Walla Walla Subbasin Plan

May 2004 Version

Submitted by: **Walla Walla Watershed Planning Unit and Walla Walla Basin Watershed Council**

MAY 2004 VERSION

Walla Walla Subbasin Plan

Prepared for

Northwest Power and Conservation Council

Submitted by

Walla Walla County (on behalf of the Walla Walla Watershed Planning Unit)

And the

Walla Walla Basin Watershed Council

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PREFACE

This subbasin plan represents the hard work of numerous individuals and organizations to produce a watershed-based approach for protection and restoration of the terrestrial and aquatic habitats found in this subbasin. It complies with the requirements set out by the Northwest Power and Conservation Council for this product and is the best product that could be produced under the required conditions and timeline, and available resources. It is not “perfect,” but it does represent a reasonable first-step. It is a snapshot in time. As a living document, it will be improved and refined through implementation and review.

This plan contains considerable, significant areas where the participants in the process (subbasin planners and public) find agreement. This will provide focus for implementation activities in the near future. The plan also identifies areas where issues remain to be addressed. It is expected that over time these issues will be resolved in a manner that is appropriate.

Additional information, and related time and budget for analysis, would have resulted in increased technical support for findings, hypotheses, biological objectives and strategies (the management plan elements) in this subbasin plan. Within the time and resource constraints provided, the best available information and analysis approaches have been used to reach the conclusions in the plan. As noted above, and as outlined in the Research, Monitoring and Evaluation (RM&E) section of the plan, additional information and refined analysis techniques are expected to become available during plan implementation that will add to the technical foundation for this subbasin management plan.

It needs to be recognized that this plan is the product of a process that, with the exception of developing Subbasin summaries, had lain dormant for over 10 years. Most of the participants in the Council’s original subbasin planning process were not available for this process for various reasons. In addition, this process was implemented with far more local involvement than earlier subbasin planning efforts. For this reason, this process has required a significant learning curve for all Columbia River subbasins; and this learning curve has occurred simultaneously in all the subbasins with very little opportunity for cross-subbasin sharing of good ideas and approaches during plan development. In addition, necessary work at the state and regional level that has been occurring simultaneous to the subbasin level planning has not always been available for inclusion in individual subbasin plans in a manner that could meet the Council’s May 28, 2004 deadline. Finally, it is important to note that the planners involved in this subbasin have not regularly worked together on watershed-based planning. Relationships as well as planning approaches had to be developed to produce a plan. These relationships and approaches will now serve as a solid foundation for the subbasin in ensuring that the plan is effectively implemented, reviewed and revised over time.

The following recommendations address what we learned in putting together this subbasin plan in a coordinated approach with all the southeastern Washington (and part of northwestern Oregon) subbasin plans (Asotin, Lower Snake, Tucannon, Walla Walla subbasin plans). Addressing these recommendations should improve future efforts to update and implement the plans:

PREFACE (Continued)

- **Plan updates should be staggered in time –** Participation was limited by the need for some planners to be involved in more than one subbasin planning effort simultaneously. This especially affected fish and wildlife co-manager staff with state, federal and tribal agencies.
- **Expectations need to be consistent with schedules and funding –** The current subbasin planning effort was on a fast track. The product of this process was limited by the time and funding available to complete the effort. This does not mean that the time and funding were not appropriate for a subbasin planning effort, merely that the expectations for the plans needed to be consistent with these factors. We believe the expectations for the current subbasin plans were ambitious considering the schedule and funding available.
- **Deliberately coordinate implementation and revision of subbasin plans with other planning efforts –** Many planning efforts are occurring, and will occur, around the region that are or should be directly coordinated with the subbasin plans. We have coordinated with several of these efforts in producing the Asotin, Lower Snake, Tucannon, and Walla Walla subbasin plans. These include the Snake River Salmon Recovery Board, watershed resource inventory area, Walla Walla habitat conservation plan for steelhead and bull trout, comprehensive irrigation district management, federal bull trout and salmon recovery, Wy-Kan-Ush-Mi- Wa-Kish-Wit Tribal Recovery, Hatchery Genetic Management and US vs. OR planning efforts. We believe that the content and implementability of our plans have benefited, and will continue to benefit significantly from this coordination.
- **Provide appropriate regional direction and assistance –** We agree that the subbasin plans must be locally generated and implemented, but this must occur in an appropriate regional context. The current process could have used more direction in this regard. Likewise, implementation and revision of the subbasin plans will benefit from appropriate regional guidance on expectations that is provided in a timely manner. For instance, we expect that regional guidance will assist us in refining our RM&E plan to be as cost-effective and scientifically-based as possible while meeting the combined needs of all subbasins and avoiding redundancy.
- **Implementation and Revision of Subbasin Plans will require ongoing involvement from subbasin interests –** The subbasin planning effort resulted in more than just plans. It resulted in relationships and processes that allow for technical, policy and public participation in developing and implementing appropriate, agreed-to on-the-ground efforts to restore and maintain fish and wildlife habitat. This will result in the good investments of tribal, local, state, regional and federal funds in watersheds. If these relationships and processes are not maintained, there is a distinct risk that the intent to maintain living plans will be defeated. We highly recommend that the appropriate level of resources (people and funding) continue to be provided to ensure that an adequate subbasin planning and implementation process is maintained.

EXECUTIVE SUMMARY

In 1980, Congress passed the Pacific Northwest Electric Power Planning and Conservation Act which authorized creation of the Northwest Power and Conservation Council by the states of Washington, Oregon, Idaho, and Montana. The Act directed the Council to develop a program "to protect, mitigate and enhance fish and wildlife…in the Columbia River and its tributaries…affected by the development, operation and management of (hydroelectric projects) while assuring the Pacific Northwest an adequate, efficient, economical and reliable power supply." The Council has established four primary objectives for the Columbia River Fish and Wildlife Program.

- A Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife.
- Mitigation across the Columbia River Basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem.
- Sufficient populations of fish and wildlife for abundant opportunities for tribal trust and treaty rights harvest and for non-tribal harvest.
- Recovery of the fish and wildlife which are affected by the development and operation of the hydrosystem and are listed under the Endangered Species Act.

The Columbia River Basin was divided into 62 subbasins based on Columbia River tributaries. Each subbasin is developing its own plan that will establish locally defined biological objectives to meet the four primary objectives defined by the Council. Plans developed at the subbasin level will be combined into the fourteen province-level plans and will form the framework within which the Bonneville Power Administration will fund proposed fish and wildlife projects. The subbasin planning process is viewed as an on-going effort and is anticipated to occur on a three-year cycle. The plans are considered "living documents" which will incorporate new information during their periodic updates.

The subbasin plans will also play a significant role in addressing the requirements of the Endangered Species Act; NOAA-Fisheries and USFWS intend to use the plans to help in recovery of ESA-listed species. In addition, the Council, Bonneville Power Administration, NOAA-Fisheries, and USFWS will use the adopted subbasin plans to help meet subbasin and province requirements under the 2000 Federal Columbia River System Biological Opinion. Other planning efforts, including the *Water Resource Inventory Area 32 Watershed Plan and Bi-State Habitat Conservation Plan*, affect and are affected by the subbasin plans. An interactive relationship is expected to develop between subbasin planning, watershed plans, and State of Washington salmon recovery plans.

Walla Walla Subbasin Plan

The Walla Walla Subbasin encompasses 1,758 square miles located in Walla Walla and Columbia Counties in southeast Washington State and Umatilla County in northeast Oregon State. Primary waterbodies include the Walla Walla River and Touchet River, both of which originate in the Blue Mountains. The Touchet River is a tributary to the Walla Walla, which is a direct tributary to the Columbia River. Melting snow from the Blue Mountains provides much of the annual runoff to the streams and rivers in the subbasin; the water level in many streams diminishes greatly during the summer months. Vegetation in the subbasin is characterized by grassland, shrubsteppe, and agricultural lands at lower elevations and evergreen forests at higher elevations.

With dryland agriculture throughout the subbasin and intensive irrigated cropland in the Walla Walla River valley, the Walla Walla Subbasin is one of the most productive agricultural regions in the world. Timber harvest and urban land uses are also influential. Approximately 90 percent of the subbasin is privately owned, with 9 percent managed by federal/state agencies. The Confederated Tribes of the Umatilla Indian Reservation also owns approximately 8,700 acres within the subbasin.

The planning process in the Walla Walla subbasin involved a number of organizations, agencies, and interested parties including the Walla Walla Watershed Planning Unit, the Walla Walla Basin Watershed Council, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, private landowners and others. The co-leads for this planning effort were Walla Walla County on behalf of the Walla Walla Watershed Planning Unit, and the Walla Walla Basin Watershed Council. The technical components of the assessment were developed by the Washington Department of Fish and Wildlife in conjunction with Oregon Department of Fish and Wildlife. The planning effort was guided by the Walla Walla Subbasin Planning Team which included representation from the leads, local resource managers, conservation districts, agencies, private landowners, and other interested parties. The vision statement and guiding principles for the management plan were formulated by the Subbasin Planning Team through a collaborative and public process. The following vision statement provided guidance regarding the assumptions and trade-offs inherent in natural resource planning:

> *The vision for the Walla Walla Subbasin is a healthy ecosystem with abundant, productive, and diverse populations of aquatic and terrestrial species that supports the social, cultural and economic well-being of the communities within the Subbasin and the Pacific Northwest.*

Aquatic Focal Species and Species of Interest

To guide the assessment and management plan, focal species were selected for aquatic and terrestrial habitats within the Walla Walla Subbasin. Aquatic focal species are steelhead, spring Chinook salmon, and bull trout. These species were chosen based on the following considerations:

- Selection of species with life histories representative of the Walla Walla Subbasin
- Endangered Species Act status
- Cultural importance of the species
- Level of information available about species' life histories allowing an effective assessment

In addition, Pacific lamprey, mountain whitefish, and freshwater mussels were designated as aquatic "species of interest" for this planning effort. These species are of cultural and ecological significance to stakeholders, but not enough information was available to warrant their selection as focal species.

Terrestrial Focal Species, Species of Interest, and Priority Habitats

Focal terrestrial species are white-headed woodpecker, flammulated owl, Rocky Mountain elk, yellow warbler, American beaver, great blue heron, grasshopper sparrow, sharp-tailed grouse, sage sparrow, sage thrasher, Brewer's sparrow, bighorn sheep and mule deer. The criteria for selection of these species are:

- Primary association with focal habitats for breeding
- Specialist species that are obligate or highly associated with key habitat elements or conditions important in functioning ecosystems
- Declining population trends or reduction in historic breeding range
- Special management concerns or conservation status (threatened, endangered, species of concern, indicator species)
- Professional knowledge of species of local interest

Bighorn sheep were selected primarily regarding their presence in the Oregon portion of the subbasin. Alkali bees and the western painted turtle were selected as terrestrial species of interest.

Within the Walla Walla Subbasin, four priority terrestrial habitats were selected for detailed analyses: ponderosa pine, eastside interior grasslands, interior riparian wetlands, and shrub-steppe. These were selected based upon determination of key habitat needs by local resource managers, the ability of these habitats to track ecosystem health, and cultural factors.

Within this subbasin plan, the role of aquatic focal species differed from the role of terrestrial focal species. Aquatic focal species were used to inform decisions regarding the relative level of enhancement effort required to achieve an ecological response. Due to data limitations, terrestrial focal species did not inform the majority of the management plan, but instead will be used to guide monitoring the functionality of priority habitats. Terrestrial priority habitats were used to guide development of the management plan for terrestrial habitats and species.

Aquatic Habitat Assessment

Assessment of aquatic habitats for steelhead and salmon within the Walla Walla subbasin was accomplished with the Ecosystem Diagnostic and Treatment (EDT) model. Bull trout were not assessed using EDT as its methodology does not yet include information pertinent to that species. EDT is a system for analyzing aquatic habitat quality, quantity, and diversity relative to the needs of a focal species. The purpose of the analysis is to identify stream reaches that can provide the greatest biological benefit based upon potential improvement in habitat conditions. This is accomplished by comparing historic aquatic habitat conditions in the watershed to those currently existing relative to life history needs of the focal species. The result of the analysis is identification of stream reaches that have high potential restoration and protection values. These values allow prioritization of corrective actions to gain the greatest benefit with the lowest risk for the focal species.

For Walla Walla River summer steelhead and spring Chinook salmon, the EDT analysis identified areas that currently have high production and should be protected (High Protection Value) and areas with the greatest potential for restoring life stages critical to increasing production (High Restoration Value). These initial EDT results were then reviewed in light of the following four considerations: 1) results of related assessment and planning documents (Limiting Factors Analysis, Walla Walla Subbasin Summary, Walla Walla Basin Watershed Council documents, etc.); 2) the necessary trade-offs between the biological benefits provided by enhancement potential of one geographic area versus another to achieve geographic prioritization; 3) balancing the needs of all aquatic focal species; and 4) physical and socioeconomic limitations. This type of review was necessary given the data gaps currently present in the EDT model and the fact that EDT is an ecologically-based model that does not incorporate factors such as limited access to wilderness areas. Through this review, the initial EDT results were modified in a limited number of instances to develop a group of priority restoration geographic areas and a group of priority protection geographic areas. These geographic areas include the stream reaches themselves and the upland areas that drain to these reaches.

Priority restoration areas identified in the Walla Walla Subbasin are shown in the table below. Within these priority restoration areas, the most negatively impacted life stages were identified for steelhead and spring Chinook. In each of these areas, the key environmental factors that contribute to losses in focal species performance, i.e. limiting factors, were also identified. Key limiting factors for steelhead and spring Chinook included the following: sediment, large woody debris, key habitat (pools), riparian function, stream confinement, summer water temperature, bedscour and flow. Decreasing the effect of these limiting factors through habitat enhancement is expected to benefit all aquatic focal species, including bull trout.

Geographic Area	Priority Protection Area	Priority Restoration Area
Walla Walla, Mill to E.L. WW	X	X
Walla Walla, E.L. WW to Tumalum Br.	X	X
Walla Walla, Tumulum Br. To Nursery Br.	X	X
Walla Walla, Tumulum Nursery Br. To Little WW Diversion	X	X
Walla Walla, Little WW to Diversion to Forks	X	X
SF Walla Walla, mouth to Elbow Creek	X	X
NF Walla Walla, mouth to L. Meadows Canyon Cr. (plus Meadows	X	X
Coppei Drainage	X	X

Geographic Area	Priority Protection Area	Priority Restoration Area
Touchet, Coppei to forks (plus Whiskey)	X	X
SF Touchet Mainstem	X	X
SF Touchet Tributaries	X	X
NF Touchet Mainstem	X	X
NF Touchet Tributaries (excl. Wolf Fork)	X	X
Wolf Fork, mouth to Coates (plus Robinson and Coates	X	X
Wolf Fork, Coates to access limit (plus Whitney)	X	X
South Fork Walla Walla (Elbow to access limit)	X	
Skiphorton & Reser Creek Drainages	X	
Lower South Fork Walla Walla Tributaries	X	
Upper South Fork Walla Walla Tributaries	X	
North Fork Walla Walla (L. Meadows to access limit)	X	
Patit Creek	X	
Walla Walla River, Dry Creek to Mill Creek	X	
Yellowhawk Mainstem	X	
Couse Creek	X	
Headwaters	X	

Priority protection geographic areas were also identified as shown in the above table. Protecting current habitat conditions in these geographic areas is expected to achieve no loss of function, and to allow for natural attenuation of limiting factors over time to benefit aquatic habitat.

Terrestrial Habitat Assessment

The terrestrial assessment occurred at two levels: Southeast Washington Ecoregion and subbasin level. Several key databases, i.e. Ecosystem Conservation Assessment (ECA), the Interactive Biodiversity Information System (IBIS), and the GAP analyses, containing information on historic and current conditions were used in the assessment. The ECA data identified areas that would provide ecological value if protected and are under various levels of development pressure. The IBIS database provided habitat descriptions and historic and current habitat maps. GAP data classifies terrestrial habitats by protection status based primarily on the presence or absence of a wildlife habitat and species management program for specific land parcels. The classification ranges from 1 (highest protection) to 4 (little or unknown amount of protection).

The nature and extent of the focal habitats were described as well as their protection status and threats to the habitat type. From historic to current times, there has been an estimated 39 percent decrease in riparian wetland habitat and a 84 percent decrease in interior grassland habitat, but a 115 percent increase in ponderosa pine habitat and 338 percent increase in shrubsteppe habitat within the subbasin (note – the shrubsteppe increase is considered partly due to the definition of "shrubsteppe" for the purposes of this assessment). Little information was available regarding the functionality of remaining habitats. In total, approximately 0.5 percent the subbasin is considered to be in high protection status, 0.5 percent is in medium protection status, 11 percent in low protection status, and 88 percent has no protection status or is area for which this information was not available.

Inventory

Complementing the aquatic and terrestrial assessments, information on programmatic and project-specific implementation activities within the subbasin is provided. A wide variety of agencies and entities are involved in habitat protection and enhancement efforts within the Walla Walla Subbasin, including the Walla Walla and Columbia Conservation Districts, Walla Walla Basin Watershed Council, Tri-State Steelheaders, Oregon Department of Fish and Wildlife (ODFW), Confederated Tribes of the Umatilla Indian Reservation, U.S. Fish and Wildlife Service (USFWS), NOAA-Fisheries, Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (ECY), Oregon Department of Environmental Quality (DEQ), cities, counties, and others. Key aquatic and terrestrial programs include the following:

- USDA Programs (e.g. Conservation Reserve Enhancement Program, Conservation Reserve Program)
- Total Maximum Daily Load water quality enhancement programs (ECY/DEQ)
- Harvest regulations (tribal and sport fishing)
- Game Management Plans (WDFW/ODFW)
- Priority Habitats and Species Program (WDFW)

Project-specific information was only available for aquatic habitats. Since 1996, projects implemented within the subbasin focused on several key attributes:

- upland issues (65%)
- passage (14%)
- instream (13%)
- riparian (8%)

Management Plan

The management plan consists of three components: working hypotheses, biological objectives, and strategies. Working hypotheses are statements about the identified limiting factors for aquatic species and terrestrial habitats. The hypotheses are intended to be testable, allowing future research to evaluate their accuracy. Biological objectives are measurable objectives for selected habitat components based upon what could reasonably be achieved over the 10 to 15 year planning horizon. Quantitative biological objectives were identified where supporting data was available. Where such data was not present, qualitative biological objectives based on desired trends were proposed. Strategies identify the types of actions that can be implemented to achieve the biological objectives.

EXECUTIVE SUMMARY (Continued)

For terrestrial species and habitats, the limited information available precluded development of biological objectives and strategies for individual focal species. Instead, terrestrial strategies focus on enhancement of priority habitat types, under the general assumption that improvements to terrestrial habitats will benefit terrestrial species. Both protection and enhancement strategies were developed.

Aquatic strategies focus on methods to achieve improvements in aquatic habitat. Both restoration and protection strategies were developed. Restoration strategies focus on enhancing the current habitat conditions while protection strategies focus on maintenance of current conditions. Although local stakeholders desired to achieve the greatest coordination possible among various planning efforts, the draft Bull Trout Recovery Plan being developed by the USFWS was not directly incorporated because it is still in draft form. However, the draft strategies it contains were considered and incorporated in general form during development of aquatic management strategies in the subbasin plan. The subbasin intends to consider incorporation of selected Bull Trout Recovery Plan strategies into the subbasin plan once the recovery plan is finalized.

For each priority restoration geographic area within the subbasin, working hypotheses were developed for each limiting factor, causes of negative impacts were listed, biological objectives were delineated, and strategies were proposed. For example, in the Walla Walla River from Mill Creek to the East Little Walla Walla priority restoration geographic area, Working Hypothesis 4 states that an increase in riparian function and a decrease in stream confinement will increase the survival of steelhead and spring Chinook in various life stages. Wherever bull trout are present in the subbasin, it is expected that improvements in habitat for spring Chinook and steelhead will also benefit bull trout. Biological objectives in this geographic area are as follows:

- Sediment – achieve less than 10% mean embeddedness
- Large Woody Debris – at least one piece per channel width should be present
- Pools – 20% or more of the stream surface area should be pools
- Riparian Function – the riparian function should be at least 62% of maximum
- Confinement – no more than 40% of the stream bank length should be confined
- Summer Maximum Water Temperature – the water temperature should exceed 72°F on fewer than four days per year
- Bedscour – limit bedscour to less than or equal to 15 centimeters
- Instream Flow – increase summer flows by 10-15%

Strategies were identified specific to each biological objective and include enhancing riparian buffers, upholding existing land use regulations, implementing conservation easements, and decommissioning/paving roads near streams. These and similar strategies were applicable across all priority restoration geographic areas. Achieving the biological objectives in the priority restoration areas is considered a priority within the subbasin.

EXECUTIVE SUMMARY (Continued)

Aquatic strategies were also developed for two additional categories: 1) the priority protection areas and 2) imminent threats. Priority protection geographic areas are those areas that EDT analysis or empirical data suggest would have the most negative impacts on the focal species if they were allowed to degrade further. Because all priority restoration areas are also considered priority protection areas, these strategies would apply to both types of geographic areas. Priority protection area strategies include but are not limited to implementation of riparian buffers, upland enhancement, alternative water development, conservation easements, expanding participation in the Conservation Reserve Program and similar efforts, and water conservation.

Imminent threats are those factors likely to cause immediate mortality to the aquatic focal species and include the following three categories: fish passage obstructions, inadequate fish screens, and stream reaches that are dewatered due directly to man-caused activities. Implementing the identified strategies in priority protection areas and addressing imminent threats throughout the subbasin are also considered priorities within this subbasin plan.

Working hypotheses for terrestrial habitats are based on factors that affect (limit) focal habitats. Hypotheses were defined for riparian/riverine wetlands, ponderosa pine habitats, and interior grasslands. Factors affecting the habitats were identified and biological objectives reflecting habitat protection as well as enhancement and maintenance of habitat function were formulated. Terrestrial habitat biological objectives are focused on protecting and enhancing functionality in areas that are have a high or medium protection status, and private lands that meet one or more of the following conditions:

- Directly contribute to the restoration of aquatic focal species
- Have high ecological function
- Are adjacent to public lands
- Contain rare or unique plant communities
- Support threatened or endangered species/habitats
- Provide connectivity between high quality habitat areas
- Have high potential for re-establishment of functional habitats

Terrestrial strategies are based on a flexible approach which takes into account a variety of conservation “tools” such as leases and easements and cooperative projects/programs. The efficacy of focusing future protection efforts on large blocks of public and adjacent lands is recognized.

The specific strategies are focused entirely on improvements in functional habitat. Strategies for achieving the biological objectives include upholding existing land use and environmental regulations, completing a more detailed assessment of the focal species, providing outreach opportunities, and identifying functional habitat areas.

EXECUTIVE SUMMARY (Continued)

Land acquisition was a highly contentious potential strategy within the subbasin. As consensus could not be reached regarding whether or not to include this as a strategy, information is provided in the plan regarding the different viewpoints. Acquisition remains a potential strategy for use in the Oregon portion of the subbasin only.

Agriculture is considered a "cover type of interest" due to its predominance in the subbasin and its potential to both positively and negatively impact terrestrial wildlife. Proposed enhancement efforts in this area focus on limiting elk and deer damage on private agricultural lands.

Additional components of the management plan include the following:

- Comparison of the relative ecological benefit of achieving the restoration biological objectives only, protection biological objectives only, versus achieving all of the proposed biological objectives.
- Preliminary numeric fish population goals from other planning efforts (Biological objectives in this plan are habitat-based. Objectives with specific fish population numbers were not established in this subbasin plan).
- Research, monitoring, and evaluation priorities for aquatic and terrestrial species and habitats.

Unique management strategies were proposed for several special topics including the Mill Creek system, fire risk, and the Spring Branch/Distributary system.

Integration of the aquatic and terrestrial strategies and integration of the subbasin strategies with those of the Endangered Species Act and the Clean Water Act are addressed in the plan. These aspects are expected to develop further as the plan is implemented and related efforts such as the Snake River Salmon Recovery Plan are developed. This plan will evolve over time through use of an adaptive management strategy that will allow funding to consistently be applied to those projects that can achieve the greatest benefits.

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APPENDICES

ACRONYM LIST

BiOp	2000 Federal Columbia River System Biological Opinion
BMP	Best Management Practice
BPA	Bonneville Power Administration
CRITFC	Columbia River Inter-tribal Fish Commission
CREP	Conservation Reserve Enhancement Program
CRP	Conservation Reserve Program
CTUIR	Confederated Tribes of the Umatilla Indian Reservation
CW	Channel width
CWA	Clean Water Act
ECA	Ecoregion Conservation Assessment
EDT	Ecosystem Diagnosis and Treatment
EQIP	Environmental Quality Improvement Program
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FSA	Farm Services Agency
IBIS	Interactive Biodiversity Information System
ISRP	Independent Scientific Review Panel
LWD	Large woody debris
MBI	Mobrand Biometrics, Inc.
N(eq)	Equilibrium abundance of returning adult spawners
NF	North Fork
NGO	Non-Governmental Organization
NOAA	National Oceanographic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NPT	Nez Perce Tribe
NWPCC	Northwest Power and Conservation Council
OOSE	Out of Subbasin Effects
OWRD	Oregon Water Resources Department
PFC	Properly Functioning Conditions
PHS	Priority Habitats and Species
SF	South Fork

ACRONYM LIST (Continued)

SH	Steelhead
SOI	Species of Interest
SPCK	Spring Chinook
SPT	Subbasin Planning Team
TMDL	Total Maximum Daily Load
TOAST	Oregon Technical Outreach and Assistance Team
TRT	Technical Recovery Team
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
VSP	Viable Salmonid Population
WDFW	Washington Department of Fish and Wildlife
WLRIS	Washington Lakes and Rivers Information System
WQMA	Water Quality Management Area
WRIA	Water Resource Inventory Area
WWBWC	Walla Walla Basin Watershed Council

GLOSSARY

Active Restoration: Active restoration is the use of a structural improvement or direct instream work for the benefit of instream habitat. Examples include installation of large woody debris, rock weirs, and J-hook vanes. Activities such as riparian planting and upland infiltration enhancement are not considered active restoration actions. Note that this is the definition of passive restoration for the terms of this subbasin plan, and may not be consistent with the typical conception of what constitutes passive restoration.

Bedscour: Average depth and frequency of scour on small-cobble/gravel riffles during high flow events. Frequent indicates at least one event every 1-2 years. Particle sizes of substrate modified from Platts et al. (1983) based on information in Gordon et a. (1991): gravel (0.2 to 2.9 inch diameter), small cobble (2.9 to 7 inch diameter), large cobble (7 to 11.9 inch diameter), boulder (>11.9 inch diameter). *

Confinement (man-made): The extent that man-made structures within or adjacent to the stream channel constrict flow (as at bridges) or restrict flow access to the stream's floodplain (due to streamside roads, revetments, diking or levees) or the extent that the channel has been ditched or channelized. *

Confinement (natural): The extent that the valley floodplain of the reach is confined by natural features. It is determined as the ratio between the width of the valley floodplain and the bankfull channel width. Note: this attribute addresses the natural (pristine) state of valley confinement only. *

Embeddedness: The extent that larger cobbles or gravel are surrounded by or covered by fine sediment. *

Entrenchment: The degree to which a stream is vertically separated from (i.e. lower than) its floodplain. Includes both human and natural causes.

Hard Bank Stabilization: Includes rip rap, concrete, and similar structures placed on the bank. Use of such structures is discouraged throughout the subbasin. Bank stabilization through the use of instream structures (e.g. J-hook vanes, vortex rock weirs), vegetation planting, fascines, and similar bio-engineered structures are the preferred methods of bank stabilization, where such activity is deemed appropriate.

Large Woody Debris (LWD): Woody debris of large enough size relative to stream characteristics to generate pools, provide rearing habitat, influence sediment transport, and manage stream morphology (e.g. pieces greater than 0.1 m diameter and greater than 2m in length).

Obstructions: Obstructions to fish passage by natural or man-caused physical barriers such as large logs or dams (not dewatered channels or hinderances to migration caused by pollutants or lack of oxygen). Note that obstructions can vary in the degree to which they block fish passage. *

GLOSSARY (Continued)

Overgrazing: Historic and/or current grazing by livestock and/or wild ungulates that is inconsistent with existing ecological conditions through its timing, intensity, duration, and utilization.

Passive Restoration: Passive restoration takes advantage of natural processes and out-of-stream activities to achieve instream habitat enhancement. Examples includes planting riparian vegetation, implementing conservation easements, increasing upland infiltration (e.g. direct seed/no-till), use of sediment basins, developing alternative livestock watering facilities, and water conservation. Note that this is the definition of passive restoration for the terms of this subbasin plan, and may not be consistent with the typical conception of what constitutes passive restoration.

Primary Pools: Large, relatively stable pools that provide critical habitat for several salmonid life stages (e.g. log or rock plunge pool or pools at meander bends that are at least 50% the width of the stream).

Protection: Implementation of a prescribed management action designed to maintain the desired ecological function of a habitat. Wherever possible, protection will occur with cooperation between the managing agency and landowner. Additionally, long-term protection activities are preferred over shorter-term activities.

Riparian Function: The riparian corridor provides a variety of ecological functions, which generally can be grouped into energy, nutrients, and habitat as they affect salmonid performance. Some aspects of these functions are expressed through specific environmental attributes within EDT, such as wood debris, flow characteristics (several attributes), temperature characteristics (several attributes), benthos, pollutant conditions, and habitat type characteristics (e.g., pool-riffle units). Not all functions are identified and treated as separate environmental attributes. Functions specifically not covered include the following:

- Terrestrial insect input (affects fish food abundance)
- Shade (provides a form of cover, temperature covered by specific attributes)
- Source of fine detritus (affects fish food abundance, large wood covered by specific attribute)
- Bank and channel stability (affects suitability of fish habitat, as well as micro-habitat)
- Bank cover (affects suitability of fish habitat, as well as micro-habitat)
- Secondary channel development (affects channel stability, flow velocities, and habitat suitability)
- Groundwater recharge and hyporheic flow characteristics (affects fish food abundance, strength of upwelling, and micro temperature spatial variation)
- Flow velocity along stream margins (affects suitability of fish habitat)
- Connectivity to off-channel habitat (affects likelihood of finding off-channel sites)

GLOSSARY (Continued)

Soft Bank Stabilization: Soft bank stabilization methods include vegetation planting, fascines, instream structures (e.g. J-hook vanes, vortex rock weirs), and similar bio-engineered structures. These are the preferred methods of bank stabilization.

Summer Flows: Typically May-November.

* These definitions were taken directly from Rules for Translating Level 2 Environmental Attribute Values To Level 3 Biometrics for Chinook Salmon, Mobrand Biometrics, 2002 (August 4 draft).

1. Introduction

In 1980, Congress passed the Pacific Northwest Electric Power Planning and Conservation Act, which authorized the states of Idaho, Montana, Oregon, and Washington to create the Northwest Power and Conservation Council (Council/NWPCC; formerly the Northwest Power Planning Council). The act directs the Council to develop a program to “protect, mitigate and enhance fish and wildlife, including related spawning grounds and habitat, on the Columbia River and its tributaries... affected by the development, operation and management of (hydroelectric projects) while assuring the Pacific Northwest an adequate, efficient, economical, and reliable power supply” (NPPC 2000).

The Council has stated the following four objectives for the Columbia River Fish and Wildlife Program (Program):

- A Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife.
- Mitigation across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem.
- Sufficient populations of fish and wildlife for abundant opportunities for tribal trust and treaty right harvest and for non-tribal harvest.
- Recovery of the fish and wildlife affected by the development and operation of the hydrosystem that are listed under the Endangered Species Act (ESA).

Wherever feasible, this program will be accomplished by protecting and restoring the natural ecological functions, habitats, and biological diversity of the Columbia River Basin. In those places where this is not feasible, other methods that are compatible with naturally reproducing fish and wildlife populations will be used. Where impacts have irrevocably changed the ecosystem, the program will protect and enhance the habitat and species assemblages with the alter ecosystem. Actions taken under this program must be cost-effective and consistent with an adequate, efficient, economical and reliable electric power supply.

To achieve these program-level objectives, the Council intends to establish specific biological objectives at the subbasin level that will then be combined into objectives at the province level. The Council will integrate locally developed plans for the 62 tributary subbasins of the Columbia River and a plan for the mainstem into the Program. Plans developed at the subbasin level will provide a framework within which fish and wildlife projects are proposed for Bonneville Power Administration (BPA) funding to implement the Program. Subbasin plans will be the context, for review of proposals for BPA funding by the fish and wildlife agencies and tribes, the Independent Scientific Review Panel (ISRP), and the Council. The projects funded by BPA will be reviewed through the Council’s Rolling Provincial Review Process once every three years.

The following is taken from NWPCC, 2001, and describes the rolling review process:

“An adopted subbasin plan is intended to be a living document that increases analytical, predictive, and prescriptive ability to restore fish and wildlife. At each three-year cycle of planning, the updated information will guide revision of the biological objectives, strategies and implementation plan. The Council views the assessment development as an ongoing process of evaluation and refinement of the region's efforts through adaptive management, research and evaluation. It will need maintenance over time that will need to be coordinated with other agencies and stakeholders. In addition, as relationships are made at a larger scale such as a province or Evolutionary Significant Unit (ESU), adaptive management practices may be warranted to reflect priorities at the larger scale."

The Walla Walla Subbasin Plan is a local response to this regional directive. Components of this plan will be integrated with those of the Yakima, Crab, Palouse, Deschutes, John Day, Lower Middle Columbia, Umatilla, Lower Snake Mainstem, and Tucannon subbasins in the Columbia Plateau Province. The key components of this subbasin plan include the introduction, subbasin overview, aquatic species and habitat assessment, terrestrial species and habitat assessment, inventory of existing projects, integration of aquatic and terrestrial components, and the management plan. This plan is based upon the best available science, and its various components explicitly identify the data, hypotheses, and assumptions used during its development.

Following are the key components of the Walla Walla Subbasin Plan by chapter:

- Chapter 1: Introduction, planning context, approach, and participants
- Chapter 2: Overview of current conditions in the subbasin
- Chapter 3: Discussion of the Ecosystem Diagnosis and Treatment modeling method used for the aquatic assessment, and results of this effort
- Chapter 4: Discussion of the methods used for the terrestrial assessment, and results of this effort
- Chapter 5: Integration of aquatic and terrestrial components
- Chapter 6: Identification of programmatic activities and recent habitat enhancement projects
- Chapter 7: Discussion of subbasin priorities in terms of the vision, working hypotheses, biological objectives, and strategies. This includes identification of topics that required special treatment outside of the standard assessment approach and an implementation plan

Through this planning process, the technical staff and the public worked together to identify working hypotheses regarding limiting factors for fish, wildlife, and habitat; define objectives that measure progress toward those goals; and develop strategies to meet those objectives. See Section 1.2 for a list of Planning Participants.

1.1 Planning Context

1.1.1 Relationship to Applicable Federal and State Regulations

The Walla Walla Subbasin Plan will play a significant role in addressing requirements of the Endangered Species Act (ESA). The National Oceanographic and Atmospheric Administration-Fisheries (NOAA-Fisheries) and the U.S. Fish and Wildlife Service (USFWS) intend to use adopted subbasin plans as one component leading toward recovery of ESA-listed species. This includes integration with NOAA-Fisheries Technical Recovery Team (TRT) goals. In addition, the Council, BPA, NOAA-Fisheries and USFWS will use adopted subbasin plans to help meet requirements under the 2000 Federal Columbia River System Biological Opinion (BiOp) at the subbasin and/or province level.

Two primary aquatic species have been listed as threatened under the ESA: steelhead and bull trout. Threatened status means that the listed group is likely to become endangered (in danger of extinction) within the foreseeable future throughout all or a significant portion of its range. Although listed at the larger ESU scale, spring Chinook are considered extirpated from the Walla Walla Subbasin.

- Summer steelhead in the Walla Walla Basin are part of the Mid-Columbia ESU, which was listed as threatened under the ESA in 1999 (NMFS 1999).
- Bull trout in the Columbia Basin (including the Walla Walla River) were listed as threatened under the Endangered Species Act in 1998.

The objectives and strategies outlined in the plan (Chapter 7) provide direction for implementing projects on tributary streams that will contribute to the recovery of these listed species.

The 1972 Clean Water Act (CWA) requires states to establish and administer standards for specific pollutants in water bodies. The CWA requires states to identify those water bodies that do not meet state standards, i.e. the 303(d) list. Although the State of Washington is currently revising their water quality regulatory system, Total Maximum Daily Loads (TMDLs) will still be required for each water body and water quality parameter that caused it to be placed on the 303(d) list. In Washington, TMDLs are developed on a five-year rotating watershed schedule in which watersheds are divided into Water Quality Management Areas (WQMAs). Specific strategies outlined in the management plan (Chapter 7) will provide direction for water quality enhancement (primarily turbidity and temperature).

1.1.2 Integration with Existing Planning Efforts

The Walla Walla Subbasin Summary was completed in 2001 (James & Scheeler 2001). This summary was comprehensive with regard to the existing conditions, programs, projects, and management activities. Information contained in the subbasin summary was used in development of this plan to the greatest extent possible. During plan development, three key departures from the subbasin summary occurred: 1) development of a more solid scientific basis within the assessment; 2) development of the management plan section where hypotheses, objectives and strategies are developed and identified for a 10 to 15 year planning horizon

(Chapter 7 of this subbasin plan); and 3) attempted integration and agreement by diverse stakeholders on the management plan.

Table 1-1 identifies other assessments and plans that subbasin technical staff and planners used to develop the current plan. Empirical data and local knowledge of the subbasin also played a key role in development of this plan. These assessment and plans are referenced in this subbasin plan, as appropriate.

Table 1-1 Primary Pre-Existing Assessments and Plans used for Subbasin Plan Development

Assessment/Plan	Sponsor
Limiting Factors Analysis	Washington Conservation Commission
Walla Walla Subbasin Summary	Northwest Power and Conservation Council
Bull Trout Recovery Plan (draft)	United States Fish and Wildlife Service
Spirit of Salmon; Wy-Dan-Ush-Mi-Wa_Kish-Wit	Columbia River Inter-tribal Fish Commission

1.1.3 Integration with Future Planning Efforts

In addition to integration with federal obligations under the Northwest Power Act, ESA, CWA, and tribal trust and treaty-based responsibilities, subbasin plans need to look more broadly toward other federal, state, and local activities. Inclusion of such elements will enable coordination of activities to eliminate duplication, enhance cost-effectiveness, and allow pursuit of funding in addition to that provided by the BPA.

The Snake River Salmon Recovery Plan is a related local planning effort that will incorporate the information provided by several subbasin plans, including the Walla Walla. The Snake River Salmon Recovery Board will play an integral role in implementation and progress evaluation for the Walla Walla Subbasin Plan.

1.2 Planning Process and Participants

The planning process in the Walla Walla Subbasin incorporated a wide variety of entities, including Walla Walla, Umatilla, and Columbia counties, WRIA 32 Planning Unit, Walla Walla Basin Watershed Council, Confederated Tribes of the Umatilla Indian Reservation, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Mobrand Biometrics, Inc., Snake River Salmon Recovery Board, Parametrix, Economic and Engineering Services, Inc., and others. Figure 1-1 shows the general relationship between the various groups.

The lead entities for development of the Walla Walla Subbasin Plan (with guidance from the WRIA 32 Planning Unit) are Walla Walla County and the Walla Walla Basin Watershed Council. These groups were the ultimate decision-makers in the subbasin planning process.

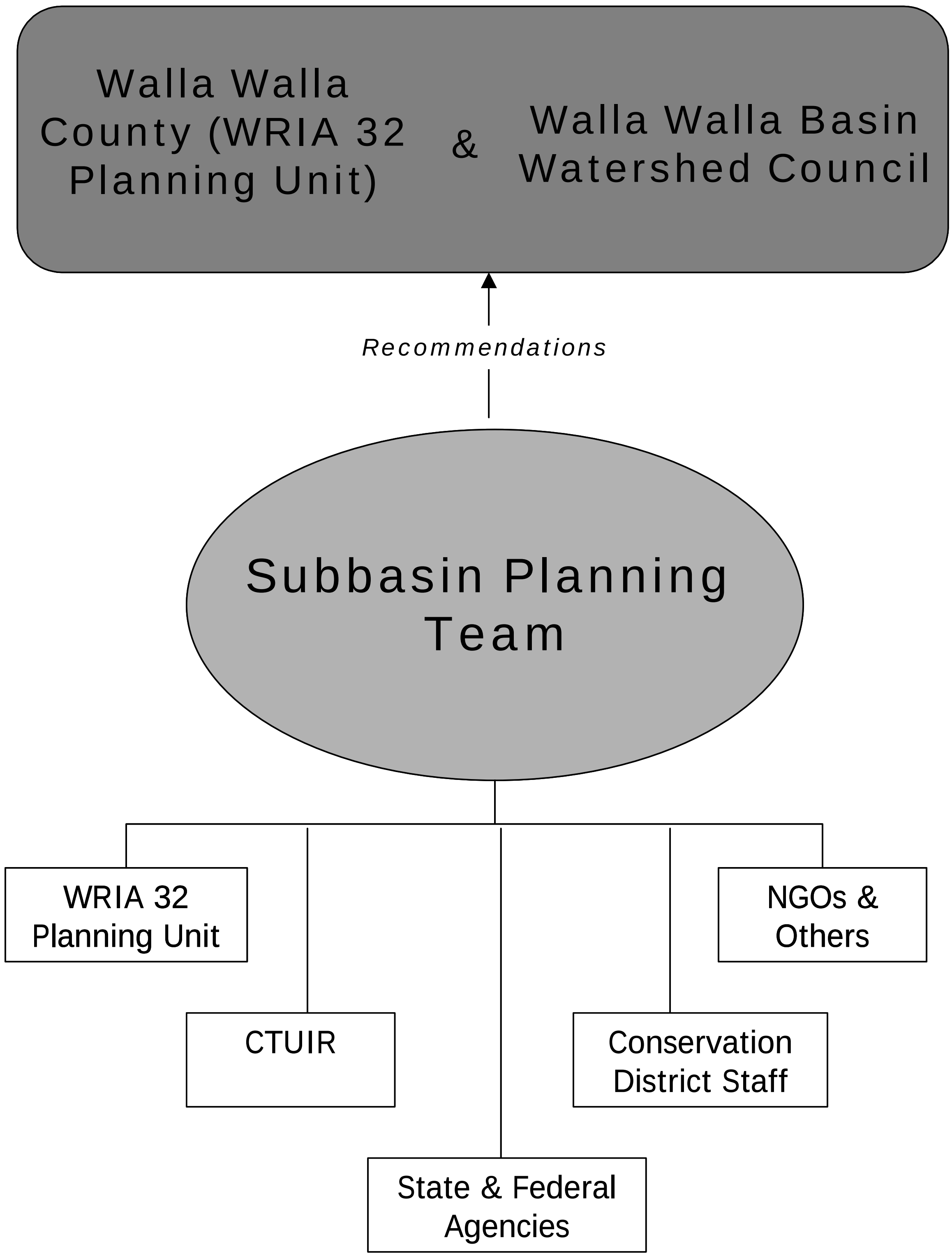

Figure 1-1 Walla Walla Subbasin Information Flow and Decision-Making Framework

The Washington Department of Fish and Wildlife developed all technical assessment components, both aquatic and terrestrial. Their work was accomplished with the assistance of Mobrand Biometrics, Inc., who provided assessment data using the Ecosystem Diagnosis and Treatment model (see Chapter 3), compiled the inventory information (see Chapter 6), and completed the objectives analysis (see Chapter 7). Organizational support, policy direction, facilitation, writing and document editing services were provided by the consultant team of Parametrix, and Economic and Engineering Services, Inc.

The key group involved in guiding the Walla Walla Subbasin Plan was the Walla Walla Subbasin Planning Team (SPT). The SPT was established in spring 2003, and has representation from the lead entities local resource managers, and others (see Table 1-2 for membership list). Meetings of the SPT were held on August 28, 2003; July 7, 2003; August 7, 2003; August 21, 2003; September 16, 2003; October 15, 2003; December 3, 2003; January 22, 2004; February 18, 2004; March 17, 2004; March 30, 2004; and April 28, 2004. Significant communication via teleconferencing and email occurred among SPT members between these meeting dates. The SPT served multiple roles, including information clearinghouse, and approving documents prior to public review. Most important, the SPT served as the forum in which significant policy-level issues were discussed and addressed. Given that all major groups involved in subbasin planning in the Walla Walla were involved on the SPT, it also served a key function coordinating the efforts of its members. The SPT operated by consensus. Decision memos were used to track approval of plan components and key decisions throughout plan development.

Table 1-2 Walla Walla Subbasin Planning Team

Member	Affiliation
Tim Bailey	Oregon Department of Fish and Wildlife
Kevin Blakely	Oregon Department of Fish and Wildlife
Steve Martin	Snake River Salmon Recovery Board
Pat Fowler	Washington Department of Fish and Wildlife
Mark Wachtel	Washington Department of Fish and Wildlife
Paul Ashley	Washington Department of Fish and Wildlife
Gary James	Confederated Tribes of the Umatilla Indian Reservation
Carl Scheeler	Confederated Tribes of the Umatilla Indian Reservation
Terry Bruegman	Columbia Conservation District
Brian Wolcott	Walla Walla Basin Watershed Council
Eric Pfeifer	Walla Walla Basin Watershed Council
Cathy LaRoque	Walla Walla County / WRIA 32 Planning Unit Coordinator
Mark Kirsch	Oregon Department of Fish and Wildlife
Jed Volkman	Confederated Tribes of the Umatilla Indian Reservation
Del Groat	United States Forest Service
Stacia Peterson	United States Forest Service
Michelle Eames	United States Department of Fish and Wildlife
Victoria Leuba	Washington Department of Ecology

Informal technical work groups were also used throughout the process. These groups were comprised primarily of Walla Walla County, Walla Walla Basin Watershed Council, United States Forest Service, United States Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Washington Department of Ecology, and consultant team staff. The primary purpose of the technical work group was to review and evaluate Washington Department of Fish and Wildlife work products before presentation to the public in order to identify inconsistencies and answer remaining technical questions. Further information regarding the planning process and participants prepared by the Walla Walla Basin Watershed Council can be found in Appendix A. Note that the document in Appendix A was not reviewed by the Subbasin Planning Team, local technical staff, the public, or other stakeholders.

1.3 Public Involvement

Public involvement was a key element of the subbasin planning process. Opportunities for public involvement were numerous, including the following:

- Subbasin Planning Scoping Public Meeting: April 28, 2003 Public Kickoff Meeting; Implementation Area meetings on July 2, 2003; July 8, 2003, August 19, 2003; September 25, 2003, October 1, 2003 and October 6, 2003.
- Subbasin Planning Assessment Public Meetings: November 5, 2003 and December 3, 2003
- Management Plan Public Workshop #1: February 18, 2004
- Management Plan Public Workshop #2: March 17, 2004
- Information posted on the Walla Walla Watershed Planning and Walla Walla Watershed Council websites (http://www.wallawallawatershed.org and http://www.wwbwc.org
- Information posted on the NWPCC website (http://www.nwppc.org/fw/subbasinplanning/admin/upload/list.asp?id=56)
- Draft documents distributed to lead entitymailing lists, Snake River Recovery Board mailing list, and interested parties

The assessment and three management plan workshops listed above provided a significant opportunity for interface between the SPT, technical staff, and the public. Prior to each of these meetings, the technical work group met to review and revise information prepared by WDFW. At each public meeting, a subbasin planning overview and status update were provided, available information was presented, and the documents available were discussed and revised. Feedback received from the public was used to change the documents in real-time at the meetings. In addition, comment sheets and self-addressed stamped envelopes were distributed at each meeting for written comments, which were incorporated into the plan at a later date. The public involvement plan for the Asotin, Lower Snake, Tucannon, and Walla Walla Subbasins can be found in Appendix A.

1.4 Plan Approval

On May 4, 2004, the Walla Walla Watershed Planning Unit recommended submittal of the Walla Walla Subbasin Plan, May 2004 Version, to the Northwest Power and Conservation Council.

During their meeting on May 17, 2004, the Walla Walla Basin Watershed Council agreed to go forward with submittal of the subbasin plan.

1.5 Plan Updates

The Walla Walla Subbasin Plan was written with a 10 to 15 year planning horizon. All hypotheses, objectives, and strategies were established with this time frame in mind. Upon approval of the subbasin plan, it will be reviewed by the Council's Independent Science Review Panel (ISRP). The entities involved in development of this plan anticipate that they will be provided the resources and opportunity to address the ISRP's concerns through a subsequent plan finalization process at the subbasin-level with local stakeholders. Upon adoption into the Council's Fish and Wildlife Program, the entities involved in development of this plan further anticipate that they will be provided the resources and opportunity to lead future updates of this subbasin plan.

2. Subbasin Overview

2.1 Subbasin Description

This section provides an overview of the major characteristics of the Walla Walla Subbasin. Further information providing more background on existing conditions, jurisdictions, physical environment, land use, economics, primary human influences on the natural environment, was prepared by the Walla Walla Basin Watershed Council and can be found in Appendix B. Note that the document in Appendix B was not reviewed by the Subbasin Planning Team, local technical staff, the public, or other stakeholders.

2.1.1 Location and Climate

The Walla Walla Subbasin includes all or part of five counties in Washington and Oregon; Walla Walla and Columbia Counties in Washington and Umatilla, Union and Wallowa Counties in Oregon (NPPC 2001; Figure 2-1). The following description of location and climate of the Walla Walla Subbasin was excerpted from the Draft Walla Walla Subbasin Summary prepared for the Northwest Power Planning Council (NPPC) (2001).

Drainage Area

“Draining an area of 4,553 square kilometers (1,758 square miles), the Walla Walla River and its tributaries originate in the Blue Mountains of southeastern Washington and northeastern Oregon and flow north and west to enter the Columbia River at Lake Wallula behind McNary Dam. About 73 percent of the drainage lies in Washington. Elevations in the subbasin range from about 1,800 meters at mountain crests to about 80 meters at the Columbia River (Figure 2-2). The eastern portion of the drainage lies in steep, timbered slopes of the Blue Mountains within the Umatilla National Forest. The remainder of the drainage consists of moderate slopes and level terrain.

Climate

“The Walla Walla watershed is largely influenced by the Cascade Mountains to the west, the Pacific Ocean beyond the mountains, and prevailing westerly winds. Maritime air masses move to the east where they are intercepted by the Cascade Mountain range, creating a rain shadow effect, which contributes to the arid steppe of the Columbia basin reaching as far as the Blue Mountains. Elevation is another major factor affecting the climate within the watershed, as it varies from warm and semiarid in the western lower part of the river valley to cool and relatively wet at the headwaters in the Blue Mountains. Temperatures exhibit a large seasonal variation with maximum temperatures rising above 38°C (100°F) in the summer and falling below –18°C (0°F) in the winter (U. S. Army Corps of Engineers 1997). Average monthly high temperatures from June through September range from 67°F in the lower elevations to 54°F at higher elevations.

“Precipitation across the Walla Walla subbasin falls mainly in the winter, with 64 percent occurring from October through March (Newcomb 1965). The lower elevations in the watershed experience precipitation primarily as rain, while higher elevations primarily receive precipitation as snow. Annual precipitation near the mouth of the Walla Walla River is less than 25 centimeters (Figure 2-3). Precipitation increases progressively eastward with elevation, with the headwaters receiving over 100 centimeters (40 inches) annually (U. S. Army Corps of Engineers 1997). Thunderstorms occur on average only 11 days per year, mostly during the summer months, but they are extremely intense and have produced torrential flows causing major fish kills and sediment deposition."

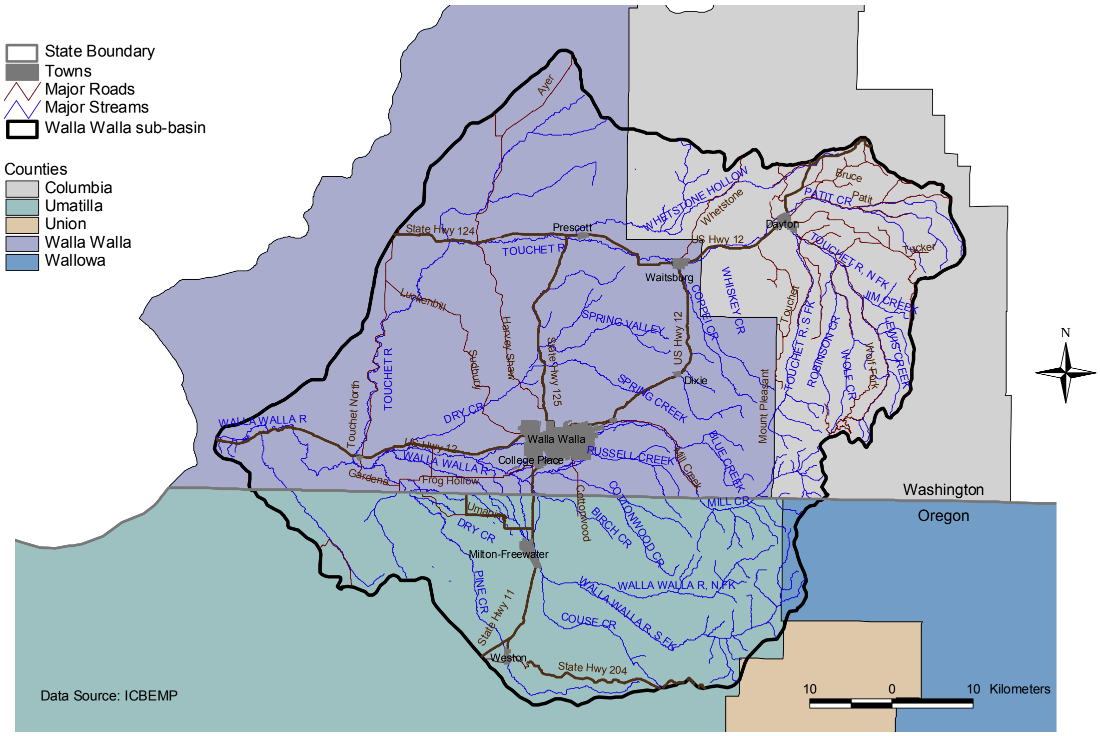

Figure 2-1 Counties, Towns, Major Roads and Major Streams within the Walla Walla Subbasin (NPPC 2001, Figure 2)

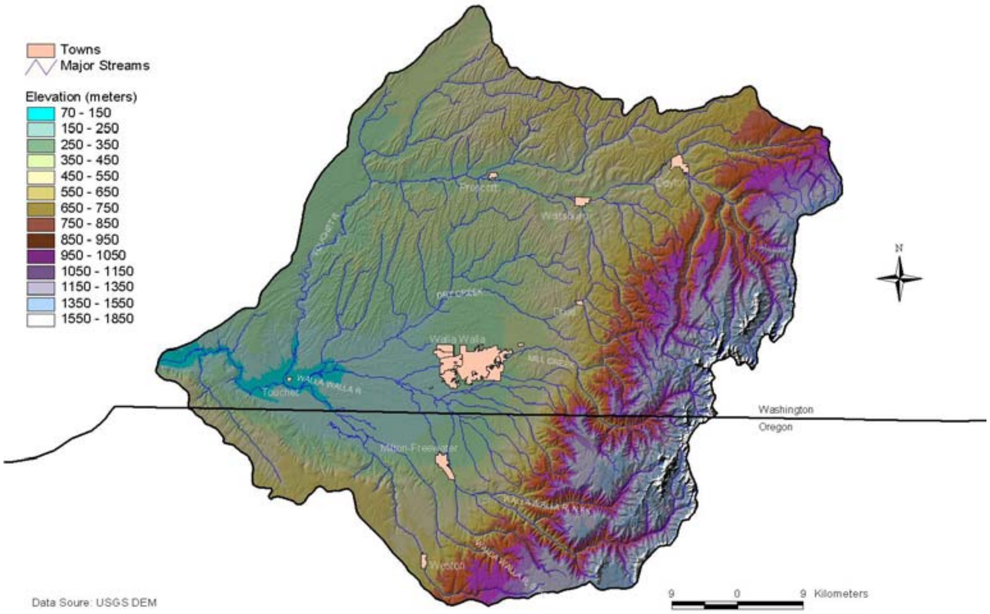

Figure 2-2 Elevation and Topography of the Walla Walla Subbasin
NPPC 2001, Figure 3

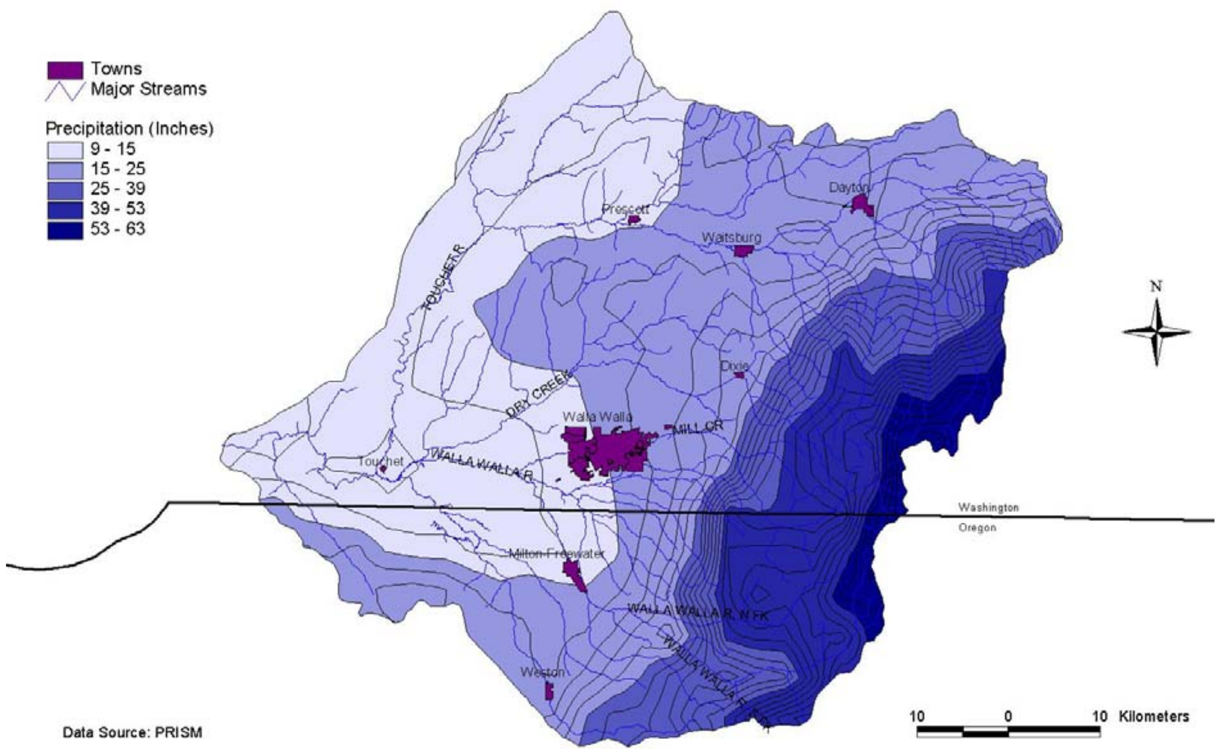

Figure 2-3 Precipitation Patterns in the Walla Walla Subbasin
NPPC 2001, Figure 4

2.1.2 Physical Environment

The following description of topography in the Walla Walla Subbasin was excerpted from the Draft Walla Walla Subbasin Summary (NPPC 2001).

> "As the river winds its way through the Walla Walla watershed, it crosses two major physiologic provinces: the Blue Mountains and the valley lowland (Newcomb 1965). The Blue Mountains dominate the topography of the basin with an average elevation of 1,500 meters (5,000 feet) along the subbasin boundary, the highest point being Table Mountain at 1,800 meters (6,000 feet) (Figure 2-3)… The valley lowland extends from the center of the basin north to the divide between the Touchet and Snake Rivers and south to the Horse Heaven Hills. Land surface elevations of the lowland province range from 750 meters (2,500 feet) at the base of the Blue Mountains to less than 81 meters (270 feet) at the confluence with the Columbia River."

2.1.3 Water Resources and Hydrology

Two primary drainage areas exist within the Walla Walla Subbasin: Walla Walla River and the Touchet River. The Touchet River drains into the lower Walla Walla River, which subsequently drains into the Columbia River. Primary tributaries to the Touchet River include the North Fork Touchet, South Fork Touchet, Robinson Creek, Wolf Fork, and Coppei Creek. A variety of smaller tributaries also contribute to the Touchet River, e.g. Griffin Fork, Burnt Fork, Green Fork, Jim Creek, Lewis Creek, and Whiskey Creek. Primary tributaries to the Walla Walla River include the South Fork Walla Walla, North Fork Walla Walla, Couse Creek, Dry Creek, Pine Creek, Mill Creek system and the spring branch/distributary system. The Mill Creek system originates in Washington, dips into Oregon, and then returns to Washington where it passes through the City of Walla Walla and joins the Walla Walla River. This system includes the Mill Creek mainstem, Blue Creek, Yellowhawk Creek , Cottonwood Creek, Garrison Creek, and others. The spring branch/distributary system includes the Little Walla Walla, East Little Walla Walla, West Little Walla Walla, McEvoy Spring Creek, and others that drain from the Walla Walla River in Oregon, travel roughly northwest, and rejoin the Walla Walla River in Washington.

Detailed descriptions of water resources and subbasin hydrology can be found in the Draft Walla Walla Subbasin Summary (NPPC 2001) and Level 1 Assessment (WRIA 32 Planning Unit 2002). The following brief description of hydrology in the Walla Walla Subbasin was excerpted from NPPC 2001.

> "The Walla Walla River flows out of the Blue Mountains, originating at nearly 1,800 meters (6,000 feet) and flows through narrow, well-defined canyons. After it leaves the mountains it flows through broad valleys that drain low, rolling lands (U. S. Army Corps of Engineers 1997). The principle tributaries of the Walla Walla River include the Touchet River, Mill Creek, and the North and South Forks of the Walla Walla River (Table 2-1).
>
> "Precipitation trend analysis shows a high degree of variability in the amount and timing of rainfall in the Washington portion of the Walla Walla subbasin (Pacific Groundwater Group 1995)… The intermittent watersheds in the lower subbasin have minimal flow during the

summer months, except during large precipitation events. Average monthly flows for the major rivers and tributaries in the Walla Walla subbasin are shown in Table 2-2.

"Fifty-eight percent of the Walla Walla subbasin falls within the 450-1,200 meter (1,500-4,000 feet) range in what is termed the transient snow zone, an area that substantially contributes to the flood regime in the subbasin… [Rain on frozen snow events] often lead to high surface erosion in agricultural lands…"

Low flows also have significant impacts in the Walla Walla subbasin. Flows are annually depressed because of natural variability and human water use throughout the subbasin. Water diversions reduce flows in some reaches of the river and principle tributaries. In the past, section of the lower Touchet River, lower Mill Creek, and Walla Walla River near the Oregon-Washington border have been completely dewatered. However, in recent years significant improvement has been seen in re-watering these reaches. More information regarding the subbasin's approach to managing instream flows can be found throughout Chapter 7, including Section 7.3.5.

Table 2-1 Drainage Area and Runoff of Major Tributaries in the Walla Walla Subbasin

Drainage	Drainage Area (sq km)	Drainage % of subbasin	Average Annual Runoff (acre/feet	Runoff % of subbasin
South Fork Walla Walla (near Milton-Freewater	163	4	139,000	30
North Fork Walla Walla (near Milton-Freewater	88	2	39,200	8
Mill Creek (near Walla Walla)[1]	154	4	69,073	15
Touchet River (at Bolles)	935	22	180,300	40
Local Runoff (remainder of subbasin)	2,857	66	37,500	8
TOTAL (Walla Walla River near Touchet)	4,292	100	462,000	100

[1]Values shown represent the data collected at gauge site #14013000, located upstream from Walla Walla, WA. This site was selected since flows measured are uninfluenced by diversions.

Source: U. S. Army Corps of Engineers 1997 as shown in NPPC 2001, Table 1

Table 2-2 Average Monthly Flows for Principle Tributaries and Portions of the Mainstem Walla Walla River

Tributary/ Stream Segment	USGS Gage #	General Location	Period of Record	Average Monthly Flows (cfs)											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mill Cr.	14013000	Near Walla Walla WA	1913-1998	131	155	159	174	140	75	38	31	31	37	73	113
Dry Cr.	14016000	Near Walla Walla WA	1949-1966	37	53	48	46	24	10	2	1	2	4	12	31
EF Touchet R	14016500	Near Dayton WA	1941-1967	135	189	183	218	187	102	54	44	44	51	82	144
Touchet R.	14017000	At Bolles, WA (near Waitsburg)	1924-1988	393	440	433	428	279	140	50	35	44	65	137	268

Tributary/ Stream Segment	USGS Gage #	General Location	Period of Record	Average Monthly Flows (cfs) Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Touchet R.	14017500	Touchet, WA (near confluence w/WW River)	1941-1954	329	577	441	475	354	173	54	26	33	60	145	272
Walla Walla R.	14018500	Near Touchet WA	1951-1998	1112	1303	1201	1071	725	252	42	19	40	80	300	812
SF Walla Walla R.	14010000	Near Milton-Freewater OR	1907-1990	175	188	214	280	305	205	124	109	107	111	135	166
NF Walla Walla R.	14011000	Near Milton-Freewater OR	1930-1968	56	66	82	119	96	41	8	4	5	11	27	52

Source: NPPC 2001, Table 2)

The quality of water in the Walla Walla subbasin is higher in the upper drainage and generally degrades in lower elevations (NPPC 2001). Streams or stream segments that fail to meet or exceed state water quality criteria are identified as impaired and are listed on the state's §303(d) list.

Temperature is a parameter of primary concern in the Walla Walla drainage, with much of the lower Walla Walla remaining above 20°C (68°F) for most of the summer (NPPC 2001). Other §303(d) listings include flow, pesticides, pH, nitrates, and fecal coliform bacteria.

The Walla Walla Subbasin Summary (NPPC 2001) and Level 1 Assessment (WRIA 32 2002) contain more detailed discussion of water quality in the subbasin.

2.1.4 Fish and Wildlife Species

Fish

There are currently more than 30 species of fish inhabiting the Walla Walla Subbasin, 17 of which are native (NPCC 2001; Table 2-3). The following description of fish species of concern found in the Walla Walla Subbasin was excerpted from the Draft Walla Walla Subbasin Summary (NPPC 2001).

> "The only naturally occurring populations of anadromous fish currently present in the Walla Walla subbasin are summer steelhead (*Oncorhynchus mykiss*). Pacific lamprey (*Lampetra tridentata*), a federally listed species of concern and vulnerable listed species in Oregon, may also exist. Summer steelhead (*Oncorhynchus mykiss*) are federally listed as threatened, a candidate for listing in Washington State, and listed as vulnerable in Oregon (Columbia Basin Fish and Wildlife Authority 1999). Native spring Chinook (*Oncorhynchus tshawytscha*), which were last documented in the Walla Walla subbasin in the 1950s, are now extinct. However, stray spring Chinook have recently been collected by CTUIR in the Washington and Oregon reaches of the Walla Walla subbasin (Mendel et al. 1999; J. Germond, WDFW, 1999).

"Non-anadromous salmonids and lamprey endemic to the Walla Walla subbasin include interior redband trout (*Oncorhynchus mykiss*), bull trout (*Salvelinus confluentus*), and mountain whitefish (*Prosopium williamsoni*), and the western brook lamprey (*Lampetra richardsoni*). As of April 20, 2000, redband trout were listed as a sensitive species in Oregon and managed similarly as steelhead when occurring in anadromous waters. Redband are a candidate for listing in Washington State as of June 21, 2000 (based on their similar classification as steelhead). Bull trout are federally listed as threatened under the Endangered Species Act (ESA), candidates for listing in Washington State, and listed as critical in Oregon."

CTUIR and ODFW have documented spring Chinook adults at Nursery Bridge and WDFW has documented adult spring Chinook at the Dayton trap. WDFW suspects that these are stray hatchery fish and not naturally produced from the Walla Walla basin, but they could be progeny from hatchery fish spawning naturally or from hatchery releases in a nearby basin (Glen Mendel, WDFW, pers. comm. 2004).

Table 2-3 Fish Species Present in the Walla Walla River Subbasin

Species	Origin[1]	Location[2]	Status[3]	Comments
Bull trout (Salvelinus confluentus)	N	R, T	C	Headwater areas
Spring Chinook (*Oncorhynchus tshawytscha*)	H	R, T	R	Presumed hatchery strays
Fall Chinook (*Oncorhynchus tshawytscha*)	H	R, T	R	Presumed hatchery strays
Redband trout/ summer steelhead (*Oncorhynchus mykiss*)	N	R, T	C/C	Dayton return range-184-1006; Walla[2] return range – 279-815
Mountain whitefish (*Prosopium williamsoni*)	N	R, T	R	
Brown trout (*Salmo trutta*)	E	R, T	R	
Lamprey (Petromyzontidae)	N	R, T	U	brook, river
Longnose dace (*Rhinichthys cataractae*)	N	R, T	R/I	
Speckled dace (*Rhinichthys osculus*)	N	R, T	A	
Umatilla dace (*Rhinichthys umatilla*)	N	R, T	I	
Leopard dace (*Rhinichthys falcatus*)	N	R, T	I	
Chiselmouth (*Acrocheilus alutaceus*)	N	R, T	C	
Peamouth (*Mylocheilus caurinus*)	N	R, T	I	
Redside shiner (*Richardsonius balteatus*)	N	R, T	C	
Northern pikeminnow (*Ptychocheilus oregonensis*)	N	R, T	C	
Sucker (Catostomidae)	N	R, T	C	Bridgelip, largescale
Carp (*Cyprinus carpio*)	E	R, T	R/I	Common in lower sections of the Walla Walla and Touchet
Bullhead catfish, brown (*Ameiurus nebulosus*)	E	R, T	R/I	Yellow, black
Tadpole madtom (*Notorus gyrinus*)	E	R, T	R/I	
Channel catfish (*Ictalurus natalis*)	E	R, T	C/I	(C) lower mainstem
Smallmouth bass (*Micropterus dolomieu*)	E	R, T	C/I	Common in lower sections of the Walla Walla and Touchet
Largemouth bass (*Micropterus salmoides*)	E	R, T	R/I	
Pumpkinseed (*Lepomis gibbosus*)	E	R, T	I	
Bluegill (*Lepomis macrochirus*)	E	R, T	R/I	
White crappie (*Pomoxis annularis*)	E	R, T	C/I	(C) lower mainstem
Black crappie (*Pomoxis nigromaculatus*)	E	R, T	C/I	(C) lower mainstem

Species	Origin[1]	Location[2]	Status[3]	Comments
Warmouth (*Lepomis gulosus*)	E	R, T	I	
Yellow perch (*Perca flavescens*)	E	R, T	I	
Paiute sculpin (*Cottus beldingi*)	N	R, T	C	
Margin sculpin (*Cottus marginatus*)	N	R, T	C	
Torrent sculpin (*Cottus rhotheus*)	N	R, T	R	
3-spine stickleback (*Gasterosteus anculeatus*)	E	R, T	R/I	
Sandroller (*Percopsis transmontana*)	N	R, T	I	

[1]Origin: N=Native stock, E=exotic, H=Hatchery reintroduction

[2]Location: R=mainstem rivers and Mill Creek, T=tributaries, P=ponds

[3]Fish species abundance based on average number of fish per 100m2: A=abundant, C=common R=rare, U=uncommon, and I =insufficient data

Source: G. Mendel, WDFW, December 2000 as shown in NPPC 2001, Table 14

Wildlife

The Walla Walla subbasin is inhabited by approximately 10 amphibian species, 207 bird species, 69 mammal species, and 15 reptile species during all or part of the year (NPPC 2001). Forty-two of these species have listed or candidate status in Oregon State, Washington State, and/or at the federal level, or are of special concern to the USFS (NPPC 2001; Table 2-4). Many species in the subbasin that are not yet listed have been identified as having declining population trends.

Table 2-4 Listed Wildlife Species within the Walla Walla Subbasin

Species	Status
American marten *Martes americana*	OR-SV, FS-MIS
Bank swallow *Riparia riparia*	OR-SU
Black-backed woodpecker *Picoides arcticus*	WA-C
Boreal owl *Aegolius funereus*	OR-SU
Burrowing owl *Athene cunicularia*	WA-C, OR-SC, US-SpCon
Ferruginous hawk *Buteo regalis*	WA-T, OR-SC, FS-S, US-SpCon
Flammulated owl *Otus flammeolus*	WA-C, OR-SC, FS-S
Fringed myotis *Myotis thysanodes*	OR-SV, US-SpCon
Golden eagle *Aquila chrysaetos*	WA-C
Grasshopper sparrow *Ammodramus savannarum*	OR-SV
Great gray owl *Strix nebulosa*	OR-SV, FS-S
Loggerhead shrike *Lanius ludovicianus*	WA-C, OR-SV,US-SpCon
Long-billed curlew *Numenius americanus*	OR-SV
Long-eared myotis *Myotis evotis*	OR-SU, US-SpCon
Long-legged myotis *Myotis volans*	OR-SU,US-SpCon
Lynx *Lynx canadensis*	WA-T,US-T
Merriam's shrew *Sorex merriami*	WA-C
Northern goshawk *Accipiter gentilis*	WA-C, OR-SC, US-SpCon
Northern leopard frog *Rana pipiens*	WA-E
Northern pygmy-owl *Glaucidium gnoma*	OR-SC
Olive-sided flycatcher *Contopus borealis*	OR-SV, US-SpCon

Species	Status
Pallid bat *Antrozous pallidus*	OR-SV
Peregrine falcon *Falco peregrinus*	WA-E, OR-E, FS-S, US-E
Pileated woodpecker *Dryocopus pileatus*	WA-C, OR-SV,FS-S
Preble's shrew *Sorex preblei*	FS-S
Pygmy nuthatch *Sitta pygmaea*	OR-SC
Rocky mountain elk *Cervus elaphus*	FS-MIS
Sage thrasher *Oreoscoptes montanus*	WA-C
Sagebrush lizard *Sceloporus graciosus*	OR-SV, US-SpCon
Silver-haired bat *Lasionycteris noctivagans*	OR-SV
Striped whipsnake *Masticophis taeniatus*	WA-C
Swainson's hawk *Buteo swainsoni*	OR-SV,FS-S
Tailed frog *Ascaphus truei*	OR-SV, US-SpCon
Three-toed woodpecker *Picoides tridactylus*	OR-SC, FS-MIS
Vaux's swift *Chaetura vauxi*	WA-C
Washington ground squirrel *Spermophilus washingtoni*	WA-C, US-C
Western boreal toad *Bufo boreas*	WA-C, OR-SV, US-SpCon
Western small-footed myotis *Myotis ciliolabrum*	OR-SU, US-SpCon
White-headed woodpecker *Picoides albolarvatus*	OR-SC, FS-MIS
White-tailed jackrabbit *Lepus townsendii*	WA-C, OR-SU
Wolverine *Gulo gulo*	WA-C, OR-T, FS-S US-SpCon

Key: WA-Washington State Listed; OR-Oregon State Listed; FS-Forest Service Listed; US-Federally Listed; E-Endangered; T-Threatened C-Candidate; SC-Sensitive, Critical; SV-Sensitive, Vulnerable; SU-Sensitive, Unknown; SpCon-Species of Concern; S-Sensitive; MIS-Management Indicator

Source: Washington Department of Fish and Wildlife 2000a; Oregon Department of Fish and Wildlife 2000a; U. S. Forest Service 1990, as shown in NPPC 2001

2.1.5 Vegetation

The following description of vegetation in the Walla Walla Subbasin was excerpted from the Draft Walla Walla Subbasin Summary (NPPC 2001). More detailed information regarding wildlife habitat and vegetation can be found in the terrestrial wildlife assessment (Chapter 4).

> "Current vegetative conditions in the Walla Walla River subbasin reflect the land use practices that have occurred in the area throughout its history (U. S. Department of Agriculture 1941). The most significant changes as they relate to surface water, fish, and wildlife have occurred in the last 150 years…. Ultimately the rangelands were overgrazed, which led to native plant species such as steppe grass vegetation associations being replaced by more competitive and/or introduced plant species (Grable 1974). Dominant species include cheatgrass (Bromus tectorum), velvet grass (Holcus lanatus), yellow starthistle (Centaurea solstitialis), barnyard grass (Echinochloa crusgual alli), tansy (Tanacetum vulgare), and rattlegrass (Bromus brizaeformis).

> "Today most of the plateau surrounding the Walla Walla River valley from the foothills to the river's mouth is dry-farmed (Figure 2-4). Remnant strips of grassland steppe vegetation exist throughout the farmed plateau and Walla Walla subbasin. Low-growing shrubs and

grasses on the upper slopes and valleys of the plateau and foothills give way to open woodlands and finally dense stands of coniferous forests on the slopes of the Blue Mountains and its foothills. Douglas fir (Pseudotsuga menziesii) and grand fir (Abies grandis) dominate the higher elevations, while ponderosa pine (Pinus ponderosa) dominates the lower elevation Blue Mountains (U. S. Army Corps of Engineers 1997). Historically, extensive riparian zones existed along streams in the Walla Walla subbasin (U. S. Army Corps of Engineers 1997). Currently, only about 37% of the Touchet River riparian zone is defined as riparian vegetation (Mudd 1975). Along the Oregon portion of the river, 70% of the existing riparian zone is in poor condition (Water Resources Commission 1988, cited in U. S. Army Corps of Engineers 1997)."

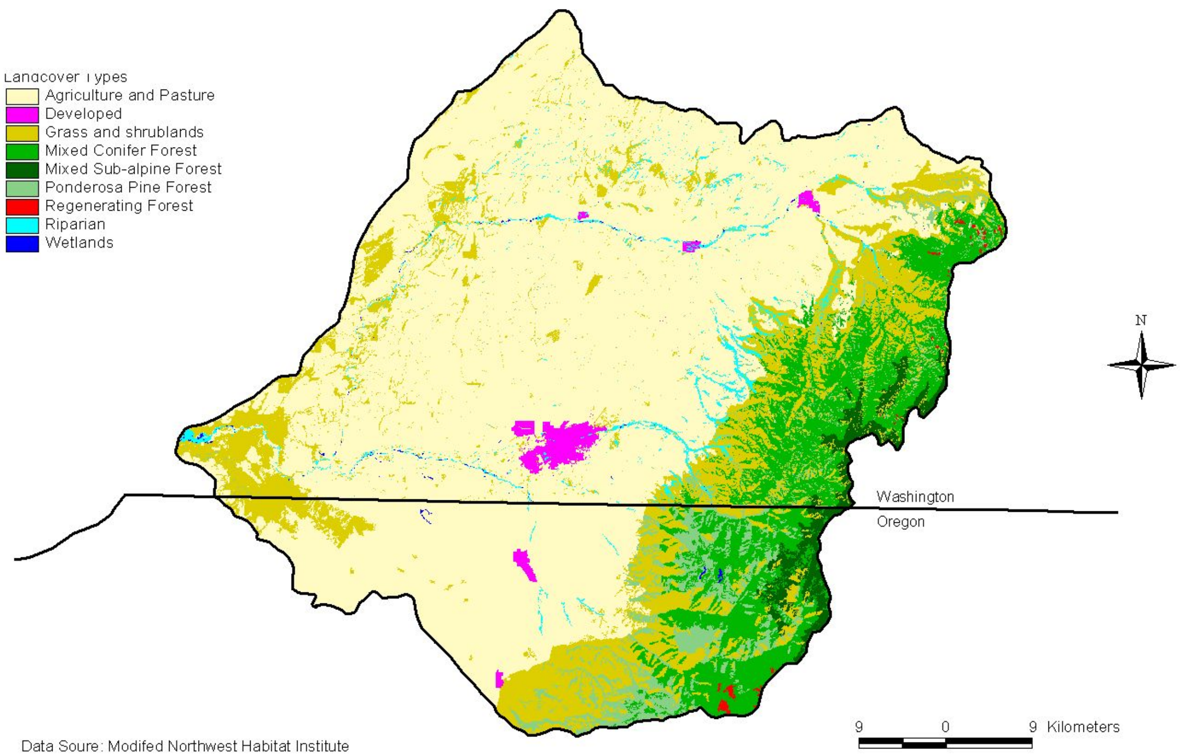

Figure 2-4 Current Land Cover in the Walla Walla Subbasin (NPPC 2001, Figure 7)

2.1.6 Current and Historic Land Use

Most of the subbasin is privately owned and used for agriculture (Figure 2-5). The Walla Walla region is one of the most productive agricultural areas in the world (NPPC 2001). The following description of agricultural land use in the Walla Walla Subbasin was excerpted from the Draft Walla Walla Subbasin Summary (NPPC 2001).

"… Crop production in the region is mostly influenced by mean annual precipitation, length of growing season, and depth of soil. Three management zones are identified based on precipitation amounts designated as 1) low (14 inches or less), 2) intermediate (14-18 inches), or high (18 inches or more). The cropping systems vary by precipitation zone, with annual cropping dominating in the high precipitation zones and three year rotations of wheat, barley, peas, and fallow being more common in the lower precipitation areas (R. Schirman, WSU Columbia County Extension, 1999).

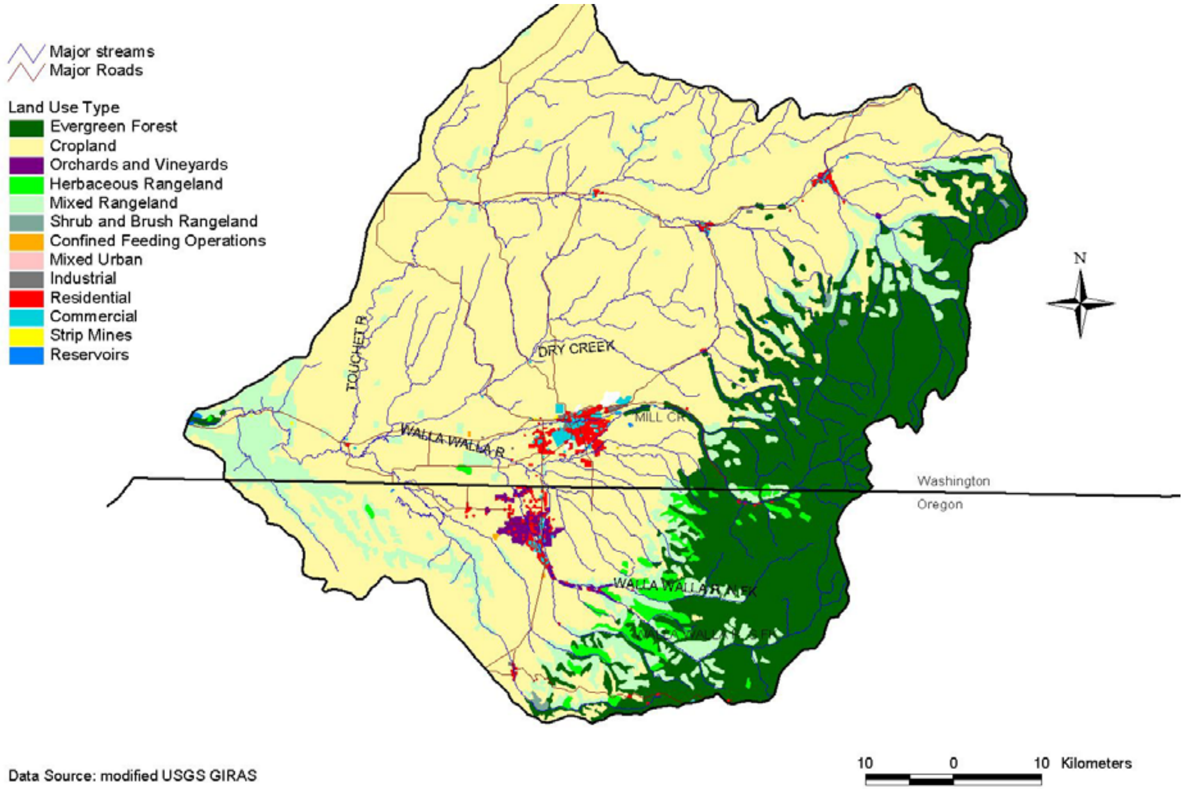

Figure 2-5 Land Use in the Walla Walla Subbasin (NPPC 2001, Figure 8)

"The Walla Walla River valley is extensively and intensively irrigated (Figure 2-6). Irrigated lands primarily occur in the narrow lowland portions of the subbasin, representing the largest use of surface and groundwater in the subbasin (Figure 2-7).

"… There has been a steady increase in the acres of irrigated croplands in the Walla Walla subbasin since the mid 1800s… The vicinities of Touchet, Gardena Farms, Walla Walla, and College Place hold the largest proportions of alfalfa and wheat, the subbasin's dominant irrigated crops. The primary water sources include the Touchet and Walla Walla Rivers, East-West Canal, Gardena Canal, Lowden Canals, gravel aquifers, and the basalt system.

"In addition to irrigated grain crops, fruit crops such as orchards and vineyards, represent a growing portion of irrigated agriculture in the subbasin… Other irrigated crops include asparagus, beans, onions, pasture, and potatoes (James et al. 1991).

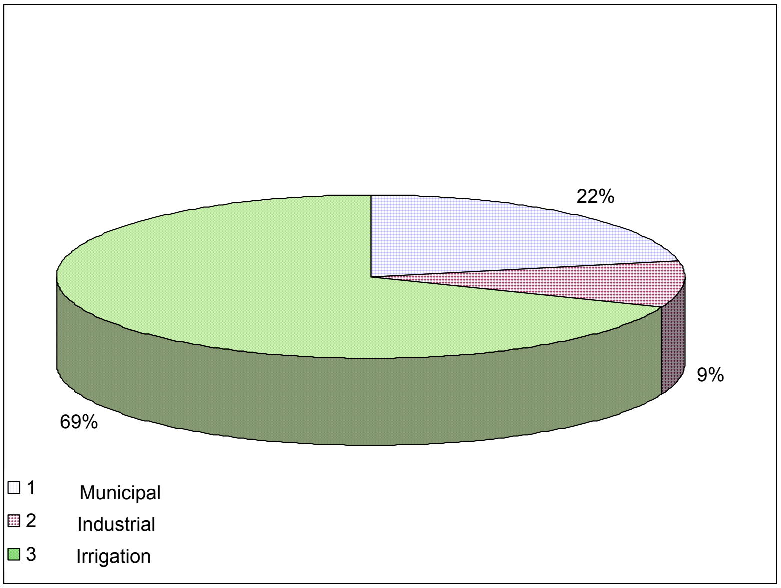

Figure 2-6 Water Use in the Walla Walla Subbasin

U. S. Army Corps of Engineers 1997 as shown in NPPC 2001, Figure 10

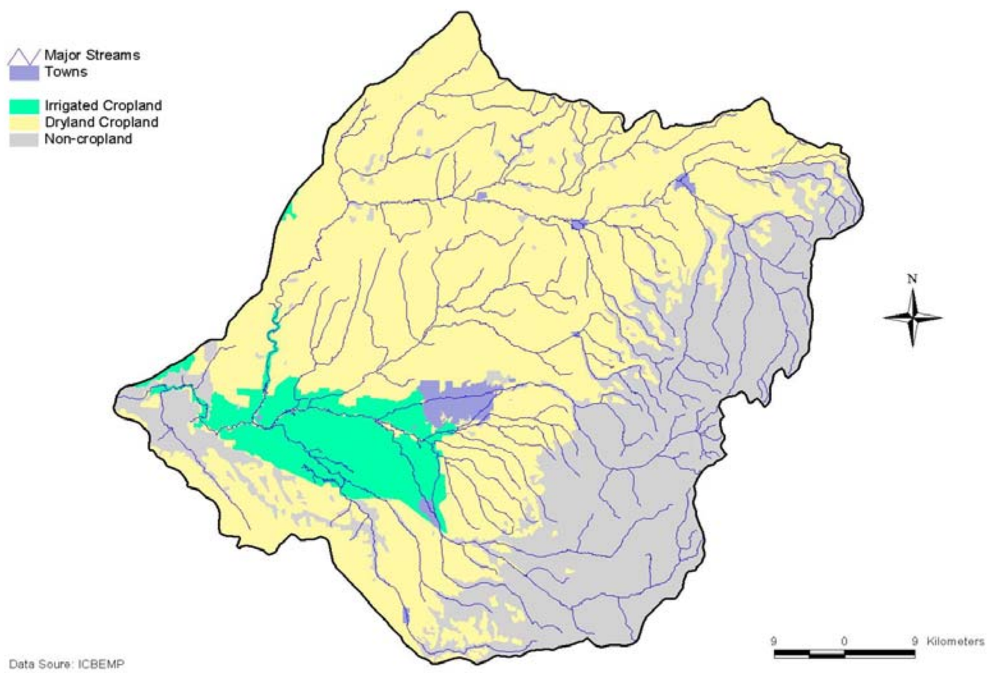

Figure 2-7 Irrigated and Non-irrigated Cropland in the Walla Walla Subbasin

NPCC 2001, Figure 11

Timber harvest represents another land use in the subbasin (Table 2-5), though its impacts are limited. The large majority of timber harvest on federally managed lands occurs in the high-elevation portions of the subbasin, while privately harvested grounds generally occur on mid-elevation lands (NPCC 2001). Timber harvest on private lands represents a substantial proportion of the ongoing logging operations in the subbasin and is expected to continue in the future as tree stands and market conditions allow (NPCC 2001). A significant proportion of forested lands, though, are protected from timber harvest and development through the Mill Creek watershed protection area.

Table 2-5 Forested Portions of the Walla Walla Subbasin and Respective Divisions by Management Entity

State	Total Forested Acreage	Federally Managed Land (acres)	State Managed Land (acres)	Privately Managed Land (acres)
Washington	138,651	44,763	6,058	87,831
Oregon	88,200	48,700	1,560	37,900

Source: NPCC 2001, Table 10

2.1.7 Political Jurisdictions and Land Ownership

"Land uses in the Walla Walla subbasin are subject to the jurisdiction of five counties and two states, Walla Walla and Columbia Counties in Washington State and Umatilla, Union, and Wallowa Counties in Oregon… A variety of other entities also manage land within the Walla Walla Basin (Table 2-6; Figure 2-8). (NPPC 2001)

Appendix B describes management entities within the Walla Walla Subbasin as follows:

> "Federal land management entities include the U. S. Forest Service (Umatilla National Forest) and the U. S. Bureau of Land Management. All lands managed by the Forest Service (USFS) and Bureau of Land Management (BLM) are located in the Blue Mountains along the eastern side of the subbasin (Saul 2002). The McNary National Wildlife Refuge is managed by the United States Fish and Wildlife Service. State management entities in the subbasin include the Washington Department of Fish and Wildlife (WDFW), Oregon Department of Fish and Wildlife (ODFW), Oregon Department of Forestry (ODF), Washington Department of Natural Resources (WDNR), Oregon Department of Environmental Quality (ODEQ), Washington Department of Ecology (WDE), the Oregon Water Resources Department (OWRD), the Washington Department of Agriculture, the Oregon Department of Agriculture (ODA), Umatilla County, and Walla Walla County. The small portions of Union and Wallowa county contained in the subbasin are owned and managed by the United States Forest Service. Figure 4 shows jurisdictional boundaries and land ownership within the Walla Walla subbasin. Despite the majority of the subbasin being privately owned and managed, the CTUIR maintain reserved rights under the Treaty of 1855 for the harvesting of salmon, wildlife, and vegetative resources at "usual and accustomed places" (U. S. Army Corps of Engineers 1997)."

The following description of land ownership in the Walla Walla Subbasin was excerpted from the Draft Walla Walla Subbasin Summary (NPPC 2001).

Table 2-6 Land Ownership in the Walla Walla Subbasin

Land Ownership	Square Kilometers	Percent of Subbasin
Private, Tribal, or Other*	4,060	90
Federal	427	9
State	25	1

Source: U.S. Army Corps of Engineers 1997 as shown in NPCC 2001

* The Rainwater Wildlife Area managed by CTUIR includes 8,768 acres within the subbasin

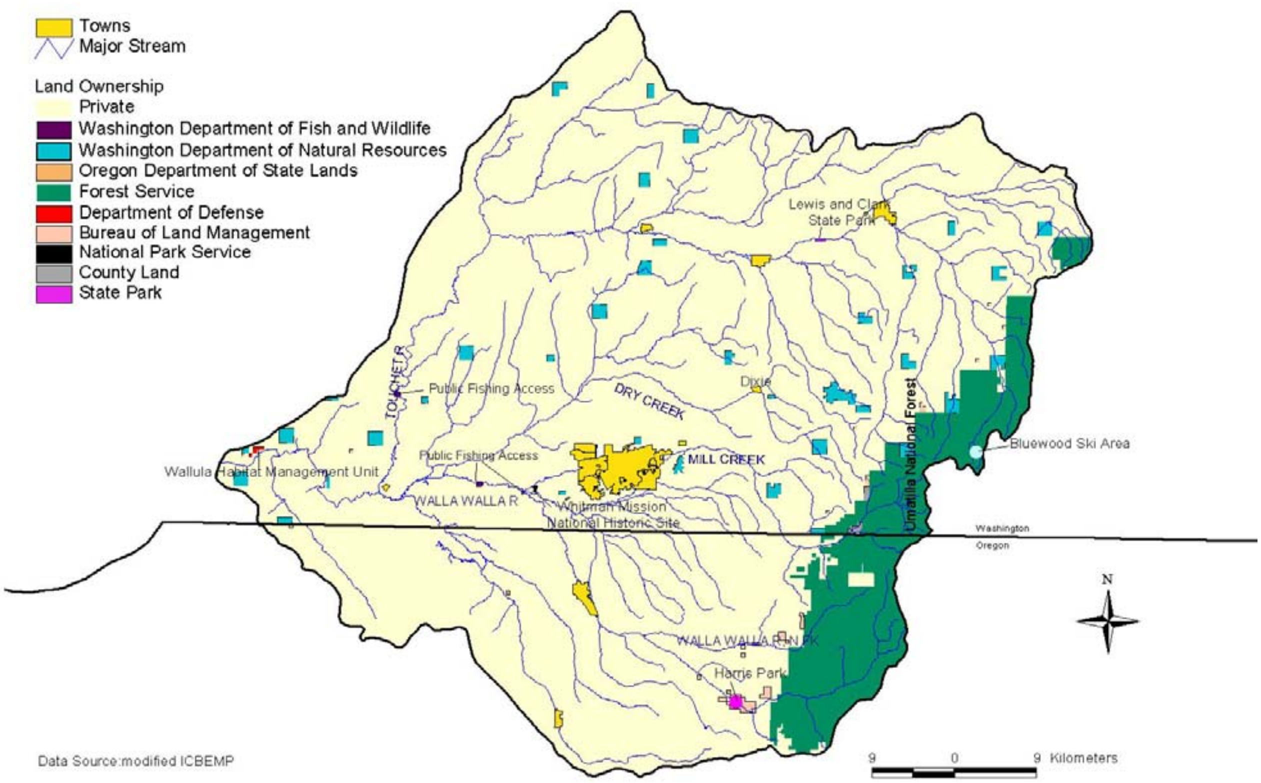

Figure 2-8 Land Ownership Patterns in the Walla Walla Subbasin

NPCC 2001, Figure 9

Note: The Rainwater Wildlife Area which encompasses 8,768 acres within the subbasin managed by CTUIR is not shown on this map.

"There are numerous towns located within the Walla Walla subbasin, many of which are incorporated (Table 2-7). Urban sprawl is a concern for resource managers, as indicated by the growing number of ranchettes, subdivisions, subdivided cropland, and floodplain encroachment. These areas often occur near wooded areas, lakes, or streams. One of the concerns is over the increasing number of shallow individual domestic wells (existing and proposed), which pose a very real and significant deterrent to full utilization of the available water resources in the underlying aquifer (Hanson and Mitchell 1977). Similarly, the increasing number of dwellings poses a threat to water quality due to the increased amount and dispersion of potential nutrient sources immediately adjacent to waterways."

Table 2-7 Incorporated Towns with Populations Exceeding 1,000 in the Walla Walla Subbasin

City	Population						Urban Area (mi^2)
	1990	1992	1994	1996	1998	1999	
Walla Walla, Washington	26,482	28,134	28,730	28,930	29,440	29,200	12.2
College Place, Washington	6,308	6,410	6,710	6,865	7,110	7,395	1.7
Milton-Freewater, Oregon	5,699	5,837	6,002	6,037	6,054	6,093	1.7
Dayton, Washington	2,468	2,470	2,505	2,550	2,553	2,555	1.5
Waitsburg, Washington	990	1,015	1,130	1,224	1,225	1,200	0.8

Source: U. S. Census Bureau 2000 as shown in NPPC 2001, Table 11

2.2 Regional Context for Subbasin Plan

2.2.1 Relation to ESA Planning Units

The Walla Walla Subbasin is only one portion of the larger ESUs that are the geographic basis for ESA listings. Given that it is only one subbasin within an ESU, if populations within the Walla Walla Subbasin were enhanced to become healthy and productive, the species could remain threatened at the ESU scale. As such, although efforts accomplished within the Walla Walla Subbasin will contribute to recovery at the ESU level, efforts across multiple subbasins will need to be coordinated to achieve enhancement of fish populations and eventual de-listing.

Figure 2-9 shows the relationship of the Walla Walla Subbasin to the Mid-Columbia River Steelhead ESU. Figure 2-10 shows the relationship of the Walla Walla Subbasin to the Mid-Columbia River Spring/Summer Chinook ESU. Although listed at the ESU scale, spring Chinook are considered extirpated from the Walla Walla Subbasin. Figure 2-11 shows the relationship between the Walla Walla Core Unit and the Umatilla-Walla Walla River Basin Recovery Unit for bull trout. Steelhead, Spring Chinook, and Bull Trout were selected as aquatic focal species in the Walla Walla Subbasin. Section 3.2 provides further detail regarding the criteria used for selection of these focal species.

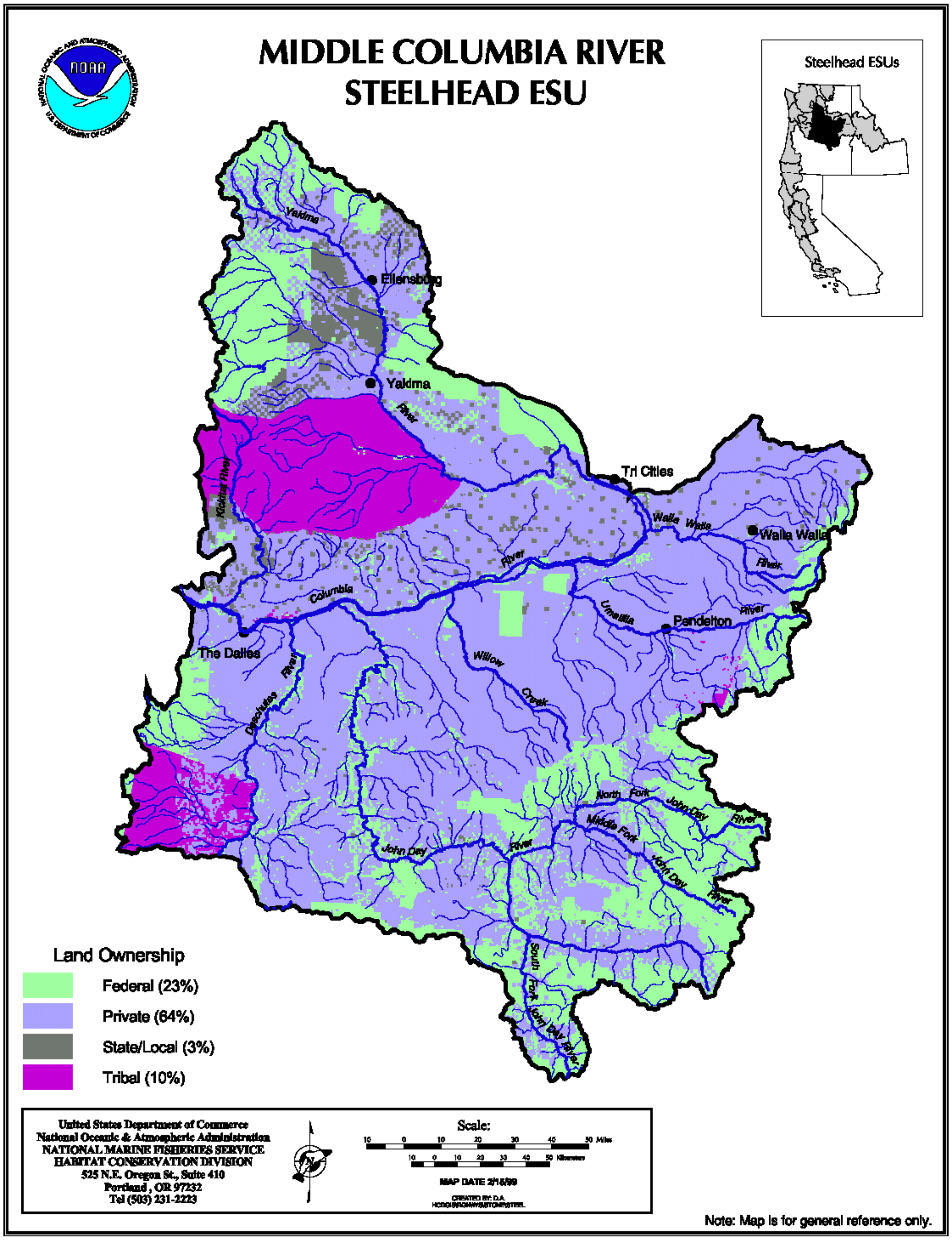

Figure 2-9 Relationship of Walla Walla Subbasin to Mid-Columbia Steelhead ESU
Source: NOAA-Fisheries 2004

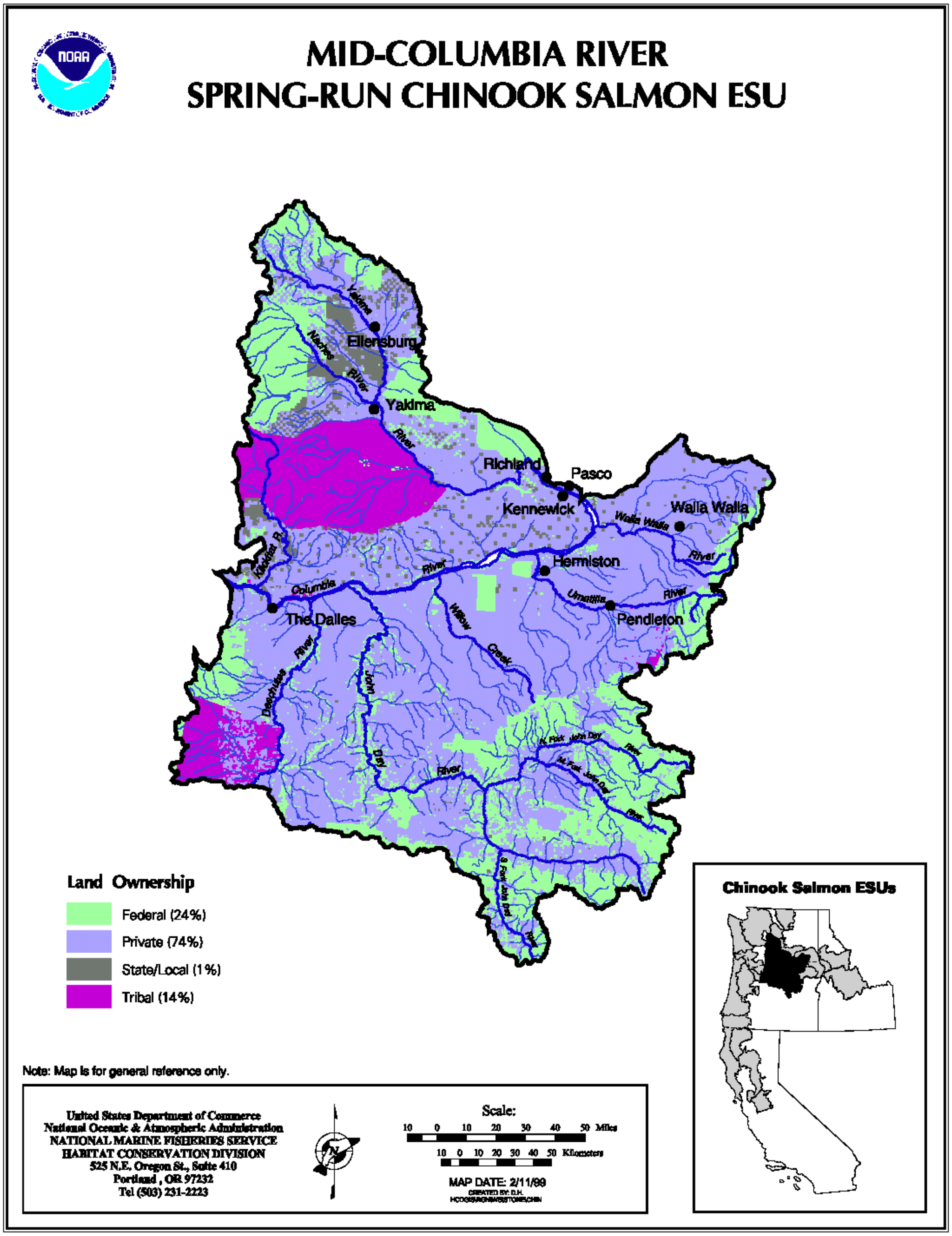

Figure 2-10 Relationship of Walla Walla Subbasin to Mid-Columbia Spring Chinook ESU
Source: NOAA-Fisheries 2004

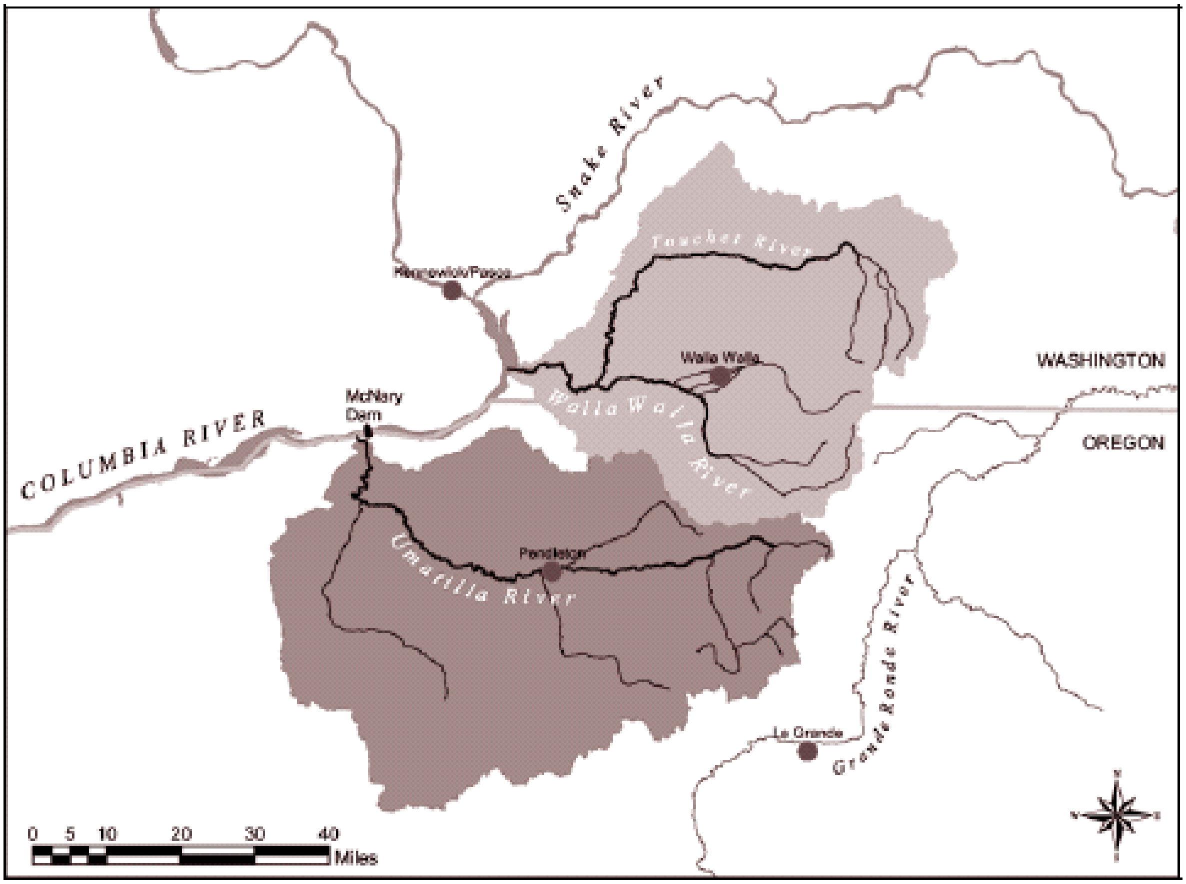

Figure 2-11 Relationship of Walla Walla Bull Trout Core Area to Umatilla-Walla Walla River Basin Recovery Unit

Source: Figure 5, Chapter 10, USFWS 2002

2.2.2 Out-of-Subbasin Environmental Conditions

Out-of-subbasin environmental conditions was described effectively by Oregon Technical Outreach andAssistance Team (TOAST):

> "Subbasin planning, by definition, is focused on the major tributaries to the mainstem Columbia and Snake rivers. However, many focal species migrate, spending varying amounts of time and traveling sometimes extensively outside of the subbasins. Salmon populations typically spend most of their lives outside the subbasin. Unhindered, sturgeon will spend short periods in the ocean. Lamprey typically spend most of their life as juveniles in freshwater, but gain most of their growth in the ocean. Planning for such focal species requires accounting for conditions during the time these populations exist away from their natal subbasin. Out-of-subbasin effects (OOSE) encompasses all mortality factors from the

time a population leaves a subbasin to the time it returns to the subbasin. These effects can vary greatly from year to year, especially for wide ranging species such as salmon."

Primary out-of-subbasin effects include factors that can be natural in origin (ocean productivity, climate, and estuary conditions), human-caused (harvest), or a combination (mainstem flows / dam operations). The relative impact of these factors varies by species, and is discussed in more detail in Chapter 3.

2.2.3 Long-term Environmental Trends

Long-term environmental trends in climate have the ability to tremendously affect the baseline habitat conditions for salmonids. "Computer models generally agree that the climate in the Pacific Northwest will become, over the next half century, gradually warmer and wetter, with an increase of precipitation in winter and warmer, drier summers (USDA Forest Service 2004). These trends mostly agree with observed changes over the past century. Wetter winters would likely mean more flooding of certain rivers, and landslides on steep coastal bluffs (Mote et al. 1999) with higher levels of wood and grass fuels and increased wildland fire risk compared to previous disturbance regimes (USDA Forest Service 2004). The region's warm, dry summers may see slight increases in rainfall, according to the models, but the gains in rainfall will be more than offset by losses due to increased evaporation. Loss of moderate-elevation snowpack in response to warmer winter temperatures would have enormous and mostly negative impacts on the region's water resources, forests, and salmon (Mote et al. 1999). Among these impacts are a diminished ability to store water in reservoirs for summer use, and spawning and rearing difficulties for salmon.

For the factors that climate models can simulate with some confidence, however, the prospects for many Pacific Northwest salmon stocks could worsen. The general picture of increased winter flooding and decreased summer and fall streamflows, along with elevated stream and estuary temperatures, would be especially problematic for in-stream and estuarine salmon habitat. For salmon runs that are already under stress from degraded freshwater and estuarine habitat, these changes may cause more severe problems than for more robust salmon runs that utilize healthy streams and estuaries." (TOAST 2004).

Locally, habitat within the Walla Walla Subbasin continues to improve. Further improvements that will be achieved through implementation of this and other habitat enhancement plans will serve to offset some of the anticipated climatic changes described above.

3. Walla Walla Subbasin Aquatic Assessment

3.1 Introduction

Summarized in this section is the aquatic assessment prepared by WDFW. Appendix C contains the complete WDFW assessment.

This section contains:

- A description of how focal species were selected and also identifies species of interest
- A description of the assessment methodology, including methodology limitations and qualifications, and instances in which the methodology was supplemented by previous assessment work and professional knowledge
- An assessment findings for the focal species
- A brief description of "species of interest."

3.2 Selection of Focal Species

Three aquatic species were identified as focal species for Walla Walla Subbasin Planning: steelhead/rainbow trout (*Oncorhynchus mykiss*), spring Chinook (*Onchorynchus tshawytcha*) and Bull Trout (*Salvelinus confluentus*). The subbasin planning parties (Walla Walla County, WWBWC, WDFW, CTUIR, the WRIA 32 Planning Unit, private citizens, and other agencies and entities) selected these species based on the following considerations:

- Selection of species with life histories representative of the Walla Walla Subbasin ecosystem
- ESA status
- Cultural importance of the species
- Level of information available/knowledge on species life history to conduct an effective assessment
- Interest by co-managers to reintroduce spring Chinook into the subbasin (although an agreed upon plan for this has yet to be adopted).

Walla Walla summer steelhead, spring Chinook and bull trout life histories intersect a broad range of the aquatic ecosystem. Spatially, the life histories of these three species cover the entire subbasin from the mouth to the headwaters. These species also occupy all levels of the water column including slack water, swift water and the hyporheic zone. Not only are they present but also the ability of these species to thrive is dependent on being able to successfully occupy these areas. Temporally, these species are present (or were assumed to be present in the past) at one lifestage or another throughout much of the watershed in all seasons. The ability of these species to be present at a particular time in a particular area is also key to the success of these species. Given the wide range of both the spatial and temporal aspects of these life histories it can be assumed that having habitat conditions that are appropriate for these three species will also produce conditions that allow for the prosperity of other aquatic life in the Walla Walla Subbasin.

The legal status of these species is important to the people of the Walla Walla Subbasin. Steelhead and bull trout are listed as threatened under the ESA at the scale of the ESU. Spring Chinook are listed as threatened at the level of the ESU, but are considered extirpated from the Walla Walla Subbasin. Currently the citizens, governments, state and federal agencies and tribes are engaged in planning for the recovery of each of the salmonids through different processes. (see Appendix C).

Although currently considered extirpated, there is general interest among co-managers (WDFW, ODFW, and CTUIR) to reintroduce spring Chinook into the subbasin. Co-managers seek for these efforts to be as successful as possible. Evaluation and enhanced understanding of potential spring Chinook habitat will allow reintroduction into areas of highest quality habitat for spring Chinook. The EDT analysis completed as the scientific basis for this subbasin plan will also provide scientific guidance for these reintroduction efforts.

Additional species, including Pacific lamprey, brook lamprey, mountain whitefish, and freshwater mussels, were identified as a “species of interest,” and are discussed briefly at the end of this chapter.

3.3 Status of Focal Species in the Subbasin

Focal species information on life history, historic and current distribution, population characterization and status, harvest and hatchery (as applicable), is provided in Appendix C, along with the available empirical data for steelhead and spring Chinook. Figure 3-1 identifies steelhead distribution and use type. Figure 3-2 identifies Chinook distribution and use type. Figures 3-3 and 3-4 identify bull trout distribution and use type in the subbasin.

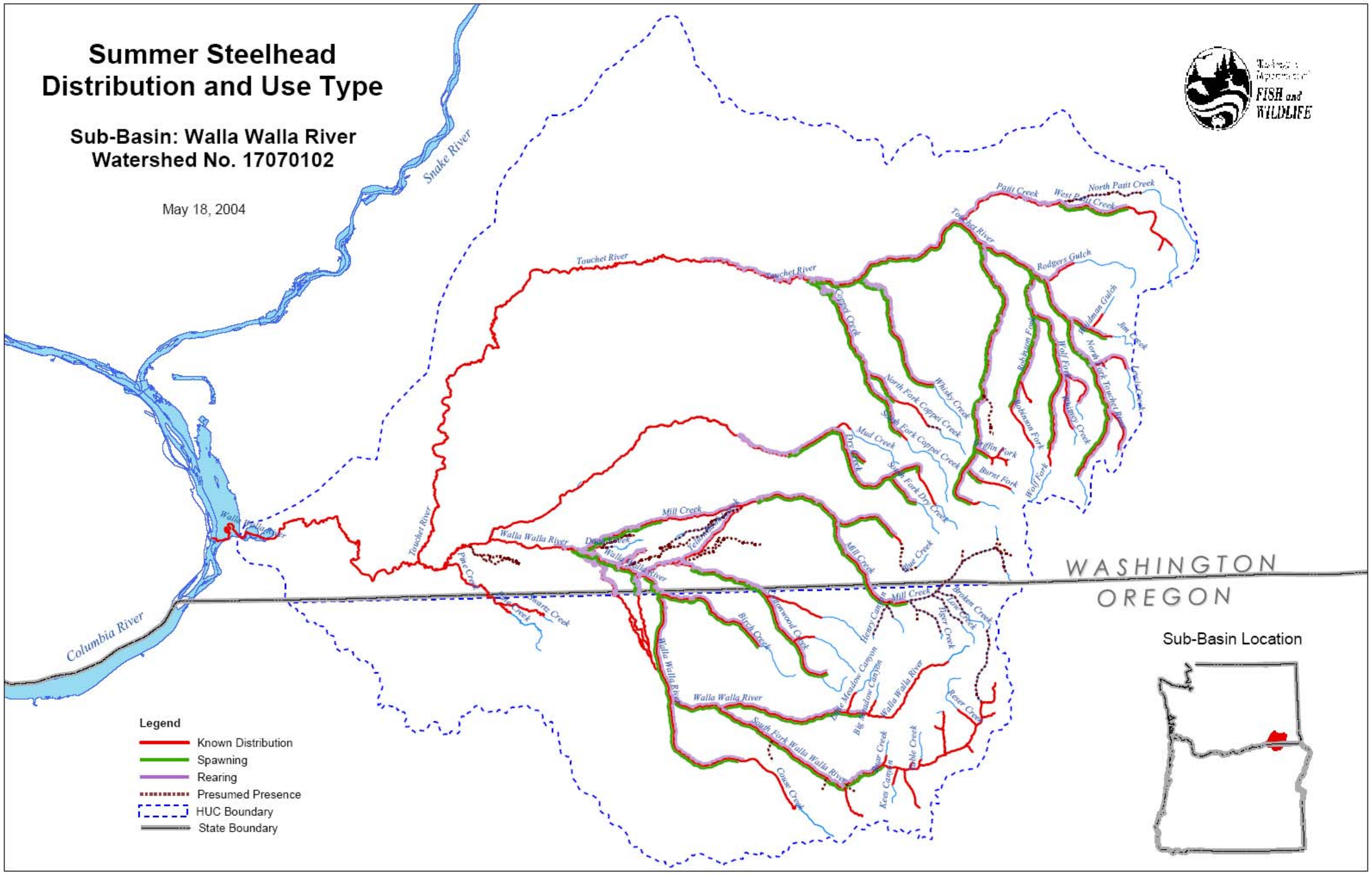

Figure 3-1 Current Known and Presumed Distribution of Summer Steelhead in Walla Walla.

Source: Data from WDFW Washington Lakes and Rivers Information System (WLRIS) database, WDFW 2004

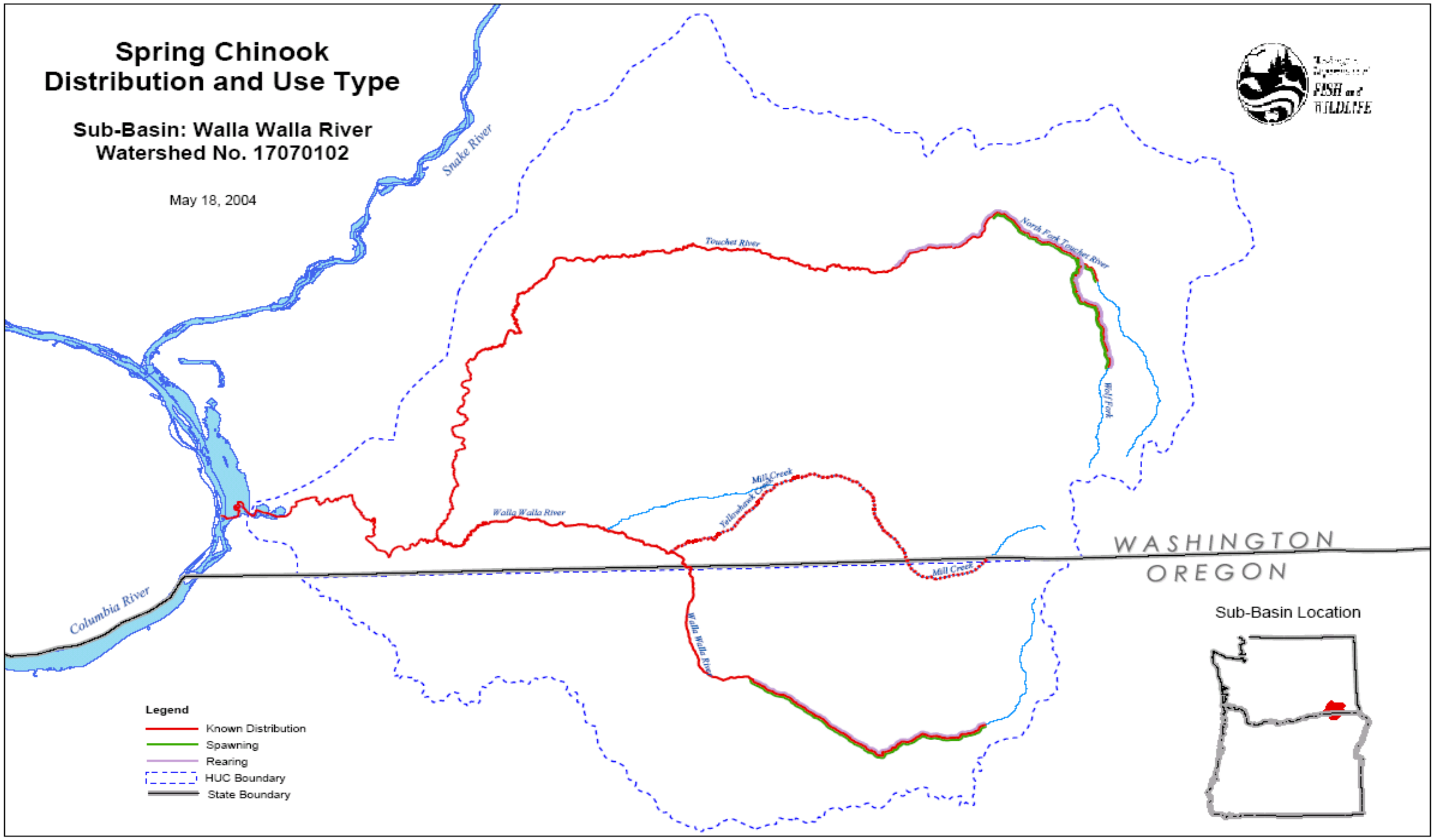

Figure 3-2 Spring Chinook Distribution and Use Type in the Walla Walla CreekWalla Walla River

Source: Data from the WDFW Washington Lakes and Rivers Information System (WLRIS) database.

Note: Areas marked as "known" distribution should be labeled as "presumed" as these represent areas where it is presumed that spring Chinook would have been present historically.

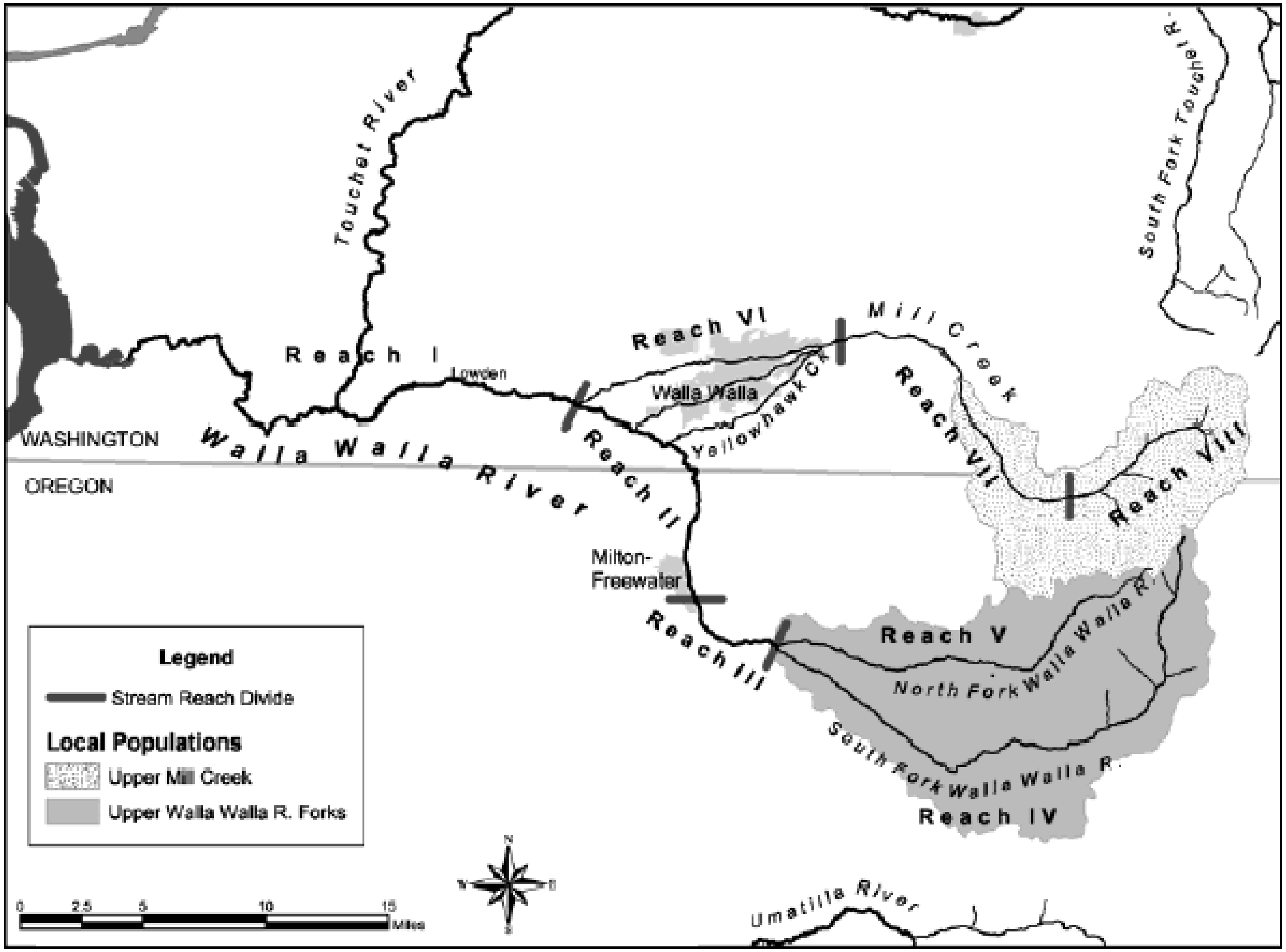

Figure 3-3 Bull Trout Distribution – Walla Walla River and Mill Creek Systems

Source: Draft Bull Trout Recovery Plan, Chapter 10, USFWS, 2002.

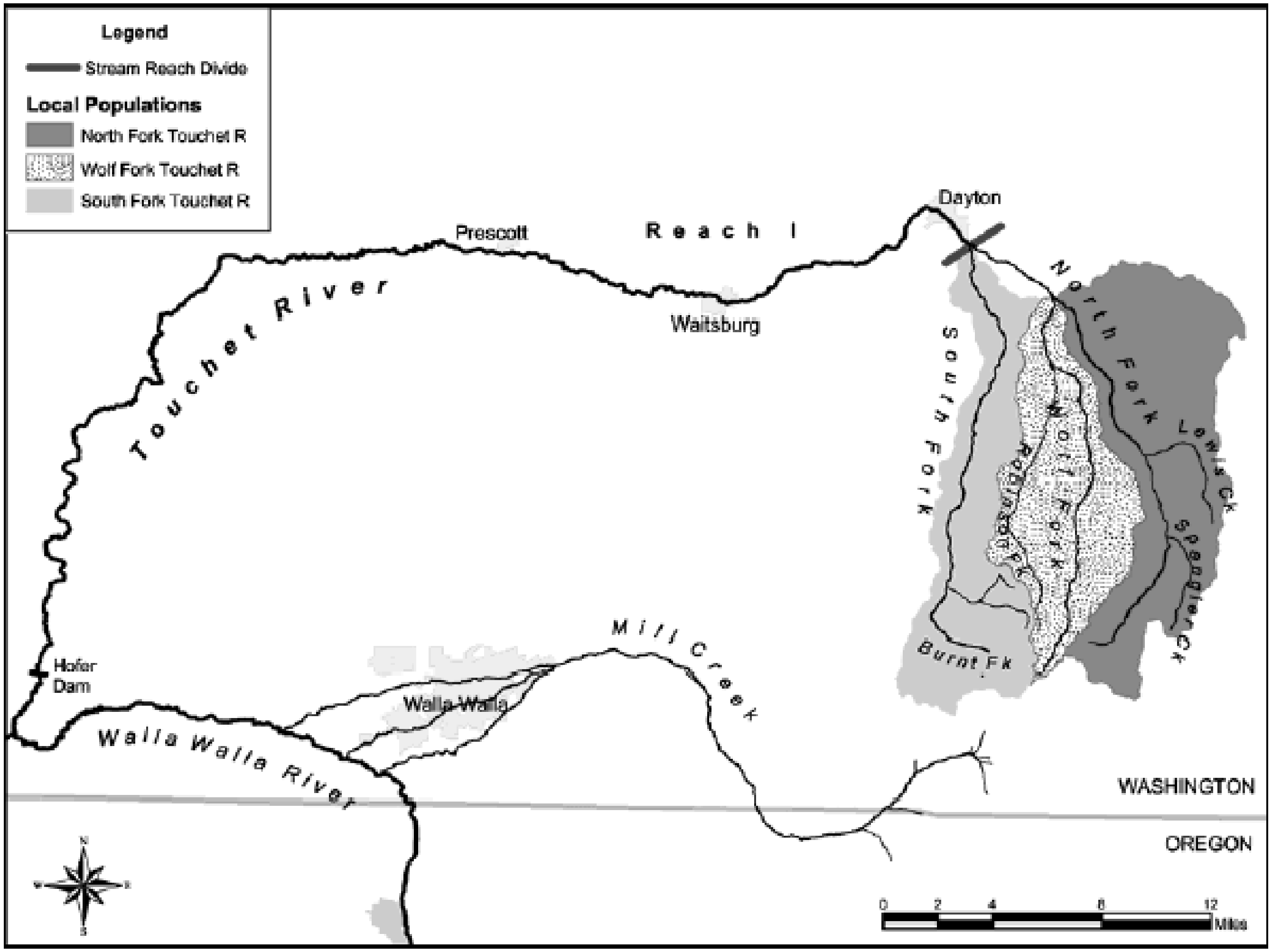

Figure 3-4 Bull Trout Distribution – Touchet River System

Source: Draft Bull Trout Recovery Plan, Chapter 10, USFWS, 2002.

3.4 Walla Walla Subbasin Habitat Assessment Methods

3.4.1 Introduction

Steelhead and spring Chinook in the Walla Walla Subbasin were assessed by the WDFW using the Ecosystem Diagnosis and Treatment (EDT) method. EDT modeling was not possible for bull trout, as EDT rules for bull trout were not available for this assessment (WDFW 2004). Additionally, a significant lack of knowledge exists regarding bull trout life history patterns specific to the Walla Walla Subbasin (WDFW 2004). Even without the EDT analysis, however, it is clear that suitable bull trout habitat is significantly less prevalent than in pre-development times (WDFW 2004).

Habitat conditions for bull trout were generally assessed in the USFWS Draft Bull Trout Recovery Plan[1]. The USFWS Bull Trout Recovery Plan (2002) identified temperature as the primary limiting factor in the Walla Walla Subbasin (WDFW 2004). Other limiting factors identified in the plan include flows, degraded riparian habitats, sediment input, water quality concerns, and channel modifications. Bull trout have a narrower tolerance range for certain attributes (i.e. temperature) than do steelhead and Chinook (pers. comm. J. Flory, USFWS, 2004. Most of the habitat improvements recommended for steelhead trout and Chinook salmon also would benefit bull trout, particularly those that would reduce instream temperatures and protect the upper reaches of the subbasin (WDFW 2004). Actions that ensure passage to the upper portions of the watershed will also benefit bull trout.

3.4.2 Overview of EDT Methodology

EDT is an analytical model relating aquatic habitat features and biological (i.e., fish) health in an effort to support conservation and recovery planning (Lichatowich et al. 1995; Lestelle et al. 1996; Mobrand et al. 1997; Mobrand et al. 1998). Additional information on the EDT model can be found at www.edthome.org.

EDT is structured as an information pyramid in which each level builds on information from the lower level (Figure 3-5). Levels 1 and 2 characterize the condition of the ecosystem/environment. Level 3 analyzes the performance of a focal species (e.g., Chinook salmon) based on the condition (quality) of its environment as detailed by the Level 2 ecological attributes. Level 3 can be thought of as a characterization of the environment in the eyes of the fish (i.e., how a fish would rate environmental conditions based on our understanding of their requirements) (Mobrand et al. 1997).

[1] See the Recovery Plan and Chapter 7 of this document, the Walla Walla Subbasin Management Plan, for additional information on bull trout.

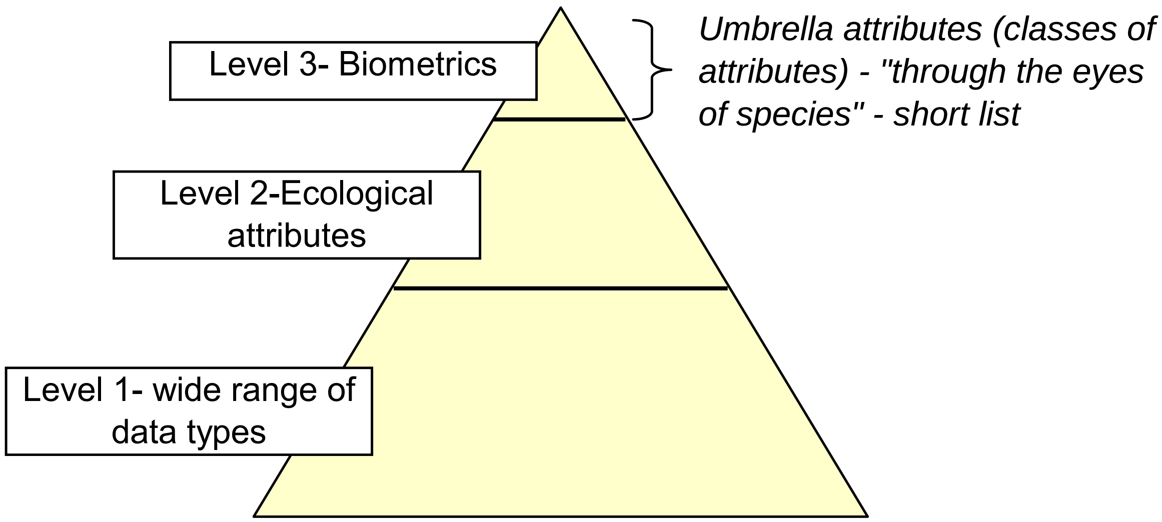

Figure 3-5 EDT Data/Information Pyramid
Source: WDFW 2004

The primary purpose of the EDT analysis is to compare historic conditions in the watershed to those that exist currently. Priority areas identified by EDT are those where historic conditions diverge the most from current conditions. WDFW began by gathering baseline information on aquatic habitat, human activities, and focal species life history to assess watershed conditions for the following three scenarios:

1. predevelopment (historic) conditions[2]
2. current conditions
3. properly functioning conditions (PFC)[3].

The comparison of these scenarios formed the basis of the analysis, from which conclusions were drawn regarding the reduction in habitat quality in the Walla Walla Subbasin and the associated reduction in focal species performance (WDFW 2004). The historic reference scenario also defined the natural limits to potential recovery within the basin (WDFW 2004).

WDFW tasked a technical workgroup to subdivide the subbasin into stream reaches based on similarity of habitat features, drainage connectivity, and land use patterns (WDFW 2004). For

[2] In general, the subbasin's historic conditions would have included undisturbed streamside forests that provide shade to the streams, less in-stream sediment, increased stream flow during summer months, greater number of pools (critical habitat during warm summer months), cooler water temperatures.
[3] Properly functioning conditions are a set of NOAA Fisheries standardized guidelines that are designed to facilitate and standardize determinations of the effect for Endangered Species Act (ESA) conferencing, consultations, and permits focusing on anadromous salmonids (Stelle 1996 as taken from ODFW 2004).

each of these stream reaches, the technical work group ranked 42 habitat parameters based on habitat quality using data/documentation when available and expert knowledge regarding fish biology, habitat processes, etc. when empirical data were not available (see Appendix C for data sources) (WDFW 2004). These habitat attributes were ranked for each of the three scenarios and input into the model.

WDFW then compiled life history information for steelhead and spring Chinook[4] (e.g., life history stages, timing of each stage, and location/habitat required for each stage within an individual stream reach) (WDFW 2004). This life history information was input into the EDT model and "crossed" with habitat information from each of the three scenarios (WDFW 2004). This Stream Reach Analysis produced a set of limiting habitat attributes by stream reach, by species, and by life history stage. This analysis identifies the key factors contributing to the loss in species performance within individual stream reaches (WDFW 2004). The result of this analysis is a priority ranking of stream reaches to be considered for restoration. For ease of comparison and implementation, WDFW (2004) grouped contiguous reaches with similar limiting factors into the geographic areas. More specific findings from EDT analysis and a description of the resulting geographic areas are provided later in this section. Appendix C describes the ways in which out-of-subbasin effects were incorporated into EDT.

3.4.3 EDT Limitations

The EDT analysis used in this assessment has proved to be a valuable tool for conducting the steelhead and spring Chinook assessment. As with all modeling tools, additional data collection and model calibration to further validate modeling conclusions would be desired. The time frame for developing the plan, combined with the shortage of data available for some key attributes suggests caution with the results.

While conducting this assessment and particularly while performing the attribute ratings for EDT, it became quite clear that in many cases we were lacking even the most basic habitat information. This made the assessment work quite difficult, particularly outside of the Forest Service lands where at least some basic surveys had been conducted. In order to properly assess the subbasin and provide better information for the management strategy process it is vital that additional habitat and life history surveys be conducted. There were some reaches for which we had no empirical data on habitat types (pools/riffles/glides, etc.), embeddedness, LWD density, winter temperature or percent fines. The entire subbasin is lacking in bedscour, bankfull widths, flow and riparian function data. Gradient measurements for individual reaches were also a concern. Gradients were measured using Terrain Navigator; the accuracy of these gradients is unknown and needs to be ground truthed. This could lead to habitat diversity appearing to be a higher magnitude problem than it actually is. It is the strong finding of this assessment that the above information begin to be acquired as soon as possible in order to better inform the land managers, both public and private, during future planning efforts.

It is our determination that the current data set used for this EDT assessment should be re-examined and revised between each rolling provincial review, and/or before it is used for other

[4] Information on bull trout life history was not available in a format usable in the EDT model.

planning efforts. Use in its present state for this Subbasin Plan was necessary; however, with more time and better data the model results can certainly be improved upon. Perhaps in the future the EDT model can also be used to develop a detailed bull trout habitat assessment.

With the limitations of EDT, information and findings from other assessment and planning processes were also used as discussed in Section 3.6.4.

3.5 EDT Analysis

3.5.1 Introduction

A technical work group was formed for the Walla Walla Basin for the purpose of rating the Level 2 habitat attributes for the freshwater stream reaches. The work group drew upon published and unpublished data and information for the basin to complete the task. Expert knowledge about habitat identification, habitat processes, hydrology, water quality, and fish biology was incorporated into the process where data was not available. Attribute rating for EDT was coordinated by WDFW using state, federal and tribal resources. The WDFW watershed steward served as coordinator for the attribute rating process. The sources used for rating the individual attributes are outlined in Table 4-2 of Appendix C. The patient (current) condition attribute ratings represent a variety of sources and levels of proof. Levels of proof (or confidence levels) assigned to ratings are directly from developed rating methods by MBI specifically for the EDT process. The attributes assigned to each reach are assigned a numerical value from 1 to 5 where: 1 is empirical observation; 2 is expansion of empirical observation; 3 is derived information; 4 is expert opinion; 5 is hypothetical. Table 4-3 of Appendix C includes template attributes.

Three baseline reference scenarios were developed for the Walla Walla Subbasin: predevelopment (historic or template as described above) conditions, current conditions, and properly functioning conditions (PFC). The comparison of these scenarios formed the basis for diagnostic conclusions about how the Walla Walla and associated summer steelhead performance have been altered by human development. The historic reference scenario also served to define the natural limits to potential recovery actions within the basin. Properly functioning conditions were a set of standardized guidelines that NOAA Fisheries provided that were designed to facilitate and standardize determinations of the effect for ESA conferencing, consultations, and permits focusing on anadromous salmonids (Stelle 1996). The objective of the diagnosis then became identifying the relative contributions of environmental factors to the losses in summer steelhead performance. To accomplish this, two types of analyses, each at a different scale of overall effect: 1) individual stream reaches, and 2) geographic area analysis.

The Stream Reach Analysis identified the factors that, if appropriately moderated or corrected, would produce the most significant improvements in overall fish population performance. It identified the factors that should be considered in planning habitat restoration projects.

The Geographic Area Analysis identified the relative importance of each area for either restoration or protection actions. In this case, the effect of either restoring or further altering environmental conditions on population performance was analyzed. These results will be discussed in the management plan (Section 8.3.2).

Table 3-1 describes the Geographic Areas used for the Walla Walla Subbasin Assessment 2003 (WDFW 2004).

Table 3-1 Geographic Areas, Locations and Stream Length in Miles Used for Walla Walla River Subbasin

Geographic Area	Location	Length in Miles
Lower Walla Walla (mouth to Touchet) (LWW)	Mouth of Walla Walla to Mouth of Touchet	20.79
Lower Touchet (mouth to Coppei) (LT)	Mouth of Touchet to mouth of Coppei Cr	50.83
Coppei Drainage (COP)	Mouth to presumed steelhead access limit	23.10
Touchet, Coppei to forks (plus Whiskey)* (TOU)	Mouth of Coppei Cr to confluence of NF and SF Touchet Rivers	21.87
Patit Drainage (PAT)	Mouth of Patit Cr to presumed steelhead access limit	19.29
NF Touchet Mainstem (TOU-NF)	Mouth of NF Touchet River to presumed steelhead access limit	18.85
NF Touchet Tribs (excluding Wolf Fork) (TOU-NFTRIB)	Rodgers, Jim, Weidman, Lewis, and Spangler Creeks; all from mouths to presumed steelhead access limit	8.11
Wolf Fork, mouth to Coates (plus Robinson & Coates) (WF)	Mouth of Wolf Fork to mouth of Coates Cr; also includes Robinson Cr and Coates Cr; mouths to presumed steelhead access limit	16.06
Wolf Fork, Coates to access limit (plus Whitney) (WF-COA)	Wolf Fork, Mouth of Coates Cr to presumed steelhead access limit; also includes Whitney Cr mouth to presumed steelhead access limit	7.43
SF Touchet Mainstem (TOU-SF)	Mouth of SF Touchet River to presumed steelhead access limit	15.93
SF Touchet Tribs (TOU-SF-TRIB)	Dry Fork SF Touchet, Griffin Fork North Griffin Fork, Beaver Slide, Green Fork and Burnt Fork; mouths to presumed steelhead access limits	9.86
Walla Walla, Touchet to Dry (plus Mud Cr) (WW-TOU)	Walla Walla River, Mouth of Touchet River to Mouth of Dry Cr and Mud Cr (trib to Walla Walla River) mouth to presumed steelhead access limit	9.54
Pine Cr mainstem (plus Swartz) (PIN)	Pine Cr mouth to presumed steelhead access limit and Swartz Cr, mouth to presumed steelhead access limit	31.77
Dry Cr [Pine] Drainage (DRY)	Dry Cr (trib to Pine Cr), mouth to presumed steelhead access limit (Oregon).	19.04
Lower Dry Cr (mouth to Sapolil) (LDRY)	Dry Cr (trib to Walla Walla), mouth to Sapolil Rd crossing (near Dixie, WA).	24.10
Upper Dry Cr (Sapolil to forks) (UDRY)	Dry Cr (trib to Walla Walla), Sapolil Rd crossing to confluence of NF and SF Dry Creeks (near Dixie, WA).	10.87
Dry Cr Tribs (Mud[Dixie], Mud[Dry], NF Dry & SF Dry) (DRY-TRIBS)	Mud Cr (trib to Lower Dry Cr), Mud Cr (trib to Upper Dry Creek near Dixie Wa), NF Dry Cr and SF Dry Cr; mouths to presumed steelhead access limit	15.20

Geographic Area	Location	Length in Miles
Walla Walla, Dry to Mill (WW-DRY)	Walla Walla River, Mouth of Dry Cr (trib to Walla Walla River) to moth of Mill Creek	6.64
W Little Walla Walla Drainage (plus Walsh) (WLWW)	West Little Walla Walla River Drainage and Walsh Cr drainage	10.81
Mill Cr, mouth to start of Corps Project at Gose St (MILL)	Mill Cr, mouth to start of US Army Corps of Engineers project at Gose St near Walla Walla Wa	5.39
Lower Mill Cr Tribs (Doan & Cold) (LMILL)	Doan Cr and Cold Cr, mouth to presumed steelhead access limit	7.78
Mill Cr, Gose Street to Bennington Dam (ML-GO)	Mill Cr, Gose St to Bennington Diversion Dam	11.36
Mill Cr, Bennington Dam to Blue Cr (plusTitus) (ML-BEN)	Mill Cr, Bennington Diversion Dam to mouth of Blue Cr and Titus Cr drainage	6.00
Blue Cr Drainage (including L. Blue) (BLUE)	Blue Cr, mouth to presumed steelhead access limit and Little Blue Cr mouth to presumed steelhead access limit	1.57
Mill Cr, Blue Cr to Walla Walla water intake (ML-BL)	Mill Cr, Mouth of Blue Cr to City of Walla Walla water intake	8.62
Middle Mill Cr Tribs (Henry Canyon, Webb &Tiger) (ML-TRIBS)	Henry Canyon Cr, Webb Canyon Cr, Tiger Canyon Cr; mouth to presumed access limit	7.87
Mill Cr, Walla Walla water intake to access limit (ML-WW)	Mill Cr, City of Walla Walla water intake to presumed steelhead access limit	5.77
Upper Mill Tribs (NF, Low, Broken, Paradise) (UML)	NF Mill Cr, Low Cr, Broken Cr, Paradise Cr; mouth to presumed steelhead access limit	6.20
Walla Walla, Mill to E L. Walla Walla (plus McEvoy & Springbranch) (WW-ML)	Walla Walla River, mouth of Mill Cr to mouth of East Walla Walla River	5.97
Garrison Cr Drainage (plus Bryant) (GAR)	Garrison Cr, Includes Bryant Cr and all Walla Walla urban streams	11.86
Stone Cr Drainage (STO)	Stone Cr drainage	7.84
E Little Walla Walla Drainage (plus Unnamed Spring & Big Spring Br) (ELWW)	East Little Walla Walla River drainage; Unnamed Spring; Big Spring Cr, mouth to presume steelhead access limit	12.17
Walla Walla, E Little Walla Walla to Tumalum Bridge (WW-ELWW-TB)	Walla Walla River, East Little Walla Walla River to Tumalum Bridge	4.87
Yellowhawk mainstem (mouth to source) (YEL)	Yellowhawk Cr drainage	8.58
Yellowhawk Tribs (Lassater, Russell, Reser & Caldwell) (YEL-TRIBS)	Lassater Cr; Russll Cr; Reser Cr; Caldwell Cr; mouths to presumed steelhead access limit	14.36
Cottonwood Cr Drainage (including NF, SF & MF) (COT)	Cottonwood Cr drainage, mouth to presumed steelhead access limit	18.06
Birch Creek Drainage (BIR)	Birch Cr drainage, mouth to presumed steelhead access limit	7.72
Walla Walla, Tumalum Bridge to Nursery Bridge (WW-NB)	Walla Walla River, Tumalum Bridge to Nursery Bridge	2.35

Geographic Area	Location	Length in Miles
Walla Walla, Nursery Br to Little Walla Walla Diversion (WW-NB)	Walla Walla River, Nursery Bridge to Little Walla Walla Diversion	1.25
Walla Walla, Little Walla Walla Diversion to forks (WW-LWWD)	Walla Walla River, Little Walla Walla Diversion to confluence of NF and SF Walla Walla River	4.87
Couse Creek Drainage (COU)	Couse Cr drainage, mouth to presumed steelhead access limit	14.21
NF Walla Walla, mouth to L. Meadows Canyon Cr (plus L. Meadows) (NFWW)	NF Walla Walla River, mouth to Little Meadows Canyon Cr and Little Meadows Cr mouth to presumed steelhead limit	9.95
NF Walla Walla, L. Meadows to access limit (plus Big Meadows) (NFWW-LM)	NF Walla Walla River, mouth of Little Meadows Canyon Cr and Big Meadows Cr mouth to presumed steelhead limit	11.51
SF Walla Walla, mouth to Elbow Creek (SFWW)	SF Walla Walla River, mouth to mouth of Elbow Cr	9.88
Lower SF Walla Walla Tribs (Flume Canyon, Elbow) (LSFWW)	Flume Canyon Cr and Elbow Cr, mouth to presumed steelhead access limit	5.49
SF Walla Walla, Elbow to access limit (SFWW-ELB)	SF Walla Walla River, mouth of Elbow Cr to presumed steelhead access limit	17.9
Upper SF Walla Walla tribs (excluding Skiphorton & Reser) (USFWW)	Bear Cr, Kees Canyon Cr, Burnt Cabin Gulch, Swede Canyon, Table Cr, Husky Spring Cr, Bear Trap Springs; mouth to presumed steelhead access limit	14.42
Skiphorton & Reser Creek Drainages (SKI-RES)	Skiphorton Cr and Reser Cr, mouth to presumed steelhead access limit	4.76

3.5.2 Scaled and Unscaled Results

Results from this analysis are provided in two forms, scaled and unscaled. Scaled results take into account the length of the geographic area being analyzed by taking the original output from EDT (i.e. percent productivity change, etc.) and dividing it by the length of stream in kilometers. This gives a value of the condition being measured per kilometer, which represents the most efficient areas to apply restoration or protection measures. The unmodified results are termed unscaled. Both results are presented, though the scaled version was given more weight in the conclusions portion of the assessment.

A Reach Analysis identifies the life stages most severely impacted (relative to historical performance) on a reach-by-reach basis, as well as the environmental conditions most responsible for the impacts. This three-part diagnosis can then be used to develop a plan designed to protect areas critical to current production, and to implement effective restoration actions in reaches with the greatest production potential.

3.5.3 Steelhead and Chinook EDT Assessment

Walla Walla summer steelhead and spring Chinook were assessed in two basic ways:

1. By identifying areas that currently have high production and therefore should be protected (i.e., high "Protection Value")[5].
2. By identifying areas with the greatest potential for restoring a life stage that is critical to increasing production (i.e., high "Restoration Potential")[6].

Table 3-2 contains a list of the scaled and unscaled EDT model estimates for summer steelhead restoration potential, and Table 3-3 contains the same information for spring Chinook. Tables 3-4 and 3-5 list the scaled and unscaled EDT protection potential for steelhead and Chinook.

Table 3-2 EDT Model Estimates for Restoration Potential of Walla Walla Summer Steelhead

				Unscaled		Scaled (%/km)	
Geographic area	Diversity Index	Prod.	N(eq)	Sum	Rank	Sum	Rank
Columbia Mainstem	49%	45%	90%	184%	1	0.2%	31
Lower Touchet (mouth to Coppei)	58%	0%	23%	81%	2	1.0%	11
Lower Walla Walla (mouth to Touchet)	21%	16%	28%	65%	3	1.9%	2
Pine Cr mainstem (plus Swartz)	43%	0%	4%	47%	4	0.7%	17
Touchet, Coppei to forks (plus Whiskey)	33%	0%	1%	35%	5	1.0%	12
NF Touchet Mainstem	28%	1%	3%	32%	6	1.1%	9
SF Walla Walla, mouth to Elbow Creek	11%	13%	6%	30%	7	1.9%	3
Mill Cr, Gose Street to Bennington Dam	17%	0%	7%	24%	8	2.1%	1
Walla Walla, Touchet to Dry (plus Mud Cr)	7%	7%	7%	21%	9	1.4%	6
Coppei Drainage	16%	0%	4%	19%	10	0.5%	21
Pattit Drainage	17%	0%	2%	19%	11	0.6%	18
SF Touchet Mainstem	17%	0%	0%	18%	12	0.7%	15
Wolf Fork, mouth to Coates (plus Robinson & Coates)	16%	0%	1%	18%	13	0.7%	16
NF Walla Walla, mouth to L. Meadows Canyon Cr (plus L. Meadows)	14%	0%	3%	17%	14	1.1%	8
SF Touchet Tribs	15%	0%	0%	15%	15	0.9%	13
Lower Dry Cr (mouth to Sapolil)	13%	0%	2%	15%	16	0.4%	28
Cottonwood Cr Drainage (including NF, SF & MF)	11%	0%	3%	14%	17	0.5%	22
E Little Walla Walla Drainage (plus Unnamed Spring & Big Spring Br)	11%	0%	1%	11%	18	0.6%	20
Walla Walla, Dry to Mill	5%	1%	4%	11%	19	1.0%	10
Dry Cr [Pine] Drainage	9%	0%	1%	10%	20	0.3%	29
Yellowhawk Tribs (Lassater, Russell, Reser &	9%	0%	1%	10%	21	0.4%	26

5 Protection value describes stream reaches or geographic areas that currently are providing valuable habitat to support one or more life history stages and therefore should be protected from negative impacts.
6 Restoration potential describes the capacity of a stream reach or geographic area to positively respond to restoration efforts designed to bring back a significant habitat attribute that currently is limiting the focal species population.

Geographic area	Diversity Index	Prod.	N(eq)	Unscaled Sum	Unscaled Rank	Scaled (%/km) Sum	Scaled (%/km) Rank
Caldwell)							
Walla Walla, Little Walla Walla Diversion to forks	8%	1%	1%	10%	22	1.3%	7
Garrison Cr Drainage (plus Bryant)	8%	0%	0%	8%	23	0.4%	27
Walla Walla, Mill to E L. Walla Walla (plus McEvoy & Springbranch)	4%	1%	2%	8%	24	0.7%	14
W Little Walla Walla Drainage (plus Walsh)	7%	0%	1%	8%	25	0.4%	25
Walla Walla, Tumalum Bridge to Nursery Bridge	5%	1%	1%	7%	26	1.8%	5
NF Touchet Tribs (excluding Wolf Fork)	6%	0%	0%	6%	27	0.5%	23
Wolf Fork, Coates to access limit (plus Whitney)	5%	0%	1%	5%	28	0.5%	24
Walla Walla, E Little Walla Walla to Tumalum Bridge	3%	1%	1%	5%	29	0.6%	19
Yellowhawk mainstem (mouth to source)	5%	0%	0%	5%	30	0.3%	30
Walla Walla, Nursery Br to Little Walla Walla Diversion	3%	0%	0%	4%	31	1.8%	4
Upper Dry Cr (Sapolil to forks)	3%	0%	1%	3%	32	0.2%	35
Dry Cr Tribs (Mud[Dixie], Mud[Dry], NF Dry & SF Dry)	2%	0%	1%	3%	33	0.1%	37
NF Walla Walla, L. Meadows to access limit (plus Big Meadows)	3%	0%	0%	3%	34	0.1%	36
Couse Creek Drainage	2%	0%	0%	3%	35	0.1%	38
Birch Creek Drainage	2%	0%	0%	3%	36	0.2%	32
Stone Cr Drainage	2%	0%	0%	3%	37	0.2%	33
Lower Mill Cr Tribs (Doan & Cold)	2%	0%	0%	2%	38	0.2%	34
Upper SF Walla Walla tribs (excluding Skiphorton & Reser)	0%	0%	0%	1%	39	0.0%	39
Skiphorton & Reser Creek Drainages	0%	0%	0%	0%	40	0.0%	40
Mill Cr, mouth to start of Corps Project at Gose St	0%	0%	0%	0%	41	0.0%	41
Lower SF Walla Walla Tribs (Flume Canyon, Elbow)	0%	0%	0%	0%	42	0.0%	42
Blue Cr Drainage (including L. Blue)	0%	0%	0%	0%	43	0.0%	43
Mill Cr, Bennington Dam to Blue Cr (plusTitus)	0%	0%	0%	0%	44	0.0%	44
Mill Cr, Blue Cr to Walla Walla water intake	0%	0%	0%	0%	45	0.0%	45
Coastal and Offshore	0%	0%	0%	0%	46	0.0%	50
Columbia Estuary	0%	0%	0%	0%	47	0.0%	49
Mill Cr, Walla Walla water intake to access limit	0%	0%	0%	0%	48	0.0%	46
Upper Mill Tribs (NF, Low, Broken, Paradise)	0%	0%	0%	0%	49	0.0%	47

Geographic area	Diversity Index	Prod.	N(eq)	Unscaled Sum	Unscaled Rank	Scaled (%/km) Sum	Scaled (%/km) Rank
Middle Mill Cr Tribs (Henry Canyon, Webb &Tiger)	0%	0%	0%	0%	50	0.0%	48
SF Walla Walla, Elbow to access limit	0%	0%	0%	0%	51	0.0%	51

Notes: 1) The scaled rank adjusted the unscaled rank by dividing by the length of stream in the geographic area to evaluate restoration potential on a per kilometer basis.

2) N(eq) is the equilibrium abundance of returning adult spawners.

Source: WDFW 2004

Table 3-3 EDT Model Degradation/Protection Potential Estimates for Walla Walla Subbasin Summer Steelhead

Geographic area	Diversity Index	Prod.	N(eq)	Unscaled Sum	Unscaled Rank	Scaled (%/km) Sum	Scaled (%/km) Rank
SF Walla Walla, Elbow to access limit	-46%	-82%	-100%	-228%	1	-7.9%	1
Columbia Mainstem	-48%	-44%	-61%	-153%	2	-0.2%	18
Columbia Estuary	-16%	-11%	-14%	-41%	3	-0.5%	10
Upper SF Walla Walla tribs (excluding Skiphorton & Reser)	-16%	-15%	-10%	-41%	4	-1.8%	4
SF Walla Walla, mouth to Elbow Creek	-12%	-9%	-13%	-35%	5	-2.2%	2
NF Touchet Mainstem	-13%	-2%	-8%	-23%	6	-0.8%	9
Skiphorton & Reser Creek Drainages	-6%	-6%	-4%	-16%	7	-2.0%	3
NF Touchet Tribs (excluding Wolf Fork)	-8%	-1%	-3%	-12%	8	-0.9%	7
Wolf Fork, Coates to access limit (plus Whitney)	-6%	-2%	-4%	-12%	9	-1.0%	5
SF Touchet Mainstem	-4%	-1%	-6%	-11%	10	-0.4%	13
Lower SF Walla Walla Tribs (Flume Canyon, Elbow)	-5%	-1%	-2%	-8%	11	-0.9%	8
NF Walla Walla, mouth to L. Meadows Canyon Cr (plus L. Meadows)	-4%	0%	-4%	-8%	12	-0.5%	12
NF Walla Walla, L. Meadows to access limit (plus Big Meadows)	-5%	-1%	-2%	-8%	13	-0.4%	14
Walla Walla, Little Walla Walla Diversion to forks	-3%	-1%	-4%	-8%	14	-1.0%	6
SF Touchet Tribs	-4%	-1%	-2%	-6%	15	-0.4%	15
Wolf Fork, mouth to Coates (plus Robinson & Coates)	-1%	0%	-4%	-6%	16	-0.2%	17
Walla Walla, E Little Walla Walla to Tumalum Bridge	-2%	-1%	-1%	-4%	17	-0.5%	11
Touchet, Coppei to forks (plus Whiskey)	0%	0%	-3%	-3%	18	-0.1%	20
Coppei Drainage	0%	0%	-2%	-2%	19	-0.1%	23
Pattit Drainage	0%	0%	-2%	-2%	20	-0.1%	25
Pine Cr mainstem (plus Swartz)	0%	0%	-1%	-1%	21	0.0%	30
Walla Walla, Dry to Mill	0%	0%	-1%	-1%	22	-0.1%	21

Geographic area	Diversity Index	Prod.	N(eq)	Unscaled		Scaled (%/km)	
				Sum	Rank	Sum	Rank
Walla Walla, Tumalum Bridge to Nursery Bridge	0%	0%	-1%	-1%	23	-0.3%	16
Walla Walla, Mill to E L. Walla Walla (plus McEvoy & Springbranch)	0%	0%	-1%	-1%	24	-0.1%	22
Cottonwood Cr Drainage (including NF, SF & MF)	0%	0%	-1%	-1%	25	0.0%	27
Yellowhawk mainstem (mouth to source)	0%	0%	-1%	-1%	26	-0.1%	24
Yellowhawk Tribs (Lassater, Russell, Reser & Caldwell)	0%	0%	-1%	-1%	27	0.0%	28
E Little Walla Walla Drainage (plus Unnamed Spring & Big Spring Br)	0%	0%	-1%	-1%	28	0.0%	26
Upper Dry Cr (Sapolil to forks)	0.0%	0.0%	-0.5%	-0.5%	29	0.0%	29
Lower Walla Walla (mouth to Touchet)	-0.4%	0.0%	0.0%	-0.4%	30	0.0%	31
Lower Touchet (mouth to Coppei)	0.0%	0.0%	-0.4%	-0.4%	31	0.0%	40
Walla Walla, Nursery Br to Little Walla Walla Diversion	0.0%	0.0%	-0.3%	-0.3%	32	-0.1%	19
Couse Creek Drainage	0.0%	0.0%	-0.2%	-0.2%	33	0.0%	35
W Little Walla Walla Drainage (plus Walsh)	0.0%	0.0%	-0.2%	-0.2%	34	0.0%	33
Dry Cr Tribs (Mud[Dixie], Mud[Dry], NF Dry & SF Dry)	0.0%	0.0%	-0.2%	-0.2%	35	0.0%	37
Stone Cr Drainage	0.0%	0.0%	-0.1%	-0.1%	36	0.0%	32
Lower Mill Cr Tribs (Doan & Cold)	0.0%	0.0%	-0.1%	-0.1%	37	0.0%	34
Birch Creek Drainage	0.0%	0.0%	-0.1%	-0.1%	38	0.0%	36
Dry Cr [Pine] Drainage	0.0%	0.0%	-0.1%	-0.1%	39	0.0%	43
Mill Cr, Walla Walla water intake to access limit	0.0%	0.0%	-0.1%	-0.1%	40	0.0%	38
Upper Mill Tribs (NF, Low, Broken, Paradise)	0.0%	0.0%	-0.1%	-0.1%	41	0.0%	39
Garrison Cr Drainage (plus Bryant)	0.0%	0.0%	0.0%	0.0%	42	0.0%	44
Mill Cr, Blue Cr to Walla Walla water intake	0.0%	0.0%	0.0%	0.0%	43	0.0%	42
Middle Mill Cr Tribs (Henry Canyon, Webb &Tiger)	0.0%	0.0%	0.0%	0.0%	44	0.0%	41
Mill Cr, Bennington Dam to Blue Cr (plusTitus)	0.0%	0.0%	0.0%	0.0%	45	0.0%	45
Lower Dry Cr (mouth to Sapolil)	0.0%	0.0%	0.0%	0.0%	46	0.0%	49
Blue Cr Drainage (including L. Blue)	0.0%	0.0%	0.0%	0.0%	47	0.0%	46
Mill Cr, mouth to start of Corps Project at Gose St	0.0%	0.0%	0.0%	0.0%	48	0.0%	47
Walla Walla, Touchet to Dry (plus Mud Cr)	0.0%	0.0%	0.0%	0.0%	49	0.0%	48
Coastal and Offshore	0.0%	0.0%	0.0%	0.0%	50	0.0%	50
Mill Cr, Gose Street to Bennington Dam	0.0%	0.0%	0.0%	0.0%	51	0.0%	51

Notes: 1) The scaled rank adjusted the unscaled rank by dividing by the length of stream in the geographic area to evaluate restoration potential on a per kilometer basis.

2) N(eq) is the equilibrium abundance of returning adult spawners.

Source: WDFW 2004

Limiting Habitat Attributes

Walla Walla mainstem

In the Lower Walla Walla (mouth to Touchet) and Walla Walla (Touchet to Dry Creek) geographic areas, the primary limiting factors were sediment load, key habitat quantity, and habitat diversity. Sediment load had high to extreme impacts on most life stages, except prespawn holding adults. There is no loss to spawning and incubation, due to sediment load, below river mile 24 because it was determined to be unlikely that steelhead ever spawned in that stretch of the Walla Walla River. Reduced key habitat quantity had the biggest impact to age-2 migrants and prespawn migrants, however, high losses to fry colonization also occurred in the lower Walla Walla. Loss of habitat diversity had a moderate affect on juvenile migrants and a high to extreme affect on rearing juvenile life stages.

The two geographic areas in the Walla Walla mainstem from Tumalum Bridge to Nursery Bridge and Nursery Bridge to the Little Walla Walla diversion ranked high on the scaled priority list because they were relatively short in length, but are limiting to subyearling and yearling steelhead. Flow (low) and habitat diversity had the highest impacts to these lifestages in this area

Touchet River Watershed

In the Lower Touchet (mouth to Coppei); sediment load was the primary limiting factor, affecting most life stages at high to extreme levels. Other limiting factors included key habitat quantity, habitat diversity, flow, predation, temperature, channel stability, and obstructions. Key habitat quantity had high to extreme impacts on age-0 active rearing, age-2 migrants, and pre-spawn migrants. Habitat diversity had moderate affects on most life stages, but high losses occurred to spawning and fry colonization. Increased peak flows were a moderate problem for colonizing fry, whereas low summer flows were a moderate to high problem for other juvenile life history stages. Predation had high impacts to fry at river mile 30, and moderate to small impacts to other juveniles throughout. Warm summer temperatures caused high losses to spawning, incubation, fry colonization, and 0-age rearing in the lower Touchet, with moderate impacts to other juvenile rearing stages. Channel stability only had high impacts to egg incubation, with moderate impacts to other life history stages. The siphon diversion, Hofer dam, and a waterfall were the obstructions that partially blocked fish passage.

In the Touchet River (from Coppei to forks, including Whiskey Ck), habitat diversity and flow were the primary limiting factors, whereas temperature, sediment load, predation, and channel stability were secondary. Habitat diversity had high impacts to spawning, fry colonization, and age-1 active rearing, with lesser affects to most other life stages. Flow had high affects to fry colonization and age-0 active rearing with lesser effects on other juvenile life history stages. Warm temperatures, high sediment, and low channel stability had high impacts on egg incubation, with lesser affects to several other life stages. Sediment load was a more important factor in Whiskey Creek than in the rest of this geographic area.

The North Fork of the Touchet mainstem had no extreme losses and fewer high losses than the Touchet River geographic areas discussed above. Habitat diversity, sediment load, temperature and flow were limiting factors, but they varied from reach to reach and it was difficult to identify primary versus secondary. Habitat diversity had high losses to spawning and fry colonization in the first couple of reaches, fading to moderate losses in the upper reaches. Conversely, sediment load was a small to moderate problem across most life stages in the lower reaches and increased to a high impact to egg incubation in the higher reaches. Temperature had high impacts to egg incubation up to Lewis Creek, and increased peak flows had a high impact to fry colonization up to Rogers Gulch Creek.

Pine Creek Sub Watershed

In the Pine Creek mainstem; sediment load, habitat diversity, flow, temperature, and obstructions were the primary limiting factors. Other limiting factors included key habitat quantity (just for prespawn holding), channel stability, and food. Sediment affected most life stages at extreme levels in river miles 0-5, with greatly reduced impacts thereafter (high for egg incubation, moderate for most other life stages). Habitat diversity had moderate affects on most life stages, but high losses occurred to spawning, fry colonization, and age-0 and age-1 active rearing. Increased peak flows were a moderate to high impact to colonizing fry, and low summer flows had small to moderate affects on age-1 and age-2 active rearing. Warm summer temperatures were limiting to egg incubation, fry colonization, and 0-age active rearing in the lower reaches (~river mile 0-10) and eight obstructions were present that partially blocked fish passage. Channel stability and food had small to moderate impacts throughout most juvenile life history stages.

Mill Creek Sub Watershed

In the Mill Creek reach from Gose St to Bennington Dam the primary limiting factors included obstructions, sediment load, habitat diversity, flow, temperature, and key habitat quantity. Secondary limiting factors included channel stability and food. Numerous obstructions associated with the flood channel and diversion dams were modeled, with a cumulative affect that seems to all but eliminate the possibility of successful adult passage. It should be pointed out that actual passage to the upstream sections of Mill Creek from either the flood channel portion of Mill Creek or Yellowhawk Creek is poorly understood. Sediment load and habitat diversity had high to extreme impacts to most life stages. Warm summer temperatures were limiting to egg incubation, fry colonization, and 0-age active rearing. Increased peak flows were a moderate to high impact to colonizing fry, and low summer flows had small to moderate affects on age-1 and age-2 active rearing. Food had a small to moderate effect on most juvenile life history stages.

South Fork of the Walla Walla (mouth to Elbow Creek)

In the South Fork of the Walla Walla (mouth to Elbow Creek) habitat diversity and key habitat quantity were the primary limiting factors. Channel stability, flow, sediment load, and temperature were secondary limiting factors. Habitat diversity had high losses to spawning and fry colonization in the first two reaches (river mile 0-9) and small to moderate impacts throughout other reaches and life stages. Increased peak flows were a moderate to high impact to colonizing fry, and low summer flows had small to moderate affects on age-1 and age-2 active rearing. Channel stability, sediment load, and temperature had high impacts to egg incubation and moderate to small impacts to several other life stages in the lower reaches.

Summary

Sediment load, habitat diversity, key habitat quantity, and obstructions were the most common limiting factors for summer steelhead. Restoration efforts should focus on reducing these limiting factors. Protection efforts should focus on protecting habitats (i.e., stream reaches and geographic areas that contain these habitats) that provide one or more of these limiting attributes. Recommendations regarding locations of specific restoration and protection activities are presented in Section 4.6. See the Management Plan and Appendix C for additional clarification regarding limiting habitat attributes and a detailed discussion of restoration and protection activities recommended in individual geographic areas.

Table 3-4 EDT Restoration Potential for Spring Chinook in Geographic Areas of the Walla Walla River Watershed, Washington and Oregon

				Unscaled		Scaled (%/km)	
Geographic area	Diversity Index	Prod.	N(eq)	Sum	Rank	Sum	Rank
Lower Touchet (mouth to Coppei)	203%	0%	325%	529%	1	6.5%	3
Columbia Mainstem	24%	55%	84%	164%	2	0.2%	20
SF Walla Walla, mouth to Elbow Creek	29%	17%	51%	96%	3	6.1%	5
Touchet, Coppei to forks (plus Whiskey)	33%	0%	61%	94%	4	2.7%	12
Mill Cr, Gose Street to Bennington Dam	44%	0%	40%	84%	5	7.6%	2
Lower Walla Walla (mouth to Touchet)	19%	6%	58%	83%	6	2.5%	14
Walla Walla, Touchet to Dry (plus Mud Cr)	29%	0%	40%	69%	7	4.5%	8
Walla Walla, Mill to E L. Walla Walla (plus McEvoy & Springbranch)	24%	4%	39%	67%	8	6.4%	4
Walla Walla, Dry to Mill	16%	0%	45%	61%	9	5.7%	6
SF Touchet Mainstem	25%	0%	25%	50%	10	2.0%	15
NF Walla Walla, mouth to L. Meadows Canyon Cr (plus L. Meadows)	22%	0%	20%	42%	11	2.6%	13
Mill Cr, mouth to start of Corps Project at Gose St	12%	0%	27%	40%	12	4.6%	7
NF Touchet Mainstem	21%	0%	18%	39%	13	1.3%	16
Walla Walla, Tumalum Bridge to Nursery Bridge	8%	5%	22%	35%	14	9.2%	1
Wolf Fork, mouth to Coates (plus Robinson & Coates)	22%	0%	11%	33%	15	1.3%	17
Walla Walla, Little Walla Walla Diversion to forks	9%	0%	22%	30%	16	3.9%	10
Walla Walla, E Little Walla Walla to Tumalum Bridge	11%	0%	16%	27%	17	3.4%	11
Wolf Fork, Coates to access limit (plus Whitney)	11%	0%	3%	14%	18	1.2%	18
Walla Walla, Nursery Br to Little Walla Walla Diversion	2%	0%	7%	9%	19	4.4%	9
NF Walla Walla, L. Meadows to access limit (plus Big Meadows)	8%	0%	1%	9%	20	0.5%	19
Mill Cr, Bennington Dam to Blue Cr (plusTitus)	0%	0%	0%	0.4%	21	0.02%	21
Mill Cr, Blue Cr to Walla Walla water intake	0%	0%	0%	0.3%	22	0.02%	22
Coastal and Offshore	0%	0%	0%	0.0%	23	0.00%	25
Columbia Estuary	0%	0%	0%	0.0%	24	0.00%	24
Mill Cr, Walla Walla water intake to access limit	0%	0%	0%	0.0%	25	0.00%	23
SF Walla Walla, Elbow to access limit	0%	0%	0%	0.0%	26	0.00%	26

Notes: 1) The scaled rank adjusted the unscaled rank by dividing by the length of stream in the geographic area to evaluate restoration potential on a per kilometer basis.

2) N(eq) is the equilibrium abundance of returning adult spawners.

Source: WDFW 2004

Table 3-5 EDT Predictions of Degradation Potential (Protection Benefit) for Spring Chinook in Geographic Areas of the Walla Walla River Watershed, Washington

Geographic area	Diversity Index	Prod.	N(eq)	Unscaled Sum	Unscaled Rank	Scaled (%/km) Sum	Scaled (%/km) Rank
SF Walla Walla, Elbow to access limit	-69%	-95%	-100%	-264%	1	-9.2%	1
Columbia Mainstem	-11%	-15%	-18%	-43%	2	-0.1%	17
SF Touchet Mainstem	-11%	-1%	-11%	-23%	3	-0.9%	5
Walla Walla, E Little Walla Walla to Tumalum Bridge	-8%	-2%	-10%	-20%	4	-2.5%	2
SF Walla Walla, mouth to Elbow Creek	-4%	-5%	-9%	-18%	5	-1.1%	3
Wolf Fork, Coates to access limit (plus Whitney)	-9%	0%	-4%	-12%	6	-1.0%	4
Columbia Estuary	-3%	-2%	-2%	-8%	7	-0.1%	16
Walla Walla, Dry to Mill	-2%	-1%	-5%	-8%	8	-0.7%	6
NF Walla Walla, L. Meadows to access limit (plus Big Meadows)	-3%	0%	-4%	-7%	9	-0.4%	9
Touchet, Coppei to forks (plus Whiskey)	-1%	0%	-6%	-7%	10	-0.2%	13
Walla Walla, Mill to E L. Walla Walla (plus McEvoy & Springbranch)	-1%	-1%	-3%	-5%	11	-0.5%	8
Walla Walla, Little Walla Walla Diversion to forks	-2%	-1%	-2%	-5%	12	-0.6%	7
Wolf Fork, mouth to Coates (plus Robinson & Coates)	-2%	0%	-2%	-4%	13	-0.2%	14
NF Touchet Mainstem	-2%	0%	-2%	-4%	14	-0.1%	15
NF Walla Walla, mouth to L. Meadows Canyon Cr (plus L. Meadows)	-1%	0%	-3%	-3%	15	-0.2%	11
Lower Touchet (mouth to Coppei)	0%	0%	-2%	-2%	16	-0.03%	19
Walla Walla, Tumalum Bridge to Nursery	0%	0%	-1%	-1%	17	-0.2%	10
Walla Walla, Nursery Br to Little Walla Walla Diversion	0%	0%	0%	-0.4%	18	-0.2%	12
Mill Cr, mouth to start of Corps Project at Gose St	0%	0%	0%	-0.4%	19	-0.04%	18
Walla Walla, Touchet to Dry (plus Mud Cr)	0%	0%	0%	-0.3%	20	-0.02%	20
Lower Walla Walla (mouth to Touchet)	0%	0%	0%	-0.3%	21	-0.01%	21
Mill Cr, Blue Cr to Walla Walla water intake	0%	0%	0%	-0.04%	22	0.00%	22
Mill Cr, Walla Walla water intake to access limit	0%	0%	0%	-0.02%	23	0.00%	23
Mill Cr, Bennington Dam to Blue Cr (plusTitus)	0%	0%	0%	-0.02%	24	0.00%	24
Coastal and Offshore	0%	0%	0%	0.00%	25	0.00%	25
Mill Cr, Gose Street to Bennington Dam	0%	0%	0%	0.00%	26	0.00%	26

Notes: 1) The scaled rank adjusted the unscaled rank by dividing by the length of stream in the geographic area to evaluate restoration potential on a per kilometer basis.

2) N(eq) is the equilibrium abundance of returning adult spawners.

Source: WDFW 2004

Spring Chinook Summary of Limiting Attributes

Walla Walla River Mainstem

Throughout the three lower Walla Walla mainstem geographic areas (from the mouth to Mill Creek), sediment load, key habitat quantity, habitat diversity, and temperature were the primary limiting factors for spring Chinook, whereas flow and predation were secondary limiting factors. Sediment load, temperature and key habitat quantity had high and extreme impacts across most life stages and were clearly the dominant limiting factors in these geographic areas. Lack of habitat diversity had low to moderate impacts to most life stages but high impacts to fry colonization, prespawn holding, and juvenile less than one year inactive rearing. Warm summer water temperatures limit spawning in the lower system, with lesser impacts on spawning and prespawn holding adults higher up in the system (above State line). The lower Walla Walla below State line is a migration corridor only for spring Chinook. Warm temperatures also impacted egg incubation and juvenile rearing. Flow (including increased peak flows, flashiness, and reduced low flows) was a low to moderate problem for juvenile life stages and reduced low flow caused high losses to prespawn holding adults in all reaches above the Touchet River. Predation was a low to moderate problem for most life stages throughout the three lower geographic areas, but not in the upper reaches (from E. Little Walla Walla to the nursery bridge).

From Mill Creek to the nursery bridge (two geographic areas) channel stability and obstructions became a secondary limiting factors. Loss of channel stability resulted in moderate impacts to fry colonization and juvenile less than one year overwintering, and high losses to egg incubation. The Burlingame diversion was a partial obstruction to age-1 migrants and prespawn migrants, whereas the nursery bridge was a partial obstruction to prespawn migrants.

Touchet River

In the Touchet River, from the mouth to Coppei, sediment load, key habitat quantity, habitat diversity, and temperature, were the primary limiting factors for spring Chinook, whereas flow, predation, and obstructions were secondary limiting factors. Sediment load and key habitat quantity had high and extreme impacts across most life stages and were clearly the dominant limiting factors in this geographic areas. Loss of habitat diversity had low to moderate impacts to most life stages but high impacts to fry colonization and prespawn holding. Warm summer water temperatures limit spawning in the lower system, with lesser impacts on spawning and prespawn holding adults higher up in the system. The lower Touchet below Waitsburg is a migration corridor only for spring Chinook. Warm temperatures also impacted egg incubation and juvenile rearing.Flow (including increased peak flows, flashiness, and reduced low flows) was a low to moderate problem for juvenile life stages and reduced low flow caused high losses to prespawn holding adults in all reaches above the Touchet River. Predation was a low to moderate problem for most life stages. Limiting factors were similar from Coppei to forks (plus Whiskey Creek); however, sediment load dropped to a secondary limiting factor throughout and key habitat quantity was not a primary factor on the Touchet reach from Whiskey Creek to Patit Creek.

Mill Creek Sub Watershed

In Mill Creek, from Gose St. to Bennington Dam, obstructions, sediment load, key habitat quantity, habitat diversity, and temperature were the primary limiting factors for spring Chinook, whereas flow was a secondary limiting factor. There were numerous obstructions associated with the core project, along with the Yellowhawk and Bennington diversion dams. Sediment load, key habitat quantity, and habitat diversity had high and extreme impacts across most life stages (except juvenile less than one year and age-1 active rearing), with one exception in the Mill Creek reach between Yellowhawk and Bennington diversions, where key habitat quantity had increased for all life stages. Warm summer water temperatures limit spawning in the lower part of the system, with lesser impacts on spawning and prespawn holding adults higher up in the system. Warm temperatures also impacted egg incubation and juvenile rearing. Flow (including increased peak flows, flashiness, and reduced low flows) was a moderate to high (fry colonization) problem for juvenile life stages and reduced low flow combined with high temperatures caused high losses to prespawn holding adults..

South Fork Walla Walla River

In the South Fork, from the mouth to Elbow Creek, sediment load, key habitat quantity, and habitat diversity were the primary limiting factors for spring Chinook, although the losses were much less severe than in other areas of the basin. Flow and temperature were secondary limiting factors. Sediment load caused a low to moderate impact to most life stages, but had a high impact to egg incubation. Key habitat quantity was only a problem in reach Walla SF1, where there was high impacts to egg incubation, 1-age active rearing, and prespawn migrants. Habitat diversity had high and extreme impacts to spawning, fry colonization, juvenile less than one year active rearing, and prespawn holding life stages in reaches Walla SF1 and 2, but only small to moderate impacts in Walla SF3. Warm summer temperatures were only a problem for spawning adults, with lesser impacts to egg incubation and prespawn holding in reach Walla SF1. Flow (including increased peak flows, flashiness, and reduced low flows) was a moderate to high (fry colonization) problem for juvenile life stages and reduced low flow was only a small problem for prespawn holding adults.

3.5.4 Restoration and Protection Potential

Although the subbasin planning process is designed to focus on restoration and protection opportunities within the subbasin, the EDT analysis also summarizes the proportion of the total restoration and protection potential that exists within the subbasin versus the portion that would be realized exclusively from improvements made outside of the basin (i.e., restoration and protection activities downstream in the Columbia River). This information has summarized for steelhead and Chinook in Table 3-6. The relative contribution of within-subbasin efforts versus out-of-subbasin efforts was determined by identifying areas critical to preserving current production (e.g. by identifying areas with high “Protection Value”), and by identifying areas with the greatest potential for restoring a significant measure of historical production (e.g. by identifying areas with high “Restoration Potential”).

Table 3-6 Within Subbasin and Out of Subbasin Steelhead and Spring Chinook Restoration and Protection Potential

	Life history diversity		Productivity		Abundance	
Steelhead	Within Subbasin	Out of Subbasin *	Within Subbasin	Out of Subbasin *	Within Subbasin	Out of Subbasin *
Restoration Potential	90%	10%	49%	51%	55%	45%
Protection Potential	71%	29%	68%	32%	69%	31%
Spring Chinook						
Restoration Potential	96%	4%	35%	65%	91%	9%
Protection Potential	89%	11%	86%	14%	89%	11%

* Out of subbasin refers to impacts and benefits from restoration and protection in the Columbia River.

These results suggest that 4 to 45 percent of potential improvements for the Walla Walla Subbasin are tied to actions outside of the subbasin (i.e., restoration in the mainstem Columbia).

Baseline Population Performance

The primary purpose of the EDT analysis is to provide a comparison of current, historical, and PFC habitat conditions. Results of this comparison help identify limiting habitat attributes and priority restoration and protection areas. Although not its primary purpose, the EDT model also estimates productivity, adult abundance, and capacity of focal species populations for each baseline habitat condition. These values are not concrete population estimates, but rather are used to calibrate the EDT model (i.e., compare model results to available empirical data) and for comparative purposes (e.g., current vs. historic vs. predicted fish returns after implementation of the management plan) to ensure habitat goals will translate to desired population numbers. Baseline population information for steelhead and Chinook are provided below.

Summer Steelhead Baseline Population Performance

For the Walla Walla subbasin analysis, the EDT analysis and empirical data estimates vary slightly (EDT abundance estimate of 864 adults vs. empirical data estimate of 1,107 adults). WDFW (2004) summarizes the EDT model results for the Walla Walla subbasin as follows:

> "The EDT model estimated a much smaller population in the mainstem (41 adults) versus the tributaries (1066) and a productivity of just 1.3 adult returns per spawner in the mainstem versus 3.4 in the tributaries (Table 3-7). The life history diversity values indicated that only 1 percent (mainstem) and 8 percent (tributaries) of the historic life history pathways could be successfully used under current conditions. The Walla Walla Subbasin had a much greater production potential for summer steelhead than it now displays, as historical abundance was estimated at 16,451 spawners, with a productivity of 14 and 19 returning adults per spawner in the mainstem and tributaries, respectively (Table 3-7). Historic life history diversity only reached 83 % because the population was modeled in two runs, and the cumulative life history diversity index would be 100 percent. With Properly Functioning Conditions (PFC) the population would yield 4,159 adults with a productivity of 3.8 to 4.6 returning adults per spawner, and a life history diversity index of 64 to 70 percent."

Table 3-7 EDT Summer Steelhead Spawner Population Performance Estimates.

Scenario	Diversity Index	Productivity	Capacity	Adult Abundance
Walla Walla River (Mouth to Forks)				
Patient (Current)	1 %	1.3	199	41
PFC	70 %	3.8	1,325	976
Template (Reference/Historic)	83 %	14.0	4,345	4,034
Tributaries				
Patient (Current)	8 %	3.4	1,509	1,066
PFC	64 %	4.6	4,063	3,183
Template (Reference/Historic)	83 %	19.1	13,101	12,417
Abundance Totals			**Current**	**1,107**
			PFC	**4,159**
			Reference	**16,451**

Summary Spring Chinook Population Baseline Performance

Separate model runs were conducted for several subpopulations of Walla Walla spring Chinook to more accurately capture the performance of the whole population; these included the Walla Walla River mainstem, Touchet River, the South Fork of the Walla Walla River, and Mill Creek (Table 3-8). The EDT model estimated the average spawning population size of the current spring Chinook to be 343 fish, with productivity ranging from 0 in Mill Creek to 6.1 in the South Fork of the Walla Walla River (Table 3-8). Current condition for life history diversity was very low in Mill Creek (0 percent), the Touchet River (4 percent and the Walla Walla mainstem (4 percent), and moderate in the South Fork (56 percent). The EDT model predicted that the Walla Walla Subbasin had a much greater production potential for spring Chinook than it now displays, as historical abundance was estimated at 17,929 spawners, with a productivity ranging from 13-25 returning adults per spawner and a life history diversity of 97 to 100 percent (Table 3-8). Under Properly Functioning Conditions (PFC), the EDT model predicted an abundance of 9,318 spawners, productivity ranging from 6.6-8.5, and a life history diversity of 90 to 100 percent (Table 3-8).

Table 3-8 Baseline Spawner Population Performance Parameters for Walla Walla River Spring Chinook as Determined by EDT, 2003.

Population	Scenario	Diversity index	Productivity	Capacity	Abundance
Mill Cr SpChk	Historical	100%	14.8	2,860	2,667
	PFC with fitness & harvest impacts	100%	6.6	1,403	1,189
	Current without fitness & harvest impacts	0%	---	4	---
	Current with fitness & harvest impacts	0%	---	3	---
SF WW SpChk	Historical	100%	24.6	1,975	1,895
	PFC with fitness & harvest impacts	94%	8.5	1,159	1,023
	Current without fitness & harvest impacts	57%	7.2	299	258
	Current with fitness & harvest impacts	56%	6.1	259	217

Population	Scenario	Diversity index	Productivity	Capacity	Abundance
Touchet SpChk	Historical	99%	14.0	9,096	8,447
	PFC with fitness & harvest impacts	97%	6.7	5,282	4,492
	Current without fitness & harvest impacts	4%	2.5	150	89
	Current with fitness & harvest impacts	4%	2.2	129	70
WW mainstem (mouth to forks) SpChk	Historical	97%	13.4	5,318	4,920
	PFC with fitness & harvest impacts	90%	6.3	3,109	2,6114
	Current without fitness & harvest impacts	5%	2.3	130	74
	Current with fitness & harvest impacts	4%	2.0	112	56
	Sum, Abundance, Historical Template				17,929
	Sum, Abundance, PFC				9,318
	Sum, Abundance, Current, no Fitness or Harvest impacts				420
	Sum, Abundance, Current, with Fitness & Harvest impacts				343

1) Assumed fitness was 90% and harvest 7%.

Note: Although table 3-8 includes all reaches of the noted streams, spring Chinook habitat may be limited in theLower Touchet and Lower Walla Walla Rivers (G. Mendel, WDFW, personal communication, 2004)

3.5.5 Population characteristics consistent with VSP.

The NOAA Fisheries Viable Salmonid Population (VSP) document (McElhany 2000) identified four parameters that are key in determining the long-term viability of a population: abundance, population growth rate, population spatial structure and diversity. Specific targets for these parameters have not been developed by the TRT for summer steelhead or spring Chinook; consequently, quantitative goals for the four parameters cannot be established at this time. However, the interim spawner abundance target for steelhead in Walla Walla has been set at 2600 adults. A spawner abundance target is understood to not be established for Walla Walla River spring Chinook. The Walla Walla River Chinook population may be included with the Lower Mainstem Tributary spawning aggregation, which has an interim goal of 1,000 spawners (WDFW 2004).

Steelhead

A WDFW (2004) discussion of the four VSP parameters as they relate to the Walla Walla EDT results for steelhead is provided below.

> Abundance: “The interim target goal of 2600 fish does not differentiate between the Touchet River and the rest of the Walla Walla subbasin. The current EDT population estimate (1,107 adults) falls short of the combined interim target, but the EDT model predicted that 4,159 fish could be achieved under PFC. Likewise, combined estimates of escapement at Nursery Bridge in Oregon, and into the Upper Touchet above Dayton fall short of TRT and agencies’ management goals. Recent data for escapement suggests increasing natural adult return to the basins. This suggests that current abundance may be sufficient to seed available habitat to promote continued increases in abundance.”

Growth Rate (productivity): "The EDT model estimated a low productivity in the Walla Walla River mainstem (1.3 returning adults per spawner) that is not able to withstand ecological variability and stochastic events. Productivity in the tributaries was considerably higher (3.4 returning adults per spawner). This level of productivity strongly suggests that tributary segments of Walla Walla steelhead populations are capable of sustaining themselves in the long term, though specific productivity targets have not been established by either the co-managers or the TRT. Preserving existing productive tributary habitat and population segments is key to rebuilding the basin wide population growth rate. EDT model estimates predicted that if PFC was achieved, productivity could increase 3 fold in the mainstem, but only 35% in the tributaries. These predictions are consistent with empirical data and the logic associated with habitat improvement. However, substantially increasing productivity in mainstem areas will be difficult. Incremental improvements to tributaries, coupled with mainstem actions that will improve, or at least prevent further degradation, habitat conditions will likely be the most successful approach."

Spatial Structure: "The Walla Walla subbasin is a large, spatially complex system with two presently recognized (TRT) steelhead subpopulations (Touchet River and Upper Walla Walla). Additional discrete spawning aggregates may exist in the basin but there is currently insufficient data to describe them. Spawning also occurs in the lower mainstem, Mill Creek and numerous smaller tributaries. There remains substantial connectivity within the upper Walla Walla and Touchet systems, but large irrigation diversions and a USACE diversion dam within the City of Walla Walla have significantly prevented adult steelhead access to large stream reaches. Further, stream de-watering has isolated juvenile population segments within portions of the basin, limiting the potential for population interaction that may have occurred in the past. Other anthropogenic impacts have negatively affected fish habitat quality over time (e.g. road and levee construction, grazing, elimination of riparian vegetation and stream channel connectivity, urbanization, gravel mining). Likewise, stochastic environmental events (floods, log-jams, dewatered stream reaches) have affected habitat and fish distribution. Because of these factors, localized extirpations of small tributary populations, and possibly a lower mainstem spawning population, may have occurred. Despite these problems, two major population segments (subpopulations) remain. Such population responses seems to fit an island-mainland population structure as defined in the NMFS Technical memorandum describing a VSP (McElhany 2000), and suggests that sufficient spatial structure remains for the O. mykiss population to persist during the short term. Reestablishment of a full spatial structure within the population will require significant improvements in habitat quality and connectivity…..Clearly the spatial structure of Walla Walla subbasin steelhead has been severely degraded. Tributary population productivity may currently be (or have been) sufficient to have prevented irrevocable harm to steelhead in the basin, but reestablishment of more complete spatial structure will be needed for the populations to achieve VSP status."

Diversity "Population diversity within the Walla Walla subbasin has been severely degraded by water withdrawal and dewatering, elimination of or passage barriers (dams, irrigation diversions) to significant reaches of habitat, generalized habitat degradation, urbanization, unscreened or improperly screened water diversions that injure or kill juvenile fish, and others. The EDT model estimated that life history diversity was severely depressed (1-8% of historic) in the Walla Walla Subbasin. If PFC were achieved the life history diversity was estimated to increase to 64-70%, a level that is much more likely to be acceptable for a VSP. It is clear from the EDT model that substantial improvements to the habitat are needed to increase life history pathways so that sufficient diversity in the population exists for stability."

Spring Chinook

Spring Chinook salmon have been extirpated, at least functionally, from the Walla Walla Basin since the early 1920s (Nielsen 1950, Van Cleave and Ting 1960) although some adults were recorded in steelhead creel surveys as late as 1955 (Oregon Game Commission, 1956 and 1957). Recently, a few adult spring Chinook have been observed in the Touchet River (Mendel et al. 2001, 2002) and in the mainstem of the Walla Walla River (Zimmerman and Duke 2001, 2002; Bronson and Duke 2003). These fish are presumed to be strays from other basins because they were extinct and most of the returning fish are generally unmarked and are likely from reintroduction efforts in the Umatilla River or elsewhere. Coded wire tags recovered from a few adults trapped in the Touchet River had Tucannon Hatchery codes (Mendel et al. 2002).

CTUIR out-planted Carson origin adult spring Chinook salmon into the SF Walla Walla and Mill Creeks during 2000-2003 to spawn naturally (Zimmerman and Duke 2001, 2002; Bronson and Duke 2003; Contor and Sexton 2003). It is too early to know if the recent habitat and flow improvements in the basin will provide suitable conditions for the progeny of the out-planted Chinook to return at or above replacement (2.0 returns per spawner). CTUIR documented successful spawning, juvenile rearing, and smolt migration of naturally reared progeny of out-planted Chinook salmon (Contor and Sexton 2003, Schwartz et al. 2004). However, 2004 will be the first year adult returns are expected from the out-planting experiment. The out-planted adults were hatchery stock (Carson stock) from out-of-basin and adult return rates will likely be lower than wild endemic stocks in the region. Wild endemic stocks such as John Day River Chinook often have substantial returns such as in 2000 when 1869 redds were observed of which 1411 were in index sites. Adult return estimated for the John Day River in 2000 was 6947 adults. However, only 94 redds were observed at index sites in 1995 (Carmichael et al. 2002). The wide variation of adult returns in the John Day from 1959 to 2000 as reported by Carmichael (et al. 2002) demonstrates that adult returns can be very low during some years even in relatively robust wild endemic stocks. Walla Walla Basin Chinook will have to contend with an additional mainstem Columbia River Dam and must be developed from available non-endemic stock. It is highly unlikely that a naturally reproducing population of spring Chinook salmon could be developed that would meet NOAA's "viable salmonid population" criteria (McElhany et al. 2000) without management intervention through reintroduction and continued habitat restoration.

EDT analysis of the Walla Walla basin identified higher quality salmonid habitat in headwater reaches with moderate to severe modification of habitat in the lower reaches. Habitat degradation has reduced the basins capacity for spring Chinook salmon from an estimated 17,000 returning adults under historical conditions to an abundance estimate of 343 adult Chinook under current conditions. For a population to meet NOAA's viable salmonid population criteria it must have "a negligible risk of extinction…over a 100-year time frame" (McElhany et al. 2000). A viable population would need to be large enough to withstand more than a decade of poor conditions. The original endemic stock is extinct and the preservation of unique genetic material is no longer an issue so small interim goals for "recovery" of an endemic population are not applicable in the Walla Walla Basin. Small adult returns would not provide surpluses for harvest opportunities, and would only provide moderate numbers for spawning, naturalization of a non-endemic stock, and nutrient enhancement.

The CTUIR master plan goals include continued ecosystem restoration and adult returns of over 8,000 adult spring Chinook salmon (CTUIR, 2004). The goals include 2,750 hatchery and 3,000 naturally-produced adults for the Oregon portion of the basin and 1,375 hatchery and 1,500 naturally-produced adults for Washington. These goals are not agreed to by all co-managers.

3.6 Integrated Assessment Analysis

3.6.1 Introduction

The information presented in this section was taken from Appendix C (WDFW 2004), and includes the results from integrating the steelhead and Chinook assessments into one combined approach, setting the stage for the management plan (Chapter 7). Divergences from EDT are identified, along with a description of the priority restoration and protection areas, and a summary of the basis for these.

3.6.2 Spring Chinook and Summer Steelhead EDT Analysis Limiting Attributes

EDT identified that sediment load, habitat diversity, and obstructions were the most common and severe limiting habitat attributes for both steelhead and spring Chinook in the Walla Walla subbasin. Warm summer temperatures, channel stability, and flow were also common limiting factors and no life stage was exempt from the effects of the degraded conditions related to these factors. Sediment load was a severe cause of direct mortality for egg incubation, but commonly impacted all life stages in indirect ways such as by reducing feeding rates for juveniles. Habitat diversity is a function of gradient, confinement, riparian function, LWD density and icing. Loss of riparian function most commonly occurs through hydromodifications (roads, dikes, bank armoring, channelization, etc.) and altered riparian vegetation and reduced LWD (from agriculture, development, past forest practices). For key habitat quantity, lack of pools and reduced base flow (reducing stream width and depth) were most limiting to pre-spawning holding and juvenile rearing life stages of both steelhead and spring Chinook. Warm summer temperatures were a common problem for spawning (pre-spawn holding), egg incubation, distribution, and rearing (young of the year) for spring Chinook, but also negatively impacted steelhead fry and juvenile less than one year summer rearing. Increased peak flows and reduced low flows were consistently moderate to high limiting factors for fry colonization and juvenile rearing life stages. Food (reduced salmon carcasses and benthic productivity) was a minor secondary limiting factor. The cumulative impact of these low-level limiting attributes could be important to the overall reduced productivity in the Walla Walla River Subbasin.

3.6.3 EDT Limiting Attributes Compared with Other Assessments and Plans

The subbasin assessment has many findings that are comparable to other recent assessments and planning efforts. Riparian Function, LWD, Pools, Confinement, and Sediment and Temperature were the most common limiting attribute identified with the assessment. These same habitat attributes were identified by virtually all the assessments performed on the Walla Walla in the last seven years (Table 3-9). Particularly pronounced in these assessments is the mention of attributes having to do with floodplain connectivity, flow, riparian health (both of which are related to the EDT attribute Riparian Function), and LWD.

Table 3-9 Assessments Performed in the Walla Walla Subbasin and the Key Limiting Factors Identified.

Assessment	Key Limiting Factors Identified
EDT	Habitat Diversity (Includes: riparian function, confinement, gradient, LWD density for most life stages); Key Habitat (pools, pool tail-outs and small cobble riffles); Temperature; Low-Flows; Sediment; Channel Stability.
LFA	LWD; pools (quality & frequency); embeddedness; floodplain connectivity; temperature; streambank condition; riparian condition; instream flow; diversion screens
Subbasin Summary	Streamflows; stream temperatures; passage impediments; riparian habitats; instream habitat diversity; sediment.
Bull Trout Recovery Plan (draft)	LWD; temperatures; sediment; channel modification; loss of riparian, barrier removal.

The Limiting Factors Analysis (LFA) performed for WRIA 32 (Kuttle, 2002) identified many of the same habitat problems as EDT or the other documents (such as sediment, confinement, lack of primary pools, flow and temperature). The LFA was not specific as to which reaches to restore. It instead outlined conditions that were poor in specific areas and highlighted them for improvement. The report did recommend areas for protection: N.F. Touchet above Lewis Cr; Wolf Fork above Whitney Cr; Mill Cr above Blue Cr; Yellowhawk Cr; SF Coppei Cr above the confluence; SF Walla Walla River from confluence to headwaters, and NF Walla Walla River on USFS land.

The Subbasin Summary (Saul et al 2001) identified many of the same habitat issues as the EDT or Limiting factors reports, but it was not reach-specific. The Summary identified key factors that occur at the local and regional level limiting fish production. These included water quality, geomorphic instability, riparian function, sedimentation, insufficient instream habitat, out-of-basin effects, the introduction and proliferation of non-native species, and ecological productivity.

The draft Bull Trout Recovery Plan (Chapter 10, USFWS 2002) lists many of the same habitat issues, but as with the Summary it is not reach specific.

3.6.4 Divergences from EDT

Introduction

EDT results and review of previous assessment and other planning documents referenced above were used to reach the following conclusions, and prepare the stage for the management plan (Section 7). These conclusions are organized consistent with the EDT framework for identifying priority restoration and protection areas. See Figure 3-6.

Restoration Priority Geographic Areas

The following geographic areas (GAs) have the highest restoration value in the Walla Walla subbasin according to the EDT analysis of steelhead and spring Chinook and taking into account other factors, such as previous planning efforts and empirical data:

- Walla Walla, Mill to E L. Walla Walla
- Walla Walla, E L. Walla Walla to Tumalum Bridge
- Walla Walla, Tumalum Bridge to Nursery Bridge
- Walla Walla, Nursery Br to Little Walla Walla Diversion
- Walla Walla, Little Walla Walla Diversion to forks
- SF Walla Walla, mouth to Elbow Creek
- NF Walla Walla, mouth to L. Meadows Canyon Cr (plus L. Meadows)
- Coppei Drainage
- Touchet, Coppei to forks
- SF Touchet Mainstem
- SF Touchet Tribs
- NF Touchet Mainstem
- NF Touchet Tribs (excluding Wolf Fork)
- Wolf Fork, mouth to Coates (plus Robinson & Coates)
- Wolf Fork, Coates to access limit (plus Whitney)

These are not in ranked order. These 15 areas are, as a group, considered a priority for restoration (Figure 3-6). The assessment team did not believe that the information available was at a fine enough detail to rank the geographic areas in order of restoration. The priority geographic areas were identified by considering first their rankings by the EDT analysis for restoration for steelhead and spring Chinook. Only GAs with an EDT devised restoration potential of 0.5 percent or greater were considered for inclusion as priority for restoration. Then these were considered in the light of past planning efforts and empirical data within the subbasin.

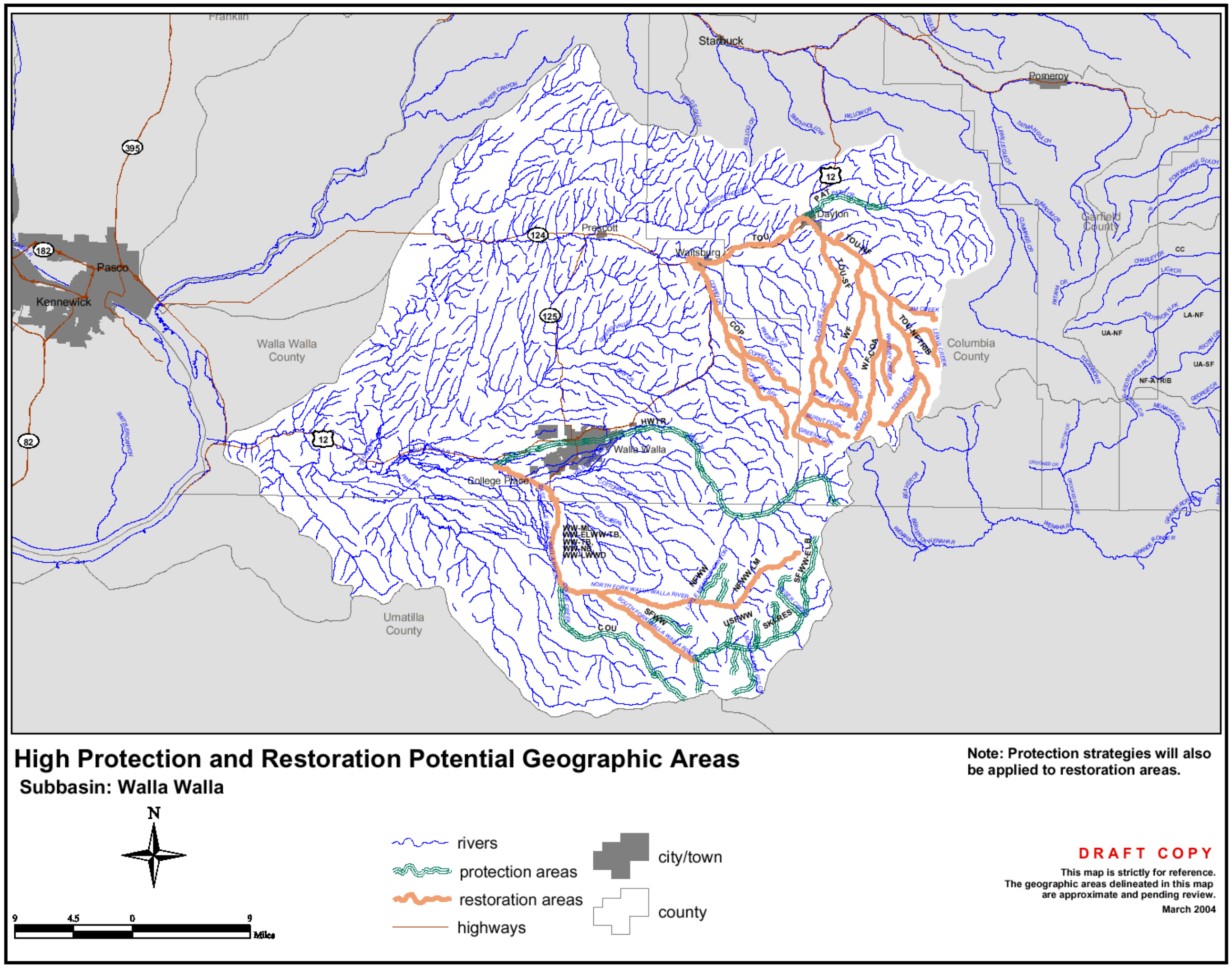

Figure 3-6 Priority Protection and Restoration Geographic Areas

The priority restoration GAs can be categorized into Walla Walla River areas and the Touchet River areas. As can be seen, the restoration areas for the Walla Walla forms one continuous block on the mainstem from the mouth of Mill Cr to the confluence of the North and South Forks of the Walla Walla and then up both forks (SF to Elbow Creek; NF to L. Meadows Canyon). The Touchet River also has contiguous restoration GAs from Coppei Cr (including Coppei Creek) up both SF and NF Touchet and their tributaries and all of the Wolf Fork system.

Mill Creek, Gose Street to Bennington and Lower Walla Walla (mouth to Touchet) were the two highest ranking GAs for restoration according to the EDT output; neither were included in the final recommendation. The recommended section of Mill Creek (Gose Street to Bennington) was the only portion of the Mill Creek/Yellowhawk complex to have a restoration potential of 0.5 percent or greater. None of the Mill Creek GAs showed any protection potential (see below) and that led us to believe that the multiple barriers on Mill Cr and the distributary function of Yellowhawk Creek were not allowing the EDT model to accurately portray the value of the Mill Creek system. It is recommended to the subbasin planning participants that the Mill Creek/Yellowhawk complex needs to be given special consideration. For full explanation and recommendations see below. The Lower Walla Walla GA was excluded from our final priorities due to empirical data and practicality. While it did not seem off base for the EDT model to see this area as prime for restoration given its degraded condition; it does seem impractical at this time to do restorative work in the area. Currently, only portions of the focal species life histories are spent in this portion of the river. Primarily it is a migration corridor for adult and out-migrating steelhead and Chinook salmon. It also provides some winter rearing for all three focal species. To include this area as priority for restoration would have meant excluding areas upstream that host a far greater diversity of life stages of our focal species. It should also be noted that doing work upstream should benefit the Lower Walla Walla by addressing three of its most limiting habitat attributes: sedimentation, low flows and temperature.

Walla Walla mainstem Touchet to Mill Cr and tributaries encompasses four GAs: Walla Walla, Touchet to Dry Creek (RM 29.4); Walla Walla, Dry Creek (RM 29.4) to Mill Creek (RM 33.5); Lower Touchet, mouth to Coppei Creek and Pine Creek mainstem (note – this is the Pine Creek that originates in Oregon and feeds directly into the Walla Walla River between the Touchet River and Mill Creek). All four of these GAs had restoration potentials greater than 0.5 percent, but were not included in the final recommendation. The reasoning for this is similar to the Lower Walla Walla reasoning above. This area simply currently doesn't support enough life history stages for inclusion as a priority restoration area when compared to the rest of the subbasin. It is primarily a migration corridor and winter rearing area. This area also would benefit greatly from upstream restoration work given that temperature, flow and sediment are three of the most limiting habitat factors. Pine Creek (enters Walla Walla River at RM23.4) is the exception as there are not upstream GAs where work would benefit this stream. For Pine Creek it was determined that the multiple barriers, the presence of only steelhead and the relatively small potential contribution to the Walla Walla population as a whole were reasons enough for exclusion.

Patit Drainage includes all of the Patit Cr and its steelhead bearing tributaries. It had a restoration potential of 0.7 percent, which warranted its consideration as a priority restoration area. Patit Creek currently supports a small population of steelhead. Given that only one of the three focal species are present here and the relatively small contribution to the Walla Walla population it was determined to exclude the Patit Drainage GA at this time

E. Little Walla Walla Drainage rated high in restoration potential but was not included in the final recommendation. As with the previous drainage it supports only a small population of steelhead. It is unknown whether spawning in the tributary is successful or if it is primarily used for rearing. Given those two factors it was excluded.

Cottonwood Creek Drainage also had a high potential for restoration according to EDT. Empirical data for the Cottonwood drainage is very limited. While there appears to be successful spawning, how much and where is still uncertain. Given that much of this stream goes dry during summer in the Washington portion and it supports only the single focal species and the uncertainty of the status of steelhead there, it was determined not to include this drainage for priority restoration at this time.

Priority Areas for Protection from EDT Analysis

The following geographic areas have the highest protection value in the Walla Walla Subbasin according to the EDT analysis, empirical data and taking into account other assessment work:

- All Priority Restoration Geographic Areas
- SF Walla Walla, Elbow to access limit
- Skiphorton & Reser Creek Drainages
- Lower SF Walla Walla Tribs (Flume Canyon, Elbow)
- Upper SF Walla Walla Tribs (excluding Skiphorton & Reser)
- NF Walla Walla, L. Meadows to access limit (plus Big Meadows)
- Patit Drainage
- Walla Walla, Dry to Mill
- Yellowhawk mainstem (mouth to source)*
- Headwaters**
- Couse Creek Drainage

*Yellowhawk mainstem assessment conclusions are outlined in the Mill Creek/Yellowhawk Complex section below.

**Headwaters is an assemblage of reaches covering the bull trout bearing (present or potential) waters upstream of the present reaches designated through the EDT process (see discussion in below).

All GAs that showed a performance decrease with simulated degradation from the EDT analysis are identified as priority by this assessment. Note that all of the GAs that were priority for restoration also were identified in the EDT assessment and in this assessment conclusion as priority for protection. This accentuates the importance of these areas for, particularly, steelhead and spring Chinook production. The result also stresses the need to protect these areas from further degradation while restorative work is completed.

Divergence from EDT

The priority areas above are consistent with the EDT output priorities for steelhead and spring Chinook with the exception of the Couse Creek Drainage. Couse Creek was identified by the technical group from Oregon as being an important area for steelhead production within the Walla Walla subbasin. Empirical evidence suggests that this is a high use area and that degradation would have a particularly harmful impact on the Walla Walla population. It also appeared highly likely that erroneous entries into the EDT database accounted for its low rating for protection potential.

Mill Creek/Yellowhawk Complex. When the Mill Creek/Yellowhawk complex was analyzed with the rest of the subbasin by EDT, the results were inconsistent with previous watershed or restoration planning documents. The geographic areas above Bennington Dam are known to have some of the best habitat in the subbasin, but their EDT results were very low for protection and restoration. In fact they showed no measurable protection value at all. A second run of EDT was made for steelhead; this time all of the obstructions for the subbasin were turned off. In this second run all of the geographic areas above Bennington came out in the top five for protection and in the top 15 for restoration. The potential performance decrease changed dramatically (see Table 3-10). The conclusion by WDFW and MBI was that the multiple obstructions in lower Mill Creek did not allow the model to fairly analyze the upper portions of Mill Creek. Given this result and the unique challenges of the Mill Creek system (see description following) the assessment recommends that a special strategy be developed for Mill Creek, as discussed in Chapter 7.

Table 3-10 Mill Creek Geographic Areas Above Bennington Dam and the Potential Performance Decrease of Steelhead With and Without Obstructions as Modeled by EDT, 2003.

Geographic Area	Steelhead Potential Performance Decrease (%/km) Without Obstructions	Steelhead Potential Performance Decrease (%/km) With Obstructions
Mill Creek, Walla Walla water intake to access limit	-22.0%	0.0%
Mill Creek, Blue Creek to Walla Walla water intake	-8.0%	0.0%
Mill Creek, Bennington Dam to Blue Creek (plus Titus)	-1.0%	0.0%

1) Potential performance decrease was the sum of the model predicted degradation in life history diversity, productivity, and abundance for the scaled (% benefit/ km) EDT output.

As described previously, the Mill Creek flood channel system together with Yellowhawk Creek presented unique challenges during the assessment. The entire lower portion of Mill Creek from Bennington Dam to Gose Street has been modified and continues to be managed for flood control. The area from Gose St to Bennington Dam (6.9 miles) is managed by the Mill Creek Flood Control District and the US Army Corps of Engineers (USACE). It is channelized and confined over its entire length, and contains many fish passage barriers (Table 3-11) as identified in the EDT analysis. The beginning of the project at Gose Street is the first obstruction. Access to the flood channel by fish entails a 5 to 8 foot change in channel height (dependant on flow levels). This portion of the project has a fish ladder that does not meet criteria. Observation of this ladder indicates that it is a severe barrier as steelhead frequently strike the concrete structure in an attempt to pass. It is almost certainly a complete barrier to spring Chinook.

Upstream of Gose Steet are sheet pile weirs that are lilely barriers at low flows. The concrete channel is considered a velocity barrier at most stream flows. This is a several mile stretch that is in effect a concrete sluice box with few or no areas for fish to rest and the flow is concentrated by design in the center of the channel.

The next obstruction is the subterranean section of the concrete channel. It is several hundred feet of dark channel. Long portions of covered and relatively dark areas have been shown to be an obstruction to passage. From the subterranean area to the end of the concrete channel is another velocity barrier. The configuration of this area is very similar to the first velocity barrier described above. It is expected to be an obstruction to passage at most flows that adult steelhead would encounter. As previously described, the channel above this confined concrete channel widens out quickly and considerably (over 200 feet). This area is an imminent threat and likely accounts for a large numbers of juvenile salmonids that are stranded here in late spring and the summer to die because of predators or poor water quality as stream flows are diverted into Yellowhawk Creek for irrigation.

As spring flows begin to recede this area becomes for all intents and purposes a large slackwater swamp. The lack of a clearly defined channel does not allow juvenile salmonids adequate passage. Very little water from upstream is flows to this area. The only water available during this time is quite likely groundwater input. The weirs through this section and that extend to Bennington Dam are also a source of obstruction, particularly to juvenile salmonids and adult spring Chinook.

The Yellowhawk Division Dam is the next obstruction that adult fish encounter, located at river mile 11.3. This structure spans the entire width of the flood channel and is about 3 feet high. This is the main source of Yellowhawk Creek and has a manually operated diversion gate to control flow in to Yellowhawk Creek from Mill Creek. The dam features one ladder that does not meet passage criteria for adult steelhead. It is possible that fish are able to clear the dam but a shallow approach to the structure makes successful passage unlikely. Above the Yellowhawk Division the stream continues to be bisected by weirs up to the next obstruction, which is Bennington Dam. This flood control diversion dam has a ladder that does not currently meet passage criteria. Actual passage at this facility is unknown, as it currently contains no counting mechanism.

The CTUIR has been radio-tracking fish tagged in Yellowhawk Creek and Mill Creek for the past three migration years (2002, 2003, and 2004). Thus far they have tracked only a few radio-tracked steelhead successfully passing the dam. The USACE has had a video camera operating in the ladder for portions of the 2003-2004 migration season and have observed passage by more than 50 adult steelhead as of April 2004.

Table 3-11 Obstructions in the USACE Mill Creek Flood Control Project, Walla Walla Washington and Estimated Percent Passage

	Steelhead % passage	Spring Chinook % passage
Gose Street Dam and Concrete Apron	50	20
Concrete channel, velocity and light barriers	30	10
Concrete capped weirs and diked channel from Gose St to Bennington Dam	80	60
Titus Cr culvert at mouth	0	0
Yellowhawk Division Dam and Ladder	80	60
Bennington Dam and Ladder	20	10
Kooskooskie Dam (outside of project)	100	90

Information as used in EDT Modeling.
Passage is an estimate of natural resource professionals; none of the obstructions have been formally evaluated for passage.

Yellowhawk Creek has its current origins at Mill Creek by way of the Yellowhawk Division Dam. Water input from Mill Creek to Yellowhawk is controlled by the Washington Department of Ecology. Generally it is maintained at 25 to 35 cfs in both summer and winter. In the summer the maintenance of this flow in order to satisfy senior water rights downstream, allows Mill Creek downstream of the Division to go dry. Most of the flow experienced in the Mill Creek project is from leak through at the dam or by the input of spring water. Yellowhawk Creek flows about 8.5 miles until it joins the Walla Walla almost 5 miles upstream of the Mill Creek flood control mouth. Yellowhawk Creek flows through urban and semi-rural areas. It has largely been confined and is missing much of the riparian structure. Passage by adults through Yellowhawk Creek does occur, but it is poorly understood as to what degree this passage is successful.

Water temperatures in Yellowhawk are marginal to acceptable to rearing juvenile steelhead. The input of relatively cool water from several spring fed tributaries modifies the temperature in the downstream portion. These tributaries (Cottonwood, Russell, and Caldwell Creeks) all have confirmed steelhead rearing and presumed limited spawning. They have all had much of their length channelized and have poor riparian conditions. The upstream portion of Cottonwood is the only section of these tributaries that has good to marginal conditions. It is assumed that some spawning does occur in Yellowhawk but the amount and success is largely unknown. Given all that, Yellowhawk does provide the best habitat downstream of Bennington Dam in the Mill Creek flood channel/Yellowhawk complex.

Titus Creek is a periodic distributary of Mill Creek. It has its origins about 2.5 miles above Bennington Dam and runs parallel to Mill Creek for 4.6 miles before rejoining. The inlet to Titus from Mill Creek is not constant. Currently this inlet is maintained in the spring and summer to provide water for water rights that are drawn from Titus. Several springs near this same area also contribute to the flow and, in fact, maintain the flow even when the inlet from Mill Creek is obstructed. Titus flows through semi-rural areas that has both good and poor riparian areas. The point at which it rejoins Mill Creek is currently perched several feet above Mill Creek itself and represents a total barrier to fish access.

Upstream from Bennington Dam Mill Creek has fair to excellent steelhead habitat throughout the Washington portion and into Oregon up to the City of Walla Walla water intake. There is one minor obstruction (Table 3-11) near where the creek crosses the Oregon/Washington border at Kooskooskie. It is an old water diversion dam that is about 6 feet high at low water. This facility was historically used to divert water for municipal use. The City of Walla Walla's current water intake dam is above Kooskooskie at RM 26.9 and pipes water overland to the City's water plant. Much of the diversion is in the winter and spring and is stored in the Walla Walla aquifer by the City for recovery in the summer when flows are low. The amount that the City can withdraw is controlled by the FERC license they hold (as limited power is produced at the water facility). Minimum flows are set at the Kooskooskie Water Gauging site currently maintained by the USGS near the above-mentioned Kooskooskie dam. Above the Intake is the protected Walla Walla Watershed. This area has limited access and is in near-pristine condition.

Given the above conditions, the following are recommended:

- The geographic areas above Bennington Dam should be given priority for protection. The EDT results support the conclusion that this area be protected from further degradation until the barriers and flow problems in lower Mill Creek are resolved. The geographic areas involved are:
    - Mill Creek, Bennington to Blue Creek
    - Mill Creek, Blue Creek to Walla Walla water intake
    - Mill Creek, Walla Walla water intake to steelhead access limit
    - Upper Mill Creek Tributaries
    - Middle Mill Creek Tributaries
    - Blue Creek Drainage
- The geographic area containing Yellowhawk Creek should remain as a priority for protection as noted in the Protection Priority Geographic Areas section above. Yellowhawk Creek is likely the only viable migration corridor for adult steelhead and salmon to access the good habitat above Bennington Dam. In order to preserve what population exists above the dam it is vital that this corridor is maintained. Yellowhawk Creek also contains valuable rearing area and serves as an escape alternative for juvenile salmonids that might otherwise rear in Mill Creek, but are unable to because of lack of water and high temperatures.
- The geographic area containing the flood control channel obstructions and immanent threats should be considered as a priority to be addressed. This presents some difficulty as all work within this area must take into consideration a wide array of stakeholders including city governments, tribal interests, state agencies, federal agencies, and citizens. The Mill Creek Working Group has been meeting since 2002 in attempt to foster ideas

and solutions to the problems associated with the Mill Creek flood channel. It enjoys a wide involvement, including all of the groups mentioned above. The assessment recommends that this group be considered as an avenue by which to continue to work.

- The geographic area (Mill Creek, mouth to start of Corps Project at Gose St) containing the area from the mouth of Mill Creek to the start of the Mill Creek flood channel at Gose St should be considered a priority for protection. If resources are to be expended modifying the project to allow safer fish passage then it would be imprudent not to protect the channel that allows access to this project.
- The geographic area containing the flood control channel obstructions should include Titus Creek. This area has the potential to be a summer rearing area for steelhead and Chinook, providing them refuge from the warmer temperatures in the flood channel.

Impacted Life Stages

Within the priority restoration geographic areas above, Table 3-12 lists the life stages that are the most impacted according to the EDT analysis.

The impacted life stages are strictly from the EDT analysis. Although EDT did not address bull trout, in certain areas bull trout life history stages are likely impacted as well by similar limiting factors (pers. comm.., J. Flory, USFWS, 2004).

Table 3-12 Impacted Life Stages

Geographic Area	Incubation	Fry	Sub-yearling rearing	Yearling Rearing	Age-2 Rearing	Pre-spawning	Spawning	Overwintering	Yearling Migrant
Walla Walla, Mill to E.L. WW	SPCK	SPCK		SH	SH	SPCK	SPCK	SH	SH
Walla Walla, E.L. WW to Tumalum Br.	SH, SPCK	SH, SPCK	SH, SPCK	SH		SPCK		SH	
Walla Walla, Tumulum Br. To Nursery Br.	SPCK	SH, SPCK	SH, SPCK			SPCK		SH	
Walla Walla, Tumulum Nursery Br. To Little WW Diversion	SPCK	SH, SPCK	SH, SPCK			SPCK		SH	
Walla Walla, Little WW to Diversion to Forks	SH, SPCK	SPCK	SH*, SPCK	SH		SPCK		SH	
SF Walla Walla, mouth to Elbow Creek	SH, SPCK	SPCK	SH, SPCK	SH		SPCK		SH	
NF Walla Walla, mouth to L. Meadows Canyon Cr. (plus Meadows	SH, SPCK		SH,SPCK	SH		SPCK		SH, SPCK	
Coppei Drainage	SH	SH	SH					SH	
Touchet, Coppei to forks (plus Whiskey)	SH	SH, SPCK	SH, SPCK	SH		SPCK	SPCK		
SF Touchet Mainstem	SH, SPCK	SPCK	SH	SH		SPCK	SPCK	SH	
SF Touchet Tribs	SH	SH	SH					SH	
NF Touchet Mainstem	SH	SH, SPCK	SH, SPCK	SH		SPCK		SPCK	
NF Touchet Tribs (excl. Wolf Fork)	SH	SH	SH					SH	
Wolf Fork, mouth to Coates (plus Robinson and Coates	SH, SPCK	SPCK	SH, SPCK	SH		SPCK		SH	
Wolf Fork, Coates to access limit (plus Whitney)	SH, SPCK	SH, SPCK	SH			SPCK		SH, SPCK	

*Steelhead Age 1 migrant outranked subyearling rearing. Substitution made because of large productivity change difference (30% and <2% respectively)
SH=Steelhead SPCK=Spring Chinook

Limiting Habitat Attributes

The habitat attributes listed in Table 3-13 are considered to have the most impact within the above Walla Walla reaches and key life stages listed in Table 3-12.

Table 3-13 Habitat Attributes

Geographic Area	LWD	Confimement	Riparian Function	Sediment	Key Habitat (pools)	Temperature	Flow	Bedscour
Walla Walla, Mill to E.L. WW	X	X	X	X	X	X	X	X
Walla Walla, E.L. WW to Tumalum Br.	X	X	X	X	X	X	X	X
Walla Walla, Tumulum Br. To Nursery Br.	X	X	X		X		X	X
Walla Walla, Tumulum Nursery Br. To Little WW Diversion	X	X	X		X		X	X
Walla Walla, Little WW to Diversion to Forks	X	X	X		X	X	X	
SF Walla Walla, mouth to Elbow Creek	X	X	X	X	X	X	X	X
NF Walla Walla, mouth to L. Meadows Canyon Cr. (plus Meadows	X	X	X	X	X	X	X	X
Coppei Drainage	X	X	X	X	X	X	X	X
Touchet, Coppei to forks (plus Whiskey)	X	X	X	X	X	X	X	X
SF Touchet Mainstem	X	X	X	X	X	X		X
SF Touchet Tribs	X	X	X	X	X			
NF Touchet Mainstem	X	X	X	X	X	X		
NF Touchet Tribs (excl. Wolf Fork)	X				X			
Wolf Fork, mouth to Coates (plus Robinson and Coates	X	X	X	X	X	X		
Wolf Fork, Coates to access limit (plus Whitney)	X	X	X	X	X			

These habitat attributes were taken from the EDT analysis. The limiting attributes identified appeared to be consistent with what is known about the subbasin. The mainstem Walla Walla GAs all identified LWD, confinement, riparian function, key habitat (pools) and flow (low) as limiting habitat factors. Sediment, temperature and bedscour were present in at least one of the geographic areas. As with the limited life stages, the NF and SF Walla Walla had identical limiting habitat attributes.

The mainstem Touchet, Coppei Cr to the forks and Coppei Cr had identical limiting attributes for steelhead. LWD, Confinement, Riparian Function, Key Habitat (pools), Sediment and Temperature were common to the NF and SF Touchet mainstem and Wolf Fork. The NF and SF Touchet Tributaries GAs had LWD and key habitat (pools) as common limiting habitat attributes.

Walla Walla Spring Source Creeks and Distributaries

The spring source and distributaries that enter the Walla Walla in the stateline area south and west of the town of Walla Walla are of special concern in this assessment. These streams include: East Little Walla Walla system; West Little Walla Walla system; McEvoy Creek; and Spring Branch. Of these only East Little Walla Walla came out high for restoration in the EDT analysis and none came out high in protection value. The concern is that the real worth of these streams that have most of their flow from groundwater/springs may not be well expressed in the EDT analysis. Flows are variable in these tributaries, and in the summer they have temperatures that are much cooler than the mainstem. As an example, in 2002 temperatures in E. Little Walla Walla reached only 70 degrees F; temperatures on the mainstem Walla Walla at Mojonnier Rd (less than 1 mile downstream) exceeded 75 degrees F (Mendel et al. 2003). In all likelihood these streams offer refuge for juvenile salmonids, both within the streams and at the mouths, from the higher temperature mainstem. These spring source creeks are impacted by water diversion activities in Oregon. The West and East Little Walla Walla are influenced by the Little Walla Walla diversion off of the mainstem Walla Walla. Water that is diverted from the mainstem Walla Walla but is not used by irrigators on the Little Walla Walla Walla ends up in the East and West Little Walla Walla Rivers. In recent years less water has been diverted down the Little Walla Walla in the summer to satisfy a minimum instream flow requirement on the mainstem Walla Walla River. Because less water has been diverted ino the Little Walla Walla, less water has been available for the West and East Little Walla Walla Rivers as well. While East Little Walla Walla can maintain flow due to groundwater influence the West Little Walla in Washington has gone dry the past three summers..

The influence that these streams can have on the steelhead and Chinook salmon populations is largely unknown. The assumption for this assessment is that the cool water input to the mainstem and opportunity for refuge should not be ignored. All of the the streams, with the exception of West Little Walla Walla, flow into geographic areas that are priority for restoration and protection and that have flow and temperature as limiting factors. West Little Walla Walla flows into the Walla Walla just downstream of the priority geographic areas. Given the complicated nature of this area, not to mention the bi-state implications, this assessment recommends that the combined citizen and technical groups consider the issue for inclusion within the management plan.

Bull Trout

The assessment of bull trout and its habitat presented some difficulty in the Walla Walla Subbasin. Rules for bull trout in EDT had not been developed in time for this assessment. This coupled with a lack of knowledge of even the basic life history of bull trout in the Walla Walla River put the fish at a distinct disadvantage when it came to naming priority habitats for protection and restoration. EDT reaches and the geographic areas described thus far in the document were developed based on the distribution of steelhead and spring Chinook, not bull trout. Given that, and to be consistent with other assessments such as the list of priority streams from the Bull Trout Recovery Plan, the following reaches are to be considered as priority for Protection under the geographic area named “Headwaters”:

- NF Touchet above EDT reaches
- Burnt and Green Forks above EDT reaches
- Wolf Fork above EDT reaches
- Mill Creek above EDT reaches
- SF Walla Walla above EDT reaches
- NF Walla Walla above EDT reaches

These reaches do not reflect the extent of bull trout habitat. Many of the reaches defined for EDT should also take into account bull trout needs when formulating management plans. In addition, it is assumed by this assessment team that actions within those reaches that benefit the other focal species will also benefit bull trout.

Bull trout in the Wallla Walla Subbasin are not at immediate risk of extinction (USFWS 2002). They spawn and rear in the headwaters of the Walla Walla Subbasin and most of its tributaries but some fish migrate downstream as far as the lower mainstem Walla Walla River. The extent of their downstream movements is presently unknown in the Walla Walla and Touchet basins, but it is currently under study in the Walla Walla River through use of radio telemetry. Barrier removal, reduction of instream sediment, and reducing or maintaining stream temperatures are some of the primary habitat recommendations in the draft bull trout recovery plans. This is consistent with the EDT analyses for steelhead and spring Chinook, and with the results of the Walla Walla Basin Limiting Factors Report.

3.7 Aquatic Species of Interest

Species of Interest (SOI) was included within the plan to provide a venue to present species that may have ecological and/or cultural significance but for which there is not enough known about the species to include them in the focal species category for planning purposes. SOI were submitted to the subbasin planning team for approval to be included within the plan. SOI that are submitted have an unknown quantity of ecological significance; in order to determine whether or not these species should be considered as focal for the subbasin more must be learned about subbasin specific life histories and conditions that may be limiting there productivity.

Each SOI has a corresponding section within the research, monitoring and evaluation section that includes either a research plan for the SOI or a place holder with the intention of inserting a plan in a later iteration of the subbasin plan. SOI were not to be submitted without either a research plan or the intention of developing one.

3.7.1 Mountain Whitefish

Mountain whitefish (*Prosopium williamsoni*) was a species of interest proposed by WDFW. The following write-up was provided by WDFW staff.

Mountain whitefish are often a forgotten member of the salmonidae family in southeast Washington. A popular winter fishery used to exist for whitefish in parts of southeast Washington. Few anglers target whitefish now.

Extensive sampling for salmon and steelhead by WDFW in the Washington portion of the Walla Walla Subbasin during the past two decades suggests that whitefish are not very common or well distributed in the subbasin. When whitefish are found, WDFW tends to observe occasional clusters of adult whitefish in pools, and occasional, isolated juveniles scattered in the Walla Walla Subbasin. The age classes between adult whitefish and subyearlings are rarely captured or observed.

WDFW has concerns that mountain whitefish in southeast Washington are not maintaining themselves and may vanish in the next decade or two. WDFW intends to propose a project to compile the literature about whitefish life history and habitat use and compare that with a compilation of WDFW sampling efforts and observations of whitefish for southeast Washington. The compilation of information would form the basis to help determine what additional sampling efforts and methods are needed to develop a more complete understanding of whitefish ecology, distribution and abundance in the Walla Walla Basin within Washington, the Tucannon River, and other southeast Washington streams.

3.7.2 Pacific and western brook lamprey (submitted by CTUIR)

Pacific and western brook lamprey were suggested as focal species by CTUIR. It is well documented that Pacific (*Lampetra tridentata*) and western brook (*Lampetra richardsoni*) lampreys were both abundant in the Walla Walla River Subbasin historically (Lane and Lane 1979, Swindell 1940). Until recently, each species received little attention from fish managers. Abundance and range are currently unknown but populations of western brook lamprey appear to be maintaining, while Pacific lamprey are believed to be at or very near extinction. Detailed life history, distribution, and abundance information can be found in Appendix E.

3.7.3 Species of Interest: Freshwater Mussels (*Mollusca Unionoida*)

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. Further information regarding the life history, distribution, and populations of freshwater mussels can be found in Appendix E.

4. Subbasin Terrestrial Assessment

4.1 Introduction

The terrestrial assessment occurred at two spatial scales. First was the Southeast Washington Ecoregion Scale, which incorporated the Asotin, Lower Snake, Palouse, Tucannon, and Walla Walla Subbasins. Note that the ecoregion also includes portions of Idaho and Oregon. The ecoregion-scale assessment, completed by WDFW, is located in Appendix F. The subbasin-scale assessment, incorporating portions of the ecoregion document and information unique to the subbasin, can be found in Appendix F.

This section includes descriptions of the:

- data available and that was used for the terrestrial assessment (section 4.2),
- selection process used to identify priority terrestrial habitats (section 4.3.1)
- four priority terrestrial habitats – Ponderosa Pine Forest, Eastside Grassland, Eastside Riparian Wetlands, Shrub-Steppe (section 4.3.2)
- one cover type of interest – Agriculture (section 4.3.3)
- status of terrestrial habitat (section 4.3.4)
- focal terrestrial species (section 4.4)

4.2 Data Used for Terrestrial Assessment

This assessment at both scales was completed through review of several key databases that summarize current and historic conditions for terrestrial wildlife and their habitats. These include the Ecosystem Conservation Assessment (ECA), Interactive Biodiversity Information System (IBIS), and GAP analyses.

The following description of the ECA database was taken directly from Appendix F (Ashley and Stovall 2004):

"Ecoregion Conservation Assessments are conducted at the ecoregional scale and provide information for decisions and activities that:

1. establish regional priorities for conservation action
2. coordinate programs for species or habitats that cross state, county, or other political boundaries
3. judge the regional importance of any particular site in the ecoregion
4. measure progress in protecting the full biodiversity of the ecoregion.

ECA brings diverse data sources together into a single system. Terrestrial species and habitat information are brought together as an integrated planning resource to identify which areas contribute the most to the conservation of existing biodiversity.

ECA has no regulatory authority. It is simply a guide for conservation action across the Ecoregion that is intrinsically flexible that should not constrain decision makers in how they address local land use and conservation issues. Since many types of land use are compatible with biodiversity conservation, the large number and size of conservation areas creates numerous options for local conservation of biodiversity. Ultimately, the management or protection of the conservation priority areas will be based on the policies and values of local governments, organizations, and citizens.

Ecoregion/subbasin planners prioritized ECA data into three conservation priority classes. The primary distinction between ECA classes is the amount of risk potential associated with those habitats. Ecoregional Conservation Assessment classifications include:

- Class 1: Key habitats mostly under private ownership (high risk potential)
- Class 2: Key habitats primarily on public lands (low to medium risk depending on ownership)
- Class 3: Unclassified/unspecified land elements (mainly agricultural lands)

ECA data included in the subbasin assessment provided subbasin planners with a logical path to <u>initially</u> determine how many acres of each focal habitat to protect and where protection should occur. An integral part of this land protection process is to identify lands already under public ownership within ECA identified areas (see Appendix L). Public ownership, key aquatic areas, vegetation zones, and rare plant communities are fine filters subbasin planners will use to support and/or guide protection and enhancement objective efforts within the subbasin (see Appendix L). This "fine filter" concept is applicable to all protection and enhancement objectives."

The IBIS database provided habitat descriptions, historic habitat maps, and current habitat maps. GAP data was used to identify the protection status of IBIS defined habitat types. The "*GAP status"* is the classification scheme or category that describes the relative degree of management or protection of specific geographic areas for the purpose of maintaining biodiversity. The goal is to assign each mapped land unit with categories of management or protection status, ranging from 1 (highest protection for maintenance of biodiversity) to 4 (no or unknown amount of protection).

- <u>Status 1 (High Protection):</u> An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a natural state within which disturbance events of natural type are allowed to proceed without interference or are mimicked through management. Wilderness areas garner this status. Approximately 0.6 percent of the Ecoregion is within this category. The area of the upper Mill Creek watershed that is closed to access would be classified as a high protection area.

- Status 2 (Medium Protection): An area having permanent protection from conversion of natural land cover and a mandated management plan in operation to maintain a primarily natural state, but which may receive use or management practices that degrade the quality of the existing natural state. An estimated 0.8 percent of the lands within the Ecoregion are in this category. There is no land classified as medium protection within the Walla Walla Subbasin.
- Status 3 (Low Protection): An area having permanent protection from conversion of natural land cover for the majority of the area, but subjective to uses of either a broad, low intensity type or localized intense type. It also confers protection to federally listed endangered and threatened species throughout the area. Lands owned by WDFW within the Ecoregion fall within medium and low protection status. Ten percent of the lands within the Ecoregion are in this category. United States Forest Service and Washington Department of Natural Resource land within the Walla Walla Subbasin would be classified as low protection stauts.
- Status 4 (No or Unknown Protection): Lack of irrevocable easement or mandate to prevent conversion of natural habitat types to anthropogenic habitat types and allow for intensive use throughout the tract, or existence of such activity is unknown. This category includes the majority (88 percent) of the land base within the Ecoregion." (Appendix F).

The relative protection status of land in the Ecoregion can be found in Table 4-1.

Table 4-1 Protection Status of Lands in the Southeast Washington Subbasin Planning Ecoregion

Subbasin	Palouse (acres)	Lower Snake (acres)	Tucannon (acres)	Asotin (acres)	Walla Walla (acres)	Total (Ecoregion)
Status 1: High Protection	49	7,383	13,793	0	8,211	29,436
Status 2: Medium Protection	15,014	8,443	10,298	4,976	8,500	47,231
Status 3: Low Protection	159,032	61,194	77,157	80,690	124,645	502,718
Status 4: No Protection	1,951,648	982,905	224,938	160,334	993,342	4,313,167
Total(Subbasin)	**2,125,841**	**1,059,935**	**326,185**	**246,001**	**1,134,698**	**4,892,552**

Source: Table 6 of Appendix F.

4.3 Terrestrial Priority Habitats

4.3.1 Selection of Terrestrial Priority Habitats

The Walla Walla Subbasin consists of 13 wildlife habitat types. These habitat types are briefly described in Table 4-2. Their historic and current abundance in the Walla Walla subbasin are illustrated in Figures 4-1, 4-2 and 4-3 respectively, and the percent change between the two time periods is detailed in Table 4-3.

Table 4-2 Wildlife Habitat Types within the Walla Walla Subbasin

Habitat Type	Brief Description
Montane Mixed Conifer Forest	Coniferous forest of mid-to upper montane sites with persistent snowpack; several species of conifer; understory typically shrub-dominated.
Eastside (Interior) Mixed Conifer Forest	Coniferous forests and woodlands; Douglas-fir commonly present, up to 8 other conifer species present; understory shrub and grass/forb layers typical; mid-montane.
Ponderosa Pine and Interior White Oak Forest and Woodland	Ponderosa pine dominated woodland or savannah, often with Douglas-fir; shrub, forb, or grass understory; lower elevation forest above steppe, shrubsteppe.
Alpine Grasslands and Shrublands	Grassland, dwarf-shrubland, or forb dominated, occasionally with patches of dwarfed trees.
Eastside (Interior) Canyon Shrublands	A mix of tall to medium deciduous shrublands in a mosaic with bunchgrass or annual grasslands.
Eastside (Interior) Grasslands	Dominated by short to medium height native bunchgrass with forbs, cryptogam crust.
Montane Coniferous Wetlands	Forested wetlands or floodplains with a persistent winter snow pack; >30% tree canopy dominated by conifers; shrubs include goose berry, salmon berry, spirea, dogwood, alder, currant, snowberry.
Shrub-steppe (not present)	Sagebrush and/or bitterbrush dominated; bunchgrass understory with forbs, cryptogam crust.
Agriculture, Pasture, and Mixed Environs	Cropland, orchards, vineyards, nurseries, pastures, and grasslands modified by heavy grazing; associated structures.
Urban and Mixed Environs	High, medium, and low (10-29 percent impervious ground) density development.
Herbaceous Wetlands	Emergent herbaceous wetlands with grasses, sedges, bulrushes, or forbs; aquatic beds with pondweeds, pond lily, other aquatic plants.
Open Water – Lakes, Rivers, and Streams	Lakes, are typically adjacent to Herbaceous Wetlands, while rivers and streams typically adjoin Eastside Riparian Wetlands and Herbaceous Wetlands.
Eastside (Interior) Riparian Wetlands	Shrublands, woodlands and forest, less commonly grasslands; often multilayered canopy with shrubs, graminoids, forbs below.

Source: IBIS 2003; as cited in Ashley and Stovall 2004.

Table 4-3 Changes in Wildlife Habitat Types in the Walla Walla Subbasin - Circa 1850 (Historic) to 1999 (Current)

Status	Montane Mixed Conifer Forest	Interior Mixed Conifer Forest	Lodgepole Pine Forest and Woodlands	Ponderosa Pine	Subalpine parkland	Alpine Grasslands and Shrublands	Interior Canyon Shrublands	Eastside (Interior) Grasslands	Shrubsteppe	Agriculture, Pasture and Mixed Environs	Urban and Mixed Environs	Lakes, Rivers Ponds, and Reservoirs	Herbaceous Wetlands *	Montane Coniferous Wetlands	Eastside (Interior) Riparian Wetlands
Historic	13,351	43,515	742	23,241	5,934	247	0	962,275	6,676	0	0	0	70,217	0	22,283
Current	22,003	120,484	0	49,904	0	872	544	154,619	29,252	719,877	11,473	768	1,135	51	15,217
Change (acres)	+8,652	+76,969	-740	+26,663	-5,934	+625	+544	-807,656	22,576	+719,877	+11,473	-+768	-68,083	+51	-7,066
Change (%)	+65	+177	-100	+115	-100	+253	999	-84	+338	999	999	999	-98	999	-32

Note: Values of 999 indicate a positive change from historically 0 (habitat not present or mapped in historic data.

* Techical staff have limited confidence in these esimtates due to data limitations.

Historic Eastside (Interior) Riparian Wetlands estimates in IBIS (2003) were not considered accurate. As such, estimates of historic wetland acres were developed separately.

Source: IBIS 2003; as cited in Ashley and Stovall 2004.

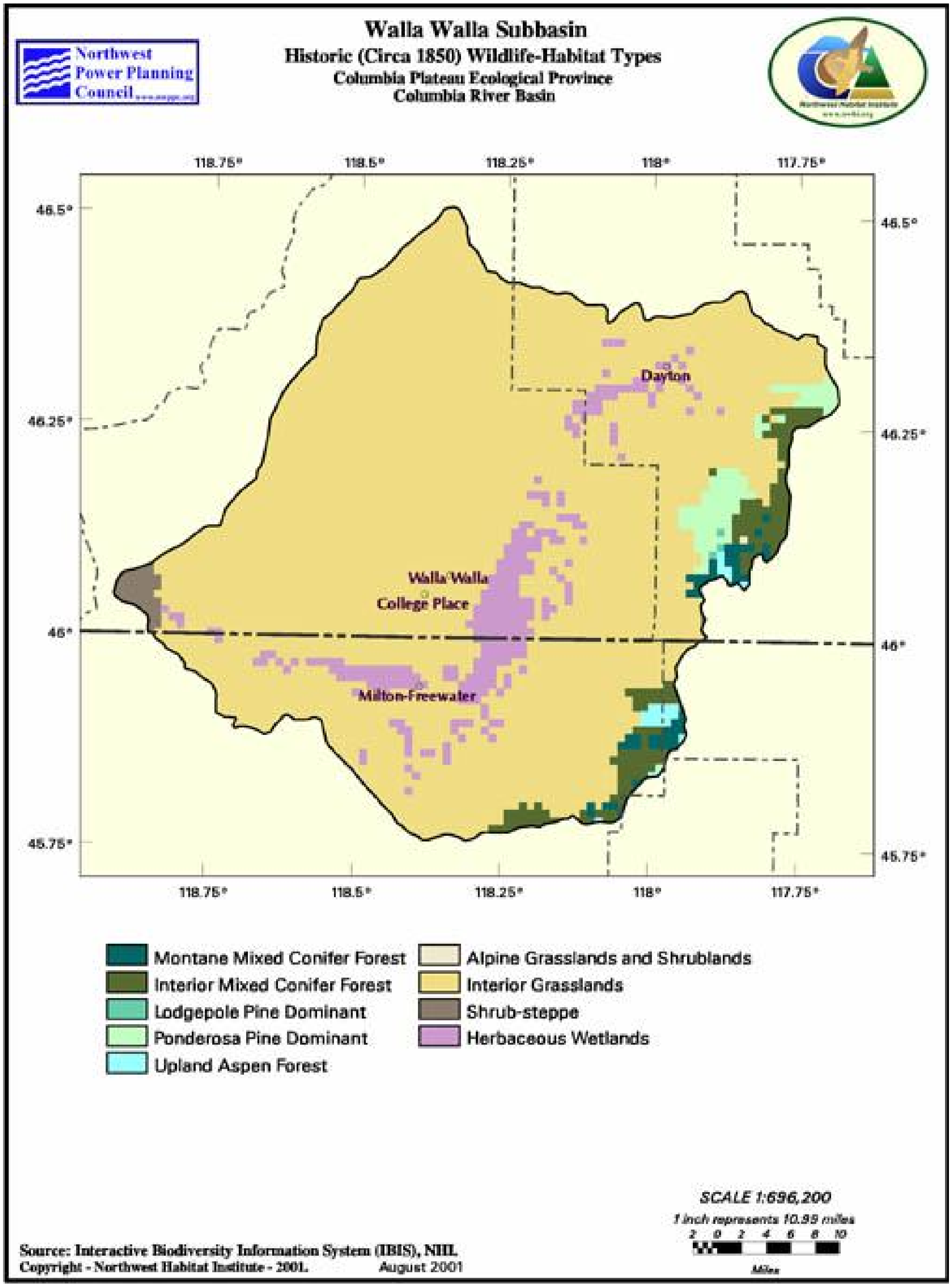

Figure 4-1 Historic Wildlife Habitat Types of the Walla Walla Subbasin

Source: IBIS 2003, as cited in Ashley and Stovall 2004.

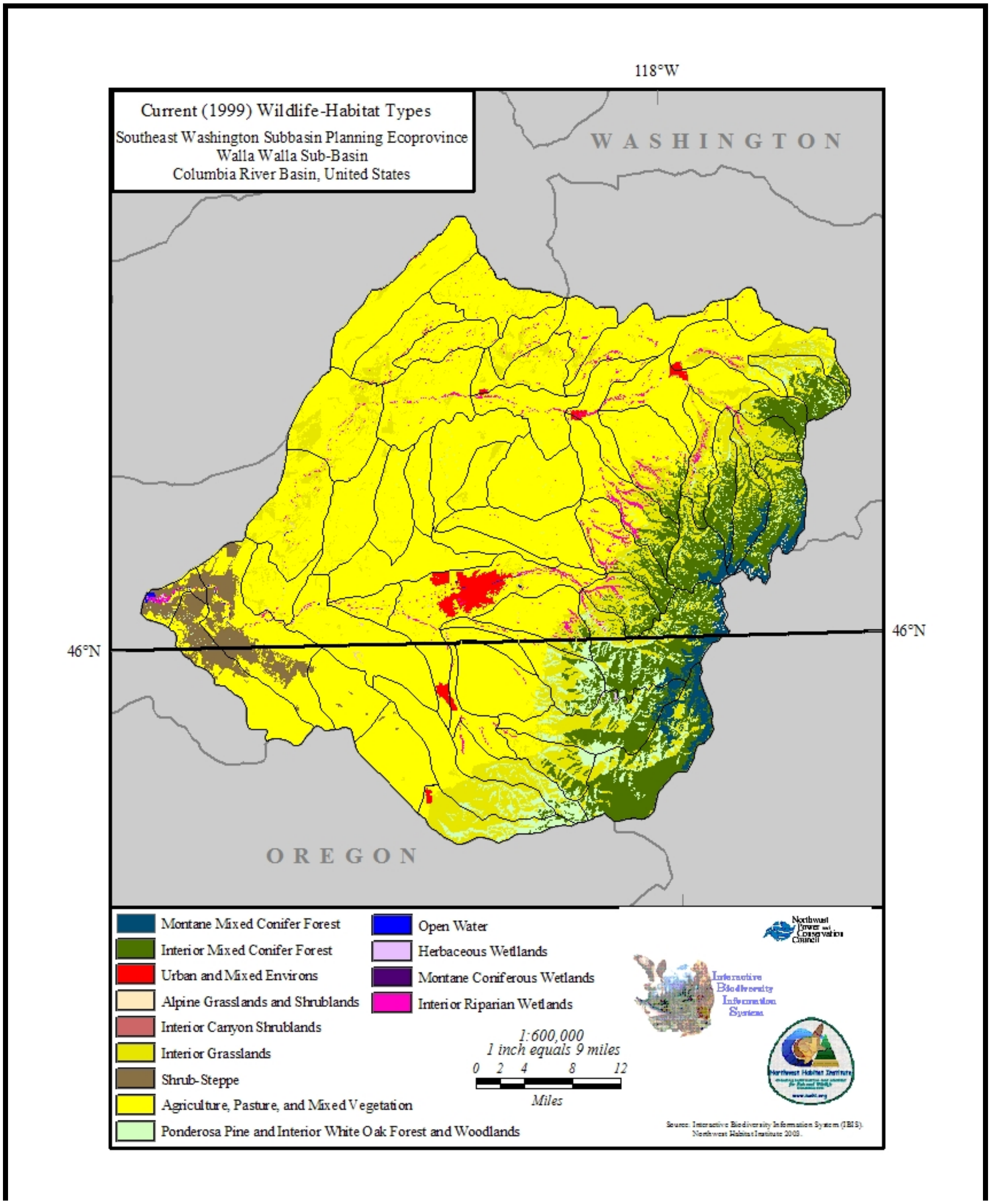

Figure 4-2 Current Wildlife Habitat Types of the Walla Walla Subbasin

IBIS 2003, as cited in Ashley and Stovall 2004.

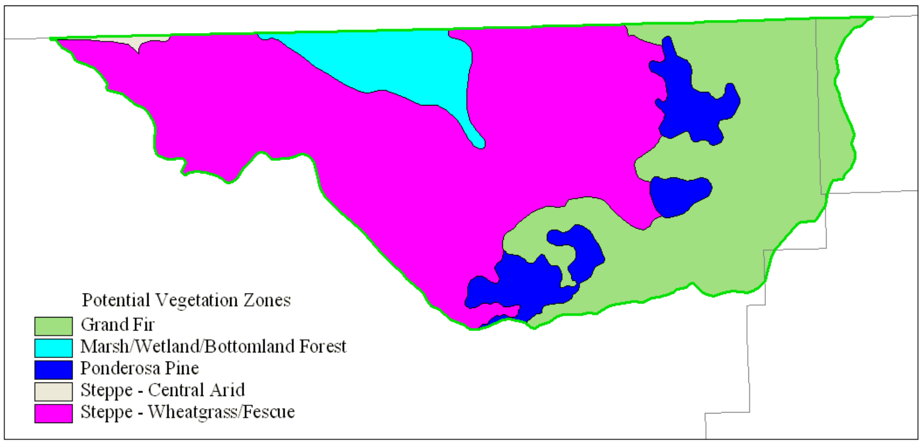

Figure 37b. Pre-agricultural vegetation zones of the Southeast Washington Subbasin Planning Ecoregion, Oregon side.

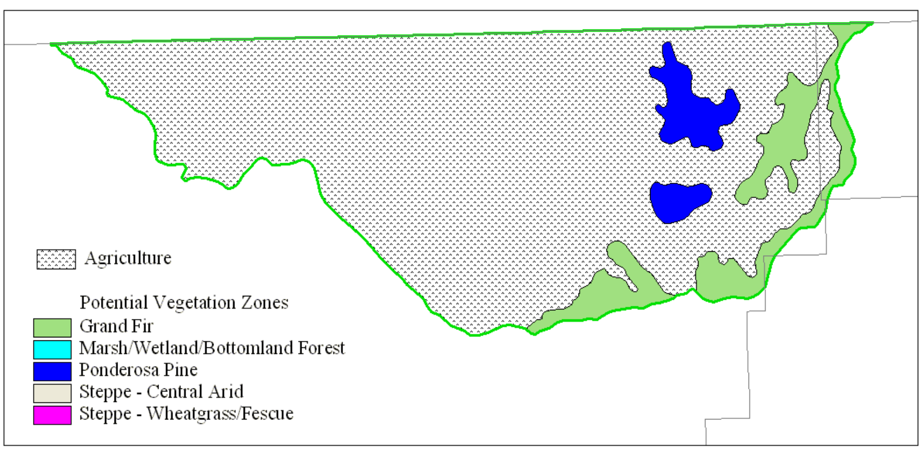

Figure 38b. Post-agricultural vegetation zones of the Southeast Washington Subbasin Planning Ecoregion, Oregon side.

Figure 4-3 Pre- and Post-Agricultural Vegetation Zones of the Southeast Washington Subbasin Planning Ecoregion

The following four key principles were used to guide selection of focal habitats (see Section 4.1.3 in Appendix F for more detail):

- Focal habitats were identified by WDFW at the ecoregion level and reviewed/modified at the subbasin level.
- Focal habitats can be used to evaluate ecosystem health and establish management priorities at the ecoregion level.
- To identify focal macro habitat types within the ecoregion, ecoregion planners used the assessment tools to develop a habitat selection matrix based on various criteria, including ecological, spatial, and cultural factors.

Of the 13 habitat types present within the subbasin, the following four were selected as focal habitats for detailed analysis within this subbasin plan (note the same habitats were selected as focal habitat types in all subbasins within the Southeast Washington Ecoregion):

- ponderosa pine
- eastside interior grasslands
- interior riparian wetlands
- shrub-steppe.

The number of extant acres occupied by each focal habitat type within the ecoregion is illustrated by subbasin in Table 4-4 (IBIS 2003, as cited in Ashley and Stovall 2004).

Table 4-4 Comparison of the Amount of Current Focal Habitat Types for Each Subbasin in the Ecoregion

Subbasin	Focal Habitats			
	Ponderosa Pine	Shrubsteppe	Interior Grassland	Riparian Wetlands
Asotin	14,997	0	134,789	1,687
Palouse	48,343	159,305	356,638	7,923
Lower Snake	1,014	6,505	416,207	3,181
Tucannon	9,918	0	114,263	4,512
Walla Walla	49,904	29,252	154,619	15,217

Source: IBIS 2003, as cited in Ashley and Stovall 2004.

Note: The Rainwater Wildlife Area managed by CTUIR contains 8,768 acres total, of which 596 acres are riparian wetland habitat, 1423 acres are graddland habitat, and <500 acres are Ponderosa Pine habitat. The remainder is a mix of other habitat types.

Ponderosa pine, grassland, and shrub-steppe focal habitat types along with their associated land cover disturbances are detailed graphically in Figure 4-4. Current and historic riparian wetland habitat information is a significant data gap; consequently, riparian wetland habitat is not included in the habitat distribution maps for the Walla Walla Subbasin.

A brief description of each focal habitat type is presented in following sections. Detailed descriptions of the focal habitat types are presented in Appendix F (Ashley and Stovall 2004).

Subbasin-specific focal habitat type anomalies and differences are described in detail in the following sections.

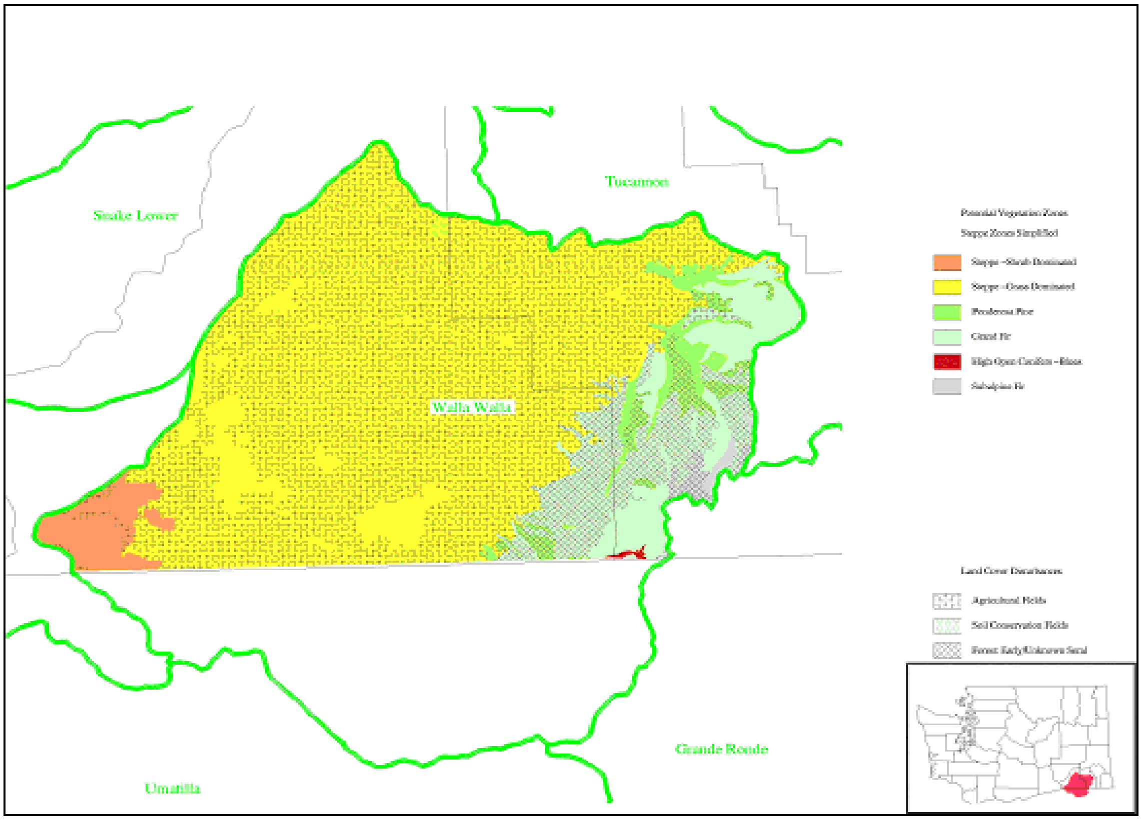

Figure 4-4 Ponderosa Pine, Grassland, and Shrubsteppe Habitat Types and Associated Land Cover Disturbances
Source: Cassidy 1997; as cited in Ashley and Stovall 2004

4.3.2 Description of Terrestrial Priority Habitats

Ponderosa Pine (*Pinus ponderosa*)

This habitat type occurs in much of eastern Washington and Oregon including the eastern slopes of the Cascades and the Blue Mountains (Johnson and O'Neil 2001). It typically occurs on the driest sites supporting conifers in the Pacific Northwest, and elevation ranges from just above sea level to over 6,000 feet in dry, warm areas (Johnson and O'Neil 2001). Typically a woodland or savanna with tree canopy coverage of 10 to 60 percent, ponderosa pines (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesii*) dominate the conifer community (Johnson and O'Neil 2001).

Within the subbasin, ponderosa pine habitat currently covers a wide range of seral conditions (Ashley and Stovall 2004). Forest management and fire suppression in the subbasin have resulted in the replacement of old-growth ponderosa pine forests with younger mixed forests (greater proportion of Douglas-fir than ponderosa pine) (Habeck 1990, as cited in Ashley and Stovall 2004). Silviculture practices (particularly clear-cut logging) and subsequent reforestation have converted these older, diverse, ponderosa dominated stands into younger stands that are less diverse and less complex structurally (Wright and Bailey 1982, as cited in Ashley and Stovall 2004).

Much of the ponderosa pine habitat has a younger tree cohort composed of more shade-tolerant species that form a more closed, multi-layered canopy (Ashley and Stovall 2004). For example, this habitat previously included natural fire-maintained stands in which grand fir (*Abies grandis*) often became the dominant canopy species (Ashley and Stovall 2004). Currently, most management regimes prescribe the harvest of large ponderosa pine and Douglas fir (Ashley and Stovall 2004). This decreases average tree size and increases stand density, thereby preventing the establishment of grand fir in the canopy (Ashley and Stovall 2004). In some portions of the subbasin, new woodlands have been created by patchy tree establishment at forest-steppe ecotones (Ashley and Stovall 2004).

Other impacts to this habitat type within the subbasin include

- Introduced annuals (especially cheatgrass) and invading shrubs under heavy grazing pressure (Agee 1993, as cited in Ashley and Stovall 2004) – these exotics have replaced the native herbaceous species in the habitat's understory.
- Four exotic knapweed species (*Centaurea* spp.) are spreading rapidly through the ponderosa pine habitat type and are threatening to replace cheatgrass as the dominant invader after grazing (Roche and Roche 1988, as cited in Ashley and Stovall 2004).
- Dense cheatgrass stands eventually alter the fire regime by reducing the frequency of low-intensity fires. This leads to catastrophic fires that kill, and lead to the replacement of, the existing stand (Ashley and Stovall 2004).
- Bark beetles (primarily of the genus *Dendroctonus* and *Ips*) kill large numbers of ponderosa pines annually and are the major mortality factor in stands of commercial saw timber (Schmid 1988 in Howard 2001, as cited in Ashley and Stovall 2004).

Remaining ponderosa pine habitats in the Walla Walla Subbasin fall primarily in the "low" to "no protection" categories. Consequently, this habitat type "will likely suffer further degradation, disturbance, and/or loss" in the ecoregion (Ashley and Stovall 2004) (Figure 4-5). Although it may continue to expand its coverage in the Walla Walla subbasin, new acreage will be young seral stages that provide little ecological value. Table 4-5 details the protection status of remaining ponderosa pine habitat within the Walla Walla Subbasin (Ashley and Stovall 2004).

Table 4-5 Ponderosa Pine Habitat GAP Protection Status/Acres in the Walla Walla Subbasin

GAP Protection Status	Acres*
High Protection	544
Medium Protection	0
Low Protection	11,229
No Protection	38,130

Source: IBIS 2003; as cited in Ashley and Stovall 2004.
* Note: The Rainwater Wildlife Area managed by CTUIR includes 8,768 acres within the subbasin.

The number of acres protected by Conservation Reserve Program (CRP) (compared by county) are listed in Table 4-6 (FSA 2004, as cited in Ashley and Stovall 2004). The number of acres protected through the Conservation Reserve Enhancement Program (CREP) (also by county) are presented in Table 4-7 (Farm Services Agency [FSA] 2003, as cited in Ashley and Stovall 2004). Land in these two programs was considered to have short-term high protection status.

Table 4-6 CRP Protected Acres by County within the Southeast Washington Subbasin Planning Ecoregion

County	Introduced Grasses (CP1)	Native Grasses (CP2)	Tree Plantings (CP3)	Wildlife Habitat (CP4)	Established Grass (CP10)	Trees (CP11)	Contour Grass (CP15)	Total Acres
Asotin	7,812	9,591	35	7,450	3,367	19	0	28,274
Columbia	5,991	20,162	581	5,929	10,839	355	28	43,885
Garfield	4,545	13,328	0	19,911	7,428	0	2,414	47,626
Umatilla	4,501	3,989	777	1,219	3,276	385	N/A	14,147
Walla Walla	44,955	95,555	129	0	11,735	166	0	152,540
Whitman	67,804	142,625	1,522	34,509	36,645	925	2,442	286,472

Source: FSA 2003

Table 4-7 Number of Acres Protected Through the CREP Program by County

County	CP-22 (Acres)
Asotin	1,339
Columbia[1]	2,087
Garfield[2]	2,535
Umatilla	52
Walla Walla	1,922
Whitman[3]	1,052

1 Columbia County CP-22 acreage was modified from FSA values and of the 2,087 acres listed above for Columbia County, 1,519 are CREP (pers. comm. T. Bruegman, May 2004).
2 Of the 2,535 acres listed above for Garfield County, 1,005 are CREP (pers. comm. D. Bartels, May 2004).
3 Whitman County has no CREP acres (pers. comm. D. Bartels, May 2004).
Source: FSA 2003

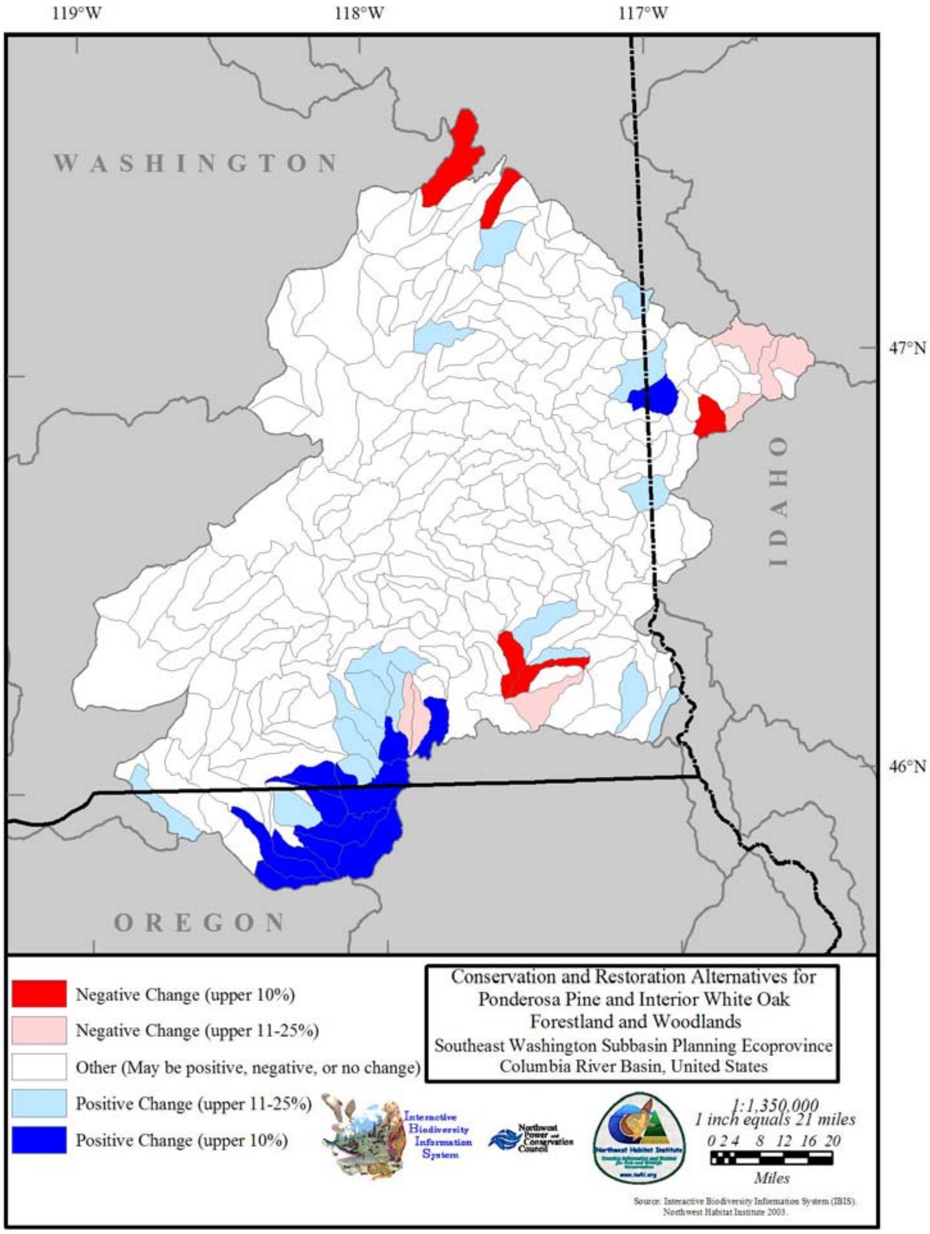

Figure 4-5 Ponderosa Pine Habitat Change in the Ecoregion

IBIS 2003; as cited in Ashley and Stovall 2004

Eastside (Interior) Grassland

Developing in hot, dry climates in the Pacific Northwest, this habitat type is found primarily at mid- to low elevations (Johnson and O'Neil 2001). In general, it is an open and irregular arrangement of short to medium-tall grass clumps (<1 meter) (Johnson and O'Neil 2001). Dominant native perennial grasses, on undisturbed sites, include Idaho fescue (*Festuca idahoensis*), bluebunch wheatgrass (*Pseudoroegneria spicata*), and Sandberg bluegrass (*Poa secunda*) (Johnson and O'Neil 2001). A large number of forbs are also present; balsamroot (*Balsamorhiza sagittata*), cinquefoil (*Potentilla recta*), and old man's whiskers (*Geum triflorum*) are among the most common (Daubenmire 1970; Franklin and Dyrness 1973; both as cited in Ashley and Stovall 2004). The eastside (interior) grassland habitat type is detailed in Appendix F (Ashley and Stovall 2004).

Ninety-one percent of native grassland habitat in the Washington portion of the Walla Walla Subbasin currently is cultivated (Cassidy 1997, as cited in Ashley and Stovall 2004). Grassland habitat across the entire subbasin has decreased by approximately 84 percent, primarily due to agricultural conversion (IBIS 2003, as cited in Ashley and Stovall 2004). These negative changes constitute the highest rate of grassland loss in the ecoregion (Ashley and Stovall 2004).

Significant portions of grassland habitat have been severely altered by the introduction of, and subsequent competition from, non-native weeds including cheatgrass (*Bromus tectorum*), knapweed (*Centaurea* spp.), and yellow starthistle (*Centaurea solstitialis*) (Ashley and Stovall 2004). Over-grazing results in the replacement of native vegetation with invasive species, especially cheatgrass and yellow starthistle (Mack 1986; Roche and Roche 1988; both as cited in Ashley and Stovall 2004)[7]. Currently, "native perennial bunchgrass/shrub communities are found only on a few 'eyebrows' on steep slopes surrounded by wheat fields, or in non-farmed canyon slopes and bottoms within agricultural areas" (Ashley and Stovall 2004).

The protection status of remaining eastside (interior) grassland habitat in the Walla Walla subbasin is presented in Table 4-8. The vast majority of the subbasin's grassland habitat is either not protected or is afforded only low-protection status; a very small percentage is included in the high-protection category (Ashley and Stovall 2004). Furthermore, the vast majority of grassland habitat throughout the Ecoregion is not protected and is at risk for further degradation and/or conversion to other land uses (Ashley and Stovall 2004).

Table 4-8 Eastside (Interior) Grassland Habitat GAP Protection Status/Acres in the Walla Walla Subbasin

GAP Protection Status	Acres
High Protection	1,478
Medium Protection	0
Low Protection	16,457
No Protection	136,674

Source: IBIS 2003, as cited in Ashley and Stovall 2004.

[7] Range transects conducted since 1991 have confirmed the degraded condition of rangeland in the subbasin (C. Smith, NRCS, pers. comm. 1995; as cited in Ashley and Stovall 2004).

Grassland habitats established through implementation of the Conservation Reserve Program receive short-term/high protection (Ashley and Stovall 2004). The number of acres protected by CRP (compared by county) are listed in Table 4-5 (FSA 2004, as cited in Ashley and Stovall 2004). The number of acres protected through the CREP program (also by county) are presented in Table 4-8 (FSA 2003, as cited in Ashley and Stovall 2004).

Eastside (Interior) Riparian Wetlands

Eastside (interior) riparian wetlands[8] occur along the interface between aquatic and terrestrial ecosystems, most often as linear strips that closely follow perennial or intermittent streams and rivers (Johnson and O'Neil 2001). Wetland hydrology or soils, periodic riverine flooding, or perennial flowing freshwater characterizes them (Johnson and O'Neil 2001). They are composed of a mosaic of shrublands, woodlands, and forest communities and have a tree layer that can be dominated by deciduous, coniferous, or mixed canopies (Johnson and O'Neil 2001). The undergrowth consists of low shrubs or dense patches of grasses, sedges, or forbs (Johnson and O'Neil 2001). The eastside (interior) grassland habitat type is detailed in Appendix F.

Ashley and Stovall (2004) summarize the current and historical condition of eastside riparian wetlands in eastern Washington as follows:

> "Historically, riparian wetland habitat was characterized by a mosaic of plant communities occurring at irregular intervals along streams and dominated singularly, or in some combination by grass-forbs, shrub thickets, and mature forests with tall deciduous trees. Beaver activity and natural flooding are two ecological processes that affected the quality and distribution of riparian wetlands."

> "Today, riparian/riverine areas contain the most biologically diverse habitats in the subbasin because of their variety of structural features (including live and dead vegetation) and the close proximity of riparian areas to water bodies. This combination of habitat features provides a wide array of habitats for numerous terrestrial species. Common deciduous trees and shrubs in riparian areas include cottonwood, alder, willow, and red osier dogwood (U. S. Forest Service and Bureau of Land Management 2000). Riparian vegetation is used by more species than any other habitat (Quigley and Arbelbide 1997)."

Both the quantity and quality of riparian vegetation has been "severally degraded" in the Walla Walla subbasin (NPPC 2001, as cited in Ashley and Stovall 2004). Only 37 percent of the Touchet River riparian zone remains in native riparian vegetation (U. S. Army Corps of Engineers 1997, as cited in Ashley and Stovall 2004). Seventy percent of the riparian zone along the Oregon portion of the Walla Walla River is in "poor" condition (U. S. Army Corps of Engineers 1997, as cited in Ashley and Stovall 2004).

[8] In Ashley and Stovall's (2004) analysis, the eastside (interior) riparian wetlands habitat type refers only to riverine and adjacent wetland habitats. Although nonetheless significant, other wetland habitat types that occur within the subbasins were not included as focal habitat types due to their limited extent.

The protection status of remaining eastside (interior) riparian wetland habitat in the Walla Walla Subbasin is presented in Table 4-9. The vast majority of the subbasin's riparian/wetland habitat is either not protected or is afforded only low-protection status; none is included in the high-protection category (Ashley and Stovall 2004). Furthermore, the vast majority of riparian habitat throughout the ecoregion is not protected and is at risk for further degradation and/or conversion to other land uses (Ashley and Stovall 2004).

Table 4-9 Eastside (Interior) Riparian Wetlands GAP Protection Status/Acres in the Walla Walla Subbasin

GAP Protection Status	Acres
High Protection	0
Medium Protection	0
Low Protection	421
No Protection	14,799

Source: IBIS 2003, as cited in Ashley and Stovall 2004.

Riparian habitats are provided additional short-term high protection by USDA's CREP program (Ashley and Stovall 2004). The number of acres enrolled in the CREP program by county is listed in Table 4-7 (Ashley and Stovall 2004).

Shrub-steppe

Description

Shrub-steppe habitats are common on the Columbia Plateau and extend onto the dry surrounding mountains (Johnson and O'Neil 2001). Widely scattered shrubs are mixed with perennial grasses (Johnson and O'Neil 2001). Elevation range is 300-9,000 feet, mostly between 2,000 and 6,000 feet (Johnson and O'Neil 2001). Shrub-steppe occurs on deep soils, stony flats, and lake beds with ash or pumice soils (Johnson and O'Neil 2001). Livestock grazing is the primary land use although much shrub-steppe has been converted to irrigation or dry-land agriculture (Johnson and O'Neil 2001). The shrub-steppe habitat type is fully described in section Appendix F.

Shrub-steppe habitat in the Washington portion of the Walla Walla Subbasin is composed entirely of the Central Arid Steppe vegetation zone[9] (Ashley and Stovall 2004). Within the Ecoregion, the Central Arid Steppe vegetation zone occurs only in the Walla Walla and Lower Snake River subbasins (Ashley and Stovall 2004).

Ashley and Stovall (2004) describe the shrub-steppe vegetation community as follows:

> "Big sagebrush, bluebunch wheatgrass, and Sandberg bluegrass dominate shrubsteppe climax vegetation (Daubenmire 1970). Other grass species occur in much smaller amounts including needle-and-thread, Thurbers needlegrass, Cusick's bluegrass, and/or bottlebrush squirreltail

[9] This shrub-steppe vegetation zone also may extend into the Oregon portion of the subbasin (Ashley and Stovall 2004).

grass. Forbs play a minor role. A cryptogamic crust of lichens and mosses grows between the dominant bunchgrasses and shrubs. Without disturbance, particularly trampling by livestock, the cryptogamic crust often completely covers the space between vascular plants."

"In areas with a history of heavy grazing and fire suppression, true shrublands are common and may even be the predominant cover on non-agricultural land. Most of the native grasses and forbs are poorly adapted to heavy grazing and trampling by livestock. Grazing eventually leads to replacement of the bunchgrasses with cheatgrass, Nuttall's fescue, eight flowered fescue, and Indian wheat (Harris and Chaney 1984). Several highly invasive knapweeds have become increasingly widespread. Yellow-star thistle is particularly widespread, especially along and near major watercourses (Roche and Roche 1988). A 1981 assessment of range conditions rated most shrubsteppe rangelands to be in poor to fair range condition, but ecological condition is usually worse than range condition (Harris and Chaney 1984)."

Within the ecoregion, the vast majority of shrub-steppe habitat is provided low or no protection and is therefore at risk for "further degradation and/or conversion to other uses" (Ashley and Stovall 2004). The protection status of shrub-steppe habitat in the Walla Walla Subbasin is summarized in Table 4-10.

Table 4-10 Shrub-steppe GAP Protection Status/Acres in the Walla Walla Subbasin

GAP Protection Status	Acres
High Protection	0
Medium Protection	0
Low Protection	1,555
No Protection	27,691

Source: IBIS 2003

Shrub-steppe habitats may be re-established directly or passively through the CRP (Ashley and Stovall 2004). As with grasslands, CRP provides short-term/high protection to shrub-steppe habitats (Ashley and Stovall 2004). Additionally, CRP grasslands may potentially provide additional shrub-steppe habitat if allowed to reach climax community conditions (Ashley and Stovall 2004). Table 4-6 presents CRP acreage by county.

4.3.3 Agriculture (Cover Type of Interest)

Agriculture operations in the Walla Walla Subbasin include dryland/irrigated crops, fruit orchards, and irrigated and non-irrigated pasture (alfalfa and hay) (Ashley and Stovall 2004). Annual grains such as wheat, oats, barley, and rye are the primary cultivated crops (Ashley and Stovall 2004). They typically are produced on upland, rolling terrain without irrigation on non-forested areas of the subbasin (Ashley and Stovall 2004). Pastures adjacent to streams and riparian areas may be irrigated (Ashley and Stovall 2004). Hay pastures typically are composed of several species, while grass seed fields are composed of only one species (Ashley and Stovall 2004).

Agricultural lands in the Walla Walla Subbasin are "extensively and intensively" irrigated (Ashley and Stovall 2004). Irrigation represents the largest use of surface and groundwater in the subbasin (Figure 4-6) (Ashley and Stovall 2004). NPPC (2001) states that an in-depth basin-wide study examining the use of surface and groundwater for agricultural irrigation is warranted (Ashley and Stovall 2004).

Ashley and Stovall (2004) summarize irrigation in the subbasin as follows:

> "There has been a steady increase in the acres of irrigated croplands in the Walla Walla Subbasin since the mid 1900s. The estimated area of irrigated Walla Walla County land in 1987 was 75,333 acres, compared to 97,136 acres a decade later (National Agricultural Statistics Service 1997, 1999). The vicinities of Touchet, Gardena Farms, Walla Walla, and College Place hold the largest proportions of alfalfa and wheat, the subbasin's dominant irrigated crops. The primary water sources include the Touchet and Walla Walla Rivers, East-West Canal, Gardena Canal, Lowden Canals, gravel aquifers, and the basalt system."

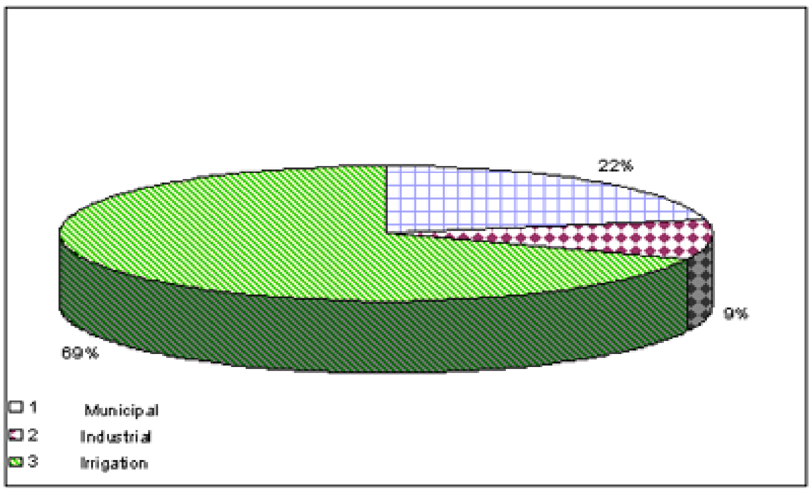

Figure 4-6 Water Use in the Walla Walla Subbasin
Source: U. S. Army Corps of Engineers 1997, as cited in Ashley and Stovall 2004.

Agricultural lands concentrated in deep soiled upland areas and valley bottoms have significantly affected grasslands, shrublands, and riparian zones in those areas (Ashley and Stovall 2004). Conversion of native habitats to agriculture altered, destroyed, and fragmented much of the grassland and riparian/floodplain habitat within the subbasin (Ashley and Stovall 2004). Increased sediment loads, the introduction of herbicides and pesticides into streams, and the invasion of exotic plants also are a result of agricultural operations (Ashley and Stovall 2004).

The conversion of agricultural land has had some beneficial wildlife impacts, especially for introduced game species. Ashley and Stovall (2004) discuss the pros and cons of agriculture conversion of native and introduced game species.

> “Although the conversion of native habitats to agriculture severely affected native wildlife species such as the sharp-tailed grouse, agriculture did provide new habitat niches quickly filled by introduced wildlife species including the ring-necked pheasant, chukar, and gray partridge. Introduced parasitic wildlife species such as European starlings also thrived as more land was converted to agriculture.”
>
> “Native ungulate and waterfowl populations took advantage of new food sources provided by croplands and either expanded their range or increased in number (J. Benson, WDFW, personal communication, 1999). Indigenous wildlife species and populations that adapted to and/or thrived on “edge” habitats increased with the introduction of agriculture except in areas where “clean farming” practices and crop monocultures dominated the landscape.”
>
> “In addition to crops, agricultural lands provide and support hunting and wildlife viewing opportunities, which promotes local economic growth. Conversely, crop depredation by elk and deer is an issue in some areas of the subbasin with a number of landowners desiring reductions in ungulate herds….”

IBIS (2003) reports that nearly all of the agriculture habitat type in the Walla Walla Subbasin and across the ecoregion is not protected. However, low and medium protection is provided to lands enrolled in conservation easements or protected under other development restrictions (e.g., county planning ordinances and university controlled experimental stations) (Ashley and Stovall 2004). The GAP protection status of agricultural habitat in the Walla Walla Subbasin is illustrated in Table 4-11.

Table 4-11 GAP Protection Status/Acres of Agriculture and Mixed Environments in the Walla Walla Subbasin

GAP Protection Status	Acres
High Protection	0
Medium Protection	0
Low Protection	20,567
No Protection	699,316

Source: IBIS 2003, as cited in Ashley and Stovall 2004.

Distribution

The Walla Walla Subbasin has the highest relative percentage of land dedicated to agriculture within the ecoregion (Figure 4-7) (Ashley and Stovall 2004). Agricultural production generally occurs wherever it is not precluded by unsuitable soils or topography or public land ownership (Ashley and Stovall 2004).

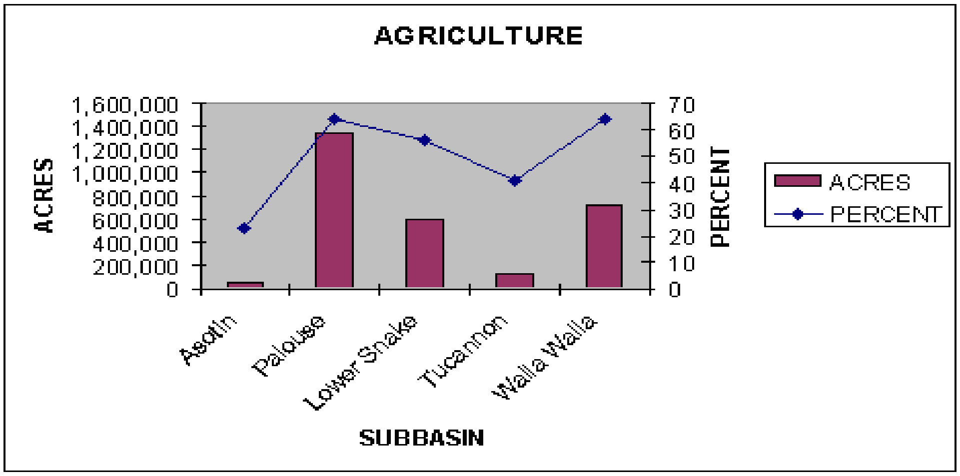

Figure 4-7 Agricultural Land Use Within the EcoregionI
Source: IBIS 2003, as cited in Ashley and Stovall 2004

4.3.4 Terrestrial Habitat and Protection Status Summary

Table 4-12 summarizes changes in the extent of focal habitats within the Walla Walla Subbasin (Ashley and Stovall 2004). Two of four Walla Walla Subbasin focal habitats (grasslands and riparian wetlands) have decreased substantially since 1850. Shrub-steppe, ponderosa pine, and agriculture (a cover type of interest) have increased.

Table 4-12 Changes in Focal Wildlife Habitat Type Acreage in the Walla Walla Subbasin From Circa 1850 (Historic) to 1999 (Current)

Focal Habitat Type	Historic Acres	Current Acres	Acre Change	Percent Change
Ponderosa Pine	23,241	49,904	+26,663	+115
Shrubsteppe	6,676	29,252	+22,576	+338
Eastside (Interior) Grassland	962,,275	154,619	-807,656	-84
Eastside (Interior) Riparian Wetlands	22,283	15,217	-7,066	-32
Agriculture	0	719,625	+719,625	---

Source: M. Hudson, WDFW, personal communication, 2003; IBIS 2003; both as cited in Ashley and Stovall 2004Ashley and Stovall (2004) summarize these habitat losses as follows.

> "The extent of both ponderosa pine and shrubsteppe habitat types has increased more than 100% from historic estimates (circa 1850)…Agricultural conversion accounts for nearly 100% of the total change (loss) in Eastside (Interior) Grassland habitats in the Walla Walla Subbasin and throughout the Ecoregion (IBIS 2003)…Riparian/riverine wetland habitat data

> are incomplete and limited in value.….Subbasin wildlife managers, however, believe that significant physical and functional losses have occurred to these important riparian habitats from hydroelectric facility construction and inundation, agricultural development, and livestock grazing."

The majority of GAP priority status 1 lands in the Walla Walla Subbasin (totaling 8,211 acres, or 0.7 percent of the subbasin) are associated with the Wenaha -Tucannon Wilderness Area (Figure 4-8) (Ashley and Stovall 2004). The vast majority of Walla Walla Subbasin state and federal lands fall under GAP priority status 3 (Ashley and Stovall 2004). Similarly, most, if not all, privately owned lands receive no protection (GAP priority status 4) (Ashley and Stovall 2004). No lands within the subbasin receive GAP priority status 2 protection (Ashley and Stovall 2004). Definitions of various levels of GAP protection status can be found in the introduction of Section 4.

Subbasin ECA priorities, focal habitat types, and public land ownership are shown in Figures 4-9a, 4-9b and 4-10. All ECA designated lands in the Washington portion of the Walla Walla Subbasin are Class 2 priority (Ashley and Stovall 2004). ECA data for the Oregon portion of the subbasin were not provided. ECA is described in detail at the beginning of Section 4.

The protection status of an area is significant, because a higher level of protection is assumed to enable planners and resource managers greater opportunities for long-term habitat enhancement (i.e., they are assured that habitat enhancement efforts will be protected in the future). Subbasin planners can use a combination of ECA, StreamNet, and IBIS data to identify areas in which to focus protection strategies and conservation efforts (Ashley and Stovall 2004). Ashley and Stovall (2004) identify "protection of critical habitats on private lands, located adjacent to existing public lands, within ECA designated areas" as a high conservation priority within the subbasin and ecoregion".

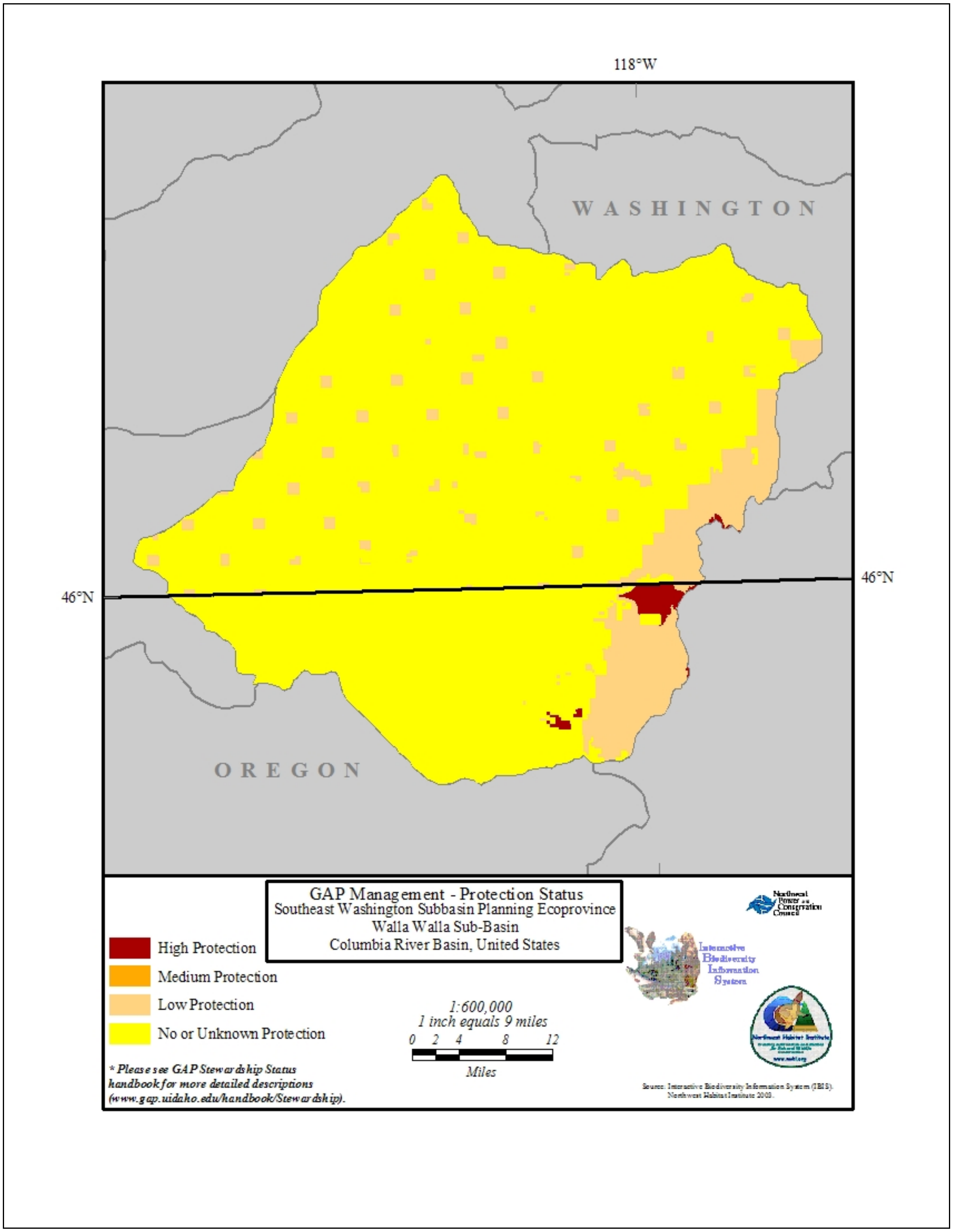

Figure 4-8 GAP Protection Status Lands in the Walla Walla Subbasin

Source: IBIS 2003, Ashley and Stovall 2004.

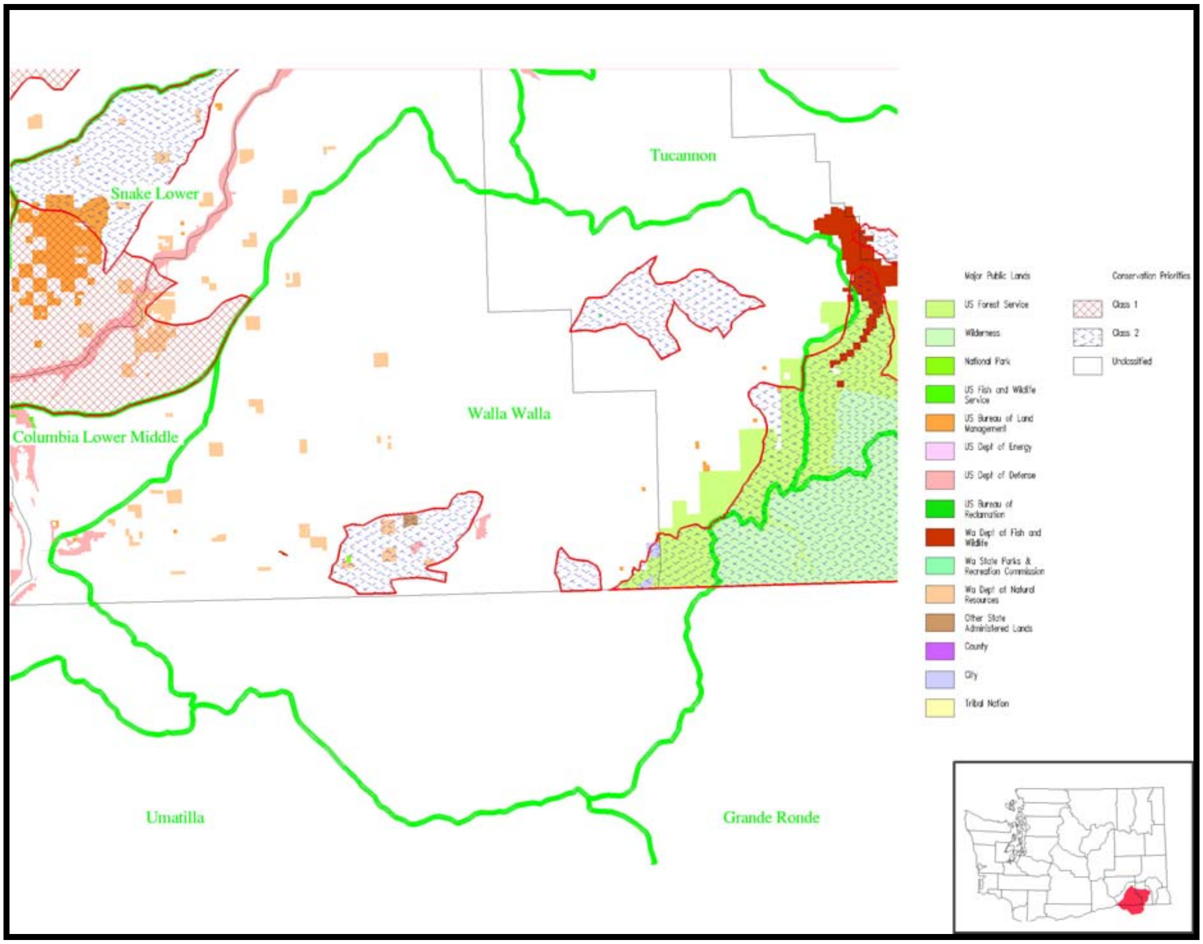

Figure 4-9a Washington State ECA Designations/Public Land Ownership in the Walla Walla Subbasin

Source: Figure 9, Appendix F.

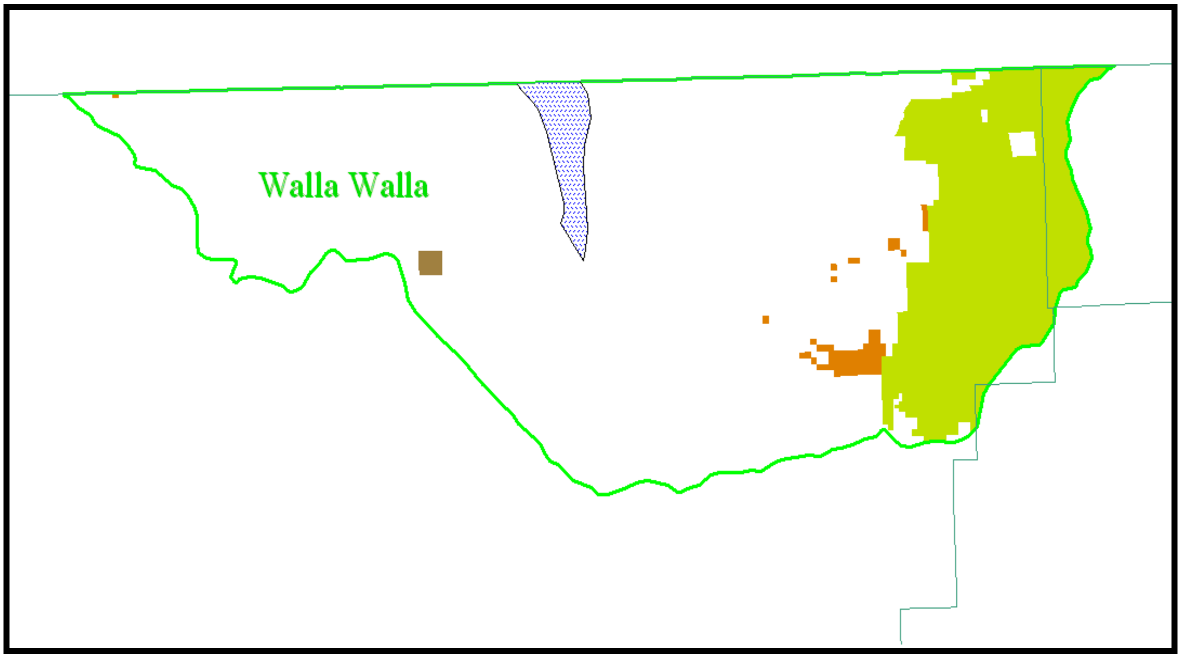

Figure 4-9b Oregon State ECA Designations/Public Land Ownership in the Walla Walla Subbasin

Source: Figure 9, Appendix F.

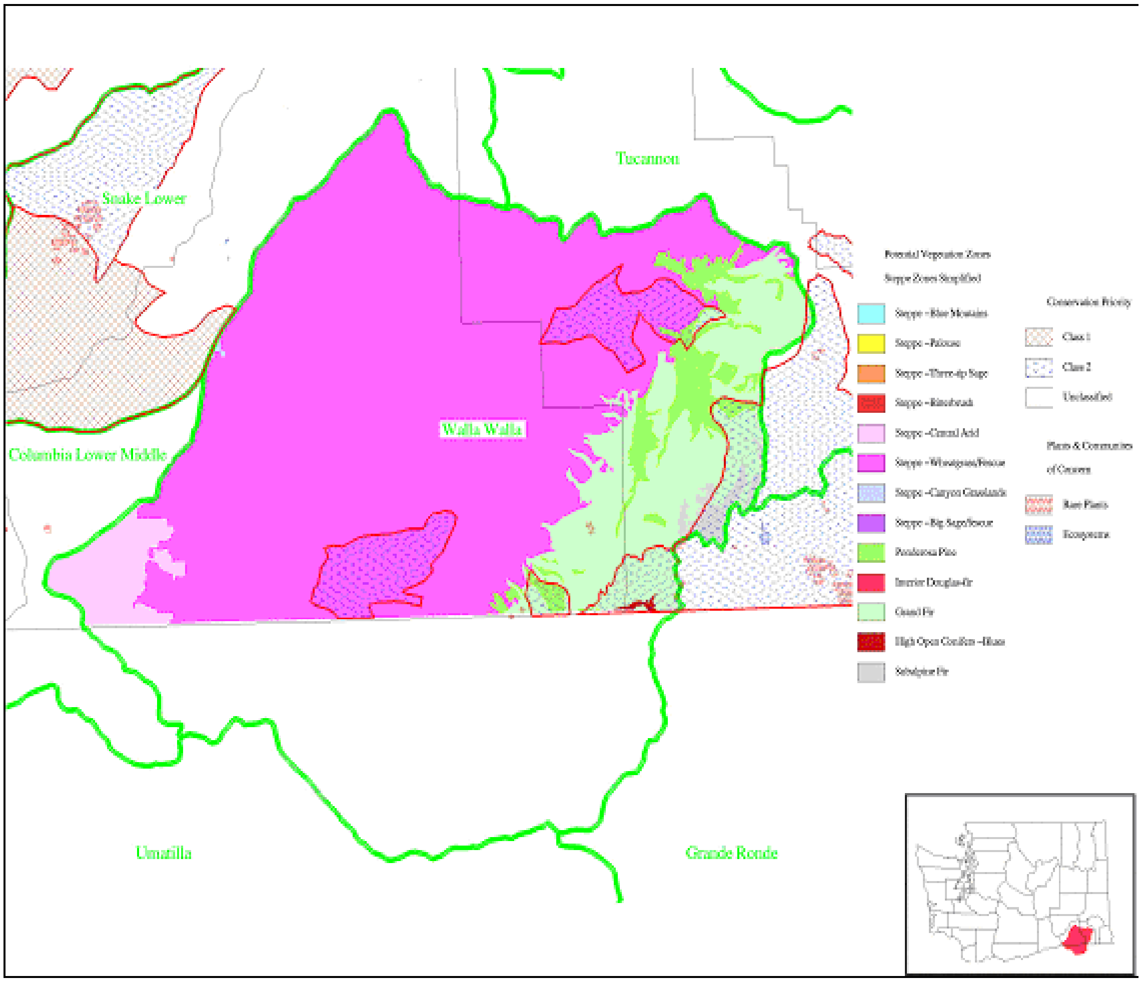

Figure 4-10 Washington State ECA Priority Areas and Focal Habitat Types
Source: ECA 2003, Ashley and Stovall 2004.

4.4 Focal Species

4.4.1 Introduction

This section reviews the process for selecting focal species, which species were chosen, and general information regarding their life history, status, and environmental relationships.

4.4.2 Focal Wildlife Species Assemblage Selection and Rationale

Subbasin planners selected focal wildlife species using a combination of several factors including:

1. primary association with focal habitats for breeding

2. specialist species that are obligate or highly associated with key habitat elements/conditions important in functioning ecosystems

3. declining population trends or reduction in their historic breeding range (may include extirpated species)

4. special management concern or conservation status such as threatened, endangered, species of concern and management indicator species

5. professional knowledge on species of local interest.

Bird species and mammalian species were chosen as focal or indicator species to represent the four priority habitats in the Walla Walla Subbasin (see Table 4-13). Focal species selection rationale and important habitat attributes are described in further detail in Table 31 of Appendix F.

4.4.3 Terrestrial Focal Species Descriptions

There are an estimated 385 wildlife species that occur in the Walla Walla subbasin (Table 25 in Appendix F). Of these species, 138 are closely associated with wetland habitat and 86 consume salmonids during some portion of their life cycle (Ashley and Stovall 2004). Fourteen species in the Walla Walla Subbasin are non-native (Ashley and Stovall 2004). Nine wildlife species that occur in the subbasin are listed federally and 83 species are listed in Washington as Threatened, Endangered, or Candidate species (Ashley and Stovall 2004).

Table 4-13 Focal Species Selection Matrix for the Walla Walla Subbasin

Common Name	Focal Habitat	Status[1]		Native Species	PHS	Partners in Flight	Game Species
		Federal	State				
White-headed woodpecker	Ponderosa pine	n/a	C	Yes	Yes	Yes	No
Flammulated owl	Ponderosa pine	n/a	C	Yes	Yes	Yes	No
Rocky Mountain elk	Ponderosa pine	n/a	n/a	Yes	Yes	No	Yes
Sage sparrow	Shrub- steppe	n/a	C	Yes	Yes	Yes	No
Sage thrasher	Shrub- steppe	n/a	C	Yes	Yes	Yes	No
Brewer's sparrow	Shrub- steppe	n/a	n/a	Yes	No	Yes	No
Mule deer	Shrub- steppe and Eastside (Interior) Grassland	n/a	n/a	Yes	Yes	No	Yes
Yellow warbler	Eastside (Interior) Riparian Wetland	n/a	n/a	Yes	No	Yes	No
American beaver	Eastside (Interior) Riparian Wetland	n/a	n/a	Yes	No	No	Yes
Great blue heron	Eastside (Interior) Riparian Wetland	n/a	n/a	Yes	Yes	No	No

				Status[1]			
Grasshopper sparrow	Eastside (Interior) Grassland	n/a	n/a	Yes	No	Yes	No
Sharp-tailed grouse	Eastside (Interior) Grassland	SC	T	Yes	Yes	Yes	No
Bighorn sheep	Eastside (Interior) Grassland	n/a	n/a	n/a	n/a	n/a	No

1 C = Candidate; SC = Species of Concern; T = Threatened; E = Endangered

Source: Table 30, Appendix F (modified)

Information regarding management of specific species, where applicable, can be found in Chapter 6.

Information regarding management of specific species, where applicable, can be found in Chapter 6. Figures 4-11 to 4-18 provide distribution maps for selected terrestrial focal species. Detailed information regarding the life history, status, environment/species relationships, distribution, and key ecological functions of terrestrial focal species can be found in Chapter 5 of Appendix F.

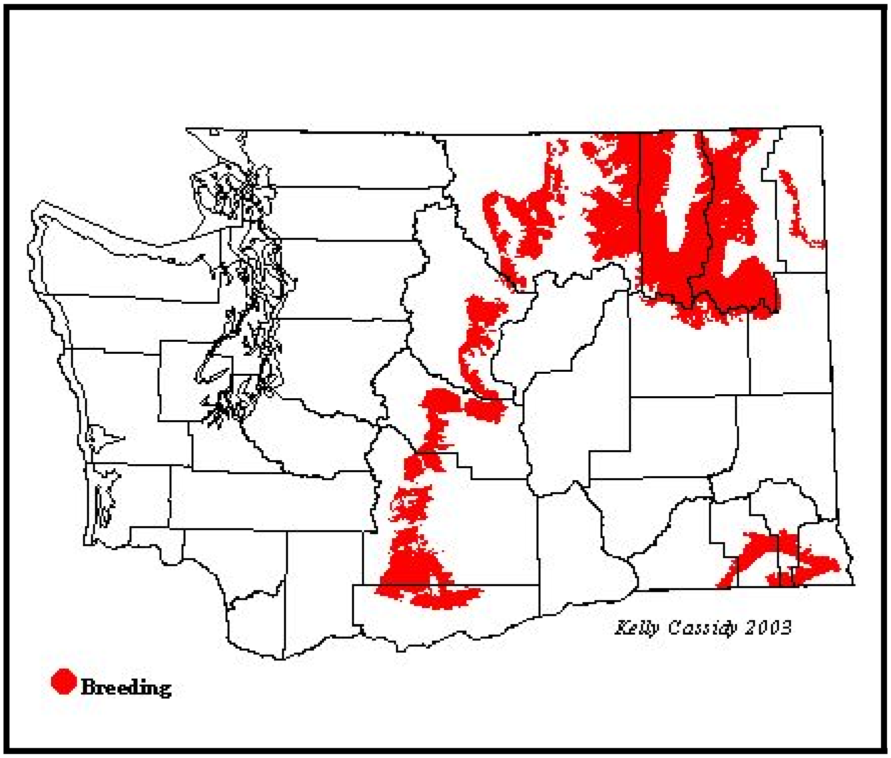

Figure 4-11 Flammulated Owl Distribution, Washington

Source: Kaufman 1996; as cited in Appendix F.

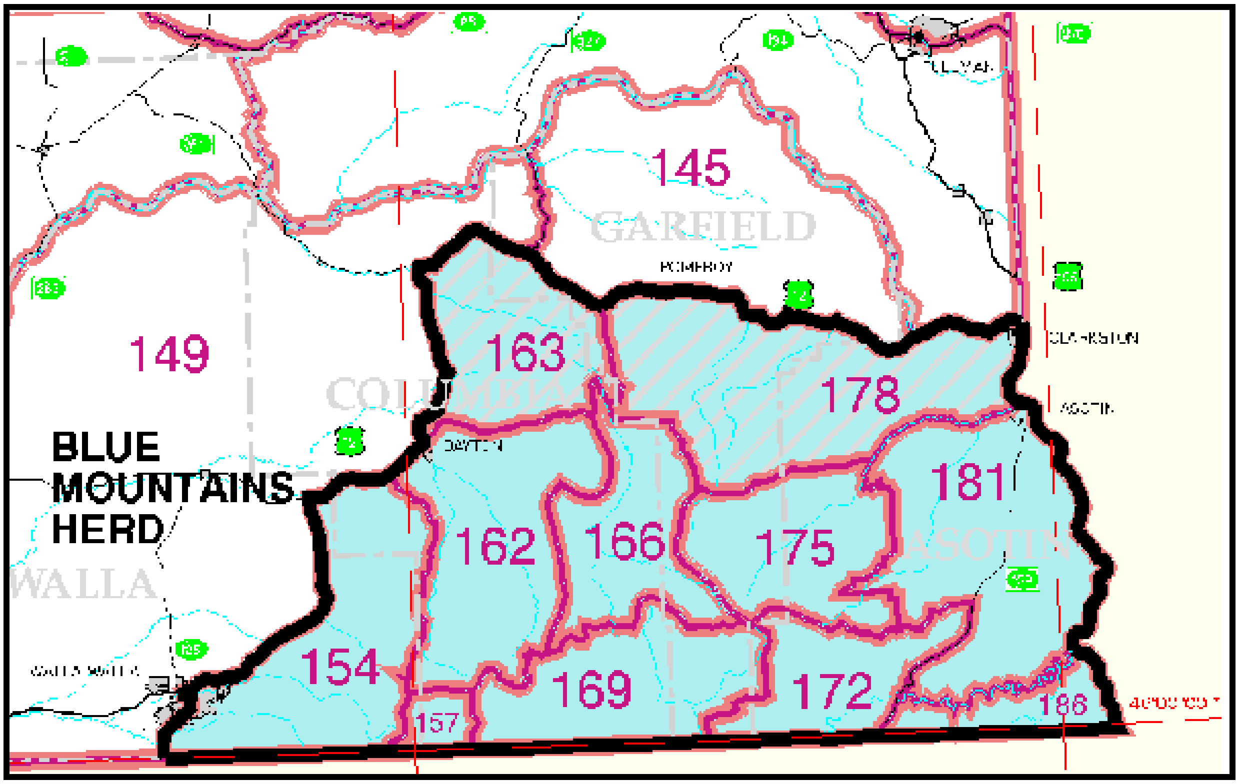

Figure 4-12 Elk Game Management Units in the Southeast Washington Subbasin Planning Ecoregion, Washington
(Fowler 2001, as cited in Ashley and Stovall 2004).

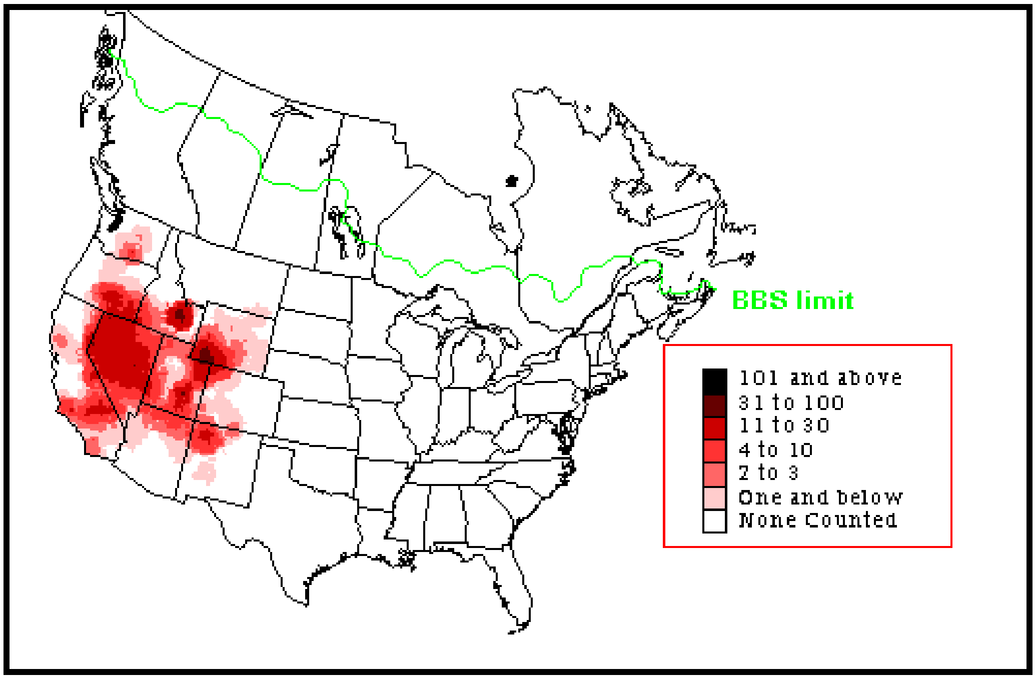

Figure 4-13 Sage Sparrow Breeding Season Abundance

Sauer et al. 2003, as cited in Ashley and Stovall 2004

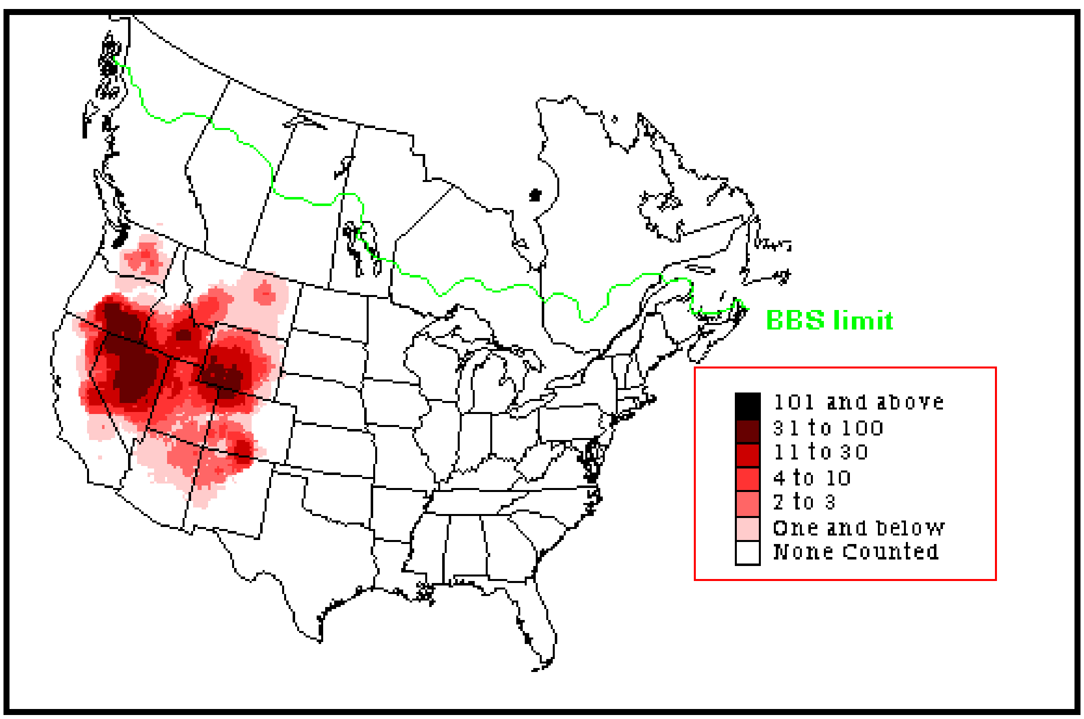

Figure 4-14 Sage Thrasher Breeding Season Abundance

Sauer et al. 2003, as cited in Ashley and Stovall 2004

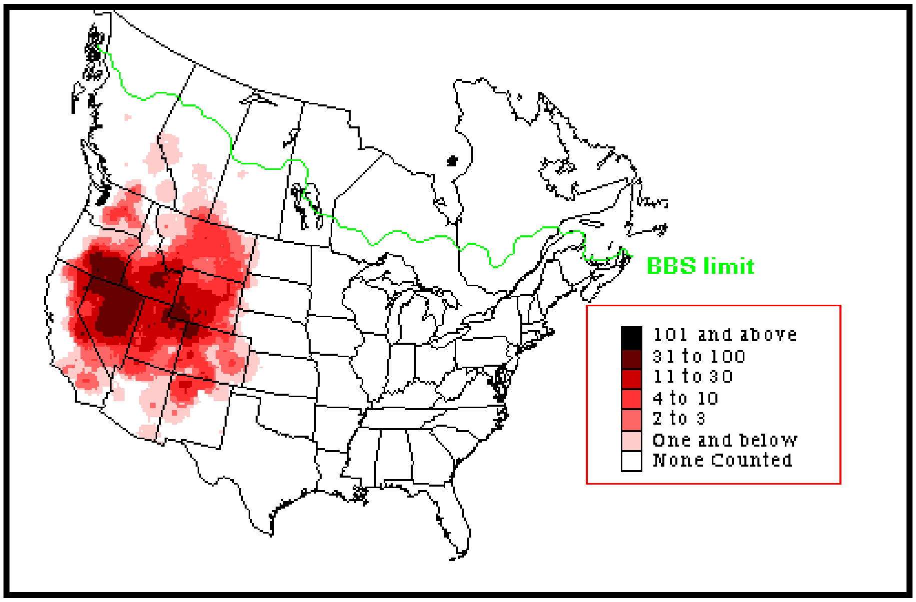

Figure 4-15 Sage Sparrow Breeding Season Abundance

Sauer et al. 2003, as cited in Ashley and Stovall 2004

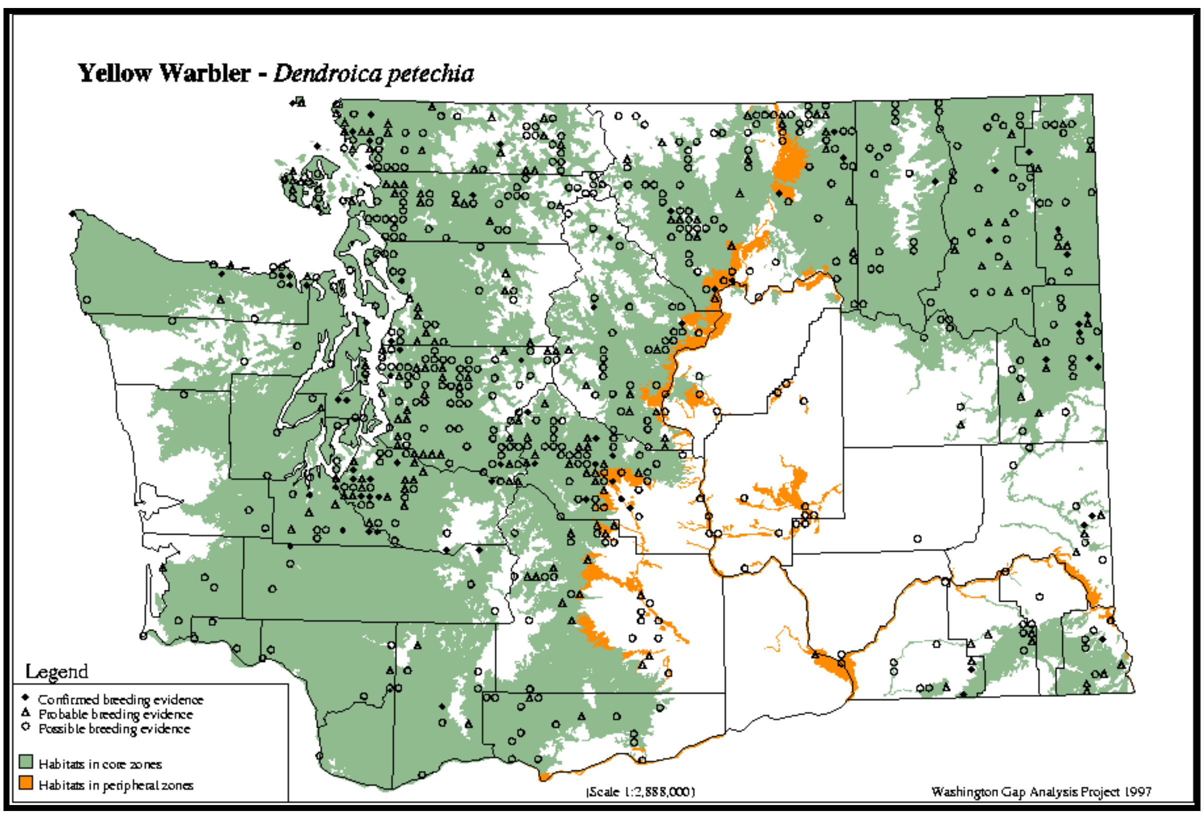

Figure 4-16 Yellow Warbler Distribution

(Washington GAP Analysis Project 1997, as cited in Ashley and Stovall 2004).

Figure 4-17 Geographic Distribution of American Beaver
Source: Linzey and Brecht 2002, as cited in Ashley and Stovall 2004.

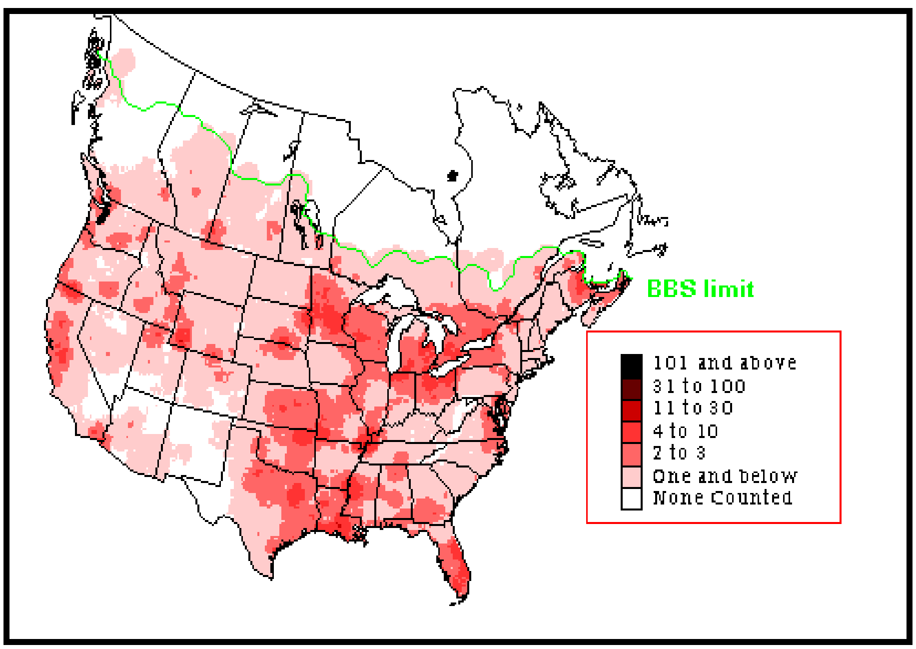

Figure 4-18 Great blue heron summer distribution
Source: Sauer et al. 2003, as cited in Ashley and Stovall 2004.

4.4.4 Terrestrial Species of Interest

Alkali bees, bighorn sheep and the western painted turtle were selected as terrestrial species of interest in the subbasin. These are species of special interest in the subbasin, but about which insufficient information exists to warrant selection as focal species. Information about these species of interest can be found in Appendix F. Alkali bees were suggested as a species of interest by the Walla Walla Watershed Planning Unit due to their unique role in pollinating wild and domesticated crops within the subbasin. Pollinators such as alkali bees are a vital component of the environment that supports agricultural viability in the region. Bighorn sheep were suggested as a species of interest by the CTUIR. Bighorn sheep, primarily in the Oregon portion of the subbasin, are of cultural importance to CTUIR, and management efforts are underway. The western painted turtle was suggested as a focal species by stakeholders that participate in the activities of both the Walla Walla Watershed Council and Walla Walla Watershed Planning Unit. Stakeholders have identified impacts to the western painted turtle as a result of modified hydrology in the Walla Walla River spring branch/distributary system (see Chapter 7 for more detailed discussion of this system). The western painted turtle is considered to be an indicator species regarding the health of wetlands and riparian areas within the Walla Walla River spring branch/distributary system.

Little detailed information exists for these three species. Gathering this information is part of the research, monitoring, and evaluation efforts outlined in Section 7.7 of this plan.

5. Integration of Aquatic and Terrestrial Components

This section of the subbasin plan addresses integration of the aquatic and terrestrial parts of the plan. These parts of the plan were developed independent of each other. The assessments for each were conducted using different methodologies and approaches. The working hypotheses, biological objectives, and strategies address the findings of the respective assessments. No attempt was made to integrate the aquatic and terrestrial aspects in other sections of this plan.

Recognizing the above, this section attempts to integrate these two aspects of the plan. The integration that is possible within the constraints of schedule and resources is very preliminary. A methodology to more fully integrate the aquatic and terrestrial aspects of the subbasin plan is under development at this time. When available later this year, it is expected that a full integration of aquatic and terrestrial aspects could be done and would be a desirable addition to this plan.

The following information is addressed in this section. First, a suggested methodology for integration that is based on the best available science is discussed. Next, a description of the process that is underway to refine this methodology, and how it could be used to provide an integration of fish and wildlife for this plan, is addressed. Finally, a preliminary integration of the aquatic and terrestrial aspects of the subbasin plan is provided.

5.1 Suggested Methodology

Work has been performed in this subbasin plan to identify appropriate aquatic and terrestrial biological objectives and strategies. A clear demonstration of how these aquatic and terrestrial aspects can be and are integrated will ensure that actions taken to improve the habitat for one biological objective does not prove counter-productive to another desired biological objective. Importantly, it will also demonstrate where implementation of a strategy or strategies will positively address two or more biological objectives whether aquatic and/or terrestrial. This will provide a better basis for selecting priorities and for most effectively implementing the subbasin plan.

In order to address integration, it is valuable to consider the relationships between land management actions and habitat impacts. The species influence diagram presented below is excerpted from *Wildlife Habitat Relationships in Oregon and Washington* (Figure5-1). The diagram displays the relationships between land management actions and the anticipated influence upon habitats, species, and wildlife functions.

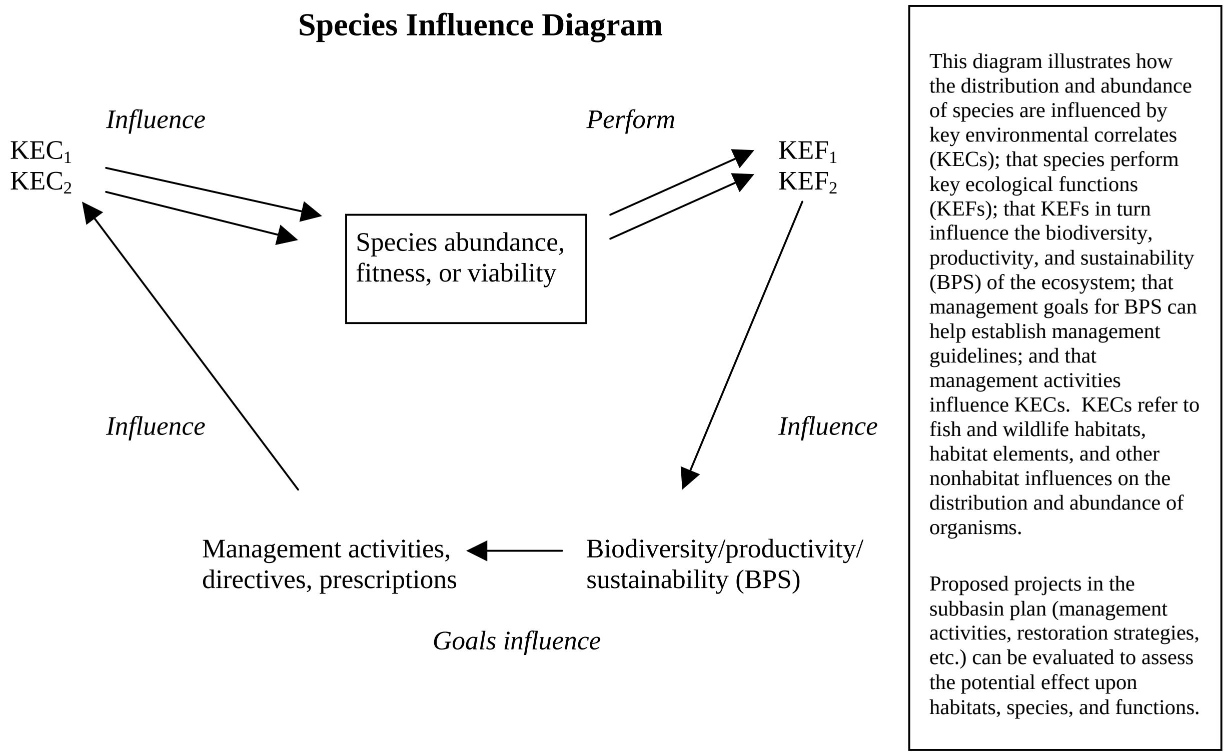

Figure 5-1 Species Influence Diagram
Source: Johnson and O'Neil, 2001.

The framework depicted above is relevant to the subbasin planning process in terms of its potential utility for integrating the aquatic and terrestrial components of the plan. Rather than viewing baseline conditions, impacts, and improvements to one system (aquatic vs. terrestrial), the status of the entire system becomes the subject of study.

As an example, the effects of land management activities upon upland and riparian habitats can be evaluated by linking specific activities to those Key Environmental Correlates (KECs), or habitat features, that are likely to be affected by the action. Based on the anticipated impacts to the habitat, one can infer how fish and wildlife species may be affected. In turn, it then becomes possible to evaluate how the functions performed by those species may be influenced – and thus gain additional insight into the effect of the proposed action on the biodiversity and sustainability of the system as a whole. For example, if planting of vegetation is proposed to occur within a riparian area, it becomes possible to quantify (based on footprint of "alteration" and the use of GIS) the anticipated effect to KECs. Once the effect to KECs is understood, it becomes possible to assess the effects to species that may result from the positive or negative alteration of existing habitats. Based on the changes to the diversity, abundance and fitness of species that may use the site, it becomes possible to understand how Key Ecological Functions (KEFs), or the functions performed by wildlife (e.g. seed dispersal), may change as a result of the proposed activities.

This assessment technique bridges the gap between terrestrial and aquatic systems. In the previous example, if vegetative planting actions are proposed to occur in a riparian area, the footprint of effect can be assessed to determine if changes to KECs (e.g. the growth of woody vegetation to a certain size) may influence the ability of the system to provide KECs that are of importance to aquatic species (e.g. large woody debris). This provides an opportunity to evaluate the relationship between management activities and habitat, from the abiotic and/or habitat forming processes perspective.

5.2 Future Efforts

Currently, efforts are underway to refine the relationships depicted in Figure 5-1 to reflect the contribution of abiotic functions (e.g. habitat forming processes) to the system. An Oregon Department of Transportation group known as the Comprehensive Mitigation/Conservation Strategy team (CMCS)[10] is working through development of this aspect, as it relates to the above diagram and the concept of ecosystem services. The relationships currently being explored between management activities, abiotic processes, and habitats are depicted in Figure 5-2. Further refinement of the specific relationships between management activities and abiotic processes will occur in association with the CMCS throughout the 2004 calendar year.

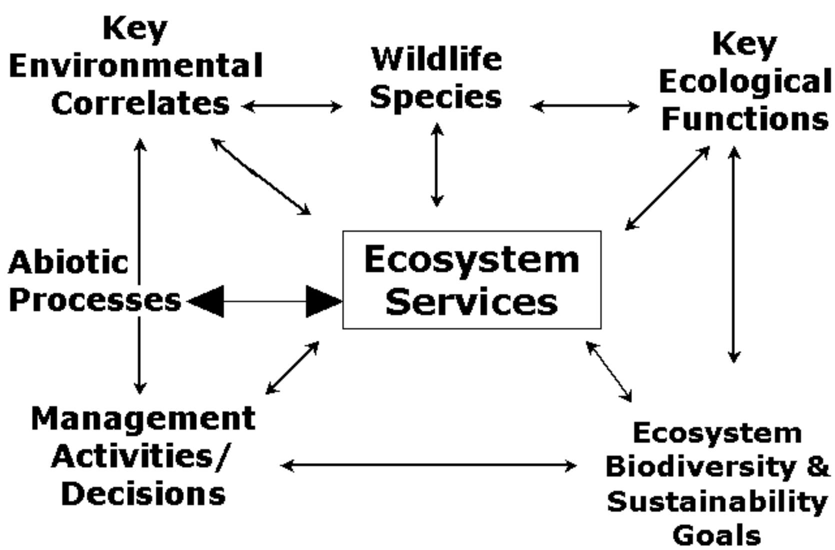

Figure 5-2 Integration of Abiotic Processes (Habitat Forming Processes)
Source: T.A. O'Neil and B. Marcot (2004).

[10] CMCS team members include representatives from ODOT, US Environmental Protection Agency, US Fish and Wildlife Service, US Army Corps of Engineers, NOAA Fisheries, Oregon Department of State Lands, Oregon Department of Fish and Wildlife, Oregon Department of Environmental Quality, Federal Highways Administration, Oregon Watershed Enhancement Board, and the Oregon Governor's Office. The CMCS is staffed by a team comprised of the Northwest Habitat Institute (Tom O'Neil), USDA Forest Service (Bruce Marcot), and Parametrix (Michelle Wilson).

An additional opportunity for integration of the aquatic and terrestrial components of the plan is provided when one examines the relationships between individual species of fish and wildlife. The Northwest Habitat Institute has identified those wildlife species in the region that have a relationship to salmon (pers. com. T.A. O'Neil, 2004). These relationships are based primarily on predator-prey interactions between the wildlife and salmon. A total of sixty-five wildlife species were preliminarily identified as having some relationship to salmonids. Of those species, six have a strong and consistent relationship with salmon; twenty-four have a recurrent relationship with salmon, and seventeen species have an indirect relationship to salmon (Johnson and O'Neil, 2001).

Of the nine focal wildlife species identified in this subbasin plan, the great blue heron is the only one that is identified as having a relationship to salmonids using the above analysis. This analysis will need to be tailored to extend to east-side watersheds, and to model salmon relationships to wildlife, to be useful for this subbasin plan. Regardless, this approach provides an example of how to develop information that can be used to identify benefits accrued to terrestrial habitat-related species through enhancement of aquatic habitat and related species.

The application of this technique can occur on a broad regional scale. It can also be utilized as part of an intense site-specific review, where one considers the impacts of various land management strategies as they apply to the specific site, as well as the entire ecoprovince in which they occur. Future revisions of the subbasin plan could more fully address the integration of the aquatic and terrestrial components by:

- Step 1. Regional Perspective
    - Assessing changes in fish and wildlife habitat (Partially complete).
    - Assessing changes in fish and wildlife species over time (Partially complete).
    - Assessing changes in fish and wildlife functions over time; identification of functional specialists or critical functional link species that need to be addressed (This information would need to be derived from changes in habitat types and changes in species).
- Step 2. Project or Program Tool
    - Assess specific study areas (potential areas of impact/benefit) utilizing field method designed to document KECs (captures habitat elements related to species needs) (Parametrix and NHI, 2004).
    - Identify relationships between specific management/activity proposals and KECs; identify whether proposed activities have a positive, negative, or neutral effect upon the habitats and habitat features of interest.
    - Assess the effect of proposed impacts/improvements upon the species of interest.
    - Assess the influence of changes to species (resulting from changes to habitat), upon the functions performed by those species; identify whether the changes in function support system goals for biodiversity/sustainability; identify whether the needs of critical functional link species or functional specialists are addressed.

- Assess how the proposed program or project activities relate to the broad-scale regional assessment performed in Step 1; determine how the anticipated project/program effects relate to what is happening on a regional basis; determine if the proposed activities support the objectives of the sub-basin plan.

While this analysis is currently outside the scope of this document, the approach may provide a potential future step for combining terrestrial and aquatic components of the plan. The true benefit comes in terms of monitoring and adaptive management, as the framework provides a feedback loop for continuous learning and improvement, based on measurable and reproducible results. Incorporation of the compatible EDT information, which can be included as a component of this integrated approach, would provide valuable depth and robustness to the management component of the framework.

5.3 Preliminary Integration

This section describes a very preliminary integration approach for the subbasin plan by identifying preliminary integrated working hypotheses. It is expected that these preliminary integrated working hypotheses will be used to add justification for proposed projects that address aquatic and terrestrial biological objectives identified in Section 7 of this subbasin plan. Simple stated, we anticipate that these hypotheses will be referenced, as appropriate, in project proposals.

The preliminary integrated working hypotheses that follow have been identified by screening the aquatic and terrestrial biological objectives and strategies. This screening looked for areas where benefits potentially will accrue to fish and wildlife species associated with habitats other than those being addressed by the specific aquatic or terrestrial habitat type biological objective and associated strategy. For example, management objective and strategies in terrestrial focal habitat types may also play a direct role in affecting aquatic priority habitats:

- Shading provided by ponderosa pine may keep streams cool.
- Ponderosa pine near streams and rivers may ultimately provide large woody debris.
- Fully functioning grassland and shrub-steppe habitat may benefit aquatic habitat by decreasing erosion and sedimentation.

In addition, indirect effects from terrestrial management objectives and strategies include the addition of KEFs that may also impact aquatic habitats and aquatic species. For example, as ponderosa pines grow in diameter from saplings (under one inch in diameter) to large trees (20 to 29 inches in diameter) the number of bird species associated with the habitat types increase from one species to 52. Moreover, the species compositions change during this process. Large trees are more likely to support piscivorous birds than smaller trees. The larger trees provide more suitable habitat for great blue herons, osprey, bald eagles, common mergansers, and hooded mergansers. Depending on the bird species, their presence may be detrimental to the focal fish species by directly preying on these fish or by competing for the same food sources. Conversely, the piscivorous birds may be beneficial to the focal fish species by consuming competitor and predatory species.

It is much more likely that terrestrial habitat improvements will have a direct effect on salmonid focal species and habitat than it is that aquatic habitat improvements will have a direct effect in terrestrial habitats and species. Except for increased riparian vegetation identified in the aquatic habitat objectives and strategies, these objectives and strategies tend to be focused on in-water structural conditions that do not directly impact many terrestrial habitat and species. However, many indirect, secondary impacts to terrestrial species may occur as a result of better aquatic habitat. For example, increased numbers of salmonids translates to increased numbers of terrestrial predators and scavengers, such as the great blue heron, bald eagle, and black bear. In addition, more properly functioning substrate and nutrient loads may increase aquatic insect populations, resulting in more food for terrestrial insectivores such as the yellow warbler. Effects on other wildlife species including most of the focal terrestrial wildlife species would be from tertiary relationships. For example, increased nutrient cycling may increase prey items for flammulated owls and great blue herons and browse for mule deer and elk. The effects of these structural improvements will likely decrease to a greater extent as the distance from enhanced streams increases.

Preliminary integrated working hypotheses are presented below that integrate terrestrial and aquatic biological objectives and strategies.

Preliminary Integrated Working Hypotheses

Hypotheses based on Aquatic Biological Objectives that Influence Terrestrial Habitat and Related Wildlife

- Biological objectives and associated strategies that address “riparian function” for aquatic species will provide benefits for terrestrial species in the “riparian/riverine wetlands” terrestrial habitat type.
- Biological objectives and associated strategies that result in increased returns of adult salmonids will positively influence wildlife species because of the increased food resources for scavengers and predators such as bald eagles, osprey, and black bear.
- Biological objectives and associated strategies that result in increased returns of adult salmonids will positively influence wildlife species because increased nutrient cycling benefits aquatic macroinvertebrates that are preyed on by wildlife species.
- Biological objectives and associated strategies that reduce turbidity, percent fines, and embeddedness will benefit wildlife species by increasing survivorship of their prey species (fish and invertebrates). Decreased turbidity will also increase the visibility of prey species to terrestrial predators
- Biological objectives and associated strategies that increase riparian vegetation quality will benefit wildlife by providing habitat for nesting, foraging, and cover.

- Biological objectives and associated strategies that result in setback of roads from streams to help improve water quality and stream stability will benefit riparian-associated species by decreasing disturbance from passing vehicles.

Hypotheses based on Terrestrial Biological Objectives that Influence Aquatic Habitat and Related Fish Species

- Biological objectives and associated strategies that result in taller, larger trees that will increase shading of streams will create better habitat for salmonids.
- Biological objectives and associated strategies that increase the number of medium trees or larger (15+ inches in diameter) will increase the amount of large woody debris in streams, which positively influence salmonids.
- Biological objectives and associated strategies that decrease spraying for detrimental insects will result in increased survival of beneficial adult insects that complete their larval stage in streams, e.g., mayflies and caddisflies, and of aquatic macroinvertebrates in general. Increased survivorship of adult and larval insects will positively influence insectivorous fish species.
- Biological objectives and associated strategies that address overgrazing and destruction of cryptogrammic crusts will decrease erosion and resulting sediment loading in streams, which will benefit salmonids.
- Biological objectives and associated strategies that enhance upland habitat through programs such as CRP or techniques such as construction of sediment basins and upland terraces will benefit aquatic species by decreasing sedimentation, turbidity, and embeddedness.

6. Inventory of Existing Programs and Projects

6.1 Programmatic Activities

This chapter outlines both recently completed and ongoing projects within the Walla Walla subbasin and identifies the main programs that are in effect. The intent is to provide a picture of what has been happening within the subbasin that will be useful in guiding decisions about project implementation in the future. The information presented here is a summary of the aquatic and terrestrial permits, management plans, and projects that are described in the Level 2 Diagnosis and Project Inventory document for the Walla Walla Subbasin (see Appendix G).

There are a variety of ongoing programmatic activities in Washington and Oregon that have the potential to improve both aquatic and terrestrial habitat and address limiting factors in the Walla Walla subbasin. These programmatic activities are summarized in Table 6-1 below. This is not meant to be a comprehensive list of all existing activities. More details may be found in the inventory document (Appendix G) and the Walla Walla Subbasin Summary (NPPC 2001).

Table 6-1 Programmatic Activities within the Walla Walla Subbasin

Administering Agency	Regulation/Program	Intent
The Northwest Power and Conservation Council (NWPCC)	1980 Northwest Electric Power Planning and Conservation Act	Protect, mitigate and enhance fish and wildlife of the Columbia River Basin that have been impacted by hydropower dams
USFWS/NOAA	Endangered Species Act (ESA)	Protect endangered or threatened species from actions that may result in harm or death to the species
US Army Corps of Engineers	USACE 404 Permits and Section 10 Permits	Protect aquatic life and water resources; requires a permit when locating a structure, excavating, or discharging dredged or fill material in waters of the United States or transporting dredged material for the purpose of dumping it into ocean waters
Washington Department of Ecology (WDOE) /Oregon Department of Environmental Quality (ODEQ)	Total Maximum Daily Load (TMDL) Program	Bring 303(d) listed streams into compliance with state water quality standards
Washington Department of Fish and Wildlife (WDFW) / Oregon Department of Fish and Wildlife (ODFW) / Oregon Water Resources Department (OWRD)	Hydraulic Code and Hydraulic Code Rules	Protect fish life and habitat areas; regulate hydraulic projects that affect the flow or channel bed of any waters of the state
Washington Department of Transportation (WADOT) / Oregon Department of Transportation (ODOT)	Road maintenance/ transportation - (in Washington, RCW 77.55.060)	Mitigate for fish passage barriers by regulating dam construction or construction of other features which obstruct fish passage
Cities and counties, with technical assistance from state agencies	In Washington, Growth Management Act (GMA) – RCW 30.70A. In Oregon, Senate Bills 10, 100, & 101.	Plan for and control growth to benefit natural resource and critical areas for fish and wildlife
Cities and counties, with technical assistance from Washington Dept of Ecology	In Washington, Shoreline Management Act (SMA) – RCW 90.58	Protect and regulate shoreline environmental resources and uses

Administering Agency	Regulation/Program	Intent
Washington Department of Ecology and local planning units / Oregon Water Enhancement Board and local watershed councils (involves collaboration with local government, tribes, and public citizens)	In Washington, Watershed Planning Act – RCW 90.82. In Oregon, 1987 legislature.	Integrated protection and management of watersheds through voluntary, collaborative plans including development of a habitat conservation plan.
Confederated Tribes of the Umatilla Indian Reservation (CTUIR)	The Wy-Kan-Ush-Mi Wa-Kish Wit: Spirit of the Salmon & Other Efforts	To restore anadromous fish populations in the Columbia Basin above the Bonneville Dam. This long-term restoration plan consists of both institutional and technical recommendations to address factors contributing to the decline of aquatic species, including support of cultural values.

Source: Derived in part from Appendix G.

Table 6-2 presents a variety of USDA programs that deal primarily with protection, restoration, and enhancement of fish and wildlife habitat. For more detailed descriptions concerning the operation of these programs, refer to Appendix G.

Table 6-2 USDA Programs Targeting Habitat Enhancement

Program	Purpose	Additional information
Conservation Reserve Program (CRP)	Remove highly erodible land from agricultural production and planting cover crops to increase wildlife habitat	Voluntary program for private landowners involving a 10-year contract and installation and annual payments
Continuous Conservation Reserve Program (CCRP)	Restore riparian habitat and improve water quality	Voluntary program for private landowners involving a 10-15 year contract and installation and annual payments
Conservation Reserve Enhancement Program (CREP)	Protect and restore agricultural land and riparian habitat by removing land from production	Voluntary program for private landowners involving a 10-15 year contract, rent, incentive and maintenance payments, and cost-sharing for installation
Wildlife Habitat Incentive Program (WHIP)	Restore and enhance fish and wildlife habitat on private lands	Voluntary program for private landowners; includes both financial and technical assistance from NRCS
Wetland Reserve Program (WRP)	Restore, create, protect, and enhance wetlands	Voluntary program for private landowners, who may participate in restoration cost-sharing or establish conservation easements on their land
Environmental Quality Incentives Program (EQIP)	Address soil, water, and related natural resource concerns on private lands in an environmentally beneficial and cost-effective manner	Voluntary program targeting farmers and ranchers; technical and financial assistance provided by NRCS, esp. for implementing land management practices such as nutrient management, pest management, and grazing land management
The Public Law 566 Small Watershed Program (PL 566)	Improve watershed conditions	Local organizations can seek funding from NRCS and other federal, state, and local funds

Note: All programs in the above table are implemented through the cooperative efforts of the USDA-Natural Resources Conservation Service (NRCS), Farm Service Agency (FSA) and local Conservation Districts.

Source: Appendix G.

In addition to the programmatic activities described above, a wide range of federal, state, tribes and local agencies and other organizations are involved in protecting and restoring habitat within the Walla Walla subbasin. Table 6-3 summarizes a subset of these organizations that are responsible for managing or implementing programs and projects with the greatest effect on protecting and improving habitat. More detailed discussion of the various responsibilities of these entities can be found in Appendix F and the Walla Walla Subbasin Summary (NPPC 2001).

It is important to note that the Walla Walla and Columbia County Conservation Districts and the Walla Walla Watershed Council play key roles in the subbasin, providing significant support in the planning, design, and implementation of the majority of programs and projects to enhance fish and wildlife habitat. In addition, it is also the primary conduit for funding to local landowners participating in habitat improvement activities.

Table 6-3 Agencies and Organizations Involved in Habitat Enhancement in the Walla Walla Subbasin

	Agency	Purpose	Activities
Federal	US Forest Service; Pomeroy Ranger District (PMD)	Achieve quality land management under the sustainable multiple-use management concept to meet the diverse needs of people	Implementation of a range of management plans and strategies designed to better manage forestlands and improve fish and wildlife habitat. Examples include: Umatilla National Forest Plan, Land and Resource Management Plan, and the Upper Charley Subwatershed Ecosystem Restoration Projects Environmental Impact Statement
Tribal	Confederated Tribes of the Umatilla Indian Reservation (CTUIR)	Manage, protect, and enhance treaty fish and wildlife resources for future generations	Restoration and mitigation activities; management of aquatic species and habitat through a variety of policies and plans
State (WA)	WDFW	Protect and restore fish and wildlife habitat for future generations	Support of a range of habitat improvement programs: Habitat Development Program, Upland Restoration Program, and Priority Habitats and Species Program. Manages the Asotin Creek Wildlife Area and provides resources for property acquisition.
	WDOE	Protect, preserve, and enhance Washington's environment and promote the wise management of air, land, and water for the benefit of current and future generations	Establishment of regulatory standards for water quality; water quality monitoring; management of water resources, instream flow rule development, shoreline, floodplain, wetlands, and watersheds
	Washington State Conservation Commission (WCC)	Protect, conserve and enhance the natural resources of the state; encourage conservation stewardship	Support for conservation districts, funding for natural resource projects, grants to support environmental improvements
	Washington Department of Natural Resources (WDNR)	Manage state land; monitor and enforce logging regulations on private lands	Land acquisition

	Agency	Purpose	Activities
State (OR)	Oregon Department of Environmental Quality (ODEQ)	Protect and enhance air and water quality, manage handling and disposal of hazardous materials	(related to aquatic resources): Enforcement of state water quality standards, development of TMDLs, water quality monitoring
	Oregon Department of Fish and Wildlife (ODFW)	Protect and enhance fish and wildlife habitat for future generations	Fish and wildlife harvest regulations, joint implementation of Walla Walla River Subbasin Salmon and Steelhead Production Plan, establishment of management priorities within the subbasin
	Oregon Department of Forestry	Protect and manage healthy forests	Enforcement of Oregon Forest Practices Act (OFPA), which regulates commercial logging on state and private lands and requires stream buffers and other forms of riparian protection
	Oregon Division of State Lands	Promote stewardship of land and water resources in order to fund schools	Management of lands across the state, administration of mineral rights, regulation of fill/removal permits for state waterways, management of state wetlands program
	Oregon Land Conservation and Development Commission	Promotes and ensures compliance with state and local land use goals, assists in state and local planning, manages coastal program	
	Oregon Watershed Enhancement Board (OWEB)	Enhance Oregon's watersheds through cooperative efforts between citizens, agencies, and local government	Funding and grants for projects that restore and enhance watersheds, support of watershed-based citizen groups, monitoring of watershed improvement projects
Local	Columbia County/ Walla Walla Conservation District	Assist in watershed planning and implementation; assists private landowners with adoption of best management practices (BMPs) to improve natural resources	Noxious weed control, erosion control, USDA program implementation, and other activities.
	County Weed Boards	Control noxious weed infestations which threaten wildlife habitat	
	Columbia County Government	Enhance fish and wildlife habitat; employ watershed planning	Local regulations include: shorelines master program, county zoning ordinance, flood damage prevention ordinance, critical areas ordinance
	Agricultural Community	Protect and enhance private lands	BMPs to reduce erosion, control noxious weeds
	Walla Walla BasinWatershed Council	Protect and enhance the Walla Walla watershed while maintaining respect for the welfare of its citizens	Collaboration with other groups/ agencies in habitat and aquatic species planning processes, implementation of restoration/ protection projects, research and monitoring, public education
	Irrigation Districts and Ditch Companies	Provide irrigation water for customers within the subbasin	Irrigation water supply, funding and implementation of habitat and flow enhancement projects

	Agency	Purpose	Activities
Other	Rocky Mountain Elk Foundation (RMEF)	Protect and enhance grassland and riparian wetland habitats	Noxious weed control; land acquisition and conservation

Source: Appendix G and (NPPC 2001).

6.2 Species Protection, Plans, and Permits

This section reviews specific aquatic and terrestrial programs within the subbasin that affect species and their habitats.

6.2.1 Aquatic Species Protection, Plans, and Permits

There are several programs operating within the Walla Walla subbasin whose main focus is on the protection of aquatic species and their habitat. The brief descriptions below give the basic background and purpose of each program. This is not a comprehensive list of existing programs, but rather a selection of those that have the greatest potential to influence the status of aquatic species and their ecosystems.

The Snake River Salmon Recovery Plan is currently being developed to protect and restore listed Snake River salmon stocks and improve the overall health of the Snake River ecosystem. The Washington portion of the plan is guided by the Snake River Regional Salmon Recovery Board, which is made up of community, business, government, and tribal representatives (http://www.snakeriverboard.org/). The plan aims to restore salmon populations by addressing the “4 Hs:” habitat, hatchery, harvest, and hydropower.

Water quality is an integral part of maintaining watershed health. Section 303(d) of the Clean Water Act (CWA) established the Total Maximum Daily Load (TMDL) program, which seeks to identify sources of pollution in 303(d) listed streams and develop plans to improve water quality and bring these streams into compliance. There are several streams on the Washington and Oregon 303(d) lists for temperature, fecal coliform bacteria, pH, and toxins. Water quality issues continue to be addressed in the Walla Walla subbasin both through the TMDL process and via the implementation of independent projects implemented by local watershed groups. One example of such an effort is the Oregon Department of Environmental Quality temperature TMDL currently under development for the Walla Walla River. This TMDL effort involved detailed modeling of the relative contribution of various approaches to ameliorate elevated water temperature, primarily increased flow and shading. For more information about the TMDL program in Washington, refer to the following Department of Ecology website: http://www.ecy.wa.gov/programs/wq/tmdl. For more information about the TMDL process in Oregon, refer to the following Department of Environmental Quality website: http://www.deq.state.or.us/wq/tmdls/tmdls.htm.

Hatchery production of salmon was initiated in the Columbia River Basin in the late 1800s. The original purpose was to maintain commercially harvestable numbers of salmon. More recently, hatcheries have also been used to supplement declining wild populations of salmonids. In 1998 (U.S. Senate Energy and Water Development Appropriation Bill, 1998, Report 105-44), Congress directed the Northwest Power and Conservation Council to conduct a review of all of the artificial production programs within the Columbia basin. These Artificial Production Review and Evaluation (APRE) reports evaluate: the purpose of each hatchery program, success in meeting established objectives, and the benefits and risks associated with the program. In addition, NOAA is developing hatchery genetic management plans (HGMPs) under the Columbia River Hydropower Biological Opinion. HGMPs are detailed plans specifying how hatcheries are to be managed and operated. Both APRE reports and HGMPs for the Walla Walla subbasin may be viewed online at: http://www.apre.info/APRE/home.jsp.

There are currently two hatchery programs that directly affect the Walla Walla subbasin:

- Summer Steelhead (Lyons Ferry) Hatchery
- Touchet Endemic Summer Steelhead

Current harvest regulations in the subbasin are intended to protect steelhead and Chinook species. As noted in WDFW Walla Walla Subbasin Aquatic Assessment (Appendix C), "Descriptions of fisheries and their estimated effects on listed species of fish in the Mid Columbia ESU are discussed in the WDFW Fishery Management and Evaluation Plan (FMEP) for the incidental Take of listed species in the Mid Columbia submitted under ESA Section 10/4d (submitted to NOAA-fisheries in 2002). Similarly, descriptions of fisheries and their estimated impacts in Oregon are described in the ODFW FMEP for Summer Steelhead and Trout Fisheries (Public Review Draft, March 2001)." The WDFW FMEP may be viewed online at: http://www.nwr.noaa.gov/1fmep/proposed/SnakeRiverWDFW_FMEP.pdf. In addition, state harvest regulations for sport fisheries are listed on WDFW's website: https://fortress.wa.gov/dfw/erules/efishrules/index.jsp.

The Draft Bull Trout Recovery Plan (USFWS 2002) has been developed to provide guidance toward achieving recovery of bull trout populations within the Columbia and Snake River Basins. This plan includes specific goals and strategies to achieve population levels required to allow de-listing of bull trout under the ESA. See Chapter 7 for further discussion regarding integration of the Bull Trout Recovery Plan and this subbasin plan.

6.2.2 Terrestrial Species Protection, Plans, and Permits

There are a few species of interest that are actively managed and monitored by WDFW in the Walla Walla subbasin. These include the Rocky Mountain elk and mule deer.

According to RCW 77.04.012, WDFW "shall preserve, protect, perpetuate, and manage the wildlife…" and "attempt to maximize the public recreational game fishing and hunting opportunities of all citizens…" WDFW has produced an overall Game Management Plan to outline its process for managing and sustaining species populations (WDFW 2003).

In addition, the Blue Mountains Elk Herd Management Plan was written to provide information and direction to management of elk in southeast Washington. Primary goals of this plan include: " (1) to manage the elk herd for a sustained yield; (2) to manage elk for a variety of recreational, educational and aesthetic purposes including hunting, scientific study, cultural and ceremonial uses by Native Americans, wildlife viewing and photography; and (3) to preserve, protect, perpetuate, manage and enhance elk and their habitats to ensure healthy, productive populations." (WDFW 2001). This plan also contains a background and history of elk population issues, as well as specific objectives and management strategies. There have already been a number of projects aimed at improving elk habitat and resulting from collaboration between various entities such as WDFW, USFS, the Rocky Mountain Elk Foundation, and the Blue Mountain Elk Initiative.

WDFW administers other programs aimed at improving habitat for terrestrial species. The Priority Habitats and Species (PHS) program provides detailed information on priority species and habitats that need to be targeted for management and conservation efforts and where these are located, along with specific management recommendations. This information is used by federal, state, local, and tribal governments, as well as other conservation and resource-oriented organizations in planning and ecosystem management. The PHS is described in detail online at: http://www.wdfw.wa.gov/hab/phspage.htm. WDFW's Upland Restoration Program is a voluntary, incentive-based program designed to encourage farmers and private landowners to improve fish and wildlife habitat by implementing water conservation measures, planting vegetation to decrease erosion, and applying other more environmentally sound agricultural practices.

ODFW plays a similar role to WDFW in Oregon. Its mission is to "to protect and enhance Oregon's fish and wildlife and their habitats for use and enjoyment by present and future generations." ODFW is responsible for the Oregon Administration Rules (OAR) for fish and wildlife.

There are several initiatives designed to address declining bird populations. The Partners In Flight (PIF) program began in 1990 and is focused on the conservation of bird species not listed under ESA. This program consists of partnerships among federal, state and local government agencies, NGOs, and private organizations and has laid the foundation for the development of bird conservation plans (BCPs) across the U.S A more detailed description can be viewed online at: http://www.partnersinflight.org/. Another program is the North American Breeding Bird Survey-BBS, a joint initiative between the US Geological Survey and Canadian Wildlife Service to monitor population trends of migratory birds in North America. Each year, thousands of volunteers across the continent collect data, which is then compiled and analyzed by professionals and made available as reports online at: http://www.mp2-pwrc.usgs.gov/bbs/index.html.

6.3 Restoration and Protection Projects

This section describes and analyzes specific habitat enhancement projects that have been completed in the subbasin.

6.3.1 Aquatic Habitat Restoration and Protection Projects

During the past several years, many projects focused on restoring and enhancing aquatic habitat within the Walla Walla subbasin have been implemented by federal, state, and local entities. A comprehensive list of these projects was compiled and incorporated into the Walla Walla

Inventory. Information on each project includes (where available): category (e.g. riparian, upland), application description, name, environmental attributes addressed, limiting factors addressed, units completed, completion data, map name and number, township, range, and section, watershed, EDT reach name, and species affected. Since 1996, a total of 716 projects have been implemented in the Walla Walla subbasin. Of this number, only four projects focused on monitoring, while the rest of the projects dealt directly with fish habitat (see Appendix G).

These projects focused on several key issues:

- upland (65%)
- passage (14%)
- instream (13%)
- riparian (8%)

Table 6-4 illustrates the general focus of projects in more detailed categories.

Table 6-4 General Focus of Fish Habitat Projects in the Walla Walla Subbasin, 1996 – present

Environmental Focus	Proportion of Effort
Sediment	38%
Flow	29%
Obstructions	14%
Temperature	5%
Channel Stability	3%
Habitat Creation	3%
LWD	3%
Chemical Water Quality	2%
Riparian Function	2%
Food	1%
Fish Community Ecology	1%

Source: Table 5, Appendix G.

These projects consist of a wide range of activities, including:

- conservation easements
- constructed habitat (pools/wetlands/off-channel habitat)
- debris removal
- direct seeding
- erosion control (critical area planting, grassed waterways, conservation cover)
- exclosures/fencing
- fish screen and fish ladder installation
- instream structures (J-hooks, rock vanes and barbs, log weirs, etc.)

- meander construction
- purchase of lease of water rights
- reforestation/tree planting
- spawning gravel addition
- woody debris addition.

For more specific details about these activities, refer to the Walla Walla Inventory (Appendix G).

Projects by Limiting Factor

The aquatic assessment identified the key limiting factors for each focal species by geographic area. These key factors in priority restoration areas were sediment (embeddedness), large woody debris, key habitat (pools), riparian function/confinement, summer water temperature, low flow, and bed scour, (see chapter 3 for details regarding how these limiting factors were identified). In addition, obstructions were noted as an imminent threat throughout the subbasin. The Level 2 Diagnosis and Project Inventory (Appendix G) for the Walla Walla subbasin included these limiting factors to classify projects and identify the relative project effort that has gone into addressing each of the key limiting factors. From an ongoing management perspective, it is important to understand whether projects implemented within the subbasin have focused on geographic areas and limiting factors critical to the restoration and enhancement of fish and wildlife habitat. The extent to which these factors have been addressed may determine future restoration priorities and strategies. Limitations of this analysis are discussed in the next section.

Table 6-5 shows the allocation of project effort for each high priority restoration/protection geographic area and among the key limiting factors in the subbasin. Project effort is expressed as the percentage of “hits.” The term “hit” refers to the particular environmental attribute that is being affected by a given project (e.g. sediment, water temperature, embeddedness, etc.) It is important to recognize that while projects are often designed to target a particular environmental attribute, in actuality, they may have a positive influence on a range of environmental attributes. For example in their project inventory, WDFW notes that a riparian project produces beneficial effects on fine sediment, riparian function, maximum and minimum temperature, turbidity and woody debris. For the 716 projects implemented within the Walla Walla subbasin, there were a total of 3,059 environmental attributes (sometimes referred to as “hits”) were addressed (see Appendix G).

Table 6-5 Efforts Directed at Specific Environmental Attributes Identified as Limiting Factors in Priority Geographic Areas, Walla Walla Subbasin Since 1996

Geographic Area[1]	Priority[2]	Anthropogenic Confinement	Bedscour	Embeddedness	Flow	Maximum Water Temperature	Obstructions	Pools	Riparian Function	Turbidity	Woody Debris	Total Effort by Geographic Area
Walla Walla, Mill to E L. Walla Walla (plus McEvoy & Springbranch)	Restoration/ Protection		■	■		□		■		□	■	1.2%
Walla Walla, E Little Walla Walla to Tumalum Bridge	Restoration/ Protection			□	□					□		0.5%
Walla Walla, Tumalum Bridge to Nursery Bridge	Restoration/ Protection					□	□	□	□	□		0.3%
Walla Walla, Nursery Br to Little Walla Walla Diversion	Restoration/ Protection						□					0.1%
Walla Walla, Little Walla Walla Diversion to forks	Restoration/ Protection			■		□	■		□	■	□	1.0%
SF Walla Walla, mouth to Elbow Creek	Restoration/ Protection			■		■		□	■	■	■	1.5%
NF Walla Walla, mouth to L. Meadows Canyon Cr (plus L. Meadows)	Restoration/ Protection					□	■	□		■		0.6%
Coppei Drainage	Restoration/ Protection		■	■	■	■		■	■	■	■	9.9%
Touchet, Coppei to forks (plus Whiskey)*	Restoration/ Protection		■	■	■	■		■	■	■	■	4.3%
SF Touchet Mainstem	Restoration/ Protection											0%
SF Touchet Tribs	Restoration/ Protection											0%
NF Touchet Mainstem	Restoration/ Protection											0%
NF Touchet Tribs (excluding Wolf Fork)	Restoration/ Protection											0%
Wolf Fork, mouth to Coates (plus Robinson & Coates)	Restoration/ Protection											0%

Geographic Area[1]	Priority[2]	Anthropogenic Confinement	Bedscour	Embeddedness	Flow	Maximum Water Temperature	Obstructions	Pools	Riparian Function	Turbidity	Woody Debris	Total Effort by Geographic Area
Wolf Fork, Coates to access limit (plus Whitney)	Restoration/ Protection											0%
SF Walla Walla, Elbow to access limit	Protection											0%
Skiphorton & Reser Creek Drainages	Protection											0%
Lower SF Walla Walla Tribs (Flume Canyon, Elbow)	Protection											0%
Upper SF Walla Walla tribs (excluding Skiphorton & Reser)	Protection											0%
NF Walla Walla, L. Meadows to access limit (plus Big Meadows)	Protection											0%
Patit Drainage	Protection											0%
Walla Walla, Dry to Mill	Protection		■	■	□			□	□	□	□	1.1%
Yellowhawk mainstem (mouth to source)	Protection		■	■				■			□	0.8%
Headwaters[3]	Protection						---					
Couse Creek Drainage	Protection		□	■		■	□	□	■	■	■	1.6%

Source: Table information originated from Appendix G.
Key (see Table 8, Appendix G for numeric values)
■ = High level of habitat restoration effort
□ = Low-Moderate level of habitat restoration effort
Empty Cell = No habitat restoration effort completed since 1996

1 Only high priority restoration and protection geographic areas are shown in this table. Information on the remaining GA's within the Walla Walla subbasin is included in Table 7, Appendix G.

2 Priority refers to the designation of a geographic area as high priority for restoration, protection, or both restoration and protection. All restoration areas are also considered protection areas.

3 No information was available in a consistent format for this geographical area, which includes a conglomeration of reaches covering the Bull Trout bearing (present or potential) waters upstream of the present reaches designated through the EDT process (see Chapter 3).

Examining the geographic location of projects shows that approximately 23 percent of efforts have addressed the key limiting factors on the highest priority restoration and protection areas within the subbasin. As shown in Table 6-5, these key factors include riparian function/anthropogenic confinement, bedscour, flow, sediment (embeddedness & turbidity), maximum water temperature, key habitat (pools), woody debris and obstructions. Management plan strategies are proposed in Chapter 7 to address these factors in the specific priority restoration geographic areas where they are limiting. In addition, addressing obstructions is a priority throughout the subbasin, along with addressing other imminent threats (man-caused dewatered streams and inadequate fish screens). However, identification of naturally-caused versus man-caused dewatered stream reaches is currently a data gap. As such, detailed analysis of the projects that address this imminent threat was not possible at this time. Fish screening projects were also not incorporated into this analysis, although a large number of fish screens in the subbasin have been installed/upgraded and this work continues.

> "Before leaving this issue, a major caveat is in order. At the time of this writing, technical difficulties precluded the inclusion of obstructions (dams, culverts, waterfalls, etc) in the Level 2 Diagnosis in a manner strictly comparable to the other environmental attributes (this difficulty will be overcome in the near future). Consequently, obstructions were not listed…for a rigorous comparison with other attributes. However, a general impression of the impact of obstructions on both steelhead and spring chinook production can be gained simply by comparing fish performance as estimated with all obstructions in place with a simulation in which all obstructions are removed (viz., in which 100% passage is assumed). As described in the section on evaluation of habitat restoration strategies, the removal of all obstructions increases the abundance of tributary steelhead, mainstem steelhead, SF Walla Walla spring chinook, Mainstem/NF Walla Walla spring chinook and Touchet spring chinook by 52%, 44% , 16%, 35% and 35%, respectively. Passage restoration increases the abundance of Mill Creek spring chinook from 0 to 25. Abundance increases of this order of magnitude resulting from the restoration of a single attribute can only be described as major." (Appendix G)

Although data is not available regarding the number of projects that have addressed obstructions throughout the subbasin, addressing this imminent threat can clearly lead to dramatic improvements in focal species abundance. As such, addressing imminent threats such as passage obstructions is a subbasin-wide priority (as described in Chapter 7).

6.4 Limitations of the Aquatic Inventory Analysis

In terms of environmental attributes addressed, the Appendix G notes that 35 percent of the total effort was directed at the most important attributes identified and the allocation of project effort was deemed to be "disproportionately high for some attributes (e.g., fine sediment and turbidity) and disproportionately low for others (e.g., temperature, anthropogenic confinement)." It goes on to suggest the following:

> "It is possible that the lack of congruence between recent restoration effort and key Restoration Areas and attributes is an example of an "outmoded diagnosis". To be more specific, it is possible that the impact of certain attributes (e.g., fine sediment) in certain areas was in fact much more severe in the recent past, and that it was then entirely appropriate to allocate much of the restoration effort to such attributes and areas. Under this theory, a failure to monitor the success of restoration projects caused managers to fail to recognize that they had been successful, and that the top environmental priorities had changed as a result."

Finally, it is important to consider that certain types of projects often do not yield measurable benefits until several years to several decades after their implementation. For example, the effects of planting trees and revegetating stream banks to reduce instream water temperature may not be evident until this vegetation matures enough to provide effective shade to the stream. Placing LWD in streams also takes time for sediment build-up to occur and pools to develop. Thus, riparian and LWD placement projects may provide more extensive benefits than what has been currently noted in the aquatic assessment (see Chapter 3). It is difficult to accurately judge the effectiveness of habitat enhancement projects because of this temporal disjunction

In sum, although this analysis may on its surface appear to show that habitat enhancement efforts in the Walla Walla Subbasin have been completed in the wrong locations and for the wrong attributes, this is a distortion caused by the "snapshot" approach of the inventory analysis. As stated in Appendix G, "It must be emphasized that it is difficult to assess the true degree to which recent habitat restoration efforts have matched current habitat needs. In addition to the fact recent projects have probably changed the diagnosis (they may, for example, have reduced the severity of sedimentation considerably), it is difficult to quantify the effectiveness of a particular project and the relative effectiveness across projects. Very few habitat restoration projects have been monitored or, which amounts to the same thing, very few evaluations of habitat restoration projects have been published. Consequently, it is impossible to determine from existing data how well a particular project actually 'worked', how much habitat it affected, or even the specific environmental attributes that were impacted."

The EDT assessment (discussed in Chapter 3) focused on current conditions as the past two years, and the inventory focused on projects implemented since 1996. Because of this mismatch, projects completed from approximately 1996-2002 that addressed factors that were limiting at that time could appear in this analysis to have addressed a factor that is not limiting. Clearly, if a project successfully addressed a limiting factor in a particular reach, that factor would no longer have been limiting when the current assessment was completed, from which the current list of limiting factors was derived. Further, certain types of projects, such as riparian revegetation, must be in place for many years before measurable effects can be seen. As such, projects that address riparian function and similar attributes on a long-term basis may also have received less credit due to the mis-match between the project duration and timeframe of this analysis. Revision of this analysis may be informative to account for projects that successfully eliminated a limiting factor and projects that have a long-term horizon.

6.4.1 Wildlife Habitat Restoration and Protection Projects

The riparian projects identified in the previous section also benefit those terrestrial species relying on riparian habitat. Additional information on specific terrestrial wildlife enhancement projects was not available for this subbasin plan. However, the Blue Mountain Elk Plan mentioned in Section 6.2 contains a list of projects relating to improving elk habitat (Appendix H). The Game Management Plan written by WDFW contains details about current research relating to individual species of interest in the subbasin (WDFW 2003).

7. Management Plan

As the core of the subbasin plan, the management plan contains the direction in which the subbasin needs to proceed in the future regarding enhancement of aquatic and terrestrial habitats over the next 10 to 15 years. It provides testable hypotheses, measurable objectives, and implementable strategies formulated upon the geographic priorities, biological priorities, and current conditions provided in the assessment and inventory. Following are the key components of the Walla Walla Subbasin Management Plan provided in this chapter:

- Vision and Guiding Principles
- Management Plan Components and Prioritization
- Aquatic Habitats
    - Aquatic Working Hypotheses and Biological Objectives
    - Aquatic Strategies
    - Imminent Threats and Passage Barriers
    - Priority Restoration Area Strategies
    - Priority Protection Area Strategies
    - Bull Trout
    - Aquatic Strategy Special Topics
    - Numeric Fish Population Goals
    - Objectives Analysis
- Terrestrial Habitats
    - Terrestrial Working Hypotheses and Objectives
    - Terrestrial Strategies
    - Terrestrial Special Topics – Agriculture as a Cover Type of Interest
- Integration with Endangered Species Act/Clean Water Act Requirements
- Research, Monitoring and Evaluation
- Plan Implementation

The various components of the Walla Walla Subbasin Management Plan described in this chapter have been developed from information presented in the assessment and inventory. Chapters 3 and 4 of this document, the aquatic and terrestrial assessments, provide the primary supporting background information used to develop the management plan. Chapter 6, the inventory, also fed into the management plan in identifying specific areas where projects have occurred, and areas (geographical and biological) that remain in need of further work. This plan is intended to be implemented by landowners, conservation districts, agencies, tribes, and others that possess the appropriate responsibilities and authorities. Where possible, this is expected to occur on a voluntary basis, using BPA and other available funding sources.

Although the management plan components are based upon individual species and their habitats, none of these ecosystem components function independently. Strategies implemented to enhance species populations or habitats can impact other species in positive or negative ways, and will have social, political and economic implications.

Social, economic, and political factors in the Walla Walla Subbasin will be important considerations in determining the success of this management plan. A large proportion of strategies rely upon the cooperation of private landowners and their communities. As mentioned in the subbasin vision statement below, the social, cultural, and economic well-being of communities within the subbasin and the broader Pacific Northwest is an ultimate goal. Such factors were considered during the comparison of alternative strategies, and will play a significant role in determining which strategies are ultimately implemented. Incorporating these considerations along with directives provided by the scientific assessment have provided the greatest opportunity for this subbasin plan to successfully enhance aquatic and terrestrial wildlife and their habitats.

7.1 Vision and Management Plan Components

7.1.1 Vision

The vision provides general guidance and priorities for the long-term future of the subbasin. The vision describes the common desired future condition of the subbasin. The vision is qualitative and should reflect the policies, legal requirements and local conditions, values and priorities of the subbasin in a manner that is consistent with the vision described for the Columbia Basin in the Council's program. The vision will provide the guidance and priority for implementing actions in the future, therefore driving the development of biological objectives and strategies for the subbasin (NWPCC 2001).

The following vision statement for the Walla Walla Subbasin was developed and approved by the Subbasin Planning Team, WRIA 32 Planning Unit, and Walla Walla Basin Watershed Council.

The vision for the Walla Walla Subbasin is a healthy ecosystem with abundant, productive, and diverse populations of aquatic and terrestrial species that supports the social, cultural and economic well-being of the communities within the Subbasin and the Pacific Northwest.

7.1.2 Management Plan Components and Prioritization

Working Hypothesis

The management plan consists of three primary components: working hypotheses, biological objectives, and strategies. Working hypotheses are statements regarding the identified limiting factors for aquatic species and terrestrial habitats. The limiting factors incorporated into the working hypotheses were those identified in the aquatic and terrestrial assessments (see Chapters 3 and 4, respectively). Working hypotheses are intended to be testable, in that future research and monitoring will enable evaluation of the accuracy of the working hypotheses. Hypotheses for aquatic species were developed at the level of life history stages for individual species in geographic areas that are priorities for restoration. Terrestrial working hypotheses were established for priority habitats. Although anadromous fish species and some terrestrial wildlife species are limited by out-of-subbasin factors such as migration success, in-subbasin factors related to habitat quantity, quality, complexity and connectivity were the focus of the working hypotheses.

Biological Objectives

Biological objectives are specific, measurable objectives for selected habitat components. Establishment of biological objectives will allow subbasin planners to track progress toward decreasing the impacts of the limiting factors identified in the working hypotheses. Consistent with Council guidance for development of subbasin plans, quantitative biological objectives were established wherever sufficient data and information was available to support development of such. Biological Objectives were developed within the context of EDT and with the EDT attributes' numerical ranking cutoff criteria in mind. In the absence of sufficient data and/or information, subbasin planners established objectives based upon a desired trend (e.g. Show downward trend in summer maximum water temperatures). In these areas, the gathering of such information was typically identified as a strategy. Both quantitative and qualitative objectives are measurable, provided that baseline information exists, to allow demonstration of progress. Reference reach analyses to determine attribute potentials was not possible within budgetary and temporal constraints. All biological objectives were developed, reviewed and modified as appropriate by technical staff and the public, with a limited set of assumptions and a 10 to 15 year planning horizon.

Strategies

Strategies identify the specific types of actions that can be implemented to achieve the biological objectives. After development of the working hypotheses and biological objectives, preliminary strategies were developed with the technical team. These were then reviewed and revised with joint meetings of technical staff and the public at Aquatic Management Plan Workshop 1, Aquatic Management Plan Workshop 2, and Terrestrial Management Plan Workshop. Significant revisions to the strategies occurred at these workshops. These joint meetings of technical staff and the public were key to ensuring that strategies ultimately were both technically sound and consistent with public needs. Where received, written comments from the public were also used to revise the strategies.

Discussion of Land Acquisition Strategies

Land acquisition was identified and discussed extensively (in its various forms, e.g. fee simple title, conservation easements, and long-term leases) as an aquatic and terrestrial habitat protection strategy in the subbasin plan development process. When the draft Walla Walla Subbasin plan was being considered for approval by the Walla Walla Watershed Planning Unit (Washington only), the Planning Unit was unable to reach consensus on inclusion of fee simple title land acquisition as a strategy, although they did supportconservation easements and long-term leases. The Walla Walla Watershed Planning Unit preferred to remove land acquisition from the list of aquatic and terrestrial strategies that could be funded by BPA. However, members of the Walla Walla Basin Watershed Council (Oregon only) felt that it is important for land acquisition to remain as a potential strategy for the subbasin plan.

Hence, fee simple title land acquisition is included as strategy in the terrestrial and aquatic management plan sections, but is considered applicable to the Oregon portion of the watershed only, and majority and minority reports on the topic are provided in Appendix I. The majority report describes the position and basis for those against inclusion of fee simple title land acquisition strategy. The minority report describes the position and basis for those supporting inclusion of fee simple title land acquisition strategy. This difference in the applicability of land acquisition as a strategy in Washington versus Oregon holds for both the aquatic and terrestrial components of this subbasin plan.

Aquatic Strategies

Working directly from the biological objectives, aquatic strategies focus on methods to achieve improvements in aquatic habitat. The general assumption is that habitat improvements will enhance fish populations. Given that biological objectives regarding specific numeric fish population goals were not developed, strategies for directly enhancing fish populations were also not developed in this subbasin plan. See Section 7.3.6 below for more detailed discussion of numeric fish population goals. For terrestrial species and habitats, the limited information available also precluded the development of biological objectives and strategies for individual focal species. Instead, terrestrial strategies focus on enhancement of priority habitat types, under the general assumption that improvements to terrestrial habitats will benefit terrestrial species.

Two general categories of aquatic strategies were developed: restoration and protection. Applied in their respective priority geographic areas, restoration strategies are focused on enhancing current conditions, while protection strategies are focused on the maintenance of current conditions. In this context, "protection" is defined as implementation of a prescribed management action designed to maintain the desired ecological function of a habitat. Wherever possible, protection will occur with cooperation between the managing agency and landowner. Additionally, long-term protection activities are preferred over shorter-term activities.

This distinction does not imply that restoration strategies will include only active work, while protection will only include passive work. Both active and passive measures may be implemented to achieve restoration and/or protection measures, where appropriate. Note that in priority geographic areas for restoration of aquatic habitats, both protection and restoration strategies will apply, because all priority restoration areas are also priority protection areas. In addition to the restoration priority areas, priority geographic areas for protection were identified in the Assessment section of the subbasin plan. These are areas that the EDT analysis or empirical data suggests would have the most negative impacts on the focal species if they were allowed to degrade further.

Terrestrial Strategies

Two general categories of terrestrial strategies were also developed: protection and enhancement. Applied across priority habitats, protection strategies focus on maintaining functional habitat.

Enhancement strategies focus on increasing the functionality of terrestrial habitats. In addition, selected strategies also focus on increasing the functionality of land that is currently under short-term conservation easements.

Prioritization

Prioritization of biological objectives and strategies was addressed in the Walla Walla Subbasin plan as follows. The priority objectives identified in this plan were selected from a broad range of alternative objectives that could be addressed in the Walla Walla Subbasin based upon the working hypotheses derived from the assessment. For aquatic species and habitats, geographic priorities were established through identification of priority geographic areas for restoration and/or protection. Because terrestrial species could potentially use all areas of the subbasin, selection of four priority habitat types established geographic priorities for management. The objectives have not been prioritized relative to each other. Subbasin planners did not attempt this type of prioritization because insufficient information was provided by the assessments to support this level of prioritization. Regardless, the objectives presented herein were evaluated by technical staff and the public and are considered to be those that could produce the greatest benefit over the next 10 to 15 years, within practical sideboards and assumptions (see Section 7.2).

The aquatic and terrestrial strategy lists were developed to provide implementing entities with a menu of options. Not all strategies will be implemented, nor are all strategies appropriate in all portions of a subbasin. Determination of which strategies are implemented will depend on opportunities that become available and site-specific conditions over time. The listed strategies are intended to result in implementation of projects that will provide the most benefit to fish and wildlife species and their habitats under local ecological and social conditions in any given point in time. For this reason, strategies cannot and should not be prioritized in the subbasin plan. Prioritization of strategies is anticipated to occur at the provincial review level when proposals are considered for funding. At this time, projects that address specific strategies should be identified and ranked for funding based on Walla Walla Subbasin vision statement which provides guidance for implementing actions; other considerations for project identification and ranking should be biological and cost effectiveness.

Some broad categories of priorities have been established in this plan for both the aquatic and terrestrial components. These include:

- Strategies that provide long-term protection will be a higher priority than strategies that provide shorter-term protection, all other factors being equal.
- Strategies that meet multiple objectives are considered a higher priority than strategies that will provide benefit for a limited number of objectives.
- Terrestrial strategies that also provide benefit for aquatic focal species will be considered a higher priority than strategies that only benefit terrestrial wildlife.

These priorities will be considered primarily as projects are being proposed and evaluated within the subbasin. The information presented in this subbasin plan has been refined to the greatest extent possible, given the limitations of EDT and limitations of time to complete the subbasin plan. However, the framework provided in this plan provides a tool from which additional analyses can be completed in the future. Information gathered through the research, monitoring, and evaluation activities proposed later in this chapter will feed into an adaptive management approach in the subbasin that will allow further refinement and prioritization of actions in the future.

In addition to specific strategies, approaches for management plan special topics have also been developed (see Sections 7.3.5 and 7.4.1). These topics include those for which insufficient information was available to enable development of working hypotheses, objectives, and strategies through the EDT model and those issues that are of special interest to local stakeholders, e.g. agriculture as a cover type of interest.

Consistent with the vision statement provided above, cultural priorities are a significant component of the management plan. This includes cultural values of the CTUIR and cultural values of local communities. These cultural values will be considered as an overlay to the biologically-driven hypotheses, objectives, and strategies provided in the remainder of this plan. As such, projects that promote tribal and/or local culture will be considered a higher priority than projects that provide equivalent biological benefits with no cultural benefits.

7.2 Aquatic Working Hypotheses and Biological Objectives

Working hypotheses were developed for each limiting factor identified by EDT in each priority restoration geographic area. Working hypotheses for limiting factors in Walla Walla River geographic areas are provided in Table 7-1. Working hypotheses for limiting factors in Touchet River geographic areas are provided in Table 7-2. The full list of working hypotheses is provided in Section 7.3. A summary of the biological objectives derived for each limiting factor by geographic area is provided in Table 7-3. Descriptions of the reaches referenced in Table 7-3 and description of the various limiting factors can be found in Appendix C.

Working hypotheses and objectives were established in all priority geographic areas for restoration. Seven limiting factors were key in these areas: sediment (embeddedness), large woody debris, key habitat (pools), riparian function/confinement, summer water temperature, bedscour, and flow. A working hypothesis and one or more biological objectives were established for each limiting factors in each priority restoration geographic area where it was one of the top factors. These limiting factors clearly are related to each other (e.g. flow and temperature, bedscour and embeddedness). Further analysis will need to occur on a site-specific basis to more specifically identify the causes of these limiting factors by geographic area, and, potentially, by reach. As an example, bedscour and embeddedness are both listed as limiting factors in several geographic areas. These would appear contradictory, as increased bedscour would tend to decrease embeddedness. This is one example of where a closer look at the EDT model results will be needed to help evaluate the specific strategies that can be implemented to address all limiting factors within a geographic area. Another example is the relationship between flow and temperature. In some areas, increasing flow may not ameliorate elevated summer water temperatures to the degree necessary to support fish populations. Work continues in the subbasin (e.g. Oregon Department of Environmental Quality Temperature TMDL Model) to identify the relationship between flow and temperature. Research will need to continue to clarify the causes and relationship between limiting factors.

The following assumptions were used by technical staff and the public during the development of biological objectives in the Walla Walla Subbasin:

- **General**: Objectives were set at a level that can reasonably be achieved within the working horizon of this plan (10 to 15 years). Objectives were designed to achieve enough change as to cause a measurable beneficial effect on salmonid populations, or to achieve a significant transition point in survival for the species. Reducing embeddedness to 20 percent or less should significantly increase egg survival in the gravel in all geographic areas. Reach-specific geomorphic function will be considered when determining appropriate enhancement actions. Restoration methodologies that will most effectively and efficiently meet objectives will be employed. Restoration methods should be sustainable and augment physical and ecological processes as much as possible. When uncertainty exists regarding restoration approach, restoration methods with the least risk will be employed.
- **Embeddedness**: Any action taken to reduce embeddedness will likely produce commensurate reductions for percent fines and turbidity.
- **LWD**: LWD distribution within the geographic area will not necessarily need to be uniform. Large, complex aggregations of LWD can be beneficial and scattered throughout the area, at least some of which may move and re-aggregate annually. The intent is to have large pieces of woody debris available in the system that contribute to these aggregations that will have significant influences on channel morphology.
- **Pools**: LWD, instream structures, and meander maintenance and enhancement are considered to be critical to the creation and stability of primary pools.
- **Confinement**: Artificial confinement caused by road and dike locations perpetuates downstream instability. Elimination of low priority man-made structures would encourage natural stream meandering that will benefit salmonids. Greater dike setback or road relocation could significantly improve stream habitat and stability while continuing to provide protection for infrastructure and private property. The prioritization of dikes within the subbasin will occur through a coordinated effort with all stakeholders.
- **Riparian Function**: Riparian function depends on riparian area width, as well as vegetative species diversity and age. A continued recognition of the value and need for riparian function, as has occurred in recent years, will allow riparian function to increase. In areas with high rates of bank erosion, some effort to stabilize the stream channel may be needed before riparian enhancement is likely to be effective. This attribute is highly dependent on time for improvement throughout the subbasin.
- **Temperature**: Only the daily maximum portion of this attribute was identified in the objectives below, but actions taken to address maximum daily temperature are expected to decrease daily average temperatures overall. Decreased temperatures are also expected to occur due to improvements in riparian function.

- **Bedscour**: Objectives are designed to reduce bedscour to less than the depth that steelhead normally deposit their eggs. It is assumed that actions taken to increase LWD and riparian function along with decreased confinement, increased sinuosity, and improved floodplain connectivity will positively affect this attribute through increased stream stability.
- **Instream Flow**: Increased bedload deposition (leading to periodic subsurface flow) and decreased watershed function (e.g. large-scale water infiltration and retention) have negative impacts upon instream flow. Minimizing bedload deposition and enhancing infiltration will enhance flows; however, it is recognized that this may not be possible in all areas.

Table 7-1 Working Hypotheses for Walla Walla River System Geographic Areas

Geographic Area Hypothesis Factor		Working Hypothesis (including Life History Stages)
Walla Walla River (Mill Creek-E. L. WW)		
Sediment	MC1	Reduction in sediment (% fines, turbidity and embeddedness) will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning
LWD	MC2	Increase in LWD densities will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning
Pools	MC3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning
Riparian Fctn/ Conf.	MC4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning
Summer Max. Water Temp.	MC5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: pre-spawning, spawning
Bedscour	MC6	Decrease in bedscour will increase survival of steelhead in the following life stages: overwintering, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry.
Flow	MC7	Increase in summer flow will increase survival of steelhead in the following life stages: yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: fry, pre-spawning.
Walla Walla River (E.L. WW-Tumalum Bridge)		
Sediment	ELWW1	Reduction in sediment (% fines, turbidity and embeddedness) will increase survival of steelhead in the following life stages: egg incubation; fry; subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation; fry; subyearling rearing, pre-spawning.
LWD	ELWW2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation; fry; subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation; fry; subyearling rearing, pre-spawning.

Geographic Area Hypothesis Factor		Working Hypothesis (including Life History Stages)
Pools	ELWW3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation; fry; subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation; fry; subyearling rearing, pre-spawning.
Riparian Fctn/ Conf.	ELWW4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation; fry; subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation; fry; subyearling rearing, pre-spawning.
Summer Max. Water Temp.	ELWW5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation; fry; subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: subyearling rearing, pre-spawning.
Bedscour	ELWW6	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation; fry; subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation; fry; subyearling rearing, pre-spawning.
Flow	ELWW7	Increase in summer flow will increase survival of steelhead in the following life stages: egg incubation; fry; subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: subyearling rearing, pre-spawning.
Walla Walla River (Tumalum-Nursery Bridge)		
Sediment	TB1	Reduction in sediment (% fines, turbidity and embeddedness) will increase survival of steelhead in selected life stages. Spring Chinook survival will increase in selected life stages. **
LWD	TB2	Increase in LWD densities will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Pools	TB3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Riparian Fctn/ Conf.	TB4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Temperature	TB5	Decrease in summer temperatures will increase survival of steelhead in selected life history stages. Spring Chinook survival will increase in selected life history stages. **
Bedscour	TB6	Decrease in bedscour will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling.

Geographic Area Hypothesis Factor		Working Hypothesis (including Life History Stages)
Flow	TB7	Increase in flow quantity will increase survival of steelhead in the following life stages: fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: sub-yearling, pre-spawning.
Walla Walla River (Nursery Br to L. WW)		
LWD	NB1	Increase in LWD densities will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Pools	NB2	Increase in primary pool quantity will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Riparian Fctn/ Conf.	NB3	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Temperature	NB4	Decrease in summer temperatures will increase survival of steelhead in selected life history stages. Spring Chinook survival will increase in selected life history stages. **
Bedscour	NB5	Decrease in bedscour will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling..
Flow	NB6	Increase in flow quantity will increase survival of steelhead in the following life stages: fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: sub-yearling, pre-spawning.
Walla Walla River (L. WW to Forks)		
LWD	LWW1	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Pools	LWW2	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Riparian Fctn/ Conf.	LWW3	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Summer Max. Water Temp.	LWW4	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation. Spring Chinook survival will increase in the following life stages: sub-yearling, pre-spawning.

Geographic Area Hypothesis Factor		Working Hypothesis (including Life History Stages)
Bedscour	LWW5	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling.
Flow	LWW6	Increase in flow quantity will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: sub-yearling, pre-spawning.
South Fork WW (mouth-Elbow)		
Sediment	SF1	Reduction in sediment (% fines and embeddedness) will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
LWD	SF2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Pools	SF3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Riparian Fctn/ Conf.	SF4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling, pre-spawning.
Summer Max. Water Temp.	SF5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: sub-yearling, pre-spawning.
Bedscour	SF6	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry, sub-yearling.
Flow	SF7	Increase in flow quantity will increase survival of steelhead in the following life stages: egg incubation, yearling rearing. Spring Chinook survival will increase in the following life stages: sub-yearling, pre-spawning.
North Fork WW (Mouth-L. Meadows Canyon Cr; plus L. Meadows)		
Sediment	NF1	Reduction in sediment (% fines, turbidity and embeddedness) will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, sub-yearling, overwintering, pre-spawning.

Geographic Area Hypothesis Factor		Working Hypothesis (including Life History Stages)
LWD	NF2	Increase in LWD densities will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, sub-yearling, overwintering, pre-spawning.
Pools	NF3	Increase in Primary Pools will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, sub-yearling, overwintering, pre-spawning.
Riparian Fctn/ Conf.	NF4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, sub-yearling, overwintering, pre-spawning.
Summer Max. Water Temp.	NF5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, sub-yearling, pre-spawning.
Bedscour	NF6	Decrease in bedscour will increase survival of steelhead in the following life stages. fry, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, sub-yearling, overwintering.
Flow	NF7	Increase in Summer Flows will increase survival of spring Chinook in the following life stages: fry, sub-yearling, pre-spawning.

Table 7-2 Working Hypotheses for Touchet River System Geographic Areas

Geographic Area		Working Hypotheses (including Life History Stages)
Coppei Creek *		
Sediment	CC1	Reduction in sediment (% fines, turbidity and embeddedness) will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing.
LWD	CC2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Pools	CC3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Riparian Fctn/ Conf.	CC4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Summer Max. Water Temp.	CC5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing.
Bedscour	CC6	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Flow	CC7	Increase in summer flow will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Touchet River (Coppei-Forks; plus Whiskey)		
Sediment	TR1	Reduction in sediment (% fines and turbidity) will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry; subyearling rearing, pre-spawning, spawning.
LWD	TR2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry; subyearling rearing, pre-spawning, spawning.
Pools	TR3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry; subyearling rearing, pre-spawning, spawning.

Geographic Area		Working Hypotheses (including Life History Stages)
Riparian Fctn/ Conf.	TR4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry; subyearling rearing, pre-spawning, spawning.
Summer Max. Water Temp.	TR5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry; subyearling rearing, pre-spawning, spawning.
Bedscour	TR6	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry; subyearling rearing.
Flow	TR7	Increase in summer flow will increase survival of steelhead in the following life stages: fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: subyearling rearing, pre-spawning, spawning.
South Fork Touchet		
Sediment	SFT1	Reduction in sediment (% fines and turbidity) will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; pre-spawning, spawning.
LWD	SFT2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; pre-spawning, spawning.
Pools	SFT3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; pre-spawning, spawning.
Riparian Fctn/ Conf.	SFT4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; pre-spawning, spawning.
Summer Max. Water Temp.	SFT5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: pre-spawning, spawning.
Bedscour	SFT6	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry.
Flow	SFT7	Increase in summer flow will increase survival of steelhead in selected life history stages. Spring Chinook survival will increase in selected life history stages. **

Geographic Area		Working Hypotheses (including Life History Stages)
South Fork Touchet Tributaries		
Sediment	NFT1	Reduction in sediment (% fines and turbidity) will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
LWD	NFT2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Pools	NFT3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Riparian Fctn/ Conf.	NFT4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
North Fork Touchet		
Sediment	NFTT1	Reduction in sediment (% fines, turbidity and embeddedness) will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing. Spring Chinook survival will increase in the following life stages: fry, subyearling, overwintering, pre-spawning.
LWD	NFTT2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, subyearling, overwintering, pre-spawning.
Pools	NFTT3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, subyearling, overwintering, pre-spawning.
Riparian Fctn/ Conf.	NFTT4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: fry, subyearling, overwintering, pre-spawning.
Summer Max. Water Temp.	NFTT5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: subyearling, pre-spawning.
North Fork Touchet Tributaries (excluding Wolf)		
LWD	NFTT1	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.
Pools	NFTT2	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering.

Geographic Area		Working Hypotheses (including Life History Stages)
Wolf Fork (Mouth-Coates; plus Robinson & Coates)		
Sediment	WFM1	Reduction in sediment (% fines and turbidity) will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering, pre-spawning.
LWD	WFM2	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering, pre-spawning.
Pools	WFM3	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering, pre-spawning.
Riparian Fctn/ Conf.	WFM4	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering, pre-spawning.
Summer Max. Water Temp.	WFM5	Decrease in summer temperatures will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, yearling rearing. Spring Chinook survival will increase in the following life stage: pre-spawning.
Bedscour	WFM6	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, yearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering.
Wolf Fork (Coates to access limit; plus Whitney)		
LWD	WFC1	Increase in LWD densities will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, subyearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering, pre-spawning
Pools	WFC2	Increase in primary pool quantity will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, subyearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering, pre-spawning
Riparian Fctn/ Conf.	WFC3	Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: egg incubation, subyearling rearing, overwintering, subyearling rearing. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering, pre-spawning
Bedscour	WFC4	Decrease in bedscour will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, overwintering. Spring Chinook survival will increase in the following life stages: egg incubation, fry; overwintering.

* Spring Chinook are not considered present in the Coppei Creek drainage.

** Specific life history stages will be inserted into these objectives when available from WDFW.

Table 7-3 Summary of Biological Objectives by Geographic Area

Geographic Area		Limiting Factors for Steelhead and Spring Chinook							
		Substrate Embeddedness (% of Substrate	LWD (# pieces per channel width)	Pools (% of stream surface area)	Riparian Function (% of max)	Confinement (% of streambank length)	Summer Maximum Water Temperature	Bedscour (cm)	Summer Flow (flow ratings per EDT)
Walla Walla River (Mill Creek-E. L. WW)	Objective	<10	1	20	62	40	Less than 4 days >72F	≤15	Increase summer flows by 10-15% (or as set by other processes)
	Current	>10	<0.33	10	37	60	More than 4 days >72	20	4 (severely reduced)
Walla Walla River (E.L. WW – Tumalum Bridge)	Objective	<10	1	20	62	40	Less than 4 days >72F	≤15	3 (moderately reduced)
	Current	>10	<0.3	10	37	65	More than 4 days >72	18	4 (severely reduced)
WW River (Tumalum-Nursery Bridge)	Objective	<10	>0.5	20	40	60	5% Reduction	<15	3
	Current	>10	<0.33	10	<25	80	EDT rating 4	14-32	Flows Reduced 50-100%
WW River (Tumalum-Nursery Bridge)	Objective	NA	>0.5	20	40	60	5% Reduction	<15	3
	Current		<0.33	10	<25	80	EDT rating 4	14-32	Flows Reduced 50-100%
WW River (L. WW to Forks)	Objective	NA	>0.5	20	50	60	5% Reduction	<15	3
	Current		<0.33	15	37	>80	EDT Rating of 2,3	14-21	Flows Reduced 20-50%
SF WW (mouth to Elbow Creek)	Objective	<10	>0.5 (SF 1&2) 1 (SF3)	20	80 (SF 1&2) 90 (SF3)	60 (SF 1&2)	5% Reduction	<6 (SF 1&2)	3
	Current	17	<0.33 (SF 1&2) 0.33-1 (SF3)	15	62 (SF 1&2) 82 (SF3)	>80 (SF 1&2)	EDT rating 3 (SF1)	6-14 (SF 1&2)	Flows reduced 20-50%
NF WW (Mouth to L. Meadows Canyon; plus L. Meadows	Objective	EDT Rating 0 & 1 (Turbidity)	>0.5	20	50	40	5% Reduction	<15	3
	Current	EDT Rating 2 & 1 (Turbidity)	<0.33	10-15	37	10-60	EDT rating 4	21	Flows Reduced 25-50% (NF 1)

Geographic Area		Substrate Embeddedness (% of Substrate	LWD (# pieces per channel width)	Pools (% of stream surface area)	Riparian Function (% of max)	Confinement (% of streambank length)	Summer Maximum Water Temperature	Bedscour (cm)	Summer Flow (flow ratings per EDT)
		Limiting Factors for Steelhead and Spring Chinook							
Coppei Creek	Objective	<10	1	15	75	15	Less than 4 days >72F & less than 12 days >61F	≤14	2.25
	Current	17	<0.33	8	60	25	More than 4 days >72 & more than 12 days >61F	19	2.8
Touchet River (Coppei-Forks; plus Whiskey)	Objective	Continue downward trend in % embeddedness ; assume related decrease in fines & turbidity	1	15	62	40	Less than 4 days >72F	≤10	3
	Current	Sediment concerns : fines & turbidity	<0.33	5 (Touchet 7) 7 (Touchet 9-11) 20 (Touchet 8)	37	>60	More than 4 days >72F	18	3.5
South Fork Touchet Mainstem	Objective	Continue downward trend in % embeddedness ; assume related decrease in fines & turbidity*	1 (SF Touchet 1)	25 (SF Touchet 1) 35 (Touchet 2 & 3)	62	15 (SF Touchet 1 & 3)	Less than 4 days >72F (SF Touchet 1)	≤15	Show improvement in improving summer flows (note – Focus on improving watershed conditions, and irrig efficiencies
	Current	Sediment concerns : fines & turbidity	<0.33	5 (Touchet 1) 25 (Touchet 2 & 3)	37	25	More than 4 days >72F	20	3 (moderately reduced)

Geographic Area		Substrate Embeddedness (% of Substrate	LWD (# pieces per channel width)	Pools (% of stream surface area)	Riparian Function (% of max)	Confinement (% of streambank length)	Summer Maximum Water Temperature	Bedscour (cm)	Summer Flow (flow ratings per EDT)
		Limiting Factors for Steelhead and Spring Chinook							
South Fork Touchet Tributaries	Objective	Continue downward trend in % embeddedness ; assume related decrease in fines & turbidity*	1 (Green Fk) 2 (Burnt Fk, Griffin Fk 1 & 2)	24 (Green Fk, Burnt Fk) 33 (Griffin Fk 1, 2, 3)	82	15	Not an EDT-Identified Limiting Factor for Steelhead or Spring Chinook; May Be Limiting for Bull Trout	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor
	Current	Sediment concerns : fines & turbidity	<0.33 (Green Fk) 1-2 (Burnt Fk, Griffin Fk 1 & 2)	5 (Green Fk) 15 (Burnt Fk) 25 (Griffin Fk 1, 2, 3)	62	25			
North Fork Touchet Mainstem	Objective	Continue downward trend in % embeddedness ; assume related decrease in fines & turbidity*	1 (NF Touchet 1-6)	10 (NF Touchet 1-6)	62 (NF Touchet 1-2)	40 (NF Touchet 1-2)	Less than 4 days >72F (NF Touchet 1-5)	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor
	Current	Sediment concerns : fines & turbidity	<0.33 (NF Touchet 1-6) 2 (NF Touchet 7)	5 (NF Touchet 1-6) 11 (NF touchet 7)	37 (NF Touchet 1-2) 75 (NF Touchet 3-7)	60 (NF Touchet 1-2) 15 (NF Touchet 3-7)	EDT Rating 3.1 (NF Touchet 1-2) EDT Rating 2.7 (NF Touchet 3-5) Same as historic (NF Touchet 6-7)		
North Fork Touchet Tributaries (excluding Wolf)	Objective	Not an EDT-Identified Limiting Factor	1 (Rodgers) 2 (Jim, Lewis, Spangler)	15	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor
	Current		<0.33 (Rodgers) 1-2 (Jim, Lewis, Spangler)	2-3					

Geographic Area		Substrate Embeddedness (% of Substrate	LWD (# pieces per channel width)	Pools (% of stream surface area)	Riparian Function (% of max)	Confinement (% of streambank length)	Summer Maximum Water Temperature	Bedscour (cm)	Summer Flow (flow ratings per EDT)
		Limiting Factors for Steelhead and Spring Chinook							
Wolf Fork (Mouth Coates; plus Robinson & Coates)	Objective	Continue downward trend in % embeddedness ; assume related decrease in fines & turbidity*	1	15	75	10	Less than 4 days >72F & Less than 12 days >61F	15	Not an EDT-Identified Limiting Factor
	Current	Sediment concerns : fines & turbidity	<0.33	9	65	30	More than 4 days >72F and more than 12 days >61F	21	
Wolf Fork (Coates to access limit; plus Whitney_	Objective	Not an EDT-Identified Limiting Factor	1 (Wolf 3)	25	75	15	Not an EDT-Identified Limiting Factor	≤14	Not an EDT-Identified Limiting Factor
	Current		<0.33	10 (Wolf 3) 15 (wolf 4)	62	25		18	

* A sampling regime to measure decreases in fines & turbidity would also be implemented.

7.3 Aquatic Strategies

The following three categories of aquatic strategies were developed:

- strategies to address imminent threats throughout the subbasin
- strategies for priority restoration areas
- strategies for priority protection areas.

All three are considered equally important for implementation. Active restoration will likely be needed to address most imminent threats, e.g. unscreened diversions, passage barriers, and human-caused dry stream reaches, although passive measures for flow enhancement may also be employed. Active restoration is the use of a structural improvement or direct instream work for the benefit of instream habitat. Examples include installation of large woody debris, rock weirs, and J-hook vanes. Activities such as riparian planting and upland infiltration enhancement are not considered active restoration actions. Note that this is the definition of passive restoration for the terms of this subbasin plan, and may not be consistent with the typical conception of what constitutes passive restoration. Passive restoration takes advantage of natural processes and out-of-stream activities to achieve instream habitat enhancement. Examples includes planting riparian vegetation, implementing conservation easements, increasing upland infiltration (e.g. direct seed/no-till), use of sediment basins, developing alternative livestock watering facilities, and water conservation. Note that this is the definition of passive restoration for the terms of this subbasin plan, and may not be consistent with the typical conception of what constitutes passive restoration.

Although passive restoration is a valuable approach in many cases, it will take longer to show measurable results. These results may be achieved only in part during the 10 to 15 year time-frame of this plan. Active restoration can show more immediate benefits, but those benefits can be short-lived and highly site-specific. Both active and passive restoration have their place, but the choice to use one over the other will be considered carefully with both short-term and long-term goals in mind.

7.3.1 Imminent Threats and Passage Barriers

As the management plan process was developing it became clear that some actions in the subbasin needed to be held apart from the process and given special status. The strategy of our management plan was to narrow the subbasin into a few geographic areas where the focal species would receive the most benefit by the work being done. While this is appropriate for most management actions it does not address conditions that are likely to cause immediate mortality to the salmonids that serve as our focal species. We identified three areas that fit into this category: passage obstructions, fish screens, and areas of the stream that seasonally go dry. These conditions should be a priority for funding wherever they occur in the subbasin, regardless of whether they are located in a priority geographic area.

Obstructions

Passage obstructions are considered a source of potential immediate mortality to fish. Delay in passage can expose fish to habitat conditions that could be adverse to survival without the opportunity to escape. Delay in passage also can affect the ability of salmonids to successfully spawn. Fish can also be physically injured by inadequate passage facilities increasing exposure to disease or possibly causing direct mortality from the injuries. In the Walla Walla Subbasin, 42 obstructions were identified during the EDT modeling process; however, 10 of these were given no adult passage obstruction rating (Table 7-4). It should be noted that some of these obstructions are actually conglomerations representing many obstructions. This was done when the actual amount of obstructions in a reach was unknown or if it was impractical to rate each obstruction individually. Obstructions should be removed or modified wherever they occur in the basin whenever the opportunity arises. Priority should be given to those obstructions that affect multiple focal species, occur lower in the basin, and are considered to be the greatest obstructions to passage.

The management work groups did not rank obstructions in order of priority. If the table is examined, however, several obstructions readily fit the above criteria.

A number of larger (> 5 cfs) diversions within the stream reaches identified by the EDT analysis as having "Several sites of significant water withdrawals along the reach without screening or screening believed to be ineffective" were identified in the Montgomery Watson Walla Walla Basin Passage Improvements Project (1999) report. The sites identified in that report included Old Lowden Diversion, Bergevin-Williams Diversion, Smith-Nelson Diversion on the mainstem Walla River and Stiller Diversion, Titus Creek, and Jones Ditch on Mill Creek. New screens have been installed on the Smith-Nelson Ditch in 1999, but the others are still in need of screening improvements. In addition, Eastside/Westside Diversion on the lower Touchet River and Milton Ditch on Couse Creek have been identified through other assessments as needing screening upgrades. Preliminary designs have been developed for Eastside/Westside Diversion and the consolidation of Milton Ditch into the Little Walla Walla River system is under construction. A review and prioritization should occur through the Walla Walla Basin Technical Workgroup or similar coordination group in the subbasin to select the preferred alternative and to determine priorities for funding and implementation. The assessment of additional screening needs for small diversions (< 5 cfs) and pumps is ongoing in both Oregon and Washington under Mitchell Act and other passage funding programs. Adequate funding may not exist to address all the screening needs for diversions < 5 cfs.

Table 7-4 Salmonid Fish Passage Obstructions in the Walla Walla Subbasin.

Drainage/Obstruction	River Mile	Spring Chinook % Passage	Steelhead % Passage
Walla Walla Drainage:			
Pine Cr: Grade Control Structure on County Road 707	7.8	NA	10%
Pine Cr: Irrigation Dam1	8.1	NA	100%
Pine Cr: Irrigation Ditch Diversion1	11.6	NA	100%
Pine Cr: Bridge on County Road 7081	11.8	NA	100%
Pine Cr: Culvert at Johnson Road1	23.6	NA	100%
Pine Cr: Culvert at Highway 112	23.9	NA	50%
Pine Cr: Spring Reservoir Dam Elev. 2100 ft6	28.7	NA	100%
Pine Cr: Spring Reservoir Dam Elev. 2350 ft6	30.6	NA	100%
Dry Cr (Walla Walla): Bridge at Lower Waitsburg Road3	18.4	NA	90%
Dry Cr (Walla Walla): Cement box culvert just upstream of Sapolil Road4	24.1	NA	90%
Mud Cr (trib Dry Cr, near Dixie): Abandoned Railroad Crossing Culvert	1.4	NA	0%
Garrison Cr: Larch and Lyon's Ponds	3.7	NA	5
Garrison Cr: Hypothetical barrier representing many upstream obstructions4, 5	4.9 to 10.0	NA	80
Bryant Cr./Walla Walla Urban Streams: Hypothetical barrier representing many barriers in Walla Walla streams4, 5	Beginning at 4.9 of Garrison Cr.	NA	20%7
Stone Cr: Pond Dam	1.1	NA	80%
Stone Cr: Hypothetical representing multiple barriers upstream of Highway 1254, 5	4.4 to 7.8	NA	20%7
Walla Walla R: Burlingame Diversion Dam	38.9	80%	90%
Big Spring Cr: Railroad crossing and other barriers upstream5	0.7	NA	50%
East Little Walla Walla R: Hypothetical representing multiple barriers upstream5, 6	1.7	NA	100%
Unnamed Spring: Railroad crossing and other barriers upstream1, 5	.3	NA	100%
Russell Cr: Old irrigation Diversion Dam, partial obstruction.	.9	NA	70%
Russell Cr: CCC Dam, complete obstruction.	5.6	NA	0%
Yellowhawk Cr: Garrison Cr. Yellowhawk Division Dam	7.8	95%	90%
Birch Cr: Waterfall	.4	NA	50%
Birch Cr: Culvert at Powerline Road	3.9	NA	50%
Walla Walla R: Nursery Bridge	46.8	NA	80%
Walla Walla R: Little Walla Walla Diversion6	48.0	NA	100%
Couse Cr: Culvert at gravel pit entrance6	1.1	NA	100%
Touchet Drainage:			
Touchet R: Hofer Dam Siphon	4.6	70%	80%
Touchet R: Hofer Dam	5.0	50%	60%
Touchet R: Falls	47.5	80%	90%
Whiskey Cr: Culvert	5.9	20%	20%

Drainage/Obstruction	River Mile	Spring Chinook % Passage	Steelhead % Passage
Touchet R: WDFW Acclimation Pond Intake Dam	63.3	90%	90%
Mill Creek Drainage:			
Doan Cr: Underground pipe in which Doan is confined	2.1	NA	10%
Mill Cr: Stiller Ditch Diversion Dam	2.6	80%	90%
Mill Cr: Gose Street Dam and Concrete Apron	5.4	20%	50%
Mill Cr: Concrete channel, velocity and light barriers5	5.4 to 9.3	10%	30%
Mill Cr: Concrete capped weirs and diked channel from Gose St to Bennington Dam5	5.4 to 12.3	60%	80%
Mill Cr: Titus Cr culvert at mouth	0	0%	0%
Mill Cr: Yellowhawk Division Dam and Ladder	11.4	60%	80%
Mill Cr: Bennington Dam and Ladder	12.3	10%	20%
Mill Cr: Kooskooskie Dam	23.0	90%	100%

1Entered at request of Oregon TOAST, passage knowledge does not exist; full passage assumed.

2 Pine Cr. had two more barriers upstream of this entered into database, passage was rated at 100%; so they were not included in table.

3 Barrier at high flows only.

4 Barrier at low and high flows.

5 Conglomeration of multiple barriers in stream reach or geographic area.

6 Entered as reach break and obstruction in EDT database; rating in database indicates 100% passage. Status uncertain.

7 These were incorrectly entered as 80% passable in the EDT database; 20% is the correct figure.

Note: Passage obstructions were identified and percentages were estimated for EDT analysis, these structures have not been evaluated for passage. This list is not to be considered comprehensive, as none of these creeks have been inventoried for passage barriers. Percentages represent the likelihood of adult passage in low flow conditions unless otherwise indicated. Obstructions are in order for each drainage: Top is closest to mouth while the bottom is farthest from mouth. (NA = Species not present).

The two obstructions on the Touchet River associated with the Hofer Dam are extremely low in the basin. The impacts from impeded obstruction here can affect production in the entirety of the Touchet sub-watershed.

The multiple obstructions associated with lower Mill Creek are very similar in that they preclude full access to almost the entire drainage.

Both the Hofer and Mill Creek obstructions affect multiple species, occur low in the basin and are among the lowest in adult passage in the subbasin.

Fish Diversions/Screens

Water diversions that are not screened or are inadequately screened are a well documented source of mortality to salmonids, particularly juveniles. If fish screens do not have the correct flows across the screen or if mesh size is wrong, fish may be impinged on the surface. A water diversion, pump or gravity, that is not screened or has too large mesh may physically divert the fish out of the stream and into a waterway that is not suitable for survival. The installation of screens that meet current NOAA standards is considered a priority for the basin. In addition projects that move diversions out of salmonid bearing waters do, in effect, remove a potential source of mortality and should also be considered a priority under this management strategy.

The EDT analysis rated reaches for water withdrawals as a habitat attribute. This rating was based on the number of withdrawals within a reach and the degree to which they were screened (see Appendix C for rating definitions). In the Walla Walla subbasin the Lower Walla Walla… Lower Touchet… Touchet, Coppei to forks; NF Touchet mainstem (lower reaches); Walla Walla, Dry to Mill; Yellowhawk mainstem; Mill Creek, Mouth to Gose St; and Mill Creek, Gose St to Bennington Dam; were geographic areas rated as having "several sites of significant water withdrawals along the reach without screening or screening believed to be ineffective." This is a rating of "3". All of these areas occur in Washington. Many of the diversions that were considered when rating these reaches are being addressed through the WDFW Cooperative Compliance Review Program. This is an effort to offer technical assistance and cost-sharing to water diverters with inadequate fish screens. This program has installed, or has contracts to install, 185 screens to date. This should significantly change the way this habitat attribute is rated in the future.

Dry Stream Reaches

There are some reaches within the Walla Walla Subbasin that go dry on a seasonal basis. Some of these may be caused by the natural hydrological regime of the area; others may be anthropogenic in origin. Anthropogenic causes can be water diversions or vegetation removal, which reduces infiltration of water in the watershed. While this plan does not advocate the implementation of resources for introducing water to a section of the stream at a time of year when water historically was not present; every effort should be made to return water to areas that are de-watered due to the causes mentioned above. Projects could include water leases or purchases. In addition larger projects that restore the riparian areas or otherwise encourage the raising of the water table and water retention of the affected areas should be encouraged.

7.3.2 Priority Restoration Area Strategies

Strategies developed for the priority restoration geographic areas are provided in Table 7-5. This table lists the working hypotheses, associated biological objectives, and associated strategies for each geographic area. For example, in the Walla Walla River (Mill Creek to East Little Walla Walla) Geographic Area, Strategies MC1.1.1 through MC1.1.23 are proposed to achieve Objective MC1.1, which was established as a measurable target for improvements in Hypothesis MC1. All related hypotheses, objectives, and strategies are numbered similarly in Table 7-5 for the Walla Walla River (Mill Creek to East Little Walla Walla) Geographic Area. Table 7-6 provides a crosswalk to identify which strategies apply to specific priority restoration geographic areas. The same set of strategies is proposed for each limiting factor for those geographic areas in which it appears. However, the particular strategies selected and implemented will be dependent on site-specific characteristics, benefits to fish, and further analysis by local resource managers and stakeholders. Table 7-7 identifies the bull trout life history stages that will benefit from limiting factor improvements in the priority geographic areas. Note that bull trout are present in other areas of the subbasin outside of the priority geographic areas (e.g. Mill Creek). A strategy summary and categorization is provided in Table 7-8.

Table 7-5 Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies

Walla Walla River (Mill Creek to E. L. Walla Walla): Working Hypotheses, Causes, Objectives, and Strategies	
Hypothesis MC1: Reduction in sediment (% fines, turbidity and embeddedness) will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning. Causes: Land use: road development, cultivation, overgrazing; Increased width-to-depth ratio; Poor riparian condition; Altered stream hydrograph leading to excessive flashiness.	
Objective MC1.1-Reduce embedded-ness within the area to <10%. This will also stimulate a corresponding decrease in percent fines and turbidity. *Current estimate: >10%.*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** Strategy MC 1.1.1-Improve the extent, structure, and function of riparian buffers to increase their ecological function through vegetation planting (native species preferred), selected livestock fencing, and similar practices, including tributaries (perennial and intermittent streams) that contribute to priority areas. Strategy MC 1.1.2-Decrease sediment delivery from upland practices through expanded use of conservation tillage, sediment basins, mowing of road shoulders in place of herbicide use, vegetative buffers on road shoulders, and other practices where possible. Strategy MC 1.1.3-Restore perennial vegetation in upland cultivated and non-cultivated areas with native species and reforestation. Strategy MC1.1.4-Implement the most economical and effective treatment methods to control noxious weeds, including the encouragement of biological control methods where feasible and appropriate. Strategy MC1.1.5-Pave, decommission, or relocate roads near the stream and in upland areas, where possible. Strategy MC1.1.6-Use appropriate BMPs for road maintenance and decommissioning where possible. Strategy MC1.1.7- Improve bank stability through implementation of soft bank stabilization methods. The use of hard stabilization methods is discouraged. Strategy MC1.1.8- Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals. Strategy MC1.1.9- Continue development and implementation of TMDL Clean-up Plans, Oregon Walla Walla River Ag. Water Quality Management Plan, and other watershed scale efforts to decrease sediment inputs. Strategy MC1.1.10- Reduce sediment inputs through implementation of forestry and agricultural BMPs. Strategy MC1.1.11-Develop and implement strategy for monitoring improvements in embeddedness, including establishment of a baseline where needed. Strategy MC1.1.12-Uphold existing land use regulations and instream work regulations (e.g. critical area ordinances, HPA requirements, DSL requirements, etc.) that limit channel, floodplain, and riparian area impacts and educate the public regarding their implementation. Strategy MC1.1.13-Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or refine regulations that better protect streams from floodplain development that leads to loss or degradation of riparian vegetation. Strategy MC1.1.14-Improve municipal stormwater management to minimize sediment inputs. Strategy MC1.1.15-Where appropriate, improve natural stream form and function. Strategy MC1.1.16-Implement upland BMPs, including activities such as sediment basins on intermittent streams. Strategy MC1.1.17-Identify relative sediment inputs of tributaries (perennial and intermittent streams). Strategy MC1.1.18-Implement best management practices for bridge design and maintenance activities to reduce build-up of sediment and other materials.

Walla Walla River (Mill Creek to E. L. Walla Walla): Working Hypotheses, Causes, Objectives, and Strategies, cont.	
Hypothesis MC1, cont.	
Objective MC1.1, cont.	Strategy MC1.1.19- Increase landowner participation in federal, state, tribal, and local programs that enhance watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)
	Strategy MC1.1.20- Where appropriate and feasible, manage beaver populations to support LWD recruitment and trap sediment, and educate the public regarding benefits of beaver.
	Strategy MC1.1.21- Maintain the occurrence of channel-forming flushing flows in spring months to flush sediment from the substrate, provided that developed areas and infrastructure are not damaged.
	Strategy MC1.1.22-Encourage treatment of municipal, industirial, and construction site stormwater, where appropriate and feasible.
	Strategy MC1.1.23- Seek funding sources to develop programs consistent with the goals of CRP and CREP in those areas where such programs are not available (e.g. smaller tributaries high in the subbasin).
	Also see Hypothesis MC6.

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued

Hypothesis MC2: Increase in LWD densities will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning

Causes: Poor riparian diversity and maturity; Straightened channels; Diking; Road development; Flood management

Objective MC2.1- Reach or exceed one piece of LWD per channel width. *Current estimate: <1 piece / 3 channel widths (<0.33 pieces/CW)*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** Strategy MC2.1.1-Add LWD in the form of rootwads, log jams, and similar properly designed structures that mimic natural formations and limit removal of recruited LWD from the stream. Strategy MC2.1.2-Increase the density, maturity, and appropriate species composition of woody vegetation in riparian buffers for long-term recruitment of LWD. Strategy MC2.1.3- Decrease the width-to-depth ratio through appropriate methods. (also see Hypotheses MC3 and MC5) The use of "hard" stabilization methods such as rip rap, concrete, or railroad ties is discouraged. Strategy MC2.1.4- Where appropriate, improve natural stream form and function (e.g. meander reconstruction) to facilitate LWD retention. Strategy MC2.1.5-Develop and implement strategy for monitoring improvements in LWD density, using existing protocols if available. Strategy MC2.1.6- Uphold existing land use regulations and instream work regulations (e.g. critical area ordinances, HPA requirements, DSL requirements, etc.) that limit channel, floodplain, and riparian area impacts and educate the public regarding their implementation. Strategy MC2.1.7- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or refine regulations that better protect streams from floodplain development that leads to loss or degradation of riparian vegetation. Strategy MC2.1.8- Decommission, modify or relocate (i.e. setback) roads, low-priority dikes, bridges, culverts, other structures and land uses to facilitate greater floodplain accessibility while protecting private and public property rights and uses. Strategy MC2.1.9- Complete a detailed inventory of confinement throughout the subbasin with cooperation of all stakeholders, including prioritization of dikes based upon their function to protect infrastructure and private property where possible. Strategy MC2.1.10-Where appropriate and feasible, manage beaver populations to support LWD recruitment, and educate the public regarding benefits of beaver. Strategy MC2.1.11-Maintain existing LWD to the greatest extent possible through outreach, education, regulatory, and other means, given limitations regarding protection of infrastructure and urban flood management needs. Strategy MC2.1.12- Improve the extent, structure, and function of riparian buffers to increase their ecological function through vegetation planting (native species preferred), selected livestock fencing, and similar practices, including tributaries (perennial and intermittent streams) that contribute to priority areas. (also see Hypothesis MC1) Strategy MC2.1.13- Implement best management practices for bridge design and maintenance activities to reduce build-up of sediment and other materials. Strategy MC2.1.14- Identify relative inputs of tributaries (perennial and intermittent streams) on LWD. Strategy MC2.1.15- Increase landowner participation in federal, state, tribal, and local programs that enhance watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued

Hypothesis MC3: Increase in primary pool quantity will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning

Causes: Straightened channels; Unstable banks; High width-to-depth ratio; Poor riparian condition (little woody vegetation); Removal of LWD in developed areas

Objective MC3.1- Increase the proportion of primary pools to 20% of stream surface area. *Current estimate: 10%*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** Strategy MC3.1.1- Where appropriate, improve natural stream form and function (e.g. meander reconstruction) to facilitate long-term natural pool formation. Strategy MC3.1.2-Install properly designed instream structures, including boulders, vortex rock weirs, and LWD (also see Hypothesis MC2) for short-term pool formation. Strategy MC3.1.3-Retain existing LWD and limit removal of recruited LWD (also see Hypothesis MC2). Strategy MC3.1.4-Where appropriate, improve bank stability through implementation of soft bank stabilization methods. The use of hard stabilization methods is discouraged. Sloughing banks may be retained in some areas to increase stream sinuosity. Strategy MC3.1.5- Decrease the width-to-depth ratio through appropriate methods. (also see Hypotheses MC2 and MC5) Strategy MC3.1.6- Improve the extent, structure, and function of riparian buffers to increase their ecological function through vegetation planting (native species preferred), selected livestock fencing, and similar practices, including tributaries (perennial and intermittent streams) that contribute to priority areas. (also see Hypothesis MC1) Strategy MC3.1.7-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals. Strategy MC3.1.8- Develop and implement strategy for monitoring improvements in primary pool quantity, quality and complexity. Strategy MC3.1.9- Where appropriate and feasible, manage beaver populations to support pool development, and educate the public regarding benefits of beaver. Strategy MC3.1.10-Wherever feasible, use passive and active approaches to allow stream channels to develop and flood naturally, while protecting private and public property rights and uses. Strategy MC3.1.11-Pursue instream flow enhancement opportunities (also see Hypothesis MC7) Strategy MC3.1.12- Identify relative inputs of tributaries (perennial and intermittent streams) on primary pool quantity, quality, and complexity. Strategy MC3.1.13- Increase landowner participation in federal, state, tribal, and local programs that enhance watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, CTUIR habitat programs, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued

Hypothesis MC4: Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: overwintering, yearling migrant, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry, pre-spawning, spawning

Causes: Roads, dikes, residential construction, overgrazing, firewood cutting and other development/land use activities close to the stream leading to confinement, poor riparian function, and decreased floodplain accessibility

Objective MC4.1-Continue riparian recovery and re-establishment to achieve at least 62% riparian function. Adequate riparian function will require addressing all of the following components: canopy cover, understory vegetation, wetlands, and floodplain connectivity. *Historic estimate: 100%* *Current estimate: 37%*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** Strategy MC4.1.1- Uphold existing land use regulations and instream work regulations (e.g. critical area ordinances, HPA requirements, DSL requirements, etc.) that limit channel, floodplain, and riparian area impacts and educate the public regarding their implementation. Strategy MC4.1.2- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or refine regulations that better protect streams from floodplain development that leads to loss or degradation of riparian vegetation on the mainstem and tributaries Strategy MC4.1.3- Improve the extent, structure, and function of riparian buffers to increase their ecological function through vegetation planting (native species preferred), selected livestock fencing, and similar practices, including tributaries (perennial and intermittent streams) that contribute to priority areas. (also see Hypothesis MC1) Strategy MC4.1.4- Seek additional funding sources consistent with current CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals. Strategy MC4.1.5-Adjust seasonal timing of livestock grazing within riparian areas to minimize soil compaction, minimize erosion, and maintain or enhance riparian vegetation. Strategy MC4.1.6-Protect high quality riparian habitats and riparian habitat in areas of high development pressure through land acquisition (Oregon only), fee title acquisitions (Oregon only), conservation easements, long-term leases, land exchanges, public education, promotion of BMPs, promotion of alternative grazing strategies and the installation of alternative forms of water for livestock, where applicable. Strategy MC4.1.7-Increase understanding of the importance of riparian habitat through education and outreach programs for both the general public and road maintenance personnel. Strategy MC4.1.8- Continue development of TMDL Clean-up Plans, OR Ag Water Quality Plan and other watershed scale efforts to remedy local factors that lead to increased nutrient loading. Strategy MC4.1.9-Develop a short-term mitigation strategy to address loss of marine-derived nutrients to the terrestrial/inland environment in areas where natural inputs are limited. Strategy MC4.1.10-Increase size and connectivity of existing patches of riparian habitat through restoration efforts, and conservation easements and long-term leases, acquisition efforts (Oregon only), where applicable.

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued	
Objective MC4.1, cont.	Strategy MC4.1.11-Wherever feasible, use passive and active approaches to allow stream channels to develop and flood naturally, while protecting private and public property rights and uses. Strategy MC4.1.12-Restore floodplain connectivity and decrease entrenchment by reducing confinement (see Objective 4.2) and/or elevating the streambed through natural or mechanical methods. Strategy MC4.1.13- Identify relative inputs of tributaries (perennial and intermittent streams) to enhance overall riparian function. Strategy MC4.1.14- Increase landowner participation in federal, state, tribal, and local programs that enhance watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, CTUIR habitat programs, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.) Strategy MC4.1.15- Where appropriate and feasible, manage beaver populations to support riparian habitat function, and educate the public regarding benefits of beaver.
Objective MC4.2-Decrease manmade confinement to no greater than 40% of steam bank length. *Historic estimate: 0%* *Current estimate: 60%*	Strategy MC4.2.1-Decommission, modify or relocate (i.e. setback) roads, low-priority dikes, bridges, culverts, other structures and land uses to facilitate greater floodplain accessibility while protecting private and public property rights and uses. Strategy MC4.2.2- Uphold existing land use regulations and instream work regulations (e.g. critical area ordinances, HPA requirements, DSL requirements, etc.) that limit channel, floodplain, and riparian area impacts and educate the public regarding their implementation. Strategy MC4.2.3-Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or refine regulations that better protect streams from floodplain development that leads to confinement. Strategy MC4.2.4-Complete a detailed inventory of confinement throughout the subbasin with cooperation of all stakeholders, including prioritization of dikes based upon their function to protect infrastructure and private property, where possible. Strategy MC4.2.5-Wherever feasible, use passive and active approaches to allow stream channels to develop and flood naturally, while protecting private and public property rights and uses. Strategy MC4.2.6- Restore floodplain connectivity and decrease entrenchment by reducing confinement and/or elevating the streambed through natural or mechanical methods (see Objective MC4.1). Strategy MC4.2.7- Increase landowner participation in federal, state, tribal, and local programs that enhance watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, CTUIR habitat programs, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued	
Hypothesis MC5: Decrease in summer temperatures will increase survival of steelhead in the following life stages: yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: pre-spawning, spawning Causes: Natural climate (air temperature and low summer rainfall); Roads, dikes, residential construction, overgrazing, agriculture, and other land use activities that have led to a high width-to-depth ratio, reduced sinuosity, poor riparian vegetation, diversity, and maturity, and altered hydrology (reduced flows, impacts of exempt wells, etc.)	
Objective MC5.1- Decrease summer daily maximum temperatures to no more than 4 days greater than 72 ^{O}F (24 ^{O}C) and show progress toward meeting Washington State temperature standards and TMDL goals. *Current estimate: EDT rating of 3.2 (> 4 days with temperature above 72F)*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** Strategy MC5.1.1- Improve the extent, structure, and function of riparian buffers to increase their ecological function through vegetation planting (native species preferred), selected livestock fencing, and similar practices, including tributaries (perennial and intermittent streams) that contribute to priority areas. (also see Hypothesis MC1) Strategy MC5.1.2- Decrease the width-to-depth ratio through appropriate methods. (also see Hypotheses MC2 and MC3) Strategy MC5.1.3- Uphold existing land use regulations and instream work regulations (e.g. critical area ordinances, HPA requirements, DSL requirements, etc.) that limit channel, floodplain, and riparian area impacts and educate the public regarding their implementation.Strategy Strategy MC5.1.4- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or refine regulations that better protect the structure and function of riparian areas and wetlands. Strategy MC5.1.5- Decommission, modify or relocate (i.e. setback) roads, low-priority dikes, bridges, culverts, other structures and land uses to facilitate greater floodplain accessibility while protecting private and public property rights and uses. Strategy MC5.1.6-Protect riparian vegetation through promotion of livestock BMPs such as alternative grazing rotations and the installation of alternative forms of water for livestock. Strategy MC5.1.7-Restore perennial vegetation in upland cultivated and non-cultivated areas with native species and reforestation. Strategy MC5.1.8- Minimize surface water withdrawals through quantification of legal withdrawals, identification and elimination of illegal withdrawals, lease of water rights and purchase of water rights, where applicable. Strategy MC5.1.9-Improve upland water infiltration through road decommissioning, reduced soil compaction, direct seeding activities, increasing native vegetation cover, etc., where appropriate. Strategy MC5.1.10-Continue development and implementation of TMDLs, Oregon Walla Walla River Ag. Water Quality Management Plan, and other watershed scale efforts to remedy local factors negatively influencing temperature regimes. Strategy MC5.1.11-Conduct appropriate shade restoration activities where streamside shading has been reduced by anthropogenic activities. Strategy MC5.1.12-Protect wetland and riparian habitats through land, conservation easements, long-term leases, acquisition (Oregon only), fee title acquisitions (Oregon only), land exchanges, public education, and promotion of urban, forestry, and agricultural BMPs, where applicable. Strategy MC5.1.13-Enhance the extent and function of wetlands and wet meadows. Strategy MC5.1.14-Enhance hyporheic flows and spring inputs to streams, and avoid diluting the benefits of these cool-water inputs. Strategy MC5.1.15-Assess and remedy significant sources of high-temperature inputs to surface waters. Strategy MC5.1.16-Where appropriate, improve natural stream form and function. Strategy MC5.1.17- Continue current data collection efforts (e.g. gauging stations) and expand where appropriate to identify changes in flow and temperature.

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued

Hypothesis MC5, Cont.

Objective 5.1, cont.	Strategy MC5.1.18-Continue funding staff to work with local landowners to facilitate and coordinate instream transfers, conserved water applications and leases in the subbasin. Strategy MC5.1.19- Identify relative thermal inputs from tributaries (perennial and intermittent streams). Strategy MC5.1.20- Increase landowner participation in federal, state, tribal, and local programs that enhance watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, CTUIR habitat programs, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)

Hypothesis MC6: Decrease in bedscour will increase survival of steelhead in the following life stages: overwintering, yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: incubation, fry.

Causes: Altered hydrology (flashiness, reduced flows, impacts of exempt wells, etc.); Confinement; Land use, including floodplain development; Reduced LWD; Poor riparian condition; Increased bank erosion

Objective MC6.1- Reduce Bedscour depths to less than or equal to 15 cm. *Current estimate: 20cm*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** Strategy MC6.1.1-Increase stream sinuosity and decrease entrenchment. Decreased entrenchment will be achieved by reducing confinement (see Objective 4.2) and/or elevating the streambed through natural or mechanical methods. Strategy MC6.1.2-Add LWD in the form of rootwads, log jams, and similar structures that mimic natural formations and limit removal of recruited LWD from the stream (also see Objective MC2.1) Strategy MC6.1.3- Increase the density, maturity, and appropriate species composition of woody vegetation in riparian buffers for long-term recruitment of LWD. Strategy MC6.1.4- Uphold existing land use regulations and instream work regulations (e.g. critical area ordinances, HPA requirements, DSL requirements, etc.) that limit channel, floodplain, and riparian area impacts and educate the public regarding their implementation. Strategy MC6.1.5- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or refine regulations that better protect riparian areas. Strategy MC6.1.6-Improve watershed conditions (e.g. upland water infiltration) through road decommissioning, reduced soil compaction, direct seeding activities, increasing native vegetation cover, etc., where appropriate. Strategy MC6.1.7- Decommission, modify or relocate (i.e. setback) roads, low-priority dikes, bridges, culverts, other structures and land uses to facilitate greater floodplain accessibility while protecting private and public property rights and uses. Strategy MC6.1.8- Improve the extent, structure, and function of riparian buffers to increase their ecological function through vegetation planting (native species preferred), selected livestock fencing, and similar practices, including tributaries (perennial and intermittent streams) that contribute to priority areas. (also see Hypothesis MC1) Strategy MC6.1.9-Wherever feasible, use passive and active approaches to allow stream channels to develop and flood naturally, while protecting private and public property rights and uses. Strategy MC6.1.10- Increase landowner participation in federal, state, tribal, and local programs that enhance watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, CTUIR habitat programs, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.) Strategy MC6.1.11- Where appropriate and feasible, manage beaver populations for velocity management and other benefits, and educate the public regarding benefits of beaver.

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued

Hypothesis MC7: Increase in summer flow will increase survival of steelhead in the following life stages: yearling rearing, age-2 rearing. Spring Chinook survival will increase in the following life stages: fry, pre-spawning

Causes: Natural climate (low summer rainfall); Altered watershed function (e.g. decreased infiltration); Increased bedload delivery; Reduced riparian function and cover, Water withdrawals

Objective MC7.1- Increase summer flows by 10-15% (or as set by other processes, e.g. TMDL, HCP, watershed planning) *Current estimate: EDT estimate is 4 (severely reduced)*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** Strategy MC7.1.1- Improve the extent, structure, and function of riparian buffers to increase their ecological function through vegetation planting (native species preferred), selected livestock fencing, and similar practices, including tributaries (perennial and intermittent streams) that contribute to priority areas. (also see Hypothesis MC1) Strategy MC7.1.2- Restore perennial vegetation in upland cultivated and non-cultivated areas with native species and reforestation. Strategy MC7.1.3- Uphold existing land use regulations and instream work regulations (e.g. critical area ordinances, HPA requirements, DSL requirements, etc.) that limit channel, floodplain, and riparian area impacts and educate the public regarding their implementation. Strategy MC7.1.4- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or refine regulations that better protect riparian areas. Strategy MC7.1.5-Improve watershed function, including increased upland water infiltration, through road decommissioning, reduced soil compaction, direct seeding activities, increasing native vegetation cover, etc., where appropriate. Strategy MC7.1.6- Decrease the width-to-depth ratio through appropriate methods. (also see Hypotheses MC2, MC3, and MC5) The use of hard stabilization methods such as rip rap, concrete, or railroad ties is discouraged Strategy MC7.1.7- Where appropriate, improve natural stream form and function. (e.g. meander reconstruction). Strategy MC7.1.8- Investigate feasibility of water storage in coordination with federal, tribal, state and local stakeholders. Strategy MC7.1.9-Evaluate and implement shallow aquifer recharge programs, where appropriate. Strategy MC7.1.10- Where appropriate and feasible, manage beaver populations for flow management and other benefits, and educate the public regarding benefits of beaver . Strategy MC7.1.11-Protect and restore springs, seeps ,wetlands and tributaries that function as water storage during spring flows and provide recharge during summer drought periods. Strategy MC7.1.12-Continue to refine understanding of and/or determine location and timing of dewatered and flow-limited stream reaches and prioritize them for restoration and enhancement activities. Strategy MC7.1.13-Identify and implement various opportunities (e.g. CTUIR/USACE feasibility study, Conservation District programs, WWBWC programs, BPA National Fish & Wildlife Program, etc.) to augment instream flows through water storage, conservation, irrigation efficiencies, water right purchase, shallow aquifer storage and recovery, and source exchange. Strategy MC7.1.14-Minimize surface water withdrawals through quantification of legal withdrawals, identification and elimination of illegal withdrawals, lease of water rights and purchase of water rights, where applicable. Strategy MC7.1.15-Pursue opportunities to allow water users to more easily transfer water for instream use and to provide adequate protection downstream and across state borders, which may require law changes or interstate agreements. Strategy MC7.7.16-Determine appropriate instream flows to support fish life stages and make process on reaching those flows over time (added per Michelle Eames, United States Fish and Wildife Service. This strategy was not reviewed nor approved by the SPT, public , or other stakeholders).

Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, continued

Hypothesis MC7, cont.

Objective MC7.1, cont.	Strategy MC7.1.16-Pursue opportunities to convert water users from surface water to deep well supplies, including evaluation of the applicability of this approach on a site-specific basis.
	Strategy MC7.1.17-Improve municipal stormwater management to minimize peak flow levels.
	Strategy MC7.1.18-Pursue use of constructed wetlands or ponds in appropriate areas for peak flow management, infiltration, and stormwater retention.
	Strategy MC7.1.19- Continue current data collection efforts (e.g. gauging stations) and expand where appropriate to identify changes in flow and temperature.
	Strategy MC7.1.20-Continue funding staff to work with local landowners to facilitate and coordinate instream transfers, conserved water applications and leases in the basin.
	Strategy MC7.1.21-Evaluate and implement aquifer storage and recovery programs, where appropriate.
	Strategy MC7.1.22- Identify relative flow inputs of tributaries (perennial and intermittent streams).

Table 7-6 Crosswalk of Strategies Between All Geographic Areas*

Geographic Area	Substrate Embeddedness	LWD	Pools	Riparian Function	Confinement	Summer Max Water Temp	Bedscour	Summer Flow
Walla Walla River (Mill Creek-E. L. WW)	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
Walla Walla River (E.L. WW-Tumalum Bridge)	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
Walla Walla River (Tumalum-Nursery Bridge_	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
Walla Walla River (Nursery Bridge to L. WW)	---	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
Walla Walla River (L. WW to Forks)	---	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
South Fork Walla Walla (mouth-Elbow)	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
North Fork WW (mouth-L. Meadows Canyon Creek; plus L. Meadows)	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
Coppei Creek	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
Touchet River (Coppei Forks; plus Whiskey)	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
South Fork Touchet	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	MC71
South Fork Touchet Tributaries	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	---	---	---
North Fork Touchet	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	---	---
North Fork Touchet Tributaries (excluding Wolf)	---	MC2.1	MC3.1	---	---	---	---	---
Wolf Fork (mouth-Coates; plus Robinson & Coates)	MC1.1	MC2.1	MC3.1	MC4.1	MC4.2	MC5.1	MC6.1	---
Wolf Fork (Coates to acess limit; plus Whitney)	---	MC2.1	MC3.1	MC4.1	MC4.2	---	MC6.1	---

* Strategies for addressing the same limiting factor are the same across all geographic areas.

Table 7-7 Bull Trout Life History Benefits by Limiting Factor in Subbasin Planning Priority Geographic Areas

Geographic Area	Substrate Embeddedness	LWD	Pools	Riparian Function	Confinement	Summer Max Water Temp	Bedscour	Summer Flow
Walla Walla River (Mill Creek-E. L. WW)	Mig	Mig	Mig	Mig	Mig	Mig	---	Mig
Walla Walla River (E.L. WW-Tumalum Bridge)	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	---	SumRg Mig
Walla Walla River (Tumalum-Nursery Bridge_	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	---	SumRg Mig
Walla Walla River (Nursery Bridge to L. WW)	N.A.	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	---	SumRg Mig
Walla Walla River (L. WW to Forks)	N.A.	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	SumRg Mig	---	SumRg Mig
South Fork Walla Walla (mouth-Elbow)	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	Sp	SumRg Mig Sp
North Fork WW (mouth-L. Meadows Canyon Creek; plus L. Meadows)	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	SumRg Mig Sp	Sp	SumRg Mig Sp
Coppei Creek *	---	---	---	---	---	---	---	---
Touchet River (Coppei Forks; plus Whiskey) *	Mig	Mig	Mig	Mig	Mig	Mig	---	Mig
South Fork Touchet	SumRg, Mig	Mig	Mig	Mig	Mig	Mig		Mig
South Fork Touchet Tributaries	Mig	Mig	Mig	Mig	Mig	N.A.	N.A.	N.A.
North Fork Touchet	Mig	Mig	Mig	Mig	Mig	Mig	N.A.	N.A.
North Fork Touchet Tributaries (excluding Wolf)	N.A.	Mig	Mig	N.A.	N.A.	N.A.	N.A.	N.A.
Wolf Fork (mouth-Coates; plus Robinson & Coates)	SumRg, Mig	SumRg, Mig	SumRg, Mig	SumRg, Mig	SumRg, Mig	SumRg, Mig	---	N.A.
Wolf Fork (Coates to acess limit; plus Whitney)	N.A.	Mig	Mig	Mig	Mig	N.A.	---	N.A.

Source: M. Wachtel & G. Mendel, WDFW, Pers. Comm., May 2004
Key: SumRg=Summer Rearing
Sp=Spawning
Mig=Migration
N.A.=Not an EDT-Identified Limiting Factor for any focal species in this area per EDT
--- = Not a Limiting Factor for Bull Trout life histories
* Bull trout not present in Coppei or Whiskey Creeks

Table 7-8 Strategy Summary and Categorization

Strategy Summary and Related Strategies	Working Hypothesis Type[1]							Strategy Category[2]			
	SED	LWD	PL	RF/ C	TEMP	BS	FL	LU / REG	INF	B/H	DG
Improve extent, structure & function of riparian buffers Related strategies: MC1.1.1, MC2.1.12, MC3.1.6, MC4.1.3, MC4.1.10, MC5.1.1, MC6.1.8, MC7.1.1	✓		✓	✓	✓	✓	✓			✓	
Decrease sediment delivery from uplands Related strategies: MC1.1.2	✓									✓	
Restore perennial vegetation Related strategies: MC1.1.3, MC5.1.7, MC7.1.2	✓				✓		✓			✓	
Control noxious weeds Related strategies: MC1.1.4	✓									✓	
Pave, decommission, or relocate roads and use appropriate BMPs for maintenance Related strategies: MC1.1.5, MC1.1.6, MC2.1.8, MC4.2.1, MC5.1.5, MC6.1.6, MC6.1.7, MC7.1.5	✓	✓		✓	✓	✓			✓		
Improve bank stability Related strategies: MC1.1.7, MC3.1.4	✓		✓							✓	
Increase participation in programs similar to CRP and CREP Related strategies: MC1.1.8, MC3.1.7, MC4.1.4	✓	✓	✓	✓	✓	✓		✓		✓	
Continue TMDL and other watershed scale assessment development Related strategies: MC1.1.9, MC4.1.8, MC5.1.10	✓			✓	✓					✓	
Implement additional forestry, agricultural & other upland BMPs Related strategies: MC1.1.10, MC1.1.16	✓				✓			✓		✓	
Monitor improvements / continue & expand data collection Related strategies: MC1.1.11, MC2.1.5, MC3.1.8, MC5.1.17, MC7.1.19	✓	✓	✓								✓
Uphold existing land use regulations Related strategies: MC1.1.12, MC2.1.6, MC4.1.1, MC4.2.2, MC5.1.3, MC6.1.4, MC7.1.3	✓	✓		✓	✓	✓	✓	✓			
Strengthen or refine land use regulations Related strategies: MC1.1.13, MC2.1.7, MC4.1.2, MC4.2.3, MC5.1.4, MC6.1.5, MC7.1.4	✓	✓		✓	✓	✓	✓	✓			
Improve municipal stormwater management & encourage treatment Related strategies: MC1.1.14, MC1.1.22, MC7.1.17	✓						✓	✓		✓	

Strategy Summary and Related Strategies	Working Hypothesis Type[1]							Strategy Category[2]			
	SED	LWD	PL	RF/ C	TEMP	BS	FL	LU / REG	INF	B/H	DG
Improve natural stream form and function/allow streams to develop naturally Related strategies: MC1.1.15, MC2.1.4, MC3.1.1, MC3.1.10, MC4.1.11, MC4.2.5, MC5.1.16, MC6.1.9, MC7.1.7	✓	✓	✓	✓	✓	✓	✓			✓	
Identify relative input from tributaries (on specific limiting factors) Related strategies: MC1.1.17, MC2.1.14, MC3.1.12, MC4.1.13, MC5.1.19, MC7.1.22	✓	✓									✓
Implement BMPs for bridge design & maintenance Related strategies: MC1.1.18, MC2.1.13	✓	✓						✓	✓		
Increase landowner participation in federal, state, tribal, & local watershed enhancement programs Related strategies: MC1.1.19, MC2.1.15, MC3.1.13, MC4.1.14, MC4.2.7, MC5.1.20, MC6.1.10	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Seek funding to develop programs consistent w/ CRP/CREP where not available Related strategies: MC1.1.23	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Manage beaver populations and educate public regarding their benefits Related strategies: MC1.1.20, MC2.1.10, MC3.1.9, MC4.1.15, MC6.1.11, MC7.1.10	✓	✓								✓	
Maintain channel-forming flushing flows Related strategies: MC1.1.21	✓		✓			✓	✓			✓	
Add large woody debris Related strategies: MC2.1.1, MC6.1.2		✓				✓				✓	
Increase woody vegetation in riparian buffers Related strategies: MC2.1.2, MC6.1.3		✓				✓				✓	
Decrease width-to-depth ratio Related strategies: MC2.1.3, MC3.1.5, MC5.1.2, MC7.1.6		✓	✓		✓					✓	
Install properly designed instream structures Related strategies: MC3.1.2			✓							✓	
Retain existing large woody debris Related strategies: MC2.1.11, MC3.1.3		✓	✓					✓		✓	

Strategy Summary and Related Strategies	Working Hypothesis Type[1]							Strategy Category[2]			
	SED	LWD	PL	RF/ C	TEMP	BS	FL	LU / REG	INF	B/H	DG
Adjust seasonal timing of livestock grazing/promote livestock BMPs Related strategies: MC4.1.5, MC5.1.6				✓				✓			
Protect high quality riparian habitats Related strategies: MC4.1.6				✓				✓			
Education & outreach re: riparian areas Related strategies: MC4.1.7	✓			✓				✓			
Inventory of confinement to prioritize dikes and roads Related strategies: MC2.1.9, MC4.2.4				✓					✓		
Minimize surface water withdrawals Related strategies: MC5.1.8, MC7.1.14					✓			✓		✓	
Pursue instream flow enhancement opportunities Related strategies: MC3.1.11							✓	✓	✓	✓	
Improve upland water infiltration Related strategies: MC5.1.9, MC6.1.6, MC7.1.5					✓					✓	
Conduct shade restoration activities Related strategies: M C 5.1.11					✓					✓	
Protect & restore wetlands Related strategies: MC7.1.11					✓		✓	✓		✓	
Enhance the extent and function of wetlands and wet meadows Related strategies: MC5.1.13					✓					✓	
Enhance hyporheic flows & spring inputs; avoid diluting such benefits Related strategies: MC5.1.14					✓					✓	
Refine understanding of dewatered and flow-limited reaches & prioritize Related strategies: MC7.1.12							✓				✓
Investigate feasibility of water storage Related strategies: MC7.1.8							✓	✓		✓	
Shallow aquifer storage/aquifer storage and recovery Related strategies:MC7.1.9, MC7.1.21							✓			✓	
Assess & remedy significant sources of high-temperature waters Related strategies: MC5.1.15							✓			✓	

	Working Hypothesis Type[1]							Strategy Category[2]			
Strategy Summary and Related Strategies	**SED**	**LWD**	**PL**	**RF/ C**	**TEMP**	**BS**	**FL**	**LU / REG**	**INF**	**B/H**	**DG**
Identify & implement opportunities to augment instream flows Related strategies: MC7.1.13							✓	✓	✓	✓	
Develop a mitigation strategy re: loss of marine derived nutrients Related strategies:UA4.1.9				✓						✓	
Restore floodplain connectivity, decrease entrenchment & increase sinuosity Related strategies: MC4.1.12, MC4.2.6, MC6.1.1	✓	✓	✓	✓	✓	✓				✓	
Facilitate, coordinate, & pursue instream transfer applications & leases Related strategies: MC5.1.18, MC7.1.15, MC7.1.20					✓		✓	✓			
Convert users from surface water to deep well supplies (site-specific) Related strategies: MC7.1.16							✓	✓	✓	✓	
Use constructed wetlands or ponds for peak flow management, infiltration, etc. Related strategies: MC7.1.18					✓		✓			✓	
Determine appropriate instream flows to support fish life stages and make process on reaching those flows over time (added per Michelle Eames, United States Fish and Wildife Service. This strategy was not reviewed nor approved by the SPT, public , or other stakeholders) Related strategies: MC7.1.16							✓	✓			

1 SED=Sediment; LWD=Large Woody Debris; PL=Primary Pools; RF/C=Riparian Function and/or Confinement; BS=Bedscour; FL=Flow; TEMP=Temperature

2 LU/REG=Land Use or Regulatory; INF=Infrastructure; B/H=Biology/Hydrology; DG=Data Gaps

7.3.3 Priority Protection Areas

In addition to the restoration priority areas, priority geographic areas for protection were identified in the Assessment section of the subbasin plan. These are areas that the EDT analysis or empirical data suggests would have the most negative impacts on the focal species if they were allowed to degrade further. Within protection areas, "passive restoration" is considered the most appropriate action to take given the technical and social evidence, as well as the limited resources available in the subbasin. These are actions that will protect the habitat on which the focal species depend on from degrading any further. In most cases marginal improvements in habitat attributes can be expected from these measures within the 10 to 15 year planning horizon. Protective actions are not limited to the priority protection areas, but may also be done in the priority restoration areas. It is, however, the intention of this subbasin plan to limit these actions outside of the priority geographic areas as outlined in the subbasin assessment.

The restoration strategy is understood to be inclusive of the activities and strategies outlined in this section. The protection strategy is intended to be applied to the priority protection areas and priority restoration areas. Proposed projects outside of these areas that are not located in restoration priority areas must show a direct benefit to the protection of these geographic areas in order to be considered under this strategy. Protection strategies presented below are organized in three main categories: riparian buffer implementation, upland enhancement, and alternative water development/water conservation.

Riparian Buffer Implementation

These are actions that provide a buffer area of reduced anthropogenic disturbance along the stream corridor. The intention is that these areas will be allowed to regenerate and repair with limited implementation of resources. It is understood by the subbasin group that many funding and regulatory entities require re-vegetation of streamside land placed into protected status. As such, riparian planting may be incorporated as part of a protection strategy. Installing riparian buffers can take many forms and the resources can come from many sources. Typically resources made available to the subbasin can be used to increase the area of stream in protective buffers by direct funding or providing assistance with landowner cost share. This has been and will continue to be an extremely effective method for stream buffer implementation in the subbasin. Riparian buffer strategies include, but are not limited to, the following:

- **Conservation Reserve Enhancement Program (CREP) –** The Conservation Reserve Enhancement Program is a joint partnership between the State (Washington/Oregon) and USDA, and is administered by local conservation districts and the Farm Services Agency (FSA). The agreement was signed in 1998 and provides incentives to restore and improve salmon and steelhead habitat on private land. The program is voluntary for landowners, the land enrolled in CREP is removed from production and grazing under 10 or 15 year contracts. In return, landowners plant trees and shrubs to stabilize the stream bank and to provide a number of additional ecological functions. Landowners receive annual rent, incentive and maintenance payments and cost share for practice installations. This plan encourages the use of resources to assist in cost share in order to maximize participation in this program.

- **Conservation Easements –** The use of conservation easements has been somewhat limited in the Pacific Northwest but is common in other parts of the country. A conservation easement is a voluntary agreement that allows a landowner to limit the type or amount of development on their property while retaining private ownership of the land. The easement is signed by the landowner, who is the easement donor, and the funding or sponsoring entity, who is the party receiving the easement. The sponsoring entity accepts the easement with understanding that it must enforce the terms of the easement in perpetuity. After the easement is signed, it is recorded with the County Register of Deeds or similar agency and applies to all future owners of the land. The activities allowed by a conservation easement depend on the landowner's wishes and the characteristics of the property. In some instances, no further development is allowed on the land. In other circumstances some additional development is allowed, but the amount and type of development is less than would otherwise be allowed. Conservation easements may be designed to cover all or only a portion of a property. Every easement is unique, tailored to a particular landowner's goals and their land. Increasing conservation easements in streams bearing salmonids is considered a responsible use of subbasin resources.
- **Continuous Conservation Reserve Program (CCRP) –** This USDA program is similar to CREP as outlined above. The focus for this program, however, is on non-salmonid-bearing streams, which are not eligible under CREP rules. CCRP projects should be encouraged and recommended for cost share status when the stream in question flows into a geographic area that has a priority for protection. Within Southeast Washington the reduction of sediment input from these small "feeder" streams and the maintenance of their seasonal flow input to salmonid streams is vital to the protection of the focal species. Minimum buffer widths are still required and vary by plan and location, as is the planting of appropriate vegetation. Contract length is similar to CREP as are the arrangements for payments and maintenance. Though this program focuses on non-salmonid bearing streams, use of this program is potentially beneficial to other species.
- **Other Cost Share Programs –**The three types of programs listed above do not form a comprehensive list of the actions that can be taken to install riparian buffers. There are a myriad of funding sources and procedures available. This strategy recommends that all programs and agreements that are similar to the above be eligible for cost-share or direct funding. This can include other federal or state funding entities or agreements signed with private funding sources. These should all require a minimum average buffer width not less than the minimum requirements under CREP, an agreement to maintain the fence or exclosures, and a time length agreement similar to the CREP requirements.

There are other methods, such as simple riparian fencing and structures, that can help in herding or managing livestock in such as a way to reduce the impact to the stream. Innovative methods that do not fit the above, but still result in a net protection increase for salmonid bearing streams, should be encouraged and be eligible for funding.

Upland Enhancement

In addition to the riparian areas above, the citizens and technical groups recognize the importance of upland actions to the priority protection geographic areas. Sediment is a limiting factor on production of all of the focal species not just in this subbasin, but throughout the region. Programs designed to maintain ground cover in the upland areas that drain directly into priority protection areas are needed to control and reduce sediment input. Increased upland vegetation can also encourage infiltration of water, slowing runoff and preserving flows in the affected streams farther into the typically dry summer months. Many of the areas listed as priority for protection can benefit from greater summer flows as this will increase living area for the focal species and can reduce temperatures. In addition to the upland areas that drain directly into priority areas other areas upstream should be considered for funding if a linkage can be established between these areas and the priority areas. Upland strategies include:

- **Conservation Reserve Program (CRP) –** CRP is a voluntary program available to agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in CRP plant long-term, resource-conserving covers to improve the quality of water and control soil erosion. In return, FSA provides participants with rental payments and cost-share assistance. Contract duration is between 10 and 15 years. CRP provides continuous ground cover over wide expanses of upland areas. Subbasin resources used to increase the amount of CRP would benefit the protection of these priority areas.
- **Direct Seed/No-Till –** Direct Seed and No-Till are a set of innovative farming practices designed to increase the amount of time that farmland has vegetative cover and to reduce the amount of soil disturbance, while still producing crops. Farming techniques such as these should be encouraged and eligible for direct or cost-share funding. These methods have been shown to be very effective in reducing the amount of sediment introduction into salmonid bearing streams.
- **Sediment Basins –** As the name implies, these are depressions strategically placed on or near agriculture land to provide for "settling" of sediment in run-off. These are relatively inexpensive methods for reducing sediment and should be encouraged and eligible for cost-share or direct funding. Sediment basins should be designed and constructed in consultation with Conservation District, NRCS or other experienced personnel to ensure effectiveness. Agreements and procedures for maintenance (clean-out) of the basins should accompany any project.
- **Upland Terrace Construction –** This is a land reforming procedure designed to slow run-off from agricultural lands. These can be very effective, particularly in reducing the impacts from large rain events. The terracing of slopes redirects run-off and increases contact time with the upland soils thereby increasing infiltration and reducing sedimentation of streams. These project types can be very effective at reducing sedimentation. They are cost-effective as they often entail a one-time expenditure of money, but offer a permanent solution. Project such as this should be eligible for cost-share or direct funding.
- **Other Upland Projects and Practices –** The above types of projects do not represent a comprehensive list of actions that can be taken in the upland areas to benefit aquatic life in streams. This subbasin plan encourages innovative techniques that can offer further

protection these priority areas. There are also a variety of funding sources that should be considered in addition to CRP that can then be cost-shared with subbasin funds.

Alternative Water Development/Water Conservation

In the Blue Mountains and surrounding lowland areas, water is often the limiting factor for both fish and livestock operations. Quite often in order to provide protection for salmonid bearing streams, including this subbasin's priority protection areas, alternative sources of water must be found or developed. Alternative water sources can greatly reduce the amount of time livestock spend in riparian areas, therefore, reducing the impacts to the stream. The subbasin management group recognizes this limitation on protection areas and encourages the development of off-stream water resources. These include, but are not limited to:

- Well development out of riparian areas
- Spring development
- Point of diversion transfers (includes surface to ground)
- Water transport development
- Shallow aquifer recharge.

Projects that reduce the amount of water removed from the stream can also protect our priority areas. Some of the above project types both reduce grazing intensity and reduce water removal. In addition to the above, when there are interested parties water right lease or purchase should be encouraged and eligible for direct or cost share funding when it will directly benefit our priority protection areas. The Washington Water Trust and Oregon Water Trust are two organizations that can help arrange for water leasing or purchase. Irrigation efficiency projects are also important to the protection of our priority areas. Water diversions that are able to extract as little water as possible from the stream while still satisfying the water rights of users provide a very needed protection for the focal species. Projects of this type include, but are not limited to:

- Lining open ditches
- Water conveyance piping
- Point of diversion transfers (includes surface to groundwater)

7.3.4 Bull Trout

Goals, objectives, recovery criteria, and strategies for recovery of listed bull trout are being developed by the United State Fish and Wildlife Service in the Bull Trout Recovery Plan (USFWS 2002 draft; portions revised 2003). As of May 2004, progress on the draft Bull Trout Recovery Plan has been placed on-hold. Draft components of the Bull Trout Recovery Plan have been published, but will probably change prior to publication of the final plan expected at the end of this year.

Addressing bull trout in the context of subbasin planning is an issue that the Subbasin Planning Team, technical staff, and local stakeholders have been struggling with throughout development of this plan. First, there are many stakeholders that have not had an opportunity to review the draft Bull Trout plan elements such as recovery criteria and strategies. Second, an attempt was made in the Walla Walla Subbasin to expand the size of the recovery effort to include additional local stakeholders. USFWS staff believed it was too late in the process to add new members to the team. Additionally, there are members of the local Bull Trout recovery unit team in Walla Walla who believe their legitimate comments and concerns have not been addressed, and are not supportive of the current set of strategies proposed in the draft Bull Trout Recovery Plan. Similar concerns exist in the Asotin, Lower Snake, and Tucannon Subbasins. Clearly, further discussion is needed with local stakeholders throughout the Bull Trout Recovery Plan process.

During development of subbasin plan strategies, strategies from the draft Bull Trout Recovery Plan and other planning efforts were considered, re-written in more generic fashion, and integrated with strategies developed specifically for the subbasin plan. Although the language has been modified, we believe the strategies identified in this subbasin plan are consistent with those outlined in the draft Bull Trout Recovery Plan.

Although the Subbasin Planning Team originally discussed incorporating Bull Trout Recovery Plan strategies by reference, the ultimate decision was made by the subbasin planning leads not to do so because local stakeholders and technical staff had insufficient time to review and discuss the current draft. Local stakeholders involved in the subbasin planning process were not willing to endorse the Bull Trout Recovery Plan approach without sufficient review time and without certainty regarding what changes will be made between now and publication of the final plan.

Despite these concerns, it is our intent to work with local stakeholders through the summer/fall subbasin planning revision period to add more information about bull trout consistent with the recovery plan. This could include recovery plan elements such as the recovery target range and abundance trends and bull trout strategies or selected strategies developed in the draft Bull Trout Recovery Plan. In the meantime, project proponents can use the draft Bull Trout Recovery Plan to demonstrate that their project is consistent with the draft plan and will benefit bull trout, which will provide greater support for such projects. Strategies and actions in the final Bull Trout Recovery Plan will be considered for their applicability to this subbasin when the final Bull Trout Recovery Plan is available.

7.3.5 Aquatic Strategy Special Topics

Mill Creek/Yellowhawk System

The Walla Walla technical staff and citizens were presented with the assessment regarding the Mill Creek/Yellowhawk complex as members at the Management Plan Workshop. The group recognizes the complexity and difficult management decisions and solutions regarding this area. The area of Mill Creek through the town of Walla Walla is unique to the subbasin and calls for a unique solution. It is appropriate at this time that this area is taken out of the context of the rest of the plan and has a strategy for it outlined separately. Within the subbasin assessment a set of recommendations were put forward to be considered in the management plan process. The recommendations are re-stated below and, with comment, accepted as part of the Walla Walla Subbasin Plan. It is important to note that all of the recommended actions below must be addressed if a solution for Mill Creek is to be successful. For example, it does no good to fix the obstructions through the Mill Creek Project if the habitat we are giving fish access to is allowed to degrade. Thus, the following are all considered to be one strategy with several actions. Further work will continue to refine the strategy for addressing the Mill Creek/Yellowhawk System with the Mill Creek working group, watershed planning, and habitat conservation planning processes.

1) The geographic areas above Bennington Dam should be considered as priority for protection. The EDT results support the conclusion that this area be protected from further degradation until the barriers and flow problems in lower Mill Creek are resolved. The geographic areas involved are:

- Mill Creek, Bennington Dam to Blue Creek
- Mill Creek, Blue Creek to Walla Walla water intake
- Mill Creek, Walla Walla water intake to steelhead access limit
- Upper Mill Creek Tributaries
    - NF Mill Creek
    - Low Creek
    - Broken Creek
    - Paradise Creek
- Middle Mill Creek Tributaries
    - Henry Canyon
    - Webb Creek
    - Tiger Creek
- Blue Creek Drainage

Comment:

The management workshop's technical and citizen members accepted that the above geographic areas be considered as a **Priority Protection Geographic Areas**. They are to be given the same status as the geographic areas presented in the Priority Protection Strategies section of the Plan. In addition the strategies that were described in that section will apply to these areas. It is well known amongst the technical and public members of the workshop that the area upstream of Bennington is some of the best steelhead habitat within the subbasin. It is also understood that portions of this area are threatened by development. It is extremely important that these geographic areas be protected until and after solutions to the downstream problems are found. The resources that will be expended downstream will have added value if this valuable upstream habitat is protected.

2) The geographic area containing Yellowhawk Creek should remain as a priority protection area as noted in the Protection Priority Geographic Areas. Yellowhawk Creek is the only viable migration corridor for adult steelhead and salmon to access the good habitat above Bennington Dam. In order to preserve what population exists above the dam it is vital that this corridor is maintained. Yellowhawk Creek also contains valuable rearing area and serves as an escape

alternative for juvenile salmonids that might otherwise rear in Mill Creek, but are unable to because of lack of water and high temperatures.

Comment:

The management workshop's technical and citizen members accepted that Yellowhawk Creek Mainstem is considered a Priority Protection Geographic Area as outlined in the Protection Priority Geographic Areas Strategies. The workshop members are in agreement that the protection of this area as a migration corridor is vital to the well-being of the Mill Creek steelhead sub-population above Bennington Dam. Its importance is magnified by the severe limitations on adult migration in the Mill Creek Project area. In addition to the strategies outlined in the Priority Protection section of this plan, projects designed to increase resting pools for adult steelhead are considered a priority for Yellowhawk. Currently the Yellowhawk system is lacking in resting pools for adult steelhead migration and juvenile rearing. In order to maximize steelhead migration success, pools should be increased on the mainstem Yellowhawk. Wood is the preferred (though not required) material for building these pool structures as it will also provide complexity of habitat for juvenile rearing.

3) The geographic area containing the USACE Mill Creek Project obstructions and imminent threats is considered as a priority to be addressed. This presents some difficulty as all work within this area must take into consideration a wide array of stakeholders including city governments, tribal interests, state agencies, federal agencies and citizens. The Mill Creek Working Group has been meeting since 2002 in attempt to foster ideas and solutions to the problems associated with the Mill Creek Project. It enjoys a wide involvement, including all of the groups mentioned above. The assessment recommends that this group be considered as an avenue by which to continue to work.

Comment:

The preferred method for creating solutions within the USACOE is through the Mill Creek Working Group. This Plan strongly urges that projects for this area be developed in cooperation with the group. This gives opportunity to maximize resources within the subbasin and can prevent the conflicting projects or plans from being developed. The obstructions within the Mill Creek Project are addressed by the strategies outlined in the **Imminent Threats** section of this plan. The obstructions and immediate mortality threats associated with this area are the priority for action within the Mill Creek/Yellowhawk complex..

4) The geographic area (Mill Creek, mouth to start of Corps Project at Gose St) containing the area from the mouth of Mill Creek to the start of the Mill Creek Project at Gose St should be considered a priority for protection. If resources are to be expended modifying the project to allow safer fish passage then it would be imprudent not to protect the channel that allows access to this project.

Comment:

The workshop members accepted the recommendation above. The area directly downstream of the Mill Creek Project to the mouth should be considered a **Priority Protection Geographic**

Area. This will ensure that the actions completed upstream of this area do not lose value to the fish population and have a greater surety of success.

5) A solution for the Mill Creek Project should include Titus Creek. This area has the potential to be a summer rearing area for steelhead and Chinook, providing them with refuge from the warmer temperatures in the Mill Creek project.

Comment:

The workshop members agreed that Titus Creek should be part of the overall solution for the Mill Creek Project In particular the following areas for Titus Creek should be addressed. The obstruction culvert at the mouth of Titus should be addressed under the Imminent Threat strategy of this Plan. Also a solution should be pursued that provides connection from the springs that feed water to Titus through the stream corridor and to the mouth. The technical group believes that valuable summer rearing areas are currently going unused within the Titus Creek that could provide an alternative to a section of Mill Creek that currently has marginal temperatures.

Spring Source / Distributary System

The spring source and distributaries that enter the Walla Walla in the stateline area south and west of the town of Walla Walla have been identified as an area of special concern in the assessment. These streams include: East Little Walla Walla system; West Little Walla Walla system; McEvoy Creek; and Spring Branch (see Figure 7-1). Of these, only East Little Walla Walla came out high for restoration in the EDT analysis and none came out high in protection value. East Little Walla Walla Drainage supports only a small population of steelhead. It is unknown whether spawning in the tributary is successful or if it is primarily used for rearing.

The concern identified in the assessment is that a primary value of these streams, which receive most of their flow from groundwater/springs, may not be well expressed in the EDT analysis. Flows are variable in these tributaries, and in the summer they have temperatures that are much cooler than the mainstem. As an example, in 2002 temperatures in E. Little Walla Walla reached only 70 degrees F; temperatures on the mainstem Walla Walla at Mojonnier Rd (less than 1 mile downstream) exceeded 75 degrees F (Mendel et al. 2003).

It is likely these streams offer refuge for juvenile salmonids, both within the streams and at the mouths, from the higher temperature mainstem. These spring source creeks are impacted by water diversion activities in Oregon. The West and East Little Walla Walla are spring source creeks that may be influenced by diversions because water diverted from the mainstem that is not used is passed on into these streams. In recent years, less water has been diverted down the Little Walla Walla in the summer to satisfy a minimum instream flow requirement for the USFWS Interim Settlement Agreement for the three districts. While East Little Walla Walla maintains flow due to groundwater influence, the West Little Walla in Washington hasgone dry the past three summers.

The following discussion of the spring branch system was provided by Mobrand Biometrics, and has not been reviewed by the subbasin planning team, co-managers, or the public:

“The Spring Branch system in the Walla Walla Subbasin probably is – and most definitely was – very important to the production of salmon and steelhead. Low gradient, structurally complex side channels, distributaries and spring brooks provide excellent nursery areas for fry and parr of most salmonid species and, to a lesser degree, protected spawning areas for salmon as well. These kinds of habitat have a large terrestrial influence, and receive both woody debris to add complexity to the physical habitat, insects and other invertebrates that juvenile fish can eat directly, and leaves and other types of vegetation that feed the aquatic insects that are the primary prey base for salmonids. They are largely protected from the more destructive impacts of floods and, because they directly connected to the hyporheic system (the shallow aquifer beneath and beside alluvial rivers), they were also buffered from the worst effects of drought. Spring brooks, and to a lesser degree distributaries and side channels, are also often infused with cool, nutrient-rich groundwater, which provides an indispensable thermal refuge in the summertime and further increases primary production and food availability. As a consequence, side channels, spring brooks and distributaries have become recognized as critical habitat elements by many biologists working in the hotter subbasins east of the Cascade Mountains. In the Yakima Subbasin, for instance, local biologists have found that juvenile spring chinook and rainbow/steelhead densities are on average three times as great in side channels as mainstem reaches.

What is unclear is the degree to which the impact of these habitat elements has been accurately captured by the EDT analysis of the Walla Walla Subbasin. The main reason for uncertainty is that this kind of habitat has a way of disappearing as a subbasin is developed: they occur in rich, flat bottomland areas, and interfere with roads, houses and, especially, agriculture. Once again using the Yakima Subbasin as an example, there were historically seven wide, unconfined portions of the Yakima River that contained scores, and in some cases hundreds, of small side channels, spring brooks and sloughs. Old maps prepared by the Bureau of Reclamation document their existence beyond doubt. Today, however, most of these areas have been filled and levelled and given over wholly to hop fields, alfalfa fields and orchards. To the untrained eye, the river system in these areas today gives absolutely no clue of the kind of fluvial structures that once were present. Indeed, many local biologists believe it is precisely the loss of these complex, unconfined areas that is the major factor limiting production of salmon and steelhead in the Yakima Subbasin today. The Yakima, however, at least had the old maps, as well as the advice and analysis of a number of excellent fluvial geomorphologists and geographers. Therefore, in the Yakima EDT analysis, the historical description of these areas included many side channels, elevated food indices, thermally moderating impacts of groundwater upwelling, and so on. It may be that the documentation of the historical structure of the Walla Walla Subbasin is missing critical pieces of information regarding this type of habitat. If this is in fact he case, then the restoration potential ascribed to the Spring Branch system of the Walla Walla Subbasin has been underestimated.”

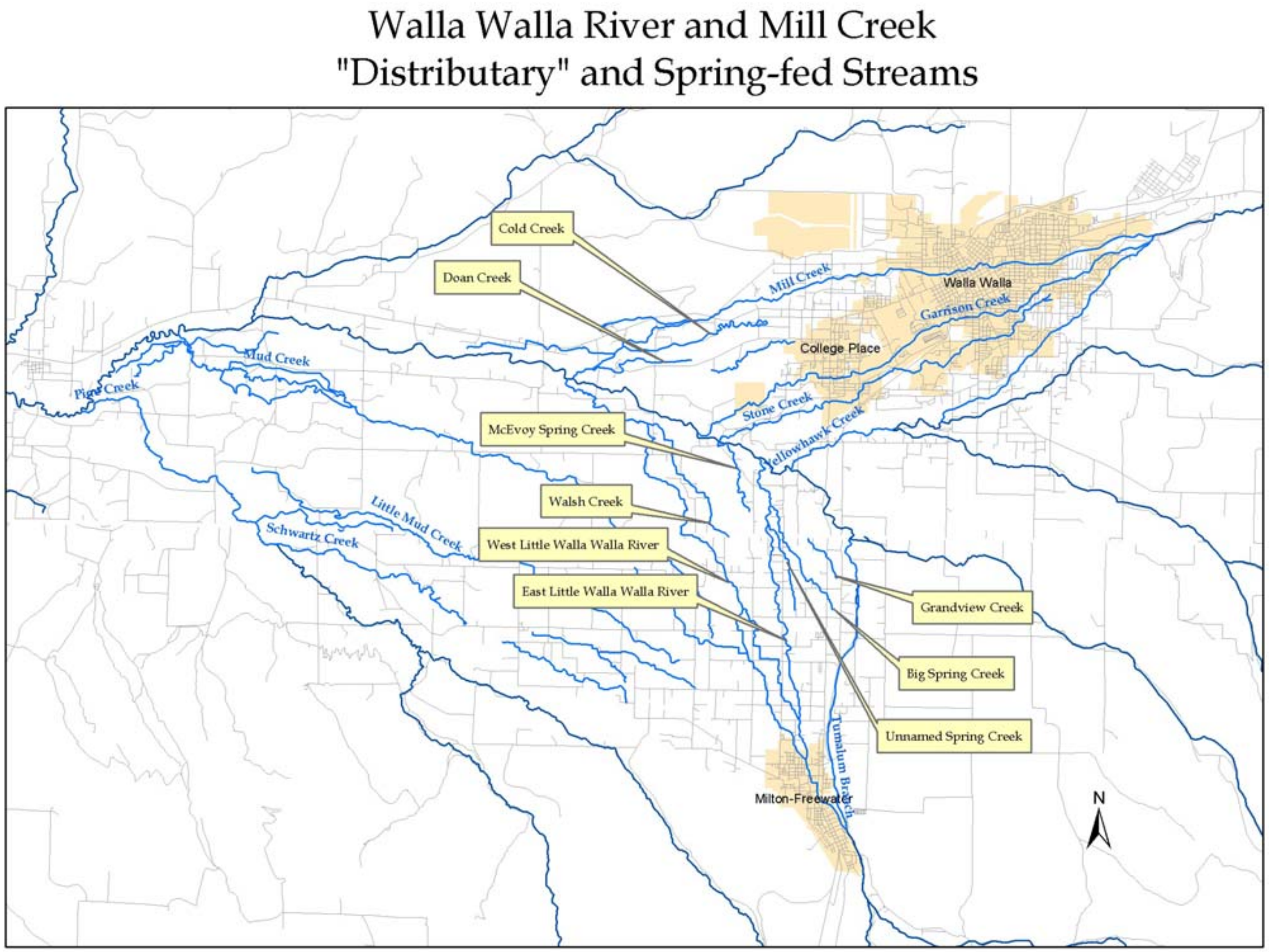

Figure 7-1 Walla Walla River and Mill Creek Distributary and Spring-Fed Stream Systems

Source: Walla Walla Basin Watershed Council

The influence that these streams can have on the steelhead and Chinook salmon populations is largely unknown. The assumption for this assessment is that the cool water input to the mainstem and opportunity for refuge should not be ignored. All of the streams, with the exception of West Little Walla Walla, flow into geographic areas that are priority for restoration and protection and that have flow and temperature as limiting factors. The West Little Walla Walla flows into the Walla Walla just downstream of the priority geographic areas.

Given the complicated nature of this area and lack of detailed understanding of fish usage, hydrology and limiting habitat conditions, the Planning team has recommended this area be identified as a special management focus area. A long-term management objective has been identified, along with specific activities to achieve the management objectives.

Objective: Enhance flow and improve habitat conditions in the Walla Walla spring creeks and distributaries to benefit aquatic and terrestrial species, and to enhance Walla Walla mainstem flow and temperature conditions.

Approach

- Conduct studies to better understand surface/ground water interaction and hydrology, temperature conditions, fish usage for different lifestages, limiting habitat conditions, and system fish production capability as part of the larger Walla Walla system
- Develop summer and winter flow enhancement targets (preliminary target suggested by citizen as base flow of 4 cfs), and identify and evaluate potential flow enhancement strategies, such as shallow aquifer recharge, irrigation efficiency, ditch management, and other applicable measures.
- Pursue projects that measurably enhance flow to the Little Walla Walla system and Walla Walla River mainstem.
- Identify and implement ways to manage impacts of residential development (e.g. exempt wells and riparian management) through CAO, zoning, conservation measures, etc.
- Identify habitat restoration projects for the lower reaches below springs (i.e. below Ferndale Rd.).
- Identify and evaluate diversion screening options for the system.
- Implement channel and habitat restoration projects to meet long-term objective.

Information collected through these efforts will be evaluated over time, and management objectives and strategies will be updated as system understanding improves.

Fire Risk Management

Fire prevention is a major concern in the upper watersheds and headwater areas of the basins. USFS has identified the burn potential of upper Mill Creek as very high, and other areas of the basin are at risk from fire. The potential habitat impacts from a major fire would be very significant, resulting in changes to watershed hydrology (water yield, peak flows, low flows), morphology, and sediment yield.

In the upper Mill Creek, which provides a good case study for the potential fire risk, lack of public access, lack of logging, and lack of naturally occurring fires (most recent fire was in 1800), has resulted in the build up of large quantities of fire fuels on USFS lands. The USFS has completed preliminary studies on reducing hazardous fuels in the Mill Creek watershed, and has concluded that undertaking a project at this time is not advisable. Several things complicate addressing fuels in the Mill Creek watershed:

- Difficulties designing an effective and feasible project while protecting riparian habitat and habitat for lynx, a species ESA listed as threatened.
- Identification of the watershed as an Inventoried Roadless Area
- Public controversy concerning an appropriate response and the likelihood of litigation.
- The risks associated with working with fire in subalpine fir, a species known for torching and spotting.

Potential impacts to bull trout were also considered during the USFS analysis.

With this information as background, a risk management strategy has been developed to address this risk and prevent the kind of catastrophic impacts from a major fire in the basin. The strategy includes two objectives and three primary strategies. The strategies are not intended to be comprehensive, but rather point to the type of activities that would need to continue to occur.

Objective 1: Reduce the risk of catastrophic fires that can lead to elevated sediment, changes in hydrology, elevated temperature, and other habitat/water quality impacts.

Objective 2: Implement timber, grassland, wheatland, and rangeland management practices that benefit aquatic focal species and their habitats.

Approach

- Implement components of federal, state, and local fire management plans that will benefit aquatic focal species and their habitats.
- Foster continued cooperation and coordination among local, state and federal fire risk management efforts and emergency response.
- Implement grazing best management practices (see Section 7.4).

Instream Flow

Significant progress has been made on flow enhancement within the Walla Walla Subbasin. A variety of programs have assisted in this effort, including the Walla Walla River Settlement Agreement between USFWS and several irrigation districts. Flow enhancement is an important priority for the subbasin. Within this subbasin planning process, flow was a significant limiting factor in ten geographic areas. Other processes such as watershed planning and development of a habitat conservation plan have also identified flow enhancement as a priority, and are working in coordination with this subbasin plan to identify flow-limited reaches and those areas where increasing flow can have the greatest benefit for fish while continuing to provide for out-of-stream needs.

Approach

- Implement flow enhancement objectives discussed in Section 7.3.2 for those geographic areas where flow was determined to be a limiting factor.
- Coordinate with flow enhancement efforts currently underway in the subbasin
- Complete further analyses to identify reaches where increasing flow will provide suitable habitat conditions.
- Complete further analyses to determine which areas are naturally flow-limited and which areas are flow limited due to human causes.

7.3.6 Numeric Fish Population Goals

The management plan aquatic hypotheses, objectives and strategies in this subbasin were derived directly from the EDT modeling effort used in the assessment. As a habitat-based model, EDT is not designed to provide accurate projections of the numbers of fish present in a subbasin, geographic area, or reach. Other adult return objectives from other planning efforts (total, natural, hatchery and harvest components) are provided in Table 7-9. Since this plan is a culmination of numerous planning efforts, it is important to recognize anadromous fish objectives from previous planning documents.

Table 7-9 does not imply consensus by all management agencies but merely gives a summary of previous goals. The benefits of passive and active habitat restoration strategies presented in Tables 7-10 through 7-13 show that natural production alone in the Walla Walla Basin is not likely to achieve the magnitude of total adult objectives listed in some of the past plans. This would suggest that an artificial production component or objective may be required (particularly for the extirpated spring chinook) if return objectives near the levels stated in Table 7-9 are expected to be met. Managers will need to continue to refine the EDT outputs to clarify the balance between natural production and artificial production that will meet subbasin adult return expectations and needs.

Table 7-9 Comparison of Anadromous Fish Objectives From Various Plans and Processes

Species	Source Plan[1]	Tot. Return Objective	Natural Returns	Hatchery Returns	Harvest Component
Spring Chinook	1990 SBP	5,000	2,000	3,000	2,441
	1996 TRP	5,000	2,000	3,000	2,500
	2001 SBS	5,500 CTUIR and ODFW only agreed	3,000	2,500	2,000
	2004 HMP	8,625 CTUIR only	4,500	4,125	3,000
Steelhead	1990 SBP	11,000	3,000	8,000	7,680
	1996 TRP	11,000	3,000	8,000	7,680

Species	Source Plan[1]	Tot. Return Objective	Natural Returns	Hatchery Returns	Harvest Component
	2001 SBS	4,600-5,600CTUIR only	3,000	1,600-2,600	1,600-2,520

1/ Sources of spring chinook and steelhead return objectives are as follows:

SBP = 1990 NPPC Subbasin Plan

TRP = 1996 CRITFC Spirit of the Salmon (Tribal Restoration Plan)

SBS = 2001 NPPC Subbasin Summary. This reflects CTUIR's numbers for steelhead and CTUIR and ODFW numbers for spring Chinook, not WDFWs (#'s for upper main-stem Walla Walla and S.Fk. only)

HMP = 2004 CTUIR Draft Walla Walla Hatchery Master Plan – this reflects CTUIR goals only so far

WDFW goals for hatchery steelhead are 900 hatchery adults to the Walla Walla and 750 hatchery adults to the Touchet from the LSRCP mitigation program. Our SaSI report has a goal for 600 naturally produced steelhead in the Touchet basin. WDFW has no established goal for spring Chinook returns to the basin. That has yet to be finalized.

7.3.7 Objectives Analysis

Although numeric fish population objectives were not set in this plan, an analysis of the anticipated benefits of achieving the objectives outlined above was generated. This work, completed by Mobrand Biometrics, Inc., made use of the same EDT model used during the aquatic assessment. These numbers are provided for comparison between historic, current, properly functioning, and post-management plan implementation conditions. Although they are not calibrated to reflect actual numeric fish populations within the subbasin, they do accurately reflect the anticipated relative change in the subbasin upon achievement of the biological objectives.

Appendix J provides the full objectives analysis completed for the Walla Walla Subbasin. This includes discussion of how close to historic conditions the basin would become if all objectives were implemented. Further, the analysis also provides relative estimates of improvements in adult abundance, adult productivity, adult carrying capacity, life history diversity, smolt productivity, and mean smolt abundance if all objectives were achieved. These results are summarized in Tables 7-10 and 7-11 for steelhead, assuming current obstructions and no obstructions, respectively. Tables 7-12 and 7-13 summarize the results of this analysis for spring Chinook, also assuming current obstructions and no obstructions, respectively.

The following description of the objectives analysis is taken directly from Appendix J:

> "Evaluation of improved passage conditions inside the subbasin was not addressed directly. This was so primarily because of the complicated series of obstructions occurring on Mill Creek inside and near the city of Walla Walla. The Walla Walla Subbasin Work Group did not set specific objectives for specific obstructions on Mill Creek because there was insufficient time and resources to address the major engineering, economic and social/legal issues that would be entailed. Instead, they estimated the benefits that would occur if active and passive actions were implemented with no change in passage in the basin, and then to compare these figures with the benefits estimated under a "full passage scenario": a scenario in which all impediments to passage were eliminated. It was felt that the initial step in any passage restoration program implemented inside the city of Walla Walla would be to estimate the benefits of completely eliminating the problem. Without a clear demonstration

of substantial benefits to fish production under this scenario, there is little incentive to begin the costly and time-consuming engineering and economic studies entailed by a passage restoration program…"

The Tables are organized by population and passage scenario and are further broken down into populations: Mill Creek, SF Walla Walla, Mainstem/NF Walla Walla and Touchet for spring Chinook; and Mainstem vs. Tributary for steelhead.

Table 7-10 Objectives Analysis – Walla Walla Subbasin Summer Steelhead Assuming Current Obstructions in Place

Scenario	Mean Adult Abundance	Adult Productivity	Adult Carrying Capacity	Life History Diversity	Mean Smolt Production	Smolt Productivity (smolts/ spawner)	Smolt Carrying Capacity
Tributary-Spawning Steelhead							
Current	1,036	3.32	1,482	7%	63,721	177	97,673
Historical	12,417	19.10	13,101	83%	186,891	226	200,228
PFC	3,183	4.60	4,063	64%	159,223	190	216,203
Passive Restoration	1,036	3.32	1,482	7%	63,721	177	97,673
Active Restoration	1,572	3.34	2,244	19%	87,799	162	134,008
Passive + Active Restoration	1,587	3.35	2,262	19%	88,550	162	134,994
Mainstem-Spawning Steelhead							
Current	41	1.30	199	1%	2,580	77	21,046
Historical	4,034	14.00	4,345	83%	68,437	171	75,981
PFC	976	3.80	1,325	70%	53,655	164	80,764
Passive Restoration	41	1.30	199	1%	2,580	77	21,046
Active Restoration	190	2.11	361	6%	12,940	117	31,086
Passive + Active Restoration	191	2.11	364	6%	13,048	117	31,249

Passive restoration=implementation of protection strategies
Active restoration=implementation of restoration strategies
PFC=Properly Functioning Conditions

Table 7-11 Objectives Analysis – Walla Walla Subbasin Summer Steelhead Assuming No Obstructions in Place

Scenario	Mean Adult Abundance	Adult Productivity	Adult Carrying Capacity	Life History Diversity	Mean Smolt Production	Smolt Productivity (smolts/ spawner)	Smolt Carrying Capacity
Tributary-Spawning Steelhead							
Current	1,083	3.25	1,564	9%	64,414	174	97,969
Historical	12,417	19.10	13,101	83%	186,891	226	200,228
PFC	3,183	4.60	4,063	64%	159,223	190	216,203
Passive Restoration	1,083	3.25	1,564	9%	64,414	174	97,969
Active Restoration	1,641	3.32	2,349	20%	89,075	161	134,329
Passive + Active Restoration	1,655	3.32	2,368	21%	89,793	161	135,314
Mainstem-Spawning Steelhead							
Current	201	2.94	305	4%	11,901	135	21,151
Historical	4,034	14.00	4,345	83%	68,437	171	75,981
PFC	976	3.80	1,325	70%	53,655	164	80,764
Passive Restoration	201	2.94	305	4%	11,901	135	21,151
Active Restoration	288	2.41	493	9%	16,529	122	31,227
Passive + Active Restoration	290	2.41	495	9%	16,645	122	31,392

Passive restoration=implementation of protection strategies
Active restoration=implementation of restoration strategies
PFC=Properly Functioning Conditions

Table 7-12 Objectives Analysis – Walla Walla Subbasin Spring Chinook Assuming Current Obstructions in Place

Scenario	Mean Adult Abundance	Adult Productivity	Adult Carrying Capacity	Life History Diversity	Mean Smolt Production	Smolt Productivity (smolts/ spawner)	Smolt Carrying Capacity
Mill Creek Population							
Current	0	0.00	0	0%	0	0	0
Historical	2,667	14.80	2,860	100%	67,588	252	75,153
PFC	1,070	6.15	1,278	100%	46,983	227	58,227
Passive Restoration	0	0.00	0	0%	0	0	0
Active Restoration	0	0.00	0	0%	0	0	0
Passive + Active Restoration	0	0.00	0	0%	0	0	0
South Fork Walla Walla Population							
Current	184	6.28	218	56%	9,040	225	11,568
Historical	1,895	24.55	1,975	100%	35,442	361	37,378
PFC	877	8.16	1,000	94%	27,593	247	31,619

Passive Restoration	184	6.28	218	56%	9,040	225	11,568
Active Restoration	280	6.29	333	83%	12,365	231	15,286
Passive + Active Restoration	283	6.32	336	84%	12,447	232	15,368
Walla Walla Mainstem and North Fork Production							
Current	31	1.53	88	1%	2,638	98	22,763
Historical	4,920	13.37	5,318	100%	202,029	269	238,482
PFC	2,207	5.70	2,676	89%	124,094	236	162,999
Passive Restoration	31	1.53	88	1%	2,638	98	22,763
Active Restoration	199	2.95	302	16%	17,204	17,204	41,166
Passive + Active Restoration	204	2.95	308	17%	12,447	148	41,544
Touchet Population							
Current	48	1.73	115	3%	2,565	66	12,704
Historical	8,447	14.01	9,096	100%	259,357	236	298,209
PFC	3,900	6.19	4,651	97%	176,248	208	176,248
Passive Restoration	48	1.73	115	3%	2,565	66	12,704
Active Restoration	211	1.95	434	22%	13,389	84	54,108
Passive + Active Restoration	211	1.95	434	22%	13,389	84	54,108

Passive restoration=implementation of protection strategies
Active restoration=implementation of restoration strategies
PFC=Properly Functioning Conditions

Table 7-13 Objectives Analysis – Walla Walla Subbasin Spring Chinook Assuming No Obstructions in Place

Mill Creek Population							
Scenario	**Mean Adult Abundance**	**Adult Productivity**	**Adult Carrying Capacity**	**Life History Diversity**	**Mean Smolt Production**	**Smolt Productivity (smolts/ spawner)**	**Smolt Carrying Capacity**
Current	25	3.50	35	11%	1,824	145	3,704
Historical	2,667	14.80	2,860	100%	67,588	252	75,153
PFC	1,070	6.15	1,278	100%	46,983	227	58,227
Passive Restoration	25	3.50	35	11%	1,824	145	3,704
Active Restoration	33	3.64	45	12%	3,146	147	9,100
Passive + Active Restoration	33	3.64	46	12%	3,175	146	9,238
South Fork Walla Walla Population							
Current	214	6.73	252	56%	9,274	219	11,563
Historical	1,895	24.55	1,975	100%	35,442	361	37,378
PFC	877	8.16	1,000	94%	27,593	247	31,619
Passive Restoration	214	6.73	252	56%	9,274	219	11,563
Active Restoration	331	6.89	388	90%	12,679	225	15,278
Passive + Active	334	6.92	390	90%	12,763	226	15,361

Restoration							
Walla Walla Mainstem and North Fork Production							
Current	42	1.70	101	2%	3,383	96	22,804
Historical	4,920	13.37	5,318	100%	202,029	269	238,482
PFC	2,207	5.70	2,676	89%	124,094	236	162,999
Passive Restoration	42	1.70	101	2%	3,383	96	22,804
Active Restoration	226	3.09	335	18%	18,334	146	41,141
Passive + Active Restoration	231	3.09	342	20%	18,590	146	41,491
Touchet Population							
Current	54	1.74	127	3%	2,828	68	12,706
Historical	8,447	14.01	9,096	100%	259,357	236	298,209
PFC	3,900	6.19	4,651	97%	176,248	208	176,248
Passive Restoration	54	1.74	127	3%	2,828	68	12,706
Active Restoration	242	2.02	478	26%	14,568	82	54,707
Passive + Active Restoration	242	2.02	478	26%	14,568	82	54,707

Passive restoration=implementation of protection strategies
Active restoration=implementation of restoration strategies
PFC=Properly Functioning Conditions

Three additional points should be considered before interpreting the model output. First, steelhead were divided into “Tributary” and “Mainstem” populations because life history patterns differ for juvenile steelhead as a function of stream size[11], and because limiting factors usually differ greatly between creeks and larger river segments. Second, out-of-subbasin harvest rates of 0 and 7 percent are assumed for steelhead and spring Chinook, respectively. Finally, a genetic fitness rate (relative to a hypothetical endemic stock) of 90 percent was assumed for steelhead and spring Chinook under Current conditions.

Spring Chinook benefits with current obstructions in place. It is difficult to speak of the impact of habitat changes on an extirpated stock like Walla Walla spring Chinook. In order to avoid awkward circumlocutions, we speak in this and subsequent sections of “the Touchet River spring Chinook population”, or the “Mill Creek spring Chinook population”. The reader should understand such phrases as referring to the potential of Touchet River or Mill Creek habitat to support a (currently non-existent) spring Chinook population. One additional editorial liberty in the service of readability is the substitution of the term “diversity index” for the more cumbersome “life history diversity index”.

Because most it is essentially inaccessible to spring Chinook, none of the habitat objectives restore production in Mill Creek. The Passive Restoration alternative also fails to improve spring Chinook performance in any of the populations, with or without passage restoration – as

[11] Juvenile steelhead are much more likely to emigrate from smaller streams before smolting than larger streams. Accordingly, 90% of the juveniles spawned in tributaries were assumed to display a “transient” life history pattern, whereas only 50% of fish spawned in mainstem reaches were assumed to be transients.

expected for an action with the main intent of simply preserving existing habitat quality in key production areas. The Active alternative, on the other hand, results in some fairly impressive benefits, as does the combined Active/Passive alternative. [Note: there is so little difference between the Active and combined Active/Passive alternatives that both will henceforth be referred to simply as the "Active alternative".]

While the abundance of the South Fork Walla Walla population increases by only 53 percent (from 184 to 283) under the Active alternative, mean abundance for the Touchet and Mainstem/North Fork populations increases by 660 and 440 percent, respectively (from 31 to 204 and from 48 to 211). Equally significant is the 93 and 13 percent increase in productivity for the Mainstem /North Fork and Touchet populations – especially in light of the fact the productivity of the former population increases nearly to 3.0, a value frequently associated with "healthy", self-sustaining populations, while the productivity of the latter population increases to 1.95, a value which could be considered marginally self-sustaining. Also impressive are the seventeen-fold and eight-fold increases in diversity indices for the Mainstem/North Fork and Touchet populations. The impacts on the productivity and diversity index of the South Fork population – 6 and 50 percent increases, respectively – are less spectacular, but do serve to bolster the capacity of the South Fork to support a fairly robust and productive natural population.

Integrated over all four spring Chinook production areas, the successful implementation of the Active habitat restoration strategy is estimated to result in a biological system that could support a spring Chinook population with a mean abundance of 698 adults, a productivity of 4.95 returns/spawner and a diversity index of 25 percent. The productivity figure alone might be justification for a reintroduction program, as many other healthy populations have productivity values in this range. The low diversity index is, however, somewhat cautionary, as it implies a risky overdependence on a relatively small portion of the watershed.

Spring Chinook benefits with full passage. It is appropriate to discuss the restoration of full passage itself, apart from other habitat work, as the first of our series of restoration actions. As might be expected given the concentration of obstructions in lower Mill Creek, full passage restoration does restore some spring Chinook production potential to Mill Creek. Unfortunately, it does not restore much. Mean abundance for a spring Chinook population without passage increases from 0 to just 24 adults with full passage. Such a population would, however, have a fairly high productivity (3.5 returns/spawner) although it would be highly dependent upon a relatively small portion of the Mill Creek drainage (diversity index = 11 percent). Similar modest benefits could be expected for the Mainstem/North Fork, Touchet and South Fork populations, in which mean abundance would increase from 16-35 percent, and productivity would increase from less than 1 to 11 percent. As upper Mill Creek is the major beneficiary of a passage restoration program, these figures imply that upper Mill Creek in its current condition is not especially productive habitat for spring Chinook. They also imply that the obstructions in the upper mainstem, that currently reduce the accessibility of the North and especially the South Fork, are not major limiting factors by themselves.

The benefits of Active Restoration under a full passage scenario are comparable to benefits without passage. In descending order, the most improved populations would be the

Mainstem/North Fork, Touchet, South Fork and Mill Creek populations. Successful implementation of Active the habitat restoration program would increase mean abundance by a factor of 5.5 in the Mainstem/North Fork, by a factor of 4.5 in the Touchet and by 56 percent and 32 percent in the South Fork and Mill Creek, respectively. Productivity would increase by 81 percent in the Mainstem/North Fork, 16 percent in the Touchet and by just 3 and 4 percent in the South Fork and Mill Creek. The diversity index increases dramatically under the Active restoration scenario: 10-fold in the Mainstem/North Fork, by a factor of 8.7 in the Touchet, and by 50 percent and 9 percent in the South Fork and Mill Creek.

When assessed simply in terms of the absolute impact on production potential, it would appear likely that full passage plus Active restoration might create habitat in three of the four drainages capable of sustaining a naturally-spawning spring Chinook population. Certainly this would seem true of the South Fork, with an estimated mean abundance of 334, a productivity of 6.92 and a diversity index of 90 percent. The Mainstem/North Fork area, with a mean abundance of 231, a productivity of 3.1 and a diversity index of 20 percent is also a good bet, although the low diversity index is somewhat troubling. The Touchet drainage, with a productivity of just 2.02, would not by itself be a promising reintroduction candidate, although it could prove useful as a satellite population to a core South Fork/North Fork/Mainstem population.

Prospects for reintroducing a naturalized spring Chinook population to the Walla Walla under a full passage/Active restoration scenario also look promising when the habitat evaluated over all four areas simultaneously. An integrated, subbasin-wide analysis suggests habitat with the capacity to support a population with a mean abundance of 1,021, a productivity of 5.36 and a diversity index of 30 percent. [Note: EDT procedures for integrating multiple populations entail calculating weighted means across populations. The result is that the sum of abundances for component sub-populations frequently differs somewhat from the abundance estimate for the composite population.] The productivity and diversity index figures especially suggest an opportunity to reestablish a naturalized spring Chinook population.

Steelhead benefits with current obstructions in place. Although the Passive restoration scenario did not improve steelhead performance in either the Tributary or Mainstem population[12], combined Active/Passive restoration (hereafter simply “Active” restoration), produced substantial benefits. These benefits were not, however, so great as the benefits to spring Chinook, primarily because the footprint of the actions more closely matched spring Chinook spawning and rearing areas than steelhead spawning and rearing areas. Moreover, steelhead use and in many ways prefer smaller streams as habitat than spring Chinook, and many of the targeted restoration reaches that are used by steelhead are in larger, mainstem areas, which are less valuable to steelhead. Nevertheless, under the Active restoration scenario, steelhead mean abundance increased 53 percent (from 1,036 to 1,587) for the Tributary population, and 467 percent (from 41 to 191) for the Mainstem population. Productivity under the Active scenario remained virtually unchanged for Tributary fish (from 3.32 to 3.35), but increased by 62

[12] The Mainstem and Tributary steelhead populations were defined on the basis of mean channel width. The Mainstem population consists of a number of reaches in the Walla Walla River (from the Touchet confluence to the Little Walla Walla), in the Touchet River (mouth to Acclimation Pond outlet) and in Mill Creek (mouth to Paradise Creek). All other reaches were considered small enough to support a “tributary-spawning population”.

percent (from 1.3 to 2.11) for Mainstem fish. The relative improvements in diversity index for Tributary and Mainstem steelhead were substantial, increasing by multiples of 2.7 and 6, respectively, but the absolute values attained were still seriously low (19 and 6 percent, respectively). These results suggest that steelhead abundance would increase noticeably under Active restoration, especially in mainstem areas, that resilience would increase marginally, but that the great bulk of production would continue to occur in a few high quality tributaries and would therefore be vulnerable to localized events.

Steelhead benefits with full passage. With full restoration of passage, the benefits of Active restoration are comparable across steelhead populations. Abundance increases 52 percent (from 1,083 to 1,655) for the Tributary population, and 44 percent (from 201 to 290) for the Mainstem population. Productivity increases very slightly for Tributary fish (from 3.25 to 3.32) but decreases 19 percent for Mainstem fish (from 2.94 to 2.41). The diversity index shows the most improvement under Active restoration, more than doubling for both populations (from 9 to 21 percent for Tributary steelhead and from 4 to 9 percent for Mainstem steelhead).

The differences between steelhead performance under Active restoration with and without full passage are more quantitative than qualitative. Abundance would be somewhat greater, as would mainstem productivity. Life history diversity, however, would continue to be seriously depressed, and Walla Walla steelhead as a whole would continue to be vulnerable to chance localized disasters.

Too much weight should not be given to the preceding caveat on steelhead benefits. The substantial increases in abundance should buffer the impacts of low life history diversity to some degree, as will the increase in mainstem population productivity. Moreover, the initial estimates of life history diversity for either population are so very low that any measure of improvement is critical.

7.3.8 Additional Fish Enhancement Efforts

According to the objectives analysis provided in Section 7.3.7, the EDT-based in-basin habitat enhancement strategies proposed in this plan will not be sufficient to achieve the interim fish production objectives suggested by various entities in Section 7.3.6. A combination of other enhancement efforts will be needed if these numeric objectives are to be achieved. These may include artificial propagation, or addressing out-of-subbasin effects. Salmon recovery planning will be the forum through which a common set of numeric fish population objectives, and the additional strategies needed to meet those objectives, will be established.

7.4 Terrestrial Habitats

Section 7.3 reviewed strategies unique to aquatic species and their habitats. This section reviews those strategies unique to terrestrial habitats. Priority habitats within the Walla Walla Subbasin include Riparian Riverine habitat, Ponderosa Pine habitat, and Interior Grassland habitat. Note that Canyon Grasslands are considered a subset of Interior Grasslands.

Appendix K includes the full management plan developed by WDFW for the Walla Walla Subbasin, including background on its development and assumptions used. Selected portions of this Attachment are provided below.

7.4.1 Terrestrial Working Hypotheses and Objectives

Four ecoregion focal habitat types occur in the Walla Walla Subbasin including riparian/riverine wetlands, ponderosa pine, interior grasslands, and shrub-steppe. Note that canyon grasslands are a subset of interior grassland habitat, as defined in Appendix K. The recommended range of management conditions provided in Table 4 of Appendix K describes the conditions that must be met for a habitat to be considered "functional." These parameters will be key when evaluating the relative success of particular strategies.

Similar to aquatics, the working hypotheses for focal terrestrial habitat types are based on factors that affect/limit focal habitats (the term, "factors that affect habitat" is synonymous with "limiting factors"). Working hypotheses were developed that capture the primary factors that affect the habitat.

Riparian/Riverine Wetlands Working Hypothesis

The near term or major factors affecting this focal habitat type are direct loss of habitat due primarily to urban/agricultural development, reduction of habitat diversity and function resulting from exotic vegetation, livestock overgrazing, fragmentation and recreational activities. The principal habitat diversity stressor is the spread and proliferation of invasive exotic vegetation. This coupled with poor habitat quality of existing vegetation have resulted in extirpation and or significant reductions in riparian habitat obligate wildlife species.

Factors Affecting the Habitat

- Loss of habitat due to numerous factors including riverine recreational developments, inundation from impoundments, cutting and spraying of riparian vegetation, etc.
- Alteration of natural hydrology due to diking, channelization, etc. resulting in reduced stream flows, reduction of overall area and extent of riparian habitat, streambank stabilization, and loss of vegetative structure, narrowed stream channels.
- Habitat alteration from 1) hydrological diversions, dams, and control of natural flooding regimes resulting in reduced stream flows and reduction of overall area of riparian habitat, loss of riparian vegetative structure, and lack of recruitment of young cottonwoods, ash, willows, etc., and 2) stream bank stabilization which narrows stream channel, reduces the flood zone, and reduces extent of riparian vegetation.
- Habitat degradation from livestock overgrazing which can widen channels, raise water temperatures, reduce understory cover, etc.
- Habitat degradation from conversion of native riparian shrub and herbaceous vegetation to invasive exotics.
- Fragmentation and loss of large tracts necessary for area-sensitive species.

- Landscapes in proximity to agricultural, residential, and recreational development may be subject to high levels of human disturbance and disproportionately support non-native species that displace and/or impact native species productivity, e.g. nest competitors (European starlings and house sparrows), nest parasites (brown headed cowbird), and domestic predators (cats and dogs).
- Recreational disturbances (e.g., ORVs), particularly during nesting season, and particularly in high-use recreation areas.

Ponderosa Pine Working Hypothesis

Although ponderosa pine has more than doubled in extent since circa 1850 (from 23,241 acres to 49,904 acres), anecdotal evidence (professional judgment) suggests that the majority of this habitat type is not functional within the Walla Walla Subbasin. Major factors affecting this focal habitat type stem from changes in climax forest structure and floristic conditions due primarily to timber harvesting, fire reduction/wildfires, mixed forest encroachment, development, recreational activities, reduction of habitat diversity and function resulting from invasion by exotic species and vegetation and overgrazing. The principal habitat diversity stressor is the spread and proliferation of mixed forest conifer species within ponderosa pine communities due primarily to fire reduction and intense wildfires. Habitat loss and fragmentation (including fragmentation resulting from extensive areas of undesirable vegetation) coupled with poor habitat quality of existing vegetation have resulted in extirpation and or significant reductions in ponderosa pine habitat obligate wildlife species.

Factors Affecting the Habitat

- Timber harvesting has reduced the amount of old growth forest and associated large diameter trees and snags.
- Changes in land use for urban, residential, and agricultural purposes have contributed to loss and degradation of properly functioning ecosystems.
- Fire suppression/exclusion has contributed towards habitat degradation, particularly declines in characteristic herbaceous and shrub understory from increased density of small shade-tolerant trees. High risk of loss of remaining ponderosa pine overstories from stand-replacing fires due to high fuel loads in densely stocked understories.
- Overgrazing has resulted in loss of properly functioning conditions, including recruitment of sapling trees and modification of understory vegetation.
- Invasion of exotic plants has altered understory conditions and increased fuel loads.
- Fragmentation of remaining tracts has negatively impacted species with large area requirements.
- Landscapes in proximity to agricultural, residential, and recreational areas may be subject to high levels of human disturbance and disproportionately support non-native species that displace and/or impact native species productivity, e.g. nest competitors (European starlings and house sparrows), nest parasites (brown headed cowbird), and domestic predators (cats and dogs).

- Spraying insects that are detrimental to forest health may have negative ramifications on beneficial moths, butterflies, and non-focal bird species.

Interior Grassland Working Hypothesis

Major factors affecting this focal habitat type are direct loss of habitat due primarily to conversion to agriculture and urban development, reduction of habitat diversity and function resulting from invasion of exotic vegetation and wildfires, and overgrazing. The principal habitat diversity stressor is the spread and proliferation of annual grasses and noxious weeds such as cheatgrass and yellow-star thistle that either supplant and/or radically alter entire native bunchgrass communities significantly reducing wildlife habitat quality. Habitat loss and fragmentation (including fragmentation resulting from extensive areas of undesirable vegetation) coupled with poor habitat quality of existing vegetation have resulted in extirpation and or significant reductions in grassland obligate wildlife species.

Factors Affecting the Habitat

- Extensive permanent habitat conversions of grassland habitats resulting in fragmentation of remaining tracts.
- Changes in land use for urban, residential, and agricultural purposes have contributed to loss and degradation of properly functioning ecosystems.
- Degradation of habitat from overgrazing and invasion of exotic plant species.
- Fire management, either suppression or over-use, and wildfires.
- Invasion and seeding of crested wheatgrass and other introduced plant species which reduces wildlife habitat quality and/or availability.
- Loss and reduction of cryptogamic crusts, which help maintain the ecological integrity of grassland communities.
- Conversion of CRP lands back to cropland.
- Landscapes in proximity to agricultural, residential, and recreational areas may be subject to high levels of human disturbance and disproportionately support non-native species that displace and/or impact native species productivity, e.g. nest competitors (European starlings and house sparrows), nest parasites (brown headed cowbird), and domestic predators (cats and dogs).

Shrubsteppe Working Hypothesis

Shrubsteppe habitat has nearly quadrupled in extent from circa 1850. Fire suppression, overgrazing, and drought have favored a shift in succession of grassland habitats to woody shrub lands. Near term or major factors affecting this focal habitat type are reduction of habitat diversity and function resulting from invasion of exotic vegetation, wildfires, and overgrazing. The principal habitat diversity stressor is the spread and proliferation of annual grasses and noxious weeds such as cheatgrass and yellow-star thistle that either supplant and/or radically alter entire shrubsteppe communities significantly reducing wildlife habitat quality. Although the extent of shrubsteppe habitat has increased significantly, conversion of shrubsteppe habitat to other land uses has resulted in direct loss and fragmentation (including fragmentation resulting from extensive areas of undesirable vegetation) of shrubsteppe habitat within its historic range.

Factors Affecting the Habitat

- Extensive permanent habitat conversions of shrubsteppe habitats resulting in fragmentation of remaining tracts.
- Changes in land use for urban, residential, and agricultural purposes have contributed to loss and degradation of properly functioning ecosystems.
- Degradation of habitat from overgrazing and invasion of exotic plant species.
- Fire management, either suppression or over-use, and wildfires.
- Invasion and seeding of crested wheatgrass and other introduced plant species which reduces wildlife habitat quality and/or availability.
- Loss and reduction of cryptogamic crusts, which help maintain the ecological integrity of grassland communities.
- Conversion of CRP lands back to cropland.
- Landscapes in proximity to agricultural, residential, and recreational areas may be subject to high levels of human disturbance and disproportionately support non-native species that displace and/or impact native species productivity, e.g. nest competitors (European starlings and house sparrows), nest parasites (brown headed cowbird), and domestic predators (cats and dogs).

Biological Objectives

Biological objectives describe physical and biological changes within the subbasin needed to achieve the vision and address factors affecting focal habitats. Biological objectives for all Ecoregion subbasins are habitat based and describe priority areas and environmental conditions needed to achieve functional focal habitat types. Where possible, biological objectives are empirically measurable and based on an explicit scientific rationale (the working hypothesis).

Biological objectives are:

- Consistent with subbasin-level visions and strategies
- Developed from a group of potential objectives based on the subbasin assessment and resulting working hypotheses
- Realistic and attainable within the subbasin
- Consistent with legal rights and obligations of fish and wildlife agencies and tribes with jurisdiction over fish and wildlife in the subbasin, and agreed upon by co-managers in the subbasin
- Complementary to programs of tribal, state and federal land or water quality management agencies in the subbasin

- Quantitative and have measurable outcomes where practical.

Biological objectives are organized into two categories: 1) protection of habitats and 2) habitat function (enhancement and maintenance). Protection objectives focus primarily on identification and protection of focal habitats through education and outreach, leases, easements, and upholding existing land use and environmental protection regulations. Habitat enhancement objectives focus on improving habitat function based on recommended habitat management conditions . Subbasin planners also took into account three broad land categories when developing objectives. These include:

1. Ecoregion Assessment and Conservation identified lands

2. Lands currently assigned GAP protection status

3. Other lands of ecological importance

Objectives are based primarily upon the ECA and GAP databases reviewed in the terrestrial assessment (Chapter 4). In addition to ECA identified lands and GAP protection status areas, subbasin planners support and encourage protection and enhancement of private lands that:

- directly contribute to the restoration of aquatic focal species
- have high ecological function
- are adjacent to public lands
- contain rare or unique plant communities
- support threatened or endangered species/habitats
- provide connectivity between high quality habitat areas
- have high potential for reestablishment of functional habitats

Discussed in greater detail in Chapter 4, lands identified as Class 1 or 2 under ECA are those areas at the greatest risk of conversion from their current habitat type to a habitat type that provides less benefit. GAP protection status is split into the following four categories:

- High Protection: Areas having permanent protection status (e.g. wilderness areas, or the upper Mill Creek Watershed Protection Area)
- Medium: Areas having permanent protection from conversion of natural land cover and a management plan in operation to maintain a primarily natural state.
- Low: Areas having permanent protection from conversion of natural land cover, but are subject to broad low intensity or limited high intensity land use.
- None/Unknown

Table 7-3 provides the biological objectives for priority habitat types in the Walla Walla Subbasin. Further detail on the relationship between these objectives and strategies can be found in Appendix K.

7.4.2 Terrestrial Strategies

A number of alternate protection and enhancement strategies were reviewed from which preferred strategies were identified i.e., easements, leases, existing/new environmental regulations, USDA programs (CRP and CREP), cooperative projects and programs, and research. The rationale behind this flexible approach is to simultaneously employ a variety of non-prioritized conservation "tools" to accomplish subbasin objectives in order to make the most of habitat protection/enhancement opportunities. Fee simple title was acquisition is considereda protection strategy only for the Oregon portion of the subbasin as discussed in Section 7.1.2.

Subbasin planners also recognized the efficacy of focusing future protection efforts around large blocks of extant public lands and adjacent private lands. Clearly, a multi-tiered, flexible, cooperative approach to protecting wildlife/aquatic habitats and associated species is key to the success of any long-term habitat protection/enhancement plan.

Terrestrial habitat strategies are summarized in Table 7-14. Note that terrestrial strategies are focused entirely upon improvements in functional habitat. Strategies for specific focal species were not identified, due to lack of adequate information upon which to base biological objectives. However, the population numbers and strategies developed in state mule deer and elk management plans (see Chapter 6 for discussion) will provide direction for management of these species. These and other focal species that are not actively managed impact the strategies through the use of their needs to define "functional" habitat and in the research, monitoring, and evaluation component of this plan (see Section 7.7). Within Table 7-15, protection is defined as implementation of a prescribed management action designed to maintain the desired ecological function of a habitat. Wherever possible, protection will occur with cooperation between the managing agency and landowner. Long-term protection activities are preferred over shorter-term activities.

Table 7-14 Summary of Terrestrial Biological Objectives

Habitat		Biological Objective ***NOTE: The working horizon for accomplishing objectives is 2004-2020. These objectives were developed from a larger group of potential objectives based on the subbasin assessment and resulting working hypotheses. Objectives are not prioritized within or between habitat types.***
Riparian Riverine	RA	Protect riparian riverine function on a minimum of 22,000 acres (conservative estimated historic acreage), with an initial focus on areas that directly contribute to the restoration of aquatic focal species (steelhead, spring Chinook, & bull trout).
	RB	Enhance riparian riverine function on up to 22,000 acres (conservative estimated historic acreage), with an initial focus on areas that directly contribute to the restoration of aquatic focal species (steelhead, spring Chinook, & bull trout).
Ponderosa Pine	PA	Protect all P. Pine habitat classified as ECA Class 1&2 (4,100 acres).
	PB	Enhance functionality on all P. Pine habitat classified as ECA Class 1&2 (4,100 acres) to achieve habitat parameters for focal and other obligate species.
	PC	Protect P. Pine habitat within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	PD	Enhance P. Pine functionality to achieve habitat parameters for focal and other obligate species in protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
Interior Grassland	GA	Protect all Interior Grassland habitat classified as ECA Class 1&2 (33,600 acres).
	GB	Enhance functionality on all Interior Grassland habitat classified as ECA Class 1&2 (33,600 acres) to achieve habitat parameters for focal and other obligate species.
	GC	Protect Interior Grassland habitat within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	GD	Enhance Interior Grassland functionality to achieve habitat parameters for focal and other obligate species in protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	GE	Show an upward trend in CRP acreage and/or functionality.

Habitat		Biological Objective ***NOTE: The working horizon for accomplishing objectives is 2004-2020. These objectives were developed from a larger group of potential objectives based on the subbasin assessment and resulting working hypotheses. Objectives are not prioritized within or between habitat types.***
Shrub-steppe	SA	Protect all shrubsteppe habitat classified as ECA Class 1&2 (no ECA identified shrubsteppe at this time).
	SB	Enhance functionality on all shrubsteppe habitat classified as ECA Class 1&2 (no ECA identified shrubsteppe at this time) to achieve habitat parameters for focal and other obligate species.
	SC	Protect shrubsteppe habitat within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	SD	Enhance shrubsteppe functionality to achieve habitat parameters for focal and other obligate species in protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	SE	Show an upward trend in CRP acreage and/or functionality.

Table 7-15 Summary of Terrestrial Strategies

Habitat Type	Obj.	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
Riparian- Riverine Wetland	RA	Strategies listed under riparian function for aquatic species are incorporated herein by reference (see Table 7-5, Hypothesis MC4)
	RB	Strategies listed under riparian function for aquatic species are incorporated herein by reference (see Table 7-5, Hypothesis MC4)
Ponderosa Pine	PA	Identify functioning ponderosa pine habitats, corridors, and linkages classified as ECA Class 1&2 for protection.
		Provide information, education, and outreach to protect habitats.
		Use easements, leases, cooperative agreements, and voluntary acquisitions (Oregon only) to protect habitat (long-term protection strategies are preferred over short-term).
		Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.).
		Identify inadequate land and water use regulations. Work to strengthen existing regulations or refine regulations to improve protection of habitats.
		Complete a more detailed assessment of focal species, focal species assemblages, and obligate species needs to determine their habitat requirements (quantity and quality). Assessment/research would ultimately determine what acreage and distribution of functional habitat is necessary to achieve habitat recovery in the context of focal species needs.
	PB	Identify non-functioning ponderosa pine habitats, corridors, and linkages within ECA Class 1 & 2 areas.
		Identify sites that are currently not in ponderosa pine habitat that have the potential to be of high ecological value, if restored.
		Provide information, outreach, and coordination with public and private land managers on the use of prescribed fire and silviculture practices to restore and conserve habitat functionality.
		Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function.
		Assist in long-term development and implementation of a Southeast Washington & Northeast Oregon Comprehensive Weed Control Management Plan in cooperation with local weed boards.
		Fund noxious weed control projects to improve habitat function.
		Work with county, state, and federal agencies and private landowners to develop livestock grazing programs on federal and private lands that do not contribute to the invasion of noxious weeds or negatively alter understory vegetation.
		Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.).
		Identify inadequate land and water use regulations. Work to strengthen existing regulations or refine regulations to improve protection of habitats.

Habitat Type	Obj.	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
Ponderosa Pine	PC	Strategy PC.1-Identify functioning ponderosa pine habitats, corridors and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas
		See PA Strategies 2-6.
	P4	Strategy P4.1-Identify non functioning ponderosa pine habitats, corridors and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
		See P2 Strategies 2-7.
Grassland	GA	Identify functioning interior grassland habitats, corridors, and linkages classified as ECA Class 1&2 for protection.
		Provide information, education, and outreach to protect habitats.
		Use easements, leases, cooperative agreements, and voluntary acquisitions (Oregon only) to protect habitats (long-term protection strategies are preferred over short-term).
		Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.).
		Identify inadequate land and water use regulations. Work to strengthen existing regulations or refine regulations to improve protection of habitats.
		Complete a more detailed assessment of focal species, focal species assemblages, and obligate species needs to determine their habitat requirements (quantity and quality). Assessment/research would ultimately determine what acreage and distribution of functional habitat is necessary to achieve habitat recovery in the context of focal species needs.

Habitat Type	Obj.	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
	GB	Identify non-functioning interior grassland habitats, corridors, and linkages within ECA Class 1 & 2 areas. Identify sites that are currently not in grassland habitat that have the potential to be of high ecological value, if restored. Provide information, outreach and-coordination with public and private land managers on management practices and the use of prescribed fire to restore and conserve habitat function. Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function. Assist in long-term development and implementation of a Southeast Washington & Northeast Oregon Comprehensive Weed Control Management Plan in cooperation with local weed boards. Fund noxious weed control projects to improve habitat function. Work with county, state, and federal agencies and private landowners to develop livestock grazing programs on public and private lands that do not contribute to the invasion of noxious weeds or negatively alter habitats. Restore viable populations of obligate wildlife species where possible. Work with USDA programs (e.g. CRP) to maintain and enhance habitat quality. Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.). Identify inadequate land and water use regulations. Work to strengthen existing regulations or refine regulations to improve protection of habitats.
	GC	Strategy GC.1-Identify functioning interior grassland habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas. See GA Strategies 2-6.
Grassland	GD	Strategy GD.1-Identify non functioning interior grassland habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas. See GB Strategies 2-8.

Habitat Type	Obj.	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
	GE	Encourage landowner participation in existing federal, state, tribal, and local programs that enhance watershed health (e.g. CRP , CREP, Wetlands Reserve Program, EQIP, Partners for Fish & Wildlife, WDFW Landowner Incentive Program, Conservation Security Program, etc.)
		Seek additional funding sources to assist individual landowner to establish and maintain productive habitat. Prioritization should be given for landowners who have already reached their payment limitations in other programs.
		Seek funding sources to develop programs consistent with the goals of CRP , EQIP, and CREP in those areas where site conditions do not meet these program requirements.
		Encourage landowners to convert land to more functional plant communities especially during opportunities such as re-enrollment of CRP
		Enroll areas with documented wildlife damage and areas directly adjacent to high-quality wildlife habitat into CRP using cover practices 2,3, and/or 4.
Shrubsteppe	SA	Identify functioning interior shrubsteppe habitats, corridors, and linkages classified as ECA Class 1&2 for protection.
		Provide information, education, and outreach to protect habitats.
		Use easements, leases, cooperative agreements, and voluntary acquisitions (Oregon only) to protect habitats (long-term protection strategies are preferred over short-term).
		Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.).
		Identify inadequate land and water use regulations. Work to strengthen existing regulations or refine regulations to improve protection of habitats.
		Complete a more detailed assessment of focal species, focal species assemblages, and obligate species needs to determine their habitat requirements (quantity and quality). Assessment/research would ultimately determine what acreage and distribution of functional habitat is necessary to achieve habitat recovery in the context of focal species needs.
	SB	Identify non-functioning shrubsteppe habitats, corridors, and linkages within ECA Class 1 & 2 areas.
		Identify sites that are currently not in shrubsteppe habitat that have the potential to be of high ecological value, if restored.
		Provide information, outreach and-coordination with public and private land managers on management practices and the use of prescribed fire to restore and conserve habitat function.
		Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function.
		Assist in long-term development and implementation of a Southeast Washington & Northeast Oregon Comprehensive Weed

Habitat Type	Obj.	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
		Control Management Plan in cooperation with local weed boards.
		Fund noxious weed control projects to improve habitat function.
		Work with county, state, federal agencies, and private landowners to develop livestock grazing programs on public and private lands that do not contribute to the invasion of noxious weeds or negatively alter the habitat.
		Restore viable populations of obligate wildlife species where possible.
		Work with USDA programs (e.g. CRP) to maintain and enhance habitat quality.
		Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.).
		Identify inadequate land and water use regulations. Work to strengthen existing regulations or refine regulations to improve protection of habitats.
	SC	Strategy SC.1-Identify functioning shrubsteppe habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
		See GA Strategies 2-6.
Shrubsteppe	SD	Strategy SD.1-Identify non functioning shrubsteppe habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public or other protected land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
		See GB Strategies 2-8.
	SE	Encourage landowner participation in existing federal, state, tribal, and local programs that enhance watershed health (e.g. CRP , CREP, Wetlands Reserve Program, EQIP, Partners for Fish & Wildlife, WDFW Landowner Incentive Program, Conservation Security Program, etc.)
		Seek additional funding sources to assist individual landowner to establish and maintain productive habitat. Prioritization should be given for landowners who have already reached their payment limitations in other programs.
		Seek funding sources to develop programs consistent with the goals of CRP , EQIP, and CREP in those areas where site conditions do not meet these program requirements.
		Encourage landowners to convert land to more functional plant communities especially during opportunities such as re-enrollment of CRP
		Enroll areas with documented wildlife damage and areas directly adjacent to high-quality wildlife habitat into CRP using cover practices 2,3, and/or 4.

7.4.3 Terrestrial Strategy Special Topics

Agriculture – Cover Type of Interest

Given its predominance within the subbasin and potential to positively and negatively impact terrestrial wildlife, agriculture is a cover type of special interest to stakeholders and subbasin planners. The primary concern regarding the interface between agriculture and wildlife was that of wildlife damage to agricultural crops. To remedy this concern, one objective was set for agricultural habitats: A1-Limit elk and deer damage on private agricultural lands.

Strategies to achieve this objective were established as follows:

Strategy A1.1- Improve quality of focal habitats on public and private lands e.g. prescribed burns, CRP, and other focal habitat strategies.

Strategy A1.2- Implement strategies in Washington elk and mule deer management plans (note – not all sub-strategies will apply in all areas), including the following:

- Salt in backcountry
- Manage recreation activities during calving season
- Limit road densities
- Quantify & fund mitigation for damages
- Maintain existing wildlife fences
- Build new wildlife fences
- Utilize radio collars to track herds for direct movement back to public land
- Forage plot development and management with appropriate forage species (not necessarily native species)

Strategy A1.3- Limit the impacts of urban, rural residential, and agricultural development in elk and deer habitat uses that result in increased conflicts.

Strategy A1.4- Implement additional strategies to attract and retain elk and deer on public lands.

Alkali Bees

Alkali bees are an essential pollinator of alfalfa fields and other agricultural crops in the subbasin (see Appendix L for details). As such, their continued viability is of unique interest to local stakeholders. The objective established for alkali bees is AB1: Protect alkali bee nesting sites. Strategies are as follows:

AB1.1-Identify and protect nesting sites.

AB1.2-Construct artificial nesting areas that simulate natural resting sites.

AB1.3-Use insecticides sparingly in areas occupied by alkali bees.

AB1.4-Provide public outreach and education regarding the benefits of alkali bees to local agricultural crops and wild plants.

Canyon Grasslands and Bighorn Sheep

Bighorn sheep were added as a species of interest at the request of Oregon stakeholders, including CTUIR and the Oregon Department of Fish and Wildlife, and was subsequently approved for inclusion by the Subbasin Planning Team. They are closely associated with canyon grassland habitats, a subset of the interior grassland habitat type. Objectives and strategies for managing canyon grassland habitat for the benefit of bighorn sheep populations are provided in Table 7-16.

Table 7-16 Canyon Grassland/Bighorn Sheep Objectives and Strategies

Objective	Strategies
CG1: Increase protection status on ≥4000 acres of core canyon grassland habitat.	Strategy CG1.1-See strategies 1 through 6 for Objective G1.
CG2: Improve canyon grassland habitat.	Strategy CG2.1-Convert introduced herbaceous vegetation to native perennial grasses (Idaho fescue percent cover ≥ 20%). Strategy CG2.2-Increase Idaho fescue component of native bunchgrass communities to ≥ 20% cover. Strategy CG2.3-Control noxious weeds. Strategy CG2.4-See strategies 2 through 7 for objective G2.
CG3: Create buffers to eliminate conflicts with domestic sheep.	Strategy CG3.1-See strategies 1 through 6 for Objective G1.

7.5 Integration with Endangered Species Act/Clean Water Act Requirements

The NWPCC subbasin planning guidelines have identified a need for subbasin plans to describe how the objectives and strategies are reflective of, and integrated with, the recovery goals for listed species within the subbasin. Further, coordination with the National Marine Fisheries Service Technical Review Teams (TRT) and state water quality management plans is recommended to facilitate consistency with ESA and CWA requirements. The Walla Walla Subbasin plan, although not having set direct fish population goals against which recovery can be measured, is supportive of recovery through its goal of habitat enhancement. Integration with the draft Bull Trout Recovery Plan did occur in a limited fashion, as described in Section 7.1. Integration with the TRT was limited, as recovery goals have not yet been developed for the subbasin. The interim recovery goals provided by the TRT are presented later in this chapter within the context of preliminary numeric fish population goals, which also includes goals from tribal and state agency interests. Walla Walla County and other entities intend to work with the TRT primarily through the Snake River Salmon Recovery Plan process.

In the Walla Walla River Subbasin the Federal Clean Water Act is implemented in large part through the State's preparation of water quality standards, Total Maximum Daily Loads (TMDLs) and TMDL implementation processes of designated management agencies. In addition to other streams, the Oregon Department of Environmental Quality and the Washington Department of Ecology have identified the Walla Walla River and certain tributaries as a water quality limited for temperature. Washington Department of Ecology has identified other water quality limitations as well: pH, fecal coliform bacteria, toxins (polychlorinated biphenyls and polycylic aromatic hydrocarbons). With regard to temperature, mainstem modeling indicates that with human warming minimized, river temperatures exceed biologically-based temperature thresholds that are developed to protect salmonid rearing. In this situation, the standard defaults to a natural heating condition – i.e., minimization of human stressors, such as vegetation removal and channel modifications. Numeric goals for shading and channel width have been produced and are being incorporated into the draft TMDL, and will likely be approved this year.

The implementation of the TMDL process occurs through management planning - typically refinements of existing plans or programs, such as the Agricultural Water Quality Management Area Plans (SB 1010), the Oregon Forest Practices Act, County Comprehensive plans, and Federal policies on Forest Service lands. These plans vary from voluntary to proscriptive (though all should have reasonable assurance of implementation), and management oversight is normally conducted through the local, state or federal land use authority. Initiative-based restoration/protection and public funding dovetails with TMDL implementation and is an important implementing mechanism. Subbasin Planning is recognized as a key effort that supports TMDL implementation, and will be recognized in the TMDL water quality management planning process.

7.6 Research, Monitoring, and Evaluation

This section provides an overview of the research, monitoring, and evaluation (RM&E) approach proposed for aquatic and terrestrial habitats and species in the Walla Walla Subbasin. This RM&E section was developed through a serious of meetings with technical staff from various entities including WDFW, ODFW, CTUIR, WWBWC, USFWS, Washington Department of Ecology, Tri-State Steelheaders, USFS, and United States Army Corps of Engineers. These participants identified specific RM&E needs based upon a combination of existing activities and the data needs identified through development of the subbasin planning vision, assessment, inventory, working hypotheses, biological objectives, and strategies. The RM&E activities proposed herein will help fill existing data gaps and will facilitate implementation of an adaptive management approach in the subbasin.

- Research activities generally are intended to fill existing data gaps and establish baseline habitat conditions.
- Monitoring activities are intended to track individual project effectiveness, to document the extent to which strategies are being implemented, and to identify habitat and species responses to such actions.
- Evaluation activities enable subbasin planners to integrate research and monitoring data in a feedback loop to determine if strategies are contributing to achievement of the

biological objectives, to assess the ability of objectives to address the working hypotheses, and to test accuracy of the working hypotheses.

The RM&E plan is split into two sections: aquatic (Section 7.7.1) and terrestrial (Section 7.7.2). Both the terrestrial and aquatics portion of the proposal describe high priority RM&E needs that will support achievement of the plan's vision. These needs are defined as programs that 1) gather data or conduct research that furthers our understanding of ecosystem function, 2) fill existing knowledge or data gaps, 3) answer questions critical to successful management of species or communities, 4) test or develop innovative restoration/management techniques, 5) identify the accuracy of assumptions, or 6) allow evaluation of the relative success of ongoing restoration/management activities, thereby facilitating adaptive management. Although they are discussed separately, each section follows the same general framework:

1. Identification of research needs to fill data gaps and establish baseline conditions

2. Identification of monitoring and evaluation needs to track progress on achievement of biological objectives and to support adaptive management in the subbasin.

The RM&E programs summarized below and presented in full in Appendices M and N (aquatic components) and L (terrestrial components). Due to out of subbasin effects, habitat enhancement within the subbasin may not spur a direct increase in focal species populations. As such, the RM&E plan outlined below tracks improvements in both habitat quality and focal species populations. This plan is not intended to provide the full details needed for research and monitoring activities within the subbasin, but instead to provide direction and key areas in which such activities should focus. The intent is for this program to grow and develop as data gaps are filled, fed back into an adaptive management program to improve the information upon which this plan is based, and plan data needs change. However, cooperation among the various entities involved in aquatic and terrestrial species population and habitat enhancement is currently a high priority, and will likely continue as such well into the future.

7.6.1 Aquatic Habitats and Species

Development of a comprehensive aquatic RM&E plan is an extensive process requiring the cooperation of multiple entities throughout the subbasin, including CTUIR, ODFW, WDFW, WWBWC, and others. Given limitations of time in the subbasin planning process and the extensive set of issues that need to be resolved in the RM&E plan, insufficient time was available to develop a fully coordinated and comprehensive aquatic RM&E plan for the subbasin. Two drafts of an aquatic RM&E plan currently exist, one developed by CTUIR (Appendix M) and one developed by WDFW (Appendix N). The intent among co-managers is to continue work on developing a coordinated RM&E plan, and to ensure that the plan is comprehensive. Co-managers intend to have a subbasin-scale aquatic RM&E plan developed during the next six months to a year, and once completed, the RM&E plan will be provided to the Northwest Power and Conservation Council as an amendment to the Walla Walla Subbasin Plan.

Following are selected guiding principles and priorities outlined in the plans:

- Fill EDT data gaps and establish baseline habitat conditions - focusing on filling data gaps that have the greatest leverage on EDT model outputs, those that are within priority protection or restoration stream reaches, attributes that have a broad effect on populations or habitat status, and data gaps that are identified specifically in the management plan).
- Focus RM&E efforts on critical data needs for VSP attributes - improve understanding of abundance, diversity, spatial structure, and productivity.
- Implementation and effectiveness monitoring to document actions should be funded/undertaken within the basin – document the why, where, how much and whether of habitat recovery actions completed in the subbasin.
- Address critical uncertainties – critical uncertainties must be answered if populations are to be rebuilt and delisted. Such uncertainties may include habitat/life history stage relationships, causal relationships for degraded habitat and depressed or extirpated populations, and understanding the relationship between resident and anadromous O. mykiss subpopulations.
- Coordinate with regional efforts – as noted in Chapter 6, a wide variety of groups participate in habitat and species enhancement efforts within the subbasin. These efforts should be coordinated to the maximum extent possible both within the subbasin and at a regional scale.
- Data management and coordination are crucial to meet regional data accessibility needs.
- Methodologies should provided data of known quality (accuracy and precision).
- Validation of the EDT model as a reliable measure of habitat and population response to recovery actions taken in the Walla Walla Subbasin.
- A systematic approach to project selection and funding will be used that is consistent with and complementary to other RM&E efforts within the Columbia Basin

Table A1 of Appendix M provides a detailed assessment of ongoing and needed RM&E activities. Following are broad RM&E recommendations based on guiding principles and priorities and the items listed in Table A1 of Appendix M:

- Fund habitat inventories to collect data necessary to fill data gap for attributes with high EDT model leverage and evaluation of progress toward subbasin plan objectives.
- Continue to fund existing monitoring and evaluation actions within the subbasin that fulfill critical VSP data needs.
- Fund additional actions to complete basic population status monitoring needs for the subbasin.
- Accountability for restoration actions needs to occur for each project. Basic documentation should be completed in a cost effective manner. A systematic approach to documenting effectiveness is required that provides sufficient accountability without unnecessary redundancy.

- Fund research on critical uncertainties represented in the Walla Walla for a broader ESU relevance if not being funded or conducted in other subbasins (opportunity for a coordinated regional effort)
- Fund and implement RM&E that shows a clear link to resolving uncertainty regarding population abundance and management goals

Additional RM&E work is needed to support the aquatic special topics outlined in Section 7.3.5 of this plan.

7.6.2 Terrestrial Habitats and Species

The full aquaticterrestrial RM&E plan for the Walla Walla Subbasin is provided in Appendix L. The intent of the terrestrial RM&E plan is to:

- Evaluate success of focal habitat management strategies, via monitoring of focal wildlife species (The results of focal species monitoring and evaluation efforts are expected to function as potential performance measures to monitor and evaluate the results of implementing management strategies and actions on focal habitats).
- Determine if management strategies undertaken are achieving recommended range of habitat management conditions, via monitoring and assessment of habitat conditions over time.
- Allow for evaluation of the assumptions and working hypotheses upon which the management plan is based, by determining if a correlation does indeed exist between focal habitat management conditions and focal species population trends.

The terrestrial RM&E plan provided in Appendix L consists of two main components: 1) research; and 2) monitoring and evaluation.

The research component identifies research needs, with their justification. Detailed research project design is not presented, however, being beyond the scope of the current planning effort. Existing data gaps, as identified through the subbasin planning process, are listed in this section, because many will require effort above routine monitoring and evaluation to address

Key research needs, a strategy to address the need, and the recommended agency/personnel to implement the strategy are identified by habitat type in Table 1 of Appendix L. General research needs that cross all habitat types include the following:

- Testing of the assumption that focal habitat are functional if a focal species assemblage's recommended management conditions are achieved.
- Testing of the assumption that selected species assemblages adequately represent focal habitats.
- Compilation of current, broad-scale habitat data through spatial data collection and GIS analysis.

All three of these general research needs would be a coordinated effort between federal, state, and local government agencies and NGOs.

The monitoring and evaluation component reviews focal habitat and focal species monitoring methodologies, and identifies monitoring needs for individual management strategies. Specifically, a monitoring and evaluation approach is provided for each terrestrial habitat enhancement strategy in Table 3 of Appendix L. Three key approaches regarding monitoring and evaluation are found throughout this table:

1. Identification of functional habitat. Current data provides a reasonable estimate of the extent of habitat types, but the functionality of those habitat types is unknown.

2. Track and report accomplishments of various entities.

3. Cooperative efforts among the various entities involved in species population and habitat enhancement work are encouraged wherever possible.

As mentioned above, this terrestrial RM&E program is intended to grow and develop as improvements are realized and strategies change. Tracking the results of project implementation and feeding those into an adaptive management program will facilitate more efficient use of project funds, and will help target such funds to those areas and projects that can provide the greatest benefit for terrestrial wildlife.

7.7 Plan Implementation

The purpose of this subsection is to briefly describe some considerations for plan implementation. Significant cooperation and coordination has occurred among local, state, federal and tribal agencies, and with individual land owners during development of this subbasin plan, and for other ongoing planning efforts. Temporary committees and other coordination structures were established. These cooperative efforts should continue. The following recommendations can guide successful subbasin implementation:

- Task the subbasin planning team with developing a more detailed implementation plan that includes a prioritization of strategy, RM&E, planning tools update, organization approach(s) and administrative activities for the next one to three years;
- Designate or establish a permanent plan implementation oversight committee comprised of agency technical staff and interested citizens. This committee could monitor and update annually the three-year implementation plan (see bullet); review project funding requests prior to submittal; assist with coordinating/integrating efforts with other planning efforts; and take on other needed activities, as identified. This could be a new committee, or an existing committee or organization structure established through subbasin planning, watershed planning, salmon recovery planning, or HCP planning. Additional subcommittees or adhoc workgroups might be established for addressing specific implementation actions.

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APPENDIX A

Subbasin Planning Public Involvement Plan

APPENDIX B

Walla Walla Subbasin Assessment

APPENDIX C

Walla Walla Subbasin Aquatic Assessment

APPENDIX D

Out of Subbasin Survival Effects in EDT Analyses

APPENDIX E

Species of Interest

APPENDIX F

Southeast Washington Wildlife Assessment

APPENDIX G

Level 2 Diagnosis and Project Inventory

APPENDIX H

Blue Mountains Elk Plan

APPENDIX I

Land Acquisition

APPENDIX J

Objectives Analysis

APPENDIX K

Walla Walla Subbasin Terrestrial Management Plan

APPENDIX L

Terrestrial RM&E Plan

APPENDIX M

Aquatic RM&E Plan, CTUIR

APPENDIX N

Aquatic RM&E Plan, WDFW