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 Lower Snake 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 Lower Snake 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 contributed to the management plan by 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 Lower Snake 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 Lower Snake 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 (Pomeroy Conservation District) and co-lead (Nez Perce Tribe).

The vision for the Lower Snake 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 Endangered Species Act 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 Endangered Species Act, 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 developed 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 developed 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. 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. 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. All biological objectives were developed by technical staff, them then reviewed and modified by the public as appropriate, with a limited set of assumptions and a 10 to 15 year planning horizon.

Strategies –General

Strategies identify the specific types of actions that can be implemented to achieve the biological objectives. After development of the working hypotheses and biological objectives, preliminary strategies were developed with the technical team. These were then reviewed and revised with joint meetings of technical staff and the public at Aquatic Management Plan Workshop 1, Aquatic Management Plan Workshop 2, and the 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 7.3.4 below for more detailed discussion of numeric fish population goals. For terrestrial species and habitats, the limited information available also precluded the development of biological objectives and strategies for individual focal species. Instead, terrestrial strategies focus on enhancement of priority habitat types, under the general assumption that improvements to terrestrial habitats will benefit terrestrial species.

In the Lower Snake Subbasin, aquatic strategies include both restoration and protection approaches. Discussions with Subbasin Planning Team members, technical staff, and the public identified a common concern that funding for work in this subbasin may be difficult to obtain given the relatively small population of steelhead present. It is unlikely that more expensive active restoration work will be funded with limited return potential. As such, the Subbasin Planning Team determined that passive restoration strategies (e.g. riparian buffer enhancement) would be the most appropriate to propose for this subbasin. This was based on four assumptions: 1) passive restoration strategies tend to be of lower cost than active restoration strategies; 2) habitat enhancement can be achieved through the implementation of passive restoration strategies; 3) passive enhancement strategies encompass those activities that would likely be proposed in the subbasin; and 4) there exists a need to prioritize reaches and limit the scope of potential actions to those that will have the greatest potential for success. There is debate within the subbasin regarding whether proposing only passive restoration strategies is appropriate. Focusing this subbasin plan on passive enhancement strategies does not preclude the use of active restoration within the subbasin, but does place greater weight upon passive enhancement efforts for BPA funding through the subbasin planning process.

Terrestrial Strategies

Two general categories of terrestrial strategies were 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 of biological objectives and strategies was addressed in the Lower Snake 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 Lower Snake Subbasin based, upon the working hypotheses derived from the assessment. For aquatic species and habitats, geographic priorities were identified 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 guided 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.

The aquatic and terrestrial strategy lists were developed to provide implementing entities with a menu of options. Not all strategies will be implemented, nor are all strategies appropriate in all portions of a subbasin. Determination of which strategies are implemented will depend on opportunities that become available and site-specific conditions over time. The listed strategies are intended to result in implementation of projects that will provide the most benefit to fish and wildlife species and their habitats under local ecological and social conditions at 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 developed 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.

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 developed 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 were developed for each limiting factor identified by EDT in each priority restoration geographic area. 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 descriptions of the various limiting factors can be found in Appendix B.

The following assumptions were used by technical staff and the public during the development of biological objectives in the Lower Snake 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. Reach-specific geomorphic function will be considered when determining appropriate enhancement actions. Passive restoration will be the preferred method of enhancement. Active restoration methods will be considered sparingly, and only where such activities are determined to be cost-effective. As such, the objectives for some habitat attributes are more conservative than those other subbasins.
- Embeddedness: Any action taken to reduce embeddedness will likely produce commensurate reductions for percent fines and turbidity.
- Large Woody Debris: 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, and some may move and re-aggregate annually. The intent is to have large pieces of woody debris available in the system that contribute to those 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, 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: The following factors negatively impact instream flow: 1) flashy flows that have caused excessive bedload deposition and widened streams that contribute to periodic subsurface flows; 2) decreased watershed and riparian function (e.g. limited large-scale water infiltration); and 3) lowered water table. Enhancing upland and riparian function and increasing infiltration will increase flows; however, it is recognized that this may not be possible in all areas. This effort will be supplemented by the lease and/or purchase of water rights, where available. Increasing instream flow is assumed to provide the greatest benefit to steelhead populations in some geographic areas (including, but not limited to, Deadman and Wawawai creeks).

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: egg incubation, fry, & overwintering.
Large Woody Debris	Increase in large woody debris (LWD) densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering.
Pools	Increase in primary pool quantity and quality will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.
Riparian Function	Increase in riparian function will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.
Confinement	Decreasing confinement will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering.
Summer Max. Water Temperature	Decrease in summer temperatures will increase survival of steelhead in the following life stages: incubation, fry, and subyearling.
Flow	Increase in summer flows will increase survival of steelhead in the following life stages: incubation, fry, subyearling rearing, and overwintering.
Bedscour	Decrease in bedscour will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.

Table 7-2 Summary of Biological Objectives by Priority Area

Priority Area		Limiting Factors for Steelhead: Substrate Embedded-ness (% of substrate)	LWD (# pieces per channel width)	Pools (% of stream surface area)	Riparian Function (% of max)	Confinement (% of bank length)	Summer Max Water Temp	Bedscour (cm)	Summer Flow
Almota Creek (mouth-L. Almota, RB trib-forks, N. Branch)	Objective	<50%	≥0.33	>8% (RB trib-forks & N. Branch)	>50% (mouth-L. Almota)	No Objective	Not an EDT-Identified Limiting Factor	15cm (RB trib-forks) 20 cm (N. Branch)	Show upward trend
	Current	70%	<0.33	8% (RB trib-forks)	37%	60% (mouth-L. Almota)		20cm (RB trib-forks) 24cm (N. Branch)	Moderately reduced
Almota Creek (L. Almota-RB trib.)	Objective	<25%	≥0.33	>10% (L. Almota-Second L. Almota)	82%	Not an EDT-Identified Limiting Factor		Not an EDT-Identified Limiting Factor	Show upward trend
	Current	37%	<0.33	10% (L. Almota-Second L. Almota)	75%				Moderately reduced
Deadman Creek (Ping-forks)	Objective	<40%	≥0.33	>12% Ping-Lynn) >5% Lynn-forks)	>50% (Ping-Lynn) >75% (Lynn-forks)	No Objective	All days < 25C; <4 days with warmest 22-25C; <12 days >16C (Ping-Lynn)	Not an EDT-Identified Limiting Factor	Show upward trend
	Current	54%	<0.33	12% (Ping-Lynn) 5% (Lynn-forks)	37% (Ping-Lynn) 62% (Lynn-forks)	25% (Ping-Lynn) 60% (Lynn-forks)	>1 day >25C; >4 days >22C; >12 days >16C (Ping-Lynn)		Moderately reduced

Priority Area		Limiting Factors for Steelhead							
		Substrate Embedded-ness (% of substrate)	LWD (# pieces per channel width)	Pools (% of stream surface area)	Riparian Function (% of max)	Confinement (% of bank length)	Summer Max Water Temp	Bedscour (cm)	Summer Flow
Deadman Creek (SF Deadman)	Objective	<25%	≥ 0.33	>20%	>50%	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor	Show upward trend
	Current	37%	<0.33	20%	37%				Moderately reduced
Alpowa Creek (Stember Cr-upper forks)	Objective	Show downward trend	≥ 0.33	≥10%	Show upward trend (≥25%)*	Not an EDT-Identified Limiting Factor	Show downward trend	Not an EDT-Identified Limiting Factor	Not an EDT-Identified Limiting Factor **
Penawawa Creek (Rock Spring Gulch- ~2.5 mi above Little Penawawa)	Objective	Show downward trend	≥ 0.33	≥10%	Show upward trend (≥25%)*	Not an EDT-Identified Limiting Factor	Show downward trend	Not an EDT-Identified Limiting Factor	Show upward trend

* Riparian function estimate was based upon improvements needed in Alpowa. However, riparian conditions in Alpowa and Penawawa are considered more impacted than Almota, thus the % enhancement objective was increased.

** Because Alpowa Creek is spring-fed, fewer flow enhancement opportunities are necessary.

7.3 Aquatic Strategies

The following two categories of aquatic strategies were developed for the Lower Snake Subbasin:

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

All are considered equally important for implementation. Activities such as riparian planting and upland infiltration enhancement are not considered active restoration actions. 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.

7.3.1 Imminent Threats

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, whether or not 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, and can affect the ability of salmonids to successfully spawn. Fish can also be physically injured by inadequate passage facilities thus increasing exposure to disease or possibly causing direct mortality from the injuries. In the Lower Snake Subbasin, two obstructions were identified during the EDT modeling process, one each in the Almota and Deadman creek. Obstructions were also identified in the rest of the subbasin streams, although passage was not estimated. See Table 7-3 for a list of known passage obstructions. Obstructions should be removed or modified throughout 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.

Although the management work groups did not rank obstructions in order of priority, assumptions can be made about priorities, given the knowledge of the fish managers in this area. Neither of the two obstructions identified in the EDT process are considered a priority for modification. The areas that they limit access to are not considered to be high production potential areas and are relatively small portions of the basin. There are several obstructions in the other Lower Snake tributaries that would have a high value to the focal species, if addressed. The culvert on Wawawai Creek significantly obstructs passage to most of the drainage and is considered a high priority for removal. The perched culvert on Steptoe Creek is probably almost a full barrier to steelhead passage. Steptoe also has a large depositional barrier near the mouth. This forms a delta barrier that is impassable at low flows. Other barriers to passage that should be noted are the occasional beaver dams on Penawawa Creek and the headcut falls below the highway on Alkali Flat.

Table 7-3 Salmonid Fish Passage Obstructions in the Lower Snake Subbasin Tributaries

Drainage/Obstruction	River Mile	Steelhead % Passage
Almota Drainage		
Little Almota Cr: Impassable headcut	1.1	0%
Deadman Drainage		
Lynn Gulch: Lynn Gulch culvert	.4	50%
Penawawa Drainage		
No permanent obstructions	NA	NA
Alpowa Drainage		
No permanent obstructions	NA	NA
Wawawai Drainage		
Wawawai Creek: Perched culvert	.1	Partial
Steptoe Drainage		
Steptoe Creek: Deposition in delta	0.0	Partial to Full
Steptoe Creek: 1st road crossing culvert	.2	Partial to Full
Steptoe Creek: 2nd road crossing culvert	.8	Partial to Full
Alkali Flat Drainage		
Alkali Flat Creek: Headcut Falls	7.0	Partial to Full

Note: Passage obstructions on Almota and Deadman Creeks were identified and percentages were estimated for EDT analysis; however, these structures have not been evaluated for passage. Other streams are identified obstructions by Washington Department of Fish and Wildlife personnel. 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, from closest to mouth to farthest from mouth. In addition to the obstructions listed in the table above, the Lower Snake River mainstem dams clearly represent significant barriers to fish passage (see Chapter 3 for discussion of out-of-subbasin effects). Further, Table 7-3 is not complete in regard to Little Almota Cr, as further obstructions exists upstream of those noted.

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 the mesh size is wrong, fish may be impinged on the surface. A pump or gravity water diversion 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). Almota Creek and Deadman Creek were both evaluated for the analysis. Almota has no known diversions. Deadman had two reaches that were rated as having minor withdrawals that may or may not be properly screened. Improperly screened withdrawals are not known to be a major source of mortality in any of the Lower Snake Subbasin tributaries. Diversions that are not screened in accordance with current criteria should be modified to meet that criterion when identified.

Dry Stream Reaches

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

7.3.2 Priority Restoration/Protection Area Strategies

Strategies developed for the priority restoration/protection 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 Almota Creek Geographic Area, Strategies AC1.1.1 through AC1.1.16 are proposed to achieve Objective AC1.1, which was developed as a measurable target for improvements in Hypothesis AC1. 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. Strategies presented in Table 7-4 are focused primarily on a protection-type approach. Additional general strategies that could be applied in these geographic areas follow the table.

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

Hypothesis AC1: Reduction in sediment (turbidity, percent fines and embeddedness) will increase survival of steelhead in the following life stages: egg incubation, fry, & overwintering.

Causes: Road development near streams, agricultural land use near streams.

Assumptions: Strategies will include only passive measures.

Objective AC1.1-Reduce embeddedness within the area to <50% from mouth-L. Almota, RB trib. - forks and in North Branch, and <25% from L. Almota-RB trib. This will also stimulate a corresponding decrease in percent fines and turbidity. Current estimate: 70% (mouth-L. Almota, RB trib.-forks, & North Branch) 37% (L. Almota-RB trib.)	**Note- Strategies are not prioritized and will be implemented based upon opportunities available.**
	Strategy AC 1.1.1-Improve the extent, structure, and function of riparian buffers through vegetation planting (native species unless otherwise required), managed grazing, selective livestock fencing, and similar practices.
	Strategy AC 1.1.2-Decrease sediment delivery from upland practices through expanded use of conservation tillage, sediment basins, mowing of road shoulders in place of herbicide use, vegetative buffers on road shoulders, and other practices.
	Strategy AC1.1.4-Implement the most economical and effective treatment methods to control noxious weeds (including false indigo), including the encouragement of biological control methods where feasible and appropriate.
	Strategy AC1.1.6-Use appropriate BMPs for road maintenance and decommissioning.
	Strategy AC1.1.7- Continue development and implementation of watershed scale efforts to decrease sediment inputs.
	Strategy AC1.1.8- Reduce sediment inputs through implementation of upland forestry and agricultural BMPs, including activities such as sediment basins on intermittent streams, and continue maintenance of current sediment basins.
	Strategy AC1.1.9-Develop and implement strategy for monitoring improvements in embeddedness.
	Strategy AC1.1.10-Uphold existing land use regulations (e.g., critical area ordinances, HPA requirements, etc.) that limit channel, floodplain, and riparian area impacts.
	Strategy AC1.1.11-Identify jurisdictions with inadequate land use 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 AC1.1.12-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 AC1.1.13-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 AC1.1.14-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 AC1.1.15-Develop off-stream livestock watering facilities wherever feasible, or access to a water gap if necessary.
	Strategy AC1.1.16-Prior to implementation of off-stream watering projects, clarify how to protect water rights when livestock watering is moved off-stream.

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC2: Increase in riparian function will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Almota from RB trib.-fork and the North Branch were rated as >90% functional, and were not considered limiting. It was assumed that improvements in this area would not be significant. Passive measures can affect riparian function through the enhancement of stream buffers. Enhancement of most riparian buffers in this area will require re-vegetation. This does not, however, increase riparian function to the degree that it would if combined with decreases in confinement (see Hypothesis AC3).

Objective	Strategies
Objective AC2.1- Facilitate riparian recovery in heavily degraded areas to achieve >82% riparian function from L. Almota-RB trib. and >50% from the mouth-L. Almota. Current estimate: 75% (L. Almota-RB trib) 37% (Mouth-L. Almota)	**Note- Strategies are not prioritized and will be implemented based upon opportunities available**
	Strategy AC2.1.1- Improve the extent, structure, and function of riparian buffers through vegetation planting (native species unless otherwise required), managed grazing, selective livestock fencing, and similar practices.
	Strategy AC2.1.2-Uphold existing land use and instream work regulations (e.g., critical area ordinances, HPA requirements, etc.) that limit channel, floodplain, and riparian area impacts.
	Strategy AC2.1.3- Identify jurisdictions with inadequate land use 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 AC2.1.4- 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 AC2.1.5-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 AC2.1.6-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 AC2.1.7-Adjust seasonal timing of livestock grazing within riparian areas to minimize soil compaction, minimize erosion, and maintain or enhance riparian vegetation.
	Strategy AC2.1.8-Increase understanding of the importance of riparian habitat through education and outreach programs for both the general public and road maintenance personnel.
	Strategy AC2.1.9- Continue development and implementation of watershed scale efforts to decrease sediment inputs.
	Strategy AC2.1.10-Increase size and connectivity of existing patches of riparian habitat through restoration and acquisition efforts.
	Strategy AC2.1.11-Wherever feasible, allow stream channels to develop and flood naturally, while protecting personal and public property rights and uses.
	Strategy AC2.1.12-Develop off-stream livestock watering facilities, wherever feasible and where access to a water gap is available.
	Strategy AC2.1.13- Prior to implementation of off-stream watering projects, clarify how to protect water rights when livestock watering

	is moved off-stream.

Almota Creek (mouth to forks):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC3: Decreasing confinement will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering (Mouth-L. Almota only).

Causes: Road development near streams.

Assumptions: Protection strategies will not reduce confinement from the mouth to L. Almota. The estimate of <10% confinement for the remainder of Almota cannot be significantly improved upon, even with active measures, and is not considered limiting in the remainder of Almota.

Objective: No objective defined. Reduction in confinement is not possible through passive measures.

Current estimate: 60% (mouth-L. Almota).

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC4: Increase in large woody debris (LWD) densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: LWD placement under protection strategies would not occur. Any contribution to wood in the stream would be from natural recruitment, and is assumed to be minimal. Access above L. Almota is limited.

Objective AC4.1-Reach >0.33 pieces of large wood per channel width. Current estimate: <0.33 pieces/channel width.	**Note- Strategies are not prioritized and will be implemented based upon opportunities available**
	Strategy AC4.1.1-Increase the density, maturity, and appropriate species composition of woody vegetation in riparian buffers for long-term recruitment of LWD.
	Strategy AC4.1.2-Develop and implement strategy for monitoring improvements in LWD density, using existing protocols if available.
	Strategy AC4.1.3- Uphold existing land use and instream work regulations (e.g., critical area ordinances, HPA requirements, etc.) that limit channel, floodplain, and riparian area impacts.
	Strategy AC4.1.4- Identify jurisdictions with inadequate land use 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 AC4.1.5-Decommission low-use roads and low-priority dikes that are near the stream to enhance floodplain connectivity, natural stream meanders, and long-term recruitment of LWD, where applicable.

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC4: Increase in large woody debris (LWD) densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: LWD placement under protection strategies would not occur. Any contribution to wood in the stream would be from natural recruitment, and is assumed to be minimal. Access above L. Almota is limited.

	Strategy AC4.1.6-Retain existing LWD to the greatest extent possible through outreach, education, regulatory, and other means, given limitations regarding protection of infrastructure and urban flood management needs.
	Strategy AC4.1.7- Improve the extent, structure, and function of riparian buffers through vegetation planting (native species unless otherwise required), managed grazing, selective livestock fencing, and similar practices.
	Strategy AC4.1.8-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 AC4.1.9-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 AC4.1.10-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available.

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC5: Increase in primary pool quantity and quality will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Given that LWD increases are all from natural recruitment and that no active pool building will take place, the expected gain in pool area will be minimal.

Objective AC5.1-Facilitate an increase in primary pools to >10% of the stream surface area from L. Almota-Second L. Almota and >8% from RB trib to the	**Note- Strategies are not prioritized and will be implemented based upon opportunities available**
	Strategy AC5.1.1-Retain existing LWD and limit removal of recruited LWD (also see Hypothesis AC4).
	Strategy AC5.1.2-Improve the extent, structure, and function of riparian buffers through vegetation planting (native species unless otherwise required), managed grazing, selective livestock fencing, and similar practices.
	Strategy AC5.1.3- Develop and implement strategy for monitoring improvements in primary pool quantity, quality and complexity.

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC5: Increase in primary pool quantity and quality will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Given that LWD increases are all from natural recruitment and that no active pool building will take place, the expected gain in pool area will be minimal.

forks and in North Branch. Current estimate: 10% L. Almota-Second L. Almota 8% RB trib-forks.	Strategy AC5.1.4-Wherever feasible, allow stream channels to develop and flood naturally, while protecting personal and public property rights and uses.
	Strategy AC5.1.5-Pursue instream flow enhancement opportunities (also see Hypothesis AC7).
	Strategy AC5.1.6-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 AC5.1.7-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 AC5.1.8-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available .

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC6: Decrease in bedscour will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering. (RB trib-forks and North Branch only).

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Protection strategies will decrease bedscour by increasing the ability of the watershed to retain water and reduce flashy runoff. High levels of bedscour are seen in the rest of Almota, but are not considered limiting.

Objective AC6.1- Decrease bedscour to 15cm or less in Almota from RB trib-forks and 20cm or less in the North Branch. Current estimate: 20cm (RB trib-forks) 24cm (North Branch).	**Note- Strategies are not prioritized and will be implemented based upon opportunities available**
	Strategy AC6.1.1- Increase the density, maturity, and appropriate species composition of woody vegetation in riparian buffers for long-term recruitment of LWD (See Hypothesis AC4).
	Strategy AC6.1.2- Uphold existing land use and instream work regulations (e.g. critical area ordinances, HPA requirements, etc.) that limit riparian area, floodplain and wetland development
	Strategy AC6.1.3- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or pass new regulations that better protect riparian areas.

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC6: Decrease in bedscour will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering. (RB trib-forks and North Branch only).

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Protection strategies will decrease bedscour by increasing the ability of the watershed to retain water and reduce flashy runoff. High levels of bedscour are seen in the rest of Almota, but are not considered limiting.

	Strategy AC6.1.4-Improve watershed conditions (e.g., upland water infiltration) through road decommissioning, reduced soil compaction, direct seeding activities, increasing native vegetation cover, CRP participation, etc.
	Strategy AC6.1.5- Improve the extent, structure, and function of riparian buffers through vegetation planting (native species unless otherwise required), managed grazing, selective livestock fencing, and similar practices
	Strategy AC6.1.6-Wherever feasible, allow stream channels to develop and flood naturally, while protecting personal and public property rights and uses.
	Strategy AC6.1.7-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 AC6.1.8-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 AC6.1.9-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available .

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC7: Increase in summer flows will increase survival of steelhead in the following life stages: incubation, fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Protection strategies will benefit summer flows by increasing the ability of the watershed to retain water.

Objective AC7.1- Show upward trend in summer flows Current estimate:	**Note- Strategies are not prioritized and will be implemented based upon opportunities available**
	Strategy AC7.1.1- Improve the extent, structure, and function of riparian buffers through vegetation planting (native species unless otherwise required), managed grazing, selective livestock fencing, and similar practices.

Almota Creek (mouth to forks & N. Branch):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis AC7: Increase in summer flows will increase survival of steelhead in the following life stages: incubation, fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Protection strategies will benefit summer flows by increasing the ability of the watershed to retain water.

Flows moderately reduced (EDT rating of 3)	Strategy AC7.1.2- Uphold existing land use and instream work regulations (e.g., critical area ordinances, HPA requirements, etc.) that limit riparian area development.
	Strategy AC7.1.3- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or pass new regulations that better protect riparian areas.
	Strategy AC7.1.4-Improve watershed function, including increased upland water infiltration, through road decommissioning, reduced soil compaction, direct seeding activities, increasing native vegetation cover, CRP, etc.
	Strategy AC7.1.5-Protect springs, seeps and wetlands that function as water storage during spring flows and provide recharge during summer drought periods.
	Strategy AC7.1.6-Continue to refine understanding of and/or determine location and timing of dewatered and flow-limited stream reaches.
	Strategy AC7.1.7-Although opportunities may be limited, minimize surface water withdrawals through implementation of efficiencies, quantify legal withdrawals, identify and eliminate illegal withdrawals, lease of water rights and purchase of water rights, where applicable.
	Strategy AC7.1.8- Develop off-stream livestock watering facilities wherever feasible and access to a water gap is available.
	Strategy AC7.1.9- Prior to implementation of off-stream watering projects, clarify how to protect water rights when livestock watering is moved off-stream.
	Strategy AC7.1.10-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 AC7.1.11-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 AC7.1.12-Seek funding sources to develop programs consistent with the goals of CRP, EQIP, and CREP in those areas where such programs are not available.

Deadman Creek (Ping-SF Deadman):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies

Hypothesis DC1: Reduction in sediment (turbidity, percent fines and embeddedness) will increase survival of steelhead in the following life stages: egg incubation, fry, & overwintering.

Causes: Road development near streams, agricultural land use near streams.

Assumptions: A group of strategies that include only passive measures.

Objective DC1.1-Reduce embeddedness within the area to <40% from Ping-forks and <25% in SF Deadman Current estimate: 54% (Ping-Forks) 37% (SF Deadman)	See Strategies for Objective AC1

Hypothesis DC2: Increase in riparian function will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Almota from RB trib.-fork and the North Branch were rated as >90% functional, and was not considered limiting. It was assumed that improvements in this area would not be significant. Passive measures can affect riparian function through the enhancement of stream buffers. Enhancement of most riparian buffers in this area will require re-vegetation. This does not, however, increase riparian function to the degree that it would if combined with decreases in confinement (see Hypothesis DC3).

Objective DC2.1- Facilitate riparian recovery in heavily degraded areas to achieve >50% riparian function from Ping-Lynn and in the SF Deadman, and >75% from Lynn-forks. Current estimate: 37% (Ping-Lynn & SF Deadman) 62% (Lynn-forks)	See Strategies for Objective AC2

Deadman Creek (Ping-SF Deadman): **Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.**
Hypothesis DC3: Decreasing confinement will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering (Ping-forks only). Causes: Road development near streams. Assumptions: Protection strategies will not significantly reduce confinement on SF Deadman, currently estimated at <10% confined.
Objective: No objective defined. Reduction in confinement is not possible through passive measures. Current estimate: 25% (Ping-Lynn) 60% (Lynn-forks)

Deadman Creek (Ping-SF Deadman): **Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.**	
Hypothesis DC4: Increase in large woody debris (LWD) densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering. Causes: Road development near streams, agricultural land use near streams, channelization. Assumptions: LWD placement under protection strategies would not occur. Any contribution to wood in the stream would be from natural recruitment, and is assumed to be minimal.	
Objective DC4.1-Reach >0.33 pieces of large wood per channel width. Current estimate: <0.33 pieces/channel width	See Objectives for Hypothesis AC4

Deadman Creek (Ping-SF Deadman): **Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.**	
Hypothesis DC5: Increase in primary pool quantity and quality will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering.	
Causes: Road development near streams, agricultural land use near streams, channelization.	
Assumptions: Given that LWD increases are all from natural recruitment and that no active pool building will take place, the expected gain in pool area will be minimal.	
Objective DC5.1-Facilitate an increase in primary pools to >12% (Ping-Lynn), >5% (Lynn-forks), and >20% (SF Deadman) Current estimate: 12% (Ping-Lynn) 5% (Lynn-forks) 20% (SF Deadman)	See Objectives for Hypothesis AC5

Deadman Creek (Ping-SF Deadman): **Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.**	
Hypothesis DC6: Increase in summer flows will increase survival of steelhead in the following life stages: incubation, fry, subyearling rearing, and overwintering.	
Causes: Road development near streams, agricultural land use near streams, channelization.	
Assumptions: Protection strategies will benefit summer flows by increasing the ability of the watershed to retain water.	
Objective DC6.1- Show upward trend in summer flows Current estimate: Flows moderately reduced (EDT rating of 3)	See Strategies for Objective AC7

Deadman Creek (Ping-SF Deadman):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis DC7: Decrease in summer temperatures will increase survival of steelhead in the following life stages: incubation, fry, and subyearling rearing. (Deadman Creek from Ping-Lynn only).

Causes: High-temperature overland runoff due to road development and agricultural land use near streams, channelization.

Assumptions: Increased riparian cover from stream buffers and increased water infiltration due to improvements in upland practices will decrease summer temperatures. Deadman from Lynn to the forks and the South Fork Deadman are not considered temperature limited according to EDT, although marginal water temperatures may exist in some places.

Objective DC7.1- Achieve the three following standards: 1. All days less than 25C (77F); 2. Less than 4 non-consecutive days with warmest day 22-25C (72-77F); and 3. Less than 12 days greater than 16C (61F) annually, where appropriate. and show progress toward meeting Washington State temperature standards and TMDL goals. Current estimate: More than 1 day greater than 25C (77F), or more than 4 days greater than 22C (72F), or more than 12 days greater than 16C (61F).	**Note- Strategies are not prioritized and will be implemented based upon opportunities available**
	Strategy DC7.1.1- Improve the extent, structure, and function of riparian buffers through vegetation planting (native species unless otherwise required), managed grazing, selective livestock fencing, and similar practices.
	Strategy DC7.1.2- Uphold existing land use and instream work regulations (e.g., critical area ordinances, HPA requirements, etc.) that protect riparian vegetation and wetlands and maintain low-density zoning.
	Strategy DC7.1.3- Identify jurisdictions with inadequate land use regulations, and work to strengthen existing or pass new regulations that better protect the structure and function of riparian areas and wetlands.
	Strategy DC7.1.4-Protect riparian vegetation through promotion of livestock BMPs such as alternative grazing rotations and the installation of alternative forms of water for livestock.
	Strategy DC7.1.5-Minimize surface water withdrawals through implementation of efficiencies, quantify legal withdrawals, identify and eliminate illegal withdrawals, lease of water rights and purchase of water rights, where applicable.
	Strategy DC7.1.6-Improve upland water infiltration through reduced soil compaction, direct seeding activities, increasing native vegetation cover, CRP participation, etc.
	Strategy DC7.1.7- Continue development and implementation of watershed scale efforts to decrease temperatures.
	Strategy DC7.1.8-Protect wetland and riparian habitats through land acquisition, fee title acquisitions, conservation easements, land exchanges, public education, and promotion of forestry, and agricultural BMPs.
	Strategy DC7.1.9-Assess and remedy significant sources of high-temperature inputs to surface waters.
	Strategy DC7.1.10-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 DC7.1.11-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 DC7.1.12-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 DC7.1.13- Develop and implement strategy for monitoring improvements in summer water temperatures.

Alpowa Creek (Stember Cr-upper forks):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies

Hypothesis ALP1: Reduction in sediment (turbidity, percent fines and embeddedness) will increase survival of steelhead in the following life stages: egg incubation, fry, & overwintering. Causes: Road development near streams, agricultural land use near streams. Assumptions: Strategies will include only passive measures.	
Objective ALP1.1-Show a downward trend in embeddedness. This will also stimulate a corresponding decrease in percent fines and turbidity. Current estimate not available.	See strategies for Objective AC1.1.
Hypothesis ALP2: Increase in riparian function will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering. Causes: Road development near streams, agricultural land use near streams, channelization. Assumptions: Passive measures can affect riparian function through the enhancement of stream buffers. Enhancement of most riparian buffers in this area will require re-vegetation. This does not, however, increase riparian function to the degree that it would if combined with decreases in confinement.	
Objective ALP2.1- Show upward trend in riparian function to achieve ≥25%. Current estimate not available.	See strategies for Objective AC2.1
Hypothesis ALP3: Increase in large woody debris (LWD) densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering. Causes: Road development near streams, agricultural land use near streams, channelization. Assumptions: LWD placement under protection strategies would not occur. Any contribution to wood in the stream would be from natural recruitment, and is assumed to be minimal.	
Objective ALP3.1-Reach ≥0.33 pieces of large wood per channel width. Current estimate not available.	See strategies for Objective AC4.1

Alpowa Creek (Stember Cr-upper forks): **Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.**	
Hypothesis ALP4: Increase in primary pool quantity and quality will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering Causes: Road development near streams, agricultural land use near streams, channelization. Assumptions: Given that LWD increases are all from natural recruitment and that no active pool building will take place, the expected gain in pool area will be minimal.	
Objective ALP4.1- Facilitate an increase in primary pools to >10%. Current estimate not available.	See strategies for Objective AC5.1
Hypothesis ALP5: Decrease in summer temperatures will increase survival of steelhead in the following life stages: incubation, fry, and subyearling rearing. Causes: High-temperature overland runoff due to road development and agricultural land use near streams, channelization. Assumptions: Increased riparian cover from stream buffers and increased water infiltration due to improvements in upland practices will decrease summer temperatures.	
Objective ALP5.1-Show downward trend in temperature. Current estimate not available.	See strategies for Objective DC7.1

Penawawa Creek (Rock Spring Gulch-~2.5 miles above Little Penawawa):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies

Hypothesis PC1: Reduction in sediment (turbidity, percent fines and embeddedness) will increase survival of steelhead in the following life stages: egg incubation, fry, & overwintering. Causes: Road development near streams, agricultural land use near streams. Assumptions: Strategies will include only passive measures.	
Objective PC1.1-Show a downward trend in embeddedness. This will also stimulate a corresponding decrease in percent fines and turbidity. Current estimate not available.	See strategies for Objective AC1.1.
Hypothesis PC2: Increase in riparian function will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering. Causes: Road development near streams, agricultural land use near streams, channelization. Assumptions:. Passive measures can affect riparian function through the enhancement of stream buffers. Enhancement of most riparian buffers in this area will require re-vegetation. This does not, however, increase riparian function to the degree that it would if combined with decreases in confinement.	
Objective PC2.1- Show upward trend in riparian function to achieve >25%. Current estimate not available.	See strategies for Objective AC2.1
Hypothesis PC3: Increase in large woody debris (LWD) densities will increase survival of steelhead in the following life stages: egg incubation, fry, subyearling rearing, and overwintering. Causes: Road development near streams, agricultural land use near streams, channelization. Assumptions: LWD placement under protection strategies would not occur. Any contribution to wood in the stream would be from natural recruitment, and is assumed to be minimal.	
Objective PC3.1-Reach >0.33 pieces of large wood per channel width. Current estimate not available.	See strategies for Objective AC4.1

Penawawa Creek (Rock Spring Gulch-~2.5 miles above Little Penawawa):
Priority Restoration Area Working Hypotheses, Limited Life History Stages, Causes, Biological Objectives, and Strategies, cont.

Hypothesis PC4: Increase in primary pool quantity and quality will increase survival of steelhead in the following life stages: fry, subyearling rearing, and overwintering

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Given that LWD increases are all from natural recruitment and that no active pool building will take place, the expected gain in pool area will be minimal.

Objective PC4.1- Facilitate an increase in primary pools to >10%. Current estimate not available.	See strategies for Objective AC5.1

Hypothesis PC5: Decrease in summer temperatures will increase survival of steelhead in the following life stages: incubation, fry, and subyearling rearing.

Causes: High-temperature overland runoff due to road development and agricultural land use near streams, channelization.

Assumptions: Increased riparian cover from stream buffers and increased water infiltration due to improvements in upland practices will decrease summer temperatures.

Objective PC5.1-Show downward trend in temperature. Current estimate not available.	See strategies for Objective DC7.1

Hypothesis PC6: Increase in summer flows will increase survival of steelhead in the following life stages: incubation, fry, subyearling rearing, and overwintering.

Causes: Road development near streams, agricultural land use near streams, channelization.

Assumptions: Protection strategies will benefit summer flows by increasing the ability of the watershed to retain water.

Objective PC6.1-Show upward trend in flow. Current estimate not available.	See strategies for Objective AC7.1

Incorporating strategies presented in the table above, “passive restoration” is considered the most appropriate action to take in the Lower Snake priority restoration/protection areas, 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 from degrading any further. In most cases marginal improvements in habitat attributes can be expected from these measures. The following general protection strategies are provided in addition to those outlined in Table 7-4. These additional strategies are organized in three main categories: riparian buffer implementation, upland enhancement, and alternative water development/water conservation.

These strategies generally address ecological health and will further assist with meeting the objectives listed above for Lower Snake Subbasin priority protection/restoration areas.

Riparian Buffer Implementation

These are actions that provide a buffer area of reduced anthropogenic disturbance along the stream corridor. The intention is that these areas will be allowed to regenerate and repair with limited implementation of resources. It is understood by the subbasin group that many funding and regulatory entities require re-vegetation of streamside land placed into protected status. As such, riparian planting may be incorporated as part of a protection strategy. Installing riparian buffers can take many forms and the resources can come from many sources. Typically, resources made available to the subbasin can be used to increase the area of stream in protective buffers by direct funding or by 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. Land enrolled in CREP is removed from production and grazing under 10 or 15 year contracts. In return, landowners plant trees and shrubs to stabilize the stream bank and to provide a number of additional ecological functions. Landowners receive annual rent, incentive and maintenance payments, and cost share for practice installations. This plan encourages the use of resources to assist in cost share in order to maximize participation in this program.
- Conservation Easements – The use of conservation easements has been somewhat limited in the Pacific Northwest but is common in other parts of the country. A conservation easement is a voluntary agreement that allows landowners 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 it would otherwise be. Conservation easements may be designed to cover all or only a portion of a property. Every easement is unique, tailored to a particular landowner’s goals and their land. Increasing conservation easements in streams bearing salmonids is considered a responsible use of subbasin resources. Conservation easement agreements that allow the least disturbance should have priority over less protective agreements.

- Continuous Conservation Reserve Program (CCRP) – This USDA program is similar to CREP as outlined above. The focus for this program, however, is on non-salmonid bearing streams, which are not eligible under CREP RULES. CCRP projects should be encouraged and recommended for cost share status when the stream in question flows into a geographic area that has a priority for protection. Within Southeast Washington the reduction of sediment input from these small “feeder” streams and the maintenance of their seasonal flow input to salmonid streams is vital to the protection of the focal species. Minimum buffer widths are still required and vary by plan and location, as is the planting of appropriate vegetation. Contract length is similar to CREP as are the arrangements for payments and maintenance. Though this program focuses on non-salmonid bearing streams, use of this program is potentially beneficial to other species.
- Other Cost Share Programs –The three types of programs listed above do not form a comprehensive list of the actions that can be taken to install riparian buffers. There are a myriad of funding sources and procedures available. This strategy recommends that all programs and agreements that are similar to the above be eligible for cost-share or direct funding. This can include other federal or state funding entities or agreements signed with private funding sources. These should all require a minimum average buffer width not less than the minimum requirements under CREP, an agreement to maintain the fence or exclosures, and a time length agreement similar to the CREP requirements.

There are other methods, such as simple riparian fencing and structures, that can help in herding or managing livestock in such a way as to reduce the impact to the stream. Innovative methods that do not fit the above, but that 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, citizens and technical groups recognize the importance of upland actions to the priority protection geographic areas. Sediment is a limiting factor on production of all of the focal species, not just in this subbasin but throughout the region. Programs designed to maintain ground cover in the upland areas that drain directly into priority restoration/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 further into the typically dry summer months. Many of the areas listed as priority for protection can benefit from greater summer flows as they will increase living area for the focal species and can reduce temperatures. In addition to the upland areas that drain directly into priority areas, other areas upstream should be considered for funding if a linkage can be established between these areas and the priority areas. Upland strategies include, but are not limited to, the following:

- Conservation Reserve Program (CRP) – CRP is a voluntary program available to agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in CRP plant long-term, resource-conserving covers to improve the quality of water and control soil erosion. In return, FSA provides participants with rental payments and cost-share assistance. Contract duration is between 10 and 15 years. CRP provides continuous ground cover over wide expanses of upland areas. Subbasin resources used to increase the amount of CRP would benefit the protection of these priority areas.

- Direct Seed/No-Till – Direct Seed and No-Till are a set of innovative farming practices designed to increase the amount of time that farmland has vegetative cover and to reduce the amount of soil disturbance, while still allowing for the production of 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 agricultural land to provide for "settling" of sediment in run-off. These are relatively inexpensive methods for reducing sediment and should be encouraged and be 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. This procedure can be very effective, particularly in reducing the impacts from large rain events. The terracing of slopes redirects run-off and increases contact time with the upland soils, thereby increasing infiltration and reducing sedimentation of streams. These project types can be very effective at reducing sedimentation. They are cost-effective, as they often entail a one-time expenditure of money but offer a permanent solution. Projects 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 in these priority areas. There are also a variety of funding sources that should be considered in addition to CRP that can then be cost-shared with subbasin funds.

Alternative Water Development/Water Conservation

In the Blue Mountains and surrounding lowland areas, water is often the limiting factor for both fish and livestock operations. Quite often, in order to provide protection for salmonid bearing streams, including this subbasin's priority restoration/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 and upland stream 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 priority restoration/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 extract as little water as possible from the stream while still satisfying the water rights of users provide a needed protection for the focal species. Projects of this type include, but are not limited to:

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

7.3.3 Aquatic Strategy Special Topic – Instream Flows

Low summer flow was identified as a limiting factor 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 (P for priority Restoration/Protection 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 and which areas are flow limited due to human causes

7.3.4 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. Adult return objectives have been developed through other planning efforts (total, natural, hatchery and harvest components). Management agencies have yet to agree on adult return objectives for Lower Snake Mainstem Subbasin tributaries or the Snake River Mainstem. Artificial production and out of subbasin efforts may be required if return objectives are set above that which can be achieved through habitat restoration plans such as this subbasin plan.

The NWPCC subbasin planning guidelines have identified a need for subbasin plans to describe how the objectives and strategies are reflective of, and integrated with, the recovery goals for listed species within the subbasin. Further, coordination with the National Marine Fisheries Service Technical Review Teams (TRT) and state water quality management plans is recommended to facilitate consistency with ESA and CWA requirements. The Lower Snake 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 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 Pomeroy Conservation District and other entities within the subbasin intend to work with the TRT primarily through the Snake River Salmon Recovery Plan process.

7.3.5 Objectives Analysis

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

Appendix J provides the full objectives analysis completed for the Lower Snake 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 7-5 and 7-6 for steelhead in Almota and Deadman Creeks, respectively.

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

> "While attainment of habitat objectives is estimated to result in an average steelhead abundance that is only 57 and 31% as great as PFC and historical, respectively,

attainment of habitat objectives does transform the population qualitatively in terms of productivity and, to a lesser degree, life history diversity. Both the EDT model and the limited empirical observations suggest that the current steelhead population is quite unproductive. The EDT estimate of current productivity, 1.6 returns/spawner, is characteristic of populations in decline. Natural production in such a population is typically sporadic, with small number of spawners in some years and none in others. In metapopulation terms, Almota Creek under current conditions could be described as a 'satellite population' that cannot persist without a continual infusion of colonists from a larger, more productive 'core population'. The current life history diversity value of 26% implies that 74% of the 'biologically possible' life history patterns are no longer viable – return fewer adult progeny than parents. This in turn means that the population is extremely vulnerable to random events impacting the handful of reaches capable of supporting a self-sustaining population.

However, if all habitat objectives are attained, the resilience of Almota steelhead should increase substantially. Not only does productivity increase to 3 returning adults/spawner, but life history diversity nearly doubles, increasing from 26 to 43%. From previous EDT analyses of populations known empirically to be self-sustaining or in decline, it has been observed that a productivity estimate of 3.0 marks the approximate boundary between stable and declining populations. The predicted increase in life history diversity also suggests that natural production would become more robust if habitat objectives were attained, because the population would be less dependent on a limited number of higher quality reaches…habitat objectives for Deadman Creek, at least in terms of percent restoration of historical/normative conditions, were less ambitious than for Almota Creek. The objective for restoring erosion-related attributes was as high as Almota Creek only in one reach (SF Deadman), and the objectives for riparian function (17 and 25%) were also significantly lower than for Almota Creek (33%). Moreover, objectives of any sort were set for relatively fewer reaches in Deadman Creek than Almota.

This reduction in the intensity and scope of objectives, not surprisingly, translates to a lower level of benefits to Deadman Creek steelhead production. Although the relative increase in life history diversity is substantial, the absolute value attained under the restoration scenario is still quite low. Moreover, the productivity value estimated under the habitat restoration objective, 1.6, is exactly the value estimated for Almota Creek under current conditions. Indeed, the performance of Deadman Creek steelhead assuming full attainment of habitat objectives would probably be quite comparable to steelhead performance in Almota Creek under current conditions. The overall impact of the proposed habitat objectives for Deadman Creek steelhead would perhaps be best summarized as a change from frankly endangered to threatened status in terms of the prospects for long-term survival."

Table 7-5 Objectives Analysis – Comparison of Almota Creek Steelhead Performance if All Habitat Restoration Objectives were Attained

Scenario	Life History Diversity	Productivity (adult returns/spawner)	Carrying Capacity (adults)	Average Abundance (adults)
Current without harvest	26%	1.6	75	29
Habitat objectives attained	43%	3.0	92	62
PFC	60%	6.3	129	108
Historic potential	60%	13.1	217	201

Source: Table 2, Appendix J.

Table 7-6 Objectives Analysis – Comparison of Deadman Creek Steelhead Performance if All Habitat Restoration Objectives were Attained

Scenario	Life History Diversity	Productivity (adult returns/spawner)	Carrying Capacity (adults)	Average Abundance (adults)
Current without harvest	1%	1.2	160	21
Habitat objectives attained	11%	1.6	219	80
PFC	83%	4.8	420	333
Historic potential	83%	8.0	651	569

Source: Table 4, Appendix J.

7.3.6 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 324c for spring Chinook over the time period of the plan. 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 Lower Snake 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 Lower Snake subbasin fish stocks.

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

- Maximize hatchery effectiveness in the subbasin--continue existing and/or 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.

Salmon recovery planning in the Snake River Region will be the forum through which a common set of numeric fish population objectives, and the additional artificial propagation and/or out-of-subbasin strategies needed to meet those objectives, will be developed. Until that time, work will continue on enhancing in-basin habitat for those fish that are present.

7.4 Terrestrial Habitats

Section 7.3 reviewed strategies unique to aquatic species and their habitats. This section reviews those strategies unique to terrestrial habitats. Priority habitats within the Lower Snake Subbasin include riparian riverine, ponderosa pine, interior grasslands, and shrub-steppe. Note that canyon grasslands are a subset of interior grasslands.

Appendix K includes the full management plan developed by WDFW for the Lower Snake Subbasin, including background on its development and assumptions used. Selected portions of this attachment are provided below.

7.4.1 Terrestrial Working Hypotheses and Objectives

All ecoregion focal habitat types occur in the Lower Snake River Subbasin, including riparian/riverine wetlands, ponderosa pine, interior grasslands, and shrub-steppe (agriculture is a cover type of interest). The recommended range of management conditions provided in Table 4 of Appendix K describes the conditions that must be met for a habitat to be considered "functional." These parameters will be key when evaluating the relative success of particular strategies.

Similar to aquatics, the working hypotheses for focal terrestrial habitat types are based on factors that affect/limit focal habitats (the term "factors that affect habitat" is synonymous with "limiting factors"). Working hypotheses were developed that capture the primary factors that affect the habitat.

Riparian/Riverine Wetlands Working Hypothesis

The 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. This coupled with poor habitat quality of existing vegetation have resulted in extirpation or significant reductions in riparian habitat obligate wildlife species.

Factors Affecting the Habitat

- Loss of habitat due to numerous factors, including riverine recreational developments, inundation from impoundments, cutting and spraying of riparian vegetation, etc.
- Alteration of natural hydrology due to diking, channelization, etc. this results 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, dams, and control of natural flooding regimes that results 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; the 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 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).
- Recreational disturbances (e.g., ORVs), particularly during nesting season, and particularly in high-use recreation areas.

Ponderosa Pine Working Hypothesis

Edaphic conditions for ponderosa pine are marginal within the Lower Snake River Subbasin. Although ponderosa pine has doubled in extent since circa 1850 (from 495 acres to 1,014 acres), this habitat type occurs only within a very limited area. Major factors affecting this focal habitat type stem from changes in climax forest structure and floristic conditions due primarily to timber harvesting, fire reduction/wildfires, mixed forest encroachment, development, recreational activities, reduction of habitat diversity and function resulting from invasion by exotic species and vegetation and overgrazing. The principal habitat diversity stressor is the spread and proliferation of mixed forest conifer species within ponderosa pine communities, due primarily to fire reduction and intense wildfires. Habitat loss and fragmentation (including fragmentation resulting from extensive areas of undesirable vegetation) coupled with poor habitat quality of existing vegetation have resulted in extirpation or significant reductions in ponderosa pine habitat obligate wildlife species.

Factors Affecting the Habitat

- Timber harvesting has reduced the amount of old growth forest and associated large diameter trees and snags.
- Changes in land use for urban, residential, and agricultural purposes have contributed to loss and degradation of properly functioning ecosystems.
- Fire suppression/exclusion has contributed towards habitat degradation, particularly declines in characteristic herbaceous and shrub understory from increased density of small shade-tolerant trees. High risk of loss of remaining ponderosa pine overstories from stand-replacing fires due to high fuel loads in densely stocked understories.
- Overgrazing has resulted in loss of properly functioning conditions, including recruitment of sapling trees and modification of understory vegetation.
- Invasion of exotic plants has altered understory conditions and increased fuel loads.
- Fragmentation of remaining tracts has negatively impacted species with large area requirements.
- Landscapes in proximity to agricultural, residential, and recreational areas may be subject to high levels of human disturbance and disproportionately support non-native species that displace and/or impact native species productivity; such species 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. These 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 that result in fragmentation of remaining tracts.
- Changes in land use for urban, residential, and agricultural purposes that contribute 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 that 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).

Shrub-steppe Working Hypothesis

The near 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; these may supplant or radically alter entire shrub-steppe 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 shrub-steppe obligate wildlife species.

Factors Affecting the Habitat

- Extensive permanent habitat conversions of shrub-steppe 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 that 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 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. These include:

- Ecoregion Assessment and Conservation identified lands
- Lands currently assigned GAP protection status
- 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 7-7 provides the biological objectives for priority habitat types in the Lower Snake Subbasin. Further detail on the relationship between these objectives and strategies can be found in Appendix K.

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, 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/or 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 7-8. 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 will impact 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).

Table 7-7 Summary of Terrestrial Habitat Biological Objectives

Habitat	Objectives	Biological Objectives Note – Objectives are not prioritized within or across habitat types
Riparian Riverine	R-A	Protect riparian riverine function on a minimum of 21,800 acres (conservative estimated historic acreage), with an initial focus on areas that directly contribute to the restoration of aquatic focal species.
Ponderosa Pine	P-A	Protect P. Pine habitat classified as ECA Class 1&2 (1,000 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.
	P-B	Enhance P. Pine functionality to achieve habitat parameters for focal and other obligate species in areas classified as ECA Class 1&2 (1,000 acres), in protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public 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	G-A	Protect Interior Grassland habitat classified as ECA Class 1&2 (140,000 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.
	G-B	Enhance Interior Grassland functionality to achieve habitat parameters for focal and other obligate species in areas classified as ECA Class 1&2 (140,000 acres), in protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	G-C	Show an upward trend in CRP acreage and functionality.

Habitat	Objectives	Biological Objectives Note – Objectives are not prioritized within or across habitat types
Shrub-steppe	S-A	Protect shrubsteppe habitat classified as ECA Class 1&2 (6,505 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.
	S-B	Enhance shrubsteppe functionality to achieve habitat parameters in areas classified as ECA class 1&2 (6,505 acres), for focal and other obligate species in protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
	S-C	Show an upward trend in CRP acreage and functionality.

Table 7-8 Terrestrial Habitat Strategies

Habitat Type	Objectives	Strategies NOTE – Strategies are not prioritized and will be implemented based upon available opportunities.
Riparian- Riverine Wetland	R-A	Strategies listed under riparian function for aquatic species are incorporated herein by reference. (aquatic riparian function strategies are listed under Objective AC2.1 in Table 7-3)
Ponderosa Pine	P-A	Strategy P-A.1 Identify functioning ponderosa pine habitats, corridors, and linkages classified as ECA Class 1&2 for protection. Strategy P-A.2 Provide information, education, and outreach to protect habitats. Strategy P-A.3 Use easements, leases, cooperative agreements, and acquisitions to protect habitat (long-term protection strategies are preferred over short-term). Strategy P-A.4 Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.). Strategy P-A.5 Identify inadequate land use regulations. Work to strengthen existing regulations or pass new regulations to improve protection of habitats. Strategy P-A.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. Strategy P-A.7 Identify functioning ponderosa pine habitats, corridors and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas

Habitat Type	Objectives	Strategies **NOTE – Strategies are not prioritized and will be implemented based upon available opportunities.**
Ponderosa Pine	P-B	Strategy P-B.1 Identify non-functioning ponderosa pine habitats, corridors, and linkages within ECA Class 1 & 2 areas. Strategy P-B.2 Identify sites that are currently not in ponderosa pine habitat that have the potential to be of high ecological value, if restored. Strategy P-B.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 P-B.4 Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function. Strategy P-B.5 Assist in long-term development and implementation of a Southeast Washington Comprehensive Weed Control Management Plan in cooperation with local weed boards. Strategy P-B.6 Fund noxious weed control projects to improve habitat function. Strategy P-B.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. Strategy P-B.8 Identify non functioning ponderosa pine habitats, corridors and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.

Habitat Type	Objectives	Strategies **NOTE – Strategies are not prioritized and will be implemented based upon available opportunities.**
Grassland	G-A	Strategy G-A.1 Identify functioning interior grassland habitats, corridors, and linkages classified as ECA Class 1&2 for protection. Strategy G-A.2 Provide information, education, and outreach to protect habitats. Strategy G-A.3 Use easements, leases, cooperative agreements, and acquisitions to protect habitats (long-term protection strategies are preferred over short-term). Strategy G-A.4 Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.). Strategy G-A.5 Identify inadequate land use regulations. Work to strengthen existing regulations or pass new regulations to improve protection of habitats. Strategy G-A.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. Strategy G-A.7 Identify functioning interior grassland habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.

Habitat Type	Objectives	Strategies **NOTE – Strategies are not prioritized and will be implemented based upon available opportunities.**
Grassland	G-B	Strategy G-B.1 Identify non-functioning interior grassland habitats, corridors, and linkages within ECA Class 1 & 2 areas. Strategy G-B.2 Identify sites that are currently not in grassland habitat that have the potential to be of high ecological value, if restored. Strategy G-B.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 G-B.4 Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function. Strategy G-B.5 Assist in long-term development and implementation of a Southeast Washington Comprehensive Weed Control Management Plan in cooperation with local weed boards. Strategy G-B.6 Fund noxious weed control projects to improve habitat function. Strategy G-B.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 G-B.8 Restore viable populations of obligate wildlife species where possible. Strategy G-B.9 Work with USDA programs (e.g. CRP) to maintain and enhance habitat quality. Strategy G-B.10Identify non functioning interior grassland habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.
Grassland	G-C	Strategy G-C.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 G-C.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 G-C.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 G-C.4 During re-enrollment, convert CRP land to more functional plant communities. Strategy G-C.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.

Habitat Type	Objectives	Strategies **NOTE – Strategies are not prioritized and will be implemented based upon available opportunities.**
Shrubsteppe	S-A	Strategy S-A.1 Identify functioning interior grassland habitats, corridors, and linkages classified as ECA Class 1&2 for protection. Strategy S-A.2 Provide information, education, and outreach to protect habitats. Strategy S-A.3 Use easements, leases, cooperative agreements, and acquisitions to protect habitats (long-term protection strategies are preferred over short-term). Strategy S-A.4 Uphold existing land use and environmental regulations (e.g. critical area ordinances, etc.). Strategy S-A.5 Identify inadequate land use regulations. Work to strengthen existing regulations or pass new regulations to improve protection of habitats. Strategy S-A.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. Strategy S-A.7 Identify functioning shrubsteppe habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.

Habitat Type	Objectives	Strategies **NOTE – Strategies are not prioritized and will be implemented based upon available opportunities.**
Shrubsteppe	S-B	Strategy S-B.1 Identify non-functioning shrubsteppe habitats, corridors, and linkages within ECA Class 1 & 2 areas. Strategy S-B.2 Identify sites that are currently not in shrubsteppe habitat that have the potential to be of high ecological value, if restored. Strategy S-B.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 S-B.4 Enter into cooperative projects and management agreements with Federal, State, Tribal, and private landowners to restore and conserve habitat function. Strategy S-B.5 Assist in long-term development and implementation of a Southeast Washington Comprehensive Weed Control Management Plan in cooperation with local weed boards. Strategy S-B.6 Fund noxious weed control projects to improve habitat function. Strategy S-B.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 S-B.8 Restore viable populations of obligate wildlife species where possible. Strategy S-B.9 Work with USDA programs (e.g. CRP) to maintain and enhance habitat quality. Strategy S-B.10 Identify non functioning shrubsteppe habitats, corridors, and linkages within protected areas (GAP) and areas of private land that meet one or more of the following conditions: directly contribute to the restoration of aquatic focal species, have high ecological function, are adjacent to public land, contain rare or unique plant communities, have threatened, endangered, or sensitive species habitat or populations, or provide connectivity between high quality habitat areas.

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

7.4.3 Agriculture – Cover Type of Interest

Given its predominance within the subbasin and its 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 developed 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 Lower Snake 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 Lower Snake Subbasin is provided in Appendix M. Information regarding RM&E priorities for aquatic species of interest is provided in Appendix D. Note that this plan was reviewed by the Nez Perce Tribe and WDFW, but not by the public. 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 on 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 Lower Snake 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 Lower Snake subbasin technical staff, managers, and stakeholders have initiated an effort to coordinate RM&E activities. Table 1 of Appendix M provides a detailed assessment of ongoing and needed RM&E activities. Following are broad RM&E recommendations based on principles and priorities and the items listed in Table 1 of Appendix M:

- Fund habitat inventories to collect data necessary to fill data gap for attributes with high EDT model leverage and evaluation of progress toward subbasin plan objectives. Specifically, appropriate data should be collected from Alpowa Creek, and possibly Penawawa Creek, to run the EDT within the next 3 years. The priority should be for Alpowa Creek. We currently do not have the data to attempt to run EDT on these two streams, and this does not allow for proper comparison of the enhancement potential between the four primary tributaries in the Lower Snake Subbasin (Almota, Deadman, Alpowa, & Penawawa).
- 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 Lower Snake 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 Lower Snake Subbasin is provided in Appendix L. The intent of the terrestrial RM&E plan is to:

- evaluate success of focal habitat management strategies, via monitoring of focal wildlife species (The results of focal species monitoring and evaluation efforts are expected to function as potential performance measures to monitor and evaluate the results of implementing management strategies and actions on focal habitats).
- determine if management strategies undertaken are achieving recommended range of habitat management conditions, via monitoring and assessment of habitat conditions over time
- allow for evaluation of the assumptions and working hypotheses upon which the management plan is based, by determining if a correlation does indeed exist between focal habitat management conditions and focal species population trends

The terrestrial RM&E plan provided in Appendix L consists of two main components: 1) research; and 2) monitoring and evaluation. The research component identifies research needs, with their justification. Detailed research project design is not presented, however, being beyond the scope of the current planning effort. Existing data gaps, as identified through the subbasin planning process, are listed in this section, because many will require effort above routine monitoring and evaluation to address

Key research needs, a strategy to address the need, and the recommended agency/personnel to implement the strategy are identified by habitat type in Table 1 of Appendix L. General research needs that cross all habitat types include the following:

- Testing of the assumption that focal habitat are functional if a focal species assemblage's recommended management conditions are achieved.
- Testing of the assumption that selected species assemblages adequately represent focal habitats.
- Compilation of current, broad-scale habitat data through spatial data collection and GIS analysis.

All three of these general research needs would be a coordinated effort between federal, state, and local government agencies and NGOs.

The monitoring and evaluation component reviews focal habitat and focal species monitoring methodologies, and identifies monitoring needs for individual management strategies. Specifically, a monitoring and evaluation approach is provided for each terrestrial habitat enhancement strategy in Table 3 of Appendix L. Three key approaches regarding monitoring and evaluation are found throughout this table:

1. Identification of functional habitat. Current data provides a reasonable estimate of the extent of habitat types, but the functionality of those habitat types is unknown.
2. Track and report accomplishments of various entities.
3. Cooperative efforts among the various entities involved in species population and habitat enhancement work are encouraged wherever possible.

As mentioned above, this terrestrial RM&E program is intended to grow and develop as improvements are realized and strategies change. Tracking the results of project implementation and feeding those into an adaptive management program will facilitate more efficient use of project funds, and will help target such funds to those areas and projects that can provide the greatest benefit for terrestrial wildlife.