland waters

Description: Two pipelines of ~2 miles each have been installed and supply 18 troughs located on upland benches away from Pass Creek.

Focus
Fisheries

Project Type(s):
Water developments to improve grazing management

Dates: Begun in 2002, still in progress
Location: Middle Fork John Day

Results: Improved water distribution is allowing for changes in grazing management that greatly reduce grazing impacts on Pass Creek's riparian area while improving overall agricultural productivity.

Monitoring: Yes: Three photopoints are being set up on the affected reach of Pass Creek and will be read annually.

Production Area(s)
Middle Fork

5th Field Name
LONG CREEK

Organizations
Landowner/Manager
North Fork John Day Watershed Council
OWEB

Limiting Factor(s)
Riparian Conditions (Primary)
Temperature Extremes (Secondary)
Low Flows (Secondary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council, 541 934-2188

Entry updated by:
Alex Conley on 5/6/04

75

Burnette Riparian Fencing

Description: 5 miles of riparian fencing were installed along 5 miles of the north side of the Middle Fork.

Focus
Fisheries

Project Type(s):
Riparian Fencing

Dates: Begun in 1999, completed in 2002
Location: Middle Fork John Day

Results: The project has greatly increased control over cattle grazing on this five-mile reach of the Middle Fork, and riparian vegetation and channel profile are improving rapidly. Note: fence materials were provided by ODFW using BPA funding.

Monitoring: Yes: Three photomonitoring points have been established and are being photographed each year in late

Production Area(s)
Middle Fork

5th Field Name
BIG CREEK

Organizations
North Fork John Day Watershed Council
OWEB
ODFW

Limiting Factor(s)
High Temp (Secondary)
Low Flows (Secondary)
Riparian Conditions (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council, 541 934-2188

Entry updated by:
Alex Conley on 5/6/04

76

Meadowbrook riparian fencing

Description: Installed ~4 miles fence along 2 miles of the West Fork of Meadow Brook and developed 12 upland water developments.

Focus
Fisheries

Project Type(s):
Riparian Fencing
Water developments to improve grazing management

Dates: Begun in 2002, completed in 2002
Location: Meadow Brook, North Fork John Day

Results: Allows for protection of riparian vegetation while allowing for better distribution of upland grazing.

Production Area(s)
North Fork

5th Field Name
NORTH FORK JOHN DAY RIVER/POTAMUS CREEK

Organizations
North Fork John Day Watershed Council
USFS Blue Mountain Demo Area

Limiting Factor(s)
Low Flows (Secondary)
Temperature Extremes (Primary)
Riparian Function (Primary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

77

Lower Camp Creek infiltration gallery

Description: An infiltration gallery was installed that allows diversion of irrigation water without requiring annual in-stream disturbance.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2003, completed in 2003
Location: Middle Fork John Day

Results: Improves fish-passage and eliminates disturbance associated with pushup dam construction.

Production Area(s)	5th Field Name
Middle Fork	CAMP CREEK

Organizations

Grant SWCD
North Fork John Day Watershed Council
OWRD
Malheur National Forest
USFS Blue Mountain Demo Area

Limiting Factor(s)

Physical Fish Passage Barriers (Primary)
Riparian Function (Secondary)

For more information, contact:
Alex Conley, North Fork John Day Watershed Council
541 934-2188

Entry updated by:
Alex Conley on 5/6/04

79

Middle Fork weed inventory and treatment

Description: Treated noxious weed invasions and inventoried distribution of weeds along roads and trails on 17 private properties

Focus	Project Type(s):
Fisheries	Riparian Weed Control
Wildlife	Herbaceous vegetation management

Dates: Begun in 2001, completed in 2003
Location: Middle Fork John Day

Results: Helps support and coordinate ongoing efforts to reduce noxious weed problems in the watershed.

Monitoring: Yes: Contact Jeff Fields.

Production Area(s)	5th Field Name
Middle Fork	BIG CREEK
	CAMP CREEK
	UPPER MIDDLE FORK JOHN DAY RIVER

Organizations

Grant Weed Control
The Nature Conservancy
North Fork John Day Watershed Council
USFS Blue Mountain Demo Area

Limiting Factor(s)

Riparian Function (Primary)

For more information, contact:
Jeff Fields, The Nature Conservancy's Middle Fork John Day Stewardship Ecologist

Entry updated by:
Alex Conley on 5/6/04

82

Small grant program

Description: 3 miles riparian fencing, 375 acres juniper thinning, 6 spring developments and 2 solar wells (1 in 2001) to provide livestock water, and 20 acres upland reseeding.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003, completed in 2003
Location: North Fork John Day

Results: Improved grazing management and upland and riparian conditions.

Production Area(s) **5th Field Name**

Organizations
Landowner/Manager
Monument SWCD
ODA
OWEB

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

85

Lower John Day River Enclosure Project

Description: Developed partnerships, constructed corridor and cross-fencing along 13 miles, installed water developments at 5 locations, and planted riparian areas.

Focus **Project Type(s):**
Fisheries
Riparian Fencing
Riparian Plantings
Establishment of Protected Areas

Dates: Begun in 1999, completed in 2000
Location: Service Creek to Twickenham

Results: Results: This project has protected a large section of the John Day River from grazing pressure, increasing bank stability and reducing erosion.

Monitoring: Yes: Site has been monitored with photos for 5 consecutive years following project. Monitoring will concentrat on vegetattive recovery.

Production Area(s) **5th Field Name**
Lower Mainstem LOWER JOHN DAY RIVER/SERVICE CREEK

Organizations
BLM
Middle John Day Watershed Council
ODFW
Oregon Trout
OWEB
Wheeler SWCD

Limiting Factor(s)
Water Contamination (Secondary)
Temperature Extremes (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

86

West Branch Bridge Creek Riparian Fence Project

Description: Fencing will exclude livestock from 1 mile of the creek and construct a cross fence, with photo-monitoring for 5 years.

Focus	**Project Type(s):**
Fisheries	Riparian Fencing OtherUpland Improvement Activities

Dates: Begun in 1999, completed in 2000
Location: West Branch Bridge Creek

Results: Banks have stabilized, willow recruitment has occurred and sediment in the creek has been reduced.

Production Area(s)	**5th Field Name**
Lower Mainstem	BRIDGE CREEK

Organizations

Bridge Creek Watershed Council — Landowner/Manager
OWEB — Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

87

Parrish Creek Riparian Pasture Project

Description: Constructed a 7-mile fence, created a 1,000-acre riparian pasture and new livestock management plan, developed off-site stock water.

Focus	**Project Type(s):**
Fisheries	Riparian Fencing Water developments to improve grazing management

Dates: Begun in 1999, completed in 2000
Location: Parrish Creek

Results: Since 1999, riparian vegetation has dramatically improved. Woody vegetation has increased in riparian areas. Off-stream stock water has resulted in less livestock use of stream.

Production Area(s)	**5th Field Name**
Lower Mainstem	LOWER JOHN DAY RIVER/KAHLER CREEK

Organizations

Landowner/Manager — Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

88

Kahler Creek Projects

Description: Riparian corridor fencing, juniper riprap, in-stream berm removal for fish passage, and water developments to improve riparian conditions.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination
Large Woody Debris placement
Riparian Fencing

Dates: Begun in 2000, completed in 2000
Location: Kahler Creek

Results: Landowner conservation practices have continued. Woody vegetation has re-established. Berm removal allows for fish to move upstream.

Monitoring: Yes: Site has been monitored with photos for 5 consecutive years following project. Water temperature, turbidity, and dissolved oxygen monitored as well.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/KAHLER CREEK

Organizations
Middle John Day Watershed Council
Wheeler SWCD
OWEB

Limiting Factor(s)
Physical Fish Passage Barriers (Primary)

Excessive sediment and cobble embeddedness (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

89

Corncob Creek Riparian Improvement Project

Description: 2,800 ft of riparian fencing and 2 cross fences were completed and the excluded area was planted with willow and cottonwood cuttings. Future work will include off-site spring development, juniper clearing, annual grass control, and perennial grass reintr

Focus
Fisheries

Project Type(s):
Riparian Fencing
Riparian Plantings

Dates: Begun in 1999, completed in 2000
Location: Corncob Creek

Results: Fencing allows improved management of riparian area. Some woody vegetation shows regrowth. Perennial regrowth is occurring in juniper control area.

Monitoring: Yes: Site has been monitored with photos for 5 consecutive years following project. Water temperature, turbidity, and dissolved oxygen monitored as well.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/KAHLER CREEK

Organizations
BLM
Monument SWCD
Wheeler SWCD
Landowner/Manager
OWEB

Limiting Factor(s)
Riparian Function (Primary)
Temperature Extremes (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

Alder Creek Juniper Control Project

\# 90

Description: Replace 360 acres of invasive juniper trees with perennial grasses to enhance soil absorption, decrease erosion, increase late season flows and potentially lower water temperatures.

Focus
Fisheries

Project Type(s):
Woody veg management
Other Flow Restoration Efforts

Dates: Begun in 1999, completed in 2000
Location: Alder Creek

Results: Tremendous increase in perennial grasses on the farmed plots. On marginal soils (thin and too rocky to farm), less perennial regrowth is occurring. Recovery will be slower in those areas.

Monitoring: Yes: Photo points will be monitored for vegetative production and diversity for the 5 consecutive years following the project.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/KAHLER CREEK

Organizations
Landowner/Manager
Wheeler SWCD
OWEB

Limiting Factor(s)
Low Flows (Primary)

Increase infiltration to reduce sedimentation (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

Johnson Creek Solar Water Development Project

\# 91

Description: Installed a solar panel to provide power for pumping water to an upland storage tank for livestock and wildlife. Exclusion fencing and helicopter seeding will improve wildlife habitat along Johnson Creek.

Focus
Fisheries

Project Type(s):
Water developments to improve grazing management
Riparian Fencing
Herbaceous vegetation management

Dates: Begun in 1999, completed in 2000
Location: Johnson Creek

Results: Perennial grasses have improved wildlife habitat in exclusion area. Solar water system has helped keep livestock distribution away from the creek area. Forage usage has improved.

Monitoring: Yes: Photo points will be monitored for vegetative production and diversity for the 5 consecutive years following the project.

Production Area(s)	5th Field Name
Upper Mainstem	JOHN DAY RIVER/JOHNSON CREEK

Organizations
BLM
ODFW
Wheeler SWCD
Longview Ranch
OWEB

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

\# 92

Mountain Creek Riparian Planting Project

Description: Plant 2,000 ft of Mountain Creek with native riparian vegetation (river birch, alder, willow, cottonwood).

Focus	Project Type(s):
Fisheries	Riparian Plantings

Dates: Begun in 2001, completed in 2001
Location: Mountain Creek

Results: Due to rodent damage and drought conditions, tree survival on first planting was low. Second planting used larger rooted stock. Survival rate on second planting will be assessed in spring, 2004. Natural willow recruitment is strong.

Monitoring: Yes: Photo points will be monitored for vegetative production and diversity for the 5 consecutive years following the project.

Production Area(s)	5th Field Name
Upper Mainstem	MOUNTAIN CREEK

Organizations
Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

\# 93

Lower John Day River enclosure project phase III

Description: Constructed two miles of allotment drift fence, one off-stream water development, noxious weed control within excluded area

Focus	Project Type(s):
Fisheries	Riparian Fencing Riparian Weed Control Establishment of Protected Areas Water developments to improve grazing management

Dates: Begun in 1999, completed in 2000
Location: Service Creek to Twickenham, Dead Dog

Results: Fence is accomplishing its goal. Livestock trespass from BLM allotment to private ground has been eliminated. Noxious weeds colonies have been reduced to controllable level.

Monitoring: Yes: Photo points will be monitored for vegetative production and diversity for the 5 consecutive years following the project.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SERVICE CREEK

Organizations

BLM	Middle John Day Watershed Council
OWEB	Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)

Water Contamination (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

94

Parrish Creek Riparian Pasture Project Phase II

Description: Constructed an additional two miles of riparian fencing as well as one off-stream water development.

Focus
Fisheries

Project Type(s):
Riparian Fencing
Water developments to improve grazing management

Dates: Begun in 1999, completed in 2000
Location: Parrish Creek

Results: Riparian habitat improvement, woody vegetation and perennials increasing, improved water quality, livestock management improved.

Monitoring: Yes: Photo points will be monitored for vegetative production and diversity for the 5 consecutive years following the project.

Production Area(s)
Lower Mainstem

5th Field Name
LOWER JOHN DAY RIVER/KAHLER CREEK

Organizations
Landowner/Manager
Middle John Day Watershed Council
OWEB
Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)
Water Contamination (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

95

West Branch Bridge Creek Watershed Improvement

Description: 20 acre juniper & brush removal, 0.7 miles riparian fencing, 20 acres rangeland seeding.

Focus
Fisheries

Project Type(s):
Riparian Fencing
Establishment of Protected Areas
Woody veg management
Other Flow Restoration Efforts

Dates: Begun in 1999, completed in 2000
Location: West Branch Bridge Creek

Results: Perennial and woody vegetation re-growth. Banks have stabilized. Competition for native vegetation has been reduced by brush and juniper removal.

Monitoring: Yes: Photo points will be monitored for vegetative production and diversity for the 5 consecutive years following the project.

Production Area(s)
Lower Mainstem

5th Field Name
BRIDGE CREEK

Organizations
Landowner/Manager
Middle John Day Watershed Council
OWEB
Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)

Increase infiltration to reduce sedimentation (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

96

West Branch Bridge Creek Watershed Improvement

Description: 49 acres upland juniper removal and rangeland reseeding.

Focus
Fisheries

Project Type(s):
Woody veg management
Other Flow Restoration Efforts

Dates: Begun in 1999, completed in 2000
Location: West Branch Bridge Creek

Results: Erosion and resulting sedimentation have been reduced.

Monitoring: Yes: Monitoring consists of before and after photo points. Also 5 continous years of photo collection.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations
BCWC
Landowner/Manager
OWEB
Wheeler SWCD

Limiting Factor(s)
Increase infiltration to reduce sedimentation (Primary)
Low Flows (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

97

Muleshoe Creek riparian improvement

Description: 50 acres of juniper clearing, 100 ft. of tree planting, 30 acres of reseeding to perennial native bunch grass, cross fence construction.

Focus
Fisheries

Project Type(s):
Riparian Fencing
Riparian Plantings
Woody veg management
Herbaceous vegetation management

Dates: Begun in 2001, completed in 2002
Location: Muleshoe Creek

Results: Perennial grasses and woody vegetation have increased dramatically. Pine tree survival rate is very high and trees are growing great. Cross fence has eliminated livestock trespass.

Monitoring: Yes: Project will be monitored for the following 5 years.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SERVICE CREEK

Organizations
Middle John Day Watershed Council
NRCS
OWEB
Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)
Water Contamination (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

Service Creek Water Quality Improvement

98

Description: Replace 13,000 ft. of open ditch and replace with PVC pipe, install three fish screens, install five water developments.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination
Fish Screening
Irrigation efficiency projects
Water developments to improve grazing management

Dates: Begun in 2001, completed in 2002
Location: Service Creek

Results: Livestock utilizing stock troughs and full utilization of water right allowing for better grazing management practices.

Monitoring: Yes: Photo monitoring will be carried out through 4 consecutive years following project completion.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SERVICE CREEK

Organizations
Middle John Day Watershed Council
NRCS
ODFW
OWEB
Wheeler SWCD

Limiting Factor(s)
Entrapement in Irrigation Sytems (Secondary)
Physical Fish Passage Barriers (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

Mountain Creek Watershed Enhancement Phase II

99

Description: 1,000 ft. riparian planting

Focus
Fisheries

Project Type(s):
Riparian Plantings

Dates: Begun in 2001, completed in 2002
Location: Mountain Creek

Results: In progress.

Monitoring: Yes: Site has been monitored with photos for 5 consecutive years following project. Wheeler SWCD will also monitor cross section profile of mountain creek for three years to record the self healing process.

Production Area(s)	5th Field Name
Upper Mainstem	MOUNTAIN CREEK

Organizations
Middle John Day Watershed Council
ODF
OWEB
Wheeler SWCD

Limiting Factor(s)
Riparian Function (Primary)
Temperature Extremes (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

\# 100

Gable Creek Ranch Riparian Improvement

Description: Replace 9060 ft. of open ditch with PVC pipe, install one head gate, one fish screen, measuring device, five fish weirs, and removed two fish barriers.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination Fish Screening Irrigation efficiency projects Weirs and other structures

Dates: Begun in 2001, completed in 2002
Location: Gable Creek

Results: Unrestricted fish passage restored through two irrigation dams being removed. Water use is more efficient. Installation of weirs has reduced stream cut-back.

Monitoring: Yes: Landowner will conduct followup photo points for 5 years following the project.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations

BCWC
ODFW
OWRD
NRCS
OWEB
Wheeler SWCD

Limiting Factor(s)

Physical Fish Passage Barriers (Primary)
Entrapement in Irrigation Sytems (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

\# 101

Bridge Creek Measuring Device Installation

Description: Installed 10 measuring flumes and 1 demo flume to educate landowners about water use and allow for better irrigation distribution by OWRD Watermaster.

Focus	Project Type(s):
Fisheries	Other Flow Restoration Efforts

Dates: Begun in 2001, completed in 2001
Location: Bridge Creek

Results: Increased control of flow and utilization of Bridge Creek. Flumes installed and now used by irrigators and OWRD.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations

BCWC
OWRD
OWEB
Wheeler SWCD

Limiting Factor(s)

Low Flows (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

102

Brooks/West Branch Watershed Enhancement

Description: Replaced 8,100 ft. of open ditch, installed control device and measuring device, eliminated 2 diversion points, installed 4 off-stream water sites.

Focus Fisheries

Project Type(s):
Diversion Dam improvements/elimination
Irrigation efficiency projects
Water developments to improve grazing management

Dates: Begun in 2001, completed in 2002
Location: West Branch Bridge Creek

Results: In progress.

Monitoring: Yes: Project will be photo monitored for 5 years following project completion.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations
BCWC, NRCS, OWEB, OWRD, USFWS, Wheeler SWCD

Limiting Factor(s)
Physical Fish Passage Barriers (Primary)
Entrapement in Irrigation Sytems (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

103

Habecker/Wade Fish Passage and Irrigation Improvement

Description: Replaced 7,600 ft. of open ditch with gated PVC pipe, installed 6 weirs, overhead passage, new fish friendly diversion.

Focus Fisheries

Project Type(s):
Diversion Dam improvements/elimination
Irrigation efficiency projects

Dates: Begun in 2003, still in progress
Location: West Branch Bridge Creek

Results: In progress.

Monitoring: Yes: Priject will be photo monitored for 5 years following completion.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations
BCWC, NRCS, OWEB, OWRD, USFWS, Wheeler SWCD

Limiting Factor(s)
Physical Fish Passage Barriers (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

104

Pine Creek Clarno Rd. Culvert Project

Description: Removed culvert that was documented as a fish barrier, installed new bottomless culvert. This project was accomplished as part of the CTWSRO Pine Creek Conservation Area project.

Focus
Fisheries

Project Type(s):
Culvert improvements
Weirs and other structures

Dates: Begun in 2003, completed in 2003
Location: Pine Creek

Results: Project restored unrestricted fish passage below Clarno Rd. and reduced the risk of catastrophic culvert failure and resulting sediment loads in streams.

Monitoring: Yes: 5 years follow up photo monitoring provided by CTWS.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/MUDDY CREEK

Organizations
CTWSRO
Middle John Day Watershed Council
OWEB
USFWS
Wheeler County
Wheeler SWCD

Limiting Factor(s)
Physical Fish Passage Barriers (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

105

Service Creek Watering System

Description: Project will protect a spring from livestock trampling and utilize a solar powered pump to bring livestock water to uplands.

Focus
Fisheries

Project Type(s):
Water developments to improve grazing management

Dates: Begun in 2003, completed in 2003
Location: Service Creek

Results: In progress.

Monitoring: Yes: Landowner along with Wheeler will monitor project 2 years following completion.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SERVICE CREEK

Organizations
Middle John Day Watershed Council
NRCS
OWEB
OWRD
Wheeler SWCD

Limiting Factor(s)
Water Contamination (Secondary)
Riparian Function (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

106

Five Minute Draw Watershed enhancement

Description: Cleared 10 acres of invasive junipers.

Focus
Fisheries

Project Type(s):
Woody veg management
Other Flow Restoration Efforts

Dates: Begun in 2002, completed in 2002
Location: Five Minute Draw (tributary to Bridge Creek)

Results: Re-establishment of perennial grasses is occurring.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations
BCWC
Wheeler SWCD
OWEB

Limiting Factor(s)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

107

Franks Field Watershed Enhancement

Description: Cleared 19 acres of invasive junipers.

Focus
Fisheries

Project Type(s):
Other Flow Restoration Efforts
Woody veg management

Dates: Begun in 2002, completed in 2002
Location: Nelson Creek (tributary to Bridge Creek)

Results: Juniper removal is complete. Future rangeland seeding is planned.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations
BCWC
Wheeler SWCD
OWEB

Limiting Factor(s)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

Prairie Ranch Spring Development

\# 108

Description: Constructed one spring/reservoir to feed seven water developments.

Focus	**Project Type(s):**
Fisheries	Water developments to improve grazing management

Dates: Begun in 2002, completed in 2002
Location: Mud Creek (tributary to Service Creek)

Results: Livestock distribution is improved, aiding in better utilization of forage.

Production Area(s)	**5th Field Name**
Lower Mainstem	LOWER JOHN DAY RIVER/SERVICE CREEK

Organizations
Middle John Day Watershed Council
Wheeler SWCD
OWEB

Limiting Factor(s)
Water Contamination (Primary)
Riparian Function (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

Geer Old Cut Brush Watershed Enhancement

\# 109

Description: 160 acres juniper and brush clearing.

Focus	**Project Type(s):**
Fisheries	Other Flow Restoration Efforts Woody veg management

Dates: Begun in 2002, completed in 2002
Location: West Branch Bridge Creek

Results: Perennial re-growth is increased.

Production Area(s)	**5th Field Name**
Lower Mainstem	BRIDGE CREEK

Organizations
BCWC
Wheeler SWCD
OWEB

Limiting Factor(s)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

110

Bar U Ranch Spring Development

Description: Developed 8 spring sites.

Focus
Fisheries

Project Type(s):
Water developments to improve grazing management

Dates: Begun in 2002, completed in 2002
Location: Pine Creek

Results: Upland forage management is improved. Streambanks are stabilized because of reduced livestock use.

Production Area(s)
Lower Mainstem

5th Field Name
LOWER JOHN DAY RIVER/MUDDY CREEK

Organizations
Middle John Day Watershed Council
OWEB
Wheeler SWCD

Limiting Factor(s)
Water Contamination (Primary)
Riparian Function (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

111

Hunt Ranch Spring Development

Description: Developed five spring sites.

Focus
Fisheries

Project Type(s):
Water developments to improve grazing management

Dates: Begun in 2003, completed in 2003
Location: Cottonwood Creek

Results: Upland forage management is improved. Streambanks are stabilized because of reduced livestock use.

Production Area(s)
Lower Mainstem

5th Field Name
BUTTE CREEK

Organizations
Middle John Day Watershed Council
OWEB
Wheeler SWCD

Limiting Factor(s)
Water Contamination (Primary)
Riparian Function (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

112

Mill Creek Range Improvement

Description: 40 acres juniper & brush removal, 1 mile cross fencing, 65 acres range planting, noxious weed control, 12 acres pine tree thinning.

Focus	Project Type(s):
Fisheries	Woody veg management Fencing to improve grazing management Herbaceous vegetation management OtherUpland Improvement Activities Riparian Weed Control

Dates: Begun in 2003, completed in 2003
Location: Service Creek, Mill Creek

Results: Perennial re-growth is increasing, sediment flows are reduced in Service Creek, forest stands are improved and understory fuel loads are reduced. Upland rangeland management is improved.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SERVICE CREEK

Organizations

Middle John Day Watershed Council
ODF
OWEB
Wheeler SWCD

Limiting Factor(s)

Excessive sediment and cobble embeddedness (Secondary)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

113

Juniper Butte Ranch Spring Development

Description: Four spring developments.

Focus	Project Type(s):
Fisheries	Water developments to improve grazing management

Dates: Begun in 2003, completed in 2003
Location: Mountain Creek (Willow Creek)

Results: Livestock distribution is improved.

Production Area(s)	5th Field Name
Upper Mainstem	MOUNTAIN CREEK

Organizations

Middle John Day Watershed Council
ODA
OWEB
Wheeler SWCD

Limiting Factor(s)

Water Contamination (Primary)
Riparian Function (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

114

Anderson-Wade culvert removal

Description: Replaced a culvert with new bottomless culvert, installed four rock weirs.

Focus
Fisheries

Project Type(s):
Culvert improvements
Weirs and other structures

Dates: Begun in 2002, completed in 2002
Location: West Branch Bridge Creek

Results: Fish passage is open. The new culvert is expected to withstand any large flood events, reducing the possibility of culvert failure and resultant sediment loads in creek.

Production Area(s)	5th Field Name
Lower Mainstem	BRIDGE CREEK

Organizations
BCWC
ODFW
USFWS
Wheeler SWCD

Limiting Factor(s)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

115

Pine Creek Culvert Removal

Description: Removed unused culvert barrier. Installed rootwads, boulders and 3 rock weirs to protect grade. This project was accomplished as part of the CTWSRO Pine Creek Conservation Area project.

Focus
Fisheries

Project Type(s):
Culvert improvements
Large Woody Debris placement
Other In-stream Activities

Dates: Begun in 2002, completed in 2002
Location: Pine Creek

Results: Project restored unrestricted fish passage and reduced the risk of catastrophic culvert failure.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/MUDDY CREEK

Organizations
CTWSRO
Middle John Day Watershed Council
USFWS
Wheeler SWCD

Limiting Factor(s)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/23/04

Demonstration projects

116

Description: 3.25 miles riparian fence, 2 off stream water developments, 59 acres perennial grass seeding, 810 acres juniper removal, 1 irrigation conveyance, noxious weed control

Focus
Fisheries

Project Type(s):
Instream water right leases and acquisitions
Riparian Fencing
Woody veg management
Herbaceous vegetation management
Riparian Weed Control

Dates: Begun in 1998, completed in 2002
Location: Bridge Creek, West Branch Bridge Creek, Bear Creek

Results: Livestock are kept out of the riparian area, resulting in woody vegetation re-growth. Perennial grasses are becoming established on juniper removal area. Conveyance has reduced sediment and increased water-use efficiency.

Production Area(s)
Lower Mainstem

5th Field Name
BRIDGE CREEK

Organizations
BCWC
OWEB
NRCS
Wheeler SWCD

Limiting Factor(s)
Water Contamination (Primary)

Excessive sediment and cobble embeddedness (Secondary)

For more information, contact:
Judy Potter
District Manager
Wheeler SWCD
(541) 468-2990

Entry updated by:
Will Homer on 3/25/04

Keerins diversions

117

Description: Replaced pushup dam with low-head structure, fishway and spillway.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 1999
Location: South Fork John Day

Results: Fish passage is now assured at all flows. Water turbidity has decreased. Vegetation covers and stabilizes the bank where materials were historically mined for construction of the annually-installed push

Monitoring: Yes: Monitoring proram performed by ABR inc. as part of the Upper South Fork Monitoring program funded by OWEB, USFWS, and DEQ

Production Area(s)
South Fork

5th Field Name
MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
BPA
OWRD
CTWSRO
Grant SWCD
Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 118

Gravity irrigation pipeline systems

Description: Replaced open irrigation ditches with pipelines.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination Irrigation efficiency projects

Dates: Begun in 1994, completed in 1994
Location: Widows Creek

Results: Pipelines serve 6 water users who now sprinkle irrigate. The pipelines replaced 5.2 miles of open ditch and eliminated
4 in-stream diversions. Water quality in Widows Creek has noticeably increased, temperature has decreased, and in-stream

Production Area(s)	5th Field Name
Upper Mainstem	FIELDS CREEK

Organizations

Grant SWCD
ODFW
Water Users
OWRD
NRCS
USBR
USFWS

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 119

Holmes diversion pipeline

Description: Eliminated pushup dam that created a barrier to fish passage.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 1998, completed in 1998
Location: Middle Fork John Day

Results: Diversion dam removed by consolidation. Fish passage has improved. Stream banks have been stabilized by riparian vegetation.

Production Area(s)	5th Field Name
Middle Fork	CAMP CREEK

Organizations

BPA
Water Users
North Fork John Day Watershed Council
Grant SWCD
CTWSRO

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

120

Fields infiltration gallery and irrigation efficiency

Description: Replaced pushup dam with infiltration gallery and converted from flood to sprinkler irrigation.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination Irrigation efficiency projects

Dates: Begun in 1997, completed in 1998
Location: John Day River

Results: Except for fine sediment sealing over the infiltration system, the entire project has worked very well. Reduced diversions, reduced irrigation demand, and reduced warm water return flows have resulted from the project.

Production Area(s)	**5th Field Name**
Upper Mainstem	UPPER JOHN DAY RIVER

Organizations

BPA	Grant SWCD
USBR	Water Users
OWRD	ODFW

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

121

Lemons

Description: Replaced pushup dam with infiltration gallery to maintain an unrestricted fish passage, improved aquatic and riparian habitat and improved efficiency of irrigation.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination Fish Screening Irrigation efficiency projects

Dates: Begun in 1996, completed in 1996
Location: Lemons Holmberg ditch

Results: Water temperatures and sediment loads in the river have decreased and irrigation water is delivered more efficiently. The riparian area vegetation is recovering and the channel is stabilizing.

Production Area(s)	**5th Field Name**
Upper Mainstem	LAYCOCK CREEK

Organizations

Grant SWCD	NRCS
ODFW	OWRD
USBR	Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 122

Cathedral Rock Ditches Project

Description: Replaced 3 pushup dams with pumps and replaced open ditches with pipelines.

Focus	Project Type(s):	
Fisheries	Diversion Dam improvements/elimination Irrigation efficiency projects	**Dates:** Begun in 1993, completed in 1994 **Location:** John Day River

Results: Eliminated fish passage barriers. Turbidity has decreased. Old ditches have been left to revert to riparian vegetation.

Production Area(s)	5th Field Name
Upper Mainstem	JOHN DAY RIVER/JOHNSON CREEK

Organizations

Grant SWCD
ODFW
USBR
OWEB
NRCS
OWRD
Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 123

Clausen ditch conversion

Description: Replaced pushup dam with pump and converted to sprinkler irrigation.

Focus	Project Type(s):	
Fisheries	Diversion Dam improvements/elimination Irrigation efficiency projects	**Dates:** Begun in 1997, completed in 1997 **Location:** John Day River

Results: Reduced stream erosion and bedload transport, eliminated riverbed scouring, reduced turbidity, and increased fish passage have resulted from the project.

Production Area(s)	5th Field Name
Upper Mainstem	UPPER MIDDLE JOHN DAY

Organizations

Grant SWCD
ODFW
Water Users
OWRD
NRCS
USBR
BPA
CTWSRO

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

124

Kight irrigation reorganization

Description: Converted from flood irrigation to wheel lines.

Focus	Project Type(s):
Fisheries	Irrigation efficiency projects Other Flow Restoration Efforts

Dates: Begun in 1996, completed in 1996
Location: John Day River

Results: Irrigation has improved crop production. Pump station is screened to meet NMFS and ODFW specifications.

Production Area(s)	5th Field Name
Upper Mainstem	LAYCOCK CREEK

Organizations

Grant SWCD
NRCS
ODFW
OWRD
USBR
Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

125

Ediger Irrigation Reorganization

Description: Replaced pushup dams with pumps; converted from flood irrigation.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination Irrigation efficiency projects

Dates: Begun in 1996, completed in 1998
Location: John Day River

Results: Irrigation has improved production. Less water is used for irrigation and water remains in stream longer to contribute to in-stream benefits. Fish passage is now assured.

Production Area(s)	5th Field Name
Upper Mainstem	LAYCOCK CREEK

Organizations

Grant SWCD
NRCS
ODFW
OWRD
USBR
Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

126

Lee irrigation organization

Description: Converted from flood to sprinkler irrigation.

Focus	Project Type(s):
Fisheries	Irrigation efficiency projects

Dates: Begun in 1998, completed in 1998
Location: John Day River

Results: The landowner and ODFW are monitoring for results.

Monitoring: Yes:

Production Area(s)	5th Field Name
Upper Mainstem	LAYCOCK CREEK

Organizations

BPA	Grant SWCD
ODFW	Water Users
OWRD	CTWSRO

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

127

Crown Ranch return flow cooling No. 1

Description: Constructed subsurface drainage system to return cooler water to the stream.

Focus	Project Type(s):
Fisheries	Return Flow Cooling Projects

Dates: Begun in 1999, completed in 1999
Location: John Day River

Results: Water temperature has decreased dramatically. Water drainage has increased and landowners are monitoring for increased production.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

Grant SWCD	ODFW
Water Users	CTWSRO

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Mullin aeration and subsoiling

128

Description: The project used a ripper to increase water absorption and deep percolation.

Focus
Fisheries

Project Type(s):
Irrigation efficiency projects

Dates: Begun in 1996, completed in 1996
Location: 1 mile east of John Day

Results: Results: Production increased markedly.

Monitoring: Yes: Landowner to monitor forage production increases and irrigation efficiency.

Production Area(s)
Upper Mainstem

5th Field Name
STRAWBERRY CREEK

Organizations
Grant SWCD
USBR
Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Water rights acquisition program

129

Description: Allows water right holders to donate, lease or sell water rights for transfer to in-stream use. Negotiates control of out-of-stream water rights to convert to in-stream water rights in those streams where acquisition will provide the greatest potential

Focus
Fisheries

Project Type(s):
Instream water right leases and acquisitions

Dates: Begun in 2000, completed in 2002
Location: Big Boulder, Big, and Hawkins creeks, Middle Fork John Day

Results: OWT has negotiated donated leases of all or a portion of 18 water right certificates from 3 different properties on the Middle Fork John Day River and tributaries. These leases provide over 5 cfs flow in critical chinook and steelhead spawning and rearin

Production Area(s)
Middle Fork

5th Field Name
CAMP CREEK
BIG CREEK

Organizations
Oregon Water Trust

Limiting Factor(s)

For more information, contact:
Steve Parret
OWT
(503) 525-0141

Entry updated by:
on

130

Salmonid habitat improvement

Description: Riparian fencing on a variety of private properties to exclude livestock grazing on approximately 25 miles of stream

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location: South Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
ODFW'S Restoration & Enhancement Program

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

131

Blue Mountain Demonstration Project

Description: Includes several projects by NFJDWC listed above.

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location: Middle and North Fork John Day rivers

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
BLM
USFS
ODF

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

132

Northeast Oregon Assembled Land Exchange

Description: The BLM has exchanged approx 30,000 acres of land for more suitable land. Planned work on exchanged lands includes closure of "draw-bottom" roads, an inventory for future road closures, and stream habitat surveys.

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location: North Fork John Day

Results: The acquisition allows for public management of approximately 56 miles of anadromous fish streams, secures important big game winter range, provides a consistent habitat base for many wildlife species, and ensures public access and use

Production Area(s) **5th Field Name**

Organizations
BLM

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

133

Bull trout recovery

Description: Draft bull trout recovery plan is currently under review. In addition to the recovery plan, bull trout angling regulations have been in effect since 1994; in-stream water rights for bull trout have been issued for at least 24 streams or stream reaches.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2000, completed in 2000
Location: Entire John Day Subbasin

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
John Day Bull Trout Recovery Team

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

134

Wildlife preserve

Description: Create a 1,200-acre preserve for salmon and steelhead production. working to restore 4 miles of spawning gravels,

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location: Middle Fork John Day

Results: Monitoring shows improved habitat for spawning and rearing salmonids due to increased riparian sedge/rush and hardwood vegetation on riverbanks, improved retention of spawning gravels, re-vegetated stream bars, increased microhabitat shading and hiding co

Production Area(s) **5th Field Name**

Organizations
CTUIR
CTWSRO
ODFW
Oregon Trout
Others
The Nature Conservancy

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

135

Description: Redistributed dredge tailings, restored floodplain.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1999, completed in 1999
Location: Clear Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 136

Description: Repaired head cuts.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1998, completed in 1998
Location: Boulder Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman
National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 137

Description: Obliterated and recontoured 8 miles of road.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1998, completed in 1998
Location: Oriental Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 138

Description: Installed buck and pole aspen exclosures.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1998, completed in 1998
Location: Morsay and Thompson creeks

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 139

Description: Installed cattle exclosure fence.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1998, completed in 1998
Location: Bear Wallow Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 140

Description: Restored dredge tailings.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1998, completed in 1998
Location: Clear Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 141

Description: Planted riparian areas with hardwoods and conifers.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1998, completed in 1998
Location: Texas Bar Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

142

Description: Propagated and planted hardwoods in riparian areas.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Boulder Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman
National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

143

Description: Obliterated 3/8 mile road near creek.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Channel Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman
National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

144

Description: Redistributed dredge tailings (5 miles of river).

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: North Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

145

Description: Planted cottonwoods and other hardwoods, obliterated road, and installed 1.5 miles of riparian exclosure.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Texas Bar Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

146

Description: Constructed riparian exclosures to exclude livestock access.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Little Indian, Butcherknife Spring, Sugarbowl, Taylor, Smith, Park, and Dry Camas creeks

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

147

Description: Obliterated and recontoured road.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: South Cable Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

148

Description: Stabilized landslide.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Neeves Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

149

Description: Installed buck and pole aspen exclosure.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997, completed in 1997
Location: Deer Lick Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

150

Description: Propagated and planted hardwoods in riparian areas.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: Boulder Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 151

Description: Collected switches for propagation at nursery.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: Boulder, Onion, and Granite creeks

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman
National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 152

Description: Hauled rock for head cut (1997 work).

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: South Fork Boulder Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman
National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 153

Description: Rehabilitated Peavy Cabin road, placed logs and matting for post-fire stabilization.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: Upper North Fork John Day River and Bull Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman
National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

154

Description: Constructed 2.5 miles of fence, changed season of use on 3 miles.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: North Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
BLM- Prineville District

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

155

Description: Redistributed dredge tailings.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: North Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

156

Description: Removed two culverts, re-sloped two closed roads.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: Sheep and Texas Bar creeks

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

157

Description: Installed 1 mile of new electric exclosure.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: Bully Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

158

Description: Installed ¼ mile of new electric exclosure.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: Hinton Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

159

Description: Installed 3.5 miles of New Zealand fence, changed allotment boundary to exclude riparian grazing.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1996, completed in 1996
Location: Matlock and Dry Matlock creeks

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

160

Description: Reclaimed 2 miles of dredge tailing.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1995, completed in 1995
Location: North Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

161

Description: Installed 2 miles of riparian fencing.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1995, completed in 1995
Location: North Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

162

Description: Obliterated and removed culverts on 12 miles road.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1995, completed in 1995
Location: Oriental Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 163

Description: Installed 76 miles of electric fence.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1995, completed in 1995
Location: North Fork Basin and Indian Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 164

Description: Planted riparian areas.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1994, completed in 1994
Location: Bull Run Creek System

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman
National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 165

Description: Closed roads, installed waterbars, conducted erosion control (3 miles).

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1994, completed in 1994
Location: Indian Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

166

Description: Provided for erosion control and restriced vehicle access for 11 recreation sites.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1994, completed in 1994
Location: North Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

167

Description: Collected seed and willow cuttings for upcoming riparian planting program. No in-stream work or planting done in 1993.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1993, completed in 1993
Location: Bull Run and Granite creeks

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Wallowa-Whitman National Forest-Baker RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

168

Description: Planted 4,786 black cottonwood, willow, ponderosa pine, and alder seedlings.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1993, completed in 1993
Location: Camas, Bear Wallow, Lane, Clear, Butcherknife, Sugar Bowl, Dry Camas, Taylor creeks; NFJD River

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

169

Description:

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

170

Description: Installed 1 mile of fencing and provided for erosion control (check dams, woody debris, rock; approximately 50 pieces).

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1993, completed in 1993
Location: Hinton Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

171

Description: Constructed livestock fencing exclosures to protect 33 miles of riparian habitat.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1993, completed in 1993
Location: Kelsay, Sponge, Desolation, Indian, Bruin, Cable, Hidaway, Dry Camas, Morsay, Sugar Bowl, Taylor, Tribble, Matlock, Smith, Hinton, Bear Wallow, Squaw, Owens creeks; Albee Meadows

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National
Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

172

Description: Removed gabion ford and culverts to improve passage.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1993, completed in 1993
Location: Desolation Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

173

Description: Conducted road obliteration/improvements: 1.6 miles road ripped, 1.95 miles seeding, 890 linear feet of barricades, 5 water bars, 255 linear feet inflow/outflow ditches, 25 entrance cross ditches, 3882 linear feet entrance treatment, and 45 log blocks.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1993, completed in 1993
Location: Meadow Brook, Meadow, Deerlick, Wilkins, Five Mile, Matlock, Juniper creeks; North Fork John Day River

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

174

Description: Reclaimed ½ mile dredge tailing.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1993, completed in 1993
Location: North Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 175

Description: Repaired/rebuilt 60 weirs and planted 200 willows.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1992, completed in 1992
Location: Desolation Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 176

Description: Removed 3 culverts, constructed rock deflector to prevent erosion.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1992, completed in 1992
Location: Hinton Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 177

Description: Planted 700 willows.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1992, completed in 1992
Location: Clear Creek

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest-N.Fork RD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Upgrade bridge and open flow restriction. # 178

Description: Replaced Deardorff Bridge on main stem Upper John Day (1999).

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1999, completed in 1999
Location: Mainstem Upper John Day

Results: Project included channel widening beneath bridge to enhance flows.

Production Area(s) **5th Field Name**

Organizations
Malheur National Forest

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Fence livestock from stream. # 179

Description: Fenced off Phipps Meadow to restore streambank and provide headcut protection.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2001, completed in 2001
Location: Middle Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Malheur National Forest

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Screen irrigation ditch # 180

Description: Improved ditch and installed fish screens. One ditch on the Middle Fork John Day was screened on the Vendondo Ditch.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2001, completed in 2001
Location: Vinegar and Middle Fork John Day

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Malheur National Forest ODFW

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 181

Description: Restored alpine meadow.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2000, completed in 2000
Location: Vinegar Hill scenic area

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Malheur National Forest

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Fire recovery

\# 182

Description: Conducted post-fire restoration, including streambank stabilization by planting riparian hardwoods.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1999, completed in 1999
Location: Summit Fire area

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Malheur National Forest

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Post-fire recovery

\# 183

Description: Stabilized streambanks by placing large woody debris, restricting grazing, and closing 45 miles of road.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1999, completed in 1999
Location: Summit Fire area

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Malheur National Forest

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

184

Diversion replacement

Description: Project will replace an irrigation diversion with a fish-friendly, alternative structure in a steelhead and bull trout bearing tributary of the Upper JD Basin. Includes new headgate and flow measuring device for better distribution.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2004, completed in 2004
Location: Indian Creek

Results: Once installed, project will provide unrestricted fish passage over diversion structure

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

Grant SWCD	OWEB
OWRD	Private

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

186

Culvert replacement, noxious weed control, juniper thinning, headcut and cutbank repair

Description: Funding provided by USFWS, OWEB and Title II (federal funds) to perform "ridgetop to ridgetop" restoration on both private and USFS lands. Part of an ongoing program to address resource concerns in the Upper South Fork John Day River Subbasin. Project types include culvert replacements, weed control, juniper removal, thinning in aspen groves and reseeding of native grass species.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination
Wildlife	Other Flow Restoration Efforts
	Herbaceous vegetation management
	Woody veg management

Dates: Begun in 2003, completed in 2004
Location: Upper South Fork JD River

Results: Aggressive juniper and noxious weed control are underway.

Production Area(s)	5th Field Name
South Fork	UPPER SOUTH FORK JOHN DAY RIVER
	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations

Grant SWCD	Grant Weed Control
Malheur National Forest	OWRD
Private	Upper South Fork John Day Watershed Council
USFWS	ODFW

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 187

Lower Mountain Creek diversion consolidation and replacement

Description: Project will consolidate two diversions into one location. New diversion structure will passage all life stages of steelhead and include a headgate and measuring device for better water distribution.

Focus	**Project Type(s):**	
Fisheries	Diversion Dam improvements/elimination	**Dates:** Begun in 2004, completed in 2004 **Location:** Mountain Creek

Results: Once installed, project will eliminate one diversion and allow for unrestricted fish passage at another.

Production Area(s)	**5th Field Name**
Upper Mainstem	MOUNTAIN CREEK

Organizations

Grant SWCD	OWEB
OWRD	Private

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 189

Noxious weed control, upland spring development, fencing.

Description: Installed cross fencing, developed springs, pumped stockwater with a solar powered pump to troughs, controlled noxious weeds and reseed to native grasses.

Focus	**Project Type(s):**	
Fisheries	Control of Non-Point Pollution Sources Establishment of Protected Areas Water developments to improve grazing management Fencing to improve grazing management Herbaceous vegetation management	**Dates:** Begun in 2002, completed in 2002 **Location:** Poison and Rosebud creeks

Results: Cross fencing and stockwater provision in the uplands have relieved pressure on the riparian areas. Noxious weed control and reseeding preserved the biodiversity of the uplands.

Production Area(s)	**5th Field Name**
South Fork	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations

BLM	CTWSRO
Grant SWCD	Grant Weed Control
NRCS	OWRD
Private	Upper South Fork John Day Watershed Council
USFWS

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

190

John Long and Hillis Ditch Diversion replacements

Description: Replaced two irrigation diversion structures with fish-friendly alternatives. Installed headgates and measuring devices for improved distribution.

Focus **Project Type(s):**
Fisheries Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: Indian Creek

Results: Unrestricted fish passage restored in a bull trout and steelhead tributary of the Upper JD River.

Production Area(s) **5th Field Name**
Upper Mainstem STRAWBERRY CREEK

Organizations
Grant SWCD OWEB
OWRD Private

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

192

Westside, Indian Spit and McKenna Ditch Diversion replacements

Description: Replaced three irrigation diversion structures with fish-friendly alternatives. Installed headgates and measuring devices for improved distribution

Focus **Project Type(s):**
Fisheries Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: Indian Creek

Results: Unrestricted fish passage restored in a bull trout and steelhead tributary of the Upper JD River.

Production Area(s) **5th Field Name**
Upper Mainstem STRAWBERRY CREEK

Organizations
Grant SWCD OWEB
OWRD Private

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Throop-Snyder Diversion Replacement

\# 193

Description: Installed a pump station to complement the BPA restoration program.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination
Other Flow Restoration Efforts

Dates: Begun in 2002, completed in 2002
Location: Upper John Day River

Results: Conversion from flood to sprinkler irrigation, water left in-stream for up to a mile from the original diversion dam to the pump station, project eliminated an annually constructed pushup dam.

Production Area(s)	5th Field Name
Upper Mainstem	UPPER MIDDLE JOHN DAY
	FIELDS CREEK

Organizations

Grant SWCD	OWEB
OWRD	Private
BPA	CTWSRO

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Irrigation improvement

\# 194

Description: Installed a pipeline in a ditch to serve stockwater to a feed lot.

Focus
Fisheries

Project Type(s):
Sediment catchment systems

Dates: Begun in 2001, completed in 2001
Location: Upper John Day River

Results: Improved water quality and protected waters of the United States.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

ODA	OWEB
OWRD	Private
Grant SWCD	

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 196

CREP habitat improvement

Description: Installed riparian fencing, developed off-stream water sources. Completed 9 projects that include 155.2 acres and 13 miles of riparian restoration.

Focus	Project Type(s):
Fisheries	Riparian Fencing
Wildlife	Riparian Plantings

Dates: Begun in 1999, completed in 2002
Location: Lower John Day in Gilliam County

Results: Unknown

Production Area(s)	5th Field Name
Lower Mainstem	LOWER ROCK CREEK
	LOWER JOHN DAY RIVER/SCOTT CANYON
	LOWER JOHN DAY RIVER/FERRY CANYON

Organizations
Gilliam SWCD NRCS

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam SWCD
NRCS Condon Field Office

Entry updated by:
George Meyers on 4/26/04

\# 197

Habitat improvement

Description: Installed riparian fencing, cleared brush and reseeded in the Middle Rock Creek area of Gilliam County.

Focus	Project Type(s):
Fisheries	Riparian Fencing
Wildlife	

Dates: Begun in 1993, completed in 1993
Location: Lower John Day in Gilliam County

Results: Fence Installed, monitoring completed

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER ROCK CREEK

Organizations
OWEB Gilliam SWCD

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

\# 198

Retrofit infiltration galleries

Description: Completed retrofit on 4 galleries in 2003.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 2003, completed in 2003
Location: Upper John Day River

Results: Retrofit reduces plugging and restores efficiency of the structures.

Production Area(s) **5th Field Name**
Upper Mainstem

Organizations
Farm Service Agency
ODFW
OWRD
USBR
Grant SWCD
OWEB
Private

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 199

Reynolds irrigation reorganization

Description: Eliminated fish passage barrier and combined 3 points of diversion into one.

Focus
Fisheries

Project Type(s):

Dates: Begun in ,
Location:

Results: Stabilized stream banks and controlled irrigation water diversion.

Production Area(s) **5th Field Name**
Upper Mainstem

Organizations
Farm Service Agency
ODFW
OWRD
USBR
Grant SWCD
OWEB
Private

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 200

Crown Ranch irrigation return flow cooling No. 2

Description: Returned approximately 2 cfs of cool, filtered water to the mainstem John Day River during critical low flow periods.

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations

Farm Service Agency
Grant SWCD
ODFW
OWEB
OWRD
Private
USBR

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 201

Noxious weed control

Description: This is an ongoing annual program to control noxious weed invasion in Grant and surrounding counties.

Focus **Project Type(s):**
Fisheries

Dates: Begun in ,
Location:

Results: Unknown

Production Area(s) **5th Field Name**

Organizations

Farm Service Agency
Grant SWCD
ODFW
OWEB
OWRD
Private
USBR

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

Grub Creek fence
202

Description: Installed a riparian exclusion fence.

Focus
Fisheries

Project Type(s):
Riparian Fencing
Water developments to improve grazing management
Fencing to improve grazing management

Dates: Begun in 2000, completed in 2000
Location: Grub Creek

Results: An aspen stand and riparian vegetation have been protected.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations
NRCS
ODFW
Private
Grant SWCD
OWEB

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

South Fork stream restoration
203

Description: Stabilized streambank with juniper riprap, riparian fence construction, seeding and hardwood planting.

Focus
Fisheries

Project Type(s):
Bank Protection
Floodplain/channel reconstruction
Riparian Plantings
Riparian Fencing

Dates: Begun in 1997, completed in 1998
Location: South Fork John Day River

Results: Riparian conditions have greatly improved and the juniper riprap are succesfully trapping sediment from the river.

Production Area(s)	5th Field Name
South Fork	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
Grant SWCD
OWEB
USFWS
ODFW
Private

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 204

St. Clair diversion No. 1

Description: Provided for positive fish passage, stream stabilization, and water control.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 1999
Location: South Fork John Day River

Results: Unrestricted fish passage for all life stages now provided over structure.

Monitoring: Yes: Fish survey and mark and recapture surveys performed to test migration over diversion structure. Results were inconclusive due to limited sample size.

Production Area(s)
South Fork

5th Field Name
MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
Grant SWCD
OWRD
CTWSRO
ODFW
Private

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 205

North Sherman Direct Seed Project

Description: Ongoing project to promote and monitor direct seed practices and their applicability in Sherman County.

Focus
Fisheries
Wildlife

Project Type(s):
Changes to cropping systems

Dates: Begun in 2003, completed in 2005
Location: Sherman County

Results: Project is expected to mitigate upland sources of sediment delivery to streams. Project is also designed to provide data

Production Area(s)
Lower Mainstem

5th Field Name
LOWER JOHN DAY RIVER/MCDONALD FERRY

Organizations
North Sherman Watershed Council
Landowner/Manager
Sherman County SWCD

Limiting Factor(s)
Low Flows (Secondary)
Excessive sediment and cobble embeddedness (Primary)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Elizabeth Cranston
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

\# 206

Juniper thinning

Description: Cut 687 acres of juniper and seeded with native and rangeland grasses to improve upland conditions, reduce erosion, and improve tributary flows.

Focus	**Project Type(s):**
Wildlife	Other Flow Restoration Efforts
Fisheries	Woody veg management
	Herbaceous vegetation management

Dates: Begun in 2003, completed in 2003
Location: Upper John Day River

Results: Aggressive juniper and noxious weed control underway.

Production Area(s) **5th Field Name**
Upper Mainstem

Organizations
CTWSRO OWEB
Partners for Wildlife

Limiting Factor(s)

For more information, contact:
Linda Brown
CTWSRO
(541) 820-3568

Entry updated by:
Mark Croghan on 3/19/04

\# 207

Prioritize and fund mitigation projects to permanently protect and enhance priority habitats

Description: Enhanced acquired, eased, or leased habitats through: alteration of land management practices, active restoration of habitats, control of noxious weeds and other non-native vegetation, and control of public access, to provide benefits to target/indicator fish and wildlife species.

Focus **Project Type(s):**
Wildlife

Dates: Begun in , still in progress
Location: Columbia Basin

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
OWC

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 208

Develop GIS layers for generation of specific natural resource map analysis

Description: Develop data sets for use in comparative analysis of multiple factors affecting fish and wildlife values in the four subbasins. This data can help integrate basin wide natural resource planning and decision making.

Focus **Project Type(s):**
Wildlife

Dates: Begun in ,
Location:

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
ODFW

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

209

Acquisition of Forrest Ranch. Partial BPA fish and wildlife habitat mitigation for impacts from John Day Pool.

Description: 4,232-acre Forrest Ranch, acquired in 2002, is managed for fish and wildlife habitat protection and enhancement through scientific monitoring and restoration projects. Annual project funding is dependent on BPA for operations, maintenance, restoration and monitoring. Management includes noxious weed control, juniper control, restoration planting, water rights protection/use, conservation livestock grazing, fencing, road maintenance, public access and monitoring.

Focus	Project Type(s):
Wildlife	Diversion Dam improvements/elimination
Fisheries	Other Flow Restoration Efforts
	Floodplain/channel reconstruction
	Riparian Plantings
	Establishment of Protected Areas
	Woody veg management
	Herbaceous vegetation management
	OtherUpland Improvement Activities
	Riparian Fencing

Dates: Begun in 2001, still in progress
Location: Mainstem and Middle Fork John Day rivers

Results: Long-term management will allow for continued protection and restoration of habitat critical to multiple fish and wildlife species.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK
Middle Fork	CAMP CREEK

Organizations

CTWSRO
USBR
BPA
Privious owners

Limiting Factor(s)

For more information, contact:
Brent Smith
Forest Conservation Area
(541) 820-3568

Entry updated by:
Mark Croghan on 3/19/04

210

Acquisition and management of Wagner Ranch

Description: 9,253-acre Wagner Ranch acquired in 2001 is currently managed as part of the Pine Creek Conservation Area Wildlife Habitat and Watershed Restoration Project.

Focus	Project Type(s):
Wildlife	

Dates: Begun in 2001, still in progress
Location: Mainstem John Day River next to Pine Creek Conservation Area

Results: Wagner Ranch acquisition expanded the Pine Creek Conservation Area Wildlife Habitat and Watershed Restoration Project to approximately 34,000 acres and 6 miles of John Day River frontage.

Production Area(s) **5th Field Name**

Organizations

CTWSRO

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

211

Acquisition and management of Pine Creek Conservation Area. Partial BPA wildlife habitat mitigation for impacts from John Day Pool.

Description: Will be managed as a Wildlife Habitat and Watershed Restoration Project in perpetuity with adequate funding from BPA. Ongoing management will include noxious weed control, prescribed fire, juniper control, restoration plantings, road maintenance, fencing, public access management and scientific monitoring.

Focus
Wildlife

Project Type(s):

Dates: Begun in 1998, still in progress
Location: Pine Creek Watershed

Results: Monitoring program has been initiated; Wildlife Habitat and Watershed Restoration Plan completed; noxious weed control in progress; juniper control initiated; one culvert replaced & one culvert removed, restoring fish passage in Pine Creek; water rights leased to instream flow; livestock removed from sensitive habitats; public access program implemented. Long-term

Production Area(s) **5th Field Name**

Organizations
CTWSRO

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

212

Acquisition of the Oxbow Ranch along the Middle Fork John Day River

Description: Managed as a Fish and Wildlife Habitat and Watershed Restoration Project in perpetuity. With 1,022 acres of land
and 9.2 cfs of water rights, this property is within critical habitat areas and contains habitat for steelhead, chinook salmon,

Focus
Wildlife
Fisheries

Project Type(s):
Diversion Dam improvements/elimination
Other Flow Restoration Efforts
Riparian Fencing
Floodplain/channel reconstruction
Establishment of Protected Areas
Herbaceous vegetation management
OtherUpland Improvement Activities
Channel reconstruction

Dates: Begun in 2001, still in progress
Location: Middle Fork John Day

Results: Property Management Plan being drafted, monitoring programs in progress, noxious weed control in progress, conservation livestock grazing program successful, water rights managed for fish benefit, riparian tree planting program ongoing. Dredge mine tailings restoration funding lost in 2002, but planned for 2005.

Production Area(s)	5th Field Name
Middle Fork	CAMP CREEK

Organizations
CTWSRO BPA
Privious landowner

Limiting Factor(s)

For more information, contact:
Brian Cochran
Oxbow Conservation Area
(541) 421-3931

Entry updated by:
Mark Croghan on 3/19/04

\# 213

Conservation Reserve Program

Description: Convert agricultural land back to native habitat The condition of the CRP stands is generally good.

Focus **Project Type(s):**
Wildlife

Dates: Begun in ,
Location: John Day Basin

Results: These efforts have benefited wildlife by improving upland habitat conditions, improving water quality and quantity, and restoring vegetation to more natural conditions. Gilliam and Wheeler counties have both enrolled their maximum allowed cropland acres in the Conservation Reserve Program (CRP). The condition of the CRP stands is generally good.

Production Area(s) **5th Field Name**

Organizations
Landowner/Manager NRCS
SWCD

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 214

Description: Increase wildlife habitat on private lands, funds planting programs using native species of plants.

Focus **Project Type(s):**
Wildlife

Dates: Begun in ,
Location:

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
Partners for Wildlife

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 215

Wildlife habitat improvement

Description: Administers funds collected from a $2 surcharge on hunting licenses, recommends funding for projects that improve wildlife habitat and facilitates hunting access on private lands.

Focus **Project Type(s):**
Wildlife

Dates: Begun in ,
Location: John Day Subbasin

Results: To date the Board has funded dozens of projects that improve wildlife forage through seeding, protected riparian areas by corridor fencing, improved wildlife water sources by developing springs, removed junipers that are encroaching onto deer and elk winter ranges, closed roads and helped with prescribed burns.

Production Area(s) **5th Field Name**

Organizations
ODFW

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

216

Deer and elk winter range improvement, big game damage control on private lands

Description: Improves habitat by fertilizing fields for forage production, seeding recently logged areas with wildlife forage mix, prescribed burning, thinning junipers and closing roads to reduce big game harassment. . Fisheries habitat is enhanced by fencing off riparian areas.

Focus Wildlife

Project Type(s):

Dates: Begun in ,
Location:

Results: Unknown

Production Area(s) **5th Field Name**

Organizations
DEAR
Green Forage

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

217

EQIP

Description: Funds stock water/spring development, fencing, juniper control, sediment ponds, grazing plans, terrace building, alternate cropping practices.

Focus Wildlife

Project Type(s):
Fencing to improve grazing management
Water developments to improve grazing management
Herbaceous vegetation management
Sediment catchment systems
Changes to cropping systems
OtherUpland Improvement Activities

Dates: Begun in 1998,
Location: Lonerock, Ferry Canyon

Results: Unknown

Production Area(s)	5th Field Name
Lower Mainstem	UPPER ROCK CREEK
	LOWER JOHN DAY RIVER/FERRY CANYON

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD

Limiting Factor(s)

For more information, contact:
NRCS Condon Field Office
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

Pond/spring development program
218

Description: Develop off-stream stock water sources.

Focus
Wildlife

Project Type(s):
Control of Non-Point Pollution Sources
OtherUpland Improvement Activities
Sediment catchment systems
Water developments to improve grazing management

Dates: Begun in 2000,
Location: Gilliam County

Results: Successful program.

Production Area(s) **5th Field Name**
Lower Mainstem

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD

Limiting Factor(s)

For more information, contact:
Gilliam-East John Day Watershed Council

Entry updated by:
George Meyers on 4/26/04

Alternate crops research committee
219

Description: Cost-share program encourages farm research on alternative crops to reduce erosion and sedimentation by using crops that require less tillage, improving soil sustainability and health.

Focus
Wildlife
Fisheries

Project Type(s):
OtherUpland Improvement Activities

Dates: Begun in ,
Location: Gilliam County

Results: Successful program.

Production Area(s) **5th Field Name**
Lower Mainstem

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD

Limiting Factor(s)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

Streamflow improvement
220

Description: Bio-engineering of stream banks using willow cuttings, juniper rip-rap and treatments.

Focus
Wildlife
Fisheries

Project Type(s):
Bank Protection
Riparian Plantings

Dates: Begun in 1999, completed in 2003
Location: Gilliam County

Results: Placement of toe rock, and willows

Production Area(s) **5th Field Name**
Lower Mainstem LOWER ROCK CREEK

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD

Limiting Factor(s)
Riparian Function (Primary)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

222

EQIP

Description: Serve on local action groups and basin work groups. Review and approve conservation plans. Technical assistance is provided for this program by 2 technicians (BPA funded positions).

Dates: Begun in 1996, still in progress
Location: Sherman County

Focus	**Project Type(s):**
Wildlife	Riparian Fencing
Fisheries	Riparian Weed Control
	Riparian Plantings
	Control of Non-Point Pollution Sources
	Fencing to improve grazing management
	Herbaceous vegetation management
	Water developments to improve grazing management
	Sediment catchment systems
	Changes to cropping systems
	Grassed waterways, filter strips, other buffers

Results:

Production Area(s)	**5th Field Name**
Lower Mainstem	LOWER JOHN DAY RIVER/MCDONALD FERRY
	GRASS VALLEY CANYON
	PINE HOLLOW
	LOWER JOHN DAY RIVER/FERRY CANYON
	LOWER JOHN DAY RIVER/SCOTT CANYON

Organizations
Sherman SWCD
NRCS

Limiting Factor(s)
Low Flows (Secondary)
Temperature Extremes (Primary)
Excessive sediment and cobble embeddedness (Primary)
Riparian Function (Secondary)
Increase infiltration to reduce sedimentation (Secondary)

For more information, contact:
Sherman County NRCS District Conservationist

Entry updated by:
Jason Faucera on 5/5/04

224

Noxious Weeds

Description: Maintain an active partnership with Weed District; include weed information in newsletters and annual reports; involve Weed District in watershed projects

Dates: Begun in 1990, still in progress
Location: Sherman County

Focus	**Project Type(s):**
Wildlife	Riparian Weed Control
Fisheries	Herbaceous vegetation management

Results:

Production Area(s)	**5th Field Name**
Lower Mainstem	LOWER JOHN DAY RIVER/MCDONALD FERRY
	GRASS VALLEY CANYON
	LOWER JOHN DAY RIVER/SCOTT CANYON
	LOWER JOHN DAY RIVER/FERRY CANYON
	PINE HOLLOW

Organizations
Sherman County SWCD

Limiting Factor(s)
Riparian Function (Secondary)
Increase infiltration to reduce sedimentation (Secondary)

For more information, contact:
Elizabeth Cranston
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

Grass Valley Watershed Enhancement and Restoration

\# 225

Description: Enhance the Grass Valley Canyon watershed. Conservation work has been ongoing in the Grass Valley Watershed

Focus	Project Type(s):
Wildlife	Riparian Fencing
Fisheries	Riparian Plantings
	Riparian Weed Control
	Control of Non-Point Pollution Sources
	Fencing to improve grazing management
	Water developments to improve grazing management
	Herbaceous vegetation management
	Prescribed burning
	Sediment catchment systems
	Grassed waterways, filter strips, other buffers
	Changes to cropping systems

Dates: Begun in 1997, still in progress
Location: Sherman County

Results: Mitigate peak flow events, enhance summer flows, reduce summer stream temperatures, reduce soil erosion and sediment delivery to streams, improve grazing management, control weeds.

Production Area(s)	5th Field Name
Lower Mainstem	GRASS VALLEY CANYON

Organizations

NFWF	Landowner/Manager
OWEB	Sherman County SWCD
NFWF	ODFW
ODA	BLM

Limiting Factor(s)

Low Flows (Secondary)
Temperature Extremes (Primary)
Excessive sediment and cobble embeddedness (Primary)
Riparian Function (Primary)
Increase infiltration to reduce sedimentation (Secondary)

For more information, contact:
Elizabeth Cranston
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

Lower John Day Ag Water Quality Management Plan (Senate Bill 1010 Plan)

\# 226

Description: Serve as Local Management Agency for Lower John Day River planning. The Ag. Water Quality Plan has been completed and is out for public review.

Focus	Project Type(s):
Wildlife	
Fisheries	

Dates: Begun in 2002, still in progress
Location: Sherman and Gilliam Counties

Results:

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/MCDONALD FERRY
	GRASS VALLEY CANYON
	LOWER JOHN DAY RIVER/SCOTT CANYON
	LOWER JOHN DAY RIVER/FERRY CANYON
	PINE HOLLOW
	LOWER JOHN DAY RIVER/CLARNO
	THIRTYMILE CREEK
	LOWER ROCK CREEK
	BUTTE CREEK

Organizations

Sherman County SWCD	Gilliam SWCD
ODA	DEQ

Limiting Factor(s)

For more information, contact:
Jason Faucera
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

227

Development of Section 7 Agreement

Description: Develop protective regulations under ESA Section 7 for common practices in the tri-county area (Sherman, Wasco, and Gilliam Counties).

Focus **Project Type(s):**
Wildlife
Fisheries

Dates: Begun in 1999, completed in Current
Location: Sherman, Wasco, and Gilliam Counties

Results: An agreement was reached in 2004, but implementation details will need to be addressed.

Production Area(s) **5th Field Name**

Organizations
Sherman County SWCD
Wasco SWCD
NRCS
NOAA
Gilliam SWCD

Limiting Factor(s)

For more information, contact:
Brian Stradley
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

228

Grass Valley Watershed Assessment

Description: Detailed watershed assessment using OWEB protocol will be accomplished once funding is approved.

Focus **Project Type(s):**
Wildlife
Fisheries

Dates: Begun in 2004, still in progress
Location: Sherman County

Results: Funding for Grass Valley Watershed has been recommended, but grant agreement has yet to be signed.

Production Area(s)	5th Field Name
Lower Mainstem	GRASS VALLEY CANYON

Organizations
Sherman County SWCD

Limiting Factor(s)

For more information, contact:
Elizabeth Cranston
Krista Coelsch

Entry updated by:
Jason Faucera on 5/5/04

Noxious Weed Control Program

229

Description: Controls weeds in the Bridge Creek Watershed.

Focus
Wildlife

Project Type(s):
Riparian Weed Control
OtherUpland Improvement Activities

Dates: Begun in 2000,
Location: WSWCD

Results: A Weed Board was established in May 2000 with 40 landowners participating in an herbicide cost-share program. A CRMP was formed for Bridge Creek in 1997 as well as EQIP programs.

Production Area(s)
Lower Mainstem

5th Field Name
BRIDGE CREEK

Organizations
BCWC
ODA
Wheeler SWCD
BLM
USFS

Limiting Factor(s)
Low Flows (Primary)

For more information, contact:

Entry updated by:
Will Homer on 3/23/04

Bridge Creek Demonstration Project

230

Description: The Bridge Creek Demonstration Project is a watershed wide tool to display Best Management Practices on each participating landowners property. It consists of juniper removal, cross fencing, natuve reseeding, and noxious weed control within the Bridge Creek watershed.

Focus
Wildlife

Project Type(s):
Riparian Weed Control
OtherUpland Improvement Activities
Water developments to improve grazing management
Herbaceous vegetation management
Woody veg management

Dates: Begun in 1997, completed in 2003
Location: Bridge Creek watershed

Results: Significant weed reductions have occurred for half the landowner participants. Effectiveness monitoring will continue for 5 years.

Monitoring: Yes: Monitoring consisted of photo points for each applied practice area. Photos were collected through 2003.

Production Area(s)
Lower Mainstem

5th Field Name
BRIDGE CREEK

Organizations
Bridge Creek Watershed Council
Wheeler SWCD

Limiting Factor(s)
Low Flows (Primary)

For more information, contact:

Entry updated by:
Will Homer on 3/23/04

231

Solar off-stream stock water

Description: Developed 4 solar off-channel livestock water sources for cattle.

Focus
Wildlife
Fisheries

Project Type(s):
Control of Non-Point Pollution Sources
Water developments to improve grazing management
OtherUpland Improvement Activities

Dates: Begun in 2001, completed in 2004
Location: Lower John Day River, Hay Creek, Rock Creek

Results: Projected reduction in the impact on riparian areas.

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SCOTT CANYON
	LOWER JOHN DAY RIVER/SCOTT CANYON
	LOWER ROCK CREEK

Organizations
Gilliam East John Day Watershed Council
OWEB

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam-East John Day Watershed Council

Entry updated by:
George Meyers on 4/26/04

232

Off-stream livestock water developments

Description: Constructed off-stream solar watering developments for livestock and wildlife.

Focus
Wildlife
Fisheries

Project Type(s):

Dates: Begun in 2001, completed in 2001
Location: Gilliam County: Lower John Day, Hay Cr., Rock Cr.

Results: Unknown

Production Area(s)	5th Field Name
Lower Mainstem	

Organizations
Gilliam East John Day Watershed Council
OWEB

Limiting Factor(s)

For more information, contact:

Entry updated by:
on

\# 233

Off-stream livestock water developments

Description: Constructed off-stream solar watering developments for livestock and wildlife. Required outcomes are range management plans and 4 solar watering sites within the 2 watersheds.

Focus	Project Type(s):
Wildlife Fisheries	Control of Non-Point Pollution Sources OtherRiparian Habitat Improvements Water developments to improve grazing management OtherUpland Improvement Activities

Dates: Begun in 2003, completed in 2004
Location: Gilliam County: East Fork Thirtymile Cr., Trail Fork Cr.

Results: Watering developments are expected to keep livestock in uplands and out of riparian areas.

Production Area(s)	5th Field Name
Lower Mainstem	THIRTYMILE CREEK UPPER ROCK CREEK

Organizations
Gilliam East John Day Watershed Council
OWEB
Gilliam SWCD

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

\# 234

Water and sediment control basins

Description: Constructed 3 sediment and water control structures to control runoff from a 10-year, 24-hour frequency storm.

Focus	Project Type(s):
Wildlife Fisheries	Sediment catchment systems

Dates: Begun in 1999, completed in 1999
Location: Rock Creek

Results: Holding sediment, structures are in place

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER ROCK CREEK

Organizations
Gilliam SWCD
OWEB

Limiting Factor(s)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

Erosion control structures

\# 235

Description: Designed and built a system of level terraces to hold a 10-year, 10-day runoff.

Focus
Wildlife
Fisheries

Project Type(s):
Sediment catchment systems

Dates: Begun in 1999, completed in 1999
Location: Hay Creek

Results: The project significantly reduced the potential for soil erosion resulting from rapid runoff during high intensity rainfall and snowmelt.

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SCOTT CANYON

Organizations
Gilliam SWCD
OWEB

Limiting Factor(s)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

Irrigation improvement and efficiency

\# 236

Description: Converted from flood irrigation to sprinkler irrigation.

Focus
Fisheries

Project Type(s):
Irrigation efficiency projects

Dates: Begun in 2002, completed in 2002
Location: Rock Creek

Results: Reduction in water usage and sediment runoff.

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER ROCK CREEK

Organizations
Gilliam East John Day Watershed Council
OWEB
Gilliam SWCD

Limiting Factor(s)
Low Flows (Primary)
Temperature Extremes (Secondary)
Water Contamination (Secondary)
Entrapement in Irrigation Sytems (Secondary)

For more information, contact:
Gilliam SWCD
Gilliam-East John Day WC

Entry updated by:
George Meyers on 4/26/04

Upland livestock and wildlife water development

237

Description: Developed a spring in upland pasture for livestock and wildlife use.

Focus	Project Type(s):
Wildlife	Control of Non-Point Pollution Sources
Fisheries	Water developments to improve grazing management

Dates: Begun in 2002, completed in 2002
Location: Lower Main Stem John Day

Results: Watering developments are expected to keep livestock in uplands and out of riparian areas.

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SCOTT CANYON

Organizations
Gilliam East John Day Watershed Council
OWEB
Gilliam SWCD

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

Upland solar livestock and wildlife water development

238

Description: Livestock and wildlife use.

Focus	Project Type(s):
Wildlife	Control of Non-Point Pollution Sources
Fisheries	Water developments to improve grazing management

Dates: Begun in 2002, completed in 2002
Location: Main Stem John Day

Results: Watering developments are expected to keep livestock in uplands and out of riparian areas.

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SCOTT CANYON

Organizations
Gilliam East John Day Watershed Council
OWEB
Gilliam SWCD

Limiting Factor(s)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

Wildlife habitat improvement
239

Description: Developed spring sources of water in the uplands.

Focus	Project Type(s):
Wildlife	Control of Non-Point Pollution Sources OtherUpland Improvement Activities

Dates: Begun in 2002, completed in 2002
Location: Thirtymile Creek

Results: Increased wildlife habitat.

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	THIRTYMILE CREEK

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD
OWEB

Limiting Factor(s)
Riparian Function (Secondary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

Upland solar livestock and wildlife water development
240

Description: Developed solar water source in uplands for livestock and wildlife.

Focus	Project Type(s):
Wildlife Fisheries	Control of Non-Point Pollution Sources Water developments to improve grazing management

Dates: Begun in 2002, completed in 2002
Location: Ferry Canyon

Results: Watering developments are expected to keep livestock in uplands and out of riparian areas.

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/FERRY CANYON

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD
OWEB

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

241

Livestock and wildlife water development

Description: Developed water source in uplands for livestock and wildlife.

Focus	Project Type(s):
Wildlife	Control of Non-Point Pollution Sources
Fisheries	Water developments to improve grazing management

Dates: Begun in 2002, completed in 2002
Location: Rock Creek

Results: Watering developments are expected to keep livestock in uplands and out of riparian areas.

Monitoring: Yes: photo point

Production Area(s)	5th Field Name
Lower Mainstem	UPPER ROCK CREEK

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD
OWEB

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

242

Erosion control, livestock / wildlife water development

Description: Constructed 1 sediment/water control structure to control runoff. Developed upland water source to allow livestock and wildlife to utilize upland pasture.

Focus	Project Type(s):
Wildlife	Control of Non-Point Pollution Sources
Fisheries	Water developments to improve grazing management
	Sediment catchment systems

Dates: Begun in 2002, completed in 2002
Location: Hay Cr.

Results: Project completed

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER JOHN DAY RIVER/SCOTT CANYON

Organizations
Gilliam East John Day Watershed Council
Gilliam SWCD
OWEB

Limiting Factor(s)
Excessive sediment and cobble embeddedness (Primary)
Riparian Function (Primary)
Increase infiltration to reduce sedimentation (Primary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

\# 243

Irrigation improvement and efficiency

Description: Constructed underground pipeline to reduce sediment runoff.

Focus	Project Type(s):
Fisheries	Irrigation efficiency projects

Dates: Begun in 2003, completed in 2004
Location: Rock Creek

Results: Unknown

Monitoring: Yes: Photo Point

Production Area(s)	5th Field Name
Lower Mainstem	LOWER ROCK CREEK

Organizations
Gilliam SWCD

Limiting Factor(s)
Low Flows (Primary)
Temperature Extremes (Secondary)
Excessive sediment and cobble embeddedness (Secondary)

For more information, contact:
Gilliam SWCD

Entry updated by:
George Meyers on 4/26/04

\# 244

CREP enrollment

Description: CREP NRCS/FSA Program

Focus	Project Type(s):
Fisheries	Riparian Fencing
Wildlife	Riparian Plantings
	Riparian Weed Control
	Wetland Restoration
	Control of Non-Point Pollution Sources
	OtherRiparian Habitat Improvements

Dates: Begun in 2004,
Location:

Results: Unknown

Production Area(s)	5th Field Name
Lower Mainstem	

Organizations
NRCS
Farm Service Agency

Limiting Factor(s)
Riparian Function (Primary)

For more information, contact:

Entry updated by:
George Meyers on 4/26/04

South Fork Desolation Aquatic Rehabilitation Planting
248

Description: 1 mile, riparian restoration to benefit Bull trout, westslope cutthroat trout, and redband trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2000,
Location: South Fork John Day

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
Randall L Scarlett
Fisheries and Wildlife Biologist
North Fork John Day Ranger District
Umatilla National Forest
Phone (541)427-5381
Email scarlett@fs.fed.us

Entry updated by:
on

North Fork John Day Dredge Tailings Restoration Project
249

Description: 5 miles, riparian restoration to benefit chinook salmon, MCR steelhead, and bull trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2001,
Location: Granite and Clear Creeks

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
Randall L Scarlett
Fisheries and Wildlife Biologist
North Fork John Day Ranger District
Umatilla National Forest
Phone (541)427-5381
Email scarlett@fs.fed.us

Entry updated by:
on

Riparian Planting - Clear Creek Dredge

250

Description: 3 miles, riparian restoration to benefit chinook salmon, MCR steelhead and bull trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2001,
Location: Clear Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
Randall L Scarlett
Fisheries and Wildlife Biologist
North Fork John Day Ranger District
Umatilla National Forest
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Entry updated by:
on

Clear Creek Dredge Tailings Restoration

251

Description: 1 mile, riparian restoration to benefit chinook salmon, MCR steelhead, and bull trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Clear Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

252

Bull Fire Riparian Planting

Description: 1.5 miles, riparian planting to benefit and MCR steelhead, and redband trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

253

West Fork Meadowbrook and Smith Creek Riparian Fences

Description: 2.25 miles of stream, riparian fencing to benefit MCR steelhead, and redband trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: West Fork John Day River, Smith Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

254

Blackjack and Bluebird Mine Pipe Cleanout

Description: Stream water quality restoration downstream of mine adits to benefit chinook salmon, MCR steelhead, and bull trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

255

Dispersed Campsite Repair

Description: Riparian restoration, 1 acre to benefit MCR steelhead, and bull trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

North Fork and South Fork Desolation Creek Arch Placement on FS Road 45

256

Description: 2 open-bottom arches, fish passage improvement to benefit chinook salmon, MCR steelhead, bull trout, westslope cutthroat trout, and redband trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: North and South Fork Desolation Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Owens Hazardous Fuels Reduction Project

257

Description: 550 acres, fuels reduction/riparian restoration to benefit MCR steelhead, and redband trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Owens Creek and Lane Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

258

North Fork John Day Riparian Hard Fencing

Description: .41 miles stream protected; 1.25 miles fence, riparian restoration to benefit MCR steelhead, and redband trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Kelsay Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

259

Bluebird Mine Drainage Pipe Replacement

Description: 1 pipe, Stream water quality restoration downstream of mine to benefit chinook salmon, MCR steelhead, and bull trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Clear Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

260

Aspen Stand Restoration and Fencing

Description: 62 acres, fencing/conifer removal/planting to benefit Redband trout, elk, deer, and neotropical migrant birds

Focus **Project Type(s):**
Wildlife

Dates: Begun in 2003,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

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Entry updated by:
on

261

Dredge Tailing Rehabilitation and Floodplain Restoration

Description: 2.8 miles of stream; 102 acres riparian habitat, riparian restoration to benefit chinook salmon, MCR steelhead, and bull trout

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Lower Clear-Granite Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Upland Water Source Development and Repair

262

Description: Proposed Districtwide; replace and repair structures at 8-10 upland water sources. Construct new water developments where needed.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2004,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Texas Bar Creek Culvert Replacement

263

Description: Proposed Replace existing barrier culverts with open-bottom arches or bridges to improve access for redband trout and potentially MCR steelhead.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2004,
Location: Texas Bar Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

264

Aspen Restoration and Fencing

Description: Proposed Continue existing program. Estimated that: 10 acres fencing, 10 acres planting, 10 acres burning, 30 acres conifer thinning in 2004

Focus **Project Type(s):**
Wildlife

Dates: Begun in 2004,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

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Entry updated by:
on

265

Bull Springs 2 Fire Planting and Caging

Description: Proposed Riparian and upland planting in approximately 550 acres of the moderate intensity burn.

Focus **Project Type(s):**
Wildlife

Dates: Begun in 2004,
Location:

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Caging Upland Shrubs (Mountain Mahogany and Bitterbrush) # 266

Description: Proposed Caging upland shrubs on approximately 10 acres along the 5212 road

Focus **Project Type(s):**
Wildlife

Dates: Begun in 2004,
Location: Along 5212 road

Results:

Production Area(s) **5th Field Name**

Organizations
Umatilla National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Instream Structures # 267

Description: Proposed - 200 structures placed on North Fork Wind Creek, T15S R26E

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2004,
Location: North Fork Wind Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Fisheries Program Manager
Deschutes and Ochoco National Forests
Pho

Entry updated by:
on

268

Fish Passage Barrier Replacement

Description: Placed a bridge over Badger Creek on road # 2200-000 MP 25.5

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1999,
Location: Badger Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

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Entry updated by:
on

269

Riparian planting

Description: Riparian planting along .25 miles of Rock Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Rock Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Riparian planting
270

Description: Riparian planting along .1 miles of Frazier Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Frazier Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

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Entry updated by:
on

Riparian planting
271

Description: Riparian planting along .5 miles Frazier Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Frazier Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

272

Riparian planting

Description: Riparian planting along 2.25 miles North Fork Wind Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: North Fork Wind Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

273

Riparian planting

Description: Riparian planting along .1 miles of a tributary to Fry Creek.

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Tributary to Fry Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

274

Riparian planting

Description: Riparian planting along .125 miles of a tributary to West Branch Rock Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Tributary to West Branch Rock Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

275

Riparian planting

Description: Riparian planting along .75 miles of Wildcat Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Wildcat Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

276

Slope recontouring and stabilization

Description: Slope recontouring and stabilization along .25 miles of Rock Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Rock Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

277

Fencing and trough installation

Description: Fencing along 1.5 miles of Frazier Creek and trough installed

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2000,
Location: Frazier Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Slope Stabilization

278

Description: Slope stabilization of Black Canyon in T14S R26E, T15S R26E, T16S R26E 35 acres were affected and 1120 structures were placed

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Black Canyon

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

Fencing

279

Description: Fencing along 6.1 miles of Wind Creek 1 structure was also placed

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Wind Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
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280

Aspen Fencing

Description: Aspen fencing along .5 miles North Fork Wind Creek 1 structure was also placed

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: North Fork Wind Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

281

Planting

Description: Planting along 2 miles of the Black Canyon

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Black Canyon

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

282

Trail Drainage Improvement

Description: Trail drainage improvement along 3.5 miles in the Black Canyon

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Black Canyon

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

283

Culvert Improvement

Description: 8 structures placed in Black Canyon

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Black Canyon

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

284

Culvert Removal and Ford Building

Description: 5 structures placed in Black Canyon in T14S R25E, T15S R26E

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2002,
Location: Black Canyon

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
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285

Road Closure (gating)

Description: One structure placed on Keeton-Fry Creek in T13S R23E

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2001,
Location: Keeton-Fry Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

286

Rock Creek Dispersed Site Rehab

Description: Boulders and logs were placed for closure at 4 sites on Rock Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2001,
Location: Rock Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
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287

Blackbear Timber Sale Road Closed

Description: Tank traps, and gating was added on Rock Creek in T14S R25E

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Rock Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
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288

Riparian Planting

Description: Riparian Planting along .5 mile of Frazier Creek

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2001,
Location: Frazier Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
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289

Sensitive Plant protection

Description: Spring fencing of .5 miles of Keeton and Fort Creek. 7 acres were affected with 2500 feet of fence and 3 structures were placed in T13S R22E, T13S R23E

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Keeton Creek, Fort Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

290

Barnhouse CG Fencing

Description: Spring fencing along Mac Creek in T13S R23E

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Mac Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
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291

Bearkull Road Closure

Description: Spring fencing along 2 miles Cottonwood Creek and road closure

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2000,
Location: Cottonwood Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

292

Fish Passage Barrier Replacement

Description: Box Culvert placed on Badger Creek and road # 2200-000 MP 25.0

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Badger Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

293

Fish Passage Barrier Replacement

Description: Pipe removed from Badger Creek road # 2200-800 MP 0.1

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2003,
Location: Badger Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
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Entry updated by:
on

294

Fish Passage Barrier Replacement

Description: Bottomless arch placed on Rock Creek and road # 3800-000 MP 1.95

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1995,
Location: Rock Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

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Daniel W. Rife, Fisheries Program Manager, Deschutes and Ochoco National Forests, 541-383-5531
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Deschutes and Ochoco National Forests
Phone - 541-383-5534
Email - drife@fs.fed.us

Entry updated by:
on

295

Fish Passage Barrier Replacement

Description: Pipe arch placed over Murray Creek and road # 5870-000 MP 0.04

Focus **Project Type(s):**
Fisheries

Dates: Begun in 1997,
Location: Murray Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
Daniel W. Rife, Fisheries Program Manager, Deschutes and Ochoco National Forests, 541-383-5531
Fisheries Program Manager
Deschutes and Ochoco National Forests
Phone - 541-383-5534
Email - drife@fs.fed.us

Entry updated by:
on

296

Fish Passage Barrier Replacement

Description: Proposed - Bottomless arch placed on Murray Creek and road # 3820-000

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2004,
Location: Windy Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
Daniel W. Rife, Fisheries Program Manager, Deschutes and Ochoco National Forests, 541-383-5531
Fisheries Program Manager
Deschutes and Ochoco National Forests
Phone - 541-383-5534
Email - drife@fs.fed.us

Entry updated by:
on

297

Fish Passage Barrier Replacement

Description: Proposed - Bottomless arch placed on Baldy Creek and road # 3820-000

Focus **Project Type(s):**

Dates: Begun in 2004,
Location: Baldy Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
Daniel W. Rife, Fisheries Program Manager, Deschutes and Ochoco National Forests, 541-383-5531
Fisheries Program Manager
Deschutes and Ochoco National Forests
Phone - 541-383-5534
Email - drife@fs.fed.us

Entry updated by:
on

298

Fish Passage Barrier Replacement

Description: Proposed - Removal of CMP and Installation of Rock Ford on Windy Creek and road # 3820-100

Focus **Project Type(s):**

Dates: Begun in 2004,
Location: Windy Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
Daniel W. Rife, Fisheries Program Manager, Deschutes and Ochoco National Forests, 541-383-5531
Fisheries Program Manager
Deschutes and Ochoco National Forests
Phone - 541-383-5534
Email - drife@fs.fed.us

Entry updated by:
on

299

Fish Passage Barrier Replacement

Description: Proposed - Bottomless arch placed on North Fork Wind Creek and road # 5840-000

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2004,
Location: North Fork Wind Creek

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
Daniel W. Rife, Fisheries Program Manager, Deschutes and Ochoco National Forests, 541-383-5531
Fisheries Program Manager
Deschutes and Ochoco National Forests
Phone - 541-383-5534
Email - drife@fs.fed.us

Entry updated by:
on

300

Fish Passage Barrier Replacement

Description: Proposed - Fish passage barrier replacement on Rock Creek and road # 3820-200

Focus **Project Type(s):**
Fisheries

Dates: Begun in 2004,
Location: Rock Creek Tributary

Results:

Production Area(s) **5th Field Name**

Organizations
Ochoco National Forest

Limiting Factor(s)

For more information, contact:
Daniel W. Rife, Fisheries Program Manager, Deschutes and Ochoco National Forests, 541-383-5531
Fisheries Program Manager
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Phone - 541-383-5534
Email - drife@fs.fed.us

Entry updated by:
on

312

Middle Fork Water Lease

Description: USBR assisted OWT on a two year lease of 11.29 cfs of diversion rights to remain instream in the Upper Middle Fork John Day, Clear Creek, and Vinegar Creek

Focus **Project Type(s):**
Fisheries Instream water right leases and acquisitions

Dates: Begun in 2003, completed in 2004
Location: Upper Middle Fork John Day River

Results: Critical flows were protected during 2003 and 2004 for a high concentration of adult chinook holding and spawning habitat as well as steelhead and chinook rearing.

Production Area(s)	5th Field Name
Middle Fork	UPPER MIDDLE FORK JOHN DAY RIVER
	CAMP CREEK

Organizations
USBR
OWT
OWRD
ODFW

Limiting Factor(s)

For more information, contact:
Mark Croghan
Bureau of Reclamation
(541) 575-3033
or
Steve Parret
OWT
(503) 525-0141

Entry updated by:
on

313

Technical assitance for irrigation related passage barriers and fish screens

Description: USBR contracted with Grant SWCD to provide planning, coordination, and engineering services to implement USBR's passage barrier and fish screening programs under RPA Action 149 of the 2000 FCRPS Biological Opinion. USBR will provide funding to the GSWCD to plan and design all passage and screening projects that meet USBR criteria.

Focus | **Project Type(s):**
Fisheries | Diversion Dam improvements/elimination; Fish Screening

Dates: Begun in 2003, completed in 2007
Location: Upper, Middle Fork, Nork Fork John Day River

Results: In 2003 and 2004 multiple projects have been identified to begin work under this contract.

Production Area(s) | **5th Field Name**
Upper Mainstem
South Fork
Middle Fork
North Fork

Organizations
USBR
Grant SWCD

Limiting Factor(s)
Physical Fish Passage Barriers (Primary)
Entrapement in Irrigation Sytems (Primary)

For more information, contact:
Mark Croghan
Bureau of Reclamation
(541) 575-3033

Entry updated by:
on

314

Luce-Long Diversion

Description: Replace push-up dam with lay flat Stanchion diversion alternative.

Focus | **Project Type(s):**
Fisheries | Diversion Dam improvements/elimination

Dates: Begun in 1994, completed in 1994
Location: Upper John Day River

Results: Unrestricted passage for all life stages provided

Production Area(s) | **5th Field Name**
Upper Mainstem | LAYCOCK CREEK

Organizations
Grant SWCD
USBR
Water Users
NRCS

Limiting Factor(s)

For more information, contact:
Kenneth Delano
GSWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Holliday Diversion Replacement

315

Description: Replace push-up dam with lay flat Stanchion diversion alternative.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1996, completed in 1996
Location: Upper John Day

Results: Unrestricted passage for all life stages provided

Production Area(s)
Upper Mainstem

5th Field Name
STRAWBERRY CREEK

Organizations
BPA
Grant SWCD
Water Users

Limiting Factor(s)

For more information, contact:
Kenneth Delano
GSWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Courchesne Infiltration Gallery

316

Description: Replaced pushup dam with infiltration gallery to maintain an unrestricted fish passage, improved aquatic and riparian habitat and improved efficiency of irrigation.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 1999
Location: South Fork Long Creek

Results: Water temperatures and sediment loads in the river have decreased and irrigation water is delivered more efficiently. The riparian area vegetation is recovering and the channel is stabilizing.

Production Area(s)
Middle Fork

5th Field Name
LONG CREEK

Organizations
Grant SWCD
BPA
CTWSRO
OWRD
ODFW

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Rudishauser Infiltration Gallery

317

Description: Replaced pushup dam with infiltration gallery to maintain an unrestricted fish passage, improved aquatic and riparian habitat and improved efficiency of irrigation.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 1998, completed in 1998
Location: Indian Creek

Results: Water temperatures and sediment loads in the river have decreased and irrigation water is delivered more efficiently. The riparian area vegetation is recovering and the channel is stabilizing.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

Grant SWCD
CTWSRO
ODFW
BPA
OWRD
Water User

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Page irrigation reorganization

318

Description: Replaced pushup dams with pumps; converted from flood irrigation.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination Irrigation efficiency projects

Dates: Begun in 1997, completed in 1997
Location: John Day River

Results: Irrigation has improved production. Less water is used for irrigation and water remains in stream longer to contribute to in-stream benefits. Fish passage is now assured.

Production Area(s)	5th Field Name
Upper Mainstem	FIELDS CREEK

Organizations

Grant SWCD
BPA
OWRD
NRCS
USBR
Water Users
ODFW

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

319

Morris irrigation reorganization

Description: Replaced pushup dams with pumps; converted from flood irrigation.

Focus	Project Type(s):
Fisheries	Irrigation efficiency projects

Dates: Begun in 1998, completed in 1998
Location: John Day River

Results: Irrigation has improved production. Less water is used for irrigation and water remains in stream longer to contribute to in-stream benefits. Fish passage is now assured.

Production Area(s)	5th Field Name
Upper Mainstem	LAYCOCK CREEK

Organizations

Grant SWCD
ODFW
CTWSRO
OWRD
BPA
Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

320

Pike irrigation reorganization

Description: Replaced pushup dams with pumps; converted from flood irrigation.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination Irrigation efficiency projects

Dates: Begun in 1998, completed in 1998
Location: John Day River

Results: Irrigation has improved production. Less water is used for irrigation and water remains in stream longer to contribute to in-stream benefits. Fish passage is now assured.

Production Area(s)	5th Field Name
Upper Mainstem	LAYCOCK CREEK

Organizations

Grant SWCD
ODFW
BPA
Water Users
OWRD
USBR
CTWSRO

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 321

Holliday Ranch return flow cooling (North)

Description: Constructed subsurface drainage system to return cooler water to the stream.

Focus Fisheries

Project Type(s): Return Flow Cooling Projects

Dates: Begun in 1995, completed in 1995

Location: John Day River

Results: Water temperature has decreased dramatically. Water drainage has increased and landowners are monitoring for increased production.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

Grant SWCD
CTWSRO
USBR
ODFW
Water Users

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 322

South Fork John Day River Riparian Restoration

Description:

Focus Fisheries

Project Type(s):

Dates: Begun in 1987, completed in 1987

Location: South Fork John Day River

Results:

Production Area(s)	5th Field Name
South Fork	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations

Grant SWCD
OWEB
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

\# 323

Lower Cottonwood Creek Riparian Fence

Description:

Focus Fisheries

Project Type(s): Riparian Fencing

Dates: Begun in 1989, completed in 1989

Location: North Fork John Day River

Results:

Production Area(s)	5th Field Name
North Fork	COTTONWOOD CREEK

Organizations

Grant SWCD
OWEB
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

324

St. Clair Fencing

Description: Installed 0.6 miles of riparian fencing.

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 1989, completed in 1989
Location: South Fork John Day River

Results:

Production Area(s)	5th Field Name
South Fork	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
Grant SWCD
OWEB
Landowner/Manager
Upper South Fork John Day Watershed Council

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

325

Utley Creek Riparian Restoration

Description: Riparian fencing of 0.8 miles of Utley Creek.

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 1990, completed in 1990
Location: South Fork John Day River

Results:

Production Area(s)	5th Field Name
South Fork	UPPER SOUTH FORK JOHN DAY RIVER

Organizations
Grant SWCD
Landowner/Manager
OWEB

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Corral Creek Riparian Restoration

326

Description: Riparian Fencing Project

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 1991, completed in 1991

Location: South Fork John Day River

Results:

Production Area(s)	5th Field Name
South Fork	UPPER SOUTH FORK JOHN DAY RIVER

Organizations
Grant SWCD
OWEB

Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Longview Riparian Restoration

327

Description:

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 1991, completed in 1991
Location: John Day River

Results:

Production Area(s)	5th Field Name
Upper Mainstem	JOHN DAY RIVER/JOHNSON CREEK

Organizations
Grant SWCD
OWEB
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Middle Fork John Day River Fencing

328

Description: Installed 7 miles of fencing.

Focus	Project Type(s):
Fisheries	

Dates: Begun in 1993, completed in 1993
Location: Middle Fork John Day River

Results:

Production Area(s)	5th Field Name
Middle Fork	

Organizations
Grant SWCD
OWR

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Mountain Creek Riparian Fence

329

Description: Installed 5.1 miles of riparian corridor fencing.

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 1994, completed in 1994
Location: Mountain Creek

Results:

Production Area(s)	5th Field Name
Upper Mainstem	MOUNTAIN CREEK

Organizations
BPA
Grant SWCD
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

331

Fox Creek Fencing

Description: Installed 1.8 miles of riparian fencing.

Focus Fisheries
Project Type(s): Riparian Fencing

Dates: Begun in 1995, completed in 1995
Location: Fox Creek

Results:

Production Area(s) North Fork
5th Field Name COTTONWOOD CREEK

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

332

Camas Creek Fencing Project

Description: Installed 5.2 miles of riparian fencing.

Focus Fisheries
Project Type(s): Riparian Fencing

Dates: Begun in 1995, completed in 1995
Location: Camas Creek

Results:

Production Area(s) North Fork
5th Field Name UPPER CAMAS CREEK

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

333

Phipps Meadow Fencing Project

Description: Installed 3.0 mile of riparian corridor fencing.

Focus Fisheries
Project Type(s): Riparian Fencing

Dates: Begun in 1996, completed in 1996
Location: Middle Fork John Day River

Results:

Production Area(s) Middle Fork
5th Field Name UPPER MIDDLE FORK JOHN DAY RIVER

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Kuhl Ranch Fencing Project
334

Description: Installed 2.7 mile of riparian corridor fencing.

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 1998, completed in 1998
Location: Upper John Day River

Results:

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations
Grant SWCD
ODFW
landowner/manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

Crown Ranch Fencing Project
335

Description: Installed 4.0 miles of riparian corridor fencing.

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 1998, completed in 1998
Location: Upper John Day River

Results:

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

St. Clair Juniper Restoration
336

Description: Juniper trees were cut to improve range condition and increase stream flows.13

Focus	Project Type(s):
Fisheries	Other Flow Restoration Efforts
Wildlife	Woody veg management

Dates: Begun in 1999, completed in 1999
Location: South Fork John Day

Results:

Production Area(s)	5th Field Name
South Fork	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
Grant SWCD
OWEB
Landowner/Manager
Upper South Fork John Day Watershed Council

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/18/04

337

Enterprise Diversion

Description: Replaced pushup dam with lay-flat Stanchion diversion alternative.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1998, completed in 1998
Location: Upper John Day River

Results: Unrestricted fish passage provided for all life stages over diversion structure. Significant riparian recovery has occurred along the north bank of the river where the new structure has resulted in increased bank stablility.

Production Area(s)
Upper Mainstem

5th Field Name
LAYCOCK CREEK

Organizations
Grant SWCD
BPA
ODFW
OWRD
CTWSRO
Water User

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

338

Beaver Dam Diversion Replacement Project

Description: Replaced pushup dam with lay-flat Stanchion diversion alternative and installed measuring device

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 2001
Location: Upper John Day River

Results: Unrestricted fish passage provided for all life stages over diversion structure.

Production Area(s)
Upper Mainstem

5th Field Name
UPPER JOHN DAY RIVER

Organizations
Grant SWCD
OWRD
OWEB
BPA
ODFW
CTWSRO
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Quinlin Ditch Diversion Dam Replacement # 339

Description: Replaced pushup dam with lay-flat Stanchion diversion alternative and installed measuring device

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 1999
Location: Upper John Day River

Results: Unrestricted fish passage provided for all life stages over diversion structure.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

Grant SWCD	ODFW
OWRD	CTWSRO
BPA	Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Southside Ditch Diversion Replacement Phase II # 340

Description: Installed a pump station for one of three users on the Southside Ditch in an effort to eliminate the associated diversion structure

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 1999
Location: Upper John Day River

Results: Eventually, all three users were switched to pump stations and the diversion dam has not be installed.

Production Area(s)	5th Field Name
Upper Mainstem	FIELDS CREEK

Organizations

Grant SWCD	OWRD
ODFW	BPA
CTWSRO	Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

341

Southside Ditch Diversion Replacement Phase III

Description: Installed a pump station for one of three users on the Southside Ditch in an effort to eliminate the associated diversion structure

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 1999
Location: Upper John Day River

Results: Eventually, all three users were switched to pump stations and the diversion dam has not be installed.

Production Area(s)
Upper Mainstem

5th Field Name
FIELDS CREEK

Organizations
Grant SWCD
OFDW
BPA
OWRD
CTWSRO
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

344

Starthistle/Knapweed Control

Description:

Focus
Wildlife

Project Type(s):
Herbaceous vegetation management

Dates: Begun in 2000, completed in 2000
Location:

Results:

Production Area(s)

5th Field Name

Organizations
Grant Weed Control

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

345

Long Creek T&A

Description:

Focus
Wildlife

Project Type(s):
Herbaceous vegetation management

Dates: Begun in 2000, completed in 2000
Location: Long Creek

Results:

Production Area(s)
Middle Fork

5th Field Name
LONG CREEK

Organizations
Grant Weed Control

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

St. Clair Diversion Dam Replacement
347

Description: Replaced pushup dam with lay-flat Stanchion diversion alternative and installed a fish screen.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 1999, completed in 1999
Location: South Fork John Day River

Results: Unrestricted fish passage provided for all life stages over diversion structure. Fish prevented from becoming entrained

Production Area(s)	5th Field Name
South Fork	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations
Grant SWCD
BPA
Landowner/Manager
Upper South Fork John Day Watershed Council
ODFW
OWRD
CTWSRO

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Rudishauser Pump Station
348

Description: Installed a pump station to replace an antiquated and inefficient irrigation system. Some inchannel work was needed to run the original pump.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination
Irrigation efficiency projects

Dates: Begun in 2000, completed in 2000
Location: Upper John Day River

Results: Pump station replaced, inchannel work not necessary any more.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations
Grant SWCD
OWEB
ODFW
Landowner/Manager
BPA
OWRD
CTWSRO

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

349

Ediger Return Flow Cooling Project

Description: Constructed subsurface drainage system to return cooler water to the stream.

Focus
Fisheries

Project Type(s):
Return Flow Cooling Projects

Dates: Begun in 2000, completed in 2000
Location: John Day River

Results: Water temperature has decreased dramatically. Water drainage has increased and landowners are monitoring for increased production.

Production Area(s)
Upper Mainstem

5th Field Name
LAYCOCK CREEK

Organizations
Grant SWCD
CTWSRO
ODFW
BPA
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

350

Vidondo Return Flow Cooling Project

Description: Constructed subsurface drainage system to return cooler water to the stream.

Focus
Fisheries

Project Type(s):
Return Flow Cooling Projects

Dates: Begun in 2000, completed in 2000
Location: John Day River

Results: Water temperature has decreased dramatically. Water drainage has increased and landowners are monitoring for increased production.

Production Area(s)
Upper Mainstem

5th Field Name
UPPER JOHN DAY RIVER

Organizations
Grant SWCD
BPA
CTWSRO
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Mullin Pump Station
351

Description: Installed a pump station to bring water delivery closer to place of use.

Focus
Fisheries

Project Type(s):
Irrigation efficiency projects

Dates: Begun in 2000, completed in 2000
Location: Upper John Day River

Results: Pump station installed; streamflows increased in this reach.

Production Area(s)
Upper Mainstem

5th Field Name
STRAWBERRY CREEK

Organizations
Grant SWCD
OWRD
BPA
ODFW
CTWSRO
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Mascal Irrigation Reorganization
352

Description: Installed a series of pump station to replace a push-up dam.

Focus
Fisheries

Project Type(s):
Diversion Dam improvements/elimination

Dates: Begun in 2000, completed in 2000
Location: John Day River

Results: Pump stations installed and a diversion dam eliminated.

Production Area(s)
Upper Mainstem

5th Field Name
JOHN DAY RIVER/JOHNSON CREEK

Organizations
Grant SWCD
OWRD
CTWSRO
ODFW
BPA
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Granite Creek Dredge Leveling Project
353

Description: Leveled piles of dredge spoils along Granite Creek

Focus
Fisheries

Project Type(s):
Floodplain/channel reconstruction

Dates: Begun in 2000, completed in 2000
Location: Granite Creek

Results: Reconnected flood plain with Granite Creek

Production Area(s)
North Fork

5th Field Name
GRANITE CREEK

Organizations
Grant SWCD
USFS
ODFW

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

\# 354

Upper South Fork Noxious Weed Control

Description:

Focus	**Project Type(s):**
Wildlife	Herbaceous vegetation management

Dates: Begun in 2000, completed in 2001
Location: South Fork John Day River

Results:

Production Area(s)	**5th Field Name**
South Fork	MIDDLE SOUTH FORK JOHN DAY RIVER

Organizations

Grant Weed Control
OWEB
Landowner/Manager
Upper South Fork John Day Watershed Council

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

\# 355

Lane Ditch Diversion

Description: Replaced a gravel push up dam with an infiltration collection system.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2001, completed in 2001
Location: Camp Creek

Results: System installed has negated construction of future dams and fish screen.

Production Area(s)	**5th Field Name**
Middle Fork	CAMP CREEK

Organizations

Grant SWCD
CTWSRO
ODFW
USFS
BPA
OWRD
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

356

Eastside Ditch Diversion

Description: Replaced a gravel push up dam with an infiltration collection system.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2001, completed in 2001
Location: Camp Creek

Results: System installed has negated construction of future dams and fish screen.

Production Area(s)	5th Field Name
Middle Fork	CAMP CREEK

Organizations

Grant SWCD
OWRD
BPA
USFS
ODFW
CTWSRO
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

357

Coolie Island Diversion Dam Replacement

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2001, completed in 2001
Location: John Day River

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s)	5th Field Name
Upper Mainstem	UPPER JOHN DAY RIVER

Organizations

Grant SWCD
ODFW
Landowner/Manager
OWRD
BPA
CTWSRO

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Upper McHalely Diversion Dam Replacement
\# 358

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus | **Project Type(s):**
Fisheries | Diversion Dam improvements/elimination

Dates: Begun in 2001, completed in 2001
Location: John Day River

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s) | **5th Field Name**
Upper Mainstem | UPPER JOHN DAY RIVER

Organizations
Grant SWCD
ODFW
OWRD
CTWSRO
BPA

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Holliday Return Flow Cooling Project (Southside)
\# 359

Description: Constructed subsurface drainage system to return cooler water to the stream.

Focus | **Project Type(s):**
Fisheries | Return Flow Cooling Projects

Dates: Begun in 2001, completed in 2001
Location: John Day River

Results: Water temperature has decreased dramatically. Water drainage has increased and landowners are monitoring for increased production.

Production Area(s) | **5th Field Name**
Upper Mainstem | STRAWBERRY CREEK

Organizations
Grant SWCD
BPA
ODFW
CTWSRO
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Fox Plumeless Thistle
\# 362

Description:

Focus | **Project Type(s):**
Wildlife | Herbaceous vegetation management

Dates: Begun in 2001, completed in 2001
Location: Fox Creek

Results:

Production Area(s) | **5th Field Name**
North Fork | COTTONWOOD CREEK

Organizations
Grant Weed Control
ODA

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

363

Beech Creek Watershed Enchancement

Description:

Focus	Project Type(s):
Wildlife	Herbaceous vegetation management

Dates: Begun in 2001, completed in 2001
Location: Beech Creek

Results:

Production Area(s)	5th Field Name
Upper Mainstem	BEECH CREEK

Organizations
Grant Weed Control

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

364

Oxbow Indian Creek Fencing

Description: Installed 0.6 mile of riparian fencing along Indian Creek

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 2002, completed in 2002
Location: Indian Creek

Results: Fence installed and effective.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

365

McDaniel Grub Creek Fencing

Description: Installed 0.5 mile of riparian fencing along Grub Creek

Focus	Project Type(s):
Fisheries	Riparian Fencing

Dates: Begun in 2002, completed in 2002
Location: Indian Creek

Results: Fence installed and effective.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Granite Creek Dredge Leveling Project Phase II
366

Description: Leveled piles of dredge spoils along Granite Creek

Focus Fisheries
Project Type(s): Floodplain/channel reconstruction

Dates: Begun in 2002, completed in 2002
Location: Granite Creek

Results: Reconnected flood plain with Granite Creek

Production Area(s) North Fork
5th Field Name GRANITE CREEK

Organizations
Grant SWCD
ODFW
USFS

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Canyon Creek Fence Maintenance
367

Description: Improved riparian fencing along Canyon Creek

Focus Fisheries
Project Type(s): Riparian Fencing

Dates: Begun in 2002, completed in 2002
Location: Indian Creek

Results: Fence installed and effective.

Production Area(s) Upper Mainstem
5th Field Name STRAWBERRY CREEK

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Beech Creek Fencing
368

Description: Installed 4.7 miles of riparian fencing along Beech Creek

Focus Fisheries
Project Type(s): Riparian Fencing

Dates: Begun in 2002, completed in 2002
Location: Indian Creek

Results: Fence installed and effective.

Production Area(s) Upper Mainstem
5th Field Name BEECH CREEK

Organizations
Grant SWCD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Pike Diversion Project Phase II
369

Description: Replaced a gravel push up dam with an infiltration collection system.

Focus Fisheries
Project Type(s): Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: John Day River

Results: System installed has negated construction of future dams and fish screen.

Production Area(s)	5th Field Name
Upper Mainstem	LAYCOCK CREEK

Organizations

Grant SWCD
BPA
OWRD
ODFW
Landowner/Manager
CTWSRO

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Ricco Ditch Diversion Dam Replacement
370

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus Fisheries
Project Type(s): Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: John Day River

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s)	5th Field Name
Upper Mainstem	UPPER JOHN DAY RIVER

Organizations

Grant SWCD
CTWSRO
OWRD
ODFW
BPA
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Rice Ditch Diversion Dam Replacement

\# 371

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: John Day River

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s)	**5th Field Name**
Upper Mainstem	UPPER JOHN DAY RIVER

Organizations

Grant SWCD	ODFW
OWRD	BPA
CTWSRO	Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Lower Island Ditch Diversion Dam Replacement

\# 372

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: John Day River

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s)	**5th Field Name**
Upper Mainstem	UPPER JOHN DAY RIVER

Organizations

Grant SWCD	ODFW
OWRD	CTWSRO
BPA	Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

373

Walker Irrigation Reorganization

Description: Replaced a gravel push up dam with an infiltration collection system.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: John Day River

Results: System installed has negated construction of future dams and fish screen.

Production Area(s)	5th Field Name
Upper Mainstem	LAYCOCK CREEK

Organizations

Grant SWCD
ODFW
BPA
OWRD
CTWSRO
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

374

Middle Fork Diversion No. 2 Replacement

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus	Project Type(s):
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: Middle Fork John Day River

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s)	5th Field Name
Middle Fork	CAMP CREEK

Organizations

Grant SWCD
BPA
OWRD
CTWSRO
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Middle Fork Diversion No. 1 Replacement
375

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: Middle Fork John Day River

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s)	**5th Field Name**
Middle Fork	CAMP CREEK

Organizations

Grant SWCD	ODFW
OWRD	BPA
CTWSRO	Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Rock Creek Diversion Replacement
376

Description: Replaced a gravel push up dam with a layflat stanchion alternative structure.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: Rock Creek

Results: Unrestricted fish passage provided at all flow levels for all life stages of salmonids.

Production Area(s)	**5th Field Name**
Upper Mainstem	ROCK CREEK

Organizations

Grant SWCD	NPS Fossil Beds
OWRD	ODFW

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

377

Emmel Return Flow Cooling Project

Description: Constructed subsurface drainage system to return cooler water to the stream.

Focus | **Project Type(s):**
Fisheries | Return Flow Cooling Projects

Dates: Begun in 2002, completed in 2002
Location: John Day River

Results: Water temperature has decreased dramatically. Water drainage has increased and landowners are monitoring for increased production.

Production Area(s)	**5th Field Name**
Upper Mainstem	UPPER JOHN DAY RIVER

Organizations

Grant SWCD
CTWSRO
BPA
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Ken Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

378

Wisenhunt Pump Station

Description: Installed a pump station for one of three landowners using the Throop-Snyder Diversion.

Focus | **Project Type(s):**
Fisheries | Diversion Dam improvements/elimination

Dates: Begun in 2002, completed in 2002
Location: John Day River

Results: Two of the three users of the Throop-Snyder Ditch have been converted to pump stations. The third user is antcipated to be converted summer 2004; the diversion dam will be demolished shortly thereafter.

Production Area(s)	**5th Field Name**
Upper Mainstem	UPPER MIDDLE JOHN DAY
	FIELDS CREEK

Organizations

Grant SWCD
ODFW
CTWSRO
OWRD
Landowner/Manager
BPA

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

379

Crown Ranch # 1 Return Flow Cooling Project

Description: Constructed subsurface drainage system to return cooler water to the stream.

Focus	Project Type(s):
Fisheries	Return Flow Cooling Projects

Dates: Begun in 1995, completed in 1995
Location: John Day River

Results: Water temperature has decreased dramatically. Water drainage has increased and landowners are monitoring for increased production.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

Grant SWCD
USBR
Landowner/Manager
ODFW

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

380

Campbell-Martin Ditch Diversion Replacement

Description: Replaced existing diversion structure with fish friendly diversion dam.

Focus	Project Type(s):
	Diversion Dam improvements/elimination

Dates: Begun in 2004, completed in 2004
Location: Indian Creek, Upper John Day

Results: New diversion structure will allow passage of fish of all life stages for all flows.

Production Area(s)	5th Field Name
Upper Mainstem	STRAWBERRY CREEK

Organizations

Grant SWCD
OWEB
OWRD
ODFW
Landowner/Manager

Limiting Factor(s)

For more information, contact:
Kenneth Delano
Grant SWCD
(541) 575-0135

Entry updated by:
Mark Croghan & Kyle Sullivan on 3/19/04

Pine Creek Culvert Removal Enginering # 381

Description: Three culverts on Pine Creek have been identified by the Oregon Department of Fish and Wildlife as impedences to fish passage. This project will develop a design and cost analysis for replacement of these three culverts

Focus	**Project Type(s):**
Fisheries	Culvert improvements

Dates: Begun in 2001, completed in 2002
Location: Pine Creek

Results: The project was the beginning steps in removing one culvert the summer of 2002. The second culvert has been replaced with a new bottomless fish-friendly device. The third is scheduled to be replaced in the coming summer work window.

Production Area(s)	**5th Field Name**
Lower Mainstem	LOWER JOHN DAY RIVER/MUDDY CREEK

Organizations
Wheeler SWCD   CTWSRO
Wheeler County

Limiting Factor(s)

For more information, contact:
Judy Potter
Wheeler SWCD
District Manager
(541) 468-2990

Entry updated by:
Will Homer on 3/25/04

GI Ranch - Bridge Creek Dirversion Engineering # 382

Description: Project to replace gravel pushup dam with fish friendly device.

Focus	**Project Type(s):**
Fisheries	Diversion Dam improvements/elimination Fish Screening

Dates: Begun in 2003, completed in 2004
Location: Bridge Creek

Results: Engineering complete for future grant submission.

Production Area(s)	**5th Field Name**
Lower Mainstem	BRIDGE CREEK

Organizations
Wheeler SWCD   OWRD

Limiting Factor(s)

For more information, contact:
Judy Potter
Wheeler SWCD
District Manager
(541) 468-2990

Entry updated by:
Will Homer on 3/25/04

Cove Creek Water Restoration Project

Description: Goal is to redevelop old inoperable live stock water sites.

Focus	**Project Type(s):**
Fisheries	Water developments to improve grazing management

Dates: Begun in 2004, completed in 2004
Location: Cove Creek (trib to Pine Creek)

Results: In progress

Production Area(s)	**5th Field Name**
Lower Mainstem	LOWER JOHN DAY RIVER/MUDDY CREEK

Organizations
Wheeler SWCD

Limiting Factor(s)
Water Contamination (Primary)
Riparian Function (Secondary)

For more information, contact:
Judy Potter
Wheeler SWCD
District Manager
(541) 468-2990

Entry updated by:
Will Homer on 3/25/04

Appendix Y

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Appendix Y

Numeric Citations from Wildlife Habitat Types in Appendix E

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