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

Table 7-1 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.
Bedscour	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.
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

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
		Limiting Factors for Steelhead and Spring Chinook							
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 dewatered 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	
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.	
Causes: Land use: road development, cultivation, improperly managed grazing; Increased width-to-depth ratio; Poor riparian condition; Altered stream hydrograph leading to excessive flashiness.	
Objective UA1.1- Reduce embeddedness within the area to 10%. This will also stimulate a corresponding decrease in percent fines and turbidity. *Historical estimate: less than 10%* *Current estimate: 18%.*	**Note- Strategies are not prioritized and will be implemented based upon opportunities available** 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. 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. Strategy UA1.1.3-Restore perennial vegetation in upland cultivated and non-cultivated areas with native species and reforestation. 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. Strategy UA1.1.5-Pave, decommission, or relocate roads near the stream and in upland areas. 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. 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.) 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. 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). 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 Strategy UA1.1.11- Reduce sediment inputs through implementation of additional forestry and agricultural BMPs. 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. 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.

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-	**Note- Strategies are not prioritized and will be implemented based upon opportunities available**
Reach or exceed one piece of LWD per channel width.	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.
Historical estimate: 4.75 pieces of LWD/CW	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.
Current estimate: 0.7 pieces of LWD/CW.	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 UA3.1.9Increase 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 ^{O}F (24 ^{O}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. Historic estimate: 18% Current estimate 33% (70% in George1 - 25% in George 3)	See strategies for Objective UA1.1
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. Historic estimate: 1.5 pieces of LWD/CW Current estimate: <1 piece / 3 channel widths (0.33 pieces/CW)	See strategies for Objective UA2.1
Objective LG2.2-Increase large woody debris density to the greatest extent practical, given limitations due to development and land use. Historic estimate: 1.5 pieces of LWD/CW Current estimate: <1 piece / 3 channel widths (0.33 pieces/CW)	See strategies for Objective UA2.1

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. Historic estimate: 25% *Current estimate: 2% (George 1)*	See strategies for Objective UA3.1
Objective LG3.2-Increase the proportion of primary pools to the maximum extent practical through passive measures in the George 2 reach. Historic estimate: 20% *Current estimate: 10% (George 2)*	See strategies for Objective UA3.1
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. *Historic estimate: 100%* *Current estimate: 37.5%*	See strategies for Objective UA4.2
Objective LG4.2-Initiate riparian recovery and re-establishment in the George 2 and George 3 reaches to achieve 75% riparian function. *Historic estimate: 100%* *Current estimate: 62.5%*	See strategies for Objective UA4.2
Objective LG4.3-Decrease manmade confinement to less than 40% of stream bank length in the George 1 reach. *Historic estimate: 0%* *Current estimate: 60%*	See strategies for Objective UA4.1
Objective LG4.4-Decrease manmade confinement to the maximum extent practical in the George 2 reach. *Historic estimate: 0%* *Current estimate: 60%*	See strategies for Objective UA4.1

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 ^{O}F (24 ^{O}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*	See strategies for Objective UA5.1

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% NFAsotin3-16% NFAsotin2)

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. *Historic estimate: 100%* *Current estimate: 62%*	See strategies for Objective UA4.2
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. *Historic estimate: 100%* *Current estimate: 62%*	See strategies for Objective UA4.2
Objective NF4.3-Decrease manmade confinement to less than 10% of streambank length. *Historic estimate: 0%* *Current estimate: 25%*	Strategy NF4.3.1-Allow for natural attenuation of confinement. 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. *Historic estimate: 6 cm* *Current estimate: 12.1 cm*	See strategies for Objective LG6.1

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. *Historic estimate: 10%* *Current estimate: 25%*	See strategies for Objective UA1.1
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. *Historic estimate: 2.5 pieces LWD/CW* *Current estimate: 0.67 pieces LWD/CW*	See strategies for Objective UA2.1
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. *Historic estimate:32%* *Current estimate: 8%*	See strategies for Objective UA3.1

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 ^{O}F (16 ^{O}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. *Historic estimate: <10%* *Current estimate: 21% (18% Charley1-3 to 26.8% Charley4)*	See strategies for Objective UA1.1
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. *Historic estimate: 3.3 pieces LWD/CW* *Current estimate: 0.67 pieces LWD/CW*	See strategies for Objective UA2.1
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. *Historic estimate: 22.3%* *Current estimate: 10.5%*	See strategies for Objective UA3.1

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. *Historic estimate: 100%* *Current estimate: 72.5%*	See strategies for Objective UA4.2
Objective CC4.2-Decrease manmade confinement to less than 25% of the streambank length in the Charley1 reach. *Historic estimate:0%* *Current estimate: greater than 80%*	See strategies for Objective UA4.1
Objective CC4.3-Do not allow for further confinement above current conditions. *Historic estimate:0%* *Current estimate: greater than 80%*	See strategies for Objective UA4.1, with a focus on particular strategies that can maintain current conditions.

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. *Historic estimate: 6cm* *Current estimate: 12.8cm*	See strategies for Objective LG6.1

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=Infrasturcture; 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 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 exclosures, and a time length agreement similar to the CREP requirements.

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

Upland Enhancement

In addition to the riparian areas above the 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 increases 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

Tenmile and Couse Creeks

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

				Hatchery Component		
		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 workout 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		25,0001	10,0001	35,0001		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 Mobrand 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 aquatics 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

Habitat	Biological Objectives *NOTE: The working horizon for accomplishing objectives is 2004-2020. These objectives were developed from a larger group of potential objectives based on the subbasin assessment and resulting working hypotheses. Objectives are not prioritized within or between habitat types.*	
Riparian Riverine	RA	Protect riparian riverine function on a minimum of 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	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)
Ponderosa Pine	PA	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. Also see Strategies P1.2-1.6 Strategy PA.2-Provide information, education, and outreach to protect habitats. Strategy PA.3-Use easements, leases, cooperative agreements, and acquisitions to protect habitat (long-term protection strategies are preferred over short-term). Strategy PA.4-Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.). Strategy PA.5-Identify inadequate land use regulations. Work to strengthen existing regulations or pass new regulations to improve protection of habitats. 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.
	PB	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. Also see Strategies P2.2-2.7. 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. 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. Strategy PB.4-Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function. 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. Strategy PB.6-Fund noxious weed control projects to improve habitat function. 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.

Habitat Type	Objective	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
Grassland	GA	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. Also see Strategies GA.2-A.6 Strategy GA.2-Provide information, education, and outreach to protect habitats. Strategy GA.3-Use easements, leases, cooperative agreements, and acquisitions to protect habitats (long-term protection strategies are preferred over short-term). Strategy GA.4-Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.). Strategy GA.5-Identify inadequate land use regulations. Work to strengthen existing regulations or pass new regulations to improve protection of habitats. 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.
	GB	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. Also see Strategies GB.2-B.9. Strategy GB.2-Identify sites that are currently not in grassland habitat that have the potential to be of high ecological value, if restored. 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. Strategy GB.4-Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function. 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. Strategy GB.6-Fund noxious weed control projects to improve habitat function. 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. Strategy GB.8-Restore viable populations of obligate wildlife species where possible. Strategy GB.9-Work with USDA programs (e.g. CRP) to maintain and enhance habitat quality.

Habitat Type	Objective	Strategies (Note-Strategies are not prioritized and will be implemented based upon available opportunities)
Grassland	GC	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.)
		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.
		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.
		Strategy GE.4-During re-enrollment, convert CRP land to more functional plant communities.
		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.

* 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 aquatics portion of the proposal describe high priority RM&E needs that will support achievement of the plan's vision. These needs are defined as programs that 1) gather data or conduct research that furthers our understanding of ecosystem function, 2) fill existing knowledge or data gaps, 3) answer questions critical to successful management of species or communities, 4) test or develop innovative restoration/management techniques, 5) identify the accuracy of assumptions, or 6) allow evaluation of the relative success of ongoing restoration/management activities, thereby facilitating adaptive management. Although they are discussed separately, each section follows the same general framework:

1. Identification of research needs to fill data gaps and establish baseline conditions
2. Identification of monitoring and evaluation needs to track progress on achievement of biological objectives and to support adaptive management in the subbasin.

The RM&E 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

Ashley, P. and Stovall, S. 2004. SE Washington Subbasin Planning Ecoregion Wildlife Assessment.

Asotin County Conservation District Landowner Steering Committee. 1995. Asotin Creek Model Watershed Plan. Sponsored by: Asotin County Conservation District.

Bouwes, Nick; Schaller, Howard; Budy, Phaedra; Petrosky, Charles; Kiefer, Russ; Wilson, Paul; Langness, Olaf; Weber, Earl, and Tinus, Eric. (1999). An analysis of differential delayed mortality experienced by stream-type chinook salmon of the Snake River: a response by State, Tribal and USFWS technical staff to the 'D' analyses and discussion in the Anadromous Fish Appendix to the U.S. Army Corps of Engineers' Lower Snake River Juvenile Salmonid Migration Feasibility Study..

Columbia Basin Fish and Wildlife Authority. (1991). *Integrated System Plan for Salmon and Steelhead Production in the Columbia River Basin*. Funded by the Northwest Power Planning Council.

Deriso, R.B. (2002). Bayesian analysis of stock survival and recovery of spring and summer chinook of the Snake River basin. *In* Incorporating Uncertainty into Fishery Models. *Edited by* J.M. Berksen, L.L. Kline, and D.J. Orth. American Fisheries Society. Bethesda, MD.

Fraley, J.J. and B.B. Shepard. 1989. Life history, ecology, and population status of migratory bull trout (*Salvelinus confluentus*) in the Flathead Lake and River system, Montana. Northwest Science 63:133-143.

FSA. 2004. CRP/CREP, unpublished data.

Goetz, F.A. 1989. Biology of bull trout, *Salvelinus confluentus*, a literature review. US Department of Agriculture, Forest Service, Willamette Nation Forest, Eugene, Oregon. 53 p.

Hare, S.R., Mantua, N.J., and Francis, R.C. (1999). Inverse production regimes: Alaska and West Coast Pacific salmon. Fisheries (Bethesda), 24: 6-14.

Idaho Department of Fish and Game. (1998). Idaho's Anadromous Fish Stocks: Their Status and Recovery Options. Report to the Director. May 1, 1998. Idaho Department of Fish and Game. IDFG 98-13.

Marmorek, D.R., C.N. Peters and I. Parnell (editors). (1998). Plan for Analyzing and Testing Hypotheses (PATH): Final Report for Fiscal Year 1998. ESSA Technologies Ltd., 1765 West 8th Avenue, Suite 300. Vancouver, BC V6J 5C6 263 pp.

National Marine Fisheries Service. (1995). Endangered Species Act Section 7 Consultation. Biological Opinion. Reinitiation of Consultation on 1994-1998 operation of the federal Columbia River power system and juvenile transportation program in 1995 and future years. March 2, 1995. National Marine Fisheries Service. Northwest Region.

National Marine Fisheries Service. (1997). In Digital Studios. Salmon Conflict. Position Statements. Response of National Marine Fisheries Service, (R. Jones) to questionnaire for Internet project. CyberLearning Collection. http://www.cyberlearn.com. Ron. S. Nolan, Aptos, CA Posted March 22, 1997.

National Marine Fisheries Service. (2000). Passage of juvenile and adult salmonids past Columbia and Snake River dams. White Paper. National Marine Fisheries Service, Seattle, Washington.

National Research Council. (1995). Upstream: salmon and society in the Pacific northwest. Prepublication copy. National Research Council, National Academy of Sciences. Washington, D.C.

Nemeth, D. J. and R. B. Kiefer. (1999). Snake River Spring and Summer Chinook Salmon: The Choice For Recovery. Fisheries

NOAA-Fisheries. 2004. ESA Listing Maps. Downloaded March 29, 2004, from http://www.nwr.noaa.gov/1salmon/salmesa/mapswitc.htm

Northwest Power Planning Council. (1992). Columbia basin fish and wildlife program – strategy for salmon, volumes 1 and 2. Northwest Power Planning Council, Portland, OR.

Northwest Power Planning Council. 2001. Technical Guide for Subbasin Planners. Council Document 2001-20.

NWPCC. 2001. Technical Guide for Subbasin Planners. Council document 2001-20.

Oregon Technical Outreach and Assistance Team (TOAST). 2004. Understanding Out-of-Subbasin Effects for Oregon Subbasin Planning.

Petrosky, C.E., Schaller, H.A. and Budy, P. 2001. Productivity and survival rate trends in the freshwater spawning and rearing stage of Snake River chinook salmon (*Oncorhynchus tshawytscha*). Can. J. Fish. Aquat. Sci. 58:1196-1207.

Rieman, B.E. and J.D. McIntyre. 1993. Demographic and habitat requirements for conservation of bull trout. United States Department of Agriculture, Forest Service, Intermountain Research Station, General Technical Report INT_302, Ogden, Utah.

Schaller, H.A., Petrosky, C.E. and Langness, O.P. (1999). Contrasting patterns of productivity and survival rates for stream-type chinook salmon (*Oncorhynchus tshawytscha*) populations of the Snake and Columbia rivers. Can. J. Fish. Aquat. Sci 56: 1031-1045.

Stovall, S. (Ed.). 2001. Draft Asotin Creek Subbasin Summary. Prepared for Northwest Power Planning Council.

StreamNet. 2004. Pacific Northwest Interactive Mapper. http://map.streamnet.org/website/snetmapper/viewer.htm

USACE (United States Army Corps of Engineers). 1975. Lower Snake River Fish and Wildlife Compensation Plan. Special Report. U.S. Army Corps of Engineers. Walla Walla, Washington. 95pp. plus Appendices.

USFWS. 2002. Draft Bull Trout Recovery Plan.

Washington Department of Fish and Wildlife. 2001. Blue Mountains Elk Herd. Wildlife Program, Washington Department of Fish and Wildlife, Olympia, WA.

Washington Department of Fish and Wildlife. 2003. Game Management Plan. Washington Department of Fish and Wildlife, Olympia, Washington, USA.

Washington Department of Fish and Wildlife. 2004. Asotin Subbasin Aquatic Assessment.

Williams et al. (1998). Response to the questions of the Implementation Team regarding juvenile salmon transportation in the 1998 season. ISAB Report 98-2. February 27, 1998. Independent Scientific Advisory Board. Northwest Power Planning Council and National Marine Fisheries Service, Portland, Oregon.