

Asotin Subbasin Plan

May 2004 Version



Submitted by: **Asotin County Conservation District**

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Asotin County Conservation District

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CONTRIBUTORS

Subbasin Lead

Asotin County Conservation District

Subbasin Co-Lead

Nez Perce Tribe

Contributors

John Andrews, Washington Department of Fish and Wildlife

Becky Ashe, Nez Perce Tribe

Paul Ashley, Washington Department of Fish and Wildlife

Chad Atkins, Washington Department of Ecology

Paul Bedoin, Landowner/Pomeroy Conservation District

Keith Berglund, Garfield County Wheat Growers

William Dowdy, U.S. Forest Service, Umatilla National Forest

Jason Flory, U.S. Fish and Wildlife Service

Pat Fowler, Washington Department of Fish and Wildlife

Del Groat, U.S. Forest Service, Umatilla National Forest

Bradley Johnson, Asotin County Conservation District

Paul Kraynak, Nez Perce Tribe

Victoria Leuba, Washington Department of Ecology

Les Marois, Nez Perce Tribe

Steve Martin, Snake River Salmon Recovery Board

Glen Mendel, Washington Department of Fish and Wildlife

Ron Scheibe, Landowner, Asotin County Conservation District

Jim Schroeder, Natural Resource Conservation Service, Clarkston Field Office

Courtney Smith, Natural Resource Conservation Service, Clarkston Field Office

Mark Schuck, Washington Department of Fish and Wildlife

Angela Sondanaa, Nez Perce Tribe

Cheryl Sonnen, Asotin County Conservation District

Barry Southerland, Natural Resource Conservation Service, Spokane State Office

Megan Stewart, Asotin County Conservation District

Stacey Stovall, Washington Department of Fish and Wildlife

Emmit Taylor, Nez Perce Tribe

Mark Wachtel, Washington Department of Fish and Wildlife

Editors

Parametrix

Economic and Engineering Services, Inc.

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:

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- **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.

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Asotin Subbasin Addendum

The Asotin Subbasin has had considerable public input and buy-in for habitat restoration and enhancement projects for aquatic species since the early 1990's. The *Asotin Creek Model Watershed Plan (Model Watershed Plan)* was completed and printed in 1995 and it serves as a guide for ridge-top-to-ridge-top restoration for fish habitat and was the First Plan of its kind completed in Washington State with Bonneville funding. It is important to remember that Plans that are completed by locals can be implemented without the need for regulatory hammers. The *Model Watershed Plan* and the associated 550 completed projects serve as an indication of what can be accomplished in prioritized watersheds on private lands with public support. The Asotin Subbasin Plan is consistent with and builds on the provisions of and success of the *Model Watershed Program*.

Local stakeholders, including the Asotin County Conservation District, recognize the importance of developing comprehensive, accurate plans to guide resource management efforts. However, these efforts must eventually begin to bear fruit through implementation to maintain the forward momentum that has been generated through the Model Watershed, Subbasin Planning, and similar processes. A significant amount of effort has gone into this plan, which represents the subbasin's best effort to balance a wide variety of interests. Participants in this process desire for this plan to be adopted by the Northwest Power and Conservation Council and implemented with the priorities, objectives, and strategies that were developed at the local level.

Given the number of on-going planning efforts in southeast Washington that are addressing salmon habitat (e.g. Model Watershed, Subbasin Planning, Water Resource Inventory Area Planning), it is essential that all efforts ultimately be merged into the Snake River Salmon Recovery Plan that will provide guidance for management of ESA-listed fish species and consistency on a regional scale. In addition to supporting implementation of related planning efforts, the Snake River Salmon Recovery Plan will provide the regional coordination that is necessary to appropriately manage fish and wildlife resources.

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 Asotin Model Watershed Plan, affect and are affected by the subbasin plans. The Asotin Creek Model Watershed Plan was completed in 1995 with local support and is currently in its implementation phase. This plan addressed issues of habitat and has served as the catalyst for a wide variety of habitat improvements throughout the subbasin. The Asotin Subbasin Plan is intended to build upon the successes of the *Model Watershed Plan* through development of an interactive relationship that is expected to be developed between subbasin planning, watershed plans, and State of Washington salmon recovery plans.

EXECUTIVE SUMMARY (Continued)

Asotin Subbasin Plan

This plan concerns the Asotin Subbasin in southeastern Washington. The Asotin Creek Subbasin is composed of 325 square miles located in Asotin and Garfield Counties drained by Asotin Creek, Couse Creek, Tenmile Creek and their tributaries. Asotin Creek originates in the Blue Mountains and is a tributary to the Snake River, draining an area of 208,000 acres. Rainfall ranges from more than 45 inches in the higher elevations to 12 inches in the lower elevations. 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 grasslands and agricultural lands at lower elevations and evergreen forests at higher elevations.

Pasture/rangeland (43 percent), cropland (26 percent), and forestland (30 percent) are the primary land uses in the subbasin. Approximately 67 percent of the Asotin Subbasin is in private ownership; most of this land is in the lower portion of the watershed.

The planning process in the Asotin Subbasin involved a number of organizations, agencies, and interested parties including the Asotin County Conservation District (ACCD), US Forest Service Pomeroy Ranger District, Nez Perce Tribe, Washington Department of Fish and Wildlife, private landowners and others. The lead entity for the planning effort was the ACCD with the Nez Perce Tribe as the co-lead. The technical components of the assessment were developed by the Washington Department of Fish and Wildlife. The planning effort was guided by the Asotin, Lower Snake, and Tucannon Subbasin Planning Team which included representation from the lead entity, co-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 vision statement is as follows.

The vision for the Asotin 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.

Together with the guiding principles, the vision statement provided guidance regarding the assumptions and trade-offs inherent in natural resource planning.

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 Asotin Subbasin. Aquatic focal species are steelhead/rainbow trout, spring Chinook salmon, and bull trout. These species were chosen based on the following considerations:

- Selection of species with life histories representative of the Asotin Subbasin
- ESA status

EXECUTIVE SUMMARY (Continued)

- Cultural importance of the species
- Level of information available about species' life histories allowing an effective assessment

In addition, Pacific lamprey and coho salmon 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 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, 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

Within the Asotin 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 Asotin 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. Further, insufficient data was available to run the EDT model on Couse Creek. The results from EDT on Tenmile were generally applied to Couse Creek.

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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 Asotin Creek summer steelhead and spring/fall 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, Asotin Subbasin Summary, Asotin Model Watershed Plan, 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.

The areas with the highest restoration value in the Asotin Subbasin are: Upper Asotin (Headgate Dam to Forks), Lower George Creek, Lower NF Asotin, Charley Creek, and Lower SF Asotin. Within these priority 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. Flow was identified as a primary limiting factor only in the Lower George geographic area. Decreasing the effect of these limiting factors through habitat enhancement is expected to benefit all aquatic focal species.

Priority protection geographic areas for aquatic focal species include all geographic areas identified for restoration plus the Upper North Fork Asotin Creek, Upper South Fork Asotin Creek, Upper George Creek, North Fork Asotin Tributaries, and the Headwater (upper ends of George Creek, Charley Creek, North Fork Asotin Creek, and South Fork Asotin Creek). 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.

EXECUTIVE SUMMARY (Continued)

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. Shrub-steppe habitats, though common on the Columbia Plateau, do not occur in the Asotin Subbasin, nor is it considered to have occurred here historically. From historic to current times, there has been an estimated 73 percent decrease in riparian wetland habitat, 27 percent decrease in interior grassland habitat, and a 57 percent decrease in ponderosa pine habitat within the subbasin. Little information was available regarding the functionality of remaining habitats. Most ponderosa pine forest and eastside grassland habitats in the subbasin are afforded “low” protection status, while most interior wetlands receive no protection. In total, none of the subbasin is considered to be in high protection status, 2 percent is in medium protection status, 33 percent in low protection status, and 65 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 Asotin Subbasin, including the ACCD, Nez Perce Tribe, U.S. Fish and Wildlife Service (USFWS), NOAA-Fisheries, Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology (DOE), USDA NRCS and FSA, US Forest Service, county, and others. Key aquatic and terrestrial programs include the following:

- USDA Programs (e.g. Conservation Reserve Enhancement Program, Conservation Reserve Program)
- ACCD Habitat Cost-Share Programs (BPA, SRFB, and DOE Grants)
- Harvest regulations (tribal and sport fishing)
- Blue Mountains Elk Management Plan (WDFW)
- Priority Habitats and Species Program (WDFW)

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

EXECUTIVE SUMMARY (Continued)

- upland issues (60%)
- riparian restoration (23.9%)
- instream (13.3%)
- monitoring (2.7%)

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.

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 U.S. Fish and Wildlife Service 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 Lower George 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, spring Chinook, and bull trout in various life stages. Biological objectives in this geographic area are as follows:

- Sediment – achieve less than 20% mean embeddedness
- Large Woody Debris – at least 1 piece per channel width should be present

EXECUTIVE SUMMARY (Continued)

- Pools – 10% or more of the stream surface area should be pools
- Riparian Function – the riparian function should be at least 50% of maximum
- Confinement – no more than 40% of the stream bank length should be confined
- Summer Maximum Water Temperature – the water temperature should exceed 75°F on fewer than 4 days per year
- Bedscour – limit bedscour to less than 10 centimeters
- Instream Flow – maintain summer flow in 90% of years

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 the river. 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.

Aquatic strategies were also developed for two additional categories: 1) 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 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

EXECUTIVE SUMMARY (Continued)

- 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.

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.

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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- K WDFW Asotin Subbasin Terrestrial Management Plan
- L Terrestrial RM&E Plan
- M Aquatic RM&E Plan

ACRONYM LIST

ACCD	Asotin County Conservation District
ACCDLSC	Asotin County Conservation District Landowner Steering Committee
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
PFC	Properly Functioning Conditions
PHS	Priority Habitats and Species

ACRONYM LIST (Continued)

SaSI	Washington Department of Fish and Wildlife Salmonid Stock Inventory
SF	South Fork
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

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 active restoration for this subbasin plan, and may not be consistent with typical definitions of active restoration.

Adult Abundance: Adult abundance is the number of adult fish that the EDT model predicts would be present, given a set of habitat conditions and incorporating a factor for calculating out of subbasin effects.

Capacity: Capacity is the number of fish that could potentially be supported by a stream under a defined set of habitat conditions (e.g. historic or current).

Hard Stabilization: Hard stabilization includes the use of rip rap, concrete, and similar structures to stabilize streambanks. *Use of such structures has been and will continue to be discouraged throughout the subbasin.* Methods such as vegetation planting, fascines, instream structures (e.g. J-hook vanes, vortex rock weirs), and similar bio-engineered structures, are the preferred methods of instream and riparian streambank stabilization.

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).

Life History Diversity: Life history diversity refers to the numerous potential paths a fish can use to move through its life cycle, including geographic options for habitat to support egg incubation, emergence, rearing, downstream migration, maturation, upstream migration, and spawning. Habitat degradation can limit the number of potential paths available, and as such leave population at-risk if a catastrophic event were to occur affecting the remaining life history pathways.

Managed Grazing: A grazing regime that includes consideration of the appropriate number of livestock for a particular area, alternative water sources and conveyance systems, timing, intensity, limited stream access (water gaps) and other practices combined in a manner that helps maintain the health and vigor of livestock, range and riparian vegetation, and water resources.

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

GLOSSARY (Continued)

Passive Restoration: Passive restoration takes advantage of natural processes and out-of-stream actions 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 this subbasin plan, and may not be consistent with typical definitions of 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 percent the width of the stream)

Productivity: Productivity refers to the number of adults that return to a stream per spawning fish.

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)

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 overarching 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).

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 provide 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 ESU, adaptive management practices may be warranted to reflect priorities at the larger scale.”

The Asotin Subbasin Plan is a local response to this regional directive. Components of this plan at the subbasin level will be integrated with those of the Grande Ronde, Imnaha, and Snake Hells Canyon subbasins in the Blue Mountain 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. The following assumptions were used by technical staff and the public during the development of biological objectives in the Asotin Subbasin. Specific definitions of terms can be found in the glossary.

Following are the key elements of the Asotin 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 list Planning Participants.

1.1 Planning Context

1.1.1 Relationship to Applicable Federal and State Regulations

The Asotin Subbasin Plan is one piece of a larger effort to achieve de-listing and/or recovery of species currently listed under the Endangered Species Act (ESA). A significant portion of ESA requirements for aquatic species in the subbasin will be met through development and implementation of the Snake River Salmon Recovery Plan. As a mechanism to obtain funding for habitat enhancement projects, the Asotin Subbasin Plan will play a key role in this process. 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.

Within the Asotin Subbasin three primary aquatic species are listed as threatened: Steelhead, bull trout, and spring Chinook. 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:

- The Snake River Basin steelhead ESU, which includes Asotin Creek summer steelhead, was listed as threatened under the federal Endangered Species Act (ESA) by NOAA Fisheries in August, 1997 (62 FR 43937).
- The Snake River spring/summer Chinook evolutionarily significant unit (ESU), which includes Asotin Creek spring Chinook, was listed as threatened under the ESA in 1992 (57 FR 14653).
- Bull Trout in the Columbia Basin (including Asotin Creek) were listed as threatened under the ESA 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, where watersheds are divided into Water Quality Management Areas (WQMAs). Asotin Creek, from the mouth at the Snake River to the confluence of the North and South Forks, is being considered for a TMDL in the Upper Snake WQMA. Specific strategies outlined in the management plan (Chapter 7) will provide direction for water quality enhancement (addressing primarily turbidity and temperature).

1.1.2 Integration with Related Planning Efforts

The Asotin Subbasin Summary was completed in 2001 (Stovall 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; and 3) attempted integration and agreement by diverse stakeholders on a common set of hypotheses, objectives, and strategies.

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.

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

Assessment/Plan	Sponsor
Limiting Factors Analysis, 2002	Washington Conservation Commission
Asotin Subbasin Summary, 2001	Northwest Power and Conservation Council
Asotin Creek Model Watershed Plan, 1995	Northwest Power and Conservation Council
Bull Trout Recovery Plan (draft), 2002	United States Fish and Wildlife Service
Spirit of Salmon; Wy-Dan-Ush-Mi-Wa_Kish-Wit, 1996	Columbia River Inter-tribal Fish Commission

In addition to integration with BPA 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 non-BPA funding.

One such planning effort completed in the past, and currently in its implementation phase, was the *Asotin Creek Model Watershed Plan* (Asotin County Conservation District Landowner Steering Committee 1995). This plan, finalized in 1995, addressed issues of salmonid habitat protection and restoration project goals and objectives. Specific goals included the following (ACCDLSC 1995):

1. Strive for substantially improved fish and wildlife habitat quality and quantity.
2. Involve community groups and volunteers outside of the farming and ranching industry to support the plan and help improve fish and wildlife habitat.
3. Prioritize habitat improvements to make cost effective and responsible use of public funds.
4. Focus project efforts on a watershed/ecosystem approach rather than just the riparian area.
5. Create pro-active management of private resources without increasing government regulations.
6. Promote cooperative efforts between landowners and agencies.
7. Strive to reduce instream sediment levels by improving upland management practices.
8. Promote the use of conservation practices on all confined livestock winter feeding and calving areas, adjacent to Asotin Creek and its tributaries, to protect water quality and the riparian area.

9. Develop a public information and education program to raise the natural resource awareness of county residents.
10. Develop a watershed management plan that meets Section 10 requirements under the Endangered Species Act for a “habitat conservation plan”.

Implementation of the *Asotin Creek Model Watershed Plan* through BPA and other funding sources has resulted in significant improvements in aquatic and terrestrial habitats in the subbasin through the cooperative efforts of landowners, the Asotin County Conservation District, and others.

One additional planning activity is the Water Resource Inventory Area (WRIA) 35 watershed planning process. This process, currently in the assessment phase, will incorporate the management plans of the Asotin, Lower Snake, and Tucannon subbasins as its approach for assessing and managing fish habitat. WRIA 35 planners intend to incorporate the appropriate subbasin plans by reference.

The Snake River Salmon Recovery Plan is another local planning effort that will incorporate the information provided by several subbasin plans, including the Asotin. Snake River Salmon Recovery is a regional effort to identify a strategy for salmon recovery that is science-based and supported by the community and Tribes. Representatives from Asotin, Columbia, Garfield, Walla Walla, and Whitman counties, the Nez Perce Tribe, and the Confederated Tribes of the Umatilla Indian Reservation are guiding the habitat recovery planning process by serving on the Lower Snake River Salmon Recovery Board. The Board is committed to engaging all of the region’s stakeholders in building a plan that puts effective and endorsed salmon recovery actions “on the ground.” The Snake River Salmon Recovery Board will play an integral role in supporting implementation and progress evaluation of habitat improvement projects for the Asotin Subbasin Plan.

1.2 Planning Process and Participants

The planning process in the Asotin Subbasin involved numerous entities, including the Asotin County Conservation District, Nez Perce Tribe, Washington Department of Fish and Wildlife, WRIA 35 Planning Unit, Snake River Salmon Recovery Board, and others. Figure 1-1 shows the general relationship between the various groups.

The lead entity for development of the Asotin Subbasin Plan was the Asotin County Conservation District. The Nez Perce Tribe served as co-lead.

The Washington Department of Fish and Wildlife developed all technical assessment components, both aquatic and terrestrial. Their work was accomplished with the assistance of Mobrاند 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 development, 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 Asotin Subbasin Plan was the Asotin, Lower Snake, and Tucannon Subbasin Planning Team (SPT). The SPT was established in fall 2003, and has representation from the lead entity, co-lead, local resource managers, and others (see Table 1-2 for membership list). Meetings of the SPT were held on November 20, 2003, January 27, 2004, March 23, 2004, and April 28, 2004. Significant communication via teleconference and email occurred among SPT members between these meeting dates. The SPT served multiple roles, including information clearinghouse, approving documents prior to public review, and most importantly, the forum in which significant policy-level issues were discussed and addressed. Given that all major groups involved in Subbasin planning in the Asotin 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 Asotin, Lower Snake, and Tucannon Subbasin Planning Team Membership

Member	Affiliation
Bradley Johnson	Asotin County Conservation District
Terry Bruegman	Columbia Conservation District
Duane Bartels	Pomeroy Conservation District
Emmit Taylor	Nez Perce Tribe
Paul Kraynak	Nez Perce Tribe
Angela Sondenaar	Nez Perce Tribe
Del Groat	United States Forest Service
Carl Scheeler	Confederated Tribes of the Umatilla Indian Reservation
Mark Wachtel	Washington Department of Fish and Wildlife
Jason Flory	United States Department of Fish and Wildlife
Paul Beaudoin	Landowner (Pomeroy Conservation District)
Chad Atkins	Washington Department of Ecology
Jed Volkman	Confederated Tribes of the Umatilla Indian Reservation
Keith Berglund	Garfield County Wheat Growers
Pat Fowler	Washington Department of Fish and Wildlife
Steve Martin	Snake River Salmon Recovery Board
Victoria Leuba	Washington Department of Ecology
Gary James	Confederated Tribes of the Umatilla Indian Reservation
Les Marois	Nez Perce Tribe

Informal technical work groups were also used throughout the process. These groups were comprised primarily of Conservation District, Nez Perce Tribe, U.S. Forest Service (USFS), USFWS, Washington Department of Fish and Wildlife (WDFW), Washington Department of Ecology and consultant team staff. The primary purpose of the technical work group was to review and evaluate WDFW work products before presentation to the public in order to identify inconsistencies and address technical issues.

The Asotin Subbasin Plan will be a significant component of the WRIA 35 Watershed and Snake River Salmon Recovery planning efforts as they proceed. As such, these two groups were provided the opportunity to review plan components during development (see Figure 1-1).

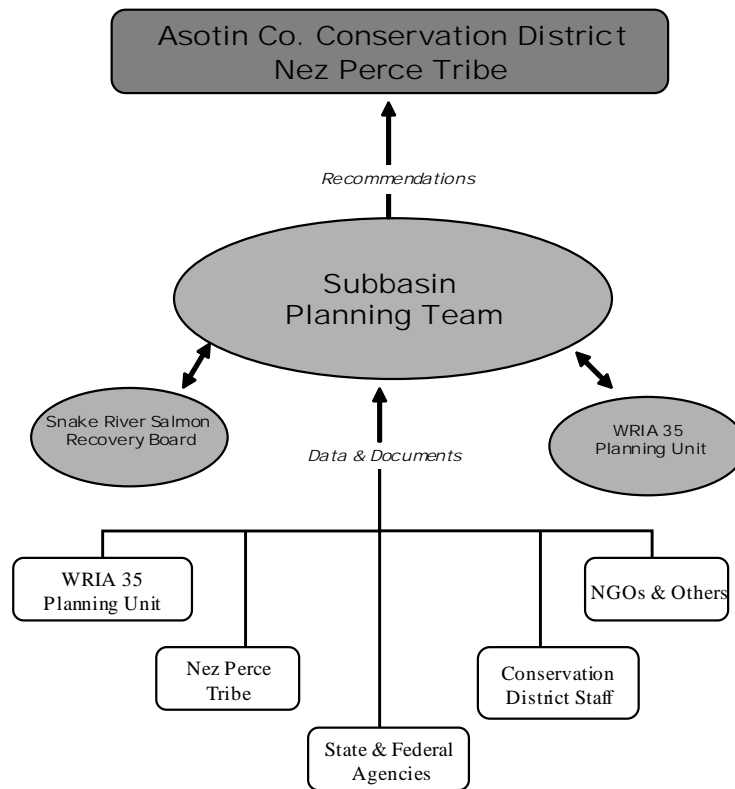


Figure 1-1 Asotin Subbasin Information Flow and Decision-Making Framework

1.3 Public Involvement

1.3.1 Public Involvement During Plan Development

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
- Subbasin Planning Assessment Public Meeting
- Management Plan Public Workshop #1
- Management Plan Public Workshop #2
- Information posted on the subbasin planning website (<http://www.nwppc.org/fw/subbasinplanning/admin/upload/list.asp?id=1>)
- Draft documents distributed to the WRIA 35 and Snake River Salmon Recovery Board mailing lists and interested parties, and discussed at their scheduled meetings.

The assessment and two 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 later incorporated into the plan. The public involvement plan for the Asotin, Lower Snake, Tucannon, and Walla Walla Subbasins can be found in Appendix A.

1.3.2 Outreach During Implementation

Over the long run, it is important to develop broad public understanding and commitment to fish and wildlife efforts in the Asotin Subbasin. This effort needs to involve individuals as well as agencies. Information and resources from state agencies, Nez Perce Tribe and subbasin scale efforts need to be provided to local groups, while local data from conservation districts and others need to be integrated into the subbasin scale effort. A sustained, long-term effort to provide information to communities and residents of the subbasin needs to be maintained. Implementation of this subbasin plan will rely upon the cooperation of private landowners. Public outreach regarding the purpose, objectives, and benefits of this plan can play a large role in supporting successful implementation. Further, public outreach and education can reap additional benefits as individuals voluntarily modify their actions for the benefit of aquatic and terrestrial species and their habitats. Public outreach and education activities should occur with the cooperation of a wide variety of local stakeholders, including the Asotin County Conservation District, Nez Perce Tribe, state agencies, and others.

1.4 Plan Approval

On May 13, 2004, the Asotin County Conservation District Board of Directors approved submittal of the Asotin Subbasin Plan, May 2004 Version, to the Northwest Power and Conservation Council.

1.5 Plan Updates

The Asotin 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

This section contains the following:

- Description of the subbasin
 - Subbasin location
 - Climate
 - Physical factors
 - Water resources and hydrology
 - Fish and wildlife species
 - Vegetation
 - Current and historic land use
 - Political jurisdictions and land ownership
- Regional context for the subbasin plan
 - Relationship to ESA planning units
 - Out-of-subbasin environmental conditions, and
 - Long-term environmental trends.

2.1 Subbasin Description

2.1.1 Location and Climate

The Asotin Creek Subbasin is composed of 325 square miles located in Asotin and Garfield Counties in the southeast corner of Washington (Northwest Power Planning Council 2001; Figure 2-1). Asotin Creek originates in the Blue Mountains and is a tributary to the Snake River, draining an area of 208,000 acres (Northwest Power Planning Council 2001). The following description of the drainage area and climate in the Subbasin were excerpted from the Draft Asotin Creek Subbasin Summary completed by the Northwest Power Planning Council (NPPC 2001).

“Asotin Creek has two major drainages, the mainstem and George Creek. The mainstem drains 119,000 acres and flows into the Snake River at the city of Asotin, Washington. Major tributaries to the mainstem include Charley Creek, North Fork of Asotin Creek, South Fork of Asotin Creek, and Lick Creek. George Creek drains 89,000 acres and its major tributaries include Pintler Creek, Nims Gulch, Ayers Gulch, Kelly Creek, Rockpile Creek, and Coombs Canyon.

“The region’s climate is influenced by the Cascade Mountains to the west, the Pacific Ocean, and the prevailing westerly winds. The subbasin receives a mean annual precipitation of 23 inches including a mean annual snowfall of 65 inches. Rainfall ranges from more than 45 inches in the higher elevations to 12 inches in the lower elevations. Ninety percent of the precipitation occurs between September and May with 30 percent of the winter’s precipitation falling as snow. Snowfall at elevations less than 1,500 feet seldom lingers

beyond three or four weeks, occasionally melting quickly enough to produce severe erosion (Kelley et al. 1982; Fuller 1986). Temperatures can range from -20°F in the winter to 105°F in the summer. The growing season in the subbasin is 115 to 155 days.”

The Tenmile and Couse Creek drainages are also located within the Asotin Subbasin, though they drain directly to the Snake River (see Figure 2-1).

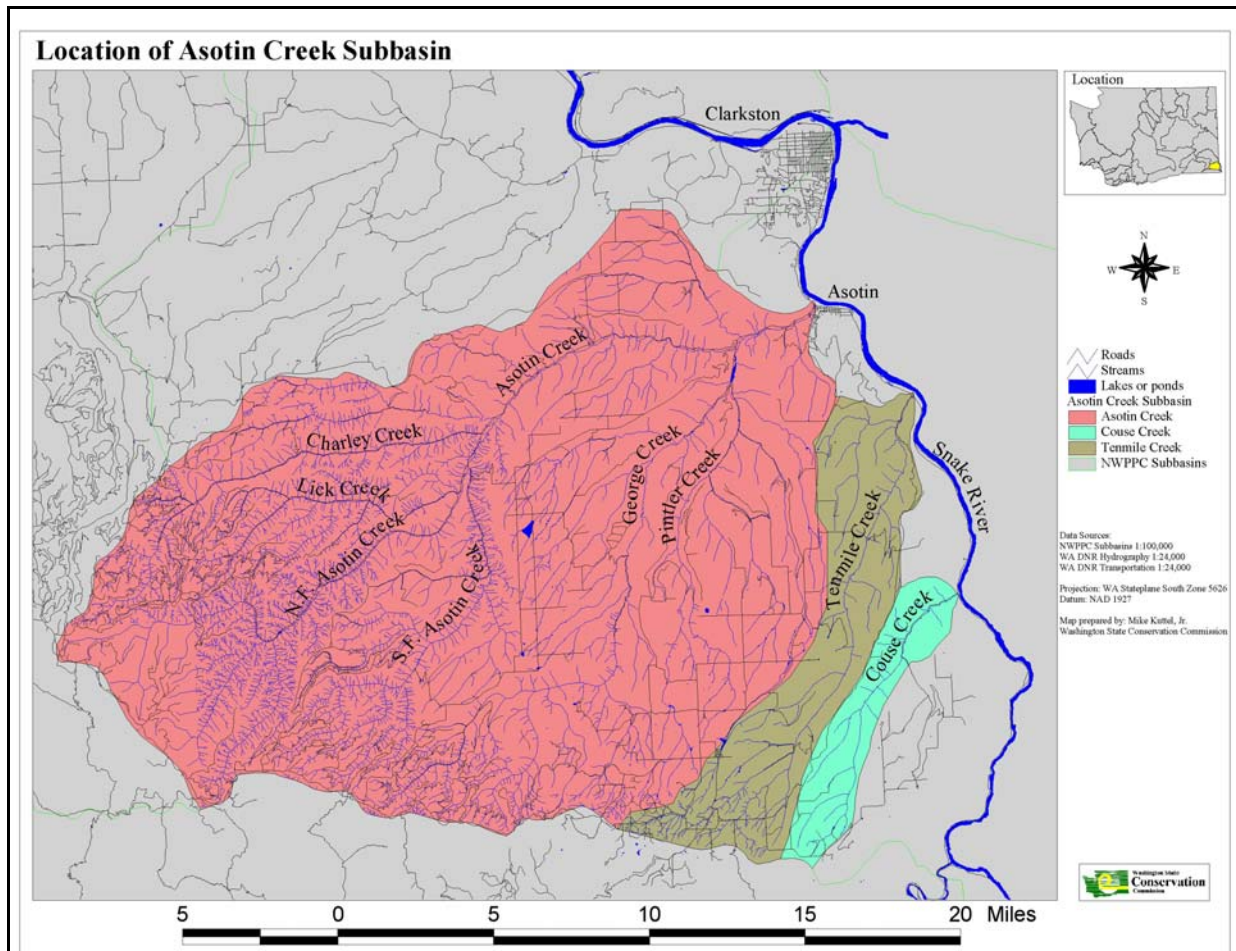


Figure 2-1 Location of Asotin Creek Subbasin (NPPC 2001, Figure 1)

2.1.2 Physical Environment

The following description of the topography and soil composition in the Subbasin was excerpted from the Draft Asotin Creek Subbasin Summary (NPPC 2001).

“Topography in the Asotin Creek subbasin consists of basaltic rocks, which include ancient fractured and folded lava flows. The bedrock is overlain by fine-grained loess soils that are highly erodible when exposed to the elements. Folding of the underlying bedrock has resulted in a plateau tilted slightly to the north and east. The increase in elevation from this

uplift caused streams to cut down and form very steep, and generally narrow, v-shaped canyons (Figure 2-2).

“Asotin Creek historically had a less severe gradient, a meandering flow pattern with point bars that formed pools and riffles, and well developed floodplain connections. The point bars provided habitat for an entire aquatic community of plants and animals. The stream channel had long, deep pools and a well-developed thalweg. Today, much of Asotin Creek and its tributaries have been straightened, diked, or relocated. The straight, wide and shallow channel continuously adjusts in order to compensate for alterations to channel shape and location, floodplain disconnections, and modifications to runoff patterns. Flood events in conjunction with these channel modifications have resulted in a braided channel lacking instream structure, pools, and woody riparian vegetation (NRCS 2001). The loss of well-developed thalwegs with naturally functioning point bars is responsible for much of the loss of fish habitat.”

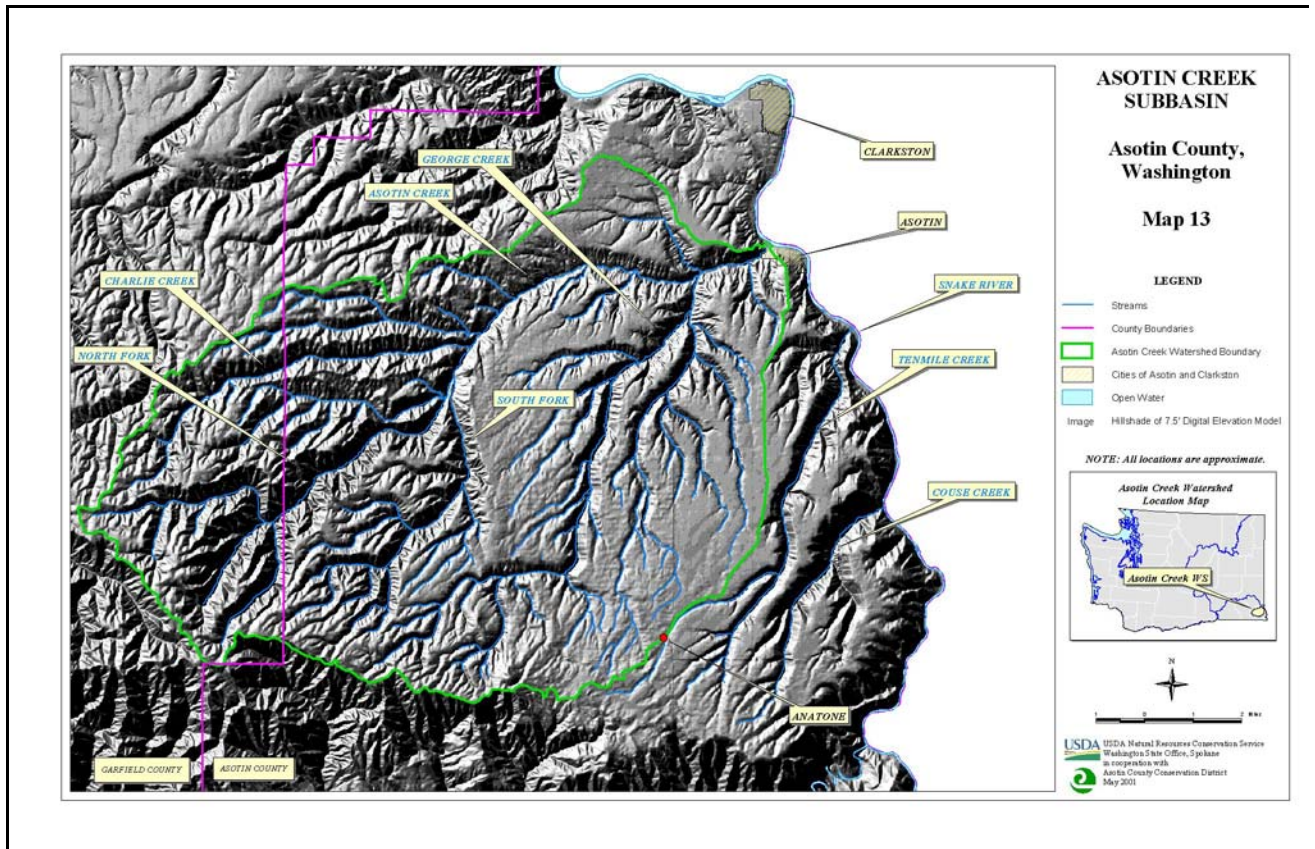


Figure 2-2 Topography of Asotin Creek Subbasin

NPPC 2001, Figure 2

2.1.3 Water Resources and Hydrology

The following description of hydrology in the Subbasin was excerpted from the Draft Asotin Creek Subbasin Summary (NPPC 2001).

“Historic and current land use practices have altered the hydrologic cycle of Asotin Creek. Farming, timber harvesting, and urbanization have changed the water cycle, reducing water infiltration and accelerating runoff. To a lesser extent, modifications of the riparian zone, including tree removal, road building, grazing, soil compaction, and flood control projects also altered Asotin Creek hydrology... Asotin Creek is now wider and shallower than it was historically. Changes in the hydrologic cycle are demonstrated by excessive runoff, altered peak flow regimes, lack of ground water recharge, reduction in soil moisture storage, and low late-season flow (Figure 2-3). Stream channel straightening, an increase in slope, and flow velocity have caused a loss of instream fish habitat, especially pools.”

**General Hydrograph:
Asotin Creek (Site 1 and Site 9)
and South Fork (Site 10)
November 1997 to October 1999**

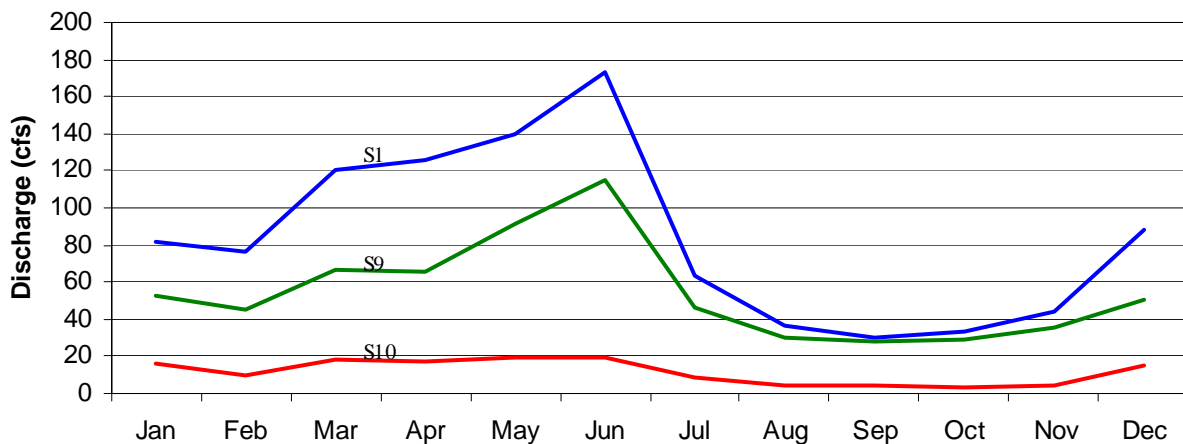


Figure 2-3 General Hydrograph: Asotin Creek/South Fork, November 1997- October 1999

ACCD 2000 as shown in NPPC 2001, Figure 5

Water quality assessments completed in the Subbasin have revealed several water quality problems in the creek and its tributaries. The Washington Department of Ecology classifies Asotin Creek and its tributaries that occur outside the Umatilla National Forest as Class A

(excellent); waters occurring within the National Forest are classified as Class AA (extraordinary). Asotin Creek, from the mouth at the Snake River to the confluence of the North and South Forks, has been shown not to meet these standards for temperature and fecal coliform, and is being considered for a Total Maximum Daily Load (NPPC 2001).

2.1.4 Fish and Wildlife Species

Fish

The Asotin Creek subbasin supports a diverse collection of anadromous and resident fish species, some of which are on the ESA list, and is an important Snake River tributary for salmonid production (NPPC 2001; Table 2-1).

Table 2-1 Fish species present in Asotin Creek Subbasin

Species	Distribution
Bull trout (<i>Salvelinus confluentus</i>)	UW
Steelhead trout (<i>Oncorhynchus mykiss</i>)	WS
Spring Chinook salmon (<i>Oncorhynchus tshawytscha</i>)	E
Mountain whitefish (<i>Prosopium williamsoni</i>)	UNK
Northern pikeminnow (<i>Ptychocheilus oregonensis</i>)	UNK
Longnose dace (<i>Rhinichthys cataractae</i>)	UNK
Speckled dace (<i>Rhinichthys osculus</i>)	LW
Redside shiner (<i>Richardsonius balteatus</i>)	UNK
Chiselmouth (<i>Acrocheilus alutaceus</i>)	NM
Peamouth (<i>Mylocheilus caurinus</i>)	NM
Largescale sucker (<i>Catostomas macrocheilus</i>)	UNK
Bridgelip sucker (<i>Catostomas columbianus</i>)	WS
Pacific lamprey (<i>Lampetra tridentata</i>)	UNK
River lamprey (<i>Lampetra ayresi</i>)	UNK
Paiute sculpin (<i>Cottus beldingi</i>)	WS
Smallmouth bass (<i>Micropterus dolomieu</i>)	UNK
Bluegill (<i>Lepomis macrochirus</i>)	NM
Crappie (<i>Pomoxis spp.</i>)	NM
Channel catfish (<i>Ictalurus punctatus</i>)	UNK
Carp (<i>Cyprinus carpio</i>)	LW

E = extirpated, UW = upper watershed, LW = lower watershed, WS = wide spread, NM = near mouth of major drainages, UNK = unknown
 Note: The Snake River ESU lists spring Chinook as threatened, however, there is debate as to whether or not remnant populations exist in the Asotin Subbasin.

Source: NPPC 2001, Table 3

The following discussion of fish species of concern occurring in the Subbasin was excerpted from the Draft Asotin Creek Subbasin Summary (NPPC 2001; See Chapter 3 for more detail).

“Historical records indicate that Asotin Creek once harbored a moderate run (>100 adults) of spring chinook salmon. However, recent surveys indicate few or no adult spring chinook annually spawn in Asotin Creek (ACCD 1995).

“Washington Department of Fish and Wildlife personnel have conducted tagging studies of naturally produced Asotin Creek chinook each year since 1985. These studies indicate an overall return rate (egg to returning spawner) of 0.01-0.52 percent for Asotin Creek chinook (Mendel et al. 1993). Although no similar studies have been done for Asotin chinook, they probably have a lower return rate than the Asotin fish because they have two more dams to negotiate.

“Summer steelhead runs have faired much better in the Asotin Creek watershed than those of the salmon. Historical records indicate that Asotin Creek once harbored strong runs (>800 adults) of summer steelhead. However, recent surveys indicate steelhead spawner escapement has declined to about 200 (ACCD 1995).

“No adult Pacific lamprey have been documented in Asotin Creek since at least 1980. However, Mendel (1994) and others have noticed small lamprey, which could have been either river lamprey, which, like the Pacific lamprey, are also anadromous and parasitic on other fish as adults, or western brook lamprey, which are blind and never leave the stream.

“A 1993 USFS survey documented the presence of bull trout in the middle branch of the North Fork of Asotin Creek, the lower 1.5 miles of the South Fork of the North Fork of Asotin Creek, and in Charley Creek. Spawning surveys indicate this population has very limited distribution... The Salmonid Stock Inventory (WDFW 1998) indicates bull trout presence in Charley Creek, the North Fork, and its tributaries. The WDFW considers bull trout a "category 1" species on the state list of threatened and endangered species and lists the Asotin Creek race as "high risk." In general, bull trout in this watershed are thought to be resident populations, but WDFW suspects it historically may have also had fluvial or adfluvial connections with the Snake River as observed in the Asotin Creek (Underwood et al. 1995).”

Wildlife

The Asotin Creek subbasin contains approximately 277 species of wildlife (NPPC 2001). Table 2-2 (NPPC 2001) identifies Priority Habitat Species (PHS) within the subbasin. Population status varies by area and species; some species are doing well, while others are listed as state threatened, candidate, or species of concern (NPPC 2001). The peregrine falcon is the only state endangered species in the subbasin, while the ferruginous hawk, sharptail grouse, and bald eagle are listed as state threatened species (NPPC 2001). Mule deer populations are near WDFW management objective, while elk and bighorn sheep populations are below management objective within the subbasin.

Table 2-2 Status of Terrestrial Priority Habitat Species (PHS) within the Asotin Creek Subbasin

Species	State Status	Population
Ferruginous hawk (<i>Buteo regalis</i>)	T	unknown
Peregrine falcon (<i>Falco peregrinus</i>)	E	1 nesting pair
Sharptail grouse (<i>Tympanuchus phasianellus</i>)	T	extirpated
Loggerhead shrike (<i>Lanius ludovicianus</i>)	C	unknown
Goshawk (<i>Accipiter gentilis</i>)	C	unknown

Species	State Status	Population
Bald eagle (<i>Haliaeetus leucocephalus</i>)	T	wintering
Golden eagle (<i>Aquila chrysaetos</i>)	SC	declining
Chukar (<i>Alectoris chukar</i>)	G	low
Wild turkey (<i>Meleagris gallopavo</i>)	G	stable
Sagebrush vole (<i>Lemmyscus curtatus</i>)	SM	unknown
Bighorn sheep (<i>Ovis canadensis</i>)	G -PHS	below MO
Mule deer (<i>Odocoileus hemionus</i>)	G-PHS	MO lowlands
Whitetail deer (<i>Odocoileus virginianus</i>)	G-PHS	MO
Elk (<i>Cervus elaphus</i>)	G-PHS	below MO

State Status: E = endangered, C = candidate, T = threatened, SC = species of concern, G = game species, PHS = Priority Habitat Species
SM = state monitor, MO = management objective.

Source: NPPC 2001, Table 6

2.1.5 Vegetation

The following description of vegetation in the Subbasin was excerpted from the Draft Asotin Creek Subbasin Summary (NPPC 2001). More detail on vegetation cover types and classification can be found in Chapter 4.

“Historical records of the condition of riparian vegetation within the subbasin are limited... Periodic flooding events have substantially altered the riparian vegetation. Aerial photographs dating from the 1950s and interviews with local residents (G. Caldwell, subbasin resident, personal communication, 1999) indicate that the predominance of alder (*Alnus* spp.) in the lower Asotin Creek watershed is a relatively recent occurrence.

“Forested riparian vegetation along Asotin Creek and other subbasin streams remains in transition, modified by recent flooding events. In 1993, about 64 percent of the riparian vegetation along Asotin Creek consisted of mixed successional stands of alder and black cottonwood (ACCD 1995)... Flooding in 1996-97 substantially reduced the riparian forest overstory on Asotin Creek. By 2000, only 16 percent of the Creek contained more than 70 percent canopy closure considered desirable for stream shading (NRCS 2001). Damage to riparian cover in the upper portion of the watershed was evident, where canopy cover was reduced approximately in half compared to pre-flood (1993) surveys.

“Understory shrubs typical of riparian forests include red-osier dogwood (*Cornus sericea*) and willows (*Salix* spp.), significant for their wildlife values (NRCS 2001). Herbaceous understory growth demonstrates disturbance in these communities. Cheatgrass (*Bromus tectorum*), Kentucky bluegrass (*Poa pratensis*), Reed canarygrass (*Phalaris arundinacea*), mullein (*Verbascum thapsus*), chicory (*Chicorium intybus*), and Scotch thistle (*Onopordum acanthium*) are among the most frequently encountered species...

“The clearest indication of rangeland trends in the watershed is a decline in range condition due to the spread of noxious weeds, primarily yellow starthistle (*Centaurea solstitialis*). The Asotin County Weed Board (Weed Board) [actually called Asotin County Noxious Weed Control Board] estimates an increase in weed-infested acreage, from 2,000 acres in 1986 to

over 15,000 acres in 1993 (ACCD 1995). About 9,000 acres occur primarily in the lower portion of the watershed, but isolated populations are also found along the South Fork and in George Creek above Wormell Gulch. Yellow starthistle thrives on south-facing, degraded sites formerly occupied by cheatgrass, but also invades native rangeland and CRP seedings. In other rangeland areas, diffuse knapweed (*Centaurea diffusa*), chervil (*Anthriscus sylvestris*), and Scotch thistle are spreading. Between 1954 and 1993, the USFS Asotin allotment experienced an improved trend for range vegetation (ACCD 1995).

“Fire suppression has eliminated the mosaic pattern of stand age classes and created a more continuous stand, enabling stand replacement fires to attain larger size. Wildlife, big game in particular, derives some benefit from these undisturbed stands... However, fire suppression has also resulted in stagnant, over-stocked stands that contain trees with low vigor and unnaturally high downed-woody fuel loadings... Current conditions are ripe for disturbances of the same types as historic regimes. However, because of the conditions created by past management activities and/or lack of management activities, it is likely that the disturbances would occur with a higher intensity and over a larger percentage watershed area.”

In 2004, the Asotin County Weed Board identified the following as noxious weed species of highest concern in the subbasin: rush skeletonweed, sulfur cinquefoil, orange hawkweed, Japanese knotweed, Dalmatian toadflax, perennial pepperweed, spotted knapweed, leafy spurge, whitetop, common bugloss, longspine sandbur, oxeye daisy, and pheasant's eye. These weeds currently have limited distribution in the subbasin, but the potential for ecosystem disturbance due to infestation by these weeds is high.

2.1.6 Current and Historic Land Use

The following description of major land uses was excerpted from the Draft Asotin Creek Subbasin Summary (NPPC 2001).

“Pasture and rangeland, cropland, and forestland are the predominant land uses within the Asotin Creek subbasin (Figure 2-4). Historic and current land uses have resulted in some portions of the subbasin undergoing stream channel instability (i.e., channel widening, down cutting, vertical cut banks, and excessive gully development).”

“Historically, livestock grazing in the Asotin Creek watershed began in the early 1800s. By the early 1900s, cattle, sheep, and wild horses grazed the watershed. The United States Forest Service (USFS) began regulating grazing on its lands and established the Asotin allotment in 1929 and the Peola-Pomeroy allotment in 1939.

“Pasture and rangelands occupy 43 percent (90,393 acres) of the Asotin Creek watershed. Livestock are wintered in the lower portions of the subbasin from December through March. After calving, most cattle graze lower canyon slopes until forest grazing is available in June or July. Fall/winter pastures include grain and canyonside pastures.

“Approximately 26 percent (54,956 acres) of the Asotin Creek watershed is comprised of cropland consisting of winter wheat and spring barley with summerfallow every two to three years...”

“Forestland covers an estimated 62,621 acres (30 percent) of the Asotin Creek watershed, primarily in the north central portion of the subbasin. The primary timber type is Douglas fir (*Pseudotsuga menziesii*). Other timber types include ponderosa pine (*Pinus ponderosa*), lodgepole pine (*Pinus contorta Douglasii*), grand fir (*A. grandis*), Engelmann spruce (*Picea engelmannii*), and western larch (*Larix occidentalis*).”

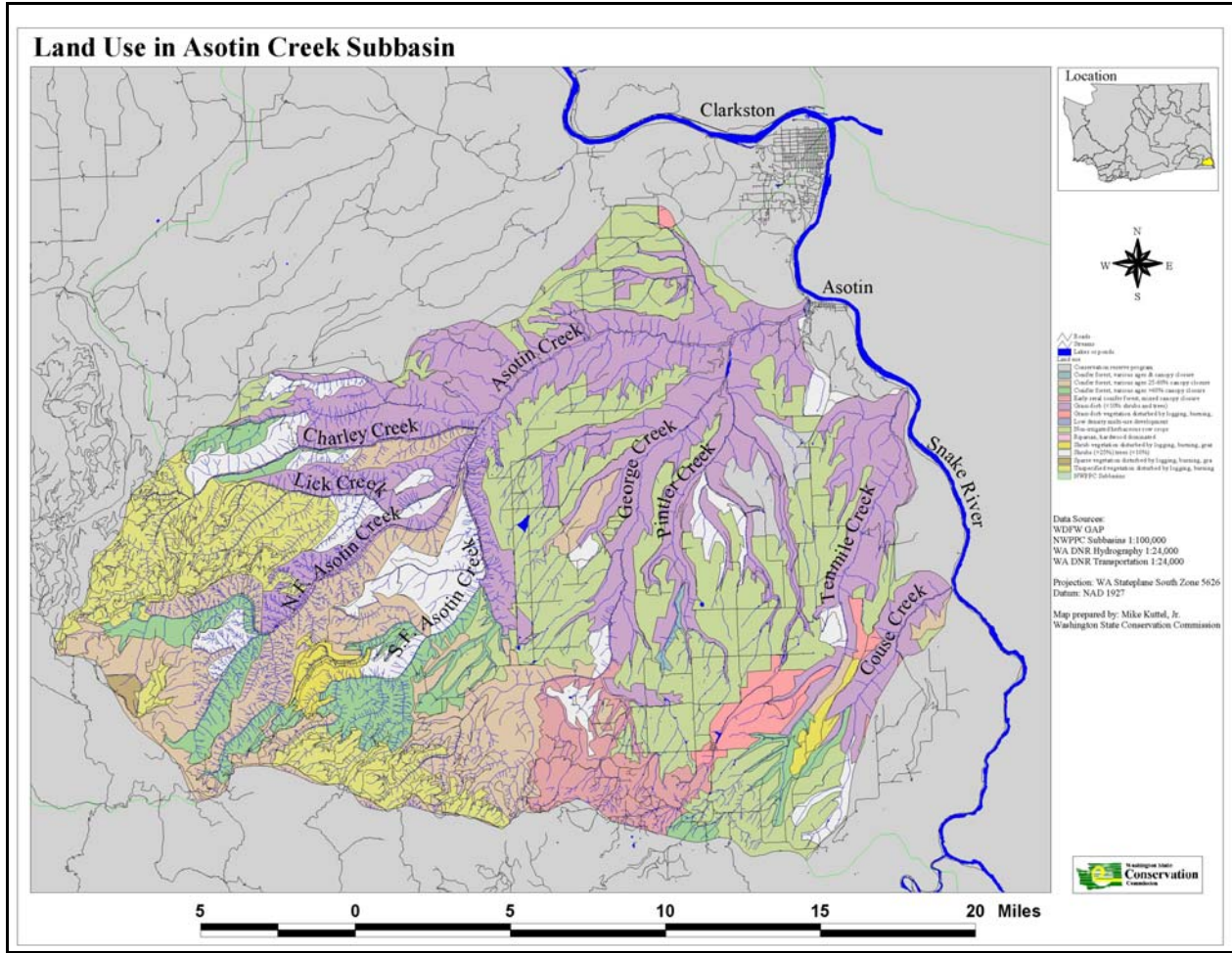


Figure 2-4 Land use in the Asotin Creek Subbasin

Source: NPPC 2001, Figure 3.

2.1.7 Political Jurisdictions and Land Ownership

The following discussion of land ownership and jurisdiction in the Subbasin was excerpted from the Draft Asotin Creek Subbasin Summary (NPPC 2001).

Primary jurisdictions in the Asotin Subbasin include Asotin County, Garfield County, City of Asotin, and the Nez Perce Tribe. With regard to subbasin planning, Cities and Counties work to uphold land use and other environmental regulations and to complete public works using the best management practices available. The Asotin County Conservation District also plays a key role in the Asotin Subbasin facilitating landowner participation in conservation programs and implementing habitat enhancement projects. The Nez Perce Tribe supports a wide variety of conservation and habitat enhancement projects within the subbasin.

“Approximately 33 percent of the lands in the Asotin Creek subbasin are in public ownership of which the Umatilla National Forest comprises 26 percent (Figure 2-5). There are 142 farm and ranch operators that own or lease agricultural lands in the subbasin. The size of agricultural holdings varies from 160 acres to 5,000 acres, with the average landowner owning or leasing 1,993 acres” (Cook and Jordan 1994).

“The majority of forestland is in the Umatilla National Forest and is managed by the USFS for multiple uses including timber management, livestock grazing, outdoor recreation, mining, and water management. The state of Washington and non-industrial private forestland owners manage the remaining forestland.”

The Asotin Subbasin is within the treaty territory of the Nez Perce Tribe and is protected as a usual and accustomed area via the treaty of 1855 that states:

“The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privileges of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land (12 Stats., 957-Article 3). Treaty of 1855.”

The tribe maintains a co-management authority with the State of Washington and the United States Government over the tribes’ treaty reserved resources. Currently, the Asotin Subbasin provides hunting, fishing and gathering opportunities for tribal members (refer to tribal harvest section).

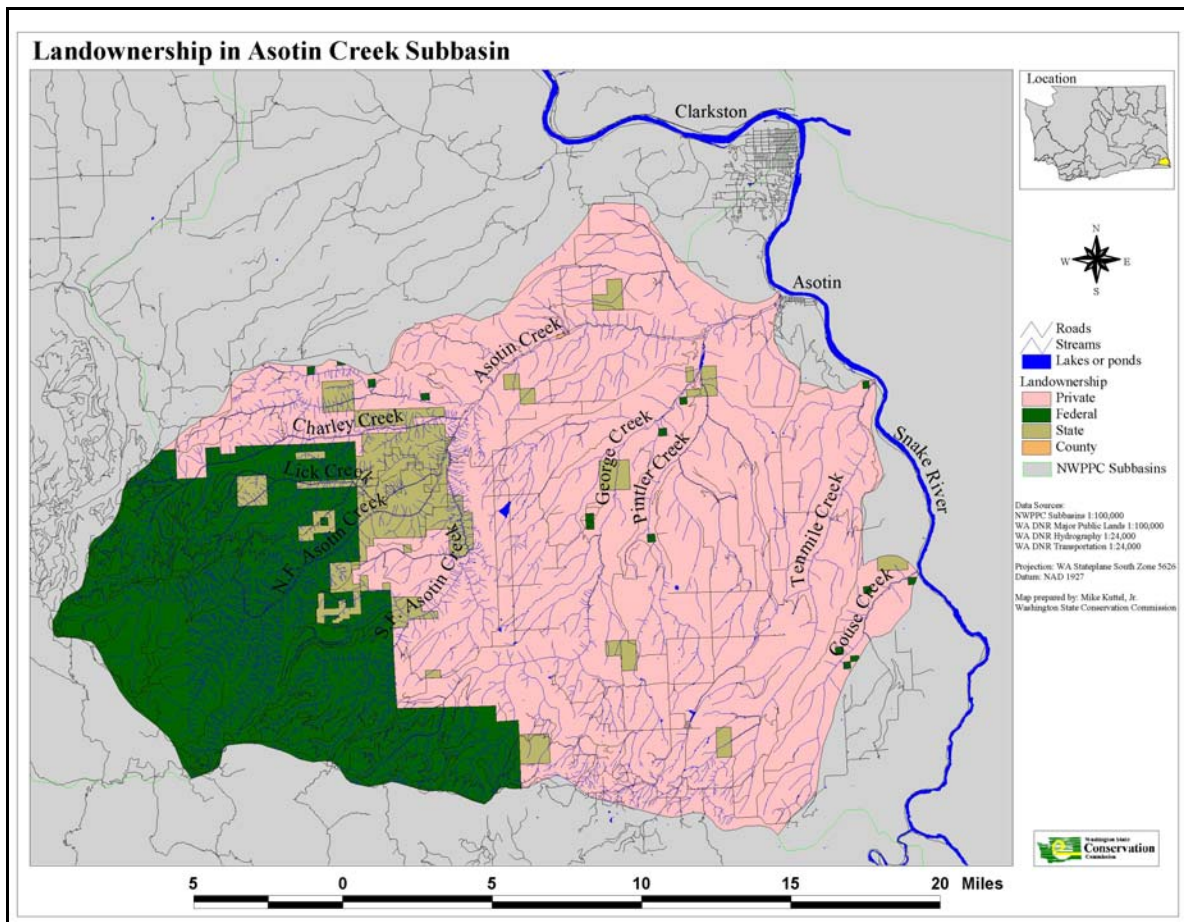


Figure 2-5 Land ownership in the Asotin Creek Subbasin
 NPPC 2001, Figure 4

2.2 Regional Context for Subbasin Plan

2.2.1 Relation to ESA Planning Units

The Asotin Subbasin is only one portion of the larger Evolutionarily Significant Units (ESUs) that are the geographic basis for ESA listings. Given that it is only one subbasin within an ESU, if populations within the Asotin Subbasin were enhanced to become healthy and productive, the species could remain threatened at the ESU scale. As such, although efforts accomplished within the Asotin 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 2-6 shows the relationship of the Asotin Subbasin to the Snake River Basin Steelhead ESU. Figure 2-7 shows the relationship of the Asotin Subbasin to the Snake River Basin Fall Chinook ESU. Figure 2-8 shows the relationship of the Asotin Subbasin to the Snake River

Basin Spring/Summer Chinook ESU. Figure 2-9 shows the relationship of Asotin Creek bull trout to the Snake River Recovery unit. Steelhead, spring Chinook, and bull trout were selected as focal species in this subbasin. Although important at the regional scale, fall Chinook were considered by co-managers to be less of a priority and as such were not selected as a focal species.

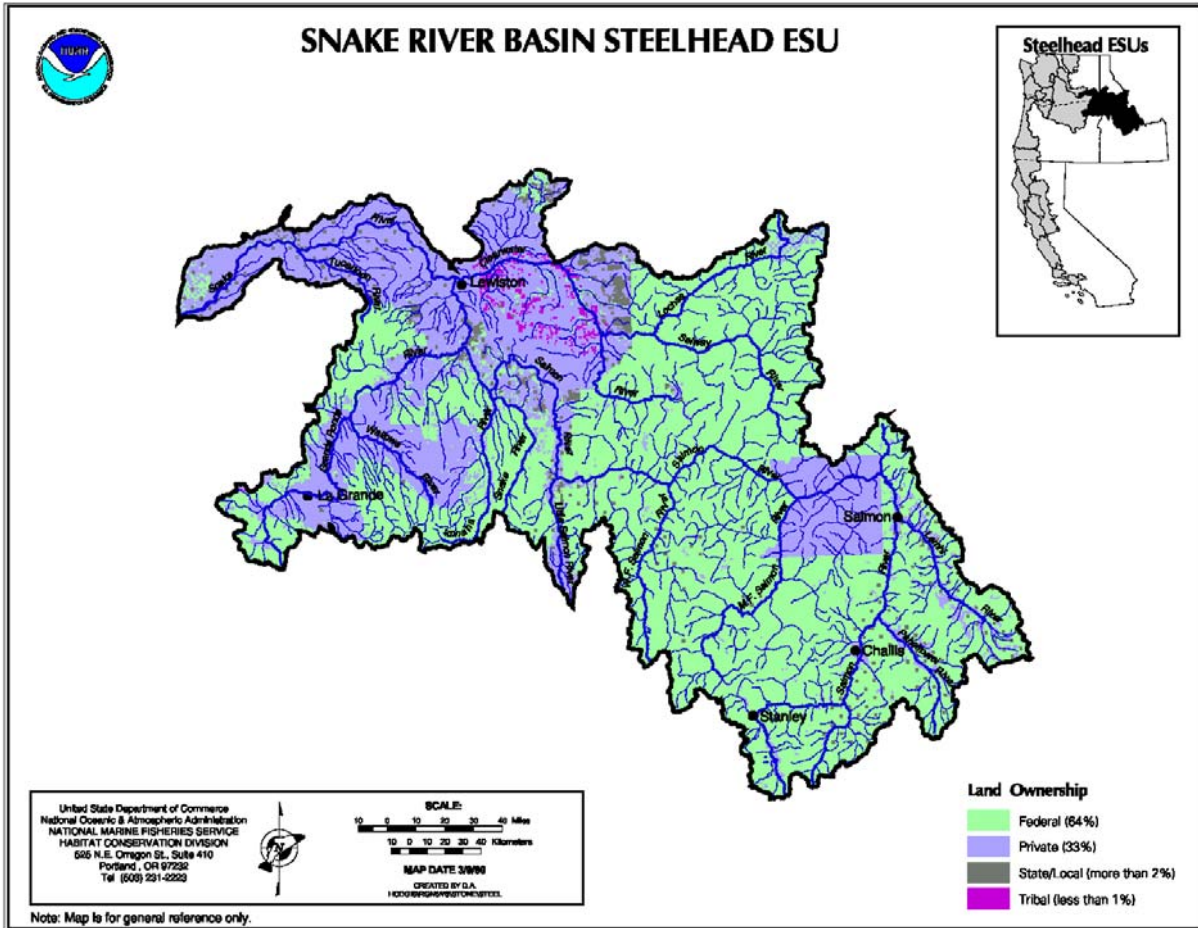


Figure 2-6 Relationship of Asotin Subbasin to the Snake River Basin Steelhead ESU
Source: NOAA-Fisheries 2004

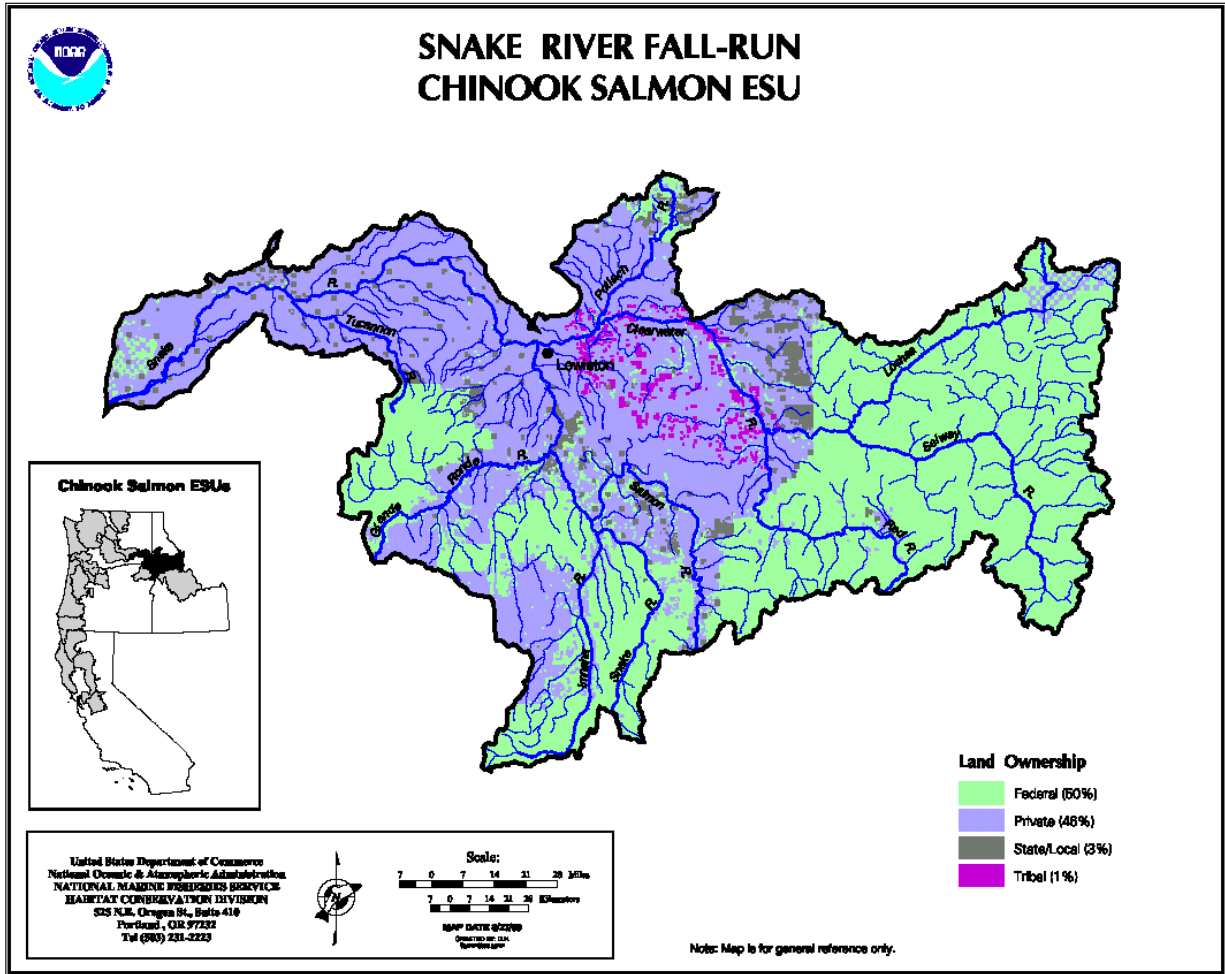


Figure 2-7 Relationship of Asotin Subbasin to the Snake River Basin Fall Chinook ESU

Source: NOAA-Fisheries 2004

Note: Fall Chinook were not selected as a focal species in the Asotin Subbasin (see Section 3.1)

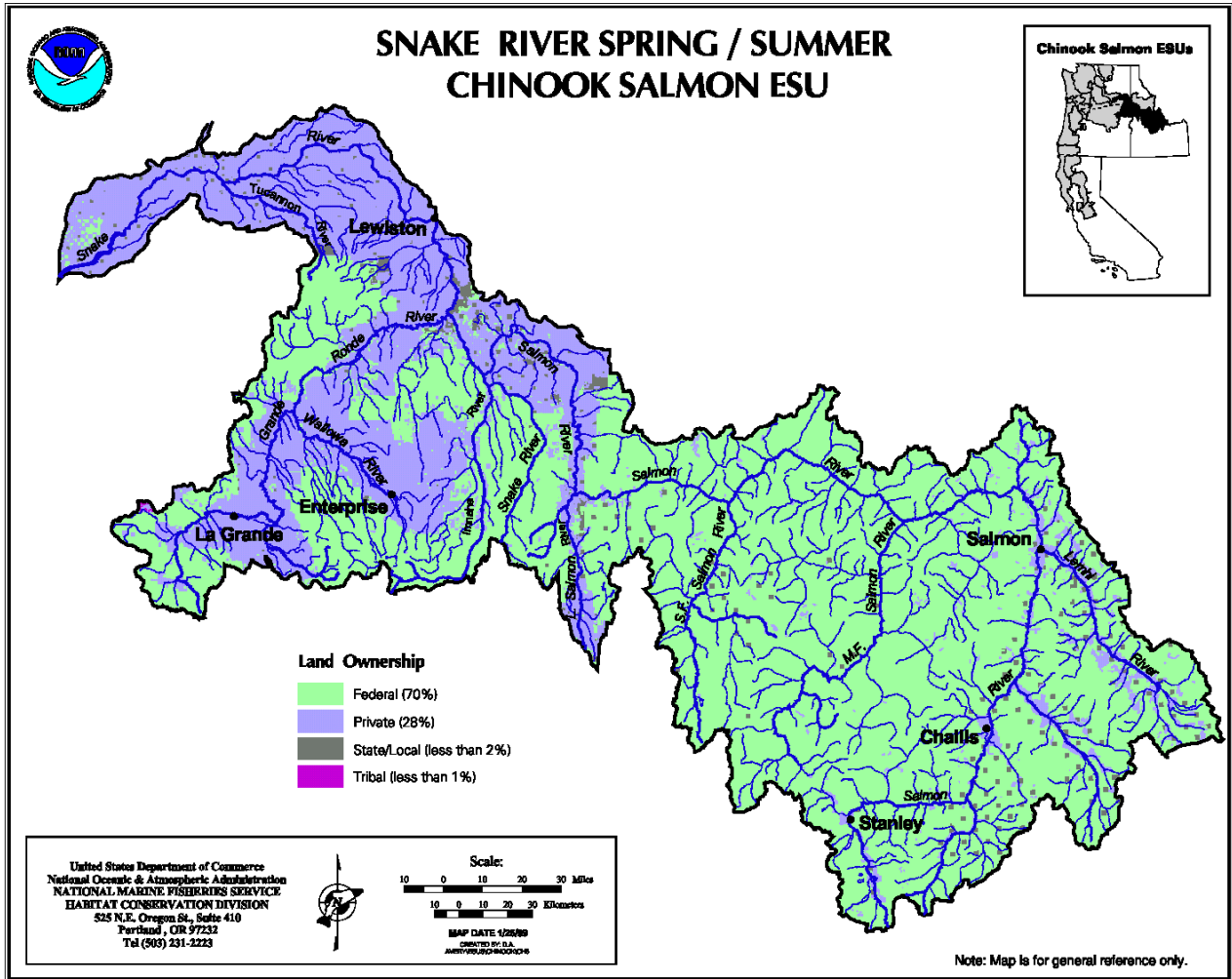


Figure 2-8 Relationship of Asotin Subbasin to the Snake River Basin Spring/Summer Chinook ESU

Source: NOAA-Fisheries 2004

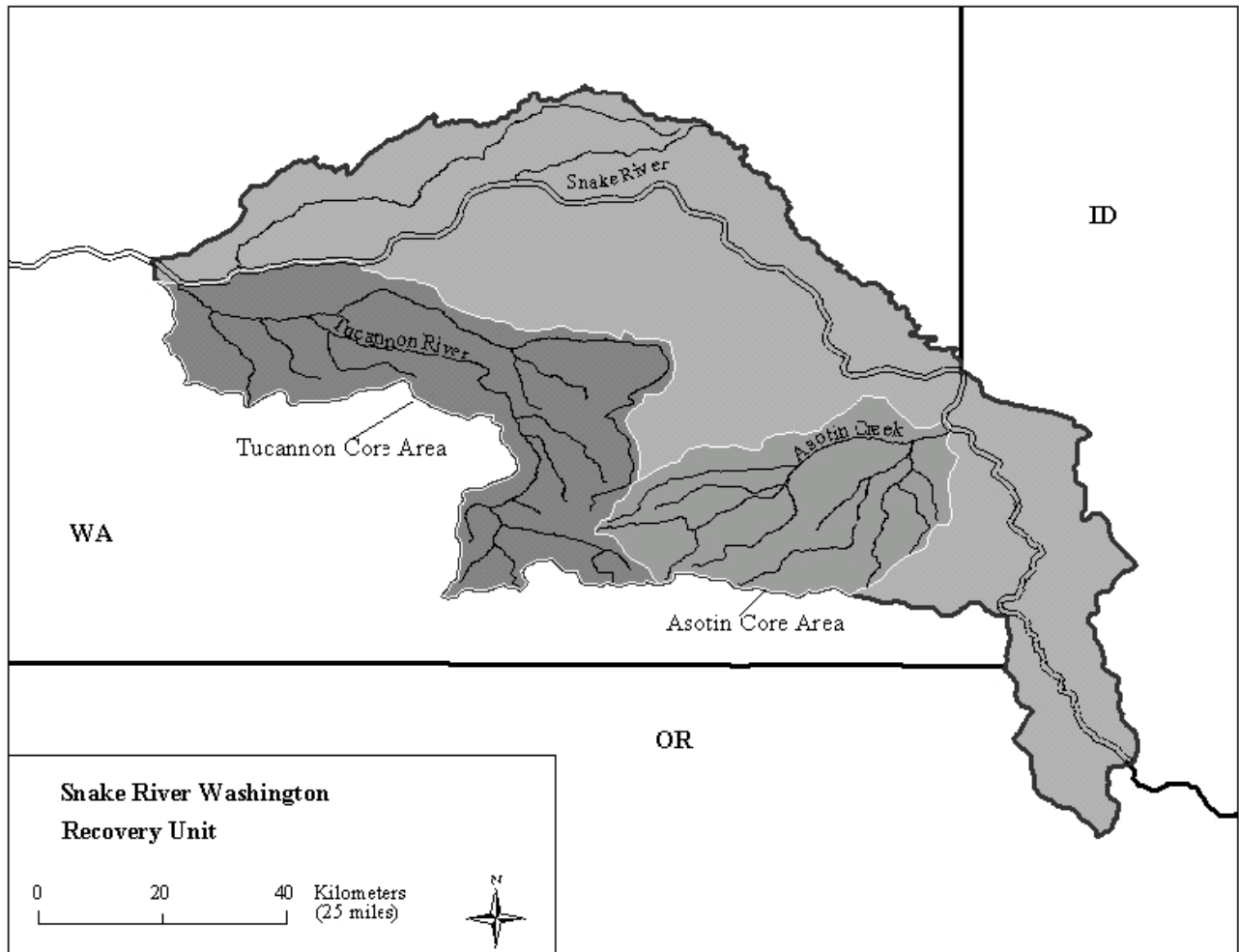


Figure 2-9 Relationship of Asotin Bull Trout Core Area to Snake River Recovery Unit
 Source: Figure2, Chapter 24, USFWS 2002.

2.2.2 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 Asotin Subbasin continues to improve, particularly through implementation efforts from the model watershed plan. 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. Aquatic Assessment

3.1 Introduction

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

This section contains:

- Description of how focal species were selected and also identifies species of interest
- 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
- Assessment findings for the focal species
- Brief description of Pacific Lamprey as a “species of interest.”

3.2 Selection of Focal Species

Three aquatic species were identified as focal species for Asotin Subbasin Planning: steelhead/rainbow trout *Oncorhynchus mykiss*, spring Chinook *Onchorynchus tshawytscha* and bull trout *Salvelinus confluentus* (see Figures 3-1, 3-2, and 3-3 respectively). The subbasin planning parties (WDFW, Nez Perce Tribe, private citizens, and other interested agencies and entities) selected these species based on the following considerations:

- Selection of species with life histories representative of the Asotin Subbasin ecosystem
- ESA status
- Cultural importance of the species
- Level of information available/knowledge on species life history to conduct an effective assessment.

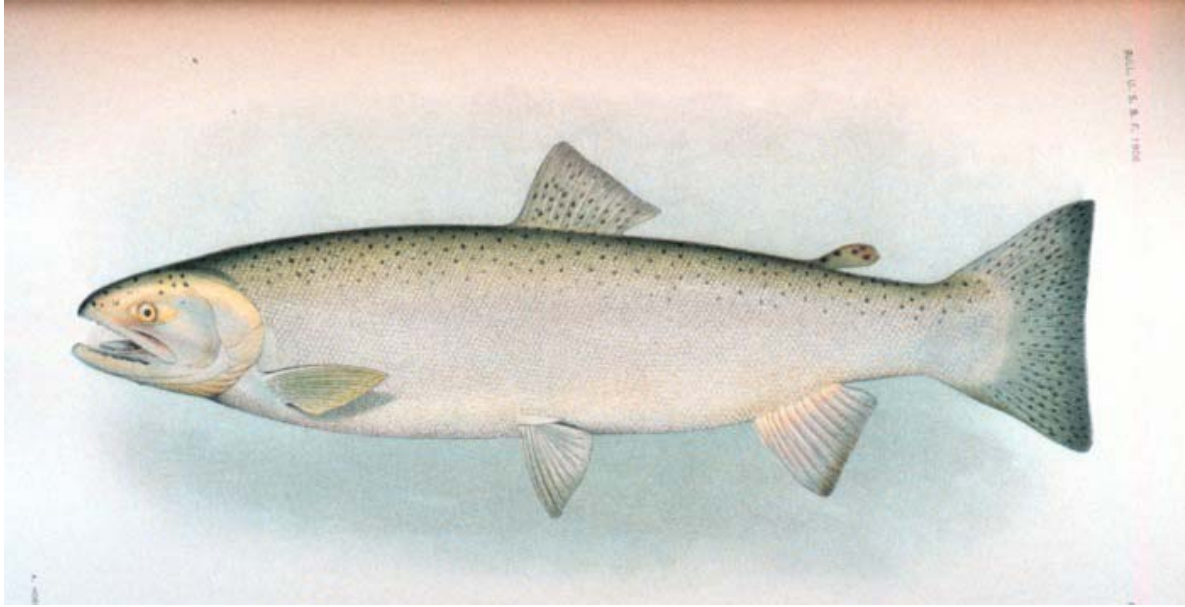


Figure 3-1 Steelhead Trout (*Oncorhynchus mykiss*)

Source: NOAA Photo Library (<http://www.photolib.noaa.gov/fish/fish3016.htm>).

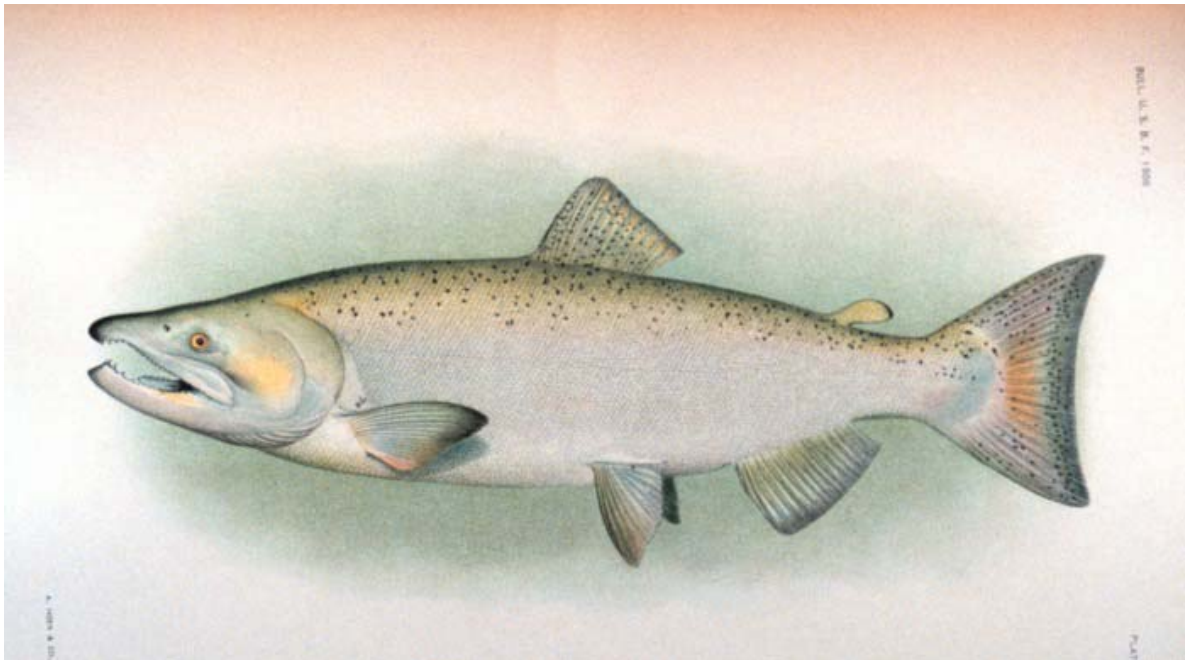


Figure 3-2 Chinook Salmon (*Oncorhynchus tshawytscha*)

Source: NOAA Photo Library (<http://www.photolib.noaa.gov/fish/fish3007.htm>).



Figure 3-3 Bull trout (*Salvelinus confluentus*)

Source: NOAA Photo Library (<http://www.photolib.noaa.gov/fish/fish3007.htm>).

Asotin 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 Asotin Subbasin.

The legal status of these species is important to the people of the Asotin Subbasin. All three species are listed as threatened under the ESA. 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. The intention of subbasin planning to address listed species within the subbasin supports the inclusion of the only three federally listed aquatic species within the subbasin as focal species.” (Appendix B).

Information and knowledge on known and present distribution of these species, population status and other characteristics varies, with the most information being available for steelhead and the least information available on bull trout.

Additional species identified as “species of interest” are discussed briefly at the end of this chapter.

3.2.1 Steelhead Life History¹

Asotin Creek

Asotin Creek summer steelhead are a typical Snake River “A”-run strain. A-run steelhead enter freshwater from June to August and generally pass Bonneville Dam before August 25. They begin passing Lower Granite Dam in early June and can continue through the following spring. Adult steelhead may enter Asotin Creek as early as September or October and continue through May. Peak entry is believed to occur in February through April (Glen Mendel, WDFW, personal communication). Spawning begins in late February or early March. Spawning peaks in early to mid-April and continues through mid-May.

There is little information on the adult age structure of Asotin Creek steelhead. Research completed on wild Asotin and Touchet River steelhead (Snake and Columbia River ‘A-run’ fish respectively) shows that 60 to 65 percent return to spawn after one year in saltwater, and 35 to 40 percent return to spawn after two years in saltwater (Bumgarner et al. 2003). Three-salt age fish are extremely rare. Until more empirical data on Asotin Creek steelhead are available, a similar age structure to the Touchet/Tucannon fish will be assumed. Fewer than 1 percent of Asotin Creek summer steelhead are believed to be repeat spawners (Glen Mendel, WDFW, personal communication).

Juveniles emerge from spawning gravels in late May or June. They typically rear for more than one year in Asotin Creek before migrating to the ocean. Migration occurs from October through June with a peak in April (Glen Mendel, WDFW, personal communication). Most juveniles migrate in their second year, but a small percentage migrate at age 1, 3 or 4 (Stovall 2001). A small group of 100 steelhead smolts sampled at Lower Granite Dam showed that most fish (62 percent) outmigrated in their second year, though 34 percent migrated in their third year, and 4 percent migrated in their first year (Hassemer 1992, cited in Busby et al. 1996). Smolt trapping conducted in the Asotin Creek between 1998 and 2001 (Bumgarner et al. 2003) showed that emigrating steelhead were about 40 percent age 1, 55 percent age 2, and 5 percent age 3 or 4. The actual makeup of steelhead smolts from Asotin Creek is unknown.

Tenmile and Couse Creeks

Tenmile and Couse Creek summer steelhead are a typical Snake River “A”-run strain. A-run steelhead enter freshwater from June to August and generally pass Bonneville Dam before August 25. They begin passing Lower Granite Dam in early June and can continue through the following spring. Adult steelhead may enter as early as March and continue through mid May. Peak entry is believed to occur in March or April (Glen Mendel, WDFW, personal communication). Spawning begins in late March or early April. Spawning peaks in early to mid-April and continues through mid to late May.

¹ Discussion in this section was taken from the WDFW Asotin Subbasin Aquatic Assessment, 2004.

Juveniles likely emerge from spawning gravels in May or June. Steelhead typically rear for more than one year in before migrating to the ocean. Juvenile migration possibly occurs from as early as late October, but because of limited water available in the fall, migration is more likely from March through May, with a peak in April (Glen Mendel, WDFW, personal communication). Most juveniles (estimated at 60 percent) migrate in their second year, but a percentage (~40 percent) probably migrate at age 1 because of high growth rates (high rearing temperatures) and limited carrying capacity (limited water). The actual makeup of steelhead smolts from Tenmile Creek is unknown.

Several assumptions needed to be made regarding steelhead life history for the purposes of this assessment. They are shown in Tables 3-1 and 3-2.

Table 3-1 Life History Assumptions Used to Model Summer Steelhead in Asotin Creek, Washington

Stock Name	Asotin Creek Summer Steelhead
Geographic Area (spawning reaches)	All Reaches
River Entry Timing (Lower Granite Dam)	August 13 - December 17; mean October 15
River Entry Timing (Asotin River)	January 29 – May 14; mean February 26
Adult Holding	Lower Granite Pool 68% Asotin River 32%
Spawn Timing	April 9 – May 28; mean April 30
Spawner Ages	63% 1-salt; 34% 2-salt; 3% 3-salt
Emergence Timing (dates)	May 28 – August 6; mean July 2
Smolt Ages	10% age 1; 85% age 2; 5% age 3
Juvenile Overwintering	Lower Granite and Little Goose Pools 21% Asotin River 79%
Stock Genetic Fitness	100%
Harvest (within Asotin Creek)	0%

Table 3-2 Life History Assumptions Used to Model Summer Steelhead in Tenmile Creek, Washington

Stock Name	Tenmile Creek Summer Steelhead
Geographic Area (spawning reaches)	Tenmile: All reaches
River Entry Timing (Columbia)	Bonneville Dam: mostly July-August, but as late as November
River Entry Timing (Tenmile)	Early January through mid-April; mean entry date in mid-February
Adult Holding	Adults begin holding in Lower Monumental Pool and between September and February
Spawn Timing	Begins week of March 1, ends 20th of May, with a peak in mid-April
Spawner Ages	60% 1-salt; 39% 2-salt; <1% 3-salt
Emergence Timing (dates)	Lasts 2 weeks beginning as early as mid-April and as late as early July, with an average period of May 25 to June 8
Smolt Ages	35% age 1; 60% age 2; 5% age 3; <0.5% age 4
Juvenile Overwintering	Snake River: 10% (late October to March) Tenmile Creek: 90% (late October to March)
Stock Genetic Fitness	90% wild
Harvest (in watershed)	No Harvest

3.2.2 Spring Chinook Life History²

Little is known about spring Chinook life history within Asotin Creek. Adult spawners probably enter Asotin Creek from late April through early June. They move upstream to areas with sufficiently cool summer water temperatures (mainly in the North Fork). Spawning begins in late August and continues through the end of September with a peak in early to mid-September. By early October, all spawners have died.

Age composition of spring Chinook spawners in Asotin Creek is unknown but is thought to be similar to that of Asotin spring Chinook. Most Asotin adults spawn at age 4 (72 percent) or age 5 (26 percent), but a small percentage may spawn at age 3 (2 percent).

Juveniles rear in Asotin Creek for at least one year prior to migrating to the ocean. They migrate from October through June, with peak migration from March through May.

Life history assumptions made to develop this assessment are summarized in Table 3-3.

Table 3-3 Life History Assumptions Used to Model Spring Chinook in Asotin Creek, Washington

Stock Name	Asotin Creek Spring Chinook
Geographic Area (spawning reaches)	Asotin: Mainstem Asotin, from mouth to forks; George Creek from mouth to Forest Service boundary line; Pintler Creek from mouth to Ayers Creek; Charley Creek from mouth to state ponds; NF Asotin Creek from mouth to SF of NF Asotin Creek; SF Asotin Creek from mouth to Redhill Gulch Creek.
River Entry Timing (Columbia)	Bonneville Dam: late March to late May
River Entry Timing (Asotin)	Late April to late June
Adult Holding	All inside Asotin Subbasin (between early May and mid-September)
Spawn Timing	Between August 27 and October 7
Spawner Ages	2% jacks; 72% age-4; 26% age-5
Emergence Timing (dates)	Late March to mid-May
Smolt Ages	100% age-1
Juvenile Overwintering	Snake River: 27% (late October to March) Tenmile Creek: 73% (late October to March)
Stock Genetic Fitness	90% of wild fitness
Harvest (in watershed)	No Harvest

3.2.3 Bull Trout Life History

Bull trout are known to exist in the Asotin Basin, but very limited information exists regarding bull trout in this subbasin; bull trout are not known to exist currently or historically in Tenmile Creek. Bull trout have been documented periodically over many years by WDFW personnel conducting electrofishing, snorkeling or creel surveys, or while trapping for steelhead, in upper

² Discussion in this section was taken from the WDFW Asotin Subbasin Aquatic Assessment, 2004.

mainstem Asotin, Charley Creek, the North and lower South Fork of Asotin creeks. In 1993, the USFS documented the presence of bull trout in the middle branch of the North Fork, the lower 1.5 miles of the South Fork of the North Fork and in Charley Creek (Stovall2001). One additional bull trout was recently noted from the 1993 survey in upper George Creek by the USFS.

Bull trout are known to spawn in upper North Fork of Asotin and Cougar creeks (a tributary of the upper North Fork). Spawning should occur from late August through October, similar to bull trout in the Asotin Creek (USFWS 2002). Juvenile rearing is generally in the spawning areas, but subadult and adult bull trout may wander or migrate to other areas of the drainage during winter, spring and summer.

Migratory bull trout apparently existed as recently as the 1980's because bull trout were captured in the upper mainstem and lower North Fork of Asotin Creek in the spring but usually were not present in those locations in the summer and fall. Sub-adult and adult bull trout may migrate to the main stem Asotin Creek, or possibly to the Snake River to overwinter (similar to bull trout in the Tucannon or the Grande Ronde rivers). Presently, it is unclear whether both migratory and resident bull trout life histories remain, or whether only the resident form still exists.

3.3 Status of Focal Species in the Subbasin

Focal species information on historic and current distribution, population, harvest and hatchery (as applicable), is provided in Appendix B, along with the available empirical data for steelhead and spring Chinook. Figure 3-4 identifies steelhead distribution and use type. As can be seen in Figure 3-5, detailed information regarding Chinook distribution and use type within the Asotin subbasin is not available.

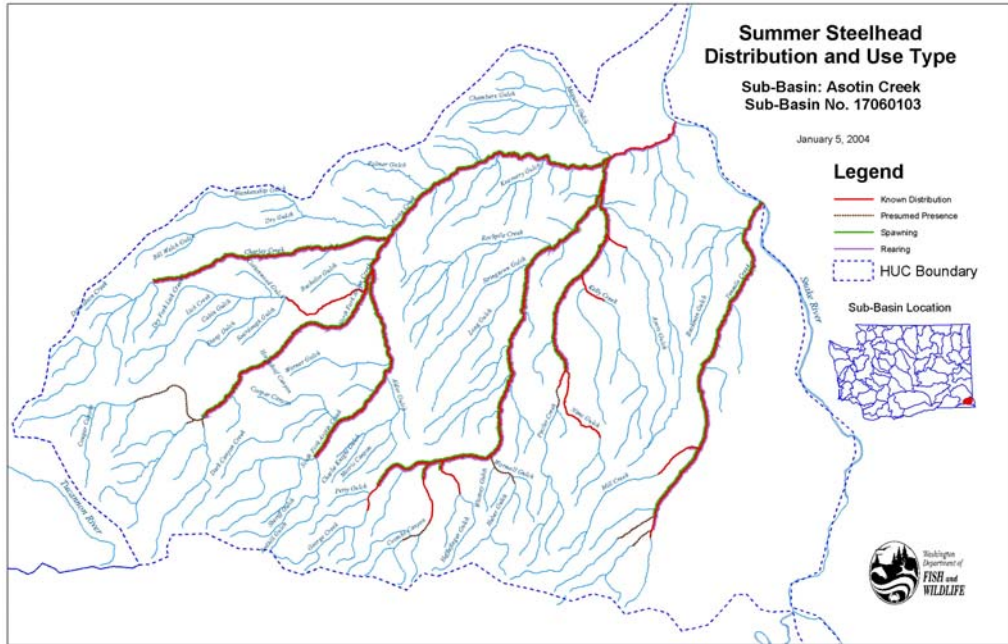


Figure 3-4 Current known and Presumed Distribution of Summer Steelhead in Asotin and Tenmile Creeks.

Source: Data from the WDFW Washington Lakes and Rivers Information System (WLRIS) database (figure taken from WDFW 2004).

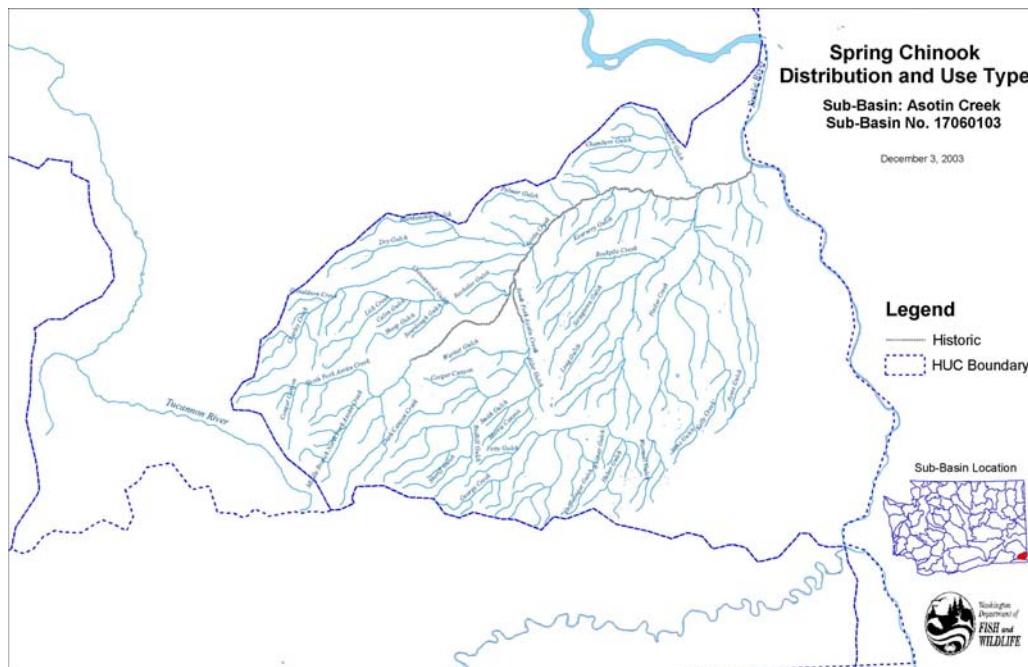


Figure 3-5 Current Known and Presumed Distribution of Spring Chinook in Asotin Creek

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

3.4 Asotin Subbasin Habitat Assessment Methods

3.4.1 Introduction

Steelhead and spring Chinook in the Asotin subbasin were assessed by the Washington Department of Fish and Wildlife 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 Asotin 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 Plan³. The USFWS Draft Bull Trout Recovery Plan (2002) identified temperature as the primary limiting factor in the Asotin subbasin (WDFW 2004). 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).

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 3-6). 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).

³ See the Recovery Plan and Chapter 7 of this document, the Asotin subbasin Management Plan, for additional information on bull trout.

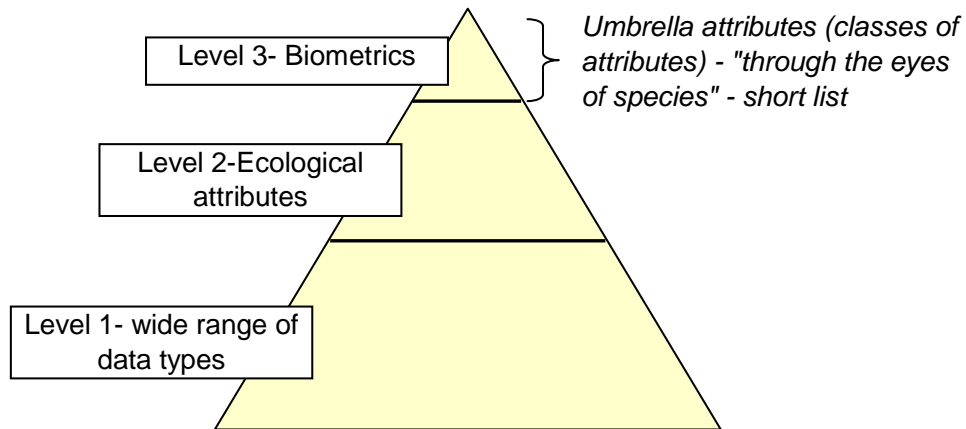


Figure 3-6 EDT Data/Information Pyramid

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) conditions⁴
2. current conditions
3. properly functioning conditions (PFC)⁵

The comparison of these scenarios formed the basis of the analysis, from which conclusions were drawn regarding the reduction in habitat quality in the Asotin 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

⁴ 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.

⁵ 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 B 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 Chinook⁶ (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 function⁷ data. Gradient measurements for individual reaches were also a concern. 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, public and private, during future planning efforts.

⁶ Information on bull trout life history was not available in a format usable in the EDT model.

⁷ The riparian corridor provides a variety of ecological functions that 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 woody debris, flow characteristics, temperature characteristics, benthos, pollutant conditions, and habitat types (e.g., pool-riffle units).

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 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.

3.5 EDT Analysis

3.5.1 Introduction

A technical work group was formed for the Asotin 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 were 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 4-4 of Appendix B. 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 4-5 of Appendix B includes template attributes.

Three baseline reference scenarios were developed for the Asotin 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 Asotin 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 Endangered Species Act (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 3-4 describes the Geographic Areas used for Asotin Creek Subbasin assessment 2003 (WDFW 2004).

Table 3-4 Geographic Areas used for Asotin Creek Subbasin

Geographic Area (Map Code)	Location	EDT Reaches included
Lower Asotin (LA)	Mouth to George Cr	Asotin1 and Asotin2
Lower George (LG)	Mouth to Wormell Cr	George1, 2 and 3
Pintler (PIN)	Mouth to Access Limit	Pintler1 and 2
Upper George (UG)	Wormell to Access Limit	George4 through George9
Upper George Tribs (UG-TRIB)	Wormell Cr, Hefflefinger Cr, Coombs Cr	Wormell, Hefflefinger, Coombs
Middle Asotin (MA)	George Cr to Headgate Dam	Asotin3A through Asotin4
Charley (CC)	Mouth to Access Limit	Charley1 through 4
Upper Asotin (UA)	Headgate Dam to Forks	Asotin5 and 6
Lick (LIC)	Mouth to Culvert	Lick
Lower NF Asotin (LA-NF)	Mouth to SF of NF Asotin	NF Asotin1 through 3
Upper NF Asotin (UA-NF)	SF of NF Asotin to Access Limit	NF Asotin4 and 5
NF Asotin Tribs (NF-TRIB)	Middle Branch, SF of the NF Asotin	Middle Branch, SF of the NF Asotin
Lower SF Asotin (LA-SF)	Mouth to Alder Cr	SF Asotin1
Upper SF Asotin (UA-SF)	Alder Cr to Access Limit	SF Asotin2 and 3

Source: WDFW 2004.

3.5.2 Scaled and Unscaled Results

Results from this analysis are provided in two forms, scaled and unscaled. Unscaled results present the potential habitat benefits that could be achieved through protection and/or restoration of an entire geographic area. However, each geographic area is different in size, and habitat projects would be unlikely to occur throughout an entire geographic area. To provide a better understanding of the potential habitat benefits to be achieved through implementation of projects in specific portions of the geographic areas, scaled results were calculated that take into account the length of each geographic area by taking the original output from EDT (i.e. percent productivity change, etc.) and dividing it by the length of the 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. 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 Asotin Creek – Steelhead and Chinook EDT Assessment

Asotin Creek 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”)⁸.
2. By identifying areas with the greatest potential for restoring a life stage that is critical to increasing production (i.e., high “Restoration Potential”)⁹.

Table 3-5 contains a ranked list of the priority geographic areas for restoration and a summary of potential performance increase for steelhead, spring Chinook, and fall Chinook by geographic area in the Asotin Subbasin. Table 3-6 contains a ranked list of the priority geographic areas for protection and a summary of potential performance increase for steelhead, spring Chinook, and fall Chinook by geographic area in the Asotin Subbasin. Potential performance increase was the sum of the model predicted increases in life history diversity, productivity, and abundance for the scaled (% benefit/ km) EDT output. Results are sorted by steelhead ranking and do not represent an integrated priority list for all species. Integration across focal species occurred during the integrated assessment analysis discussed below. Further detail regarding the restoration and protection potential performance increase for steelhead and spring Chinook can be found in Appendix B.

The “restoration potential” of a geographic area is the is the production benefit to a specific population if that area were to be restored to historical environmental conditions. Restoration potential is measured in terms of life history diversity, productivity, and average adult abundance, and is expressed as the percent increase in each of these variables relative to current values. In other words, restoration potential is a measure of the maximum fisheries benefit that could be achieved by restoring a particular geographic area. “Protection value” is essentially the inverse of restoration potential: a measure of the decrease in fish performance to be expected if a specific geographic area were to be degraded in a standardized way. Relative protection values over a number of geographic areas can be used to prioritize the areas in terms of their importance to preserving current production. Both restoration potential and protection value can be scaled to control for the impact of geographic areas that differ in size by dividing the absolute value by the length of the geographic area. Thus, scaled values represent, for instance, restoration potential per kilometer of stream.

⁸ 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.

⁹ 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.

Table 3-5 Ranked List of Geographic Areas Based Upon EDT Restoration Priority Potential

Geographic area	EDT Restoration Priority Scaled Rank		Potential Performance Increase (%/km)	
	Steelhead	Spring Chinook	Steelhead	Spring Chinook
Lower Asotin (mouth to George)	1	1	7.5%	31.3%
Upper Asotin (above Headgate Dam to forks)	2	2	5.7%	13.1%
NF Tributaries (Lick, SF of NF, Middle Branch)	3	N/A	4.6%	N/A
Upper George Tributaries (Wormell, Heffelfinger, Coombs)	4	N/A	3.8%	N/A
Lower SF (mouth to Alder)	5	4	3.5%	10.4%
Lower NF (mouth to SF of NF)	6	5	3.1%	9.3%
Charley (mouth to access limit)	7	9	2.9%	1.9%
Upper George (Wormell to access limit)	8	8	2.8%	3.1%
Pintler (mouth to access limit)	9	10	2.6%	1.2%
Upper NF (SF of NF to access limit)	10	N/A	2.6%	N/A
Middle Asotin (George to Headgate Dam incl.)	11	3	2.5%	10.7%
Lower George (mouth to Wormell)	12	6	2.3%	7.1%
Upper SF (Alder to access limit)	13	7	1.9%	3.6%
Snake	14	12	1.8%	8.0%
Columbia	15	11	0.4%	1.4%

Source: Table 4-22 Appendix B (WDFW 2004),

Table 3-6 Ranked List of Geographic Areas Based Upon EDT Protection Priority Potential

Geographic area	EDT Restoration Priority Scaled Rank		Potential Performance Increase (%/km)	
	Steelhead	Spring Chinook	Steelhead	Spring Chinook
Lower NF (mouth to SF of NF)	1	1	-9.4%	-13.5%
Upper Asotin (above Headgate Dam to forks)	2	2	-6.5%	-6.1%
Charley (mouth to access limit)	3	10	-4.7%	-0.7%
Upper NF (SF of NF to access limit)	4	N/A	-4.6%	N/A
Upper SF (Alder to access limit)	5	3	-2.9%	-5.2%
Middle Asotin (George to Headgate Dam incl.)	6	4	-2.0%	-4.5%
Lower Asotin (mouth to George)	7	6	-1.6%	-3.7%
Lower SF (mouth to Alder)	8	7	-1.5%	-3.4%
Snake River	9	5	-0.6%	-3.8%
Lower George (mouth to Wormell)	10	8	-0.2%	-0.9%
Upper George (Wormell to access limit)	11	9	-0.2%	-0.7%

Geographic area	EDT Restoration Priority Scaled Rank		Potential Performance Increase (%/km)	
	Steelhead	Spring Chinook	Steelhead	Spring Chinook
Columbia River	12	11	-0.2%	-0.2%
Pintler (mouth to access limit)	13	12	0.0%	0.0%
Upper George Tributaries (Wormell, Heffelfinger, Coombs)	14	N/A	0.0%	N/A
NF Tributaries (Lick, SF of NF, Middle Branch)	15	N/A	0.0%	N/A

Source: Table 4-23 Appendix B (WDFW 2004).

Steelhead Summary of limiting habitat attributes

Habitat diversity, sediment load, and key habitat quantity were the most common limiting factors for summer steelhead (WDFW 2004). For various life stages, the EDT analysis identified the following primary limiting factors (WDFW 2004):

- Fry and subyearling parr: habitat diversity (as influenced by gradient, confinement, hydromodifications [e.g., roads, dikes], degraded riparian function, and instream large wood)
- Juvenile rearing: lack of pool habitat
- Pre-spawning holding: lack of pool habitat
- Egg incubation and early life history stages: sediment load and channel stability

Spring Chinook Summary of limiting habitat attributes

Habitat diversity and key habitat quantity were the most common limiting factors for spring Chinook (WDFW 2004). The EDT analysis identified the following primary limiting factors (WDFW 2004):

- For fry and subyearling parr - habitat diversity (as influenced by gradient, confinement, hydromodifications [e.g., roads, dikes, dams], degraded riparian function, instream large wood, and icing)
- Quantity of key habitat (across various life stages in most geographic units).
 - Pools were reduced (29 percent) and riffles were increased (24 percent) as compared to reference conditions.
 - Pool tailouts (prime spawning areas) were reduced by up to 10 percent in some reaches.
 - Pools (prime pre-spawning holding and juvenile over-wintering habitat) were reduced up to 42 percent in some reaches.
- Warm summer water temperatures (for spawning, adult holding, and egg incubation).
- Sediment load (for egg incubation).
- Altered hydrologic regime (increased peak flows and in particular, reduced low flows during the critical summer months)

- Food availability (for fry colonization and juvenile rearing life stages).

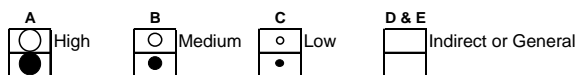
Restoration efforts should focus on reducing the limiting factors identified for summer steelhead and spring Chinook. Protection efforts should focus on protecting habitats (or stream reaches and geographic areas that contain these habitats) that provide one or more of these limiting attributes. Recommendations regarding locations of specific restoration and protection activities are outlined in Table 3-7 and Table 3-8. See the Management Plan and Appendix B for additional clarification regarding limiting habitat attributes and a detailed discussion of restoration and protection activities recommended in individual geographic areas.

Table 3-7 Geographic Areas and Attribute Classes (Level 3s) from EDT Analysis on Asotin Creek 2003

Geographic area priority		Attribute class priority for restoration																
Geographic area	Protection benefit	Restoration benefit	Channel stability/landscape ^{1/}	Chemicals	Competition (w/ hatch)	Competition (other sp)	Flow	Food	Habitat diversity	Harassment/peaching	Obstructions	Oxygen	Pathogens	Predation	Sediment load	Temperature	Withdrawals	Key habitat quantity
Lower Asotin (mouth to George)		○	●				●	●	●	●					●	●		●
Lower George (mouth to Wormell)			●				●	●	●	●					●	●		●
Pintler (mouth to access limit)		○	●				●	●	●	●					●	●		●
Upper George (Wormell to access limit)		○	●				●	●	●	●					●	●		●
Upper George Tribs (Wormell Heffelfinger Coombs)		○	●				●	●	●	●					●	●		●
Middle Asotin (George to Headgate Dam incl.)			●				●	●	●	●					●	●		●
Upper Asotin (above Headgate Dam to forks)	○	○	●				●	●	●	●					●	●		●
Charley (mouth to access limit)	○	○	●				●	●	●	●					●	●		●
Lower NF (mouth to SF of NF)	○	○	●				●	●	●	●					●	●		●
Upper NF (SF of NF to access limit)	○	○	●				●	●	●	●					●	●		●
NF Tribs (Lick, SF of NF, Middle Branch)	○	○	●				●	●	●	●					●	●		●
Lower SF (mouth to Alder)	○	○	●				●	●	●	●					●	●		●
Upper SF (Alder to access limit)	○	○	●				●	●	●	●					●	●		●
Snake	○	○																
Columbia																		●

Key to strategic priority (corresponding Benefit Category letter also shown)

^{1/} "Channel stability" applies to freshwater areas; "channel landscape" applies to estuarine areas.



3.5.4 Tenmile and Couse Creeks – Steelhead EDT Assessment

Tenmile Creek was evaluated using EDT. Since Tenmile includes only 12 reaches, two of which are point reaches to designate obstructions, it was not grouped into geographic areas for the purpose of identifying protection and restoration reaches. For Tenmile Creek the unscaled version of the EDT output was used to rank priority restoration and protection reaches. This was determined to be the most effective way of identifying important reaches for this area. As opposed to the Asotin assessment where it was important to identify those areas with the greatest restorative and protective value per kilometer, focus was on singling out the reaches in Tenmile that could have the greatest impact on the subbasin population. The best way to accomplish this

was to point out that reach(es) if restored or protected, would give the greatest contribution to the subbasin population.

In general the mainstem Tenmile reaches ranked higher for restoration than the Mill Creek Reaches. Within that area, the reaches from the end of the seasonally dewatered area to the mouth of the Middle Branch were considered highest in both restoration and protection value (Tenmile4 and 5)(Table 3-8). Potential performance increase was the sum of the model predicted increases in life history diversity, productivity, and abundance for the scaled (% benefit/ km) EDT output. Results are sorted by steelhead ranking and do not represent an integrated priority list for all species. In both reaches in this area, sediment load and channel stability were the most limiting factors on the most limited life stage, incubating eggs. Temperature impacts on incubating eggs and colonizing fry were also major factors affecting production but only in Tenmile4. Lack of key habitat and habitat diversity also were shown as problems according to EDT. Sediment load and habitat diversity (pools) are attributes that were also highlighted as problems by the Limiting Factors Analysis (Kuttle 2001). Tenmile in its entirety is flow limited. It is unknown and hard to estimate how much the change in land cover within this short, steep watershed has effected groundwater infusion during critical summer months. It is very possible that changes in land use practices throughout the basin could positively affect summer flows.

The relative contribution of Tenmile Creek to the overall population of steelhead in the Asotin Subbasin is small (see section 4.3.4). Thus, it was not considered with the geographic areas of Asotin Cr when identifying priority areas for restoration and protection. Though the relative contribution to the population is small, the importance that Tenmile steelhead has to the population in terms of diversity is unknown. This assessment clearly shows that Tenmile4, which is the top restoration and protection reach, is the most important for consideration of protection or restoration strategies.

Table 3-8 Priority Reaches for Restoration and Protection of Summer Steelhead in Tenmile Creek

	EDT Restoration Priority Unscaled		EDT Protection Priority Unscaled	
	Rank	Performance Increase	Rank	Performance Decrease
Tenmile4 (dewatered area to Mill Cr)	1	215%	1	124%
Tenmile5 (Mill Cr to mouth of Middle Branch)	2	117%	2	84%
Tenmile2 (Snake River road to Weissenfels Rd)	3	104%	6	8%
Tenmile6 (Middle Branch to Weissenfels Pond)	4	77%	3	33%
Tenmile3 (Weissenfels Rd to seasonal dewatered area)	5	68%	7	4%
Middle Branch (Mouth to end steelhead distribution)	6	47%	4	25%
Tenmile1 (Mouth to Snake River Rd)	7	33%	9	0
MillCreek3 (Mill Cr Rd culvert to irrigation diversion)	8	31%	8	1%
Millcreek1 (Mouth to Mill Cr Road culvert)	9	28%	5	14%
Tenmile8 (Weissenfels Pond to end steelhead distribution)	10	0%	9	0

Impacted Life Stages and Limiting Habitat Attributes

Within the Tenmile4 reach, the following life stages are the most impacted and the following habitat attributes are the most limiting to those life stages according to the EDT analysis:

- Tenmile 4 (dewatered area to Mill Cr)
 - i. Incubation (SH)
 - ii. Fry (SH)
 - iii. Overwintering (SH)
 - iv. Subyearling rearing (SH)
- Tenmile 4 (dewatered area to Mill Cr)
 - i. LWD
 - ii. Riparian Function
 - iii. Sediment (Turbidity, Fines and Embeddedness)
 - iv. Key Habitat (pools)
 - v. Flow

The results of EDT above are consistent with past assessments and the technical knowledge of the Tenmile basin.

The lack of resources available within the timetable provided did not allow for an EDT assessment of Couse Creek. Couse Creek has a known spawning steelhead population and thus has some importance to the subbasin population as a whole. The results from EDT on Tenmile can generally be applied to Couse Creek. It is thought that sediment and lack of habitat diversity are limiting to steelhead production (Kuttle 2001).

3.5.5 Asotin Subbasin – 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.

For comparison within the EDT analysis, Mobrand Biometrics brought each of the EDT 46 habitat attributes in each reach up to a level that was no longer harmful to fish, but is not necessarily beneficial. This represents properly functioning conditions (PFC). PFC can be thought of as habitat conditions able to support populations sufficient for a self-sustaining population, but not necessarily populations that would be considered abundant. A comparison of the model results under current conditions, PFC conditions, and historic conditions can be found in Tables 3-9 and 3-10. Note that PFC as defined in this plan is based upon the definition provided by Mobrand Biometrics, and a wide variety of opinions exist regarding the proper definition of PFC.

Asotin and Tenmile Summer Steelhead

“The EDT model estimated the average spawning population size of the current Asotin Creek summer steelhead to be 206 fish, with a carrying capacity of 423 fish and a productivity of just 2 adult returns per spawner. The life history diversity value indicates only 18 percent of the historic life history pathways can be successfully used under current conditions. The analysis also suggests that the Asotin Subbasin has a much greater production potential for summer steelhead than it now displays, as historical abundance is estimated at 8,677 spawners, with a productivity of 21.6 returning adults per spawner and a life history diversity of 100 percent.”

“The EDT model appears to underestimate the current population size and carrying capacity in Asotin Creek compared with the empirical data (206 adults, 423 capacity from EDT vs. 651 current adults from empirical data). However, EDT likely overestimates the historical abundance (8,677) and productivity (21.6 returning adults per spawner). In 2001, WDFW used a potential parr production estimator on data collected between 1981-2000 to assess steelhead production potential. That model estimated 1,662 as current potential carrying capacity with a parent to progeny ratio of 1.07.”

EDT results for Asotin and Tenmile Creeks are presented in Table 3-9.

Table 3-9 EDT Summer Steelhead Spawner Population Performance Estimates.

Scenario	Diversity Index	Productivity	Capacity	Adult Abundance
Asotin				
Patient (Current)	18 %	2.0	423	206
PFC	57 %	2.3	636	356
Template (Reference/Historic)	100 %	21.6	9,099	8,677
Tenmile				
Patient (Current)	2% (49)	(2.5)	(291)	(175)
PFC	44% (72)	(5.7)	(449)	(370)
Template (Reference/Historic)	100%	18.1 (25.1)	1,740 (1744)	1,644 (1676)

EDT results also indicate that current abundance, productivity, and life history pathways are substantially less than in the past. This finding is consistent with the results of other analyses and is in-line with planning efforts in the basin (WDFW 2004).

Asotin Creek Spring Chinook

For the Asotin subbasin spring Chinook analysis, EDT estimates appear to be rather high for capacity and abundance when compared to available data. In particular, the EDT model estimates current Asotin Creek spring Chinook abundance at 158 fish, which is much higher than empirical data from WDFW’s monitoring efforts over the past 20 years (average of two adults per year) (WDFW 2004). EDT capacity estimates also seem high when compared to historical population data.

“The EDT model estimated the average spawning population size of the current spring Chinook to be 158 fish, with a carrying capacity of 558 fish and a productivity of 1.4 adult returns per spawner (Table 3-10). The life history diversity value indicates only 29 percent of the historic life history pathways can be successfully used under current conditions. The analysis also suggests that the Asotin Subbasin has a much greater production potential for spring Chinook than it now displays, as historical abundance is estimated at 4,348 spawners, with a productivity of 14.9 returning adults per spawner and a life history diversity of 100 percent. Under PFCs, the EDT model predicted an abundance of 1,018 spawners with a capacity of 1,439 spawners, a productivity of 3.4 returning adults per spawner, and a life history diversity of 86 percent.”

Table 3-10 EDT Spring Chinook Spawner Population Performance Estimates.

Scenario	Diversity Index	Productivity	Capacity	Adult Abundance
Patient (Current)	29 %	1.4	558	158
PFC	86 %	3.4	1,439	1,018
Template (Reference/Historic)	100 %	14.9	4,662	4,348

3.5.6 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 Asotin Creek has been set at 400 adults. An interim spawner abundance target has not been set for Asotin Creek spring Chinook (Lohn 2002 as cited in WDFW 2004). The Asotin Creek Chinook population may be included with the Lower Mainstem Tributary spawning aggregation, which has an interim goal of 1,000 spawners (WDFW 2004).

A WDFW (2004) discussion of the four VSP parameters as they relate to the Asotin Creek EDT results for summer steelhead and spring Chinook is provided in Appendix B, Section 4.3.4.2 (steelhead) and 4.4.4.2 (spring chinook).

3.5.7 Out-of-Subbasin Effects

Out of Subbasin Effects – General

Given that this subbasin plan focuses heavily upon anadromous species, out-of-subbasin environmental conditions can play a large role in determining the actual populations of such species. Out-of-subbasin effects were described effectively by TOAST (2004):

“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.”

Out of Subbasin Effects – Asotin Subbasin Empirical Data

Information in this section was provided by Becky Ashe, Nez Perce Tribe.

Anadromous fish focal species in the Asotin subbasin are limited primarily by out-of-subbasin factors involving hydropower development, ocean productivity, predation and harvest. Hydropower development and operation increases mortality in Snake River stocks of spring/summer and fall chinook. Fluctuations of ocean productivity in combination with the hydrosystem have caused severe declines in productivity and survival rates. Predation, especially within reservoirs, is also a potential limiting factor to salmonid smolts. Out of subbasin harvest is also a potential limiting factor for naturally produced chinook and steelhead stocks within the subbasin.

It is generally accepted that hydropower development on the lower Snake River and Columbia River is the primary cause of decline and continued suppression of Snake River salmon and steelhead (CBFWA 1991; NPPC 1992; NMFS 1995, 1997; NRC 1995; IDFG 1998; Williams et al. 1998). However, less agreement exists about whether the hydropower system is the primary factor limiting recovery (Mamorek et al. 1998).

Adult escapement of anadromous species to the Snake River basin remains relatively low despite significant hatchery production/reintroduction efforts. Smolt-to-adult return rates (SAR), from smolts at the uppermost dam to adults returning to the Columbia River mouth, averaged 5.2 percent in the 1960s before hydrosystem completion and only 1.2 percent from 1977 to 1994 (Petrosky et al. 2001) (Figure 3-7). This is below the 2 to 6 percent needed for recovery (Mamorek et al. 1998).

In contrast to the decline in SAR, numbers of smolts per spawner from Snake River tributaries did not decrease during this period, averaging 62 smolts per spawner before hydrosystem completion and 100 smolts per spawner afterward (Petrosky et al. 2001) (Figure 3-7). In this summary both spawner escapement and smolt yield are measured at the uppermost mainstem dam (currently Lower Granite). The increase in smolts per spawner was due to a reduction in density dependent mortality as spawner abundance declined. Accounting for density dependence, a modest decrease occurred in smolts per spawner from Snake River tributaries over this period, but not of a magnitude to explain the severe decline in life-cycle survival (Petrosky et al. 2001).

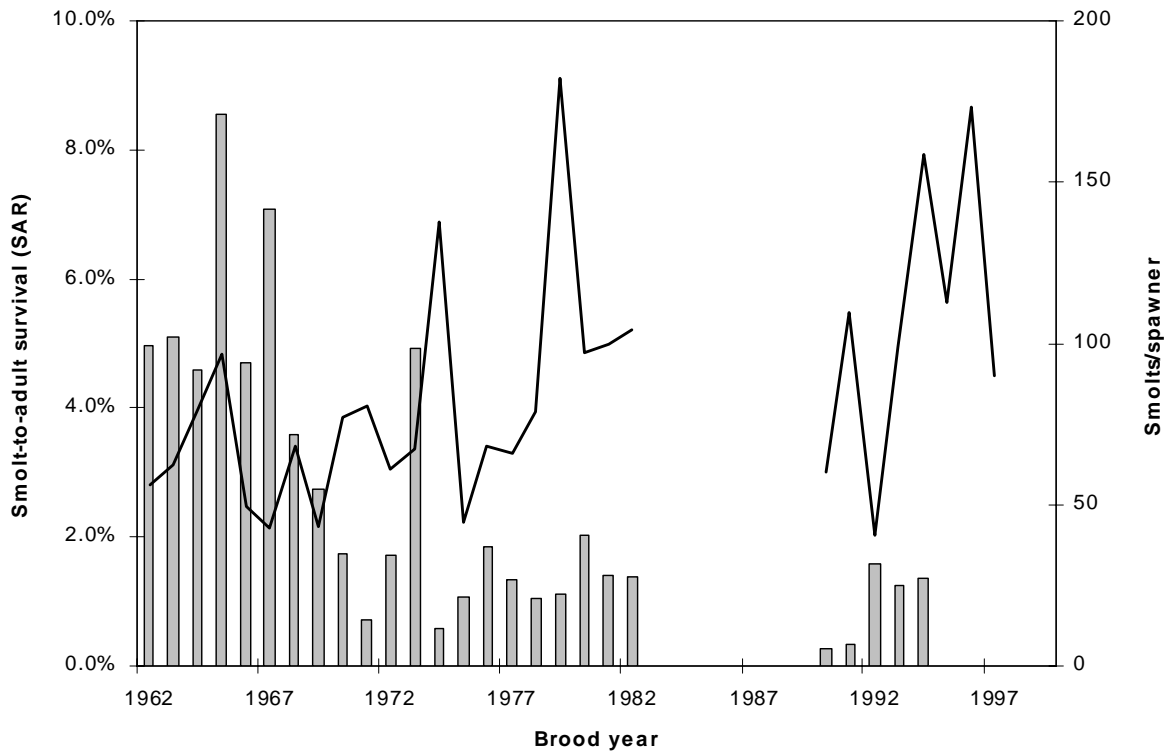


Figure 3-7 Smolt to Adult Survival Rates and Smolts/Spawners for Wild Snake River Spring and Summer Chinook

Key: Smolt to Adult Survival Rates = Bars; SAR; and Smolts/Spawner = solid line.

The SAR describes survival during mainstem downstream migration to adult returns whereas the number of smolts per spawner describes freshwater productivity in upstream freshwater spawning and rearing areas.

Source: Petrosky et al. 2001.

The dams cause direct, indirect, or delayed mortality, mainly to emigrating juveniles (IDFG 1998, Nemeth and Kiefer 1999). As a result of this increased mortality, Snake River spring and summer chinook declined at a greater rate than downriver stocks, coincident with completion of the federal hydropower system (Schaller et al. 1999). Schaller et al. (1999) concluded that factors other than hydropower development have not played a significant role in the differential decline in performance between upriver and downriver stocks. The Snake River stocks above eight dams survived one-third as well as downriver stocks migrating through 3 dams for this time period after taking into account factors common to both groups (Schaller et al. 1999; Deriso 2002). The additional decline in productivity of upriver stocks relative to downriver stocks indicates this portion of the mortality is related to factors unique to upriver stocks.

Patterns of Pacific Decadal Oscillation and salmon production would indicate that poor ocean conditions existed for Columbia River salmon after the late 1970s (Hare et al. 1999). However,

the natural fluctuations of ocean productivity affecting all Columbia River stocks, in combination with mortality as a result of the hydrosystem, appear to have caused the severe declines in productivity and survival rates for the Snake River stocks. Temporal and spatial patterns of hatchery release numbers did not coincide with the differential changes in survival rates between upriver and downriver stocks (Schaller et al. 1999). Harvest rates were drastically reduced in the early 1970s, in response to declines in upriver stream-type chinook abundance. Given that changes in smolts per spawner cannot explain the decreases in SAR or overall survival rates for Snake River stocks, it appears the altered migration corridor has had a strong influence on the mortality that causes these differences in stock performance.

The SAR and smolt per spawner observations (Figure 3-7) indicate that the overall survival decline is consistent primarily with hydrosystem impacts and poorer ocean (out-of-subbasin factors), rather than large-scale impacts within the subbasins between the 1960s and present (Schaller et al. 1999; Petrosky et al. 2001). Because the smolt/spawner data represent aggregate populations from a mix of habitat qualities throughout the Snake River basin, and are from a period after hydropower development, they do not imply there is no room for survival improvement within the Snake River subbasins. However, because of limiting factors outside the subbasins, and critically reduced life-cycle survival for populations even in pristine watersheds, it is unlikely that potential survival improvements within the Snake River subbasins alone can increase survival to a level that ensures recovery of anadromous fish populations

TOAST (2004) provides a regional overview of out of subbasin factors impacting anadromous fish in the Columbia Basin, including the Snake River.

The TOAST (2004) utilized the most current studies and information reviewing mainstem passage effects on juvenile and adult salmonids to model hydrosystem effects on survival of anadromous fish. Juvenile survival through the mainstem Columbia and Snake rivers depends upon habitat quality and quantity, river flow, juvenile travel time, juvenile migration timing, dam survival, transportation survival, survival of naturally migrating fish, and competitive interactions with hatchery fish.

For example, survival of yearling chinook migrating in-river from above Lower Granite Dam (past eight hydroelectric projects) averages 36 percent (88 percent per project) and subyearling chinook in-river survival averages 29 percent (approximately 85 percent per project). For juveniles that are transported, TOAST (2004) assumed 98 percent of the juveniles survive to the point of release (NMFS 2000 White Paper Transportation). However, once transported Snake River yearling and subyearling chinook are released from the barges survival is 50 percent for yearlings (Bouwes et al. 1999) and 35 percent for subyearlings (PATH 1999 as cited by TOAST 2004) compared to that of juveniles migrating in-river, respectively.

Adult chinook survival past each mainstem dam under current conditions was assumed to average 93 percent (PATH 2000 as cited by TOAST 2004). Thus, total adult survival through mainstem river reaches is highly dependent on the number of dams each adult must pass. For example, adult chinook returning to the Asotin Creek would have to pass eight mainstem dams, and thus their overall survival rate would be 56 percent. Historically, adult chinook survival through the mainstem Columbia and Snake Rivers was assumed to average 92 percent (TOAST 2004).

TOAST (2004) also incorporated impacts to survival in the estuary and ocean and through mainstem fisheries.

Table 5 in TOAST (2004) contains Smolt-to-Adult (SAR) survival rates of juvenile fish from the mouth of the subbasin to their return to the subbasin as adults. They were calculated from intermediate EDT results. Results of SAR rates calculated for fish from Asotin Creek (those that originate above Lower Granite Dam) were:

- yearling chinook juveniles – 0.9% with a range of 0.3% to 2.97%.
- subyearling chinook – 0.4% with a range of 0.13% to 1.32%.
- steelhead juveniles – 1.69% with a range of 1.04% to 4.68%

TOAST (2004) compared the estimates of survival derived from EDT to actual smolt-to-adult survival estimates for spring chinook (yearling) populations above Lower Granite Dam (C. Petrosky, Idaho Department of Fish and Game January 9, 2004 e-mail), (Table 3-11). These data update the earlier run reconstruction data reported by Marmorek et al. (1998). Since 1992 (the period used for the Multi-Species Framework project), the SAR geometric mean has been 0.8 percent and with an SAR range of 0.19 to 3.0 percent. The SAR rates derived from EDT of 0.9 percent with a range of 0.3 to 2.97 percent is similar to the post 1992 geometric mean. Therefore, SAR rates derived from the EDT are probably a reasonable point estimate for yearling chinook SARs for those life history types entering each of the mainstem Columbia/Snake river reservoirs.

Table 3-11 Estimated Smolt to Adult Survival For Spring Chinook and Steelhead Smolt (Years 1964-2000)

Smolt Outmigration Year	Chinook SAR	Steelhead SAR
1964	2.35%	4.21%
1965	2.32%	3.68%
1966	2.31%	3.93%
1967	4.49%	4.01%
1968	2.58%	3.39%
1969	3.83%	3.66%
1970	1.92%	2.55%
1971	1.53%	2.27%
1972	1.02%	1.52%
1973	0.49%	0.63%
1974	1.39%	1.29%
1975	3.11%	1.84%
1976	0.92%	1.70%
1977	0.35%	0.90%
1978	0.98%	3.07%
1979	1.09%	3.18%
1980	0.55%	2.54%
1981	1.39%	1.11%

Smolt Outmigration Year	Chinook SAR	Steelhead SAR
1982	1.70%	3.37%
1983	1.83%	2.63%
1984	2.56%	3.66%
1985		3.07%
1986		3.05%
1987		3.63%
1988		2.01%
1989		1.02%
1990		2.33%
1991		1.55%
1992	0.19%	1.04%
1993	0.38%	1.07%
1994	1.02%	1.18%
1995	0.31%	1.40%
1996	0.36%	1.61%
1997	1.72%	1.39%
1998	1.15%	1.89%
1999	2.91%	3.16%
2000	3.00%	4.68%

Estimated Smolt to Adult Survival as measured at Lower Granite Dam for spring chinook and steelhead smolt outmigration years 1964-2000 based on run reconstruction.

Source: C. Petrosky, Idaho Department of Fish and Game January 9, 2004 e-mail as cited in TOAST 2004.

Out of Subbasin Effects and EDT

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 Snake and Columbia rivers). Appendix C provides further detail regarding how out-of-subbasin effects were integrated into the EDT analysis.

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 Snake and Columbia rivers). Analysis of the maximum in-basin and out-of-basin changes in life history diversity, productivity, and abundance that could potentially be observed for steelhead and spring Chinook has been summarized in Table 3-12 below. 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”).

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 3-12 Steelhead and Chinook Restoration and Protection Potential

Steelhead	Life history diversity		Productivity		Abundance	
	Within Subbasin	Out of Subbasin*	Within Subbasin	Out of Subbasin*	Within Subbasin	Out of Subbasin*
Restoration Potential	61%	39%	52%	48%	28%	72%
Protection Potential	66%	34%	64%	36%	66%	34%
Chinook						
Restoration Potential	68%	32%	69%	31%	37%	63%
Protection Potential	59%	41%	61%	39%	64%	36%

* Out of subbasin refers to impacts and benefits from restoration and protection in the mainstem Snake and Columbia Rivers.
Source: Section 4.3.4.6 of Appendix B

These results show that for steelhead, 34 to 72 percent of potential improvements for the Asotin subbasin are tied to actions outside of the subbasin (i.e., restoration and protection in the mainstem Columbia and Snake rivers). For Chinook, 31 to 63 percent of potential improvements for the Asotin subbasin are tied to actions outside of the subbasin. These represent a significant impact of out-of-subbasin environmental conditions upon subbasin fish populations. Discussion of the need for activities outside of the subbasin in addition to those actions proposed in this plan is provided in Section 7.3.8.

3.6 Integrated Assessment Analysis and Conditions

3.6.1 Introduction

The information presented in this section was taken from Appendix B (WDFW 2004). It 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

Within the Asotin subbasin the EDT analysis identified habitat diversity was the most common limiting habitat attribute for both steelhead and spring Chinook. For fry and subyearling parr, habitat diversity is a function of gradient, confinement, riparian function, LWD density and icing. Many of the Asotin reaches are thought to have gradients above 3 percent and a high degree of natural confinement that depresses habitat diversity. Icing was generally rated as

moderate to high, depending on the elevation and location of the reach, with current conditions receiving the same values as historic conditions.

Sediment load, channel stability, and flow were common secondary limiting factors for egg incubation and early life history stages of summer steelhead and spring Chinook throughout the Asotin watershed.

Warm summer temperatures were a common problem for spawning (pre-spawn holding) and egg incubation for spring Chinook, but appeared to have little effect on steelhead, probably due to differences in spawn timing. Increased peak flows, reduced low flows, and food (salmon carcasses and benthic productivity) were consistently low to moderate limiting factors for fry colonization and juvenile rearing life stages. The cumulative impact of these low-level limiting attributes could be important to the overall reduced productivity in the Asotin Creek Subbasin.

Throughout the Asotin Creek subbasin key habitat quantity was also an important limiting factor for spring Chinook and steelhead. Key habitat quantity was limiting across various life stages in most geographic units. In general, for current conditions, pools were reduced (29 percent) and riffles were increased (24 percent) when compared to the reference condition. In some reaches, pool tailouts were reduced by up to 10 percent which affected spawning adults; in other reaches, primary pools were reduced up to 42 percent which affected pre-spawn holding, juveniles less than 1 year old, over-wintering and other life stages. Key habitat quantity will have to be evaluated on a reach-by-reach basis, based on the data that was entered into the Stream Reach Editor for EDT.

EDT analysis indicates that restoration efforts should focus on restoring riparian function (offchannel habitat, connection to the floodplain, and riparian vegetation), minimizing manmade confinement (roads and dikes), increasing large woody debris (LWD) density and reducing sediment load throughout the watershed. Addressing these habitat attributes will benefit both steelhead and spring Chinook.

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. Habitat diversity, key habitat by lifestage, sediment and temperature were the most common limiting attribute identified with the assessment; this compared favorably with earlier assessments (Table 3-13).

Table 3-13 Assessments Performed in the Asotin Subbasin and the Key Limiting Factors Identified

Assessment	Key Limiting Factors Identified
EDT	Habitat Diversity (Includes: riparian function ¹ , confinement, gradient, LWD density for most life stages); Sediment Load (Including embeddedness; and percent fines); Temperature; Key Habitat (pools and pool tail-outs)
LFA	Sediment; Confinement; Pools; Temperature
Subbasin Summary	water quality; riparian function; sedimentation; instream habitat (inc. pools and LWD); passage; non native species
Model Watershed Plan	sediment; pools; LWD density; temperature
Bull Trout Recovery Plan (draft)	LWD; temperatures; sediment; bank stability; loss of riparian, passage

¹The riparian corridor provides a variety of ecological functions that 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 woody debris, flow characteristics, temperature characteristics, benthos, pollutant conditions, and habitat types (e.g., pool-riffle units).

A more detailed discussion of these similarities as well as a few differences is provided in Appendix B, Section 4.6.

3.6.4 Divergences from EDT

The EDT model provided ranking of geographic areas based solely upon their potential to provide habitat for fish species from a biological perspective, comparing historic conditions to current conditions. Although EDT is the most comprehensive tool currently available for completing aquatic habitat assessments of the nature required for subbasin planning, significant data gaps remain that limited its accuracy in some cases. Thus, the Subbasin Planning Team reevaluated these EDT results in light of several additional considerations. Other plans were used to corroborate EDT. EDT is useful but not perfect. Where we noticed something was wrong, we looked at other information and fixed it.

- Prioritization of geographic areas was required. This necessitated comparison of trade-offs between the biological benefits provided by restoration and protection of the geographic areas.
- The needs of all aquatic focal species needed to be balanced. This again required balancing between geographic areas that would provide significant benefit to one focal species, but lesser benefit to others.
- Socioeconomic factors may limit restoration opportunities in selected geographic areas. Given the lack of time and resources to develop a comprehensive socioeconomic analysis for the subbasin, limitations due to this factor were based upon best professional judgment of the Subbasin Planning Team and technical staff. Clearly there are value judgments involved in determining what is considered feasible and not feasible, and differences in such value judgments do exist within the subbasin. A comprehensive socioeconomic study within the subbasin should be developed with the cooperation of local stakeholders. This analysis would provide a solid foundation upon which socioeconomic conditions could be factored into consideration of project priorities.
- Consistency with other planning efforts.

These factors were used to evaluate the results of the EDT model and identify areas where divergence from the EDT modeling results was needed. In areas where the EDT results appeared inconsistent with previous assessment efforts or with knowledge of the subbasin, the Subbasin Planning Team and technical staff reviewed the EDT results in light of the above factors and modified the final list of priority geographic areas accordingly. These areas are discussed as “divergences from EDT” in this section. Establishing priorities does not preclude projects from being implemented in non-priority areas. If opportunities present themselves in non-priority areas, project sponsors could use the initial EDT modeling results to support the need for such a project. However, such a project would be a lower priority than projects proposed in a priority geographic area or a project that addresses imminent threats. The full EDT modeling results are provided in Appendix B.

In two cases, EDT results were questioned.

Lower Asotin ranked high for restoration when evaluated for both spring Chinook and steelhead. As noted in Appendix B, this is inconsistent with other assessments/planning efforts performed over the last 10 years on the Asotin Subbasin. Lower Asotin Creek and middle Asotin (George Creek to Headgate Dam) have not been listed as high priorities for steelhead restoration in previous planning efforts. EDT compares historic and current conditions, and the larger the difference between these conditions the higher the priority for restoration under EDT. These areas has probably diverged the furthest from historical conditions, and thus would benefit the population the greatest if completely restored. However, these stream reaches are currently marginal habitat for steelhead and the lowest reach has the most human disturbance and development in the subbasin.

Much of the lowest stream reach is diked for flood protection and development constrains options for fish habitat restoration. The opportunities for restoring this stream reach to approach historic conditions are very limited by the town of Asotin and rural development along the stream. Similar to the lower stream reach, the middle stream reach is likely far different than historic conditions. Roads and housing development in a very narrow valley have severely constrained Asotin Creek and will limit options for restoring this stream segment. It is very unlikely that historic conditions can be approached in either of these stream reaches and the empirical data suggests that steelhead production is limited in these areas. However it has not been included as a priority area for restoration because the stream reach has the most human disturbance and development in the subbasin, is diked in the lower section for flood protection, and opportunities for restoring this area to historic conditions are limited relative to other geographic areas that were selected as priorities.

It should be noted that during the other planning efforts the Lower Asotin was mentioned as being a low priority for these same reasons. However, none of the other planning documents actually identified specific areas as being higher priority for restoration than others in the final documents. Restoration efforts in Lower George and Charley Creek are likely to have only a moderate benefit to spring Chinook.

Lower George Creek was included as a priority for restoration due to steelhead empirical data summarized in Appendix B. Lower George had the highest densities and population estimates for >1+ steelhead. This clearly demonstrates its importance to the steelhead population. It is

also clear that there is the need for active restoration. It is unclear why this portion of George Creek ranked as such a low priority for restoration; this could very well be a factor of the lack of hard data available for many key attributes as discussed previously.

The second divergence was that sediment was not identified in the EDT analysis as a limiting factor in Charley Creek, however, even casual observation of this creek proves that conclusion wrong. Other assessments clearly identified sediment as a limiting factor throughout the Asotin drainage, thus it was included as a limiting attribute.

3.7 Assessment Conclusions – Setting the Stage for the Management Plan

3.7.1 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 3-8.

3.7.2 Asotin Creek - Restoration Priority Geographic Areas

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

- Upper Asotin (Headgate Dam to Forks)
- Lower George Creek
- Lower NF Asotin
- Charley Creek
- Lower SF Asotin

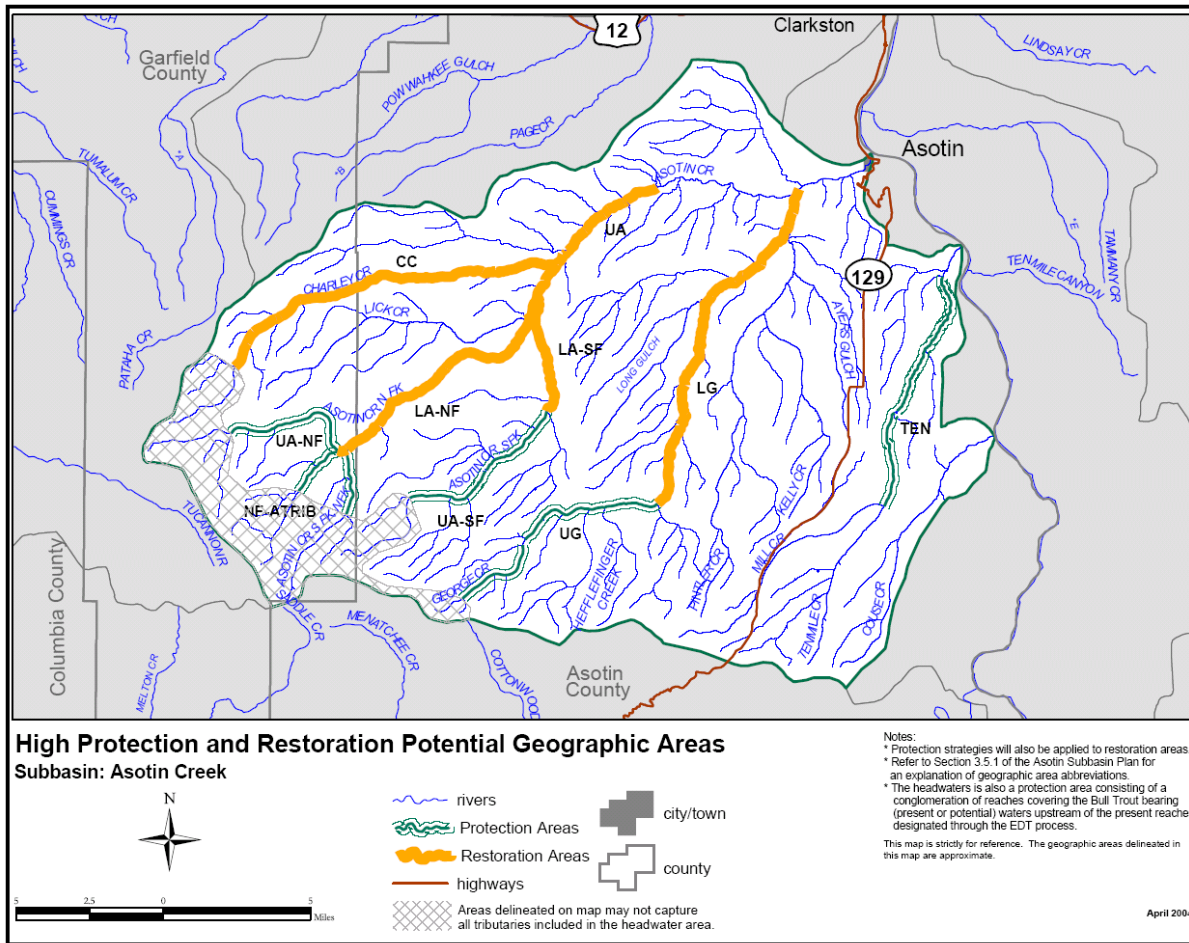


Figure 3-8 Priority Protection and Restoration Potential Geographic Areas

Key: NF-ATRIB=North Fork Asotin Creek Tributaries, UA-NF=Upper North Fork Asotin, UA-SF=Upper South Fork Asotin, LA-NF=Lower North Fork Asotin, LA-SF=Lower South Fork Asotin, CC=Charley Creek, UA=Upper Asotin, UG=Upper George, LG=Lower George

These are not in ranked order. Ranking of areas for restoration should be done by the management strategy planning team. The priority geographic areas were identified by considering first their rankings by the EDT analysis for restoration for both steelhead and spring Chinook from Tables 3-14 and 3-15. Then these were considered in the light of past planning efforts within the subbasin. NF Tributaries and Upper George Tributaries rate high according to EDT for restoration for steelhead. The areas, however, are not considered ever to have been spring Chinook habitat and thus were not included in the EDT analysis for spring Chinook. Since there would be no benefit to spring Chinook they were eliminated from consideration.

3.7.3 Impacted Life Stages

Within the priority restoration geographic areas above the following life stages are the most impacted according to the EDT analysis:

Table 3-14 Impacted Life Stages

Priority Restoration Geographic Area	Incubation	Fry	Sub-yearling rearing	Overwintering	Yearling Rearing	Pre-spawning
Upper Asotin	Steelhead Spring Chinook	Spring Chinook	Steelhead	Steelhead	Steelhead, Spring Chinook	Spring Chinook
Lower George	Steelhead Spring Chinook	Spring Chinook	Steelhead Spring Chinook	Steelhead Spring Chinook*	Steelhead	
Lower NF Asotin	Steelhead Spring Chinook	Steelhead Spring Chinook	Steelhead Spring Chinook	Spring Chinook	Steelhead	Spring Chinook
Charley	Steelhead Spring Chinook	Steelhead Spring Chinook	Steelhead	Spring Chinook	Steelhead	Spring Chinook
Lower SF Asotin	Steelhead Spring Chinook	Steelhead Spring Chinook	Steelhead Spring Chinook	Steelhead *		Spring Chinook

*Though overwintering for spring Chinook and steelhead in these two geographic areas were not in the top four when considering all three population performance measurements; it had an extremely high impact on productivity compared to pre-spawning and spawning which were in the top four.

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). These represent the top four by life stage rank for the geographic areas as determined from the reach analyses. Life stage ranks are determined through EDT for each reach by considering all three EDT population performance measures (life history diversity, abundance and production). The individual reach analysis that make up the geographic areas were then considered in determining the top four life stages. Those life stages that were ranked in the top four within the reaches most often were determined to be the four most impacted life stages for the geographic areas. It should be noted that in order to develop a well targeted subbasin plan we determined to make this distinction in life stage impacts. However, throughout the system the habitat factors that were identified as most limiting to these life stages actually impact all life stages of salmonids to some degree. The previous assessment and planning documents did not usually go into this fine of detail, in that limited life stages were not clearly defined within specific reaches. These results are consistent with previous assessments, given that there appears to be general agreement on the limiting factors for the Asotin, particularly since the affected life stages are determined for the EDT analysis using the latest literature.

3.7.4 Limiting Habitat Attributes

The following habitat attributes are considered to have the most impact within the above Asotin Creek reaches and key life stages listed above:

Table 3-15 Key Limiting Habitat Attributes in Priority Restoration Geographic Areas

Geographic Area	LWD	Confinement	Riparian Function	Sediment	Key Habitat (pools)	Temperature	Flow	Bedscour
Upper Asotin	X	X	X	X	X	X		
Lower George	X	X	X	X	X	X	X	X
Lower NF Asotin	X	X	X	X	X			X
Charley	X	X	X	X	X			X
Lower SF Asotin	X	X	X	X	X	X		

These habitat attributes were taken directly from the EDT analysis. They were then modified given local knowledge and to be consistent with previous assessment and planning documents. Please note the commonality of compromised habitat attributes in the above reaches. While this does show pervasive problems within the system, it also can potentially make managing to these priority reaches simpler; meaning the same types of projects can benefit multiple reaches.

Although flow was identified as a limiting factor for all of the priority geographic areas to a certain degree, EDT results showed that it was a significant limiting factor for the Lower George geographic area only. Other limiting factors in the remaining geographic areas had a more significant impact upon fish populations than flow. As such, flow was identified by EDT as a key limiting factor in only the Lower George geographic area (Pers. comm., M. Wachtel, WDFW, May 2004).

3.7.5 Protection Priority Geographic Areas

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

- Upper NF Asotin
- Upper SF Asotin
- Lower NF Asotin
- Charley Creek
- Upper Asotin
- Upper George Creek
- Headwaters (upper ends of George Creek, Charley Creek, NF and SF Asotin)*
- NF Asotin Tributaries
- Lower SF Asotin
- Lower George Creek

*Headwaters is a 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 “E.” below).

Standing out within this list is NF Asotin. Its upper and lower areas are high for protection. This, and the inclusion of the Lower NF in the list of streams highly rated for restoration accentuates, the current importance of this reach to salmonids in the subbasin. Upper Asotin, Charley Creek and Lower SF are all also present on both lists. It is important to note that the inclusion on one list does not exclude a reach from being on the other. This simply means that according to the EDT analysis it is important to preserve the habitat that is there while doing restorative work. Upper George was not ranked particularly high when analyzed for steelhead and spring Chinook by EDT. Its inclusion though is consistent with other assessments and is on the list of core streams in the *Draft Bull Trout Recovery Plan* (see comments below). It should be noted that many of the above protection reaches apply only to steelhead. It is unlikely that spring Chinook would benefit from protection in Upper SF, Charley Cr or George Cr because they use these areas very little, if at all.

The lower South Fork Asotin stream reach was added to the list of areas EDT results indicated have high protection value based on information and conclusion in past planning documents, the sporadic presence of bull trout, and the fact that the entire reach is now in public ownership.

3.7.6 Tenmile and Couse Creeks – Restoration and Protection Priority Geographic Areas

In general the mainstem Tenmile reaches ranked higher for restoration than the Mill Creek Reaches. Within that area, the reaches from the end of the seasonally dewatered area to the mouth of the Middle Branch were considered highest in both restoration and protection value (Tenmile4 and 5). In both reaches in this area sediment load and channel stability were the most limiting factor on the most limited life stage, incubating eggs. Temperature impacts on incubating eggs and colonizing fry were also major factors affecting production but only in Tenmile4. Lack of key habitat and habitat diversity also were shown as problems according to EDT. Sediment load and habitat diversity (pools) are attributes that were also highlighted as problems by the Limiting Factors Analysis (Kuttle 2001). Tenmile in its entirety is flow limited. It is unknown and hard to estimate how much the change in land cover within this short, steep watershed has effected groundwater infusion during critical summer months. It is very possible that changes in land use practices throughout the basin could positively affect summer flows.

The relative contribution of Tenmile Creek to the overall population of steelhead in the Asotin Subbasin is small (see Appendix B). Thus, it was not considered with the geographic areas of Asotin Creek when identifying priority areas for restoration and protection. Though the relative contribution to the population is small the importance that Tenmile steelhead has to the population in terms of diversity is unknown. This assessment clearly shows that Tenmile, which is the top restoration and protection reach, is the most important for consideration of protection or restoration strategies.

The lack of resources available within the timetable provided did not allow for an EDT assessment of Couse Creek. Couse Creek has a known spawning steelhead population and thus has some importance to the subbasin population as a whole. The results from EDT on Tenmile can generally be applied to Couse Creek. It is thought that sediment and lack of habitat diversity are limiting to steelhead production (Kuttle 2001).

3.7.7 Bull Trout

The assessment of bull trout and its habitat presented some difficulty in the Asotin Subbasin. Rules for bull trout in EDT had not been developed in time for this assessment. This coupled with a glaring lack of knowledge of even the basic life history of bull trout in the Asotin drainage put the fish at a distinct disadvantage when it came to naming priority habitats for protection and restoration. The *Draft Bull Trout Recovery Plan* identified temperature as being the most limiting factor in the subbasin. Protecting the upper reaches from degradation is the key to modifying or maintaining bull trout suitable temperatures in the Asotin. 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 these two points, and to be consistent with other assessments such as the list of priority streams from the Recovery Plan, the upper reaches of George Creek, Charley Creek, NF Asotin and SF Asotin not covered within the geographic areas should be considered priority for protection. These areas quite probably represent the last good bull trout habitat in the Asotin Subbasin.

3.8 Aquatic Species of Interest

Species of Interest (SOI) were approved by the subbasin planning team for inclusion, because they may have ecological and/or cultural significance to the subbasin (WDFW 2004). In order to determine whether or not they should be classified as a focal species, more information is required regarding their subbasin specific life histories and conditions that may be limiting their productivity and abundance (WDFW 2004). WDFW (2004) has established a 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 the future.

3.8.1 Pacific Lamprey (*Lampetra tridentata*)

Pacific lamprey (*Lampetra tridentata*) were suggested as a species of interest by the Nez Perce Tribe. The following write-up was provided by the Nez Perce Tribe (2004), (see Appendix D).

History

Pacific lamprey numbers have been in great decline since the installation of numerous dams and habitat degradation in the Columbia Basin. The Nez Perce Tribe regards Pacific lamprey as a highly valued resource harvested to this day as a subsistence food and is highly regarded for its cultural value. The Asotin Subbasin historically had a large run of anadromous Pacific Lamprey. There are numerous oral recollections of fishing for the lamprey as an alternative subsistence food source by Native Americans.

The town of Asotin is derived from the Nez Perce word Heustiin that means place of eels, (Allen Slickpoo Sr., Nez Perce, Salmon and His People, Landeen, Pinkham 1999).

Asotin County resident Frank Schiebe, who was the dam operator at Headgate Dam from 1954 – 1960, on main Asotin Creek, recalls numerous lampreys could be seen maneuvering over the

headgate dam. He also recalled that lampreys were also taken out of Asotin Creek for use as sturgeon bait by local fishermen, (pers. comm. F. Scheibe, 2004).

Life History

The life cycle of the Pacific Lamprey is similar to that of salmonids. Pacific Lamprey reach the spawning grounds in mid-summer (Kan 1975; Beamish 1980) and generally spawn the following spring. Thus, adult lamprey spend approximately 1 year in freshwater. Spawning generally occurs in small tributary streams, where both sexes construct a crude redd (Scott and Crossman 1973), generally located in the center of the stream near the tailout of a pool, and immediately upstream of shoreline depositional areas (Beamish 1980). Mating is repeated several times in the redd, with each mating followed by actions that move substrate over newly laid eggs. Water temperatures of 10-15°C have been measured in Clear Creek, a tributary of the John Day River, during spawning (Kan 1975). Adults die soon afterward and provide valuable nutrients to small tributaries where salmon fry rear (Kan 1975).

Eggs typically hatch into ammocoetes in less than 2 weeks; these newly hatched larvae, which are filter feeders, then drift downstream and bury themselves in silt, mud, or fine gravel along the margins and backwaters of streams and rivers (Scott and Crossman 1973; Hammond 1979). Ammocoetes generally spend 5-6 years in freshwater (Scott and Crossman 1973). In the fall of their last year, they metamorphose into macrophthalmia, which resemble the adult form. This transformation process is generally completed by early winter.

Downstream migration of macrophthalmia appears to be stimulated by and dependent on late winter and early spring floods (Hammond 1979). Because they are not strong swimmers, lampreys appear to be dependent on spring flows to carry them to the ocean (Kan 1975; Beamish 1980). The upstream, spawning migration of adults generally begins in early spring. Adult lamprey use the mainstem in returning to their spawning grounds, but do not feed during this period. They were once an important food source for sturgeon in the mainstem (Kan 1975).

Pacific lampreys appear to travel directly into the open ocean, rather than feed in the estuary of nearby coastal waters (Kan 1975; Beamish 1980), as do some other lamprey species.

Pacific lampreys rear in the ocean habitat for up to 3.5 years (Beamish 1980), and range in excess of 100 km offshore, often in areas of considerable depth (up to 800 m) (Kan 1975; Beamish 1980;). Adult lampreys in the ocean are parasitic on many fish species, including salmon. They attach themselves to fish and other animals and feed on blood and body fluids through a hole rasped in the flesh of the host (Wy-Kan-Ush-Mi Wa-Kish-Wit, (Spirit of the Salmon): The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes, Volume I, CRITFC 1996).

Evidence suggests that Pacific Lamprey was well integrated into the native freshwater fish community, and as such had positive effects on the system. It was in all probability, a big contributor to the nutrient supply in oligotrophic streams of the basin as adults died after spawning (Beamish 1980). We suspect that it was an important buffer for upstream migrating adult salmon from predation by marine mammals. Juvenile lampreys migrating downstream

may have buffered salmonid juveniles from predation by predacious fishes and sea gulls (Close et al. 1995).

Pacific Lamprey ammocoetes provide Snake River basin white sturgeon *Acispenser transmontanus* populations with an important food source (Galbreath 1979), which potentially contributed to Snake River white sturgeon historical productivity, (Cochnauer, Claire 2001). Pfeiffer and Pletcher (1964) found that coho fry ate emergent larval lamprey (Close et al. 1995).

Need

Since the completion of the hydropower system in the Columbia Basin, the numbers of Pacific lamprey have declined dramatically compared with historical levels of abundance and distribution.

Counts at Bonneville Dam have exceeded 300,000 lampreys in the past (Starke and Dalen 1995). These counts include only those fish that passed the counting station during the 18 hours of counting, i.e., they do not include lamprey that passed through navigation locks or at night. Counts of Pacific lamprey returning over lower Snake River dams were in the thousands in 1969, but declined to hundreds by 1978 (Hammond 1979) and numbered only 40 individuals total in 1993 (L. Basham, Fish Passage Center, Portland, personal communication 1994) (Wy-Kan-Ush-Mi Wa-Kish-Wit, (Spirit of the Salmon): The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes, Volume I, CRITFC 1996).

Currently there is no empirical data on the numbers of Pacific Lamprey that may still be returning to this watershed, they are considered functionally extirpated. Basic life history, distribution, and remaining population status are urgently needed to fully understand this species and to begin intensive management before populations decline to unrecoverable thresholds. Additional research is required to establish current numbers, limiting factors, available habitat and rehabilitation potential.

On going efforts to determine the current status of Pacific Lamprey have largely been focused from the mouth to the Lower and Mid Columbia regions with the exception of the Idaho Department of Fish and Game study in the Clearwater River Basin above the confluence of the Lower Snake River.

To enhance information sharing and to eliminate duplication of development of research methodology proposed efforts should adopt methods such as those that are currently being utilized by other Columbia River Intertribal Fish Commission tribes. The Nez Perce Tribe's goal relating to lamprey is to create a sustainable annual subsistence harvest and re-establish the lamprey's role in the Asotin subbasin.

3.8.2 Coho Salmon (*Oncorhynchus kisutch*)

Coho salmon (*Oncorhynchus kisutch*) were suggested as a species of interest by the Nez Perce Tribe. The following write-up was provided by the Nez Perce Tribe (2004) (see Appendix D).

The Nez Perce tribe regards coho salmon as a highly valued resource that was historically harvested as a subsistence food and is highly regarded for its cultural value.

Life History

Coho salmon spawn in small coastal streams and the tributaries of larger rivers. They prefer areas of mid-velocity water with small to medium sized gravels. Because they use small streams with limited space, they must use many such streams to successfully reproduce. Stream gradients of 3 percent or less provide conditions favorable for coho salmon (Reeves et al. 1989).

Historically, coho salmon in the Snake River Basin spawned from mid-October to mid-December, fry emerged from the gravel in late spring (April), juveniles reared for approximately 18 months and emigrated to the ocean (Cramer and Witty 1998). Smolt emigration from the Grande Ronde began in late April to early May. Passage over Ice Harbor Dam peaked in early June and smolts reached the Columbia River estuary in mid-May to early-June (Cramer and Witty 1998). The majority of adults coho salmon returning to the Grande Ronde River had spent 15 months rearing in the ocean and returned to spawn at age 3 (Cramer and Witty 1998).

Data

Coho salmon were considered to be extirpated in the Snake River basin in 1986 based on zero counts over the Snake River dams. There are no documented reports of coho salmon in Asotin Creek. However, historically, coho were abundant in the adjacent subbasins: the Clearwater and Grande Ronde. Nez Perce Tribal elders confirm the historical presence of coho salmon in the Clearwater River Subbasin (Paul Kucera, Director of Research, Nez Perce Tribe, Personal Communication) and Schoning (1940, 1947) and Fulton (1968) also document that residents of the area caught coho salmon in the Clearwater River Subbasin. In addition, the Grande Ronde subbasin was historically a major producer of coho salmon. Cramer and Witty (1998) estimated adult coho production exceeded 20,000 fish in the Grande Ronde subbasin (x miles upstream from Asotin Creek) prior to 1902.

Need

The Nez Perce Tribe has a mission to recover and restore all populations, all species of anadromous and resident fish within the traditional lands of the Nez Perce Tribe.

To support this mission, the Nez Perce Tribe has developed a plan for reintroduction and restoration of coho salmon to the Snake River Basin which includes the Grande Ronde Subbasin (Grassel et al. 2004 DRAFT) and the Clearwater River Subbasin (NPT and FPI 2004). The Nez Perce Tribe has an ongoing coho salmon reintroduction program in the Clearwater River Subbasin and recently has completed a master plan (NPT and FPI 2004) which identifies Asotin Creek as a stream for potential supplementation using a rotating schedule of juvenile coho salmon releases aimed at determining which tributaries have potential to support natural production.

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 E. The subbasin-scale assessment, incorporating portions of the Ecoregion document and information unique to the subbasin, can be found in Appendix E.

This section includes descriptions of the:

- data available 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 E (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 initially 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 (Figure 3). 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 (Figure 4). 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).

Status 1 (High Protection): 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. In the Asotin Subbasin, there are no high protection areas.

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. In the Asotin Subbasin, most the Asotin Creek Wildlife Area managed by WDFW would fall into this category.

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. In the Asotin Subbasin, portions of the Asotin Creek Wildlife Area managed by WDFW would fall into this category as would land managed by the U.S. Forest Service and Washington Department of Natural Resources.

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 E).

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	15,015	8,443	10,298	4,976	0	38,732
Status 3: Low Protection	159,032	61,194	77,157	80,690	124,645	502,718
Status 4: No Protection	195,164	982,905	224,938	160,334	993,342	2,556,683
Total(Subbasin)	369,259	1,059,935	326,185	246,000	1,126,198	3,127,568

Source: Table 6 of Appendix E

4.3 Terrestrial Priority Habitats

4.3.1 Selection of Terrestrial Priority Habitats

The Asotin subbasin consists of 11 wildlife habitat types. These habitat types are briefly described in Table 4-2. Their historic and current abundance in the Asotin subbasin are illustrated in Figures 4-1 and 4-2 respectively, and the percent change between the two time periods is detailed in Table 4-3.

Table 4-2 Wildlife Habitat Types Within the Asotin 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.
Lodgepole pine forest and woodlands	Lodgepole pine dominated woodlands and forests; understory various; mid- to high elevations.
Ponderosa pine	Ponderosa pine dominated woodland or savannah, often with Douglas-fir; shrub, forb, or grass understory; lower elevation forest above steppe, shrub-steppe.
Eastside (interior) grasslands	Dominated by short to medium height native bunchgrass with forbs, cryptogam crust.
Shrub-steppe (not present)	Sagebrush and/or bitterbrush dominated; bunchgrass understory with forbs, cryptogam crust.
Interior canyon shrublands	Chokecherry, oceanspray, and Rocky Mtn. maple with shrubs and grasses dominated the understory.
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
Montane coniferous wetlands	Forest or woodland dominated by evergreen conifers; deciduous trees may be co-dominant; understory dominated by shrubs, forbs, or graminoids; mid- to upper montane.
Eastside (interior) riparian wetlands	Shrublands, woodlands and forest, less commonly grasslands; often multilayered canopy with shrubs, graminoids, forbs below.

Source: Ashley and Stovall 2004.

**Table 4-3 Asotin Subbasin Historic and Current Habitat Type Acres and Percent Change
Changes in Wildlife Habitat Types in the Asotin Subbasin – circa 1850 (historic) to 1999 (current)**

Status	Montane Mixed Conifer Forest	Interior Mixed Conifer Forest	Lodgepole Pine Forest and Woodlands	Ponderosa Pine	Eastside (Interior) Grasslands	Shrubsteppe	Interior Canyon Shrublands	Agriculture, Pasture, and Mixed Environs	Urban and Mixed Environs	Herbaceous Wetlands	Montane Coniferous Wetlands	Eastside (Interior) Riparian Wetlands
Historic	1,479	20,705	1,479	34,756	185,363	0	0	0	0	1,972	0	6,096
Current	6,093	27,921	2,902	14,997	134,789	0	311	57,040	86	28	137	1,687
Change (acres)	+4,614	+7,216	+1,423	-19,758	-50,575	0	+311	+57,040	+86	-1,944	+137	-4,409
Change (%)	+76	+26	+51	-57	-27	0	999	999	999	-99	999	-73

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

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

Source: Ashley and Stovall 2004.

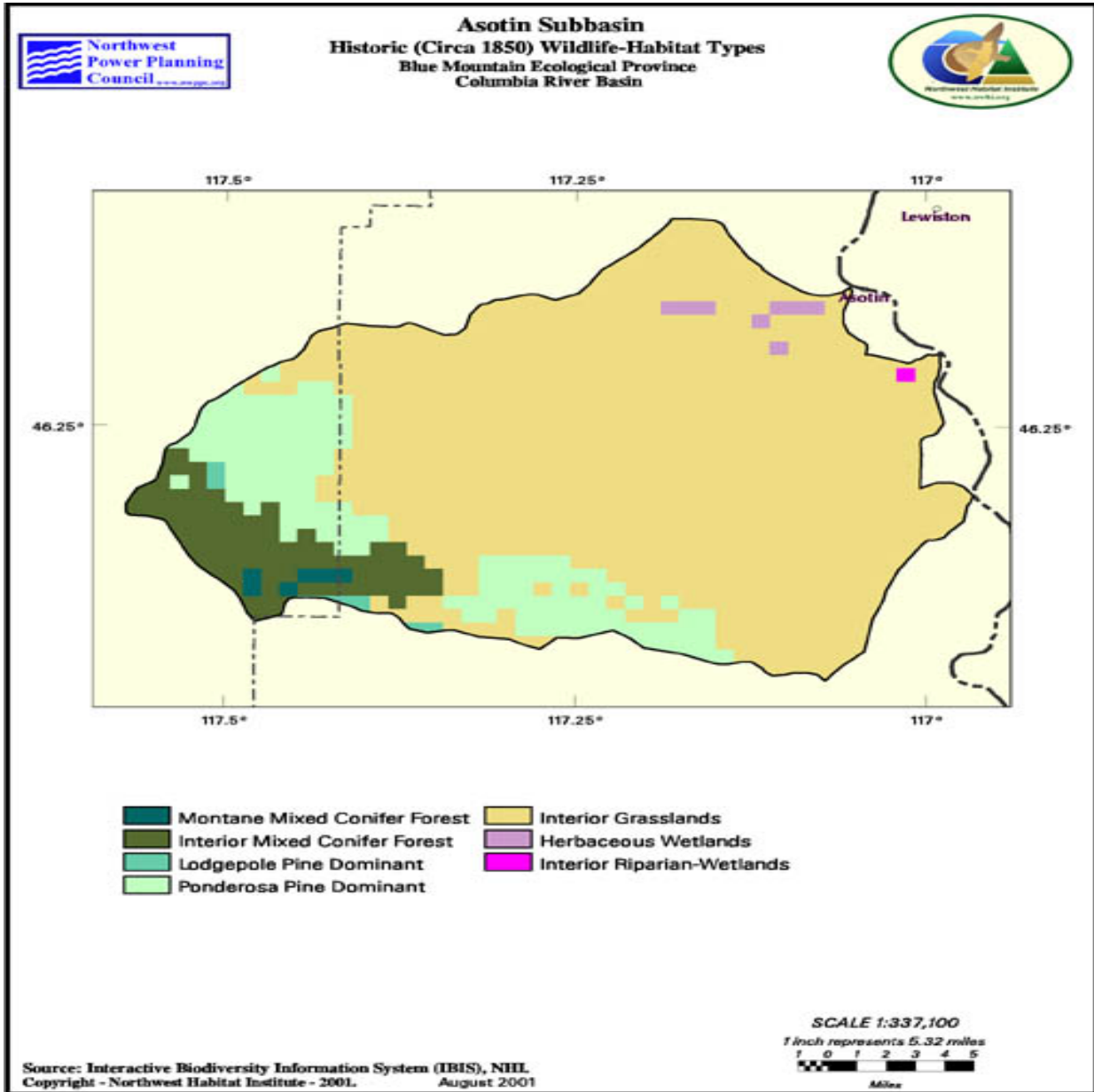


Figure 4-1 Asotin Subbasin Historic (Circa 1850) Wildlife Habitat Types

IBIS 2003, as cited in Ashley and Stovall 2004

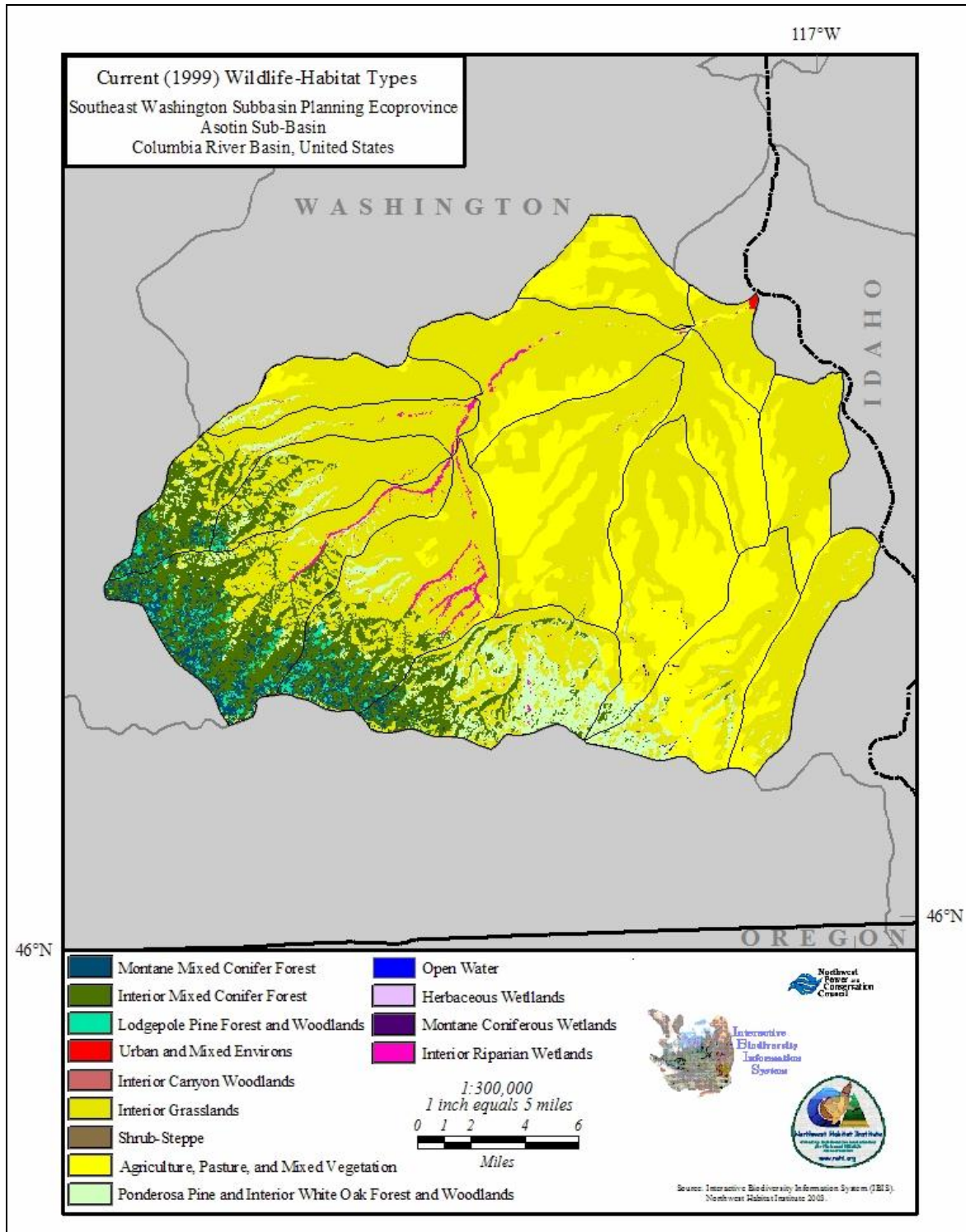


Figure 4-2 Current Wildlife Habitat Types of the Asotin Subbasin

IBIS 2003, as cited in Ashley and Stovall 2004

The following four key principles were used to guide selection of focal habitats (see Section 4.1.3 in Appendix E 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.
- Focal wildlife species/guilds can be used to represent focal habitats and to infer or measure response to changing habitat conditions at the subbasin 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 11 habitat types that are 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). Although there is little, if any, shrub-steppe habitat within the Asotin subbasin¹⁰ (Table 4-4), it is included as a focal habitat for the Ecoregion and therefore will be discussed as a focal habitat in this assessment (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: Ashley and Stovall 2004

¹⁰ Additionally, both IBIS (2003) and Washington GAP data do not recognize it as a historical or current habitat type in the Asotin subbasin.

Ponderosa pine and eastside (interior) grassland focal habitat types are detailed graphically in Figure 4-3. Steppe vegetation zones are combined to form the grassland habitat type. Current and historic riparian wetland habitat information is a significant data gap, therefore, riparian wetland habitat is not included in the habitat distribution maps for the Asotin 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 E (Ashley and Stovall 2004). Subbasin-specific focal habitat type anomalies and differences are described in detail in the following sections (Ashley and Stovall 2004).

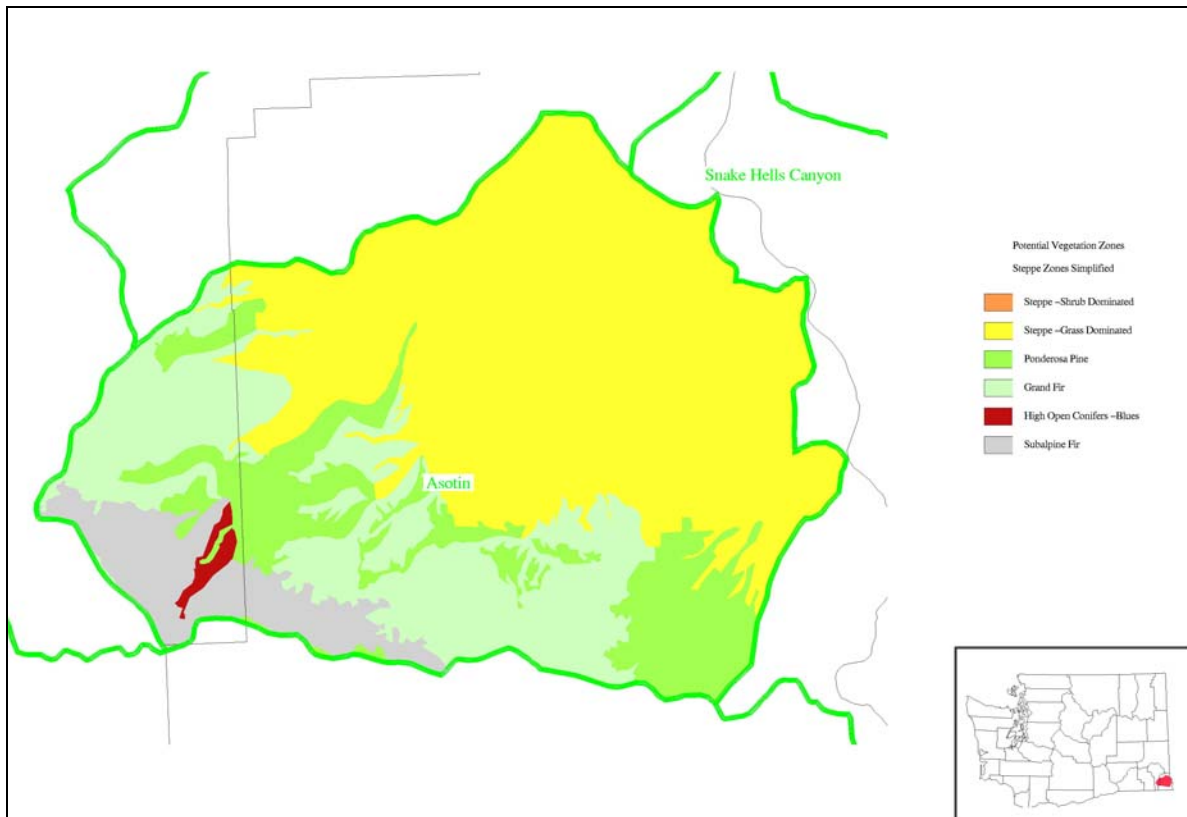


Figure 4-3 Ponderosa Pine and Eastside (Interior) Grassland Habitat Types in the Asotin Subbasin

Cassidy 1997; as cited in Ashley and Stovall 2004).

4.3.2 Description of Terrestrial Priority Habitats

Ponderosa Pine (*Pinus ponderosa*) Forest

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 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

1. 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.
2. 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).
3. 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).
4. 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 Asotin 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 subbasin. Table 4-5 details the protection status of remaining ponderosa pine habitat within the Asotin subbasin (Ashley and Stovall 2004).

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

GAP Protection Status	Acres
High Protection	0
Medium Protection	212
Low Protection	6,512
No Protection	8,332

Source: Ashley and Stovall 2004

The number of acres protected by 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 CREP program (also by county) are presented in Table 4-7 (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)	Established 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	25,616	62,594	36	19,781	15,932	11	24,791	148,761

Source: FSA 2003

Table 4-7 Number of Acres Protected Through the CREP/Continuous CRP Program By County (FSA CP-22 2003)

County	CREP 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

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*). A large number of forbs are also present; balsamorhiza (*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 E (Ashley and Stovall 2004).

The Blue Mountain steppe vegetation zone comprises the grassland habitat within the Asotin subbasin (Ashley and Stovall 2004). In this ecoregion, the Blue Mountain steppe vegetation zone occurs only in the Asotin subbasin (Ashley and Stovall (2004); however, throughout most of the subbasin, native grasslands have been replaced by agricultural crops, or severely altered by introduction of, and subsequent competition from, introduced 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). 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 Asotin 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; none 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 Asotin Subbasin

GAP Protection Status	Acres
High Protection	0
Medium Protection	4,464
Low Protection	35,195
No Protection	95,170

Source: 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 4-6 (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 4-7 (FSA 2003, as cited in Ashley and Stovall 2004).

Eastside (Interior) Riparian Wetlands

Eastside (interior) riparian wetlands 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 E.

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, agricultural conversion, altered stream channel morphology, and water withdrawal have played significant roles in changing the character of streams and associated riparian areas. Grazing in some areas has extensively suppressed woody vegetation. Herbaceous vegetation has also been highly altered with the introduction of Kentucky bluegrass and reed canarygrass, which has spread to many riparian areas.”

“Riparian zones along the Snake River and Asotin Creek have been lost and fragmented by agricultural development and subdivision. In 1993, an estimated 70 percent of the streambanks on private rangelands adjacent to Asotin Creek were either excluded from livestock grazing or used only during spring or early summer. Thirty percent of the streambanks are grazed year long or between mid-summer and winter (ACCD 1995 in NPPC 2001d). Some riparian reaches next to confined winter-feeding areas lack trees, shrubs and ground cover due to trampling by livestock. Portions of riparian areas also show signs of overgrazing, such as reduced ground cover, influxes of introduced vegetation, hedging of shrubs, decreased shrub vigor, low diversity of plant species and poor age class structure.”

“Forested riparian vegetation along Asotin Creek and other subbasin streams remains in transition, modified by recent flooding events. In 1993, about 64 percent of the riparian vegetation along Asotin Creek consisted of mixed successional stands of alder and black cottonwood (ACCD 1995 in NPPC 2001d). These stands of predominantly young age class provided from 37 percent canopy cover near the mouth of the creek to 79 percent canopy cover at Headgate Park. Flooding in 1996-97 substantially reduced the riparian forest overstory on Asotin Creek. By 2000, only 16 percent of the creek contained more than 70 percent canopy closure considered desirable for stream shading (NRCS 2001). Damage to riparian cover in the upper portion of the watershed was evident, where canopy cover was reduced approximately by half compared to pre-flood (1993) surveys. Douglas-fir and grand fir were the successional dominants in these older stands, with alder and ponderosa pine as notable components.”

In conjunction with HEP surveys, Ashley (2003, as cited in Ashley and Stovall 2004) conducted vegetation transects along the upper reaches of South Fork Asotin Creek. Results indicate that

mean tree canopy cover is 45 percent and mean shrub cover is 51 percent (Ashley and Stovall 2003). Black cottonwood (*Populus balsamifera*) and alder trees (*Alnus* spp.) are co-dominant with locusts (*Robinia* spp.), water birch (*Betula occidentalis*), ponderosa pine, and willows (*Salix* spp.) also present. Shrub species observed by Ashley (2003) include mock orange (*Philadelphus* spp.), snowberry (*Symphoricarpos albus*), and ninebark (*Physocarpus capitatus*). No indication is given as to how representative upper South Fork Asotin Creek's riparian wetland community is to riparian wetlands in other portions of the subbasin.

The protection status of remaining eastside (interior) riparian wetland habitat in the Asotin 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 Asotin Subbasin

GAP Protection Status	Acres
High Protection	0
Medium Protection	210
Low Protection	534
No Protection	950

Source: 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). 297 stream miles are eligible for CREP enrollment in Asotin County; however, only ~58 stream miles are currently registered (NRCS unpublished data, as cited in Ashley and Stovall 2004). The CREP program protects an average of ~23 acres of habitat per stream mile (1,339 acres ÷ 58 miles) on enrolled lands in Asotin County (FSA, unpublished data, as cited in 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 not reported to occur currently or historically within the Asotin subbasin (Ashley and Stovall 2004).

4.3.3 Agriculture (Cover type of interest)

Asotin subbasin agriculture operations include dryland/irrigated crops and irrigated and non-irrigated pasture (alfalfa and hay). Cultivated crops include annuals and perennials (e.g., fruit trees, carrots, onions, wheat, and barley). Wheat and barley are the dominant crops; they typically are produced on upland, rolling terrain without irrigation on non-forested areas of the subbasin. Pastures adjacent to streams and riparian areas may be irrigated. Hay pastures typically are composed of several species, while grass seed fields are composed of only one species. (Ashley and Stovall 2004)

Agricultural lands concentrated in valley bottoms have significantly affected grasslands, shrublands, and riparian zones in those areas. Conversion of bottomland habitat into agriculture land uses results in the permanent fragmentation and destruction of functioning native habitats. 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 has also become an issue in the Asotin subbasin with most landowners desiring reductions in ungulate herds....”

IBIS (2003) reports that nearly all of the agriculture habitat type in the Asotin 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 Asotin subbasin is illustrated in Table 4-10.

Table 4-10 GAP Protection Status/Acres of Agriculture and Mixed Environments in the Asotin Subbasin

GAP Protection Status	Acres
High Protection	0
Medium Protection	28
Low Protection	3,172
No Protection	53,763

Source: Ashley and Stovall 2004

Distribution

Primarily due to steep topography and shallow soils, the Asotin subbasin has the lowest percentage of agriculture land within the ecoregion (Figure 4-4). Agricultural production generally occurs wherever it is not precluded by unsuitable soils or topography or public land ownership. (Ashley and Stovall 2004)

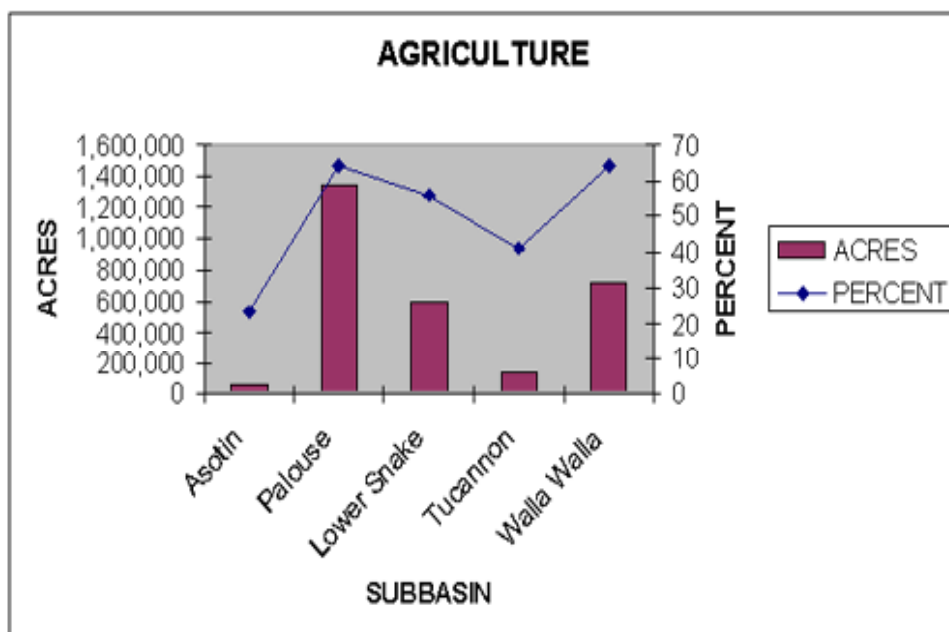


Figure 4-4 Agricultural land use within the Ecoregion

IBIS 2003

4.3.4 Terrestrial Habitat and Protection Status Summary

Table 4-11 summarizes changes in the extent of focal habitats within the Asotin subbasin (Ashley and Stovall 2004). All Asotin subbasin focal habitats have decreased substantially since 1850. Only agriculture (a cover type of interest) has increased.

Table4-11 Changes in Focal Wildlife Habitat Types in the Asotin Subbasin From Circa 1850 (Historic) to 1999 (Current)

Focal Habitat Type	Historic Acres	Current Acres	Acre Change	Percent Change
Ponderosa Pine	34,756	14,997	-19,758	-57
Shrub-steppe	0	0	0	0
Eastside (Interior) Grassland	185,363	134,789	-50,575	-27
Eastside (Interior) Riparian Wetlands	6,096	1,687	-4409	-73
Agriculture	0	57,040	+57,040	---

M. Hudson, WDFW, personal communication, 2003; IBIS 2003; both as cited in Ashley and Stovall 2004

Ashley and Stovall (2004) summarize these habitat losses as follows:

“Forest succession, logging, and development account for the 57 percent total change (loss) in ponderosa pine habitat (IBIS 2003). Similarly, conversion of grasslands to agriculture largely accounts for the entire change (loss) in eastside (interior) grasslands habitat (IBIS 2003)...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.”

An estimated 2 percent (4,976 acres) of the Asotin subbasin is protected by GAP priority 2 status, 33 percent (80,689 acres) is under GAP priority 3 status, and the remainder (65 percent or 160,334 acres) has no degree of protection (GAP priority status 4) (Figure 4-5) (Ashley and Stovall 2004). The Asotin subbasin is the only subbasin in the Ecoregion that has no high protection status (priority 1) lands (Ashley and Stovall 2004). Definitions of various levels of GAP protection status can be found in the introduction of Section 4.

Subbasin ECA priorities and public land ownership are shown in Figure 4-6. There are no ECA Class 1 priority lands in this subbasin (Ashley and Stovall 2004). 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, GAP, 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”.

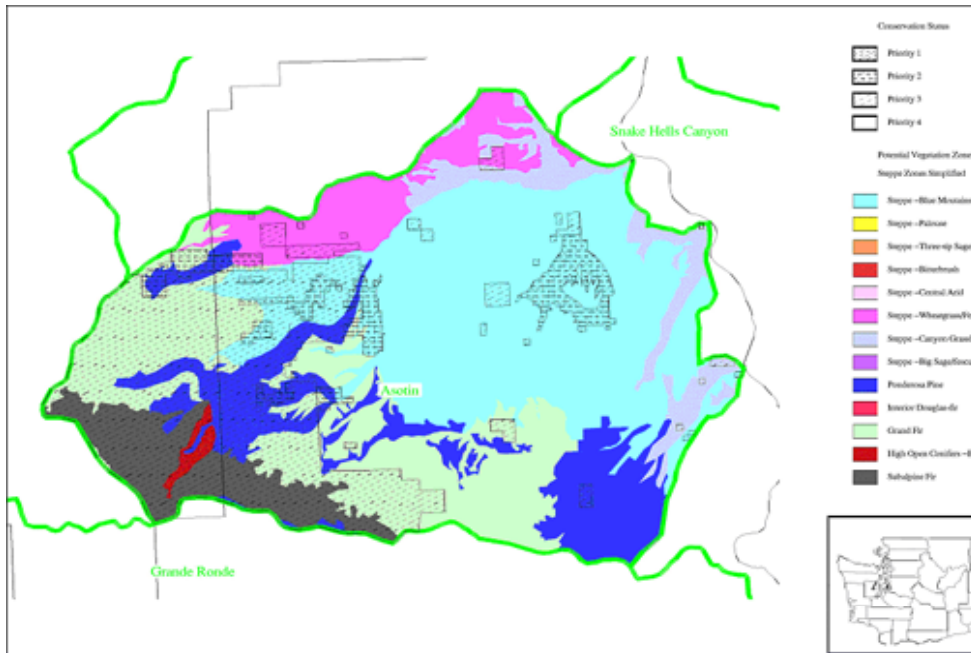


Figure 4-5 Protection Status and Vegetation Zones of the Asotin Subbasin
 Cassidy 1997, as cited in Ashley and Stovall 2004.

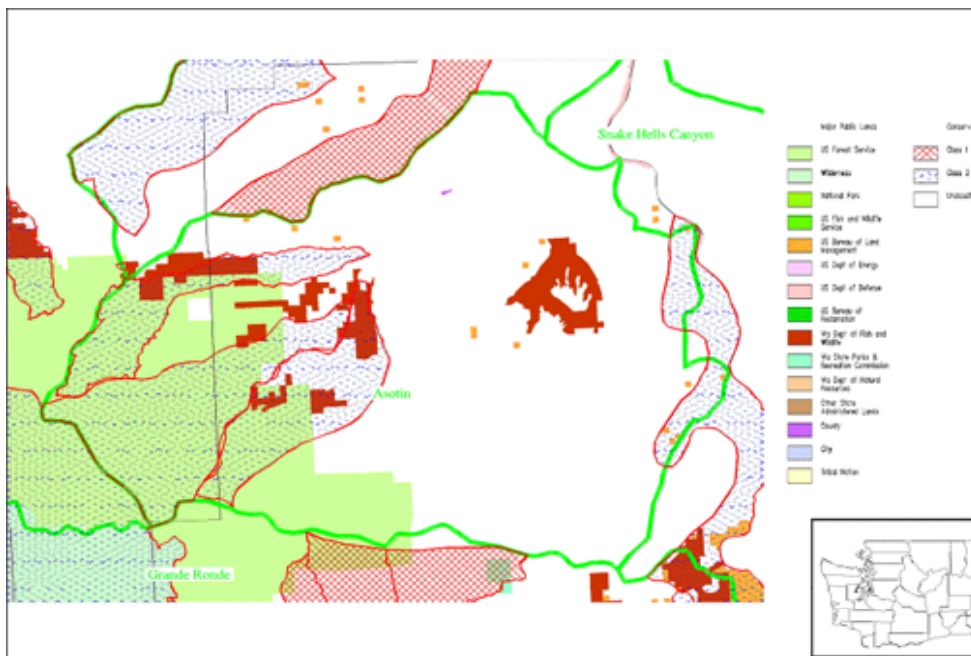


Figure 4-6 ECA and Publicly Owned Lands in the Asotin Subbasin
 ECA 2003, as cited in Ashley and Stovall 2004).

4.4 Focal Species

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

4.4.1 Focal Wildlife Species Assemblage Selection and Rationale

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

- primary association with focal habitats for breeding
- specialist species that are obligate or highly associated with key habitat elements/conditions important in functioning ecosystems
- declining population trends or reduction in their historic breeding range (may include extirpated species)
- special management concern or conservation status such as threatened, endangered, species of concern and management indicator species
- professional knowledge on species of local interest.

There are an estimated 246 wildlife species that occur in the Asotin subbasin (Appendix E). Of these species, 84 are closely associated with wetland habitat and 48 consume salmonids during some portion of their life cycle. Eleven species in the Asotin subbasin are non-native. Nine wildlife species that occur in the Subbasin are listed federally and 43 species are listed in Washington as Threatened, Endangered, or Candidate species, (Ashley and Stovall 2004)

A total of ten species were chosen as focal or indicator species to represent four priority habitats in the Asotin Subbasin (see Table 4-12). Focal species selection rationale and important habitat attributes are described in further detail in Table 31 of Appendix E.

Table 4-12 Focal Species Selection Matrix for the Asotin Subbasin

Common Name	Focal Habitat ¹	Status ²		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
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
Grasshopper sparrow	Eastside (Interior) Grassland	n/a	n/a	Yes	No	Yes	No

Common Name	Focal Habitat ¹	Status ²		Native Species	PHS	Partners in Flight	Game Species
		Federal	State				
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
Mule Deer *	Eastside (Interior) Grassland	n/a	n/a	n/a	n/a	n/a	Yes

¹ SS = Shrubsteppe; RW = Riparian Wetlands; PP = Ponderosa pine

² C = Candidate; SC = Species of Concern; T = Threatened; E = Endangered

Source: Table 30, Appendix E

* Bighorn sheep and mule deer were added at the subbasin-level.

Information regarding management of specific species, where applicable, can be found in Chapter 6. Figures 4-7 to 4-11 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 Appendix E.

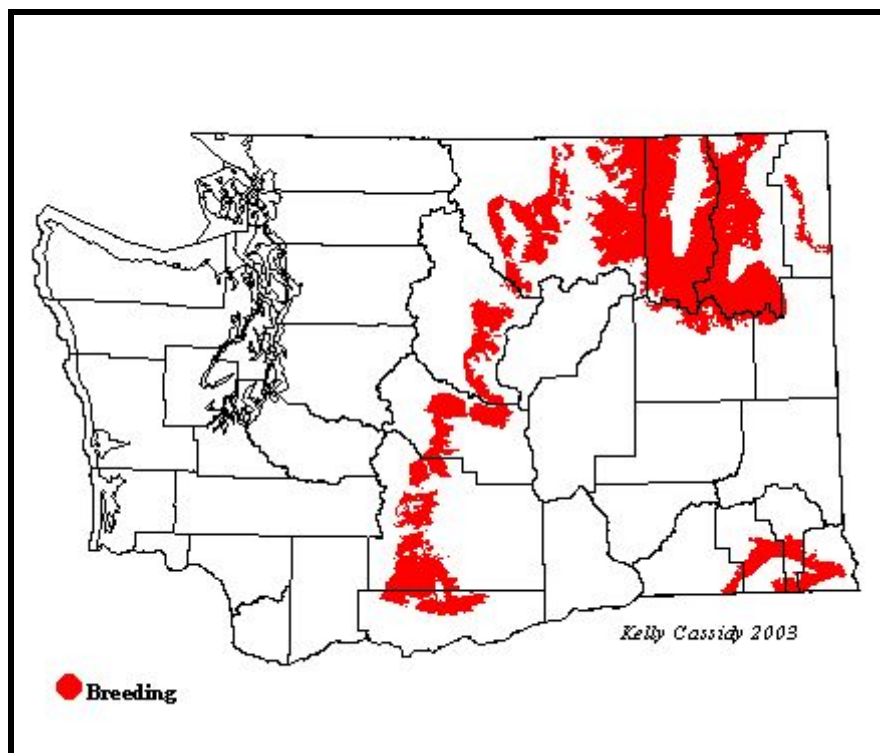


Figure 4-7 Flammulated Owl Distribution, Washington

Source: Kaufman 1996; as cited in Appendix E

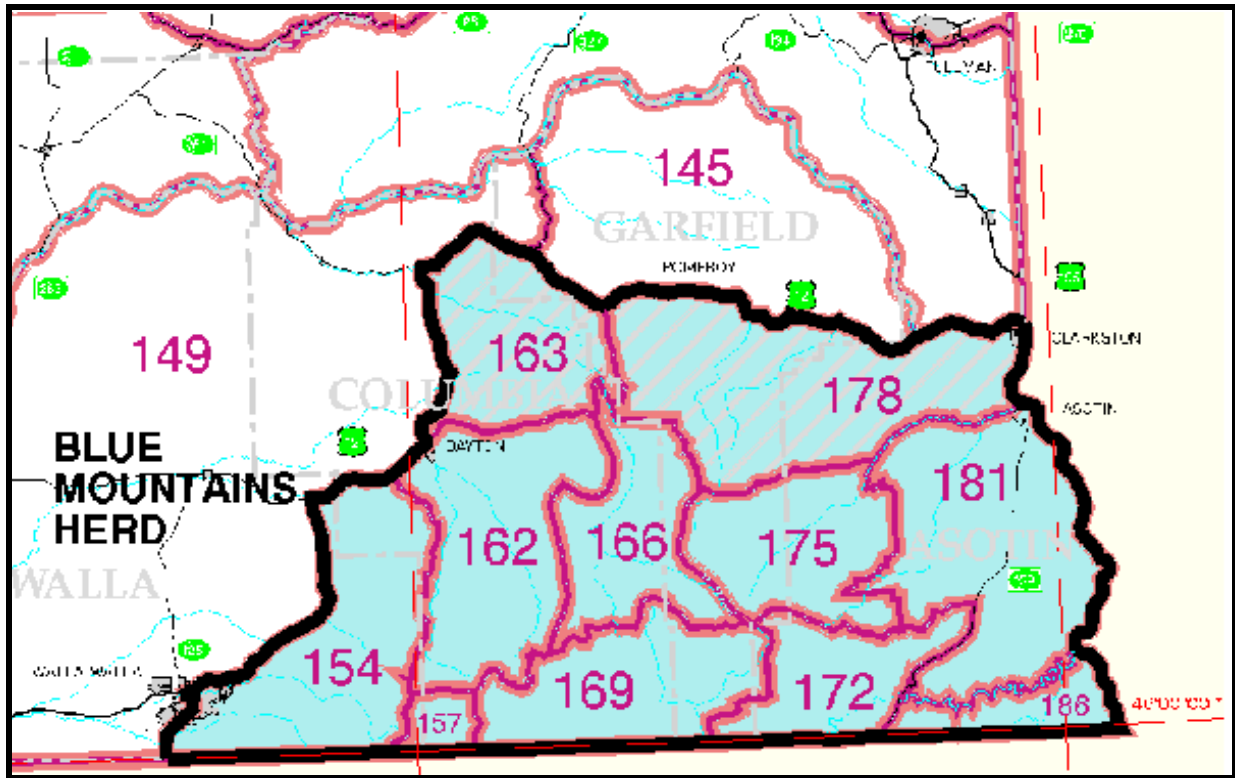


Figure 4-8 Elk Game Management Units in the Southeast Washington Subbasin Planning Ecoregion, Washington

(Fowler 2001, as cited in Ashley and Stovall 2004).

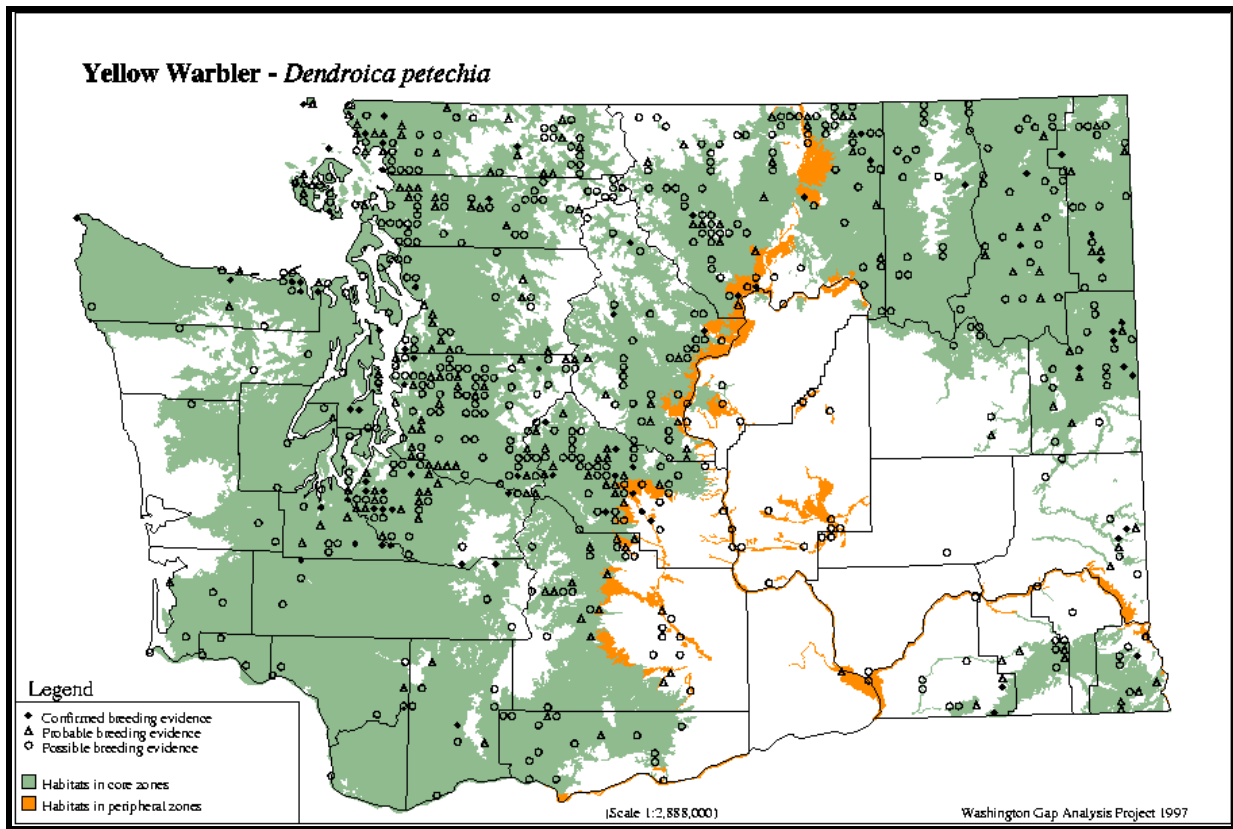


Figure 4-9 Breeding Bird Atlas Data (1987-1995) and Species Distribution for Yellow Warbler

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



Figure 4-10 Geographic Distribution of American Beaver

Source: Linzey and Brecht 2002, as cited in Ashley and Stovall 2004.

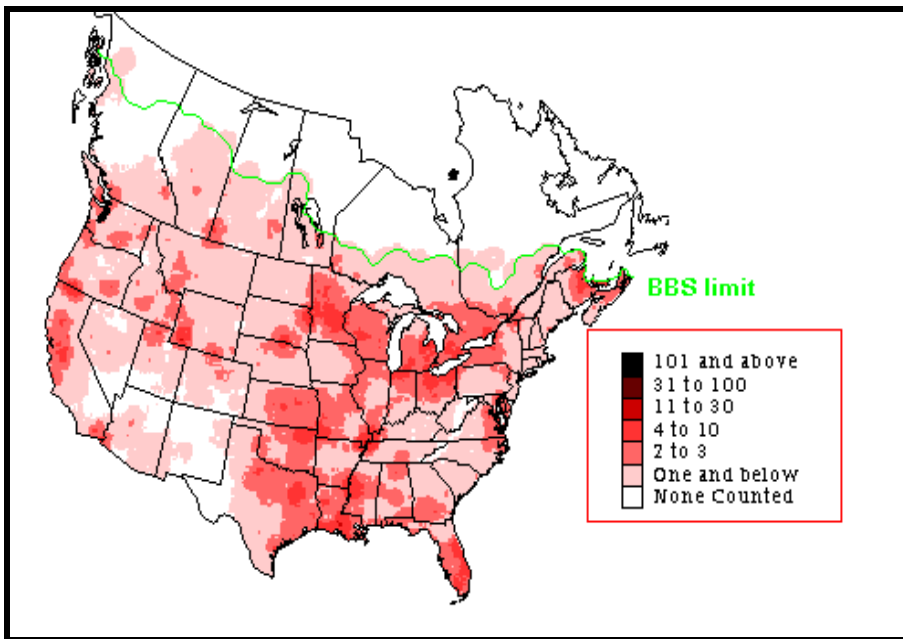


Figure 4-11 Great Blue Heron Summer Distribution

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

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.

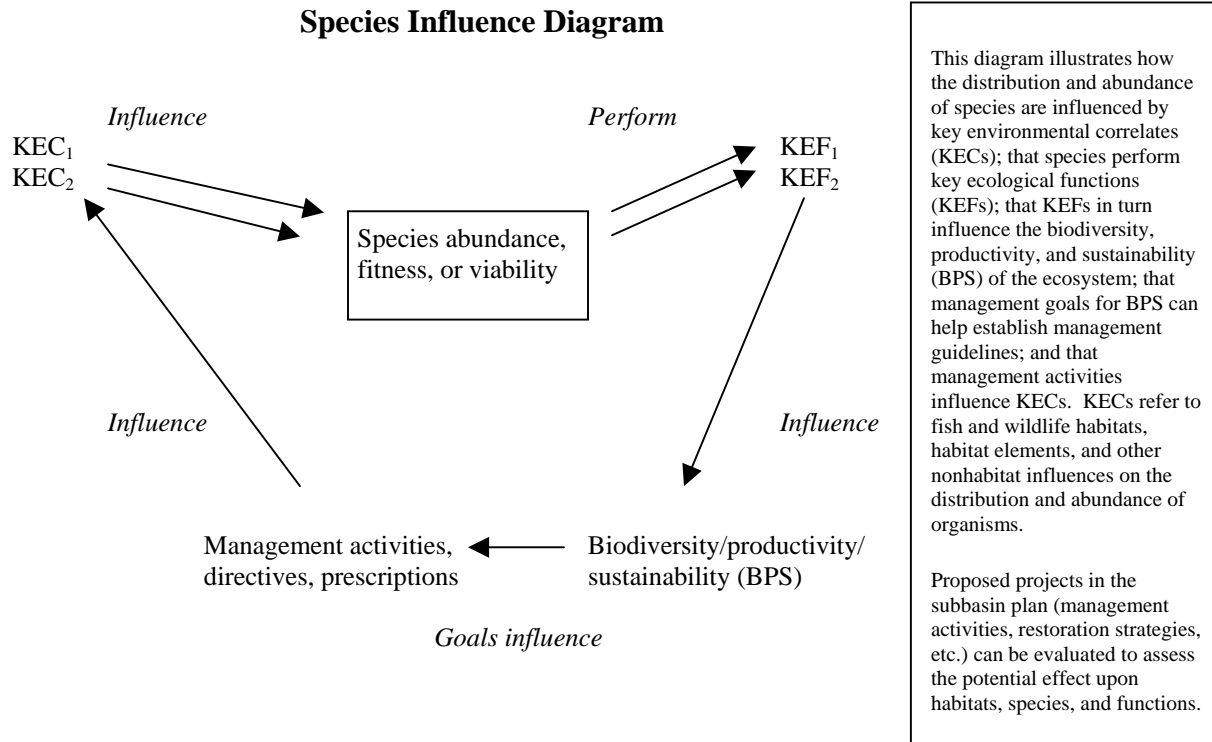


Figure 5-1 Species Influence Diagram

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)¹¹ 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.

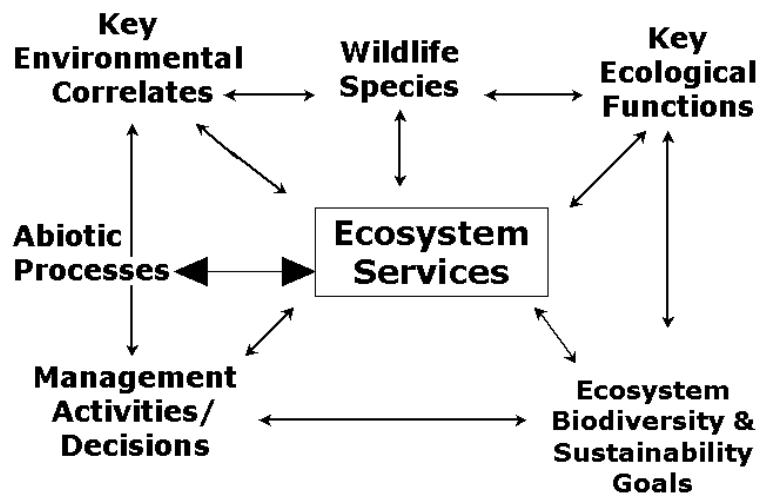


Figure 5-2 Integration of Abiotic Processes (Habitat Forming Processes)

Source: T.A. O'Neil and B. Marcot (2004).

¹¹ 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 cryptogammic 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 Asotin 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 Washington Department of Fish and Wildlife (WDFW) and Asotin Inventory Assessment (see Appendix F).

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

Table 6-1 Programmatic Activities within the Asotin Subbasin

Administering Agency	Regulation	Required when...	Intent
The Northwest Power and Conservation Council (NWPCC)	1980 Northwest Electric Power Planning and Conservation Act	charged with developing a 20-year plan to deliver power to the region and a Fish and Wildlife Program funded by the Bonneville Power Administration (BPA)	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)	An action has the potential to harm or kill an endangered or threatened species	Protect endangered or threatened species
US Army Corps of Engineers	USACE 404 Permits and Section 10 Permits	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	Protect aquatic life and water resources
Natural Resource Conservation Service (NRCS)	Farm Security and Rural Investment Act of 2002 ("Farm Bill")	Through the Farm Bill programs, NRCS provides technical and financial assistance to landowners and operators to voluntarily apply conservation on their land. Implementing the programs helps landowners and operators reduce soil erosion, protect streams and rivers, restore and establish fish and wildlife habitat, and improve air and water quality.	Provide leadership in a partnership effort to help people conserve, maintain, and improve natural resources and the environment. Promote harmony between people and the land.
Farm Service Agency (FSA)	CRP and other programs	"Grassroots" delivery system of farm programs to Agency customers. FSA's programs	Ensure the well-being of agriculture, the environment and the public through efficient and

Administering Agency	Regulation	Required when...	Intent
		are delivered through an extensive network of field offices. State and County Office elected committees, comprised of farmers in the local area, are responsible for overseeing FSA services delivered to the farming community. This extensive network enables FSA to maintain close relationships with Agency customers and successfully address customer's needs in an effort to continually improve the delivery of FSA programs.	equitable administration of farm commodity programs; emergency and disaster assistance; domestic and international food assistance and international export credit programs.
Washington Department of Ecology (WDOE)	Total Maximum Daily Load (TMDL) Program	Streams are on the 303(d) list for violating state water quality standards	Bring streams into compliance with state water quality standards
WDFW	Hydraulic Code and Hydraulic Code Rules	Constructing hydraulic projects which affect the flow or channel bed of any waters of the state	Protect fish life and habitat areas
Washington Department of Transportation (WADOT)	Road maintenance/ transportation - RCW 77.55.060	Constructing a dam or other feature which obstructs fish passage	Mitigate for fish passage barriers
Cities and counties, with technical assistance from Department of Community, Trade, & Economic Development	Growth Management Act (GMA) – RCW 30.70A	State and local governments are planning for future growth and development	Control growth in natural resource and critical areas for fish and wildlife
Cities and counties, with technical assistance from Dept of Ecology	Shoreline Management Act (SMA) – RCW 90.58	Regulating shoreline development	Protect shoreline environmental resources and uses
Department of Ecology and local planning units (involves collaboration with local government, tribes, and public citizens)	Watershed Planning Act – RCW 90.82	(Voluntary process to produce collaborative watershed management plans)	Integrated protection and management of watersheds; primary focus is on instream flows and water quantity with optional components of water quality and habitat

Source: Appendix F

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 F.

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

Program	Purpose	Additional information
		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 F

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 Asotin 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 E and the Asotin Creek Subbasin Summary (Stovall 2001).

It is important to note that the Asotin County Conservation District (ACCD) plays a key role 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 Asotin 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

Agency		Purpose	Activities
Natural Resource Conservation Service (NRCS)		Provide leadership in a partnership effort to help people conserve, maintain, and improve natural resources and the environment. Promote harmony between people and the land.	Through the Farm Bill programs, NRCS provides technical and financial assistance to landowners and operators to voluntarily apply conservation on their land. Implementing the programs helps landowners and operators reduce soil erosion, protect streams and rivers, restore and establish fish and wildlife habitat, and improve air and water quality.
Farm Service Agency (FSA)		Ensure the well-being of agriculture, the environment and the public through efficient and equitable administration of farm commodity programs; emergency and disaster assistance; domestic and international food assistance and international export credit programs.	“Grassroots” delivery system of farm programs to Agency customers. FSA’s programs are delivered through an extensive network of field offices. State and County Office elected committees, comprised of farmers in the local area, are responsible for overseeing FSA services delivered to the farming community. This extensive network enables FSA to maintain close relationships with Agency customers and successfully address customer’s needs in an effort to continually improve the delivery of FSA programs.
Tribal	Nez Perce Tribe (NPT)	Manage, protect, and enhance treaty fish and wildlife resources for future generations	Restoration and mitigation activities
State	WDFW	Protect and restore fish and wildlife habitat	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
Local	Asotin County Conservation District	Advocate, educate and assist in responsible land management and agricultural practices that conserve and improve air, soil, and water	Continue private land habitat improvement programs in uplands,

Agency		Purpose	Activities
		quality and fish and wildlife habitat.	riparian and instream areas. Reduction of upland and riparian erosion and sedimentation and riparian and instream enhancements to protect ESA Listed salmonid stocks spawning and rearing habitat. Assist with information and education of voluntary programs to protect and restore critical habitat for steelhead and Chinook specifically. Assist in watershed planning processes and adoption of best management practices designed to improve natural resources.
County Weed Boards (ex. Asotin County Noxious Weed Control Board)		eradicate, contain, and/or control noxious weed infestations which threaten wildlife habitat in Asotin County	Noxious weed control
Asotin County Government		Preserve and protect local streams and riparian areas	Local regulations include: shorelines master program, county zoning ordinance, flood damage prevention ordinance, critical areas ordinance
Agricultural Community		Protect and enhance private lands for long-term sustainability for present and future generations	Ridge-top-Ridge-top "grassroots" activities designed to utilize Best Management Programs for sediment reduction and protection of upland, riparian and instream habitat. Continue education as to the importance of private land ownership and look for opportunities to maintain agricultural designations with long-term conservation easements for continued protection of habitat on private lands.
Other	Rocky Mountain Elk Foundation (RMEF)	Protect and enhance grassland and riparian wetland habitats	Noxious weed control; land acquisition and conservation

Source: Appendix F and (Stovall 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 Asotin 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.

The following description of the Columbia River Anadromous Fish Restoration Plan (Wy-Kan-Ush-Mi Wa-Kish-Wit) was provided by the Nez Perce Tribe.

“The Columbia River Anadromous Fish Restoration Plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes, Wy-Kan-Ush-Mi Wa-Kish-Wit, is the culmination of the leadership and wisdom of these tribes fish and wildlife committees and the technical work of the reservation fisheries and the Columbia River Inter-Tribal Fish Commission staffs. This tribal salmon restoration plan outlines the cultural, biological, legal, institutional and economic context within which the region’s salmon restoration efforts are taking place. This long-term plan addresses virtually all causes of salmon decline and roadblocks to salmon restoration for all anadromous fish stocks: Chinook, coho, sockeye, steelhead, chum, eels (Pacific Lamprey) and sturgeon, above Bonneville Dam. This area encompassing about three quarters of the Columbia River Basin, is where most of the tribes’ treaty-reserved fishing places and fish resources are located.”

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 303(d) streams in the Asotin subbasin; however, no TMDLs have been approved at this time. For more information about the TMDL program in Washington, refer to the Department of Ecology’s website: <http://www.ecy.wa.gov/programs/wq/tmdl>. Water quality issues continue to be addressed in the Asotin subbasin both through the TMDL process and via the implementation of independent projects implemented by local watershed groups.

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. There are currently no hatchery programs operating within the Asotin subbasin. However, previous hatchery releases of steelhead occurred in the subbasin during the mid 1980s to late 1990s. In addition, ongoing steelhead and Chinook hatchery adults straying from other nearby subbasins may occur. (see Chapter 3)

Currently harvest regulations in the subbasin are intended to protect steelhead and Chinook species. As noted in WDFW Asotin subbasin Aquatic Assessment (Appendix B), “Descriptions of fisheries and their estimated effects on listed species of fish in the Snake River basin are discussed in the WDFW Fishery Management and Evaluation Plan (FMEP) for the incidental Take of listed species submitted under ESA Section 10/4d (submitted to NOAA-fisheries on Dec. 2, 2002).” 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 Nez Perce tribe also has treaty harvest rights within the subbasin. The following detail regarding tribal harvest rights was provided by the Nez Perce Tribe:

“The Nez Perce Tribe has usual and accustomed fishing locations not only within that portion of the 13,204,000 acres that have been found to been exclusively used and occupied by the Tribe including the major portions of the Snake, Salmon and Clearwater Rivers and their drainages situated in three states-Washington, Oregon, and Idaho (Figure 6-1), but there are many Nez Perce usual and accustomed fishing sites located beyond that aboriginal territory as well. The best example of that is represented by the rights the Nez Perce Tribe to fish pursuant to treaty rights at usual and accustomed fishing areas in the lower Columbia River as determined by the *U.S. v. Oregon* litigation.

Salmon and other migratory fish species are an invaluable food resource and an integral part of the Nez Perce Tribe’s culture. Anadromous fish have always made up the bulk of the Nez Perce tribal diet and this dependence on salmon was recognized in the treaties made with the Tribe and the United States. In 1855, representatives of the United States government negotiated a treaty with the Nez Perce in which the Tribe expressly reserved:

The exclusive right of taking fish in all the streams where running through or bordering said reservation is further secured to said Indians; as also the right of taking fish at all usual and accustomed places in common with citizens of the Territory; and of erecting temporary buildings for curing, together with the privileges of hunting, gathering roots and berries, and pasturing their horses and cattle upon open and unclaimed land (12 Stats., 957-Article 3). Treaty of 1855.

Thus, the legal, historic, economic, social, cultural, and religious significance of the fish to the Nez Perce Tribe continues to this day, which makes the decline of fish populations in the Snake River Basin a substantial detrimental impact to the Nez Perce way of life.

Territory of the Nez Perce Tribe

Reproduction of map depicting findings of Indian Claims Commission Docket No. 175



© 1995 Nez Perce Tribe

Nez Perce ICC Territory: The ICC boundary as described in Docket No. 175 18 1, 11 (1967). Mapped onto 1:100,000 scale U.S. Geological Survey map sheet and digitized, with the registration residual mean square error <0.01 inches. Map error at 1:800,000 scale is approximately 670 feet or 0.13 miles.

Nez Perce 1855 Reservation: The ICC boundary as described in the "Treaty with the Nez Percés, 1855," and interpreted by the Indian Claims Commission's map from Docket 175. The boundary was mapped onto 1:100,000 scale U.S. Geological Survey map sheets and digitized with the registration residual mean square error < 0.01 inches. Map error at 1:800,000 scale is approximately 670 feet or 0.13 miles.

Nez Perce 1863 Reservation: The ICC boundary as described in the "Treaty with the Nez Percés, 1863." The boundary was mapped by the Bureau of Indian Affairs onto 1:24,000 scale U.S. Geological Survey map sheets and digitized with the registration residual mean square error < 0.03 inches. Map error at 1:800,000 scale is approximately 200 feet or 0.04 miles.

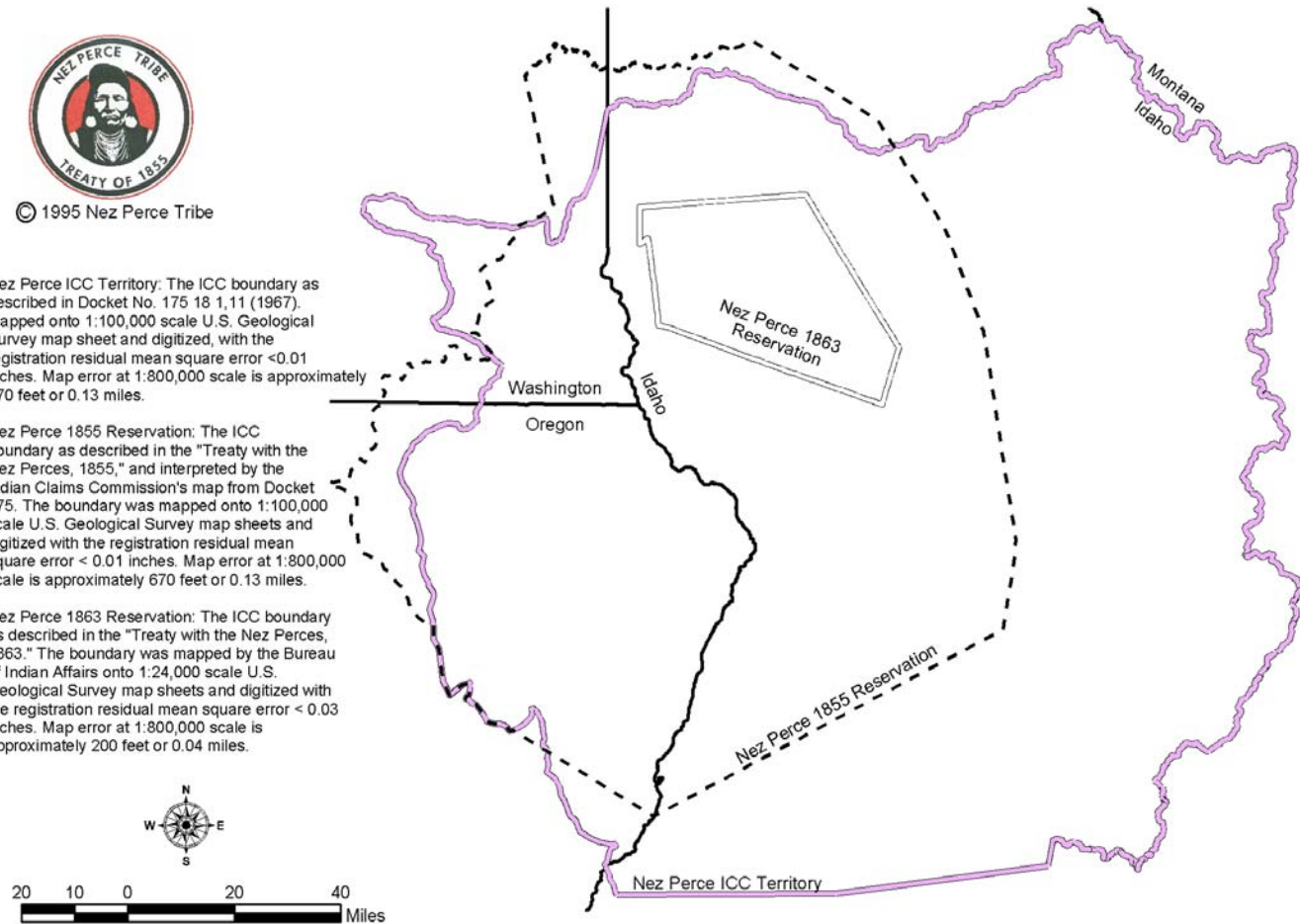


Figure 6-1 Nez Perce Ceded Territory and Reservation Land

Source: Nez Perce Tribe 2004.

The Nez Perce Tribe has what might be deemed near exclusive jurisdiction to regulate tribal members exercising treaty reserved fishing rights at all off reservation, usual and accustomed locations in the Snake River Basin. As a general rule, state jurisdiction within Indian Country is preempted both by federal protection of tribal self-government and by federal treaties and statutes on other subjects relating to Indians, tribes, their property and federal programs.

The Nez Perce Tribe's Department of Fisheries Resource Management has a Harvest program whose purpose is to provide fisheries harvest management plans, evaluations and assessments (e.g. Endangered Species Act Biological Assessments, Tribal Resource Management Plans, co-manager coordination and harvest documentation) necessary to procedurally implement treaty reserved fishing rights. Harvest monitoring activities are enormous in scope, encompassing fishing conducted year-round from the mainstem Columbia River (Zone 6) up to the headwaters of the Clearwater River on the Montana/Idaho border. Within this area, the Tribe has the reserved right to access fully 50 percent of the fish available for harvest. The Snake River Basin fisheries proposed by the Nez Perce Tribe have been grouped into six separate geographic management units within the Treaty of 1855 Reservation boundary where ceremonial, subsistence, and commercial fisheries have historically occurred for the Tribe: 1) Mainstem Snake River (includes Asotin and Lower Snake tributaries); 2) Tucannon River Subbasin; 3) Clearwater River Subbasin; 4) Salmon River Subbasin; 5) Grande Ronde River Subbasin, and 6) Imnaha River Subbasin. The Tribe is responsible for developing the plans necessary to insure that proposed harvest is biologically and legally sound and that it occurs (i.e. take numbers, locations, dates and gear types) in the manner designed."

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 Asotin 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. These projects are listed in Appendix 7 of that plan (WDFW 2001).

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.

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 enhancing aquatic habitat within the Asotin subbasin have been implemented by federal, state, tribal and local entities. A comprehensive list of these projects was compiled and incorporated into the Asotin 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 581 fish habitat-related projects have been implemented in the Asotin subbasin (5 are incomplete at present). Of this

number, 451 affected habitat directly, while the remainder dealt with administration, public education and information, project evaluation, and equipment (see Appendix F).

These projects focused on several key issues:

- upland issues (60%)
- riparian restoration projects (23.9%)
- instream projects (13.3%)
- monitoring activities (2.7%)

Table 6-4 further breaks down these categories and shows that over 60 percent of recent projects have addressed sedimentation issues, over 25 percent have targeted water quality and/or riparian function, and about 16 percent have concentrated on increasing instream habitat (see Appendix F).

Table 6-4 General Focus of Projects Implemented in the Asotin Subbasin Since 1996

General Focus of Project	Proportion of Projects
Geomorphic instability and insufficient instream habitat	16.3%
Sedimentation	32.9%
Sedimentation and agriculture development	21.5%
Water quality	0.5%
Water quality and riparian function	22.9%
Water quality and sedimentation	1.2%
Water quality, agriculture development and sedimentation	2.4%
Water quality, sedimentation, riparian function and agriculture development	2.2%

Expressed in terms of the proportion of the total number of projects with direct habitat impacts.

Source: Table 5, Appendix F

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

- instream habitat construction/bioengineering
- direct seeding
- establishment of permanent grasses/pastures/haylands
- sediment basin construction/ maintenance
- upland multi-purpose pond construction
- terrace construction
- reforestation/tree planting
- spring development
- erosion control (critical area planting, grassed waterways, conservation cover)
- pipeline installation

- water gaps and windbreaks
- riparian fencing and tree planting

For more specific details these activities, refer to the Asotin Inventory Draft (Appendix F).

Although these projects have been located in almost every area within the subbasin, they have largely targeted the geographic areas (GAs) with high restoration potential (see Chapter 3 for more information about these GAs). As noted in Appendix F, “All geographic areas but one – the Upper NF Asotin – have received at least some attention. Over 60 percent of recent projects have targeted the Pintler Creek, lower George Creek and the upper Asotin Creek GAs. This (very approximate) allocation of effort is roughly consistent with the current diagnosis, as Pintler Cr, lower George and the upper Asotin areas are ranked 3, 4 and 1, respectively, on the unscaled list of priority restoration areas. In the future, however, considerably more effort should be directed toward the Charley Creek, Lower NF Asotin and lower SF Asotin GAs.”

Table 6-5 shows the distribution of projects by GA. The unscaled values mean that the length of the GA has not been taken into account – in other words, the data is not displayed per unit area.

Table 6-5 Approximate Allocation of Effort by Geographic Area Among Fish Habitat Projects Implemented in Asotin Creek Since 1996.

Geographic Area	Unscaled Preservation Value	Unscaled Restoration Potential	Number of Projects	% Total Projects
Pintler (mouth to access limit)	13	3	192	37.2%
Upper Asotin (above Headgate Dam to forks)	3	1	87	16.9%
Lower George (mouth to Wormell)	9	4	77	14.9%
Middle Asotin (George to Headgate Dam incl.)	5	10	44	8.5%
Charley (mouth to access limit)	2	2	36	7.0%
Lower SF (mouth to Alder)	6	7	26	5.0%
Upper George (Wormell to access limit)	12	6	22	4.3%
Lower Asotin (mouth to George)	8	8	21	4.1%
NF Tribs (Lick, SF of NF, Middle Branch)	10	9	4	0.8%
Upper George Tribs (Wormell Heffelfinger Coombs)	11	12	3	0.6%
Lower NF (mouth to SF of NF)	1	5	3	0.6%
Upper SF (Alder to access limit)	4	11	1	0.2%
Upper NF (SF of NF to access limit)	7	13	0	0.0%
Total			516	100.0%

Source: Table 6, Appendix F

Figures 6-2 to 6-11 maps have been taken from the Asotin Creek Subbasin Summary (Stovall 2001) and illustrate the locations of many BPA and non BPA-funded projects from 1996-2000. Similar maps are unavailable for projects completed after 2000 but have been included in the discussion above. Additional information and detail regarding project implementation from 1996-2000 can be found in the Asotin Creek Subbasin Summary (Stovall 2001)

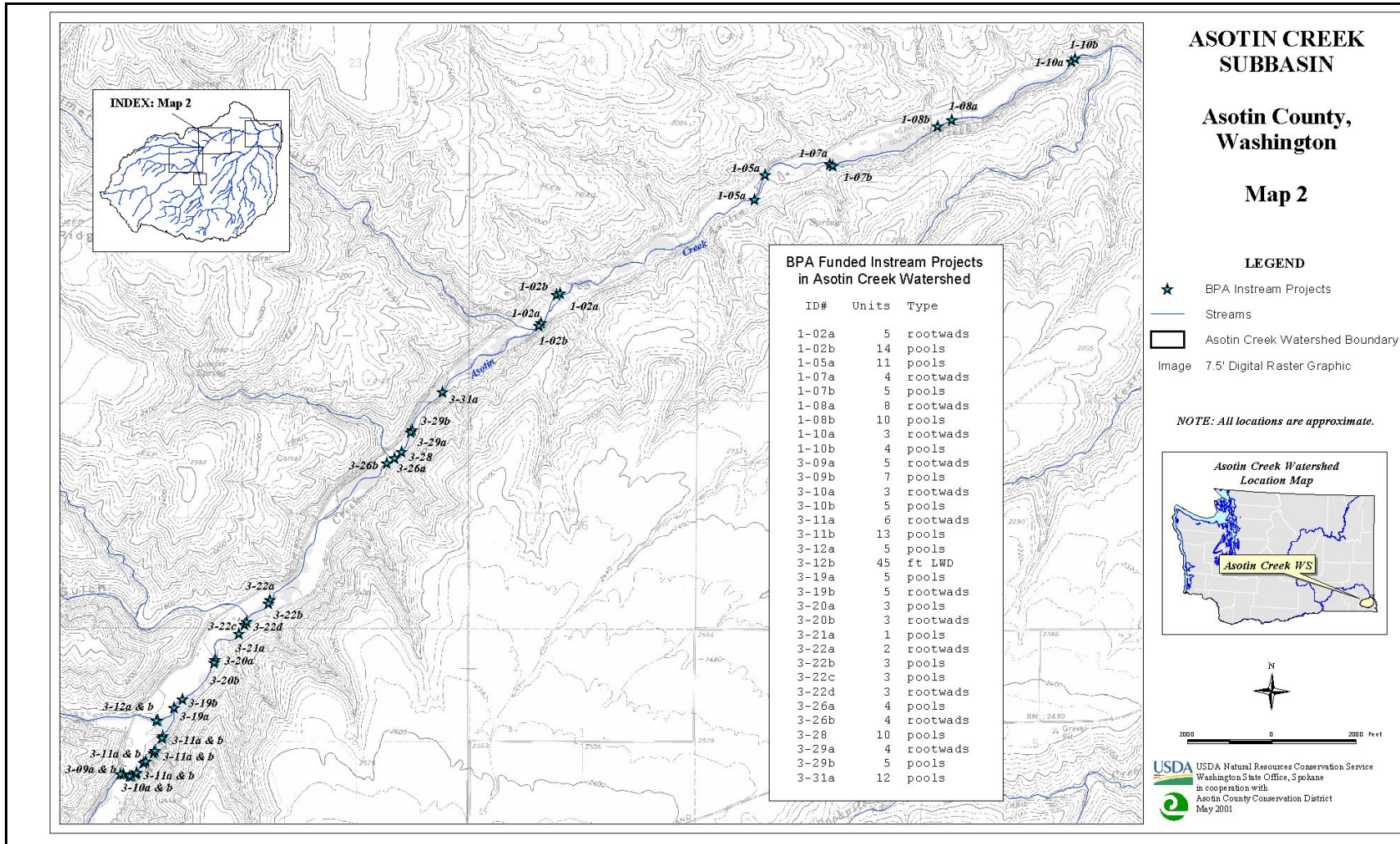


Figure 6-2 BPA-Funded Instream Projects (1996-2000): Mainstem Asotin Creek

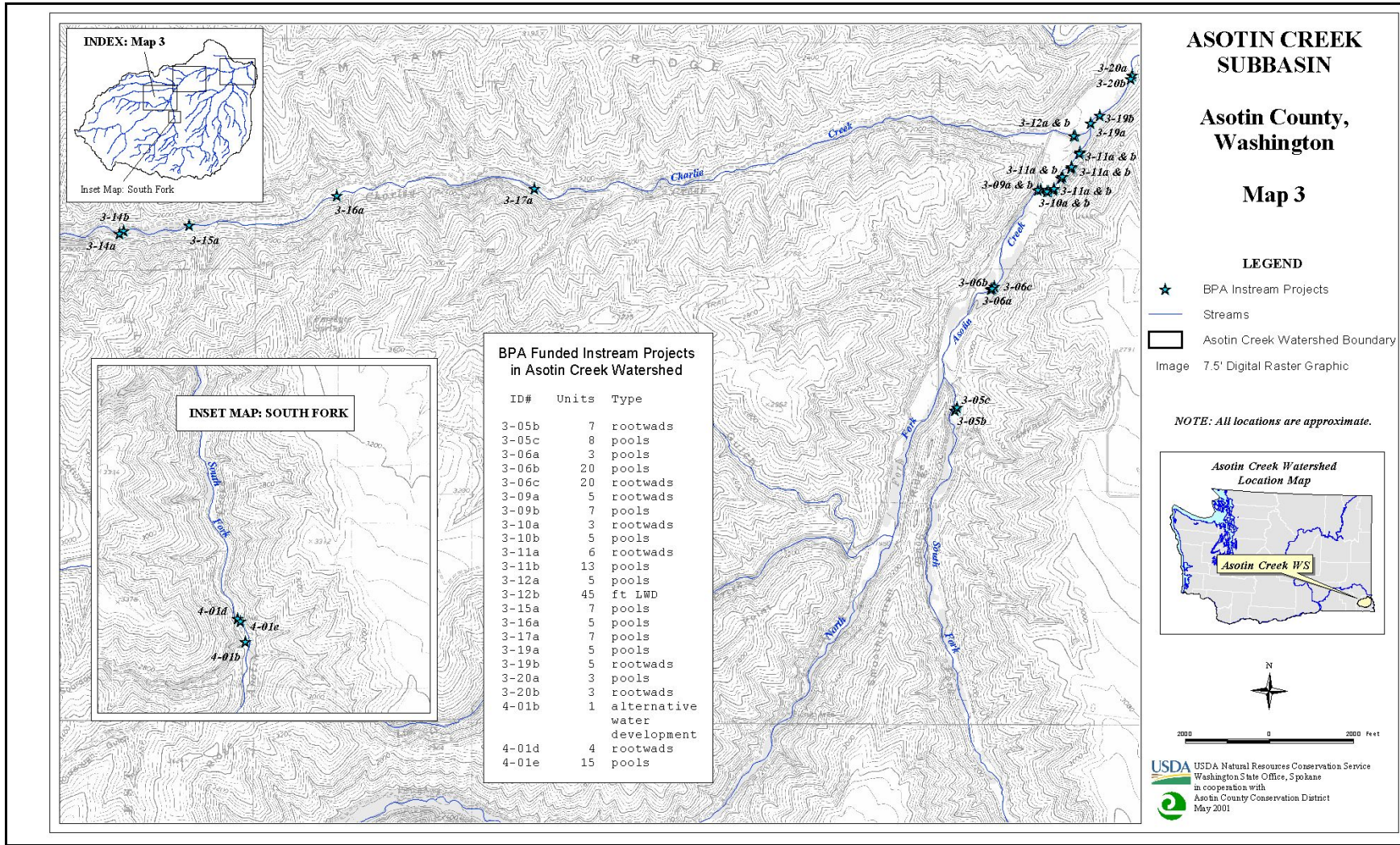


Figure 6-3 BPA-Funded Instream Projects (1996-2000): Tributaries and Upper Asotin Creek

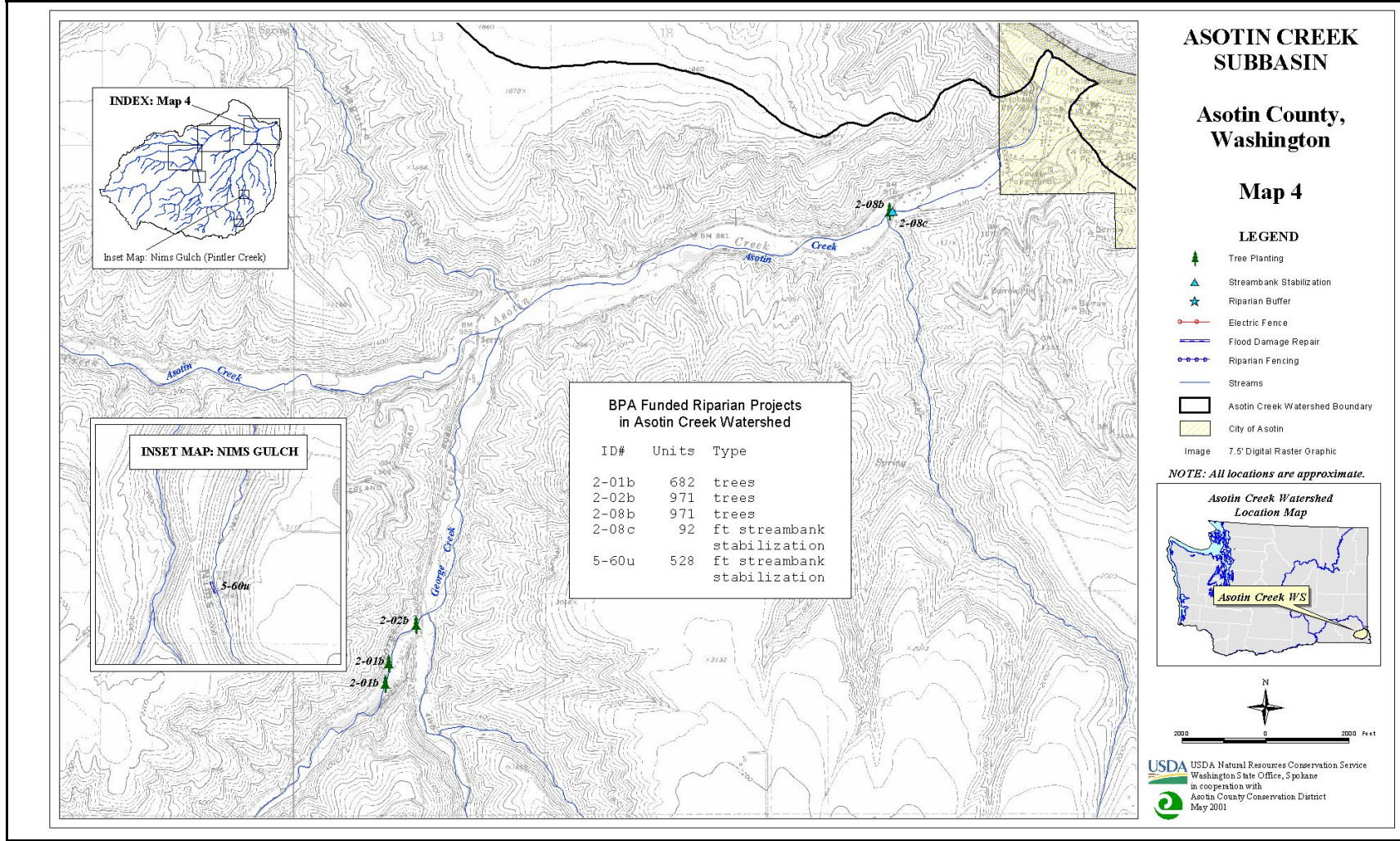


Figure 6-4 BPA-Funded Riparian Projects (1996-2000): Lower Asotin Creek

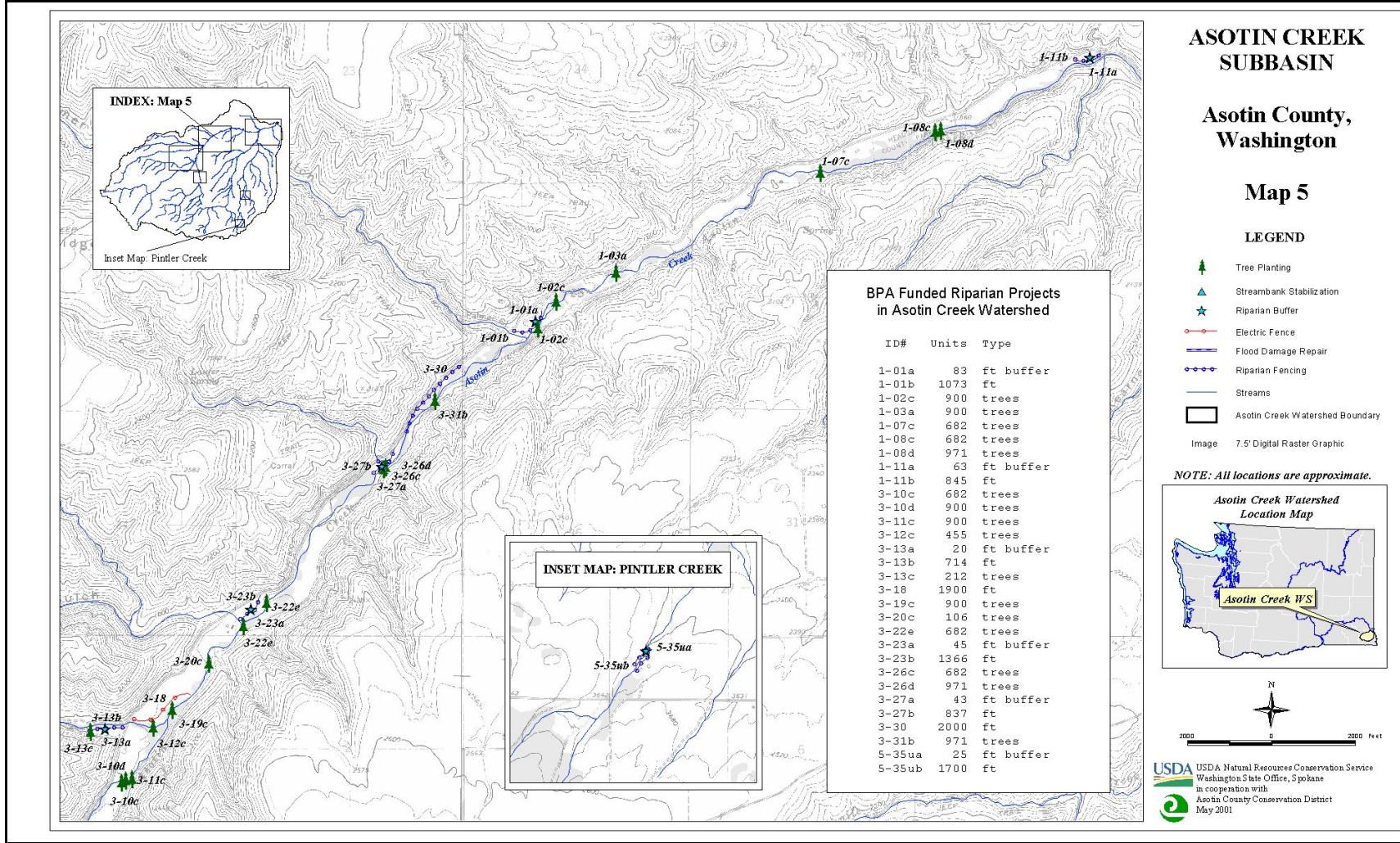


Figure 6-5 BPA-Funded Riparian Projects (1996-2000): Mainstem Asotin Creek

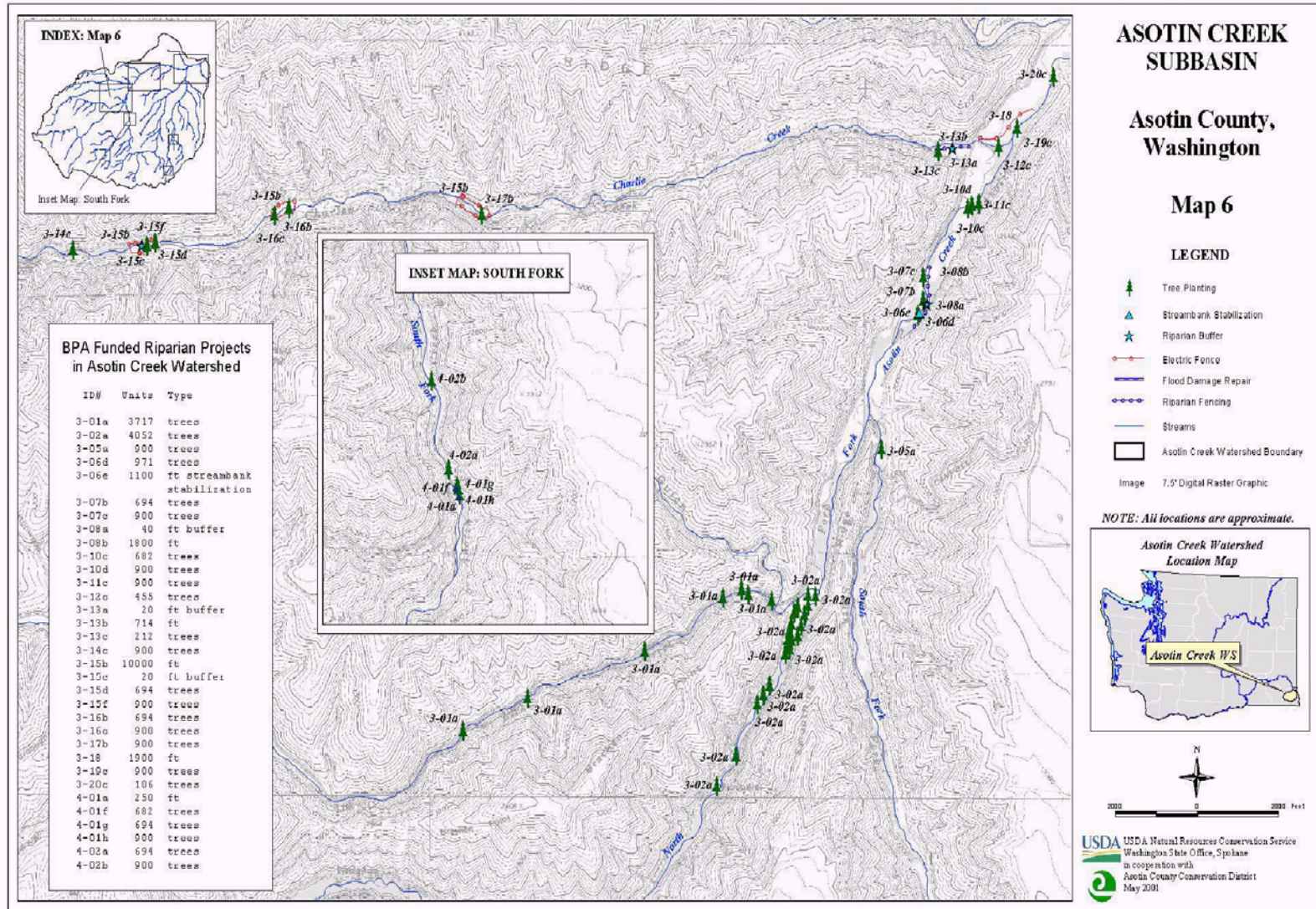


Figure 6-6 BPA-Funded Riparian Projects (1996-2000): Tributaries and Upper Asotin Creek

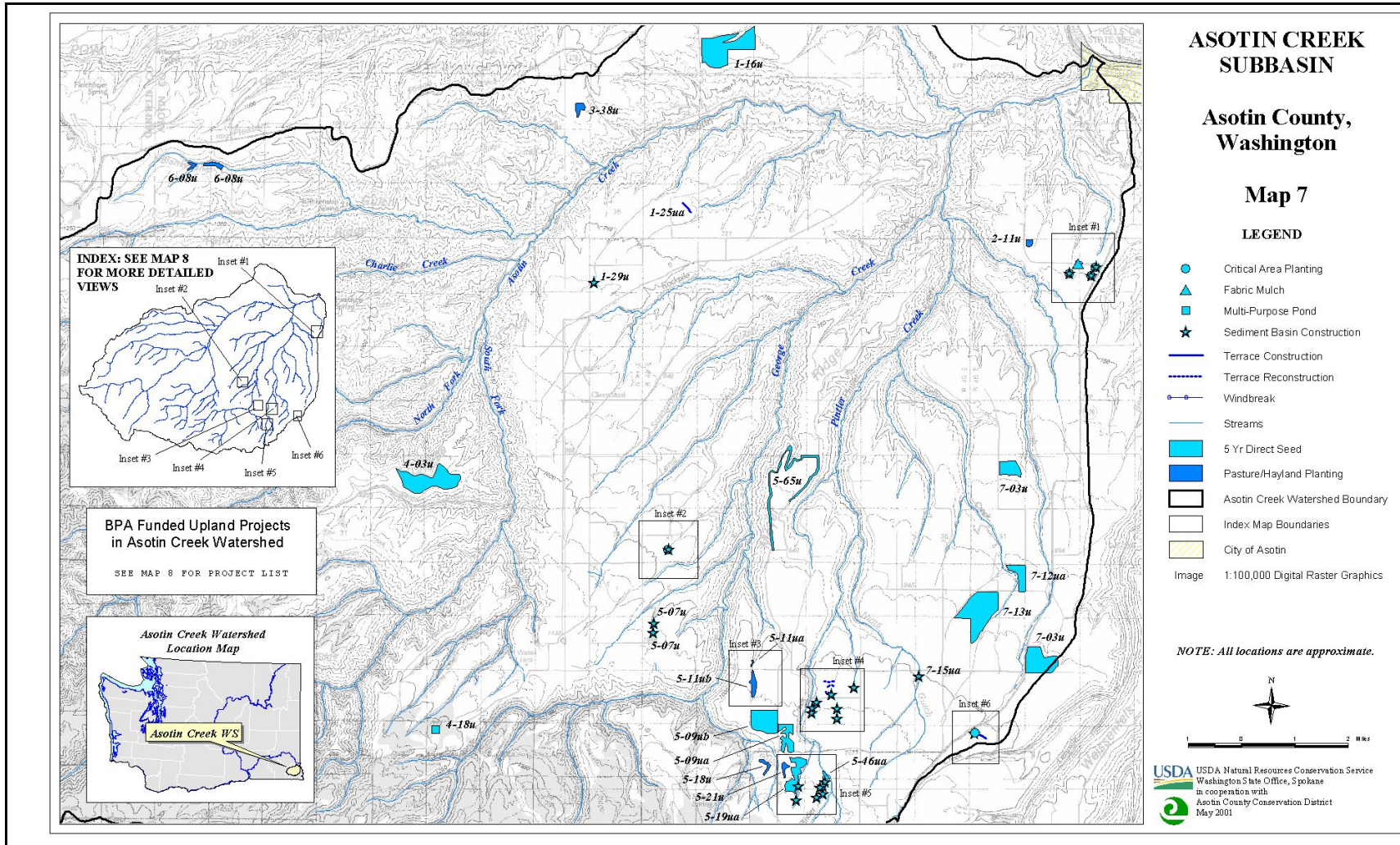


Figure 6-7 BPA-Funded Upland Projects (1996-2000): Lower Asotin Creek Watershed

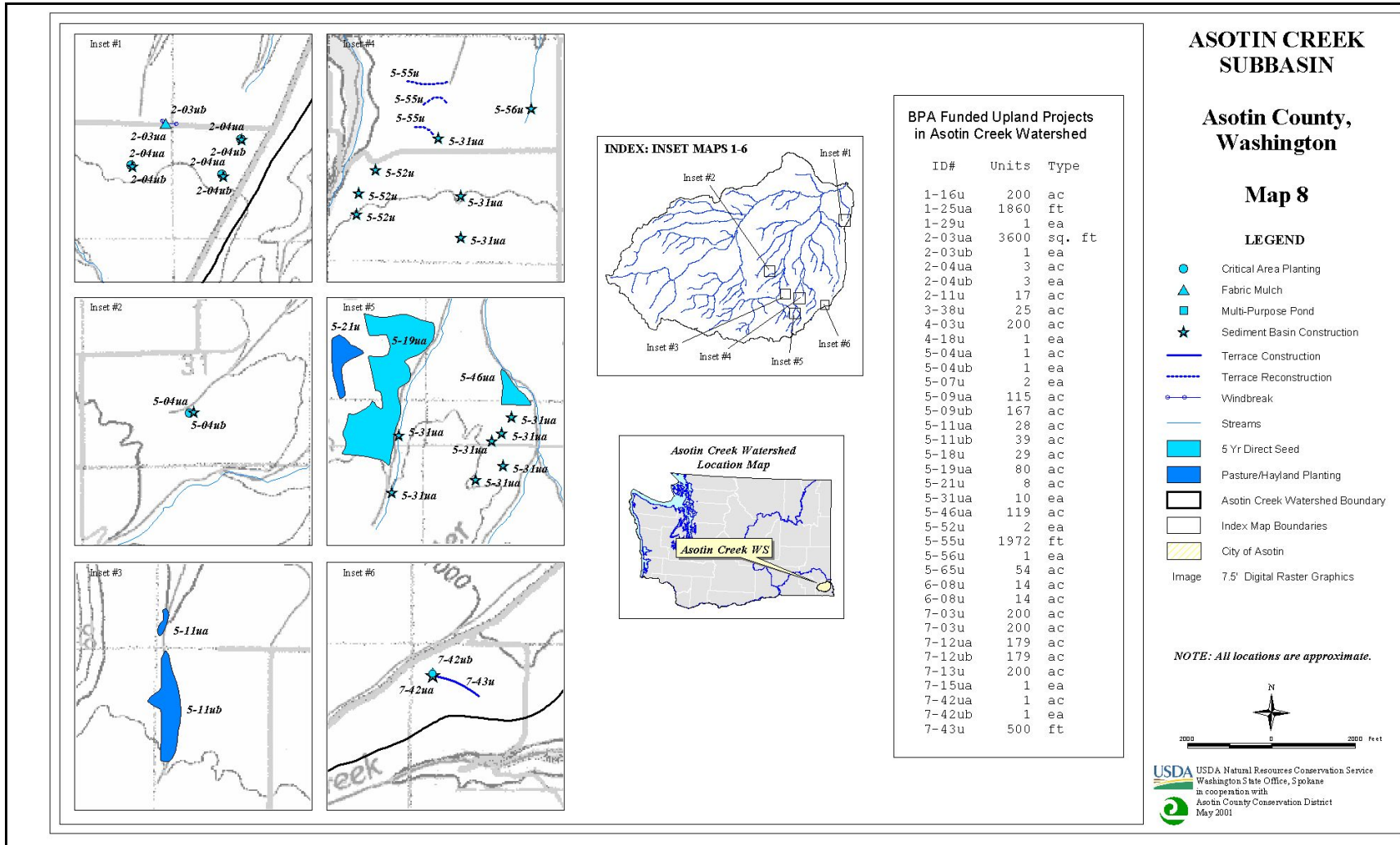


Figure 6-8 BPA-Funded Riparian Projects (1996-2000): Upper Asotin Creek Watershed

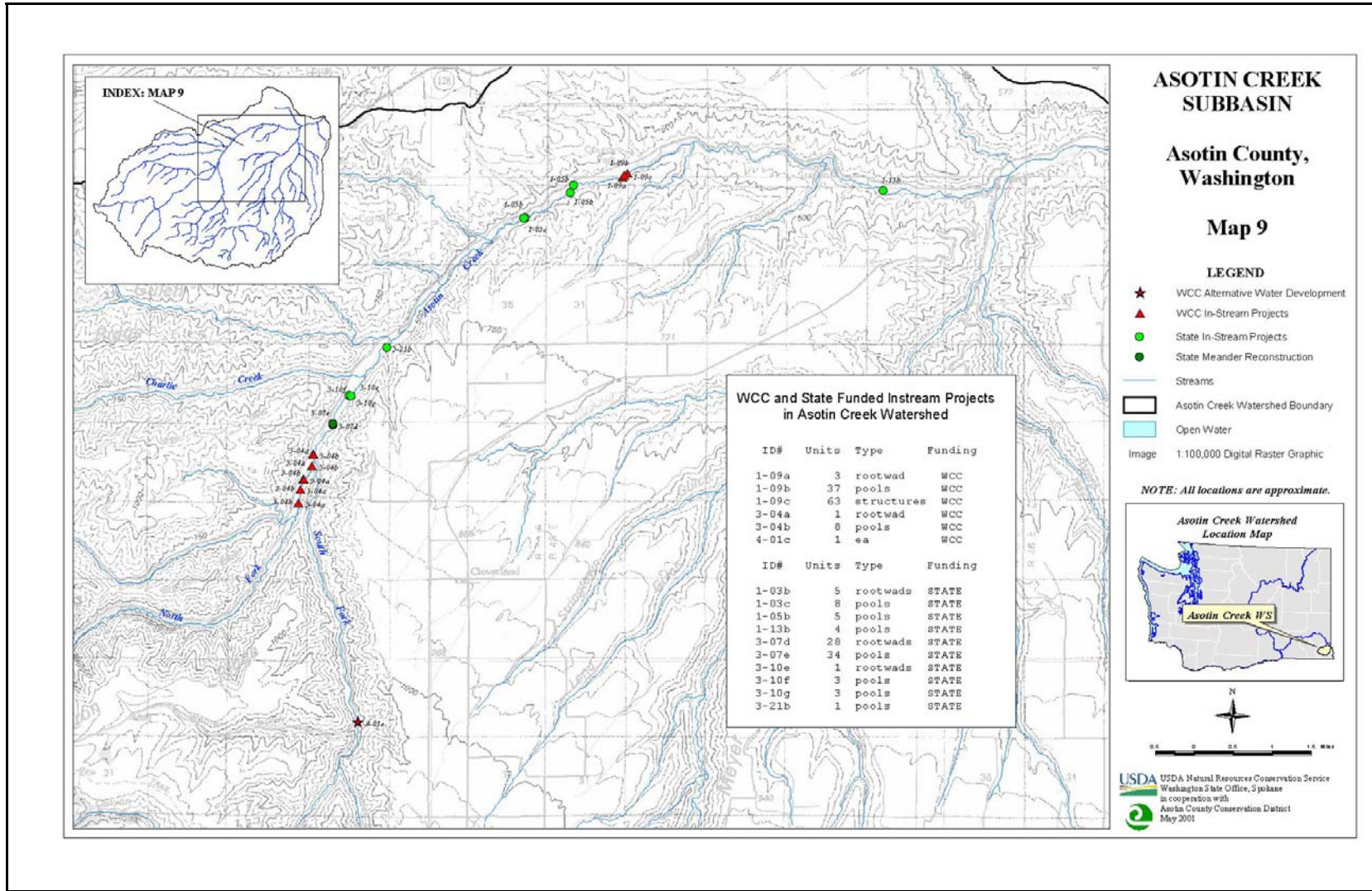


Figure 6-9 Non-BPA Funded Instream Projects (1996-2000): Asotin Creek Watershed

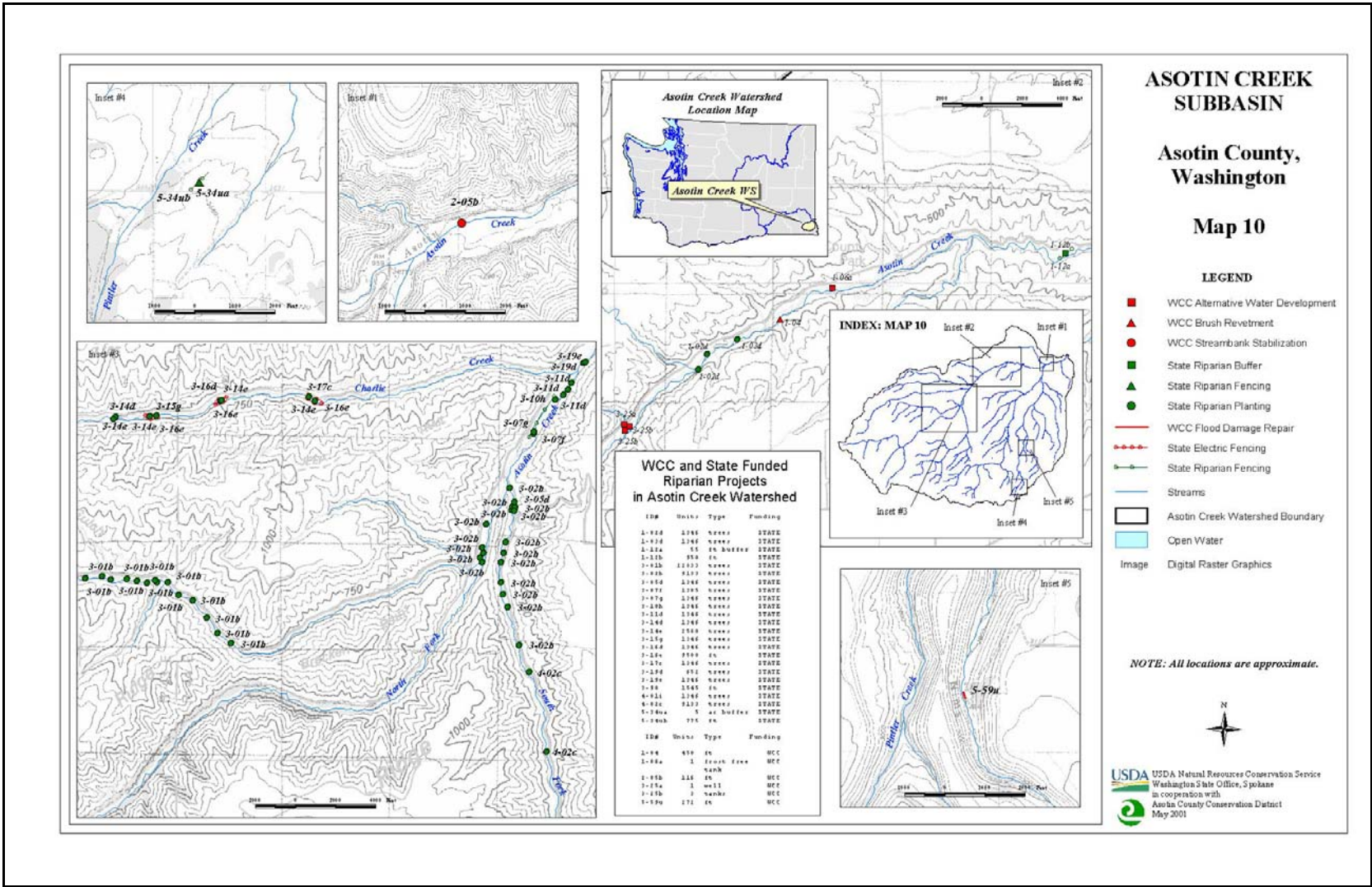


Figure 6-10 Non-BPA Funded Riparian Projects (1996-2000): Asotin Creek Watershed

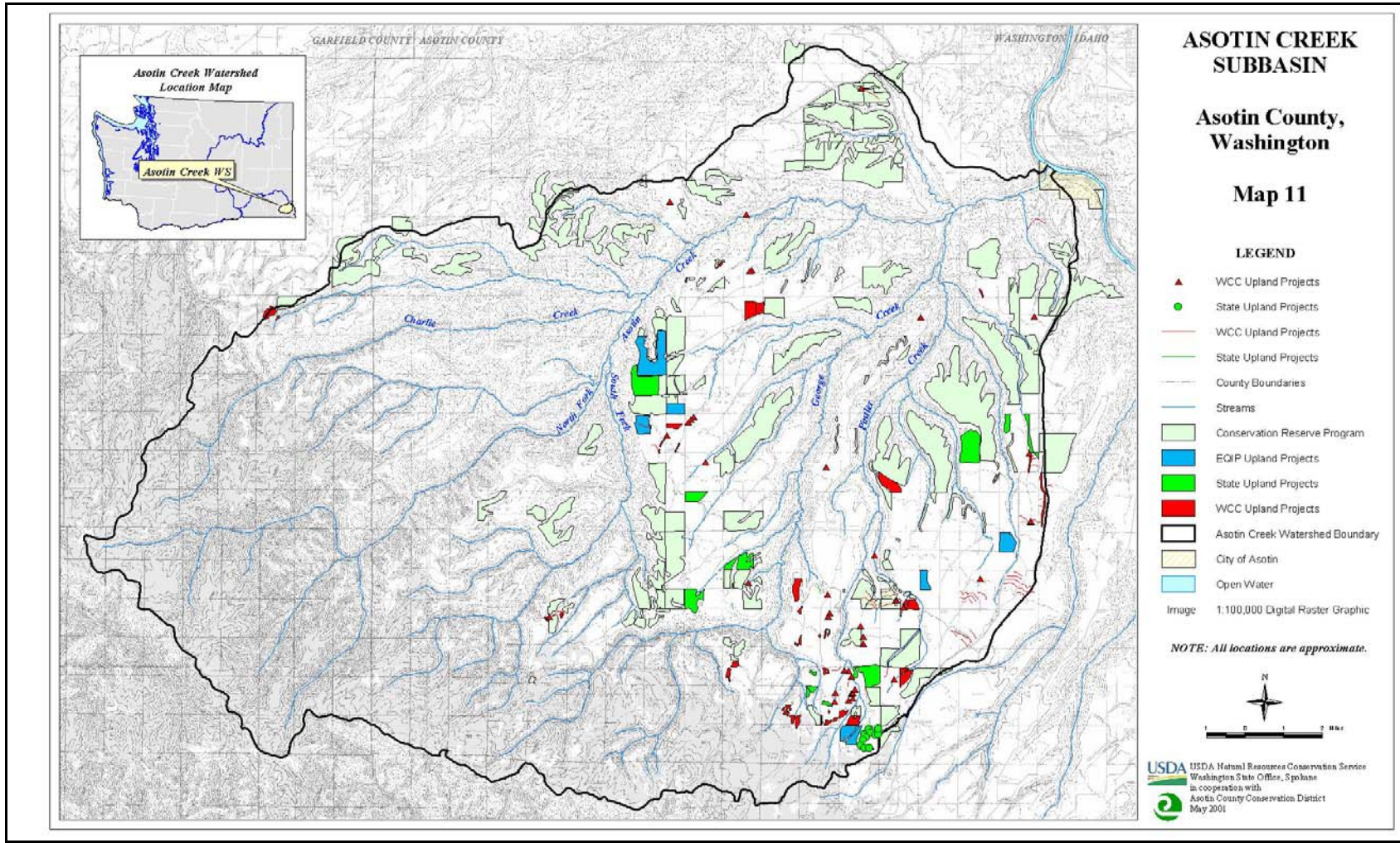


Figure 6-11 Non-BPA Funded Upland Projects (1996-2000): Asotin Creek Watershed

It is important to recognize that while projects may target a particular limiting factor, or problematic area, 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. Therefore, although the total number of projects listed in Asotin Creek is 451, the number of individual environmental benefits is presumably much higher. Refer to Section 5.2.2 in Appendix F for a more detailed explanation of this concept.

It is also useful to examine the main environmental attributes addressed by projects implemented within each GA of the subbasin. Table 6-6 provides a list of both quantitative and qualitative habitat factors that were primary targets of projects implemented since 1996.

Table 6-6 Habitat Restoration Effort By Habitat Element Across Geographic Areas

Geographic Area	Quantity of Habitat					Quality of Habitat					
	Channel Length	Minimum Channel Width	Primary Pools	Pool Tailouts	Temperature	Bed Scour	Embeddedness	Fine Sediment	Turbidity	Riparian Function	Woody Debris
Charley (mouth to access limit)					X			X	X	X	X
Lower Asotin (mouth to George)							X	X	X		
Lower George (mouth to Wormell)							X	X	X		
Lower NF (mouth to SF of NF)						X	X	X	X	X	
Lower SF (mouth to Alder)					X		X	X	X	X	X
Middle Asotin (George to Headgate Dam incl.)							X	X	X	X	
NF Tribs (Lick, SF of NF, Middle Branch)								X	X	X	
Pintler (mouth to access limit)						X	X	X	X	X	
Upper Asotin (above Headgate Dam to forks)							X	X	X	X	
Upper George (Wormell to access limit)							X	X	X		
Upper George Tribs (Wormell Heffelfinger Coombs)							X	X	X		
Upper NF (SF of NF to access limit)											
Upper SF (Alder to access limit)						X	X	X	X	X	

Source: Table 7 of Appendix F (modified)

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).

6.3.2 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 6.3 contains a list of projects relating to improving elk habitat (Appendix G). 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 Asotin 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
- Research, Monitoring and Evaluation

The various components of the Asotin 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 Asotin 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 (NWPPCC 2001).

The following vision statement and guiding principles for the Asotin Subbasin were developed and approved by the Subbasin Planning Team through discussion with the WRIA 35 Planning Unit providing public review. Note that the Subbasin Planning Team includes representatives from the lead (Asotin County Conservation District) and co-lead (Nez Perce Tribe).

The vision for the Asotin 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.

Guiding Principles

- Respect, recognize, and honor the legal authority, jurisdiction, treaty-reserved rights, and all legal rights of all parties.
- Protect, enhance, and restore habitats in a way that will sustain and recover native aquatic and terrestrial species diversity and abundance with emphasis on the recovery (de-listing) of ESA listed species.
- Enhance species populations to a level of healthy and harvestable abundance to support tribal treaty and public harvest goals.
- Foster ecosystem protection, enhancement, and restoration that result in ridgetop-to-ridgetop stewardship of natural resources, recognizing all components of the ecosystem, including the human component.

- Provide information to residents of the Asotin, Tucannon, and Lower Snake Subbasins to promote understanding and appreciation of the need to protect, enhance, and restore a healthy and properly functioning ecosystem.
- Provide opportunities for natural resource-based economies to recover in concert with aquatic and terrestrial species.
- Promote and enhance local participation in, and contribution to, natural resource problem solving and subbasin-wide conservation efforts.
- Assist in efforts to coordinate implementation of the Pacific Northwest Electric Power Planning and Conservation Act, the ESA, the Clean Water Act, and other local, state, federal, and tribal programs, obligations, and authorities.
- Coordinate and support planning efforts to eliminate duplication that results in prioritized protection, enhancement, and restoration projects in strategic areas.
- Develop a scientific foundation for diagnosing biological problems, for designing and prioritizing projects, and for monitoring and evaluation to guide improving management to better achieve objectives.

7.1.2 Management Plan Components and Prioritization

The management plan consists of three primary components: working hypotheses, biological objectives, and strategies.

Working Hypotheses

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 by technical staff, reviewed and modified by the public as appropriate, with a limited set of assumptions and a 10 to 15 year planning horizon.

Strategies

After development of the working hypotheses and biological objectives, preliminary strategies were developed with the technical team. Strategies identify the specific types of actions that can be implemented to achieve the biological objectives. 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. Local stakeholders have been unable to reach consensus on inclusion of fee simple title land acquisition as a strategy. Conservation easements and long-term leases are supported aquatic and terrestrial strategies.

Hence, fee simple title land acquisition was deleted as strategy from the terrestrial and aquatic management plan sections, and majority and minority reports on the topic are provided in Appendix H. The appendix describes the position and basis for those against inclusion of fee simple title land acquisition strategy. The appendix also describes the position and basis for those supporting inclusion of fee simple title land acquisition strategy.

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 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. 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 Asotin 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 Asotin 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 in 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, and as such are not prioritized within individual biological objectives. 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 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.

Special Topics

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.

An additional significant component of the management plan includes cultural priorities of the Nez Perce Tribe. Objectives established to support tribal culture, and projects proposed to achieve such objectives, will be considered as an overlay to the biologically-driven hypotheses, objectives, and strategies provided in the remainder of this management plan. As such, projects that support tribal culture should be considered a higher priority than projects that provide equivalent biological benefits with no cultural benefits. In support of this subbasin plan, the Nez Perce Tribe completed a study of sites of high cultural value due to historic and current use by tribal members. This study, provided in full in Appendix I, was based upon information gathered from reports of tribal members. A map of known high priority sites can be found in the appendix. Further funding to review additional sources and expand documentation of Nez Perce cultural priorities is suggested in the study.

7.2 Aquatic Working Hypotheses and Biological Objectives

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. Example working hypotheses for each type of limiting factor are provided in Table 7-1. 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 7-2. Descriptions of the reaches referenced in Table 7-2 and description of the various limiting factors can be found in Appendix B.

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. 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 Asotin Subbasin. Specific definitions of terms can be found in the glossary.

- **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. Passive restoration will be the preferred method of enhancement, but active restoration methods will also be considered.
- **Embeddedness:** Any action taken to reduce embeddedness will likely produce commensurate reductions for percent fines and turbidity.
- **Large Woody Debris (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. Some effort to stabilize the stream channel is 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.
- **Beds scour:** Objectives are designed to reduce bed scour 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 Example Working Hypotheses

Factor	Example Working Hypothesis
Sediment	Reduction in sediment (turbidity, percent fines and embeddedness) will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) yearling rearing; c) fry.
Large Woody Debris	Increase in LWD densities will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) overwintering; b) yearling rearing; c) pre-spawning.
Pools	Increases in primary pool quantity, quality and complexity will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) overwintering; b) yearling rearing; c) pre-spawning.
Riparian Function	Increase in riparian function and a decrease in confinement will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) overwintering; b) yearling rearing; c) fry d) pre-spawning.
Summer Max. Water Temperature	Decrease in summer temperatures will increase survival of steelhead in the following life stages: a) subyearling rearing; b) yearling rearing. Spring Chinook survival will increase in the following life stages: a) yearling rearing; b) pre-spawning.
Beds scour	Decrease in bed scour will increase survival of steelhead in the following life stages: a) incubation; b) overwintering. Spring Chinook survival will increase in the following life stages: a) incubation; b) overwintering; c) fry.
Flow	Increase in summer flows will increase survival of steelhead in the following life stages: a) subyearling rearing; b) yearling rearing. Spring Chinook survival will increase in the following life stages: a) subyearling rearing.

Table 7-2 Summary of Biological Objectives by Priority Restoration Geographic Area

		Limiting Factors for Steelhead and Spring Chinook							
Geographic Area		Substrate Embeddedness (% of substrate)	LWD (# pieces per channel width)	Pools (% of stream surface area)	Confinement (% of streambank length)	Riparian Function (% of maximum)	Summer Maximum Water Temperature	Bedscour (cm)	Summer Flow
Upper Asotin Creek	Objective	10	1	25	25	75	Less than 4 days above 75F	*	*
	Current	18	0.7	14.5	42	62	More than 4 days above 75F; No days above 81F		
Lower George Creek	Objective	20	1 (above Pintler)	10 (George 1) Maximum Extent Practical (George2)	40 (George1) Maximum Extent Practical (George2)	50 (George 1) 75 (George 2 & 3)	Less than 4 days above 75F	< 10	Maintain flow in 90% of years
	Current	33 (70 in George1; 25 in George3)	0.33	2 (George1) 10 (George2)	60	37.5 (George 1) 62.5 (George 2&3)	More than 4 days above 75F; No days above 81F	16.4	Dries up in summer
Lower N. Fork Asotin	Objective	10	2	15	10	75-90 (above Lick) 75 (mouth to Lick)	*	< 10	*
	Current	14.1	0.6	7.2	25	62		12.1	
Lower S. Fork Asotin	Objective	10	1	12-15	10	75	Less than 12 days above 61F	*	*
	Current	25	0.67	8	25	62	More than 12 days above 61F	*	
Charley Creek	Objective	10	2	15	25 (Charley1) Decrease to Greatest Extent Practical (Charley2&3)	75	*	< 10	*
	Current	21 (18 Charley1-3; 26.8 Charley4)	0.67	10.5	80	72.5		12.8	

* Not an EDT-identified limiting factor.

Note: Geographic areas are shown on Figure 3-7.

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 Asotin Subbasin four obstructions were identified during the EDT modeling process and one obstruction was identified after the EDT model results were already completed (Table 7-3). 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. A comprehensive inventory, analysis and prioritization of passage barriers are a high priority and needs to be completed on all locations within the subbasin that may limit migration of both anadromous/resident fish in their juvenile and adult life stages.

Though the management work groups did not rank obstructions in order of priority, the relatively small number of obstructions in the subbasin allows for the priorities to be obvious.

- The culvert at Trent Grade is low in the basin and does not allow full access by steelhead into an area of the subbasin that is priority for protection, thus representing some of the better steelhead habitat available.
- The culvert at Asotin Road on Charley Creek occurs very low in this drainage thus compromising access to the entire stream, most of which is in good condition.

The areas that these obstructions restrict access to are high priorities for either restoration or protection. It would be irresponsible to address habitat conditions in these areas and not also consider the removal or modification of these partial barriers. An inventory, analysis and prioritization of passage barriers are a high priority and needs to be completed on all locations within the subbasin that may limit migration of both anadromous/resident fish in their juvenile and adult life stages.

Table 7-3 Salmonid Fish Passage Obstructions in the Asotin Subbasin.

Drainage/Obstruction	River Mile	Spring Chinook % Passage	Steelhead % Passage
Asotin:			
Asotin Creek: Headgate Dam	9.1	*90%	100%
George Creek: Trent Grade culvert	18.8	NA	60%
Charley Creek: Asotin Rd culvert	.2	**	**
Tenmile:			
Mill Creek: Mill Creek Rd culvert	2.9	NA	75%
Tenmile Creek: Pond Dam	15.3	NA	0%
Couse:			
No Barriers Identified			

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).

* Headgate dam was entered as 100% passable for CHS in the EDT database. It is likely a slight barrier. Reconstruction of the dam for a WDFW project scheduled for 2004 should eliminate this as an adult barrier.

** The Asotin Rd culvert was not identified as a barrier for EDT analysis. It likely a partial barrier for both steelhead and spring chinook adult passage.

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 B for rating definitions). In the Asotin Subbasin, Lower Asotin, Middle Asotin, Upper Asotin, Lower George, and Charley Creek were the only geographic areas identified as being impacted by water withdrawals. These were all rated as having minor withdrawals that may or may not be properly screened.

Dry Stream Reaches

There are some reaches within the Asotin 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 into 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 above mentioned man-caused reasons. 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. Asotin Creek and Tenmile Creek were both identified as having areas that typically go dry in the summer. These are not likely caused by withdrawals, but may be due to compromised riparian or upland conditions.

7.3.2 Priority Restoration Area Strategies

Strategies developed for the priority restoration geographic areas are provided in Table 7-4. This table lists the working hypotheses, associated biological objectives, and associated strategies for each geographic area. For example, in the Upper Asotin Geographic Area, Strategies UA1.1.1 through UA1.1.13 are proposed to achieve Objective UA1.1, which was established as a measurable target for improvements in Hypothesis UA1. All related hypotheses, objectives, and strategies are numbered similarly. As discussed above, strategies are not prioritized and will be implemented based upon opportunities available. In Table 7-4, the historical and current estimates were derived from the EDT assessment. Proposed causes were developed by local technical staff. While Table 7-4 demonstrates the linkage of strategies between similar biological objectives in multiple geographic areas, Table 7-5 summarizes strategies by working hypothesis type and general category: land use, infrastructure, biology/hydrology, and data gaps. In this table, strategies are combined by their general descriptions, with specific strategy identification numbers provided. The “related strategies” listed in Table 7-5 are not a compilation of strategies from all geographic areas, but instead represent a comprehensive list of all strategies that are proposed within this management plan. This table provides a reference to help identify those strategies that occur across multiple objectives, and the variety of strategies proposed in the general strategy categories.

Table 7-4 Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Objectives and Strategies

Upper Asotin: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies	
<p>Hypothesis UA1: Reduction in sediment (turbidity, percent fines and embeddedness) will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) yearling rearing; c) fry.</p> <p>Causes: Land use: road development, cultivation, improperly managed grazing; Increased width-to-depth ratio; Poor riparian condition; Altered stream hydrograph leading to excessive flashiness.</p>	
<p>Objective UA1.1- Reduce embeddedness within the area to 10%. This will also stimulate a corresponding decrease in percent fines and turbidity.</p> <p><i>Historical estimate: less than 10%</i></p> <p><i>Current estimate: 18%.</i></p>	<p>Note- Strategies are not prioritized and will be implemented based upon opportunities available</p> <p>Strategy UA1.1.1-Improve the extent, structure, and function of riparian buffers to increase their filtration capacity through vegetation planting, selected livestock fencing, and similar practices.</p> <p>Strategy UA1.1.2-Decrease sediment delivery from upland practices through expanded use of conservation tillage, sediment basins, mowing of road shoulders in place of herbicide use, managed grazing, and other practices.</p> <p>Strategy UA1.1.3-Restore perennial vegetation in upland cultivated and non-cultivated areas with native species and reforestation.</p> <p>Strategy UA1.1.4-Implement the most economical and effective treatment methods to control noxious weeds, including the encouragement of biological control methods where feasible and appropriate.</p> <p>Strategy UA1.1.5-Pave, decommission, or relocate roads near the stream and in upland areas.</p> <p>Strategy UA1.1.6- Decrease instream deposition by improving bank stability. The use of hard stabilization methods is discouraged. Sloughing banks may be retained in some areas to increase stream sinuosity.</p> <p>Strategy UA1.1.7-Increase landowner participation in federal, state, tribal, and local programs that improve watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)</p> <p>Strategy UA1.1.8-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals.</p> <p>Strategy UA1.1.9-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available (e.g. smaller tributaries high in the subbasin).</p> <p>Strategy UA1.1.10- Continue development of Total Maximum Daily Load Clean-up Plans and other watershed scale assessments to remedy local factors that lead to increased sediment inputs</p> <p>Strategy UA1.1.11- Reduce sediment inputs through implementation of additional forestry and agricultural BMPs.</p> <p>Strategy UA1.1.13-Enforce existing land use regulations (e.g. critical area ordinances) that limit floodplain and riparian area development and educate the public regarding their implementation.</p> <p>Strategy UA1.1.14-Identify jurisdictions with inadequate floodplain regulations, and work to strengthen existing or pass new regulations that better protect streams from floodplain development that leads to loss or degradation of riparian vegetation.</p>

Upper Asotin: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies , continued

Hypothesis UA2: Increase in LWD densities will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) overwintering; b) yearling rearing; c) pre-spawning.

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

Objective UA2.1-

Reach or exceed one piece of LWD per channel width.

Historical estimate:
4.75 pieces of LWD/CW

Current estimate:
0.7 pieces of LWD/CW.

Note- Strategies are not prioritized and will be implemented based upon opportunities available

Strategy UA2.1.1-Add LWD in the form of rootwads, log jams, and similar structures that mimic natural formations.

Strategy UA2.1.2-Increase the density, maturity, and appropriate species composition of woody vegetation in riparian buffers for long-term recruitment of LWD.

Strategy UA2.1.3- Decrease the width-to-depth ratio through appropriate methods. (also see Hypotheses UA3 and UA5) The use of "hard" stabilization methods such as rip rap, concrete, or railroad ties is discouraged.

Strategy UA2.1.4-Improve stream sinuosity (e.g. meander reconstruction) to facilitate LWD retention.

Strategy UA2.1.5-Develop and implement strategy for monitoring improvements in LWD density.

Strategy UA2.1.6-Enforce existing land use regulations (e.g. critical area ordinances) that limit floodplain and riparian area development and educate the public regarding their implementation .

Strategy UA2.1.7-Identify jurisdictions with inadequate floodplain regulations, and work to strengthen existing or pass new regulations that better protect streams from floodplain development that leads to loss or degradation of riparian vegetation.

Strategy UA2.1.8-Dike/road removal to enhance floodplain connectivity, natural stream meanders and long-term recruitment of LWD.

Strategy UA2.1.9-Increase landowner participation in federal, state, tribal, and local programs that improve watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)

Strategy UA2.1.10-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals.

Strategy UA2.1.11-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available (e.g. smaller tributaries high in the subbasin).

Strategy UA2.1.12- Retain existing LWD and limit removal of newly-recruited LWD

Upper Asotin: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis UA3: Increases in primary pool quantity, quality and complexity will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) overwintering; b) yearling rearing; c) pre-spawning

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

Objective UA3.1-
Increase the
proportion of
primary pools to
25% of stream
surface area.

Historic estimate:
30%

Current estimate:
14.5%

Note- Strategies are not prioritized and will be implemented based upon opportunities available

Strategy UA3.1.1-Improve stream sinuosity (e.g. meander reconstruction) to facilitate long-term natural pool formation.

Strategy UA3.1.2-Install instream structures, including boulders, vortex rock weirs, and LWD (also see Hypothesis UA2) for short-term pool formation.

Strategy UA3.1.3-Retain existing LWD and limit removal of newly-recruited LWD (also see Hypothesis UA2).

Strategy UA3.1.4- Decrease instream deposition by improving bank stability. The use of hard stabilization methods is discouraged. Sloughing banks may be retained in some areas to increase stream sinuosity.

Strategy UA3.1.5- Decrease the width-to-depth ratio through appropriate methods. (also see Hypotheses UA2 and UA5)

Strategy UA3.1.6-Improve the extent, structure, and function of riparian buffers through vegetation planting, managed grazing, and similar practices.

Strategy UA3.1.8- Develop and implement strategy for monitoring improvements in primary pool quantity, quality and complexity.

Strategy UA3.1.9-Increase landowner participation in federal, state, tribal, and local programs that improve watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)

Strategy UA3.1.10-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals.

Strategy UA3.1.11-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available (e.g. smaller tributaries high in the subbasin).

Upper Asotin: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis UA4: Increase in riparian function and a decrease in confinement will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) overwintering; b) yearling rearing; c) fry d) pre-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 UA4.1- Continue riparian recovery and re-establishment to achieve at least 75% 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: 62%

Note- Strategies are not prioritized and will be implemented based upon opportunities available

- Strategy UA4.1.1-Enforce existing land use regulations (e.g. critical area ordinances) that protect riparian vegetation and wetlands and educate the public regarding their implementation.
- Strategy UA4.1.2-Identify jurisdictions with inadequate riparian area and wetland regulations, and work to strengthen existing or pass new regulations that better protect the structure and function of riparian areas and wetlands.
- Strategy UA4.1.3- Improve the extent, structure, and function of riparian buffers through vegetation planting, managed grazing, and similar practices (also see Hypothesis UA1).
- Strategy UA4.1.4-Adjust seasonal timing of livestock grazing within riparian areas to minimize soil compaction and erosion.
- Strategy UA4.1.5-Protect high quality riparian habitats and riparian habitat in areas of high development pressure through land acquisition, fee title acquisitions, conservation easements, land exchanges, public education, promotion of BMPs, promotion of alternative grazing strategies and the installation of alternative forms of water for livestock.
- Strategy UA4.1.6-Increase understanding of the importance of riparian habitat through education and outreach programs for both the general public and road maintenance personnel.
- Strategy UA4.1.7- Continue development of Total Maximum Daily Load Clean-up Plans and other watershed scale assessments to remedy local factors that lead to increased nutrient loading.
- Strategy UA4.1.8-Develop a mitigation strategy to address loss of marine-derived nutrients to the terrestrial/inland environment.
- Strategy UA4.1.9-Increase landowner participation in federal, state, tribal, and local programs that improve watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)
- Strategy UA4.1.10-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals.
- Strategy UA4.1.11-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available (e.g. smaller tributaries high in the subbasin).

Objective UA4.2- Decrease manmade confinement to no greater than 25% of steam bank length.

Historic estimate: 0%
Current estimate: 42%

- Strategy UA4.2.1- Decommission, modify or relocate (i.e. setback) roads, low-priority dikes, bridges, culverts, other structures and land uses to facilitate greater floodplain accessibility.
 - Strategy UA4.2.2-Enforce existing land use regulations (e.g. critical area ordinances) that limit floodplain development and educate the public regarding their implementation.
 - Strategy UA4.2.3-Identify jurisdictions with inadequate floodplain regulations, and work to strengthen existing or pass new regulations that better protect streams from floodplain development that leads to confinement.
 - Strategy UA4.2.4-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.
-

Upper Asotin: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis UA5: Decrease in summer temperatures will increase survival of steelhead in the following life stages: a) subyearling rearing; b) yearling rearing. Spring Chinook survival will increase in the following life stages: a) yearling rearing; b) pre-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 UA5.1-
Decrease summer
daily maximum
temperatures to no
more than 4 days
greater than 75 °F
(24 °C) and show
progress toward
meeting
Washington State
temperature
standards and
TMDL goals.

*Historic estimate:
1-4 days above
75F & no days
above 77F*

*Current estimate:
more than 4 days
above 75F & no
days above 81F*

Note- Strategies are not prioritized and will be implemented based upon opportunities available

Strategy UA5.1.1- Improve the extent, structure, and function of riparian buffers to increase their filtration capacity through increasing the density, maturity, and appropriate species composition of woody vegetation, understory vegetation planting, selected livestock fencing, and similar practices (also see Hypothesis UA1).

Strategy UA5.1.2- Decrease the width-to-depth ratio through appropriate methods. (also see Hypotheses UA2 and UA3)

Strategy UA5.1.3-Enforce existing land use regulations (e.g. critical area ordinances) that protect riparian vegetation and wetlands and maintain low-density zoning and educate the public regarding their implementation.

Strategy UA5.1.4-Identify jurisdictions with inadequate riparian area and wetland regulations, and work to strengthen existing or pass new regulations that better protect the structure and function of riparian areas and wetlands.

Strategy UA5.1.5- Decommission, modify or relocate (i.e. setback) roads, low-priority dikes, bridges, culverts, other structures and land uses to facilitate greater floodplain accessibility..

Strategy UA5.1.6-Protect riparian vegetation through promotion of livestock BMPs such as alternative grazing rotations and the installation of alternative forms of water for livestock.

Strategy UA5.1.7-Restore perennial vegetation in upland cultivated and non-cultivated areas with native species and reforestation.

Strategy UA5.1.8-Minimize surface water withdrawals through implementation of irrigation efficiencies, quantify legal withdrawals, identify and eliminate illegal withdrawals, lease of water rights and purchase of water rights, where applicable.

Strategy UA5.1.9-Improve upland water infiltration through road obliteration, reduced soil compaction, direct seeding activities, increasing native vegetation cover, etc.

Strategy UA5.1.10-Continue development and implementation of TMDLs and other watershed scale assessments to remedy local factors negatively influencing temperature regimes.

Strategy UA5.1.11-Conduct appropriate shade restoration activities where streamside shading has been reduced by anthropogenic activities.

Strategy UA5.1.12-Protect wetland habitats through land acquisition, fee title acquisitions, conservation easements, land exchanges, public education, and promotion of urban, forestry, and agricultural BMPs.

Strategy UA5.1.13-Enhance the extent and function of wetlands and wet meadows.

Strategy UA5.1.14-Increase landowner participation in federal, state, tribal, and local programs that improve watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)

Strategy UA5.1.15-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals.

Strategy UA5.1.16-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available (e.g. smaller tributaries high in the subbasin).

Lower George Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies

Hypothesis LG1: Reduction in sediment (turbidity, percent fines and embeddedness) will increase survival of steelhead in the following life stages: a) incubation; b) overwintering; c) subyearling rearing; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) overwintering; c) subyearling rearing; d) fry.

Causes: Land use: road development, cultivation, overgrazing; Increased width-to-depth ratio; Poor riparian condition; Altered stream hydrograph leading to excessive flashiness.

Objective LG1.1-Reduce embeddedness within the area to 20%. This will also stimulate a corresponding decrease in percent fines and turbidity. See strategies for Objective UA1.1

Historic estimate: 18%

Current estimate 33% (70% in George1 - 25% in George 3)

Hypothesis LG2: Increase in LWD densities will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) overwintering; c) subyearling rearing; d) fry.

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

Assumption: Given infrastructure limitations (e.g. land use development), the LWD density objective is not expected to be achieved in Lower George Creek below Pintler Creek.

Objective LG2.1-Reach or exceed one piece of large woody debris per channel width above Pintler Creek. See strategies for Objective UA2.1

Historic estimate: 1.5 pieces of LWD/CW

Current estimate: <1 piece / 3 channel widths (0.33 pieces/CW)

Objective LG2.2-Increase large woody debris density to the greatest extent practical, given limitations due to development and land use. See strategies for Objective UA2.1

Historic estimate: 1.5 pieces of LWD/CW

Current estimate: <1 piece / 3 channel widths (0.33 pieces/CW)

Lower George Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis LG3: Increase in primary pool quantity, quality and complexity will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) overwintering; c) subyearling rearing; d) fry.

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

Objective LG3.1-Increase the proportion of primary pools to exceed 10% of stream surface area for the George1 reach. See strategies for Objective UA3.1

Historic estimate: 25%

Current estimate: 2% (George 1)

Objective LG3.2-Increase the proportion of primary pools to the maximum extent practical through passive measures in the George 2 reach. See strategies for Objective UA3.1

Historic estimate: 20%

Current estimate: 10% (George 2)

Hypothesis LG4: Increase in riparian function and a decrease in confinement will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) overwintering; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) overwintering; c) subyearling rearing; d) fry.

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 LG4.1-Exceed 50% riparian function in the George 1 reach through initiation of riparian recovery and re-establishment of riparian function in heavily degraded areas. See strategies for Objective UA4.2

Historic estimate: 100%

Current estimate: 37.5%

Objective LG4.2-Initiate riparian recovery and re-establishment in the George 2 and George 3 reaches to achieve 75% riparian function. See strategies for Objective UA4.2

Historic estimate: 100%

Current estimate: 62.5%

Objective LG4.3-Decrease manmade confinement to less than 40% of stream bank length in the George 1 reach. See strategies for Objective UA4.1

Historic estimate: 0%

Current estimate: 60%

Objective LG4.4-Decrease manmade confinement to the maximum extent practical in the George 2 reach. See strategies for Objective UA4.1

Historic estimate: 0%

Current estimate: 60%

Lower George Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis LG5: Decrease in summer temperatures will increase survival of steelhead in the following life stages: a) subyearling rearing; b) yearling rearing. Spring Chinook survival will increase in the following life stages: a) subyearling rearing.

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.)

Assumption: Historical flow patterns are unknown in Lower George and occasional sub-surface flow events may have occurred.

Objective LG5.1-Decrease summer daily maximum temperatures to no more than 4 days greater than 75 °F (24 °C) and show progress toward meeting Washington State temperature standards and TMDL goals.

Historic estimate: 1-4 days above 75F, no days above 77F

Current estimate: more than 4 days above 75F, no days above 81F

Hypothesis LG6: Decrease in bedscour will increase survival of steelhead in the following life stages: a) incubation; b) overwintering. Spring Chinook survival will increase in the following life stages: a) incubation; b) overwintering; c) 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 LG6.1-Reduce Bedscour depths to less than or equal to 10 cm.

Historic estimate: 6cm

Current estimate: 16.4cm

Note- Strategies are not prioritized and will be implemented based upon opportunities available

Strategy LG6.1.1- Increase stream sinuosity (e.g. meander reconstruction).

Strategy LG6.1.2-Add LWD in the form of rootwads, log jams, and similar structures that mimic natural formations.

Strategy LG6.1.3- Increase the density, maturity, and appropriate species composition of woody vegetation in riparian buffers for long-term recruitment of LWD.

Strategy LG6.1.4-Enforce existing land use regulations (e.g. critical area ordinances) that limit riparian area, floodplain and wetland development and educate the public regarding their implementation .

Strategy LG6.1.5-Identify jurisdictions with inadequate riparian area protections, and work to strengthen existing or pass new regulations that better protect riparian areas.

Strategy LG6.1.6-Improve watershed conditions (e.g. upland water infiltration) through road obliteration, reduced soil compaction, direct seeding activities, increasing native vegetation cover, etc.

Strategy LG6.1.7- Decommission, modify or relocate (i.e. setback) roads, low-priority dikes, bridges, culverts, other structures and land uses to facilitate greater floodplain accessibility.

Strategy LG6.1.8- Improve the extent, structure, and function of riparian buffers to increase their filtration capacity through vegetation planting, managed grazing, and similar practices.

Strategy LG6.1.9-Increase landowner participation in federal, state, tribal, and local programs that improve watershed conditions (e.g. CRP, CREP, Wetlands Reserve Program, EQIP, Landowner Incentive Program, Partners for Fish & Wildlife, Conservation Security Program, etc.)

Strategy LG6.1.10-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals.

Strategy LG6.1.11-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available (e.g. smaller tributaries high in the subbasin).

Lower George Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategie, continued

Hypothesis LG7: Increase in summer flows will increase survival of steelhead in the following life stages: a) subyearling rearing; b) yearling rearing. Spring Chinook survival will increase in the following life stages: a) subyearling rearing.

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

Objective LG7.1-
Increase stream
discharge through
the area to
maintain
continuous surface
flow in 90% of
years.

*Historic estimate:
minimum channel
width 5.8 feet
Current estimate:
minimum channel
width 0 feet (reach
dries up in the
summer)*

Note- Strategies are not prioritized and will be implemented based upon opportunities available

- Strategy LG7.1.1-Improve the extent, structure, and function of riparian buffers to increase their filtration capacity through vegetation planting, managed grazing, and similar practices.
 - Strategy LG7.1.2- Restore perennial vegetation in upland cultivated and non-cultivated areas with native species and reforestation.
 - Strategy LG7.1.3-Enforce existing land use regulations (e.g. critical area ordinances) that limit riparian area development and educate the public regarding their implementation .
 - Strategy LG7.1.4-Identify jurisdictions with inadequate riparian area protections, and work to strengthen existing or pass new regulations that better protect riparian areas.
 - Strategy LG7.1.5-Improve watershed conditions, including increased upland water infiltration, through road obliteration, reduced soil compaction, direct seeding activities, increasing native vegetation cover, etc.
 - Strategy LG7.1.6- Decrease instream deposition by improving bank stability. The use of hard stabilization methods is discouraged. Sloughing banks may be retained in some areas to increase stream sinuosity.
 - Strategy LG7.1.7-Increase stream sinuosity (e.g. meander reconstruction).
 - Strategy LG7.1.8- Investigate feasibility of water storage in coordination with federal, tribal, state and local stakeholders.
 - Strategy LG7.1.9-Implement shallow aquifer recharge programs, where appropriate
 - Strategy LG7.1.10- Where appropriate and feasible, manage beaver populations (increase, decrease, or maintain) and educate the public regarding benefits of beaver.
 - Strategy LG7.1.11-Protect and restore springs, seeps and wetlands that function as water storage during spring flows and provide recharge during summer drought periods.
-

Lower North Fork Asotin Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies

Hypothesis NF1: Reduction in sediment (turbidity, % fines and embeddedness) will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) fry; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) overwintering.

Causes: Land use: road development, cultivation, grazing; Increased width-to-depth ratio; Poor riparian condition; Altered stream hydrograph leading to excessive flashiness.

Objective NF1.1-Reduce embeddedness within the area to 10%. This will also stimulate a corresponding decrease in percent fines and turbidity. See strategies for Objective UA1.1

Historic estimate: <10%

Current estimate: 14.1% (12% NFAotin3-16% NFAotin2)

Hypothesis NF2: Increase in LWD densities will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) fry; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) subyearling rearing c) overwintering d) pre-spawning.

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

Objective NF2.1-Reach or exceed two pieces of large woody debris per channel width. See strategies for Objective UA2.1

Historic estimate: 10 pieces LWD/CW

Current estimate: 0.6 pieces LWD/CW

Hypothesis NF3: Increase in primary pool quantity, quality and complexity will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) fry; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) subyearling rearing c) overwintering d) pre-spawning.

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

Assumption: This area has well-established riparian areas that have begun to recover, although large fields adjacent to the creek need to be addressed to connect existing areas of quality riparian habitat. A lack of conifer species as a result of logging in the 1960s is also limiting function and diversity in this area.

Objective NF3.1-Increase the proportion of primary pools to exceed 15% of stream surface area for the George1 reach. See strategies for Objective UA3.1

Historic estimate: 25%

Current estimate: 7.2%

Lower North Fork Asotin Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis NF4: Increase in Riparian Function and a decrease in confinement will increase survival of steelhead in the following life stages: a) incubation b) fry; c) subyearling rearing; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) subyearling rearing c) overwintering d) pre-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

Assumptions: This area has well-established riparian areas that have begun to recover, although large fields adjacent to the creek need to be addressed to connect existing areas of quality riparian habitat. A lack of conifer species as a result of logging in the 1960s is also limiting function and diversity in this area. Active work to decrease confinement in this Geographic Area is considered to have potential detrimental effects

Objective NF4.1-Increase riparian complexity and width to achieve 75-90% riparian function for areas above Lick Creek.	See strategies for Objective UA4.2
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Historic estimate: 100%

Current estimate: 62%

Objective NF4.2-Initiate riparian recovery and re-establishment to achieve at least 75% riparian function and increased riparian complexity from the mouth to Lick Creek.	See strategies for Objective UA4.2
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Historic estimate: 100%

Current estimate: 62%

Objective NF4.3-Decrease manmade confinement to less than 10% of streambank length.	Strategy NF4.3.1-Allow for natural attenuation of confinement.
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Historic estimate: 0%

Current estimate: 25%

See Strategies UA4.1.2 and UA4.1.3

Hypothesis NF6: Decrease in bedscour will increase survival of steelhead in the following life stages: a) incubation; b) overwintering. Spring Chinook survival will increase in the following life stages: a) incubation; b) overwintering; c) 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 NF6.1-Reduce Bedscour depths to less than or equal to 10 cm.	See strategies for Objective LG6.1
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Historic estimate: 6 cm

Current estimate: 12.1 cm

Lower South Fork Asotin Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies

Hypothesis SF1: Reduction in sediment (turbidity, % fines and embeddedness) will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) fry; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) overwintering.

Causes: Land use: road development, cultivation, overgrazing; Increased width-to-depth ratio; Poor riparian condition; Altered stream hydrograph leading to excessive flashiness.

Objective SF1.1-Reduce embeddedness within the area to 10%. This will also stimulate a corresponding decrease in percent fines and turbidity.

See strategies for Objective UA1.1

Historic estimate: 10%

Current estimate: 25%

Hypothesis SF2: Increase in LWD densities will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) fry; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) subyearling rearing c) overwintering d) pre-spawning.

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

Objective SF2.1-Reach or exceed one piece of large woody debris per channel width.

See strategies for Objective UA2.1

Historic estimate: 2.5 pieces LWD/CW

Current estimate: 0.67 pieces LWD/CW

Hypothesis SF3: Increase in primary pool quantity, quality and complexity will increase survival of steelhead in the following life stages: a) incubation; b) subyearling rearing; c) fry; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) subyearling rearing c) overwintering d) pre-spawning.

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

Objective SF3.1-Increase the proportion of primary pools to 12-15% of stream surface area for the George1 reach.

See strategies for Objective UA3.1

Historic estimate:32%

Current estimate: 8%

Lower South Fork Asotin Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis SF4: Increase in Riparian Function and a decrease in confinement will increase survival of steelhead in the following life stages: a) incubation b) fry; c) subyearling rearing; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) fry; b) subyearling rearing c) overwintering d) pre-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 SF4.1-Continue riparian recovery and re-establishment to achieve at least 75% riparian function.

Historic estimate: 100%

Current estimate: 62%

See strategies for Objective UA4.2

Objective SF4.2-Decrease manmade confinement to less than 10% of the streambank length.

Historic estimate: 0%

Current estimate: 25%

Strategy SF4.2.1-Allow for natural attenuation of confinement.

See Strategies UA4.1.2 and UA4.1.3

Hypothesis SF5: Decrease in summer temperatures will increase survival of steelhead in the following life stages: a) subyearling rearing; b) yearling rearing. Spring Chinook survival will increase in the following life stages: a) subyearling rearing b) pre-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 SF5.1- Decrease summer daily maximum temperatures to no more than 12 days greater than 61 °F (16 °C) and show progress toward meeting Washington State temperature standards and TMDL goals.

Historic rating only marginally less than current

See strategies for Objective UA5.1

Charley Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies

Hypothesis CC1: Reduction in sediment (turbidity, % fines and embeddedness) will increase survival of steelhead in the following life stages: a) incubation; b) fry; c) subyearling rearing; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) fry; c) overwintering; d) subyearling.

Causes: Land use: road development, cultivation, overgrazing; Increased width-to-depth ratio; Poor riparian condition; Altered stream hydrograph leading to excessive flashiness.

Objective CC1.1-Reduce embeddedness within the area to 10%. This will also stimulate a corresponding decrease in percent fines and turbidity. See strategies for Objective UA1.1

Historic estimate: <10%

Current estimate: 21% (18% Charley1-3 to 26.8% Charley4)

Hypothesis CC2: Increase in LWD densities will increase survival of steelhead in the following life stages: a) incubation; b) fry; c) subyearling rearing; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) fry; c) overwintering; d) subyearling.

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

Objective CC2.1-Reach or exceed one piece of large woody debris per channel width. See strategies for Objective UA2.1

Historic estimate: 3.3 pieces LWD/CW

Current estimate: 0.67 pieces LWD/CW

Hypothesis CC3: Increase in primary pool quantity, quality and complexity will increase survival of steelhead in the following life stages: a) incubation; b) fry; c) subyearling rearing; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) fry; c) overwintering; d) subyearling rearing.

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

Objective CC3.1-Increase the proportion of primary pools to 12-15% of stream surface area for the George1 reach. See strategies for Objective UA3.1

Historic estimate: 22.3%

Current estimate: 10.5%

Charley Creek: Working Hypotheses, Limited Life History Stages, Causes, Objectives, and Strategies, continued

Hypothesis CC4: Increase in Riparian Function and a decrease in Confinement will increase survival of steelhead in the following life stages: a) incubation; b) fry; c) subyearling rearing; d) yearling rearing. Spring Chinook survival will increase in the following life stages: a) incubation; b) fry; c) overwintering; d) subyearling rearing.

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

Assumption: This area has some well-established riparian areas that have begun to recover. Heavy grazing, remnant geographic features from State fishing ponds, natural confinement complicated with an existing road and lack of conifer species is limiting function and diversity in this area.

Objective CC4.1-Continue riparian recovery and re-establishment to achieve at least 75% riparian function.

See strategies for Objective UA4.2

Historic estimate: 100%

Current estimate: 72.5%

Objective CC4.2-Decrease manmade confinement to less than 25% of the streambank length in the Charley1 reach.

See strategies for Objective UA4.1

Historic estimate:0%

Current estimate: greater than 80%

Objective CC4.3-Do not allow for further confinement above current conditions.

See strategies for Objective UA4.1, with a focus on particular strategies that can maintain current conditions.

Historic estimate:0%

Current estimate: greater than 80%

Hypothesis CC5: Decrease in bedscour will increase survival of steelhead in the following life stages: a) incubation; b) overwintering; c) fry. Spring Chinook survival will increase in the following life stages: a) incubation; b) fry; c) overwintering.

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 CC5.1- Reduce Bedscour depths to less than or equal to 10 cm.

See strategies for Objective LG6.1

Historic estimate: 6cm

Current estimate: 12.8cm

Table 7-5 Strategy Categorization

Strategy Summary Related Strategies	Working Hypothesis Type ¹							Strategy Category ²			
	SED	LWD	PL	RF/C	TEMP	BS	FL	LU / REG	IS	B/H	DG
Improve extent, structure & function of riparian buffers Related strategies: UA1.1.1, UA3.1.6, UA4.1.3, UA5.1.1, LG6.1.8, LG7.1.1	✓		✓	✓	✓	✓	✓			✓	
Decrease sediment delivery from uplands Related strategies: UA1.1.2	✓									✓	
Restore perennial vegetation Related strategies: UA1.1.3, UA5.1.7, LG7.1.2	✓				✓		✓			✓	
Control noxious weeds Related strategies: UA1.1.4	✓									✓	
Pave, decommission, or relocate roads Related strategies: UA1.1.5, UA2.1.8, UA4.2.1, UA5.1.5, LG6.1.7	✓	✓		✓	✓	✓			✓		
Improve bank stability Related strategies: UA1.1.6, UA3.1.4, LG7.1.6	✓		✓							✓	
Increase participation in federal, state, & tribal programs Related strategies: UA1.1.7, UA2.1.9, UA3.1.9, UA4.1.9, UA5.1.14, LG6.1.9	✓	✓	✓	✓	✓	✓		✓		✓	
Increase participation in similar programs Related strategies: UA 1.1.8, UA2.1.10, UA3.1.10, UA4.1.10, UA5.1.15, LG6.1.10	✓	✓	✓	✓	✓	✓		✓		✓	
Implement similar programs where existing programs are not available Related strategies: UA 1.1.9, UA2.1.11, UA3.1.11, UA4.1.11, UA5.1.16, LG6.1.11	✓	✓	✓	✓	✓	✓		✓		✓	
Continue TMDL and other watershed scale assessment development Related strategies: UA1.1.10, UA4.1.7, UA5.1.10	✓			✓	✓					✓	
Implement additional forestry & agricultural BMPs Related strategies: UA1.1.11, UA5.1.6	✓				✓			✓		✓	
Monitor improvements Related strategies: UA1.1.12, UA2.1.5, UA3.1.8	✓	✓	✓								✓
Enforce existing land use regulations Related strategies: UA 1.1.13, UA2.1.6, UA4.1.1, UA4.2.2, UA5.1.3, LG6.1.4, LG7.1.3	✓	✓		✓	✓	✓	✓	✓			
Strengthen or pass new land use regulations Related strategies: UA 1.1.14, UA2.1.7, UA4.1.2, UA4.2.3, UA5.1.4, LG6.1.5, LG7.1.4	✓	✓		✓	✓	✓	✓	✓			

Strategy Summary Related Strategies	Working Hypothesis Type ¹							Strategy Category ²			
	SED	LWD	PL	RF/C	TEMP	BS	FL	LU / REG	IS	B/H	DG
Add large woody debris Related strategies: UA2.1.1, LG6.1.2		✓				✓				✓	
Increase woody vegetation in riparian buffers Related strategies: UA2.1.2, LG6.1.3		✓				✓				✓	
Decrease width-to-depth ratio Related strategies: UA2.1.3, UA3.1.5, UA5.1.2		✓	✓		✓					✓	
Improve stream sinuosity Related strategies: UA2.1.4, UA3.1.1, LG6.1.1, LG7.1.7		✓	✓			✓	✓			✓	
Install instream structures Related strategies: UA3.1.2			✓							✓	
Retain existing large woody debris Related strategies:UA2.1.12, UA3.1.3		✓	✓					✓		✓	
Adjust seasonal timing of livestock grazing Related strategies:UA4.1.4				✓				✓			
Protect high quality riparian habitats Related strategies:UA4.1.5				✓				✓			
Education & outreach Related strategies:UA4.1.6				✓				✓			
Develop a mitigation strategy re: loss of marine derived nutrients Related strategies:UA4.1.8				✓						✓	
Inventory of confinement to prioritize dikes and roads Related strategies:UA4.2.4				✓					✓		
Minimize surface water withdrawals Related strategies:UA5.1.8					✓			✓		✓	
Improve upland water infiltration Related strategies:UA5.1.9					✓					✓	
Conduct shade restoration activities Related strategies:UA5.1.11					✓					✓	
Protect wetlands Related strategies:UA5.1.12, LG7.1.11					✓		✓	✓		✓	
Enhance the extent and function of wetlands and wet meadows Related strategies:UA5.1.13					✓					✓	

Strategy Summary Related Strategies	Working Hypothesis Type ¹							Strategy Category ²			
	SED	LWD	PL	RF/C	TEMP	BS	FL	LU / REG	IS	B/H	DG
Improve watershed conditions Related strategies:LG6.1.6, LG7.1.5							✓	✓		✓	
Investigate feasibility of water storage Related strategies:LG7.1.8							✓	✓		✓	
Shallow aquifer storage Related strategies:LG7.1.9							✓			✓	
Manage beaver populations and educate public regarding their benefits Related strategies:LG7.1.10							✓			✓	
Allow for natural attenuation of confinement Related strategies:NF4.3.1, SF4.2.1				✓						✓	

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; IS=Infrastructure; B/H=Biology/Hydrology; DG=Data Gaps

7.3.3 Priority Protection Area Strategies

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. 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.

Protection strategies were defined by the management technical and citizen groups. 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. 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 understanding of the technical and citizen groups is that the areas denoted above as also being listed as priority restoration areas are not restricted to the strategy outlined in this section. 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 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 revegetation when placing streamside land 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 of Washington and USDA,

and is administered by the Washington State Conservation Commission 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 these easements are 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. Conservation easement agreements that allow the least disturbance should have priority over less protective agreements.
- **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 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. 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 is not 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 enclosures, 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 citizen 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, but are not limited to, the following:

- **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 soil, 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 for these priority areas. There are also a variety of funding sources should also 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 drinking 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 transfer
- Water transport development

Projects that reduce the amount of water removed from the stream can also protect priority areas. Some of the above project types reduce both grazing intensity and water removal. In addition, 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 is one organization that can help arrange for water leasing or purchase. Irrigation efficiency projects are also important to the protection of 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 focal species. Projects of this type include, but are not limited to:

- Lining open ditches
- Water conveyance piping
- Point of diversion transfers

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 Asotin 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 Asotin who believe their legitimate comments and concerns have not been responded to, 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 were 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

Tennile and Couse Creeks

The subbasin assessment recommended that a section of Tennile Creek be considered for protection and restoration strategies. The management group considers the Tennile Creek steelhead population important. The group would have liked to have seen Tennile, as a

geographic area, analyzed with the geographic areas in Asotin Creek. This lack of technical information made determining management plans for Tenmile in the context of the subbasin a difficult task. It is acknowledged that Tenmile contributes a relatively small numbers of steelhead to the Asotin Subbasin. What is unknown is the importance of this contribution as a satellite population to the genetics or sustainability of the Asotin sub-population. The technical and citizen groups that contributed to the development of this plan recommends that Tenmile be considered in the context of the entire subbasin in future assessments. Given the information that is available at this time the recommendation from the assessment that the reach designated Tenmile4 be given status as a priority area is accepted. This reach begins where the seasonally dewatered area ends and continues to the confluence with Mill Creek (River Mile 2.7 to 10.6).

Tenmile4 is designated as a protection priority area for this subbasin management plan. It is afforded the same status as protection priority geographic areas. It is also to be governed under the strategies outlined in Section 7.3.3. After considering the restoration strategy for Tenmile4 it was determined that it would not be appropriate to afford this reach that status. In addition, the habitat attributes in Tenmile4 that were determined to be limiting to steelhead production will be addressed by applying the activities outlined in the priority protection strategies. As of this writing, nearly all of Tenmile Creek is enrolled in CREP. We strongly urge that the stream buffer protection on Tenmile Creek be completed. When that is completed attention should turn to the upland areas to further reduce sediment input into Tenmile Creek.

Couse Creek was not evaluated using EDT. This area supports a small steelhead population. It is not afforded priority status within this subbasin plan. While we recognize the importance of all steelhead bearing streams, it is appropriate at this time to set priorities within the subbasin. We accept the assessment recommendation that Couse Creek is not a priority for funding at this time. We strongly recommend that Couse Creek be considered for priority status at the next iteration of subbasin planning. Couse Creek, like all areas in the subbasin that support focal species, is recommended for funding under the Section 7.3.1 of the subbasin plan (Imminent Threats). Those interested in pursuing habitat enhancement projects on this sub-watershed should be encouraged to consider alternate funding sources.

Instream Flows

Flow enhancement is an important priority for the subbasin. Within this subbasin planning process, flow was a limiting factor identified in several geographic areas. Other processes such as watershed planning 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 (Priority Restoration Areas) 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. Limited irrigation withdrawals occur in the subbasin (supporting 30 to 40 irrigated acres). These withdrawals do not dewater streams and are not believed to limit flows. Further, these withdrawals are taken from stream reaches that support migration life history stages only and occur during times of year when there are no fish migrating through these reaches. As such, these irrigation withdrawals would not limit life history stages of any focal species.

7.3.6 Numeric Fish Population Goals

The management plan aquatic hypotheses, objectives and strategies in this subbasin were derived 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 goals from other planning efforts (total, natural, hatchery and harvest components) are provided in Tables 7-6 and 7-7. Table 7-6 provides numeric adult fish return goals from the Nez Perce Tribe. Table 7-7, developed by the Nez Perce Tribe with brief review by the Washington Department of Fish and Wildlife, provides preliminary numeric fish population goals from various sources. Since this plan is a culmination of numerous planning efforts, it is important to recognize anadromous fish goals from previous planning documents.

Tables 7-6 and 7-7 do 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 this chapter show that natural production alone in the Asotin Basin is not likely to achieve the magnitude of total adult goals listed in some of the past plans (see Objectives Analysis in Section 7.3.6). This would suggest that an artificial production component or goal may be required if return goals near the levels stated in the tables below are expected to be met.

Note – as goals, these numeric fish population values are not considered part of the subbasin plan working hypotheses, objectives, and strategies framework that focuses on habitat enhancement.

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 Recovery Teams (TRT) and state water quality management plans is recommended to facilitate consistency with ESA and CWA requirements. The Asotin 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 above. 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. The Asotin County Conservation District and other entities within the subbasin intend to work with the TRT primarily through the Snake River Salmon Recovery Plan process.

Table 7-6 Nez Perce Tribe Adult Fish Return Goals for the Asotin Subbasin

		<u>Hatchery Component</u>				
		Long-Term Return	Natural Spawning Component	Broodstock Need	Rack Return	Harvest Component
Spring Chinook	Future Goals ¹	>500	>250	40	NA	>100
	Existing Condition	<100	<100	0	NA	Undefined ²
	Unmet Goals	>400	>150		NA	>100
A-run Steelhead	Future Goals ¹	2,000	1,500	NA	NA	500
	Existing Condition	651	>651	0	NA	Undefined ²
	Unmet Goals	1,400	900	NA	NA	500
Bull Trout	Future Goals ¹	Undefined	Undefined	Undefined	Undefined	Undefined
	Existing Condition	Unknown	Unknown	0	0	0
	Unmet Goals	Unknown	Unknown	NA	NA	NA
Lamprey	Future Goals ¹	Undefined	Undefined	Undefined	Undefined	Undefined
	Existing Condition	Unknown (0)	Unknown (0)	0	NA	0
	Unmet Goals	Unknown	Unknown	NA	NA	NA

1 Goals are derived from various management plans as described in Appendix A. This table does not necessarily imply consensus by all management agencies but merely gives direction to managers who must work out the restoration and recovery of each specie and population over time through implementation of the plan.

2 Sport harvest is closed under the existing conditions.

Table 7-7 Comparison of Draft Fish Management Goals From Various Plans Pertaining to the Asotin Creek Subbasin

Species	Long-term Return Goals	Natural Spawning Component	Hatchery Spawning Component	Total Spawning Component	Harvest Component	Overall Goal/Notes
Spring chinook						
Historical Abundance		>100				ACCD 1995
NMFS 2002		1,000	----	----	----	Interim Abundance Goal – Lower Mainstem tributaries
CRFMP		25,000 ¹	10,000 ¹	35,000 ¹		At Lower Granite
LSRCP	1,152 hatchery plus 1,248 naturally produced	----	----	----	----	Lower/Mid Snake River and tributaries
EDT Model Current		158	0	158	0	WDFW 2004
EDT Model PFC	1,018	1,018				WDFW 2004
EDT Model Historic	4,348	4,348				WDFW 2004
A-Run Steelhead						
Historical Abundance		> 800				ACCD 1995
NMFS 2002		400	----	----	----	Interim Abundance Goal
WDFW escapement goal (SaSi 2004)	160					
CRFMP	<62,2003					At Lower Granite
LSRCP	4,656 hatchery plus 5,044 naturally produced for all of SE WA (none specifically identified for Asotin Creek)					Mitigation goal – Current
WDFW Potential Parr Production Model		1,662				Current Potential carrying capacity estimate (WDFW 2001)
EDT Model Current		206				WDFW 2004
EDT Model PFC	356	356				WDFW 2004
EDT Model Historic	8,677	8,677				WDFW 2004
Bull Trout	See draft bull trout recovery plan					

Species	Long-term Return Goals	Natural Spawning Component	Hatchery Spawning Component	Total Spawning Component	Harvest Component	Overall Goal/Notes
Lamprey						
Historical Abundance		"large runs"				The name "Asotin" is derived from the Nez Perce word Heesut'iin, which means "Eel Creek" (Hitchum 1985).
CW Tech. Group	10,0004	----	-----	----	----	Based on 60's count at L. Snake River dams

1 CRFMP, which has expired (US v. Oregon), establishes interim management goals for fish passing over the Lower Granite Dam; Snake River specific goals are not defined.

2 Represents interim abundance goal for Snake River ESU

3 CRFMP, which has expired (US v. Oregon), establishes interim management goals for fish passing over the Lower Granite Dam; Snake River specific goals are not defined.

4 Interim goal is based on historic (late 1960's) counts >30,000 at Lower Snake River dams

Key: NMFS 2002=NMFS Draft Interim Abundance Goals; CRFMP=Columbia River Fish Management Plan; LSRCP=Lower Snake River Fish and Wildlife Compensation Plan.

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 habitat enhancement objectives outlined above was generated. This work, completed by Mobrاند Biometrics, Inc., made use of the same EDT model used during the aquatic assessment. Note that these numbers are provided for comparison between historic, current, properly functioning, and post-management plan implementation conditions only. They are not calibrated to reflect actual numeric fish populations within the subbasin. However, they are useful to compare the anticipated relative change in the subbasin upon achievement of the biological objectives.

Appendix J provides the full objectives analysis completed for the Asotin 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 7-8 and 7-9 for steelhead and spring Chinook, respectively.

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

“The benefits of active and combined active/passive restoration are considerable for both steelhead and spring chinook. Although the 50 percent increase in mean steelhead abundance after combined active and passive restoration is significant, the 20 percent increase in productivity and, especially, the doubling of life history diversity, is even more significant. A listed stock such as Asotin Creek steelhead can be sent into a demographic death spiral by localized catastrophes or by a relatively short succession of drought years if it does not have the resiliency conferred by robust productivity and a reasonably large number of viable alternative life history strategies. While a productivity of 2.38 adult returns/spawner can hardly be described as “robust”, it is certainly better than the current value of 1.98. There is, however, no need for equivocation in interpreting the significance of more than doubling the life history diversity index. In a small, agricultural watershed like Asotin Creek, accidents and localized natural events can seal the fate of a depressed population, especially if that population is wholly dependent upon a small number of critical pieces of habitat.

The benefits of the proposed package of restoration actions to spring Chinook are similar to those for steelhead, but considerably more impressive. Clearly the most important result is the near doubling of productivity from 1.32 to 2.50. Such a development might well be enough to move Asotin spring Chinook from the status of museum piece to a viable natural stock and an important hedge against extinction for the larger ESU in which it belongs. The 139 percent increase in life history diversity is nearly as important as the productivity increase, and for the same reasons cited for steelhead: this increase loosens the life-or-death dependence on a handful of reaches.”

Table 7-8 Objectives Analysis – Asotin Creek Summer Steelhead

Scenario	Mean Adult Abundance	Adult Productivity	Adult Carrying Capacity	Life History Diversity	Smolt Productivity	Mean Smolt Abundance
Current	219	1.98	443	18.0%	159	19,788
Historical	8,196	19.92	8,629	100.0%	219	100,459
PFC	412	2.35	719	66.0%	180	36,434
Passive Restoration	225	2.00	449	19.0%	160	20,355
Active Restoration	327	2.38	564	40.0%	189	29,545
Passive + Active Restoration	332	2.39	571	41.0%	190	29,945

Passive restoration=implementation of protection strategies

Active restoration=implementation of restoration strategies

PFC=Properly Functioning Conditions

Table 7-9 Objectives Analysis – Asotin Creek Spring Chinook

Scenario	Mean Adult Abundance	Adult Productivity	Adult Carrying Capacity	Life History Diversity	Smolt Productivity	Mean Smolt Abundance
Current	128	1.32	529	28.0%	210	24,205
Historical	4,348	14.87	4,662	100.0%	556	604,491
PFC	820	3.53	1,145	97.0%	442	200,050
Passive Restoration	134	1.34	533	29.0%	211	25,393
Active Restoration	539	2.50	899	64.0%	340	117,074
Passive + Active Restoration	543	2.50	905	67.0%	341	117,905

Passive restoration=implementation of protection strategies

Active restoration=implementation of restoration strategies

PFC=Properly Functioning Conditions

7.3.8 Additional Fish Enhancement Efforts

According to the objectives analysis provided in the previous section, 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 as described above. A combination of other enhancement efforts will be needed if these numeric objectives are to be achieved.

If the most aggressive subbasin restoration scenario were implemented and all objectives outlined in this plan were achieved, EDT predicts increases in mean adult abundance of 52 percent for steelhead and 324 percent for spring Chinook over the time period of the plan (see Tables 7-5, 7-8, and 7-9). Increases in productivity are also predicted, 1.98 to 2.39 for steelhead and 1.32 to 2.50 for spring Chinook. However, these increases as predicted will not be sufficient to meet even the lowest of numeric fish goals for naturally-produced fish as outlined in Section 7.3.6.

As discussed in Section 3.5.8, out-of-subbasin factors—including estuarine and ocean conditions, hydropower impacts such as water quality and fish passage, mainstem Snake/Columbia river water quality and quantity conditions, and downriver and oceanic fisheries—are key factors limiting recruitment of anadromous spawners to the Asotin subbasin.

Out-of-subbasin work combined with in-subbasin work is needed to achieve any of the proposed numeric fish population goals listed above. Achieving these goals for anadromous species will reflect progress made toward improving out-of-basin conditions. Increases in both anadromous adult escapement and habitat carrying capacity will be required to achieve numeric anadromous fish goals. Minimizing the impact of out-of-subbasin effects on subbasin restoration efforts will require coordination and cooperation in province- and basinwide efforts to address problems impacting Asotin subbasin fish stocks.

Increasing anadromous fish productivity and production, as well as life stage-specific survival, through artificial production may need to be implemented within the subbasin. Specific strategies to accomplish this can include the following:

- Investigate the potential to implement innovative hatchery production strategies in appropriate areas to support fisheries, natural production augmentation and rebuilding, reintroduction, and research.
- Apply safety net hatchery intervention based on extinction risk analysis and benefit risk assessments.
- Implement artificial propagation measures and continue existing artificial and natural production strategies.
- Monitor and evaluate effectiveness of implementation of hatchery and natural production strategies.

Salmonid recovery planning in the Washington portion of the Snake River Region (includes Washington portions of Asotin, Lower Snake, Tucannon, Walla Walla, and Grand Ronde subbasins) is occurring under the guidance of the Snake River Salmon Recovery Board. The Board will be exploring the development of a common set of numeric fish population goals that addresses all four Hs (habitat, hydropower, harvest and hatcheries). Fish population goals identified by the Board could include additional artificial propagation and/or out-of-subbasin strategies needed to meet those goals. These numeric fish population goals will be aimed at recovery and delisting of ESA listed salmonids. Preliminary numeric fish population goals have been identified by the co-managers (state and federal fish and wildlife agencies and tribes; see previous section) to meet the needs of production and harvest. These goals assume that a combination of natural and artificial production will be used in the subbasin and are expected to evolve over time.

7.4 Terrestrial Habitats

Section 7.3 reviewed strategies unique to aquatic species and their habitats. This section has the following three main components:

- Terrestrial Working Hypotheses, Factors Affecting Habitats, and Objectives
- Terrestrial Strategies
- Terrestrial Special Topic – Agriculture as a Cover Type of Interest

Priority habitats within the Asotin 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 Asotin Subbasin, including background on its development and assumptions used. Selected portions of this attachment are provided below.

7.4.1 Terrestrial Working Hypotheses, Factors Affecting Habitats, and Objectives

Three ecoregion focal habitat types occur in the Asotin Subbasin, riparian/riverine wetlands, ponderosa pine, and interior grasslands. 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.

As for aquatic habitat types, 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 short-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 exotics. Coupled with poor habitat quality of existing vegetation this has resulted in extirpation or significant reductions in riparian habitat obligate wildlife species.

Factors Affecting the Habitat

- Loss of habitat due to numerous factor including riverine recreational developments, inundation from impoundments, cutting and spraying of riparian vegetation, etc.
- Alteration of natural hydrology due to diking, channelization, etc. This has resulted in reduced stream flows, reduction of overall area and extent of riparian habitat, streambank stabilization, loss of vegetative structure, and narrowed stream channels.
- Habitat alteration from 1) hydrological diversions, headgate dam, 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 the 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 that may be subject to high levels of human disturbance and many disproportionately support non-native species that displace and/or impact native species productivity. Such species may include 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

The short-term or major factors affecting this focal habitat type are direct loss of habitat 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 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. This is 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 may disproportionately support non-native species that displace and/or impact native species productivity. Such species may include 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

The short-term or 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 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 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 that 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 reduce 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 that may be subject to high levels of human disturbance and may disproportionately support non-native species that displace and/or impact native species productivity. Such species may include 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 are 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, acquisitions, 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:

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

Table 7-10 provides the biological objectives for priority habitat types in the Asotin Subbasin. Further details on the relationship between these objectives and strategies can be found in Appendix K.

Table 7-10 Biological Objectives for Priority Terrestrial Habitats

		Biological Objectives
Habitat		<i>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.</i>
Riparian Riverine	RA	Protect riparian riverine function on a minimum of 6,000 acres (conservative estimated historic acreage), with an initial focus on areas that directly contribute to the restoration of aquatic focal species.
Ponderosa Pine	PA	Protect P. Pine habitat within habitat classified as ECA Class 1 & 2 (9,000) acres), 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 land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	PB	Enhance P. Pine functionality to achieve habitat parameters for focal and other obligate species within habitat classified as ECA Class 1 & 2 (9,000 acres), 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 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 Interior grassland habitat within habitat classified as ECA Class 1 & 2 (14,000 acres), 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 land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	GB	Enhance Interior functionality to achieve habitat parameters for focal and other obligate species within habitat classified as ECA Class 1 & 2 (14,000 acres), 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 land, contain rare or unique plant communities, have threatened, endangered or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	GC	Show an upward trend in CRP acreage and functionality.

Table 7-11 Terrestrial Habitat Strategies

Habitat Type	Objective	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
Riparian- Riverine Wetland	RA	<p>Strategies listed under riparian function for aquatic species are incorporated herein by reference (aquatic riparian function strategies are listed under Objective UA4.1 in Table 7-4)</p>
	PA	<p>Strategy PA.1-Identify functioning ponderosa pine habitats, corridors, and linkages classified as ECA Class 1&2, 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 land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.</p> <p>Also see Strategies P1.2-1.6</p> <p>Strategy PA.2-Provide information, education, and outreach to protect habitats.</p> <p>Strategy PA.3-Use easements, leases, cooperative agreements, and acquisitions to protect habitat (long-term protection strategies are preferred over short-term).</p> <p>Strategy PA.4-Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.).</p> <p>Strategy PA.5-Identify inadequate land use regulations. Work to strengthen existing regulations or pass new regulations to improve protection of habitats.</p> <p>Strategy PA.6-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.</p>
Ponderosa Pine		<p>Strategy PB.1-Identify non-functioning ponderosa pine habitats, corridors, and linkages within ECA Class 1 & 2 areas, 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 land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.</p> <p>Also see Strategies P2.2-2.7.</p> <p>Strategy PB.2-Identify sites that are currently not in ponderosa pine habitat that have the potential to be of high ecological value, if restored.</p>
	PB	<p>Strategy PB.3-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.</p> <p>Strategy PB.4-Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function.</p> <p>Strategy PB.5-Assist in long-term development and implementation of a Southeast Washington Comprehensive Weed Control Management Plan in cooperation with local weed boards.</p> <p>Strategy PB.6-Fund noxious weed control projects to improve habitat function.</p> <p>Strategy PB.7-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.</p>

Habitat Type	Objective	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
Grassland	GA	<p>Strategy GA.1-Identify functioning interior grassland habitats, corridors, and linkages classified as ECA Class 1&2, 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 land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.</p> <p>Also see Strategies GA.2-A.6 Strategy GA.2-Provide information, education, and outreach to protect habitats.</p> <p>Strategy GA.3-Use easements, leases, cooperative agreements, and acquisitions to protect habitats (long-term protection strategies are preferred over short-term).</p> <p>Strategy GA.4-Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.).</p> <p>Strategy GA.5-Identify inadequate land use regulations. Work to strengthen existing regulations or pass new regulations to improve protection of habitats.</p> <p>Strategy GA.6-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.</p>
	GB	<p>Strategy GB.1-Identify non-functioning interior grassland habitats, corridors, and linkages within ECA Class 1 & 2 areas, 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 land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.</p> <p>Also see Strategies GB.2-B.9.</p> <p>Strategy GB.2-Identify sites that are currently not in grassland habitat that have the potential to be of high ecological value, if restored.</p> <p>Strategy GB.3-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.</p> <p>Strategy GB.4-Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function.</p> <p>Strategy GB.5-Assist in long-term development and implementation of a Southeast Washington Comprehensive Weed Control Management Plan in cooperation with local weed boards.</p> <p>Strategy GB.6-Fund noxious weed control projects to improve habitat function.</p> <p>Strategy GB.7-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.</p> <p>Strategy GB.8-Restore viable populations of obligate wildlife species where possible.</p> <p>Strategy GB.9-Work with USDA programs (e.g. CRP) to maintain and enhance habitat quality.</p>

Habitat Type	Objective	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
Grassland	GC	<p>Strategy GE.1-Increase landowner participation in 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.)</p> <p>Strategy GE.2-Seek additional funding sources consistent with current CRP and CREP guidelines to increase individual landowner enrollment in programs that achieve similar goals, including prioritization of landowners who have already reached their payment limitations.</p> <p>Strategy GE.3-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available.</p> <p>Strategy GE.4-During re-enrollment, convert CRP land to more functional plant communities.</p> <p>Strategy GE.5-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.</p>

* Functionality refers to the ability of a habitat area to support wildlife populations.

7.4.2 Terrestrial Strategies

Rather than focus solely on acquisitions as the major protection strategy, subbasin planners examined a number of alternate strategies from which preferred strategies were identified, including easements, leases, acquisitions, and 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. For example, in addition to using acquisitions as a habitat protection tool, habitat managers will concurrently examine whether habitat objectives can be achieved, all or in part, on extant public lands, through leases and easements with private landowners, with USDA programs, and through cooperative projects/programs.

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 7-9. 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 will provide direction for management of these species (see Chapter 6 for discussion). 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).

7.4.3 Terrestrial Special Topic – Agriculture as a 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
- Develop forage plots

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.

7.5 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 Asotin Subbasin. The RM&E activities proposed herein will help fill existing data gaps and will facilitate implementation of an adaptive management approach in the subbasin. Although general in nature due to limitations of the Subbasin planning process, this RM&E plan is intended to be refined over time.

- 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 aquatic 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 program is summarized below and is presented in full in Appendices L (terrestrial components) and M (aquatic 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.

7.5.1 Aquatic Habitats and Species

The full aquatic RM&E plan for the Asotin Subbasin is provided in Appendix M. Information regarding RM&E priorities for aquatic species of interest is provided in Appendix D. Following are the guiding principles and priorities outlined in the plan:

- 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). This includes gathering information regarding aquatic species of interest.
- 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 Asotin 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.

The Asotin subbasin technical staff, managers, and stakeholders have initiated an effort to coordinate RM&E activities. Table 1 of Appendix L 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 1 of Appendix L:

- 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 Asotin 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.

7.5.2 Terrestrial Habitats and Species

The full aquatic RM&E plan for the Asotin Subbasin is provided in Appendix M. 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.

7.6 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, 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.

8. References

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