Habitat
Appendix C

Table of Contents

Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, Washington 98052
Telephone: (425) 883 0777
Fax: (425) 882 5498

WRIA 45 WATERSHED MANAGEMENT PLAN
FINAL DRAFT HABITAT COMPONENT

Submitted to:

WRIA 45 Planning Unit
and
Chelan County Natural Resources Program
316 Washington Street, Suite 401
Wenatchee, WA 98801

Submitted by:

Golder Associates Inc.
18300 NE Union Hill Road, Suite 200
Redmond, Washington 98052

June 30, 2005 043-1284-000.301

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The habitat component of the Wenatchee Watershed Plan (Plan) builds upon existing research, reports and programs to develop and implement habitat improvement actions in Water Resource Inventory Area (WRIA) 45. The Wenatchee Watershed contains salmonid habitat that is important to the entire Columbia River region. The Upper Columbia Biological Strategy (Biological Strategy) states that, "the Wenatchee River is unique among sub-basins in the Upper Columbia Region in that it supports the greatest diversity of populations and overall abundance of salmonids, yet is facing the greatest risk of habitat loss and degradation. There are core populations of sockeye salmon, steelhead, bull trout, and both Spring and Summer Chinook salmon in the upper Wenatchee [watershed] that are relatively strong when compared to other populations in the Columbia sub-basin. The highest regional priority should be protection of this salmonid community," (UCRTT, 2002).

The habitat component of the Wenatchee Watershed Plan (Plan) has been structured to protect and enhance habitat for aquatic species throughout the Wenatchee Watershed by identifying actions that will improve overall habitat function and connectivity. The Plan emphasizes salmonid and aquatic habitat as specified in the Watershed Planning Act (RCW 90.82.100). However, as the entire watershed is linked together by the streams flowing through the valley, the WRIA 45 Planning Unit recognized early in the planning process that to only address habitat for salmonids and other fish where they live in valley bottoms would be short-sighted. Therefore, this habitat component considers upland habitat as it relates to aquatic processes to benefit species, both aquatic and terrestrial, with an emphasis on the protection and enhancement of habitat for endangered salmonids.

1.1 Goals and Intent

RCW 90.82.100 requires that the habitat component of a watershed plan be designed to "protect or enhance fish habitat in the management area." This will be accomplished in WRIA 45 through existing laws and ordinances, and through coordination with other ongoing activities in the watershed, such as 2496 Salmon Recovery. Beyond those requirements, the Planning Unit will use the habitat component as an opportunity to take a project-oriented, watershed-system scale approach to habitat improvement and to ensure watershed-wide local involvement and public education.

The WRIA 45 Planning Unit has catalogued and mapped habitat concerns and past habitat improvement projects in the watershed, as were identified in previous research and studies. These maps, coupled with biological priorities established by the Upper Columbia Biological Strategy (Biological Strategy) (UCRTT, 2002) and agreed upon by the Planning Unit, will be used to ensure that benefits to the entire watershed system are taken into account when habitat improvement projects are recommended and prioritized through this plan. Additionally, the habitat maps will be utilized as a public involvement and education tool to develop new habitat projects that address needs identified throughout the watershed.

The intention of the 2514 Watershed Plan is to build actions that treat the source of habitat degradation, as opposed to treating only the effects. Treatments of the cause of the problem (such as allowing a stream reach to access the floodplain, riparian plantings, best management practices, etc) are preferred over short-lived engineered treatments (such as bank stabilization) that may only function to move the problem further downstream. These improvements will be achieved through the habitat component's watershed-system scale approach. Overall, this habitat component of the Wenatchee Watershed Plan (2514 habitat component) provides the Planning Unit an opportunity to recommend projects for habitat protection, enhancement, and restoration that the local residents see as priorities in their sub-watershed, and make sense at the watershed-system scale.

Salmon Recovery planning under HB 2496 is being completed in the Upper Columbia region (including WRIA 45) concurrently with 2514 Watershed Planning. The 2514 habitat component has taken 2496 planning into consideration and will complement the Salmon Recovery Plan for WRIA 45 in a variety of ways:

- 2514 watershed planning is not specific only to listed species or aquatic species. Any habitat needs of terrestrial or aquatic species may be considered in the plan and addressed by plan actions. This plan adds local input to the breadth of habitat attributes addressed through various planning and regulatory processes in the watershed;
- The 2514 habitat component, in conjunction with the Upper Columbia Salmon Recovery Plan, will be used to suggest and prioritize *specific* projects based on priorities established primarily in the Upper Columbia Biological Strategy, as well as other documents;
- The 2514 habitat component includes local projects, recommended by local residents and landowners; and
- The 2514 habitat component is intended to complement and be consistent with, but not necessarily duplicate the actions recommended in the Salmon Recovery Plan. If actions from the Salmon Recovery and Watershed Plan are combined, they should paint a very clear picture of the status of and the needs for watershed habitat for many species, including listed salmonids.

1.2 Habitat Status and Information Sources

The Wenatchee Watershed provides habitat for a wide variety of terrestrial and aquatic species. Natural habitat characteristics vary widely throughout the watershed from the steep, forested mountains in the northwest to the shrub-steppe of the eastern watershed at the confluence of the Wenatchee and Columbia Rivers. Terrestrial species that inhabit the Wenatchee watershed and receive special attention through a variety of planning and regulatory processes include Peregrine falcon, Bald eagle, Northern Spotted owl, Marbled murrelet, lynx, Larch Mountain salamander, and other species that are threatened or endangered, or otherwise closely monitored through federal and state programs. The Washington Department of Natural Resources has completed a catalogued list of species and habitat types in the watershed recognized by its agency as priorities for management and preservation (WDFW, 2005).

The Wenatchee Watershed is home to a variety of aquatic species including the following salmonids: Spring and Summer Chinook, sockeye, steelhead, westslope cutthroat, and adfluvial bull trout (adfluvial bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). The documented, presumed, and potential distributions of anadromous salmonids in each of the sub-watersheds of the WRIA are illustrated in maps in this document as described by the Salmon and Steelhead Habitat Inventory and Assessment Project (SSHIAP) (WCC, 2001). The potential distribution of these species is an important consideration in determining which habitat improvement activities to implement.

Much of the planning, protection, and restoration/enhancement work in the watershed has focused on the needs of salmonids because of the federal Endangered Species Act listings of Upper Columbia River (including the Wenatchee) steelhead and Spring Chinook as endangered and bull trout as threatened in 1997, 1998, and 1999, respectively. All the fish stocks in the Wenatchee Watershed except Summer Chinook, and sockeye are classified as depressed in the WA DNR Salmonid Stock Inventory (SaSi) index. The watershed also supports resident westslope cutthroat trout. Coho salmon

were extirpated from the region in the early 1900s; there are efforts underway by the Yakama Nation to reintroduce them. Additional information regarding the status of aquatic habitat can be reviewed in the Limiting Factors Analysis (Andonaegui, 2001), the Upper Columbia Biological Strategy (UCRTT, 2002), Chelan County Lead Entity Strategy (Chelan County, 2004), the Wenatchee Subbasin Plan (2004), Washington Conservation Commission fish distribution data (SSHIAP) (WCC, 2001), and an assortment of other reports as detailed in the Wenatchee Phase II Habitat Completion Memo (Golder, 2005). [Placeholder for links to these documents on CD version of report]

The WRIA 45 Limiting Factors Analysis described habitat conditions in relation to aquatic habitat needs in the Wenatchee Watershed as follows, "Anadromous salmonid populations in the Wenatchee [watershed] are influenced by the following out-of-[watershed] impacts: degraded estuarine habitat, fish harvest, unfavorable ocean conditions, and the effects of seven Columbia River reservoirs and hydroelectric dams on smolt and adult migration. Spring and Summer Chinook, sockeye salmon, and steelhead trout must negotiate a 468 mile journey from the mouth of the Wenatchee River to the Pacific Ocean, once as smolts and again as adults. Within the [watershed], human alterations to the environment are exacerbating naturally limiting conditions by reducing habitat quality and quantity, thereby reducing a species' chances of successfully completing its life cycle. These alterations have primarily occurred in the lower gradient, lower reaches of sub-watersheds in the lower [part of WRIA 45] and include road building and placement, conversion of riparian habitat to agriculture and residential development, water diversion, reduced large woody debris (LWD) recruitment, and flood control efforts that include LWD removal, berm construction, and stream channelization," (Andonaegui, 2001).

Much more has been researched and written about the salmonid and terrestrial habitat conditions in the Wenatchee Watershed, and many of those documents were used to provide background data for this Watershed Plan. Priorities for aquatic habitat projects in the 2514 Watershed Plan are based primarily on the biological needs identified in the Upper Columbia Biological Strategy (UCRTT, 2002). These priorities were found to be consistent with the Wenatchee Subbasin Plan (NPPC, 2004) and the WRIA 45 Limiting Factors Analysis (Andonaegui, 2001).

Habitat improvement projects recommended in this chapter were developed through a combination of input provided at public meetings held in various locations across the watershed in early 2005, noted project needs from various local agencies, and the needs established by the Habitat Subcommittee of the Wenatchee Watershed Planning Unit. In early 2005, the Planning Unit requested information on planned or needed habitat projects from many entities and agencies working in the watershed. These proposed projects were catalogued and will be discussed in this plan.

1.3 Action Types: Protection and Restoration/Enhancement

The actions prescribed to address habitat issues fall into two categories: *Protection* and *Enhancement/Restoration*. Protection actions generally involve land acquisitions, conservation easements, or other methods to ensure that potential future activities or land uses will not interfere with habitat goals. Enhancement and restoration actions generally involve specific activities intended to improve or restore habitat for a target species, such as the removal of fish passage barriers, restoration of channel function, or reconnection of disconnected habitat areas. These terms are defined by the Planning Unit as follows:

- Restoration – Creating a specific functional condition that has the desired effect on a given species.

- Enhancement Actions – Actions that move toward creating the specific functional condition of restoration, without necessarily achieving all criteria necessary for restoration, or the complete creation of that condition.
- Protection – Prevention of future more active or invasive land use activities than the current land use.

Protection is only applicable in areas that have retained healthy, functioning habitat in a relatively pristine condition. Protection is more cost and time-effective in the long term than restoration or enhancement actions because a larger, on-the-ground activity is not required to *create* habitat. Where it is possible to protect functioning systems, protection is recommended over restoration/ enhancement actions. Actions to restore fish access to fully functioning protected areas are also a high priority. Throughout the watershed, there are areas where adequate stewardship is currently occurring. In these areas, continued maintenance is recommended before initiation of a new protection or restoration/enhancement action.

1.3.1 Public Outreach

Through the Limiting Factors Analysis, Subbasin Planning, Salmon Recovery Planning and Watershed Planning processes, a list of tools, or a "toolbox," was created for each Wenatchee sub-watershed based on the protection and restoration/enhancement needs of that sub-watershed. Not every tool in every toolbox is intended to be implemented in the sub-watershed. Additionally, specific tools are only applicable at appropriate locations. The tools range in application from instream, riparian, and upland areas, and include both policy and on-the-ground actions.

In January 2005 nine workshops were held throughout the watershed to gain an understanding of local residents' preferences for specific habitat improvement tools where they live. Workshops were held for the Chiwawa and Upper Wenatchee; Nason; Icicle; Chumstick; Peshastin; White, Little Wenatchee, and Lake Wenatchee; Mission, Brender, and Yaksum; Lower Wenatchee from Leavenworth to Dryden; and Lower Wenatchee from Dryden to Mouth sub-watersheds.

Each workshop provided residents an opportunity to identify locations in need of habitat improvement and propose specific projects. Many of these proposed projects need to be further researched for feasibility and benefits, but the workshops provided an invaluable opportunity for local residents to identify projects based on their familiarity with the area. For example, many landowners expressed a desire to complete riparian planting projects in specific locations. After the workshops, Chelan County Natural Resources applied for funding to complete these projects. The outcome of the funding applications is expected in late summer 2005.

At each workshop, the toolbox for the sub-watershed(s) being discussed was also introduced. Workshop attendees were asked to rank the appropriateness of each tool for their sub-watershed. While this ranking can be used as a general score of public acceptance, it is important to note that many tools are applicable only to isolated areas within each sub-watershed, or only under specific conditions. The ranking does not take this and other factors that affect applicability of tools to specific locations into account; it is intended to be used as a factor in weighing public acceptance of specific tools that could be used to address a habitat problem.

1.4 Watershed-wide Prioritization Framework

Effective planning for future habitat improvements requires prioritization of actions and projects both within sub-watersheds and across the Wenatchee watershed. This prioritization will allow effective

and efficient allocation of time and resources to optimize improvements. Prioritization will be based on the following:

- **Biological Needs** and **Sub-Watershed Categories**, as established in the Upper Columbia Biological Strategy (UCRTT, 2002);
- **Terrestrial Benefit**;
- **Community Acceptance**, determined via public outreach, initiated at public workshops held in January 2005; and
- **Cost and Benefits of Specific Projects**.

A prioritization framework will be used to select which proposed habitat projects to recommend for funding and implementation. This framework will utilize all of the above criteria with the goal of identifying projects that are biologically beneficial, feasible, have the greatest overall watershed benefit, enjoy community acceptance, and whose implementation represents an efficient use of funds and resources.

1.4.1 Biological Needs and Priorities

Prioritization of habitat projects will first consider the biological needs established for each sub-watershed in the Upper Columbia Biological Strategy (Biological Strategy) (UCRTT, 2002). The Biological Strategy considered sub-watershed habitat condition and relative location in the watershed to gauge effectiveness of habitat improvements in each sub-watershed and watershed-wide. This resulted in assignment of a "sub-watershed biological priority category" ranging from 1 to 3 to each sub-watershed. This category describes the watershed-wide benefit resulting from implementation of habitat actions in that sub-watershed. Descriptions of the biological priority category assigned to each sub-watershed, along with identified biological needs in each sub-watershed are shown in Figure 1. Descriptions of the categories are as follows:

Category 1 – These sub-watersheds represent systems that most closely resemble natural, fully functional aquatic ecosystems. In general, they support large, often continuous blocks of high-quality habitat and smaller drainages supporting multiple populations. Connectivity among smaller drainages and through the main sub-watershed stream corridor is good, and more than two species of federally listed fish are known to occur. Exotic species may be present but are not dominant. ***Protecting functioning ecosystems in these sub-watersheds is a priority.***

Category 2 – These sub-watersheds support important aquatic resources, often with smaller drainages classified as strongholds for one or more populations. The most important difference between Category 1 and Category 2 is an increased level of fragmentation that has resulted from habitat disturbance or loss. These sub-watersheds have a substantial number of smaller drainages where native populations have been lost or are at risk for a variety of reasons. At least one federally listed fish species can be found within each of these sub-watersheds. Connectivity among smaller drainages may still exist or could be restored within the watershed so that it is possible to maintain or rehabilitate life history patterns and dispersal. ***Restoring ecosystem functions and connectivity within these sub-watersheds are priorities.***

Category 3 – These sub-watersheds may still contain smaller drainages that support salmonids. In general, however, these smaller drainages have experienced substantial degradation and are strongly fragmented by extensive habitat loss, most notably through loss of connectivity with the mainstem corridor. At this time, the opportunities for restoring full expression of life histories for multiple

populations found within the sub-watershed are limited. ***The priority for funding in these sub-watersheds should be to rectify the primary factor that is causing the habitat degradation.***

In general, watershed-scale prioritization of projects should be accomplished in the following way:

- **Category 1** sub-watersheds should receive priority allocation of financial and management resources.
- Subsequent allocation of resources should be given to **Categories 2** and **3**, in that order, once refuge habitats (**Category 1**) for the target species are protected and secured. This does not mean, however, that specific actions should not occur in **Category 2** and **3** sub-watersheds until all activities in **Category 1** sub-watersheds are completed. Any projects within those sub-watersheds that increase the range, life history diversity, or age cohorts of one or more species would contribute to the overall strategy of making them more robust to disturbances outside and within the region.

Sub-watershed categories, and priorities of actions within each sub-watershed, are illustrated in Figure 1.

1.4.2 Terrestrial Benefit

Terrestrial benefit(s) of projects will be factored into the initial biological prioritization results (Section 1.4.1 above). A project with anticipated terrestrial benefits will rank higher than other projects in the same aquatic biological benefit category (above) without terrestrial benefits. For example, if two projects are proposed that provide the same biological benefit to a category 1 watershed, and one of those also provides habitat for birds, it will rank higher than the other.

1.4.3 Community Acceptance

Community acceptance of actions in the "toolbox" of proposed actions (as discussed in section 1.3.1) will be factored into the results from the prioritization above to result in a final prioritized list of projects.

It is likely that there will be a range of community acceptance for tools from the toolbox that can accomplish a similar biological objective. The results from the community acceptance analysis may also illustrate a need to find new proposed projects to address important biological priorities.

Community acceptance and support can be gauged by asking the following questions about each project:

1. Would the action/project enjoy broad community support?
2. Does the action/project address a specific need in the community?
3. Will the action/project lead to implementation of other actions/projects? (such as a demonstration project)
4. Does the action/project promote a voluntary, incentive-based approach?

Projects with positive answers to each question will rank higher than those that do not have support. Community opposition to a project may be reason enough to cancel a project or to find another means of achieving the same biological benefit. Community involvement in the habitat project planning

process was initiated at the January 2005 public workshops. The public will continue to be engaged throughout the planning process.

1.4.4 Project Cost and Feasibility

Project cost and feasibility are also extremely important factors in determining the order in which projects should be funded and implemented. Project cost and feasibility will be rated for each project based on answers to the following questions:

1. Does the project have landowner consent and support?
2. Is the project technically feasible? Does the intended site have the ability to achieve the desired environmental benefits?
3. Does the project have a high ecological benefit per dollar spent?
4. Does the project have a high likelihood of success? Would it be vulnerable to failure?
5. Does the project have a high likelihood of acquiring the needed funding? Is it already partially funded?
6. Does the project enable the success of other projects?

Projects with positive answers to these questions will receive a higher project cost and feasibility score, and therefore rank higher than projects that do not.

1.4.5 Overall Prioritization of Projects

As part of the habitat component of this watershed plan, a prioritization framework (consisting of the basic criteria discussed in this section) has been developed and potential habitat projects have been identified. The prioritization of these and other recommended projects will be an iterative process occurring in the months following the production of this document. An internal list of proposed projects will be maintained by Chelan County Natural Resources. The project list will be evolving regularly, and will be continually prioritized based on availability of funds, citizen interests, habitat needs, project feasibility, local and watershed-wide needs, and the foreseeable benefits of specific proposed projects.

2.0 WATERSHED-WIDE HABITAT ACTIONS

The WRIA 45 Planning Unit has chosen to address both aquatic and terrestrial habitat in this watershed plan. Based upon the watershed system-wide approach introduced above, the Planning Unit has developed a framework that recognizes both human activities and natural phenomena that have an effect on watershed health as a whole. Actions in this section pertain to forest roads, riparian and wetland health, noxious weeds, and other topics that affect the watershed as a whole.

An assortment of studies has been completed at a larger, watershed-wide scale to assess terrestrial and aquatic habitat needs. Those particularly relevant to this habitat component are:

- Chelan County Fish Barrier Inventory (Chelan County, 2001)
- Instream flow assessment (EES, 2005) (Golder, 2003) (Ecology, unpublished)
- Draft Wenatchee River Total Maximum Daily Load (TMDL) Study (Ecology, 2005)

2.1 Watershed-Wide Actions

WW-1 - The WRIA 45 Planning Unit supports implementation of the actions in the Wenatchee Subbasin Plan (Subbasin Plan sections 7.4 to 7.6 (NPCC, 2004)), and supports the Subbasin Plan approach to evaluation and monitoring of terrestrial ecosystems in the Wenatchee Watershed. The Planning Unit asks the co-planners and co-managers to seek funding from BPA and other sources for implementation of these actions.

WW-2 – The WRIA 45 Planning Unit members, both collectively and individually, intend to be involved in the public planning process for plans and projects. The Planning Unit will take an active role in disseminating information about public comment opportunities to its members. Additionally, the Planning Unit will provide public comment on watershed scale studies and plans when, by a vote of the Planning Unit, they are determined to be a priority of the Planning Unit and important to aquatic and overall watershed health.

WW-3 – The mainstem Wenatchee River provides habitat *important to the entire watershed* for many life stages of spring and summer Chinook, steelhead, and bull trout, and needs to be protected, enhanced, and restored. All remaining intact areas on the mainstem should be maintained. Where possible, floodplain function should be restored, particularly from the Mission Creek confluence downstream to the Columbia River confluence.

WW-4 – All property owners and managers in the watershed are encouraged to continue to cooperate in maintaining forest roads. Opportunities for inter-agency or multiple owner cooperation in roads management should continue to be supported.

Forest Roads Background Information for WW-4

The regulations that govern forest road maintenance depend upon ownership. The majority of forest lands in WRIA 45 are public and managed by the USFS. Other public forest lands are managed by WA DNR and the US BLM. Private industrial forest lands are regulated by WA DNR according to the rules of the Forest Practice Act. Small forest land owners are regulated under emergency rules for small forest landowners' road maintenance and abandonment planning, effective October 31, 2003. The emergency rules affect WAC 222-16, 222-20 and 222-24. These rules will remain in effect until permanent rules are adopted.

Roads on National Forest lands are currently managed under the National Road Policy originally passed in January, 2001. In general terms, this policy directed the Forest Service to identify the minimum road system that will provide safe access and travel to the public and allow for economic and efficient management, while minimizing to the extent practical the long-term ecological impacts roads cause to the environment. As a part of this policy, National Forests were directed to use science-based road analysis to help guide decisions on road management. The Okanogan and Wenatchee National Forests (OWNF) completed a Roads Analysis in December 2003 for high use roads on all National Forest Lands that accommodate two wheel drive passenger cars (approximately 20% of all roads on the Forests). The Roads Analysis was intended to do the following:

- "Addresses the effects of roads on biological, social, and economic factors,
- Identifies strategies and opportunities that move us closer toward the goal of an affordable and efficient road system that meets the needs of the public and the USDA Forest Service and also has a minimal impact on the environment, and
- Includes previously completed plans, analyses, and decisions," (OW National Forest Roads Analysis http://www.fs.fed.us/r6/wenatchee/planning/planmain.htm).

In the Wenatchee Watershed, 30 miles of passenger car accessible roads were recommended for major repair, 75 for minor repair, 59 to leave as is, and 9 for reduced maintenance (OWNF, 2003). No roads were recommended for stabilization or restoration to forest land. National Forest roads maintained for high clearance vehicles only (4 wheel drive), and roads in long-term storage (not driveable) make up approximately 80% of the roads in the Wenatchee watershed. Watershed analyses have been completed for portions of the lower Wenatchee watershed, the Doctor Bob Road system in the Icicle Watershed, and the White and Little Wenatchee River watersheds. Projects are currently under development that may permanently close and restore some roads in these sub-watersheds (Thomas, 2005).

On state and private forest lands, forest practices are conducted according to the state Forest Practice Rules (WAC 222). The Forest Practice Rules prescribe standards by which roads are to be maintained and/or abandoned. Assessments of the current situation and a plan for implementation for each forest area, called Road Maintenance and Abandonment Plans (RMAPs) are required to be in place by 2006, and are to be fully implemented by 2016 under the Forest Practice Rules (WAC 222-24).

WW-5 - Noxious weeds threaten aquatic and terrestrial ecosystems throughout the Wenatchee Watershed. The Planning Unit supports efforts toward noxious weed control and eradication.

WW–6 – A fish barrier inventory has been conducted in many areas of the watershed, however, data from the inventory does not always include consistent information about each barrier (i.e. whether it is a partial or full barrier, etc.). This information is needed. A method for updating the inventory should be established and funded. Also, the Chelan County fish barrier inventory should be integrated with fish barrier information collected by other land managers, such as the Forest Service.

WW-7 – [Placeholder - Recreational Fishery.] Information may be used from the anticipated Entiat white paper.

WW-9 - [Placeholder – Wetlands] – Does the Planning Unit want to make a statement regarding an overall approach to floodplain protection and restoration in the watershed?

OE-1 - [Placeholder – Outreach and Education] Efforts that are ongoing in the Wenatchee Watershed to improve or maintain habitat quality need to be encouraged and retained. Recognize and acknowledge achievements in the watershed that have accomplished habitat improvement or protection.

OE-2 – [Placeholder – Outreach and Education] Provide support of specific education and outreach programs in the watershed. Programs include: 4H Forestry Education Program, Kids in the Creek, Salmon Fest, Trout Unlimited education programs, Bird Fest, Chelan Douglas Land Trust field trips, Hatchery programs (LNFH, and friends of NW Hatcheries), existing noxious weed/native plant education programs, and others.

OE-3 – [Placeholder – Watershed Clean-Up.] This may move to the Public Outreach section of the Plan. This action may be implemented by the 4-H program or CCCD.

2.2 Other Watershed-Wide Projects and Proposed Actions

There are other watershed-wide habitat actions currently completed, ongoing, or proposed the Wenatchee Watershed. These include stream restoration and coho stock supplementation, and are detailed in Table 1. Table 1 also presents proposed projects in the Wenatchee Watershed, including riparian revegetation, restoration in reaches targeted by the TMDL study, and a songbird conservation project.

3.0 SUB-WATERSHED SCALE ACTIONS

For each sub-watershed, maps (Figures 2 through 10) have been created to illustrate documented, presumed, and potential salmonid species distribution. The maps also display locations of completed, ongoing and proposed aquatic habitat enhancement and protection projects. Projects on the maps include those that were collected by the Habitat Subcommittee as of June 30, 2005; additional projects are anticipated. These maps provide a watershed system perspective for evaluation of proposed projects; they are another tool to help prioritize and track projects based on potential fish distribution and the relationship to other projects. Salmonid distribution shown on these maps is documented, presumed, and potential distribution as reported by SSHIAP (WCC, 2001).

[Placeholder – Streambed elevation profiles, detailing fish distribution and physical parameters as related to elevation along the mainstem of each sub-watershed, are currently being produced by the Habitat Subcommittee and are anticipated in a future draft of this document.]

3.1 Lower Wenatchee Sub-Watershed (Tumwater to Confluence) - Category 2

3.1.1 Sub-Watershed Habitat Overview

The 68,128 acre Lower Wenatchee sub-watershed covers the area from below Tumwater Canyon downstream to the confluence with the Columbia River (RM 23.5 to RM 0). Land cover in the Lower Wenatchee sub-watershed is primarily forest (38.5% of the sub-watershed), followed by shrubland (29.6%), grasslands (16.4%), and orchards (11.6%) (MWG, 2003). A large portion of this sub-watershed is privately owned, especially riparian lands. Rural residential/resource zoning accounts for 63% of land use, followed by commercial forest (24%) and commercial agriculture (9%) as classified for zoning purposes (MWG, 2003). Impacts on habitat in the Lower Wenatchee sub-watershed are primarily related to railroad and road building, townships, orchards, and residential land development. The river is constrained by Highway 2 and the railroad in many places throughout this reach. The effects of these land use activities have resulted in a highly channelized stream, loss of riparian habitat and other specific effects as described below (Peven Consulting, 2004; WRIA 45 Habitat Subcommittee, 2003).

Native salmonid species in the Lower Wenatchee sub-watershed are sockeye salmon, spring and summer Chinook, steelhead, rainbow, and adfluvial bull trout. (Adfluvial bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River.) Observed, presumed, and potential ranges of anadromous salmonid species are illustrated in Figure 2. This sub-watershed provides spawning and rearing habitat for Summer Chinook and steelhead, and serves as an important passage corridor for anadromous species, and is therefore critical to the health of anadromous fish in the entire Wenatchee Watershed.

Native vegetation in the Lower Wenatchee sub-watershed transitions from west to east as elevation decreases. Riparian areas, or those areas where vegetation is influenced by the proximity to water, are narrower on the east side of the sub-watershed than those to the west. Toward the east, this narrow riparian band changes quickly to upland vegetation. The Lower Wenatchee sub-watershed supports a diverse assortment of plants, including the following rare plant species: Seely's silene, clustered lady-slipper, pine broomrape, bulb-bearing water hemlock, longsepal globemallow, and a number of carex species.

3.1.2 Habitat Concerns in the Sub-watershed

The Biological Strategy (UCRTT, 2002) describes the following factors as impacting habitat condition in this sub-watershed:

- Land development, state highway and railroad affect channel migration, woody debris recruitment, and gravel recruitment;
- Riparian habitat and off-channel habitat have been significantly lost or degraded in this reach;
- Late summer instream flows are often critically low throughout this reach;
- Floodplain function has been impaired by development, causing extremes in the peaks and low points of the hydrograph;
- Stream temperatures often exceed standards[1], which are affected in part by riparian habitat loss and low instream flows; and
- The lower mainstem Wenatchee sub-watershed provides important habitat for many life stages of Spring and Summer Chinook, steelhead, and bull trout. The mainstem at this time is most vulnerable to riparian and instream habitat degradation. All remaining intact areas on the mainstem should be protected, and floodplain function should be restored, particularly from the Mission Creek confluence downstream to the Columbia River confluence.

The Lower Wenatchee Watershed Assessment (USFS, 1999b), completed by the US Forest Service, states that the lower watershed has seen an invasion of noxious plant species, including common knapweed, oxeye daisy, St. John's wort, and cheatgrass. These plants are persistent and "may displace native species indefinitely."

3.1.3 Historic and Ongoing Habitat Projects

Projects completed to date in the Lower Wenatchee sub-watershed have primarily involved riparian plantings and in-stream habitat. These projects are illustrated in Figure 2 along with documented, presumed, and potential salmonid species distribution. The symbols on the map illustrate the primary entity responsible for each project. Details about these projects can be found in Table 2.

An assortment of studies has been conducted in the Lower Mainstem Wenatchee to identify locations for potential habitat improvement. A FLIR (Forward Looking Infrared) temperature assessment was conducted in the watershed (Watershed Sciences, LLC 2002a; 2002b; 2003). The baseline temperature data are being used to help locate projects where key thermal refugia need to be protected, and to aid in understanding instream flow needs. A channel migration zone (CMZ) study has also been completed for the lower Wenatchee River (Jones & Stokes, 2004) to provide general guidance and specific details about the circumstances and methods most appropriate for salmon recovery actions within the lower Wenatchee River (and lower Nason Creek).

3.1.4 Proposed Projects and Actions

The CMZ study located 20 potential restoration, enhancement, or protection project needs along the lower 26 miles of the Wenatchee River from Leavenworth to the confluence with the Columbia (and

[1] This statement may also include a reference to naturally high temperatures. It will be updated based upon language in the temperature TMDL, which is currently in draft form.

9 other sites on Nason and Icicle Creeks). Three of these projects were funded by the 5th Round of the Salmon Recovery Funding Board. These projects are illustrated on Figure 2.

The remaining seventeen projects in the Lower Wenatchee identified by the CMZ study that are not funded to date are illustrated on Figure 2. In addition to the CMZ study projects, other habitat improvement projects have been proposed in the Mainstem Wenatchee sub-watershed, and are also detailed on Figure 2.

3.1.5 Biological Needs to be used for Prioritization of Lower Wenatchee Habitat Projects

Strategies recommended by the Biological Strategy for aquatic habitat in the Lower Wenatchee sub-watershed, in priority order are:

1) Protect existing riparian habitat and channel migration floodplain function.

2) Restore channel migration to normative function.

3) If restoration is not possible, improve fish access to oxbows and historical side channels.

4) Increase late summer flows.

Additionally, protection of existing riparian areas and channel migration floodplain function in the Lower Wenatchee should be given additional emphasis because of its watershed-wide benefit. The Biological Strategy states, "Recent research indicates that the mainstem Wenatchee River provides important habitat for many life stages of spring and summer Chinook salmon, steelhead, and bull trout. The mainstem at this time is most vulnerable to riparian and instream habitat degradation. All remaining intact areas on the mainstem should be protected, and flood plain function should be restored, particularly from the Mission Creek confluence downstream to the Columbia River confluence. This would require only passive restoration. Since this reach has the highest discharge in the [WRIA], the extent of riparian vegetation needed to restore flood plain function would be larger than the tributaries. Benefits of this action would be numerous to anadromous and inland salmonids, as well as a myriad of wildlife species," (UCRTT, 2002).

The proposed projects in this sub-watershed have been evaluated with respect to fulfilling these prioritized biological needs. The results indicate the types of projects that may are appropriate for the sub-watershed. Further information about prioritization of projects in this sub-watershed and across the watershed can be found in Section 4.

3.2 Upper Wenatchee (Lake Wenatchee to the mouth of Tumwater Canyon) including Chiwaukum Creek – Category 1

3.2.1 Sub-watersheds Habitat Overview

The 36,301 acre Upper Wenatchee and 32,012 acre Chiwaukum sub-watersheds cover the area from below Lake Wenatchee to the mouth of Tumwater Canyon (RM 54.2 to RM 23.5). Land cover in the Upper Wenatchee and Chiwaukum sub-watersheds is primarily forest (74%), with other areas being made up of mostly grasslands and some areas of bare rock, sand, and clay (MWG, 2003). The vast majority of the land in these subwatersheds is in commercial forest use (88%), as classified for zoning purposes (MWG, 2004). Impacts on habitat in the Upper Wenatchee and Chiwaukum sub-watershed are primarily related to the state highway, railroad, and private land development. The river is constrained by Highway 2 and suffers from reduced of large woody debris recruitment (UCRTT, 2002).

Native salmonid species in the Upper Wenatchee sub-watershed are sockeye salmon, spring and Summer Chinook, steelhead, rainbow, westlope cutthroat and adfluvial bull trout (adfluvial bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River. This sub-watershed provides an important passage corridor for many species and important spawning habitat for Summer Chinook and steelhead. The Chiwaukum sub-watershed contains current and potential habitat for bull trout, Spring and Summer Chinook, and Summer Steelhead. Current and potential range of these anadromous species is illustrated in Figure 3. The reach from Lake Wenatchee to the Chiwawa River confluence is designated a Key Watershed in the Northwest Forest Plan. The Northwest Forest Plan defines Key Watersheds as, "A system of large refugia comprising watersheds that are critical to at-risk fish species and stocks and provide high quality water…and…Contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species, and ensure that refugia are widely distributed across the landscape," (USFS, 1997).

The Upper Wenatchee contains habitat for a diverse assortment of plants, including the following rare plant species: Seely's silene, clustered lady-slipper, pine broomrape, bulb-bearing water hemlock, longsepal globemallow, and a number of carex species (USFS, 1999b). Mesic (mixed – not wet and not dry), and consequently more diverse forest types appear in the higher elevations of the Upper Wenatchee River and Chiwaukum Creek when compared against the Lower Wenatchee sub-watershed. Habitat also exists for a number of threatened or endangered or otherwise specially managed species including: gray wolf, peregrine falcon, grizzly bear, northern spotted owl, bald eagle, marbled murrelet, and lynx. The forest service has designated the Fish Lake area in the upper portion of the Upper Wenatchee sub-watershed as a "special interest area" because of the abundance of bogs and wetlands around the lake. The Fish Lake area has high species richness and contains a number of osprey nests, great blue heron rookeries, barred owl nests, aspen stands, and habitat for beaver, grouse, mollusks, and snag dependent species.

3.2.2 Habitat Concerns in the Sub-Watersheds

There are no urban areas within the Upper Wenatchee or Chiwaukum sub-watersheds although the small community of Plain is located along the Wenatchee River. Land in these sub-watersheds is primarily part of the Wenatchee National Forest. Most is managed for harvest. The Biological Strategy describes factors affecting habitat condition in these sub-watersheds to include:

- The state highway, railroad, and private land development affect woody debris recruitment, channel migration, and gravel recruitment;
- The state highway cut off a large oxbow near Nason Creek confluence;
- Historical log drives and resultant loss of wood recruitment has reduced channel complexity; and
- Fecal coliform and water temperatures are slightly elevated.

Additionally, the USFS Watershed Assessment describes that, at Tumwater Canyon, the Mainstem Wenatchee is affected by coarse sedimentation impacts from fire, and its proximity to State Highway 2, which reduces gravel and LWD recruitment (USFS, 1999b).

3.2.3 Historic and Ongoing Habitat Projects

There were two completed habitat projects identified in the Upper Wenatchee sub-watersheds as of June 30, 2005, both involving passage at Tumwater Dam (Table 3). These projects, USFS land use

designations and private forest lands, along with documented, presumed, and potential salmonid species distribution are illustrated in Figure 3.

3.2.4 Proposed Projects and Actions

There were no proposed habitat projects identified in the Upper Wenatchee or Chiwaukum sub-watersheds as of June 30, 2005.

3.2.5 Biological Needs to be Used for Prioritization of Upper Wenatchee and Chiwaukum Habitat Projects

Recommendations established in by the Biological Strategy for aquatic habitat in the Upper Wentachee sub-watershed (including the Chiwaukum sub-watershed), in priority order, are:

1) Protect remaining floodplain and riparian habitat;

2) Restore channel migration to resemble historical function;

3) If restoration is not possible, improve fish access to oxbows and historical side channels that have been cut off from the main channel;

4) Initiate public information efforts to discourage harassment of spawning Summer Chinook salmon;

5) Reduce non-point pollution from septic tanks and livestock; and

6) Initiate public information efforts to encourage protection of riparian habitat.

In Tumwater Canyon, specific recommendations from the Biological Strategy are to:

1) Protect existing riparian habitat, and
2) Address passage barriers at Skinney Creek near mouth.

Currently, there are no known proposed projects in the Chiwaukum and Upper Wenatchee sub-watersheds, although both rank as Category 1. This indicates a need for potential proposed projects that emphasize protection in this sub-watershed. Further information about prioritization of projects in this sub-watershed and across the watershed can be found in Section 4.

3.3 Mission Sub-Watershed – Category 3

3.3.1 Sub-watershed Habitat Overview

Mission Creek drains a 59,794 acre area and joins the Wenatchee River at Wenatchee RM 10.4. Land cover in the Mission sub-watershed is primarily forest (69.4%), followed by grasslands (15.1%) shrublands (10.7), and orchards (3.0%) (MWG, 2003). A large portion of this sub-watershed is used for commercial forest (77.4%), which is owned by private companies and the USFS. Rural residential/resource accounts for 19% of land use. Agriculture, as described for zoning purposes, accounts for less than 3% of the sub-watershed (MWG, 2003).

Native salmonid species in the Mission Creek sub-watershed are juvenile Spring Chinook and steelhead. Currently, use is limited in the sub-watershed. Documented, presumed, and potential

distribution of these fish is illustrated in Figure 4. At present, the Mission sub-watershed is not considered to contribute significantly to salmonid population abundance.

Elevation in the Mission Creek sub-watershed ranges from 795' to 6800'; there is a similarly wide range in habitat attributes in the sub-watershed. The lower elevations of the sub-watershed are "composed of bitterbrush, ponderosa pine, and ponderosa mixed with Douglas fir that are used extensively as winter habitat range for mule deer and a small herd of elk. The mid elevations are composed of Douglas and grand fir forests with interspersed south-facing slopes of ponderosa pine. The upper elevations are comprised of subalpine fir forest and subalpine and alpine meadows." Sandstone outcrops are common and create unique cliff habitats. In a few of the side canyons, such as Ragg Canyon, small wetlands occur and provide important and unique habitats (USFS, 1995).

3.3.2 Habitat Concerns in the Sub-Watershed

The Mission sub-watershed has been impacted primarily by floodplain restriction followed by agriculture, and other land use developments. In the very lower portion of the sub-watershed, urbanization has created many factors that may limit natural production of fish species (Peven Consulting, 2004).

The Upper Columbia Biological Strategy (UCRTT, 2002) describes factors affecting habitat condition in this sub-watershed to include:

- Low or non-existent flows with associated high instream temperatures in Lower Mission Creek disrupt distribution and abundance of native species, particularly in summer;
- Channelization of Mission, Brender, and Yaksum Creeks;
- Degraded water quality and loss of riparian habitat, road construction, urban/residential and agricultural development, especially in the floodplains, grazing and soil compaction have changed channel function;
- There are several culvert passage barriers; and
- Loss of channel sinuosity and floodplain function in the Mission Creek sub-watershed.

3.3.3 Historic and Ongoing Habitat Projects

Projects recently completed in the Mission sub-watershed have primarily involved fish passage. Fish passage projects have been completed by the US Forest Service and Chelan County Conservation District and are listed in Table 4. These and other projects completed or ongoing in the sub-watershed are illustrated in Figure 4 along with documented, presumed, and potential salmonid species distribution. The symbols on the map illustrate the primary entity responsible for each project.

3.3.4 Proposed Projects and Actions

There were no proposed habitat projects in the Mission sub-watershed as of June 30, 2005.

3.3.5 Biological Needs to be Used for Prioritization of Mission Sub-Watershed Habitat Projects

Recommendations established in the Biological Strategy (UCRTT, 2002) for aquatic habitat in the Mission sub-watershed, in priority order, are:

1) Increase stream flow;

2) Reduce nonpoint pollution from septic tanks and livestock; and

3) Other projects should be delayed until flow and water quality are addressed. (Other projects would address riparian health, off channel habitats, and in channel attributes.)

There are currently no proposed projects in the Mission sub-watershed. It was ranked as a category 3 by the Biological Strategy. Identification and implementation of projects in Category 1 and 2 watersheds should occur before there is a focus on finding additional projects in the Mission sub-watershed. This is consistent with recommendation 3 above, from the Biological Strategy. Further information about prioritization of projects in this sub-watershed can be found in Section 4.

3.4 Peshastin Sub-Watershed – Category 2

3.4.1 Sub-watershed Habitat Overview

The Peshastin sub-watershed drains an area of 86,291 acres and joins with the Wenatchee River at Wenatchee RM 17.9. Land cover in the Peshastin sub-watershed is primarily forest (69%), followed by grasslands (18.2%), and shrubland (5.9%) (MWG, 2003). Commercial forest is by far the most dominant land use in the sub-watershed (94.8%). Other land uses are rural residential/resource (4%) and a small amount of commercial agriculture (MWG, 2003).

Native salmonid species in the Peshastin Creek sub-watershed are Spring Chinook, steelhead, rainbow, adfluvial bull trout, and westlope cutthroat trout (adfluvial bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). Documented, presumed, and potential range of anadromous salmonid species is illustrated in Figure 5. This sub-watershed provides important bull trout and steelhead spawning and rearing habitat, both in the mainstem Peshastin and in Peshastin tributaries.

3.4.2 Habitat Concerns in the Sub-watershed

Including terrestrial species, there are five threatened and endangered species, and 35 species of concern in the Peshastin sub-watershed. Approximately 29% of the Peshastin sub-watershed is in the Alpine Lakes Wilderness and drains into Ingalls Creek, the largest tributary by water volume to the Peshastin. Much of Peshastin Creek is bounded and altered by highway construction and channel rerouting. Historically, mining was believed to have adversely affected [fish] production. In general, land use practices that have diminished fish productivity include road construction, orchards, irrigation, residential development, and historic mining.

In this sub-watershed, there is a low abundance and limited distribution of low elevation naturally functioning Ponderosa pine habitat. This alteration of Ponderosa pine habitat has resulted from timber harvest, fire suppression, and conversion to other uses. Increased access within the watershed from roads and land uses has increased disturbance to wildlife. Riparian habitat has been fragmented. There is also a low abundance and distribution of late-successional forest habitat (USFS, 1999a).

The Biological Strategy lists the following factors affecting habitat condition in this sub-watershed:

- Channel migration, riparian habitat, floodplain function, stream sinuosity, and gravel recruitment are severely impacted by the State highway;

- Low instream flows in lower Peshastin Creek impede upstream migration, reduce rearing habitat, and likely contribute to elevated water temperature; and
- Loss of riparian habitat resulting from land development and State highway reduces quantity and quality of spawning and rearing habitat.

3.4.3 Historic and Ongoing Habitat Projects

Projects completed to date in the Peshastin sub-watershed are listed in Table 5, and have involved fish barrier removal, instream habitat improvement, and off channel habitat development. Three projects in this sub-watershed have been funded by the Salmon Recovery Funding Board; others were completed by Longview Fibre and Chelan County Conservation District. These projects, as well as documented, presumed, and potential salmonid species distribution are illustrated in Figure 5. The symbols on the map illustrate the primary entity responsible for each project.

3.4.4 Proposed Projects and Actions

Currently, only one proposed project has been identified in the Peshastin sub-watershed, channel reconstruction through the CMZ study. It is illustrated in Figure 5.

3.4.5 Biological Needs to be used for Prioritization of Peshastin Habitat Projects

Recommendations established in the Biological Strategy in the Peshastin sub-watershed, in priority order, are:

1) Increase stream sinuosity and floodplain function from Ingalls Creek to mouth.

2) Restore flow from Camas Creek to mouth.

3) Other projects should be delayed until stream sinuosity and flows are addressed. (Other projects would address riparian health, degraded channel and floodplain restoration in mainstem Peshastin, and fish passage.)

There is only one proposed project in the Peshastin sub-watershed. As Peshastin Creek is a Category 2 sub-watershed, other proposed projects should be identified here, particularly those that address the top biological need, increasing stream sinuosity and floodplain function from Ingalls Creek to the mouth of Peshastin Creek. Further information about prioritization of projects in this sub-watershed and across the watershed can be found in Section 4.

3.5 Chumstick Sub-Watershed – Category 3

3.5.1 Sub-watershed Habitat Overview

The Chumstick sub-watershed drains 52,969 before meeting with the Wenatchee River at Wenatchee RM 23.5. Land cover in the Chumstick sub-watershed is primarily forest (75.2%), and grasslands (18.9%) (MWG, 2003). Commercial forestry accounts for 74.5% of land use in the sub-watershed, followed by rural resource lands (22.5%). The Leavenworth Urban Growth Area comprises 1,300 acres in the lower reaches of the sub-watershed. Summer steelhead is the only known salmonid species native to the Chumstick sub-watershed. Chumstick Creek may have supported coho salmon as well, although few records exist. Documented, presumed, and potential range of steelhead in the Chumstick is illustrated in Figure 6. (Note that bull trout, chinook, and sockeye also appear on Figure 6, but are located only on the mainstem Wenatchee River.)

3.5.2 Habitat Concerns in the Sub-watershed

This sub-watershed has been substantially degraded and is strongly fragmented. Brook trout, an introduced non-native species, now occurs in much of the Chumstick Creek drainage. The Chumstick sub-watershed does not support extensive anadromous fisheries habitat, and opportunities for fully restoring anadromous fisheries to this watershed are limited.

On land, most of the forest has been logged several times; large pine and Douglas fir were the primary trees removed. Effective fire suppression has altered species composition and stand densities. Fire exclusion has influenced both plant community structure and composition. Noxious weeds are prevalent in this sub-watershed. These include common knapweed, oxeye daisy, St. John's wort, dalmation toadflax, and Sulpher cinquefoil. These species have the potential to displace native species indefinitely (USFS, 1999a).

There are many species of special management concern that may reside in the Chumstick su-watershed. These "include 5 threatened and endangered species (gray wolf, peregrine falcon, grizzly bear, bald eagle, and northern spotted owl); 10 species of concern (e.g. tailed frog, olive-sided flycatcher, long-eared myotis; one sensitive species (northern goshawk); 2 survey and manage species (great grey owl, mollusks); 5 protection buffer species (e.g. white-headed woodpeaker, flammulated owl); and 8 management indicator species (e.g. primary cavity excavators, pine maren, mule deer). The [sub]watershed is included within the North Cascade grizzly bear recovery area. In 1999, eleven spotted owl activity areas were located within the [sub]watershed," (USFS, 1999a).

The Biological Strategy (UCRTT, 2002) describes factors affecting habitat condition in this sub-watershed to include:

- Private land development and high road density affects sediment delivery;
- Channel migration affected by state highway, the railroad, multiple water crossing structures, and private land development;
- Fecal coliform and water temperature levels are elevated, mostly a result of livestock and improper septic tanks;
- Passage is impeded at the North Road and numerous smaller culverts upstream; and
- Riparian habitat has been degraded or lost from Little Chumstick Creek to mouth.

3.5.3 Historic and Ongoing Habitat Projects

There have been many fish passage projects completed to date in the Chumstick sub-watershed, mostly by the Chelan County Conservation District. These and other projects completed in the sub-watershed are illustrated in Figure 6 and listed in Table 6. The symbols on the map illustrate the primary entity responsible for each project. Details about the projects can be found in Table 6.

3.5.4 Proposed Projects and Actions

Figure 6 shows the locations and primary responsible entity for each of the proposed projects in the Chumstick sub-watershed.

3.5.5 Biological Needs to be Used for Prioritization of Chumstick Habitat Projects

Recommendations established in the Biological Strategy for aquatic habitat in the Chumstick Creek sub-watershed, in priority order, are:

1) Restore passage for anadromous and inland fish. This should be done in a comprehensive, coordinated strategy, rather than a piecemeal approach;

2) Protect remaining floodplain and riparian habitat;

3) Increase stream flow;

4) Restore riparian habitat, primarily from Eagle Creek to Suntisch Canyon;

5) Reduce road densities;

6) Restore stream channel migration;

7) Reduce nonpoint pollution from septic tanks and livestock; and

8) Reduce fine sediment input from roads and some land management activities.

Three potential projects have been identified in Chumstick sub-watershed, which address its highest priority biological need, fish passage. Further information about prioritization of projects in this sub-watershed and across the watershed can be found in Section 4.

3.6 Icicle Sub-Watershed – Category 2

3.6.1 Sub-watershed Habitat Overview

The Icicle sub-watershed is the largest sub-watershed to the Wenatchee River, covering 136,916 acres. The Icicle joins the Wenatchee River at RM 25.6. Land cover in the Icicle is primarily forest (68.8%) and grasslands (13.1%) (MWG, 2003). Commercial forestry is by far the most dominant land use in the sub-watershed, accounting for 95.8% of land use. Other land uses are rural residential/resource, rural recreational, and rural waterfront. Native salmonid species are steelhead, cutthroat, redband, and bull trout (adfluvial bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). Spring Chinook currently spawn in the lower Icicle River but their origin is likely from hatcheries (Peven 1994). Documented, presumed, and potential range of these species is illustrated in Figure 7. This sub-watershed contains high quality aquatic and terrestrial habitat in the upper watershed above river mile 5.7, and is designated as a Key Watershed by the Northwest Forest Plan. Seventy-four percent of the Icicle sub-watershed is located within the Alpine Lakes Wilderness. Precipitation in the watershed ranges from 120 inches at the ridge of the crest to 20 inches at the mouth of the Icicle (USFS, 1995b).

There is a wide range of habitat variability throughout the sub-watershed, which can be understood by looking at the elevation and precipitation variation between the upper and lower sub-watershed. “There are eight rare plant species in the Icicle Creek Watershed: Smokey Mountain sedge, Wenatchee larkspyr, Ross’s avens, showy stickseed, long sepal golbemallow, rock willow, Oregon checkermallow, and Seely’s silene.” (USFS, 1995b).

3.6.2 Habitat Concerns in the Sub-watershed

The Leavenworth National Fish Hatchery (LNFH) located at River Mile 3.1, currently blocks salmonid migration past the hatchery to protect spring Chinook reared at the facility from a variety of diseases. Restoration of passage to provide access for bull trout and steelhead to the upper watershed is underway and partially complete[2]. On land, some noxious weeds in the Icicle sub-watershed are increasing at alarming rates. These include knapweed, oxeye daisy, and Dalmatian toadflax, (USFS, 1995b).

The Upper Columbia Biological Strategy describes factors affecting habitat condition in this sub-watershed to include:

- Land development downstream of Leavenworth hatchery has affected stream channel migration, recruitment of large woody debris, and off channel habitat;
- There are barriers to migration on Icicle Creek at Leavenworth Hatchery and possibly in the boulder field near Snow Creek;
- Water withdrawals on Icicle Creek (primarily between Rat Creek and the hatchery) likely contribute to low flows and high summer temperatures in lower Icicle Creek;
- The Icicle Road upstream of Chatter Creek at places may confine the stream channel and affect floodplain function; and
- The 1994 Rat Creek fire caused increased sedimentation and water temperature in the middle and lower Icicle drainage in the years immediately following the fire.

3.6.3 Historic and Ongoing Habitat Projects

Projects completed to date in the Icicle Creek sub-watershed include check dam removal in the historic river channel originally bypassed by the LNFH, studies of fish passage and evaluation of the channel migration zone near the confluence with the Wenatchee River. Information on the LNFH project can be found at: http://leavenworth.fws.gov/eis.htm. These projects are illustrated in Figure 7, along with documented, presumed, and potential salmonid species fish distribution. The symbols on the map illustrate the primary entity responsible for each project. Details about these projects can be found in Table 7.

3.6.4 Proposed Projects and Actions

Phase I of the Lower Wenatchee Channel Migration Zone (CMZ) study assessed four sites on the lower Icicle River, which may provide improvement in aquatic habitat if implemented. A project is needed to complete the next phase of that study. The location of the projects identified in Phase I, City of Leavenworth Projects, and other proposed projects in the Icicle sub-watershed, along with the primary responsible entity are illustrated in Figure 7.

3.6.5 Biological Needs to be Used for Prioritization of Icicle Habitat Projects

Recommendations established in the Biological Strategy for aquatic habitat in the Icicle Creek sub-watershed, in priority order, are:

[2] Precise language to be provided by the USFS detailing the purpose of the hatchery and the status of the ongoing enhancement project.

1) Protect remaining floodplain and riparian habitat downstream of Chatter Creek. Emphasis should be placed on habitat downstream of Leavenworth Hatchery.

2) Rectify human-made passage barriers.

3) Restore flow conditions on Icicle Creek downstream of Rat Creek.

4) Investigate the role of surface and well water withdrawals on instream flows and habitat use

5) Develop strategies with water users to reduce effects, if any.

6) Initiate public information efforts to discourage harassment of spawning salmonids.

7) Manage recreation areas to reduce impacts to riparian cover.

Projects have been proposed in the Icicle sub-watershed to address the first and fourth biological priority. Further information about prioritization of projects in this sub-watershed and across the watershed can be found in Section 4.

3.7 Nason Sub-Watershed – Category 2

3.7.1 Sub-watershed Habitat Overview

Nason Creek drains a 69,010 acre area and joins with the Wenatchee River at Wenatchee RM 53.6. Land cover in the Nason sub-watershed is primarily forest (76.6%). Other land cover types in the sub-watershed are grasslands (7.6%), transitional (5.8%), and shrubland (5.3%) (MWG, 2003). A large portion of this sub-watershed is privately owned, especially riparian lands. Commercial forest accounts for 91.5% of land use. Most other lands are used as rural residential/resource (7.7%).

Native salmonid species in the Nason Creek sub-watershed are Spring Chinook, steelhead, adfluvial bull trout, and westlope cutthroat trout (adfluvial bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). The documented, presumed and potential range of anadromous salmonid species in this sub-watershed is illustrated in Figure 8.

3.7.2 Habitat Concerns in the Sub-watershed

Primary salmonid limiting factors in the Nason sub-watershed are loss of floodplain, impaired riparian and existing floodplain function, fish passage, and sedimentation. This sub-watershed has been substantially constrained in lower reaches by the construction of the railroad and the state highway (Peven Consulting, 2004).

The Biological Strategy describes factors affecting habitat condition in the Nason sub-watershed to include:

- The state highway, railroad, and private land development affect woody debris recruitment, channel migration, and gravel recruitment; and
- Lower Nason Creek is on the State 303(d) list for water temperature.

3.7.3 Historic and Ongoing Habitat Projects

Longview Fibre has completed fish passage projects and Chelan County has conducted a study evaluating Nason Creek's channel migration zone for the lowest four miles, from Coles Corner to the confluence of the Wenatchee River. These projects and documented, presumed, and potential anadromous salmonid distribution are illustrated in Figure 8. The symbols on the map illustrate the primary entity responsible for each project. Details about these projects can be found in Table 8.

3.7.4 Proposed Projects and Actions

Figure 8 shows the locations and primary responsible entity for each of the potential projects identified in the Nason sub-watershed. Five projects on Nason Creek were identified through the Lower Wenatchee CMZ study. Four of these would improve aquatic habitat by creating hydraulic connection to side channels isolated by highway construction. The other would protect existing wetland habitat.

3.7.5 Biological Needs to be Used Prioritization of Nason Habitat Projects

Strategies recommended by the Biological Strategy for the Nason sub-watershed, in priority order, are:

1) Protect remaining floodplain and riparian habitat.
2) Restore channel migration and historic function.
3) If restoration is not possible, improve fish access to oxbows and historical side channels.
4) Initiate public information efforts to discourage harassment of spawning salmonids.

Projects have been proposed to address the first two biological needs in the Nason sub-watershed. Further information about prioritization of projects in this sub-watershed and across the watershed can be found in Section 4.

3.8 Chiwawa Sub-Watershed – Category 1

3.8.1 Sub-watershed Habitat Overview

The second largest sub-watershed to the Wenatchee, the Chiwawa, drains 126,271 acres before joining the Wenatchee at RM 58.6. Land cover in the Chiwawa sub-watershed is primarily forest (78.5%), followed by grasslands (6.2%), and bare rock, sand, or clay (5.5%) (MWG, 2003). Commercial forest accounts for 97% of land use, with the rest being made up of rural residential/resource, rural recreational/resource, and rural waterfront.

Native salmonid species in the Chiwawa sub-watershed are Spring Chinook, steelhead, adfluvial bull trout and westlope cutthroat trout (adfluvial bull trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). Documented, presumed, and potential range of these anadramous species is illustrated in Figure 9. The Chiwawa is designated as a Key Watershed by the Northwest Forest Plan. "Significant resource extraction (timber, mineral, and grazing), heavy recreational use, and excellent fish, wildlife, and rare plant values co-exist in this [sub-]watershed," (USFS, 1997). It provides critical spawning and rearing habitat for multiple species.

Elevation ranges in the Chiwawa sub-watershed from 9,082 feet above sea level in the headwaters to 1,880 feet at its confluence with the Wenatchee River. This elevation range allows the sub-watershed to support habitat for a wide variety of plant and animal species. "Rare plants occur all over the [sub-]watershed from the dry forests to high windswept rocky ridges. Candystick, five species of moonworts, Salish fleabane, longsepal globemallow, pine broomrape, and pygmy saxifrage occur in the [sub-]watershed, while another five species are suspected to occur," (USFS, 1997). Overall, the Chiwawa sub-watershed supports moderate to high-quality terrestrial habitat (USFS, 1997).

3.8.2 Habitat Concerns in the Sub-watershed

The Chiwawa sub-watershed is mainly forested land, most managed by the Wenatchee National Forest. The sub-watershed is generally in good condition, especially considering the resource-based land use activities that have occurred here.

The Biological Strategy describes factors affecting habitat condition in the Chiwawa sub-watershed to include:

- Most of this watershed is in public ownership and protected as a Wilderness Area or managed under standards in the Northwest Forest Plan. Habitat within these areas is generally in good condition;
- There is limited housing development in private parcels on the lower Chiwawa River. Loss of riparian vegetation in these reaches may influence water temperatures and hiding cover; and
- Water withdrawals in the lower Chiwawa River could potentially affect the amount of juvenile rearing habitat available in low flow years.[3]

3.8.3 Historic and Ongoing Habitat Projects

There were no completed or ongoing habitat projects identified in the Chiwawa sub-watershed as of June 30, 2005. Figure 9 shows USFS land use designations, private forestland, and documented, presumed, and potential salmonid species distribution in the Chiwawa sub-watershed.

3.8.4 Proposed Projects and Actions

There were no proposed projects identified in the Chiwawa sub-watershed as of June 30, 2005.

3.8.5 Biological Needs to be Used for Prioritization of Chiwawa Habitat Projects

Strategies recommended by the Biological Strategy for the Chiwawa sub-watershed, in priority order, are:

1) Protect remaining floodplain and riparian habitat, particularly around Chikamin Flats;

2) Investigate the role of surface and well water withdrawals on instream flows and habitat use. Develop strategies with water users to reduce effects, if any;

3) Initiate public information efforts to discourage harassment of spawning Spring Chinook salmon and bull trout; and

[3] This statement may be further developed after the instream flow study is completed.

4) Manage recreation areas to reduce or avoid impacts to riparian habitats.

No projects have been proposed in the Chiwawa sub-watershed, however it is rated as a Category 1 in the Biological Strategy. Lack of projects in this category 1 sub-watershed indicates a need for potential projects. Further information about prioritization of projects in this sub-watershed can be found in Section 4.

3.9 Upper Watershed (Lake Wenatchee, White, and Little Wenatchee Sub-Watersheds) – Category 1

3.9.1 Sub-watersheds Habitat Overview

The upper end of the Wenatchee Watershed contains three sub-watersheds: White, Little Wenatchee, and Lake Wenatchee. The Little Wenatchee and White Rivers flow into Lake Wenatchee, the outlet of which is the source of the Wenatchee River, at RM 54.2. The primary land cover of all three sub-watersheds is forest, which makes up 63.7% of the White, 84.3% of the Little Wenatchee, and 73.4% of the Lake Wenatchee. In the White, other land cover is primarily bare rock, sand, or clay (12.5%), and grasslands (11.1%). In the Little Wenatchee other land cover is transitional (4.7%), shrubland (4.3%), and grassland (3.4%). In the Lake Wenatchee, other land cover is predominantly water (18.6%).

Native species in these sub-watersheds are sockeye, Spring Chinook, steelhead, rainbow, westlope cutthroat and bull trout (adfluvial full trout spawn in the colder headwater tributaries and migrate within other Wenatchee sub-watersheds and the Columbia River). The White and Little Wenatchee sub-watersheds are also designated as Key Watersheds by the Northwest Forest Plan, and provide critical spawning and rearing habitat for multiple species. In the Little Wenatchee, bull trout numbers above the waterfalls are extremely low. The Lake Wenatchee sub-watershed is a necessary adult holding and juvenile rearing area for sockeye salmon and bull trout. Current and potential range of anadromous salmonid species in these sub-watersheds is illustrated in Figure 10.

Important terrestrial habitat contributions of these sub-watersheds include habitat for "rare plant species, disjunct plant species, and species endemic to the Wenatchee Mountains [which] occur within these watersheds," (USFS, 1998). There are a wide range of plant communities, with smaller unique communities in pockets. Rare plants include candystick (*Allotropa virgata)*, lance-leaved moonwart *(Botrychium lanceolatum)*, Smoky Mountain sedge *(Carex proposita)*, Seely's silene *(Silene seelyi),* and others, (USFS, 1998).

The watershed is located at an important point along the Cascade Range and provides connectivity for terrestrial wildlife for species moving north-south and east-west. "From a landscape scale/range-wide status of many species, it is important to maintain the integrity of the White River and Little Wenatchee watershed," (USFS, 1998). "The wildlife species of particular importance in this watershed include: northern spotted owl, gray wolf, grizzly bear, bald eagle, waterfowl, mountain goat, and wolverine," (USFS, 1998). Pine marten have also been found in the watershed, (USFS, 1998). Some National Forest land in these sub-watersheds has been designated as "Riparian Reserve," which protects it from harvest, and protects stream water quality and riparian function.

3.9.2 Habitat Concerns in the Upper Watershed

These sub-watersheds are primarily forest land, most of which is congressionally designated as wilderness. Much of the sub-watersheds' habitat is in a near-reference condition (USFS, 1998).

Habitat problems in these sub-watersheds are generally related to the *threat* of development, as opposed to actions that have occurred. Protection is important in these sub-watersheds.

The Upper Columbia Biological Strategy (RTT, 2003) describes factors affecting habitat condition in the White River sub-watershed to include:

- Past riparian harvest and log drives have altered woody debris accumulations and channel morphometry; and
- Habitat is intact and continuous, but development pressures place a critical need to protect and maintain stream channel and floodplain integrity.[4]

The Biological Strategy describes factors affecting habitat condition in the Little Wenatchee sub-watershed to include:

- Past riparian harvest and log drives below the waterfalls may have affected stream channel morphometry and function;
- Habitat above the waterfalls is intact and relatively pristine: essentially need to protect and maintain stream channel and floodplain integrity; and
- The lower Little Wenatchee is on the state 303(d) list for temperature.

The Biological Strategy describes factors affecting habitat condition in the Lake Wenatchee sub-watershed to include:

- Shoreline development. Bulkheads change the dynamics of nearshore wave action, affecting invertebrate production, gravel disposition, and habitat use.

The White and Little Wenatchee Watershed Assessment (USFS, 1998) describes factors affecting terrestrial habitat to include:

- The control of fires in the higher elevations has caused an advance of shrubs and conifers into meadows;
- Sheep grazing of the high meadows maintained the grasses/forbs at an early successional stage;
- Roads and trails have affected habitat, particularly riparian, meadows, and ridges;
- A few smaller drainages have a high level of roads; although their linkage to the watershed and affect on aquatic health is unknown.

3.9.3 Historic and Ongoing Habitat Projects

Projects completed to date in the White and Little Wenatchee sub-watersheds have involved land acquisition and/or transfer facilitated by the Chelan-Douglas Land Trust and the Washington Department of Fish and Wildlife for habitat protection, and restoration projects by the US Forest Service in the upper mainstem White River drainage. These projects and documented, presumed, and potential salmonid species distribution are illustrated in Figure 10. The symbols on the map illustrate the primary entity responsible for each project. Details about these projects can be found in Table 10.

[4] There may be a need to include information here that was not included in the Biological Strategy. This will be decided by the Habitat Subcommittee in a later draft.

3.9.4 Proposed Projects and Actions

Figure 10 shows the locations and primary responsible entity for each of the proposed projects in the White, Little Wenatchee and Lake Wenatchee sub-watersheds. Table 10 provides additional project detail.

3.9.5 Biological Needs to be Used for the Prioritization of White, Little Wenatchee, and Lake Wenatchee Habitat Projects

Strategies recommended by the Biological Strategy for the White River sub-watershed, in priority order, are:

1) Protect stream channel, riparian and floodplain function: focus on Panther Creek downstream to mouth;

2) Restore wetland complexes that connect to stream channel;

3) Protect shorelines along Lake Wenatchee near White River mouth;

4) Initiate public information efforts to discourage harassment of spawning Spring Chinook, sockeye salmon, and bull trout; and

5) Manage recreation areas to reduce impacts to riparian cover.

Strategies recommended by the Biological Strategy for the Little Wenatchee sub-watershed, in priority order, are:

1) Protect stream channel, riparian, and floodplain function: focus on Little Wenatchee River falls downstream to mouth;

2) Address road impacts on the drainage, emphasis on Rainy Creek and Little Wenatchee between Hidden Creek and Fir Creek;

3) Restore wetland complexes that connect to stream channel;

4) Manage recreation areas to reduce impacts to riparian cover; and

5) Initiate public information efforts to discourage harassment of spawning salmonids.

Strategies recommended by the Biological Strategy for Lake Wenatchee are to protect remaining nearshore habitat and develop a means to reduce impacts of bulkheads.

The proposed projects in these sub-watersheds have been evaluated with respect to fulfilling these prioritized biological needs. The results indicate types of projects that may need to be proposed in each sub-watershed. Further information about prioritization of projects in these sub-watershed and across the watershed can be found in Section 4.

4.0 NEXT STEPS IN WATERSHED-WIDE PROJECT PRIORITIZATION

The sub-watershed discussion in Section 3 introduced biological needs in each sub-watershed in WRIA 45 as established in the Biological Strategy. The Biological Strategy also assigned categories to each sub-watershed in order to determine where the best use of habitat improvement resources might be spent on a watershed scale. This section considers biological needs together with other criteria important in determining where and when to implement habitat projects, and builds the framework of a watershed-wide habitat project prioritization.

4.1 Fulfilling Biological Needs in Each Sub-Watershed

Through this planning effort, proposed projects from throughout the watershed have been catalogued into a database maintained by Chelan County Natural Resources. This internal proposed project list will be ever changing as new ideas are developed, so all information is not reported here. These proposed projects were sorted to determine which biological need they address.

Tables 11-13 show the biological needs for sub-watersheds in categories 1, 2, and 3, and the projects identified that may address them. These tables can be used to identify high priority biological needs for which projects have not yet been developed. The tables are intended to be used both as a public outreach tool and as a project prioritization tool. Note that no projects have been identified in any of the Category 1 sub-watersheds except White River. Identification of potential projects in these sub-watersheds should be the next immediate step in implementation of the habitat component of this Watershed Plan.

4.2 Community Outreach and Other Factors

As was stated in Section 1, other factors to be used for prioritization of projects are: terrestrial benefits, community acceptance, and costs and benefits of specific projects. The Watershed Planning Unit understands the importance of community support and acceptance in both the implementation and long term support of habitat improvement projects. The public outreach process was initiated with community meetings in January 2005, and the public will continue to be engaged as additional project ideas are developed.

Community acceptance, along with relative project cost and benefit will be used to rank projects for implementation.

4.3 Project Implementation

The working list of proposed project ideas on file with the County will be maintained, updated, modified, and consulted as necessary to determine where and when specific projects should be implemented and identify priority projects for grant funding.

5.0 METHODS FOR MEASURING PROGRESS TOWARD GOALS

This section contains strategies for understanding and documenting the effectiveness of salmon recovery actions toward goals in both the Salmon Recovery Plan and the Habitat Component of the Wenatchee Watershed Plan. Section 5.1 details effectiveness monitoring specific to the Wenatchee Watershed. It has been excerpted from the Biological Strategy. Section 5.2, excerpted from the Upper Columbia Salmon Recovery Plan, contains Upper Columbia-wide strategies for adaptive management.

5.1 Effectiveness Monitoring

5.1.1 Indicator Watersheds

Effectiveness monitoring prescriptions for indicator watersheds as reported in the Biological Strategy (UCRTT, 2002) are as follows:

Mainstem Upper Wenatchee River

- Monitor stream channel sinuosity, width/depth ratio, and riparian coverage from fixed stations on a periodic schedule. Continue ariel reconnaissance.
- Survey side channels and oxbows for presence of juvenile salmonids.
- Monitor selected water quality parameters at fixed stations set periodicity.

Mainstem Lower Wenatchee River

- Monitor stream channel sinuosity, width/depth ratio, riparian coverage, and both gravel and LWD recruitment from fixed stations on a periodic schedule. Begin aerial reconnaissance.

Peshastin

- Monitor stream channel sinuosity, width/depth ratio, riparian coverage, and both gravel and LWD recruitment from fixed stations on a periodic schedule. Begin aerial reconnaissance.

Icicle Creek

- Monitor stream channel sinuosity, width/depth ratio, riparian coverage, and both gravel and LWD recruitment from fixed stations on a periodic schedule. Begin aerial reconnaissance.
- Monitor stream flows.
- Monitor public awareness at high use areas, such as campgrounds.
- Monitor adult passage and spawning throughout watershed.

Chiwawa

- Monitor stream channel sinuosity, width/depth ratio, riparian coverage, and both gravel and LWD recruitment from fixed stations on a periodic schedule. Begin aerial reconnaissance.

- Monitor public awareness at high use areas, such as campgrounds.

Nason

- Monitor stream channel sinuosity, width/depth ratio, riparian coverage, and both gravel and LWD recruitment from fixed stations on a periodic schedule. Begin aerial reconnaissance.
- Monitor public awareness at high use areas, such as campgrounds.
- Survey side channels and oxbows for presence of juvenile salmonids.

5.1.2 Non-Indicator Watersheds

Effectiveness monitoring criteria for non-indicator watersheds are as follows:

Mission Creek

- Monitor water flow and quality at selected locations.

Chumstick Creek

- Monitor selected water quality parameters at fixed stations and set periodicity.
- Monitor adult passage and spawning success throughout watershed.

5.2 Monitoring and Adaptive Management

The following has been excerpted from the Draft Upper Columbia Salmon Recovery Plan (UCRTT, 2005).

Monitoring is needed to assess if actions recommended in this plan achieve their desired effects. There is a risk that the recommended actions identified in this plan may not be adequate to ensure long-term viability of the listed species. To manage that risk, this plan includes critical research, monitoring, and evaluation (RME) to assess the possibility that onsite and offsite actions will have the predicted results.

Research and monitoring are designed to test implementation, validation, status/trend, and effectiveness. Implementation monitoring determines if planned actions were implemented as intended and whether all implementation objectives are on schedule. Validation monitoring determines whether the fundamental ecological assumptions underlying the recovery plan are true. Prominent among these assumptions are the effects of specific environmental conditions on survival and abundance of listed fish species embodied in the EDT model. Status/trend monitoring determines the current conditions (status) of the populations and their habitats and their changes over time. Effectiveness monitoring focuses on whether the recovery actions changed the environment and/or the VSP parameters of listed fish species as predicted by the plan.

A final area of evaluation addresses conditions outside the ESUs (downstream from the mouth of the Yakima River). Factors in this area will have a significant effect on the success of recovery of Chinook and steelhead in the Upper Columbia Basin. These factors include commercial harvest, sport and tribal harvest, conditions in the mainstem Columbia River (including hydroelectric operations), and conditions in the estuary and ocean including short and longer term cycles in ocean conditions. The regional RME program developed under the FCRPS Biological Opinion will measure status, trends, and effectiveness of actions in this area.

5.2.1 Implementation Monitoring

Recovery actions implemented within the Upper Columbia Basin will be monitored to assess whether the actions were carried out as planned. This will be carried out as an administrative review and will not require environmental or biological measurements.

Implementation monitoring will address the types of actions implemented, how many were implemented, where they were implemented, and how much area or stream length was affected by the action. Indicators for implementation monitoring will include visual inspections, photographs, and field notes on numbers, location, quality, and area affected by the action. Success will be determined by comparing field notes with what was specified in the plans or proposals (detailed descriptions of engineering and design criteria). Thus, design plans and/or proposals will serve as the benchmark for implementation monitoring. Any deviations from specified engineering and design criteria will be described in detail.

5.2.2 Status/Trend Monitoring

The status and trend of spring Chinook, steelhead, and bull trout and their habitats will be monitored throughout the Upper Columbia Basin following the guidelines in the Upper Columbia Monitoring Strategy (Hillman, 2004). Within each subbasin, status/trend sampling sites will be selected according to the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program (EMAP) design, which is a spatially-balanced, site-selection process developed for aquatic systems and recommended within the Upper Columbia Monitoring Strategy. This approach has been used successfully within the Wenatchee subbasin (under the Upper Columbia Monitoring Strategy) and in the Okanogan subbasin (under the Okanogan Basin Monitoring and Evaluation Program). The Upper Columbia Monitoring Strategy describes in detail the approach, indicators, and protocols needed to assess status and trends of listed fish species and their habitats in the Upper Columbia Basin. This strategy will be updated annually as new information becomes available.

5.2.3 Effectiveness Monitoring

To the extent possible, effectiveness of recovery actions will be monitored using the Before-After-Control-Impact (BACI) design with stratified random sampling, as described in the Upper Columbia Monitoring Strategy (Hillman 2004). The Upper Columbia Monitoring Strategy describes in detail the approach, indicators, and protocols needed to assess effectiveness of habitat restoration classes. It is critically important to coordinate these effectiveness monitoring programs with status/trend monitoring and effectiveness monitoring within the Hydro sector.

5.2.4 Research

As noted earlier, unknown aspects of environmental conditions vital to salmonid survival are termed "critical uncertainties." In this plan, critical uncertainties are a major focus of research. Critical uncertainty research targets specific issues that constrain effective recovery plan implementation. This includes evaluations of cause-and-effect relationships between fish, limiting factors, and actions that address specific threats related to limiting factors. Listed below are research actions that are needed to assess the effects of the uncertainties on recovery of listed fish species in the Upper Columbia Basin. Research actions address both in-basin and out-of-basin factors and are not all inclusive.

5.2.4.1 Harvest

- Evaluate innovative techniques (e.g., terminal fisheries and tangle nets) to improve access to harvestable stocks and reduce undesirable direct and indirect impacts to naturally produced Upper Columbia stocks.
- Evaluate appropriateness of stocks used in weak-stock management.
- Develop better methods to estimate harvest of naturally produced fish and indirect harvest mortalities in freshwater and ocean fisheries.

5.2.4.2 Hatchery

- Assess the interactions between hatchery and naturally produced fish.
- Determine relative performance (survival and productivity) and reproductive success of hatchery and naturally produced fish in the wild.
- Assess if hatchery programs increase the incidence of disease and predation on naturally produced fish.
- Examine the feasibility and need of steelhead kelt reconditioning.

5.2.4.3 Hydro Project

- Evaluate if passage through hydroelectric projects affects reproductive success of listed fish species.
- Assess baseline survival estimates for juvenile listed fish species as they pass hydroelectric projects.
- Assess the effects of hydroelectric operations on juvenile and sub-adult bull trout survival.
- Assess the effects of temporary powerhouse shutdowns on the incubation success of steelhead in spawning gravels in the Chelan tailrace.

5.2.4.4 Habitat

- Implement selected restoration projects as experiments.
- Increase understanding of estuarine ecology of Upper Columbia stocks.
- Increase genetic research to identify genotypic variations in habitat use.
- Increase understanding of linkages between physical and biological processes so managers can predict changes in survival and productivity in response to selected recovery actions.
- Examine relationships between habitat indicators and landscape variables.
- Examine fluvial geomorphic processes to better understand their effects on habitat creation and restoration.
- Examine water balance and surface/groundwater relations.
- Test assumptions and sensitivity of EDT model runs.

- Evaluate nutrient enrichment benefits and risks using fish from hatcheries or suitable analogs.
- Assess population structure and size of bull trout in the Upper Columbia Basin.
- Assess the presence of bull trout in the Lake Chelan and Okanogan subbasins and upstream of Entiat Falls in the Entiat subbasin.
- Assess the effectiveness and feasibility of using fish transfers and artificial propagation in bull trout recovery.
- Examine migratory characteristics and reproductive success of bull trout.
- Describe the genetic makeup of bull trout in the Upper Columbia Basin.

5.2.4.5 Ecological Interactions

- Determine the effects of exotic species on recovery of salmon and trout and of the feasibility to eradicate or control their numbers.
- Examine consumption rates of fish (especially exotics) that feed on listed fish species.
- Determine the interactions and effects of shad on Upper Columbia stocks in the lower Columbia River.
- Determine the significance of marine mammal predation on Upper Columbia stocks and alternatives for management in the Columbia River mainstem and estuary.
- Assess the occurrence of resident bull trout populations and their interactions with migrant (fluvial and adfluvial) populations.
- Determine the effects of brook trout and bull trout interactions (competition, predation, and hybridization).
- Evaluate the interactions of bull trout with spring Chinook and steelhead.

5.2.5 Data Management

Because the indicators and protocols recommended in this plan are from the Upper Columbia Monitoring Strategy, this plan will incorporate the data dictionary and infrastructure being developed for that program. The data management program is being developed by the Bureau of Reclamation, Spatial Dynamics, Inc., and Commonthread, Inc., with input from State, Federal, and Tribal agencies and consultants. The data dictionary is a data management tool that provides a comprehensive conceptual framework based on the monitoring indicators and data collection protocols. The data dictionary will also include a geodatabase (incorporating an ArcHydro Geodatabase Model) that will host GIS work (landscape classification information). The data dictionary will be used to develop field forms that crews will fill out during data collection.

The primary database will be held temporarily at the NOAA Fisheries Science Center in Seattle and will contain summarized data and portals to raw data collected within each subbasin. Ultimately, the database will be maintained within the Upper Columbia region. The data management program will automatically summarize the raw data, thereby reducing processing errors. Data will be uploaded only by authorized personnel, who have user access. Data can be retrieved (downloaded) by anyone.

Trained field crews will collect and record data onto field forms generated by the data dictionary. A monitoring supervisor will review data forms each day to make sure that all required information was

collected. In addition, quality control will include a review for outliers, missing data, and other anomalies. Data will then be entered into the data management program by the authorized user. Compiled data will be double-check for accuracy by a second person (this will reduce recording errors). Data will be analyzed following the protocols developed in the data dictionary. Each year an annual report describing the results of the past years' work will be made available to technical/scientific staff representing different agencies, decision-makers, stakeholders, and the public.

5.2.6 Adaptive Management

Adaptive management has been defined in Washington State law as "reliance on scientific methods to test the results of actions taken so that the management and related policy can be changed promptly and appropriately" (RCW 79.09.020). It is described as a cycle occurring in four stages: identification of information needs; information acquisition and assessment (monitoring); evaluation and decision-making; and continued or revised implementation of management actions. Adaptive management is captured in the sequence: "hypothesis statement," "monitor," "evaluate," and "respond."

This plan has identified information needs and suitable monitoring programs. Evaluation will occur at three levels (Figure 8.1):

- **Scientific Evaluation**—An evaluation of available information by independent scientists to assess the strengths and weaknesses of the actions.
- **Public Evaluation**—An evaluation of available information by the public to assess socio-economic factors.
- **Decision-Making Evaluation**—An evaluation of available information by decision-makers, who determine what alternatives and management actions are needed when "triggers" are reached.

The purpose for evaluation is to interpret information gathered from monitoring and research, assess deviations from targets or anticipated results (hypothesis), and recommend changes in policies or management actions where appropriate. Input from both independent scientists, stakeholders, and the general public are required. These groups will annually provide feedback to decision makers (policy forum), who have the responsibility to change policies or management actions.

The primary missing elements in this recovery plan are threshold levels that trigger management changes. These triggers must be measurable over a period short enough to allow for timely management changes or, at a minimum, soon enough to serve as an early warning of ineffective or unforeseen adverse impacts. When a performance metric (e.g., VSP parameter or habitat indicator) reaches the triggering threshold, a management response is required. Three general management responses are possible: (1) predefined mandatory responses; (2) mandatory, but circumstance-specific responses; and (3) responses made as a result of newly discovered opportunities. During the first few years of recovery plan implementation, it is expected that most of the management response triggers will be of types 2 and 3 because of the large uncertainties associated with implementation of a new program.

Before a complete adaptive management plan for the Upper Columbia Basin can be put into effect, threshold values for performance standards must be developed for each objective included in this plan. Natural resource specialists (modelers, ecologists, hydrologists, geomorphologists, etc.) should

be retained in the near future to identify basin-specific response triggers and management responses needed in the event of failure to make adequate progress toward the objective.

5.2.7 Check-In Schedule

The Upper Columbia Salmon Recovery Board with NOAA Fisheries and the USFWS will conduct mid-point evaluations, or "check-ins," in years 1, 3, 5, 8, 12, and every fourth year thereafter, following implementation. The first *Check-In Report*, submitted one year after the plan is implemented, will primarily address progress made towards obtaining funding, initiating studies, developing priorities, and other programmatic issues. To the extent possible, it will also provide updates to adult fish returns (spawners), abundance and abundance trends, and juvenile fish survival. Later reports will detail research and monitoring results. If necessary, these results will be used to "adaptively" modify the recovery plan.

It is important that the public and the agencies have confidence in the recommended recovery actions and in the science that supports the actions. Accordingly, the Upper Columbia Salmon Recovery Board, working through the Policy Forum and technical workgroups, will obtain independent scientific review of its 3-, 5-, 8-, and 12-year evaluation reports. Beyond the 12-year check-in, independent scientific review will be under the discretion of the Upper Columbia Salmon Recovery Board and the Policy Forum.

5.2.8 Consistency with Other Monitoring Programs

An important aspect of this recovery plan is that it uses existing monitoring programs to evaluate the status/trend and effectiveness of recovery actions within the Upper Columbia Basin. Specifically, this plan incorporates by reference the Upper Columbia Monitoring Strategy (Hillman 2004), the Okanogan Basin Monitoring and Evaluation Program, and the Draft Monitoring and Evaluation Plan for PUD Hatchery Programs (Murdoch and Peven 2005). The former two address status/trend and effectiveness monitoring of habitat actions, while the latter addresses status/trend and effectiveness of hatchery actions. The PUDs currently have monitoring programs identified in their HCPs and Biological Opinions to address hydroproject actions. Actions implemented in areas downstream from the ESUs will be addressed within the Action Agencies/NOAA Fisheries RME Program for the FCRPS Biological Opinion. This plan encourages these programs to continue.

The development of other regional monitoring programs may result in modifications to the monitoring programs used in the Upper Columbia Basin. These other programs, in various states of development, include the Bull Trout Recovery Monitoring and Evaluation Program being developed by the Recovery Monitoring and Evaluation Technical Group (RMEG), the Collaborative, Systemwide Monitoring and Evaluation Project (CSMEP), and the Pacific Northwest Aquatic Monitoring Partnership (PNAMP). As these programs develop more fully, they will provide guidance on valid sampling and statistical designs, measuring protocols, and data management. This information may be used to refine and improve the existing monitoring and evaluation programs in the Upper Columbia Basin. The intent is to make monitoring and evaluation programs more consistent throughout the Columbia Basin and Pacific Northwest.

5.2.9 Coordination

Many entities have been or will be implementing recovery actions within the Upper Columbia Basin. In addition, monitoring programs implemented within the Upper Columbia region include:

- Upper Columbia Monitoring Strategy,
- Okanogan Basin Monitoring and Evaluation Program,
- Action Agencies/NOAA Fisheries RME Program,
- Draft Monitoring and Evaluation Plan for PUD Hatchery Programs,
- Washington Salmon Recovery Funding Board Program,
- HCPs Monitoring Programs,
- Coho Reintroduction Monitoring Program,
- PACFISH/INFISH Monitoring Program,
- Pacific Northwest Interagency Regional Monitoring Program,
- USFWS, USGS, and BOR monitoring programs, and
- WDFW and Department of Ecology monitoring programs.

It is critical that these programs be coordinated to reduce redundancy, increase efficiency, and minimize costs.

In 2004, the Upper Columbia Regional Technical Team (UCRTT) and its monitoring subcommittee began the process of coordinating monitoring activities in the Upper Columbia Basin. The UCRTT holds annual meetings with entities conducting monitoring activities within the Upper Columbia Basin with the purpose of coordinating activities and sharing information. The UCRTT is working to enhance coordination between the Upper Columbia Monitoring Strategy, the Okanogan Basin Monitoring and Evaluation Program, and other monitoring programs in the Upper Columbia Basin. These efforts have been beneficial and this plan encourages the process established by the UCRTT to continue.

6.0 REFERENCES

Andonaegui, C., 2001. Salmon, steelhead, and bull trout habitat limiting factors for the Wenatchee subbasin (Water Resource Inventory Area 45) and Portions of WRIA 40 within Chelan County (Squilchuck, Stemilt and Colockum drainages). Final draft report. WSCC.

Chelan County, 2001. Chelan County Fish Barrier Inventory. Chelan County Natural Resources Department.

Driscoll, Diane, Ken MacDonald, and Jackie Haskins, 1998. Biological Assessment for steelhead, Spring Chinook, bull trout, and cutthroat trout in White-Little Wenatchee watershed. Baseline condition and effects of ongoing activities, including Rainy-Jove grazing allotment and recreation. USFS, Wenatchee-Okanogan NF: Wenatchee, Washington.

EES, 2005. Draft Technical Report Lower Wenatchee River PHABSIM Studies. EES Consulting Inc. and Thomas R. Payne and Associates. Prepared for: Chelan County Natural Resources Department and WRIA 45 Watershed Planning Unit. February 2005.

Golder Associates (Golder), 2005. Wenatchee Watershed Planning Phase II Closeout Report Habitat Component. Submitted to: Chelan County Natural Resources and WRIA 45 Watershed Planning Unit. February 15, 2005.

Golder Associates (Golder) in association with Sound Resolutions and Cascadia Consulting Group, 2003. Final Draft Decision Framework for an Instream Flow Workplan for the Wenatchee Basin. Submitted to: Chelan County Watershed Program, WRIA 45 Instream Flow Subcommittee, and WRIA 45 Planning Unit. August 7, 2003.

Jones & Stokes, 2004. Chelan County Natural Resource Program, Final Wenatchee River Channel Migration Zone Study – Phase II. April 16. (J&S 01243.01) Bellevue, WA. Prepared for the Chelan County Natural Resource Program, Wenatchee, WA.

Montgomery Water Group, Environment and Engineering Services, and Pacific Groundwater Group (MWG), 2003. Wenatchee River Basin Watershed Assessment. Prepared for: Wenatchee Watershed Planning Unit and Chelan County Natural Resources Program, 411 Washington Street, Wenatchee, WA 98801

Northwest Power and Conservation Council (NPCC), 2004. Wenatchee Subbasin Plan. Prepared for the Northwest Power and Conservation Council. Lead organizations: Chelan County and the Yakama Nation.

Okanogan and Wenatchee National Forests (OWNF), 2003. Okanogan and Wenatchee National Forest Roads Analysis. December 2003. Available online at: http://www.fs.fed.us/r6/wenatchee/planning/planmain.htm. Accessed: 06/05.

Peven Consulting, 2004. Supplement to the Wenatchee Subbasin Plan's Management Plan. Chuck Peven, 3617 Burchvale Road, Wenatchee, WA 98801.

Peven, C.M., 1994. Spring and summer Chinook spawning ground surveys on the Wenatchee River basin, 1993. Chelan County P.U.D. Fish and Wildlife Operations. Wenatchee, Washington.

Raekes, Cindy L., 2004. Baseline Condition and Effects for White River Road Relocation and Bank Stabilization Project. USDA Forest Service, Wenatchee National Forest, Leavenworth, Washington.

Thomas, 2005. Personal communication, Cameron Thomas, USFS Wenatchee National Forest. June 2005.

Upper Columbia Regional Technical Team (UCRTT), 2005. Draft Upper Columbia Salmon Recovery Plan.

Upper Columbia Regional Technical Team (UCRTT), 2002. A Biological Strategy to Protect and Restore Salmon Habitat in the Upper Columbia Region, A Report to the Upper Columbia River Salmon Recovery Board. June 2002. Available from the Upper Columbia Salmon Recovery Board, Chelan, Washington.

USFS, 1999a. Chumstick watershed assessment. Leavenworth Ranger District, Wenatchee NF, Leavenworth, Washington.

USFS, 1999b. Mainstem Wenatchee River watershed assessment. Leavenworth Ranger District and Lake Wenatchee Ranger District, Wenatchee NF, Leavenworth, Washington.

USFS, 1998. White and Little Wenatchee Rivers Watershed Assessment. Leavenworth Ranger District, Wenatchee NF: Leavenworth, Washington.

USFS, 1997. Chiwawa River Watershed Analysis. Leavenworth Ranger District, Wenatchee NF: Leavenworth, Washington.

USFS, 1996. Nason Creek watershed assessment. Leavenworth Ranger District, Wenatchee NF, Leavenworth, Washington.

USFS, 1995a. Fisheries Biological Assessment of the Wenatchee River.

USFS, 1995b. Icicle Creek Watershed - Watershed Assessment. Leavenworth Ranger District, Wenatchee NF: Leavenworth, Washington.

USFS, 1990. Wenatchee National Forest Management Plan.

USFS, Year. Northwest Forest Plan.

US Fish and Wildlife Service (USFWS), 2004. Draft Bull Trout Recovery Plan.

Washington Conservation Commission (WCC), 2001. Salmonid and Steelhead Habitat Inventory and Assessment Project (SSHIAP)

Washington Department of Ecology (Ecology), 2005. Draft Wenatchee River Total Maximum Daily Load Study. March 2005. Final Report expected late 2005.

Washington Department of Fish and Wildlife (WDFW), 2005. Priority Habitat and Species Data.

Watershed Sciences, LLC., 2002. Aerial Remote Sensing Surveys in the Methow, Entiat, and Wenatchee River Sub-Basins Thermal Infrared and Color Videography. Report to the Pacific Watershed Institute.

Watershed Sciences, LLC., 2002. Aerial Surveys in the Wenatchee River Basin, Thermal Infrared and Color Videography. Preliminary Report to Washington State Department of Ecology.

Watershed Sciences, LLC., 2003. Aerial Surveys in the Wenatchee River Basin, Thermal Infrared and Color Videography. Preliminary Report to Washington State Department of Ecology.

TABLES

Completed, Ongoing, and Proposed Projects

Lead Funding Source	Supplemental Funding Source	Project Name	Description	Sponsoring Program/Participating Agencies	Target Species	Cost	Funding Date	Start Date	End Date	Project Type (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	Primary Limiting Factor (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	Other Limiting Factors	Objective (Protection, Restoration, Enhancement, Study)	Project Status (Proposed, Initiated, or Completed)	Date Provided
TABLE 1 - Wenatchee Watershed-Wide Completed, Ongoing, and Proposed Projects															
		Meadow Creek Burn Recovery		Evergreen State College, Cascade High School										Completed	4/4/2005
SRFB		Jon Small Off-Channel Rearing Pond		Icicle Valley Chapter of Trout Unlimited	salmonids	$134,170 + $62,091 match	1999				aquatic habitat		Enhancement	Completed	4/4/2005
SRFB		Harrimen Stream Restoration Project		Chelan County, Salmon Recovery Funding Board	bull trout, chinook, sockeye, steelhead, coho, cutthroat	$192,900	5/15/2000		12/31/2001		habitat		restoration	Completed	4/4/2005
		Camas Meadows Natural Areas Preserve		Washington Department of Natural Resources/Natural Areas Program									protection	Completed	4/4/2005
		Coho Supplementation in Mid-Columbia O&M/M&E	Yakama Nation Coho Supplementation	Yakama Indian Nation, Bonneville Power Administration		$432,556	1998		2000				reintroduction	Completed	4/4/2005
SRFB		Beebe Springs Restoration	Increase sinuosity of stream in former channelized area. Create meandering areas in a 1/5-mile area. Maximize opportunities for spawning and rearing habitat for spring Chinook and steelhead	Lake Chelan Sportsman Association	salmonids	$84,092 + $14,840 match	2004				aquatic habitat		Enhancement	Completed	4/4/2005
(Upper Columbia Community Salmon Fund - SRFB/NFWF)		Wenatchee Riparian Revegetation	This project will identify opportunites for riparian restoration throughout the Wenatchee Watershed. This project is currently being developed and will identify locations with willing landowners and will have planting perscriptions for each area.	Chelan County	fish, terrestrial						riparian		restoration	Proposed (more detail coming soon)	4/19/2005
NFWF		Wenatchee Valley Neotropical Migratory Songbird Conservation Project	This project protects species rich neotropical migratory songbird habitat from development through placing conservation easements on private land. It brings together provate-public partnerships that supplement regulatory protection with voluntary private conservation schemes. the project emphasizes conservation within high priority designated conservation areas where opportunities exist (i.e. where landowners are receptive). It implements the "Conservation Strategy for Lnadbirds of the Wast-Slope of the Cascade MOuntains in Oregon and Washington," prepared for Oregon-Washington Partners in Flight.	CDLT	terrestrial	$250,000					terrestrial		Protection, Study (to identify and prioritize), monitoring	Initiated	4/19/2005
WDOE		Target Reach Restoration	Restore riparian vegetation in 303(d) listed stream sections	CCCD	salmonids	est. $53,000					water quality (temperature)		Restoration	Initiated	4/19/2005
TABLE 2 - Completed, Ongoing, and Proposed Projects in the Lower Wenatchee Sub-Watershed															
		CMZ 1 - preserve riparian and backchannel	Preserve existing riparian valley flat backchannel habitats. Remover park facilities within 200 fe of the main channel and initiate riparian enhancement planting.								riparian, aquatic habitat		Protection, Enhancement	Completed	4/4/2005
		Dryden Dam Passage Plans	Tumwater Falls/Dryden Dams Passage Plans	Bonneville Power Administration		$123,692 for both	1983		1987		passage		Enhancement	Completed	4/27/2005
		Dryden Dam Passage		Chelan County Public Utility District, Bonneville Power Administration		$1,445,200	1985		1986		passage		Enhancement	Completed	4/27/2005
		Riverside Park		Department of Natural Resources/ALEA		$59,000 (ALEA share)	1989		1991					Completed	4/27/2005
SRFB		Blackbird Island Habitat Development	Placement of critical in-stream habitat including rocks, logs, rootwads and aquatic vegetation to help restore a ½ mile section of high quality off-channel salmon and steelhead spawning and rearing habitat. Excavate a ½ mile of old river terrace and relic stream channel to a depth that will allow groundwater percolation and flow to enter and fill the old channel until exiting via surface water flows to the mainstem Wenatchee River.	Chelan County Commissioners	salmonids	$57,132 + $13,000 match	1988				aquatic habitat		Enhancement	Completed	4/4/2005
SRFB		FLIR Assessment – Lower Wenatchee	A FLIR flight is proposed to map the stream temperature during the low-flow, high temperature period. Data collected from this study will provide valuable Baseline temp. data, and information about the location and extent of use of thermal refugia by salmonids in this stretch of the Wenatchee. Future projects include protection of land around key thermal refugia as well as protection and restoration of in-stream flows currently being identified by the Wenatchee Watershed Planning Effort.	Chelan County	salmonids	$52,317 + $13,000 match	2001				aquatic habitat		Study	Completed	4/4/2005
SRFB		Jones-Shotwell Diversion Enhancement	Diversion improvement, screen replacement, enhancement of off-channel refugia on lower Wenatchee River.	Chelan County Conservation District	salmonids	$257,044 + $46,047 match	2004				aquatic habitat		Enhancement	Completed	4/4/2005
SRFB		Wenatchee Instream Flow Habitat Project	Technical work under Phase 3 is currently underway and will be complete by March 2005. This application would be used to evaluate alternatives and develop flow recommendations for Nason, Chiwawa, Icicle, Peshastin, Chumstick, Mission and the lower Mainstem Wenatchee.	Chelan County	salmonids	$170,000 + $30,000 match	2004				flow		Study	Completed	4/4/2005
SRFB		Chelan County Fish Barrier Inventory	Assess physical barriers that interrupt adult and juvenile salmonid migration. Identify problem culverts within the Wenatchee and Entiat watersheds, evaluate effectiveness of barrier removal in terms or restored access to fish habitat and create a ranking of recommended project areas.	Chelan County Commissioners	salmonids	$75,000 + no match	1988				passage		Study	Completed	4/4/2005
SRFB		Lower Wenatchee Channel Migration Zone Study	Identify historic and current channel migration rates, factors affecting migration rates, means to restore floodplain function and appropriate types and locations of restoration initiatives in order to regulate development in hazardous zones and help ensure the protection of properly functioning habitat on the lower mainstem Wenatchee River.	Chelan County Commissioners	salmonids	$173,142 + $60,000 match	2000		2004		aquatic habitat		Study	Completed	4/4/2005

Completed, Ongoing, and Proposed Projects

Lead Funding Source	Supplemental Funding Source	Project Name	Description	Sponsoring Program/Participating Agencies	Target Species	Cost	Funding Date	Start Date	End Date	Project Type (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	Primary Limiting Factor (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	Other Limiting Factors	Objective (Protection, Restoration, Enhancement, Study)	Project Status (Proposed, Initiated, or Completed)	Date Provided
		Storm Drain Project		Chelan County Conservation District, City of Leavenworth, City of Cashmere							water quality			Completed	4/27/2005
		Tumwater Falls Passage Plans	Tumwater Falls/Dryden Dams Passage Plans	Bonneville Power Administration		$123,692 for both	1983		1987		passage		Enhancement	Completed	4/27/2005
		Improve the Tumwater Dam Passage	Improve the Tumwater Dam Passage	Bonneville Power Administration		$1,425,900	1985		1986		passage		Enhancement	Completed	4/27/2005
		CCCD riparian revegetation on Wenatchee River (#2)	This is the location of a riparian revegetation project implemented in 2001 along the Wenatchee River by a private landowner with assistance from the CD in 2001. The location is approximately in the middle of 1,200 linear feet of a riparian revegetation site. The first attachment is a photo o this site a year after installation of plants and irrigation.	CCCD	salmonids				2004		riparian		Enhancement	Completed	4/4/2005
		CCCD habitat improvement and riparian revegetation on Wenatchee (#1)	This is a location of an in stream habitat improvement and riparian revegetation project conducted by Chelan County (see second and third photo attachments) in 2004 on the Wenatchee River. This project resulted from a flood in 1996 that nearly took out the Sleepy Hollow Road and bridge. Chelan County Public Works did some emergency work to save the road immediately after the flood and as a condition of the in stream work permit, they were required t put some habitat features (rock "barbs" and log/root wads anchored to large boulders between and in the bards. There are two rock barbs and about 8 log/root wads) in the river and reestablish riparian vegetation on the bank. The CD was/is responsible for the plantings.	CCCD/NRCS	salmonids				2001		riparian, aquatic habitat		Enhancement	Completed	4/4/2005
		Wenatchee Foothills Trail		Chelan Douglas Land Trust										Completed	4/4/2005
		Wenatchee Wastewater Treatment Plant Improvements		Department of Ecology/Water Quality Program			2004 Fiscal Year				water quality		Enhancement	Completed	add 4/27
SRFB		Gagnon CMZ Project Feasibility: study hydrogeomorphic feasibility of off-channel creation (CMZ 10)	This project was identified in the Channel Migration Zone Study which was funded in the 2nd Round. Grant would fund hydorgeomorphic feasibility study and design of off-channel creation project.	Chelan County	salmonids	$82,450 + $14,550 match	2004				Aquatic habitat		Study	Initiated	4/4/2005
SRFB		Dryden Fish Enhancement CMZ Project: study potential creation of off-channel rearing habitat (CMZ 15)	Lower Wenatchee River at Dryden. Create off-channel rearing habitat for spring Chinook, (bull trout) and summer steelhead. Create prime, high quality, year-round rearing habitat, predator escape cover and high flow refuge areas by establishing perennial year-round stream flow and unhindered fish access to an existing but normally dry high water overflow floodplain channel through channel excavation to groundwater and through the placement of several rock and log habitat structures in the new channel.	Chelan County PUD	salmonids	$146,000 + $34,000 match	2004				aquatic habitat		Enhancement	Initiated	4/4/2005
SRFB		Irwin CMZ Project Feasibility: backchannel creation, riparian enhncement, and avulsion barrier. (CMZ 19)	This project was identified in the Channel Migration Zone Study which was funded in the 2nd Round. Grant would fund hydorgeomorphic feasibility study and design of off-channel creation project.	Chelan County	salmonids	$82,450 + $14,550 match	2004				aquatic habitat		Study	Initiated	4/4/2005
		CMZ 11 - hydraulic connection and preserve riparian	Conceptual drawing in CMZ study. Create a hydraulic connection from the main channel to the existing borrow pit/wetland habitats to restore high flows. Excavate borrow pits as needed to create high and low-flow habitat. Preserve existing valley flat-forested riparian habitat.								aquatic habitat	hydraulic connection, in-channel habitat, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ 12 - preserve valley flat, floodplain riparian, and backchannel	Preserve existing active valley flat and floodplain conifer woodland riparian habitat. Preserve existing high-flow backchannel.								aquatic habitat	backchannel, floodplain	Protection	Proposed	4/4/2005
		CMZ 13 - hydraulic connection and riparian enhancement	Create a hydraulic connection from the main channel to the existing borrow pit/wetland habitats. Excavate borrow pits to groundwater to create low-flow backchannel habitat. Riparian enhancement planting of the active valley flat immediately adjacent to the main channel.								aquatic habitat	hydraulic connection, in-channel habitat, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ 14 - riparian buffer planting	Enhancement planting of the riparian buffer adjacent (+ or - 200 feet) to the main channel. Preserve the existing land use beyond the buffer area.								riparian	riparian	Enhancement	Proposed	4/4/2005
		CMZ 16 - riparian planting	Riparian enhancement planting of the valley flat to restore a forested valley flat habitat.								aquatic habitat	riparian, backchannel	Enhancement	Proposed	4/4/2005
		CMZ 18 - road retirement and riparian planting	Retire access road, followed by riparian enhancement planting of the valley flat to restore a forested valley flat habitat.								riparian	riparian	Protection	Proposed	4/4/2005
		CMZ 19a -hydraulic connection with backchannel	Conceptual drawing in CMZ study. Create a hydraulic connection with the backchannel pond habitat and the main channel through either installating a culvert or excavating the existing berm. Design the culvert size and elevation to allow high and low-flow events to connect with restored backchannel habitats. Ensure protection of existing WDFW boat ramp and parking facilities.								aquatic habitat	backchannel, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ 2 - backchannel creation and riparian enhancement and preservation	Conceptual drawing in CMZ study. Backchannel creation on the low alluvial terrace (former orchard), at the downstream end of the site to create high and low-flow backchannel habitat. Riparian enhancement planting at the low alluvial terrace in association with backchannel construction to create floodplain hardwood woodland habitat. Preservation of existing riparian forest within the active valley flat. Preservation of existing high-flow backchannels. Riparian enhancement planting in high-terrace pasture areas to create additional floodplain hardwood within the active valley flat.								aquatic habitat	backchannel, riparian, floodplain	Restoration, Enhancement	Proposed	4/4/2005
		CMZ 20 - backchannel creation and riparian enhancement	Conceptual drawing in CMZ study. Backchannel creation within the low terrace island with a connection to the Wenatchee River main channel. Riparian enhancement planting within the high terrace active valley flat and adjacent to the Icicle Creek main channel. Preserve existing riparian valley flat backchannel habitats.								aquatic habitat	backchannel	Restoration, Enhancement	Proposed	4/4/2005

Completed, Ongoing, and Proposed Projects

Lead Funding Source	Supplemental Funding Source	Project Name	Description	Sponsoring Program/Participating Agencies	Target Species	Cost	Funding Date	Start Date	End Date	Project Type (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	Primary Limiting Factor (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	Other Limiting Factors	Objective (Protection, Restoration, Enhancement, Study)	Project Status (Proposed, Initiated, or Completed)	Date Provided
		CMZ 3 - preservation of existing floodplain hardwoods and backchannel habitats.	Preservation of existing floodplain hardwood woodland and backchannel habitats. Bank stabilization using plantings immediately upstream of the backchannel inlet to stabilize current bank erosion.								aquatic habitat	backchannel, riparian, bank stabilization	Protection	Proposed	4/4/2005
		CMZ 4 - preservation of active valley flat habitat.	Preservation of active valley flat habitat. Riparian enhancement planting of the sparsely vegetate lateral bar to enhance existing shrub floodplain and promote establishment of floodplain hardwood woodland.								aquatic habitat	floodplain, riparian	Protection, Enhancement	Proposed	4/4/2005
		CMZ 5 - riparian planting, backchannel creation, hydraulic connection, and preservation of riparian.	Riparian enhancement planting of the active valley flat immediately adjacent to the main channel within the park facilities to promote the regeneration of hardwood trees and a shrub understory. Backchannel creation with a hydraulic connection to the backbar channel located immediately downstream of the park facilities and upstream of the utility line crossing. Creating this backchannel would provide high and low flow habitats. Hydraulic connection to oxbow habitats described in Action Site 6 via culvert construction under SR 2 and the restoration of existing backchannel located at the downstream end of the oxbow outflow. Preservation of floodplain hardwood woodland riparian valley flat habitats along SR 2.								aquatic habitat	riparian, backchannel, floodplain	Protection, Enhancement	Proposed	4/4/2005
		CMZ 6 - hydraulic connection of oxbows, channel enhancement	Hydraulic connection of the oxbow habitats via culvert or bridge construction under SR 2 to restore high and low-flow hydraulics to the abandoned oxbow (backchannel) and valley flat habitat. Enhancement of existing drainage channel connected to the Wenatchee River and located at the downstream end of the oxbow outflow within the valley flat associated with Action Site 5. Design the channel form and elevation to allow high and low-flow events to connect with restored oxbow habitats.								aquatic habitat	backchannel, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ 7 - stabilize and preserve backchannel	Stabilize backchannel inlet to reduce the current need for maintenance dredging. Preserve high-flow backchannel habitat; install LWD downstream of the diversion structure to provide immediate instream habitat complexity during high flow events. Preserve floodplain woodland riparian valley flat habitats.								aquatic habitat	backchannel, in channel habitat, riparian	Protection	Proposed	4/4/2005
		CMZ 8 - hydraulic connection of backchannels and riparian restoration	Hydraulic connection to the backchannel habitats described in Action Site 9 via culvert construction under the Burlington Northern Railroad ballast. Design the culvert size and elevation to allow high and low-flow events to connect with restored oxbow habitats. Preservation of floodplain hardwood woodland riparian valley flat habitats along the main channel.								aquatic habitat	backchannel, riparian	Protection	Proposed	4/4/2005
		CMZ 9 - hydraulic connection of backchannel habitats and riparian restoration	Hydraulic connection of the backchannel habitats to the main channel via culvert construction under the Burlington Northern Railroad ballast (Action Site 8). Design the culvert size and elevation to allow high and low-flow events to connect with restored oxbow habitats. Restoration of floodplain hardwood woodland riparian valley flat habitats along the main channe								aquatic habitat	backchannel, riparian	Restoration, Enhancement	Proposed	4/4/2005
		Habitat Improvements near golf course	This project has not been defined in detail, but there is interest in developing ways to improve habitat along the mainstem Wenatchee River at the Leavenworth Golf Course. The property is owned by the City of Leavenworth and is leased to the golf course. Potential projects may includ BMPs, riparian, public outreach.	City of Leavenworth, golf course	salmonids						aquatic		enhancement	Proposed	4/19/2005
		Kayak,whitewater course with habitat improvements	This project would be located on the mainstem Wenatchee River along City of Leavenowrth property (near Blackbird Island). There is a desire among the recreation community to create a whitewater park and provide fish habitat improvements at the same time.	City of Leavenworth, American Whitewater, local recreation	salmonids (1st target may be recreation)								enhancement associated with recreation project	Proposed	4/19/2005
		Wetland Enhancement on Fish and Wildlife Property	This project would be located near the confluence of Icicle Creek and the Wenatchee River and would provide off channel habitat.	City of Leavenworth, WDFW	salmonids						wetlands		Enhancement	Proposed	4/19/2005
		CAO Update	Critical Areas Ordinance Update	City of Leavenworth	aquatic, terrestrial						riparian		Protection	Initiated	4/19/2005
		UGA Critical Areas Master Plan	Development of a UGA Critical Areas Master Plan	City of Leavenworth	aquatic, terrestrial						terrestrial		Protection	Proposed	4/19/2005
TABLE 3 - Completed, Ongoing, and Proposed Projects in the Upper Wenatchee and Chiwaukum Sub-Watersheds															
		Tumwater Falls Passage Plans	Tumwater Falls/Dryden Dams Passage Plans	Bonneville Power Administration		$123,692 for both	1983		1987		passage		Enhancement	Completed	4/27/2005
		Improve the Tumwater Dam Passage	Improve the Tumwater Dam Passage	Bonneville Power Administration		$1,425,900	1985		1986		passage		Enhancement	Completed	4/27/2005

Completed, Ongoing, and Proposed Projects

Lead Funding Source	Supplemental Funding Source	Project Name	Description	Sponsoring Program/Participating Agencies	Target Species	Cost	Funding Date	Start Date	End Date	Project Type (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	Primary Limiting Factor (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	Other Limiting Factors	Objective (Protection, Restoration, Enhancement, Study)	Project Status (Proposed, Initiated, or Completed)	Date Provided
TABLE 4 - Completed, Ongoing, and Proposed Projects in the Mission Sub-Watershed															
		Little Camas Creek Culvert Replacement	Little Camas Creek Culvert Replacement	USFS	Chinook						passage		enhancement	Completed	4/4/2005
WDOE, EPA 319 Grant		Lower Mission Creek Planting Project	Vegetative component of an emergency flood control project in lower Mission Creek for three property owners.	CCCD, Cashmere Middle School Recycling Club	salmonids				1996		riparian		Restoration	Completed	4/19/2005
WDOE, EPA 319 Grant		Brender Creek Revegetation	Restoration planting downstream of culvert through Evergreen Dr from Sunset Hwy to mouth of No Name Creek.	CCCD, Cashmere Middle School Recycling Club	salmonids				1996		riparian		Restoration	Completed	4/19/2005
WA Conservation Committsion, Trout Unlimited, Private Landowners		Brender Creek Sediment Pond	Final phase of channel stabilization and sediment settling pond project. Addresses off-channel habitat, high sedimentation from Brender Creek, flood control, and riparian restoration. Partners contributed both services and assistance, such as engineering, design, technical assistance, permitting, construction oversight, plants and labor, in additions to cost share for construction equipment.	CCCD, Trout Unlimited, NRCS, WDFW, Private Landowners	salmonids				1997		aquatic (sedimentation)		Restoration	Completed	4/19/2005
WDOE - Supplemental Watershed Planning		Fecal Coliform Source Analysis	Study and identification of target reaches within streams on 303(d) list for fecal coiform exceedences.	CCCD, WWPU	salmonids	est $30,000					water quality		Study	Completed	4/19/2005
		Wier for fish habitat and surface water withdrawal	1 of 3 Mission Creek log weir project that the CD completed in 1996. These structures were installed to create both fish habitat and a location for surface water withdrawal for orchardists	CCCD	salmonids				1996		passage			Completed	4/4/2005
		Wier for fish habitat and surface water withdrawal	1 of 3 Mission Creek log weir project that the CD completed in 1996. These structures were installed to create both fish habitat and a location for surface water withdrawal for orchardists	CCCD	salmonids				1997					Completed	4/4/2005
		Wier for fish habitat and surface water withdrawal	1 of 3 Mission Creek log weir project that the CD completed in 1996. These structures were installed to create both fish habitat and a location for surface water withdrawal for orchardists	CCCD	salmonids				1998					Completed	4/4/2005
SRFB		Brender Creek Habitat Development	Create a salmonid rearing pond and step pools to connect upstream to a sedimentation pond that collects unusually heavy soil runoff from Brender Creek. Reopen ½ mile of unavailable tributary habitat and create a high quality half acre in-channel salmon and steelhead pond for summer and overwintering of juveniles.	Chelan County Commissioners	salmonids	$43,931 + $3K match	1988				aquatic habitat		Enhancement	Completed	4/4/2005
		Upper Sand Creek Culvert Replacement	Upper Sand Creek Culvert Replacement	USFS	Chinook						passage		enhancement	Completed	4/4/2005
		Lower Sand Creek Culvert Replacement	Lower Sand Creek Culvert Replacement	USFS	Chinook						passage		Enhancement	Completed	4/4/2005
Coastal Protection and USFWS Partners Program		Mission Creek Streambank Project	Streambank stabilization, fish habitat improvement, erosion control	CCCD	steelhead	est. $60,000					water quality (temperature)		Restoration	Initiated	4/19/2005
TABLE 5 - Completed, Ongoing, and Proposed Projects in the Peshastin Sub-Watershed															
BOR		Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis	This project will identify priority areas for in-stream restoration projects and protection opportunities. The details of this project are still being developed.	BOR	salmonids						aquatic		Restoration, enhancement, protection	Proposed	4/19/2005
Longview Fibre		Remove blocking culvert	Remove blocking culvert in T22 R18E S21	Longview Fibre	fish						passage		enhancement	Completed	4/4/2005
Longview Fibre		Remove blocking culvert	Remove one of four blocking culverts in T27 R17E S31	Longview Fibre	fish						passage		enhancement	Completed	4/4/2005
Longview Fibre		Remove blocking culvert	Remove blocking culvert in T23 R17E S23	Longview Fibre	fish						passage		enhancement	Completed	4/4/2005
Longview Fibre		Made blocking culvert into bridge	Made blocking culvert into bridge at T23 R17 S23	Longview Fibre	fish						passage		enhancement	Completed	4/4/2005

Completed, Ongoing, and Proposed Projects

Lead Funding Source	**Supplemental Funding Source**	**Project Name**	**Description**	**Sponsoring Program/Participating Agencies**	**Target Species**	**Cost**	**Funding Date**	**Start Date**	**End Date**	**Project Type** (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	**Primary Limiting Factor** (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	**Other Limiting Factors**	**Objective** (Protection, Restoration, Enhancement, Study)	**Project Status** (Proposed, Initiated, or Completed)	**Date Provided**
		CCCD instream sturcture on Mill Creek	This is the location of an in stream project that was implemented in 2004 on Mill Creek, a tributary to Peshastin Creek, by the CD. It involved installing a new fish screen on the irrigation diversion and fish passage structures (6) to allow for passage past the diversion point. The old screen was not compliant with current WDFW standards and just below the diversion point the stream had down cut approximately 4' and was a fish passage barrier. Attachments 4 and 5 (completed project3 and 4) show this project after completion.	CCCD/Chelan County	fish				2004		passage		Enhancement	Completed	4/4/2005
WA Conservation Commission		Riparian Restoration	Streambank buffer restoration projects with two landowners through the Conservation Reserve Enhancement Program (CREP).	CCCD	fish	est. $4,000			2001		riparian		Restoration	Completed	4/19/2005
SRFB		Peshastin Creek Fish Barrier Removal	Build a fish passage structure at Peshastin Irrigation District diversion structure on lower Peshastin Creek. Structure will allow access to spawning and rearing habitat for steelhead, bull trout and spring Chinook.	Chelan County	salmonids	$70,000 + $255,000 match	2004				passage		Enhancement	Completed	4/4/2005
SRFB		Peshastin Irrigation Dam / Fish Barrier	Build a fish passage structure at Peshastin Irrigation District diversion structure on lower Peshastin Creek. Structure will allow access to 29.5 km of spawning and rearing habitat for steelhead, bull trout and spring Chinook.	Chelan County Commissioners	salmonids	$100,000 + no match	1998				passage		Enhancement	Initiated	4/4/2005
SRFB		Peshastin Creek Off-Channel Development	Develop an off-channel stream/pond system and riparian vegetation within the Peshastin Creek bypass channel parallel to Peshastin Creek. Project will provide critical summer and overwintering habitat for steelhead, bull trout and spring Chinook.	Chelan County Commissioners	salmonids	$22,264 + no match	1988				aquatic habitat		Enhancement	Initiated, then Discont	4/4/2005
		CMZ 17 - Peshastin Creek channel reconnection, riparian planting	Conceptual drawing in CMZ study. Reconnecting Peshastin Creek to its historic valley flat and natural channel. Riparian enhancement planting of the valley flat to restore a forested valley flat habitat. Removing and relocating fill material from the active valley flat.								aquatic habitat	floodplain, riparian	Restoration, Enhancement	Proposed	4/4/2005
TABLE 6 - Completed, Ongoing, and Proposed Projects in the Chumstick Sub-Watershed															
		Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
		Phase I Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
		Phase I Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
		Phase I Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
		Phase I Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
		Phase I Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
		Phase I Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
		Phase I Fish passage on Chumstick	1 of 8 fish passage projects on Chumstick. These culverts were identified by the NRCS as being fish passage barriers and were replaced in 2001 by the CD.	CCCD/NRCS	salmonids						passage		Enhancement	Completed	4/4/2005
BOR - design only		McDevitt Diversion Project	This project proposes to address an approximately 2 foot barrier and unscreened diversion associated with irrigation withdrawal on the lower Chumstick Creek. BOR is doing the design work ($29, 326) Current construction estimate is for $17,000. Funding has not been secured for construction.	Bureau of Reclamation (BOR)	Spring chinook, steelhead	design $29,326 const. Est. $17,000					passage		Restoration	Initiated	4/19/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
		Phase II Fish Passage on Chumstick	Fish passage on Chumstick	CCCD/NRCS	salmonids						passage		Enhancement	Proposed	4/4/2005
SRFB		Final Phase Chumstick Culvert Replacement	The overall goal of this project is to enhance and improve salmonid migration throughout the Chumstick drainage. These projects, coupled with the replacement of a large culvert on Highway 209/North Road (funded by Bonneville Power Administration) will provide access to 78 Sq. miles for anadromous and resident fish.	Chelan County Conservation District	salmonids	$273,100 + $70,000 match	2001				passage		Enhancement	Proposed	4/4/2005

Completed, Ongoing, and Proposed Projects

Lead Funding Source	Supplemental Funding Source	Project Name	Description	Sponsoring Program/Participating Agencies	Target Species	Cost	Funding Date	Start Date	End Date	Project Type (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	Primary Limiting Factor (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	Other Limiting Factors	Objective (Protection, Restoration, Enhancement, Study)	Project Status (Proposed, Initiated, or Completed)	Date Provided
SRFB		Chumstick Creek Fish Barrier - North Road #1	Replace an existing round culvert on North Road to create a natural creek bed and resting pools at intermittent locations to facilitate fish migration. Existing culvert precludes fish passage durin low flow due to the steep gradient and inadequate water depth and at other times due to high velocities and excessive length of pipe.	Chelan County Commissioners	salmonids	$42,000 + $170,000 match	1988				passage		Enhancement	Proposed	4/4/2005
SRFB		Chumstick Creek Barrier Removal - North Road #2	Replace an existing culvert on North Road that precludes fish passage with a large diameter counter-sunk pipe allowing ESA-listed threatened and endangered salmonids and other migratory fish species to access .78 miles of quality spawning and rearing habitat in the Chumstick Creek watershed.	Chelan County Public Works	salmonids	$370,372 + $501,400 match	2000				passage		Enhancement	Proposed	4/4/2005
		Chumstick Groundwater Study and Water Balance	There is a need for a ground water study of the entire Chumstick drainage area in order that a proper water balance can be completed. Antidotal reports of longtime residents tell of extensive historical salmon runs in the lower portions of the Creek. Parts of the creek go dry.												4/19/2005
		Chumstick - Titus Mitigation Site Development	Wetland restoration as mitigation for the Chumstick-Titus Road construction. This would be 1:1 mitigation somewhere in the Wenatchee Watershed.	City of Leavenworth	terrestrial						wetlands		Study (site development), then enhancement.	Proposed	4/19/2005
TABLE 7 - Completed, Ongoing, and Proposed Projects in the Icicle Sub-Watershed															
SRFB		Wetland and Riparian Complex Acquisition	CDLT seeks to acquire and protect the wetland and riparian complex at the mouth of the Icicle and Wenatchee Rivers. This 50-acre site is one of the most important salmonids spawning and rearing areas in the region and contributes to habitat used by endangered spring Chinook, endangered steelhead, threatened bull trout, fall Chinook, cutthroat trout, and the most important remaining run of Columbia Basin sockeye salmon. There is development pressure in the area, and it will continue to be more expensive and potentially unavailable in the future.	Chelan-Douglas Land Trust	salmonids	$1,337,800 + $250,000 match	2001				aquatic habitat		protection	Completed	4/4/2005
SRFB		Icicle Creek Reach Level Analysis	Perform a reach-level assessment of the lower reach of Icicle Creek, which extends from the confluence with the Wenatchee River to the Leavenworth National Fish Hatchery (2.8 river miles). This reach is utilized by chinook, steelhead, sockeye, and bull trout, and is the focus of coho reestablishment efforts by the Yakama Nation. We propose to perform an assessment of lower Icicle Creek and synthesize data obtained together with existing information to develop a restoration and protection strategy for the reach. Completion of the assessment, and a restoration and protection strategy will facilitate coordinated efforts to restore floodplain functior in the lower Icicle. This was done on the lowest reach of Icicle Creek, just below the Hatchery down to the mouth.	Icicle Valley Chapter of Trout Unlimited	salmonids	$40,375 + $7,125 match	2002				aquatic habitat		Study	Completed	4/4/2005
		LNH Icicle Creek Restoration Project	The final engineering reviews of Phase II are underway, funding and permits are being secured and plans for work to proceed are in place for this summer. As directed in the Environmental Impact Statement (EIS) completed in January of 2002, this project provides fish passage and habitat improvements while protecting downstream neighbors from flooding, supporting a very important Yakama Indian Tribal Fishery, and maintaining existing Leavenworth National Fish Hatchery operations	U.S. Fish and Wildlife Service, U.S. Forest Service	salmonids	$5,700,000 +		2003	ongoing		aquatic habitat		restoration	Initiated	4/4/2005
		CMZ Site #21 - Possible restoration or enhancement opportunities.	This site was identified in Phase 1 of the CMZ Study using aerial photo interpretation. Ponderosa pine woodland at confluence of Icicle Creek and Wenatchee River warrants preservation and may provide site for future instream structure installation for in-channel habitat enhancement. Additional study is needed determine restoration/enhancement opportunities.	Chelan County NRP	aquatic, terrestrial						riparian		Study	Proposed	4/19/2005
		CMZ Site #22 - Possible restoration or enhancement opportunities.	This site was identified in Phase 1 of the CMZ Study using aerial photo interpretation. Wooded areas provide good riparian function. More detailed onsite studies are needed to determine these areas' role as high flow refugia.	Chelan County NRP	aquatic, terrestrial						riparian		Study	Proposed	4/19/2005
		CMZ Site #23 - Possible restoration or enhancement opportunities.	This site was identified in Phase 1 of the CMZ Study using aerial photo interpretation. Wooded areas provide good riparian function and constitute existing high flow refugia. Additional study is needed determine restoration/enhancement opportunities.	Chelan County NRP	aquatic, terrestrial						riparian		Study	Proposed	4/19/2005

Completed, Ongoing, and Proposed Projects

Lead Funding Source	Supplemental Funding Source	Project Name	Description	Sponsoring Program/Participating Agencies	Target Species	Cost	Funding Date	Start Date	End Date	Project Type (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	Primary Limiting Factor (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	Other Limiting Factors	Objective (Protection, Restoration, Enhancement, Study)	Project Status (Proposed, Initiated, or Completed)	Date Provided
		CMZ Site #24 - Possible restorationor enhancement opportunities.	This site was identified in Phase 1 of the CMZ Study using aerial photo interpretation. Active floodplain immediately downstream of fish hatchery provides high flow structure and may provide a good site for instream structure placement, riparian plantings and off-channel habitat creation. Additional study is needed determine restoration/enhancement opportunities.	Chelan County NRP	aquatic						aquatic		Study	Proposed	4/19/2005
		Icicle Floodplain Protection	Protect Icicle Creek floodplain through acquisitions and/or conservation easements.	CDLT (others?)	fish, terrestrial						riparian, floodplain		Protection	Proposed	4/19/2005
		City of Leavenworth fish screen	Install fish screen at the intake point for the City of Leavenworth intake point for the water treatment plant.	City of Leavenworth	salmonids						aquatic		enhancement	Proposed	4/4/2005
BOR		Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis	This project will identify priority areas for in-stream restoration projects and protection opportunities. The details of this project are still getting developed.	BOR	salmonids						aquatic		Restoration, enhancement, protection	Proposed	4/19/2005
TABLE 8 - Completed, Ongoing, and Proposed Projects in the Nason Sub-Watershed															
Longview Fibre		Made blocking culvert into bridge	Made blocking culvert into bridge at T26 R16E S13	Longview Fibre	salmonids						passage		enhancement	Completed	4/4/2005
Longview Fibre		Remove blocking culvert	Remove one of four blocking culverts in T27 R17E S31	Longview Fibre	salmonids						passage		enhancement	Completed	4/4/2005
Longview Fibre		Remove blocking culvert	Remove one of four blocking culverts in T27 R17E S31	Longview Fibre	salmonids						passage		enhancement	Completed	4/4/2005
		CMZ Nason 1 - hydraulic connection of oxbows and riparian restoration	Hydraulic connection of the oxbow habitats via culvert construction under SR 207; and the enhancement of the oxbow channel to provide high-flow and low-flow habitat, and increase current valley flat hydraulic capacity. Restoration of riparian forest into the active valley flat.								aquatic habitat	backchannel, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ Nason 2 - hydraulic connection of oxbows and riparian restoration	Conceptual drawing in CMZ study. Hydraulic connection of the oxbow habitats via culvert construction under SR 207; and the enhancement of the oxbow channel to provide high-flow and low-flow habitat, and increase current valley flat hydraulic capacity. Restoration of riparian forest into the active valley flat.								aquatic habitat	backchannel, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ Nason 3 - hydraulic connection of oxbows and riparian restoration	Conceptual drawing in CMZ study. Hydraulic connection of the oxbow habitats via culvert construction under SR 207; and the enhancement of the oxbow channel to provide high-flow and low-flow habitat, and increase current valley flat hydraulic capacity. Restoration of riparian forest into the active valley flat.								aquatic habitat	backchannel, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ Nason 4 - hydraulic connection of oxbows and riparian restoration.	Hydraulic connection of the oxbow habitats via culvert construction under SR 207; and the enhancement of the oxbow channel to provide high-flow and low-flow habitat, and increase current valley flat hydraulic capacity. Restoration of riparian forest into the active valley flat.								aquatic habitat	backchannel, riparian	Restoration, Enhancement	Proposed	4/4/2005
		CMZ Nason 5 - wetland habitat preservation.	Preserve wetland habitats and possibly used for wetland mitigation projects in the future								wetlands	wetlands	Protection	Proposed	4/4/2005
BOR		Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis	This project will identify priority areas for in-stream restoration projects and protection opportunities. The details of this project are still getting developed.	BOR	fish						aquatic		Restoration, enhancement, protection	Proposed	4/19/2005
TABLE 9 - Completed, Ongoing, and Proposed Projects in the Chiwawa Sub-Watershed															
Chelan County		Beaver Creek Culvert Replacement	Replace culvert with a 20 foot modular bridge unit to oprn up habitat for spring chinook and steelhead (possibly bull trout) on Beaver Creek. This project is located on Chiwawa Loop Rd, mailpost 0.0, Section 12, T26N R17. This project will take place at RM 0.3 on Beaver Creek.	Chelan County Public Works	salmonids	est. $90,000					passage		Restoration	Initiated	4/27/2005

Completed, Ongoing, and Proposed Projects

Lead Funding Source	Supplemental Funding Source	Project Name	Description	Sponsoring Program/Participating Agencies	Target Species	Cost	Funding Date	Start Date	End Date	Project Type (water quantitiy, water quality, aquatic habitat, terrestrial habitat)	Primary Limiting Factor (passage, flow, aquatic habitat, riparian, terrestrial, wetlands, water quality)	Other Limiting Factors	Objective (Protection, Restoration, Enhancement, Study)	Project Status (Proposed, Initiated, or Completed)	Date Provided
TABLE 10 - Completed, Ongoing, and Proposed Projects in the Upper Watershed (Lake Wenatchee, White, and Little Wenatchee Sub-Watersheds)															
		Little Wenatchee, Nason, Rainey/L.wenatchee	Check cam's email/Cindy Raekas	USFS	salmonids									Completed	4/4/2005
CDLT		Acquisition of 37 acres	Acquisition of 37 acres in the White River watershed from Glenn Martin by CDLT. Parcel is #27169440000.	Chelan Douglas Land Trust	fish, terrestrial		2005	2005	2005		riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition	Acquisition	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition	Acquisition	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT		Acquisition of 20 acres	Acquisition of 20 acres in the White River watershed from Glenn Martin by CDLT. Parcel is #271616110050	Chelan Douglas Land Trust	fish, terrestrial		2005	2005	2005		riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 240 acres	Acquisition of 240 acres by the CDLT and WDFW from Longview Fibre. Parcel is #281632000050	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 27 acres	Acquisition of 27 acres from Jo M. Levin by CDLT and WDFW. Parcel is #271604310000	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 40 acres	Acquisition of 40 acres from WICO by CDLT and WDFW. Parcel is #271609140000	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 38 acres	Acquisition of 38 acres from WICO by CDLT and WDFW. Parcel is #27160940050	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 21 acres	Acquisition of 21 acres from Christy Collins by CDLT and WDFW. Parcel is #271610300050	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 21 acres	Acquisition of 21 acres from Christy Collins by CDLT and WDFW. Parcel is #271610300050	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 2.5 acres	Acquisition of 2.57 acres from WICO by CDLT and WDFW.	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
CDLT/WDFW		Acquisition of 50 acres	Acquisition of 50 acres from Walter E. Williams by CDLT and WDFW. Parcel is #271615220050	Washington Department of Fish and Wildlife and Chelan Douglas Land Trust	fish, terrestrial						riparian	aquatic habitat, terrestrial habitat	protection	completed	4/4/2005
SRFB		White River Floodplain Restoration	Reestablish off channel habitat access for salmon and steelhead in an old oxbow at the end of the Sears Creek Road along the White River. Obliteration of the road and removal of two culverts will reestablish fish access into .5 miles of off channel habitat and allow the floodplain to functio naturally in this area during high flows.	Eastern Washington Regional Fisheries Enhancement Group, Salmon Recovery Funding Board, Chelan-Douglas Land Trust	bull trout, chinook, cutthroat, sockeye, steelhead	$50,000 + $90,000 match	1999		10/15/2004		passage		Enhancement	Completed	4/4/2005
		White R. Logjam		USFS					2004					Completed	4/4/2005
		White R. Oxbow Restoration Project		USFS					2002					Completed	4/4/2005
		White R. Spur Roads Project		USFS					2004					Completed	4/4/2005
		White River Floodplain Protection	Protect White River floodplain through acquisitions and/or conservation easements.	CDLT (other, depending on location)	fish, terrestrial						riparian, floodplain		Protection	Proposed	4/19/2005
		White River Habitat Improvement	Restoration and habitat improvement projects in the White River	CDLT (USFS, others?)	fish, terrestrial						riparian		Restoration/Enhancment	Proposed	4/19/2005
		Closure of White and Little Wenatchee Rivers to motorized water craft	There is some public interest in closing the White and Little Wenatchee Rivers to motorized water craft, especially when fish are spawning. The high speeds of jet skis and other motorized vehicles exacerbates the bank erosion problem as well.		fish						aquatic		Protection	Proposed	4/19/2005
		Lake Wenatchee Fish Pen Waste	The concentration of fish pens with the resultant concentration of fish food and fish waste is resulting in continued concern by local residents concerning water quality in Lake Wenatchee, especially at the northwest end of the lake (many residents take their dirinking water directly fror the lake).		salmonids						water quality		enhancement, protection	Proposed	4/19/2005
BOR		Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis	This project will identify priority areas for in-stream restoration projects and protection opportunities. The details of this project are still being developed.	BOR, USFS, Chelan County	salmonids						aquatic		Restoration, enhancement, protection	Proposed	4/19/2005

Proposed Wenatchee Habitat Projects - Biological Needs in Category 1 Sub-Watersheds

Chiwawa River Sub-Watershed	
Biological Priorities	***Project Name***
1) Protect remaining floodplain and riparian habitat, particularly around Chikamin Flats.	
2) Investigate the role of surface and well water withdrawals on instream flows and habitat use. Develop strategies with water users to reduce effects, if any.	No Projects Identified
3) Initiate public information efforts to discourage harassment of spawning spring chinook salmon and bull trout.	
4) Manage recreation areas to reduce or avoid impacts to riparian habitats.	

Mainstem Upper Wenatchee River (Lake Wenatchee to Tumwater	
Biological Priorities	***Project Name***
1) Protect remaining floodplain and riparian habitat.	
2) Restore channel migration to resemble historical function.	No Projects Identified
3) If restoration is not possible, improve fish access to oxbows and historical side channels that have been cut off from the mainstem.	
4) Initiate public information efforts to discourage harassment of spawning summer chinook salmon.	
5) Reduce nonpoint pollution from septic tanks and livestock.	
6) Initiate public information efforts to encourage protection of riparian habitat.	
UNRATED	Beaver Creek Culvert Replacement

Mainstem Middle Wenatchee (Tumwater Canyon)	
Biological Priorities	***Project Name***
1) Protect existing riparian habitat.	
2) Address passage barriers at Skinney Creek near mouth.	No Projects Identified

Little Wenatchee Sub-Watershed	
Biological Priorities	***Project Name***
1) Protect stream channel, riparian and floodplain functions: focus on Little Wenatchee River falls downstream to mouth.	
2) Address road impacts in the drainage, emphasis on Rainy Creek and Little Wenatchee between Hidden Creek and Fir Creek.	No Projects Identified
3) Restore wetland complexes that connect to stream channel.	
4) Manage recreation areas to reduce impacts to riparian cover.	
5) Initiate public information efforts to discourage harassment of spawning salmonids.	

White River Sub-Watershed	
Biological Priorities	***Project Name***
1) Protect stream channel, riparian and floodplain functions. Focus on Panther Creek dodwnstream to mouth.	Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis
	White River Floodplain Protection
2) Restore wetland complexes that connect to stream channel.	White River Habitat Improvement
3) Protect shorelines along Lake Wenatchee ner White River mouth.	
4) Initiate public information efforts to discourage harassment of spawning spring chinook, sockeye salmon, and bull trout.	
5) Manage recreation areas to reduce impacts to riparian cover.	
UNRATED	Closure of White and Little Wenatchee Rivers to motorized water craft

Lake Wenatchee Sub-Watershed	
Biological Priorities	***Project Name***
1) Protect remaining near shore habitat, and develop a means to reduce impacts of bulkheads.	
UNRATED	Lake Wenatchee Fish Pen Waste

In regards to Biological Needs: Category 1 sub-watersheds should receive priority allocation of financial and management resources. Subsequent allocation of resources should be given to Categories 2 and 3, in that order, once refuge habitats (Category 1) for the target species are protected and secured. This does not mean, however, that specific actions should not occur in Category 2 and 3 sub-watersheds until all activities in Category 1 sub-watersheds are completed. Any projects within those sub-watersheds that increase the range, life history diversity, or age cohorts of one or more species would contribute to the overall strategy of making them more robust to disturbances outside and within the region. Sub-watershed categories, and priorities of actions within each sub-watershed, are illustrated in Figure 1.

Proposed Wenatchee Habitat Projects - Biological Needs in Category 2 Sub-Watersheds

*Mainstem Lower Wenatchee River Sub-Watershed (Tumwater to Mouth)	
Biological Priorities	***Project Name***
1) Protect existing riparian habitat and channel migration floodplain function.	CMZ 2 - backchannel creation and riparian enhancement and preservation
	CMZ 3 - preservation of existing floodplain hardwoods and backchannel habitats.
	CMZ 20 - backchannel creation and riparian enhancement
	CMZ 11 - hydraulic connection and preserve riparian
	CMZ 5 - riparian planting, backchannel creation, hydraulic connection, and preservation of riparian.
	CMZ 7 - stabilize and preserve backchannel
	CMZ 12 - preserve valley flat, floodplain riparian, and backchannel
	CMZ 4 - preservation of active valley flat habitat.
2) Restore channel migration to normative function.	Dryden Fish Enhancement CMZ Project: study potential creation of off-channel rearing
	Gagnon CMZ Project Feasibility: study hydrogeomorphic feasibility of off-channel creation (CMZ 10)
	CMZ 6 - hydraulic connection of oxbows, channel enhancement
	Irwin CMZ Project Feasibility: backchannel creation, riparian enhncement, and avulsion barrier. (CMZ 19)
	CMZ 19a -hydraulic connection with backchannel
	CMZ 9 - hydraulic connection of backchannel habitats and riparian restoration
	CMZ 13 - hydraulic connection and riparian enhancement
	CMZ 14 - riparian buffer planting
	CMZ 16 - riparian planting
	CMZ 8 - hydraulic connection of backchannels and riparian restoration
	CMZ 18 - road retirement and riparian planting
	Habitat Improvements near golf course
	Wetland Enhancement on Fish and Wildlife Property
	Wetland Enhancement on Fish and Wildlife Property
3) If restoration is not possible, improve fish access to oxbows and historical side channels.	
4) Increase late summer flows.	
UNRATED	Kayak,whitewater course with habitat improvements
	CAO Update
	UGA Critical Areas Master Plan

Peshastin Creek Sub-Watershed	
Biological Priorities	***Project Name***
1) Increase stream sinuosity and floodplain function from Ingalls Creek to mouth.	CMZ 17 - Peshastin Creek channel reconnection, riparian planting
2) Restore flow from Camas Creek to mouth.	
3) Other projects should be delayed until stream sinuosity and flows are addressed.	
UNRATED	Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis

Icicle Creek Sub-Watershed	
Biological Priorities	***Project Name***
1) Protect remaining floodplain and riparian habitat downstream of Chatter Creek. Emphasis should be placed on habitat downstream of Leavenworth Hatchery.	CMZ Site #21
	CMZ Site #22
	CMZ Site #23
	CMZ Site #24
	Icicle Floodplain Protection
	Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis
2) Rectify human-made passage barriers.	
3) Restore flow conditions on Icicle Creek downstream of Rat Creek.	
4) Investigate the role of surface and well water withdrawals on instream flows and	Fish Screen
5) Develop strategies with water users to reduce effects, if any.	
6) Initiate public information efforts to discourage harassment of spawning salmonids.	
7) Manage recreation areas to reduce impacts to riparian cover.	

Nason Creek Sub-Watershed	
Biological Priorities	***Project Name***
1) Protect remaining floodplain and riparian habitat.	CMZ Nason 5 - wetland habitat preservation.
2) Restore channel migration to historical function.	CMZ Nason 1 - hydraulic connection of oxbows and riparian restoration
	CMZ Nason 2 - hydraulic connection of oxbows and riparian restoration
	CMZ Nason 3 - hydraulic connection of oxbows and riparian restoration
	CMZ Nason 4 - hydraulic connection of oxbows and riparian restoration.
	Wenatchee Watershed Habitat Restoration Identification and Prioritization Analysis
3) If restoration is not possible, improve fish access to oxbows and historical side channels.	
4) Initiate public information efforts to discourage harassment of spawning salmonids.	

In regards to Biological Needs: Category 1 sub-watersheds should receive priority allocation of financial and management resources. Subsequent allocation of resources should be given to Categories 2 and 3, in that order, once refuge habitats (Category 1) for the target species are protected and secured. This does not mean, however, that specific actions should not occur in Category 2 and 3 sub-watersheds until all activities in Category 1 sub-watersheds are completed. Any projects within those sub-watersheds that increase the range, life history diversity, or age cohorts of one or more species would contribute to the overall strategy of making them more robust to disturbances outside and within the region. Sub-watershed categories, and priorities of actions within each sub-watershed, are illustrated in Figure 1.

*Although the Lower Mainstem Wenatchee River is a Category 2 sub-watershed, the Biological Strategy states, "Recent research indicates that the mainstem Wenatchee River provides important habitat for many life stages of spring and summer chinook, steelhead, and bull trout. The mainstem at this time is the most vulnerable to riparian and instream habitat degradation. All remaining intact areas on the mainstem should be protected, and flood plain function should be restored, particularly from the Mission Creek confluence downstream to the Columbia River confluence. This would require only passive restoration," (UCRTT, 2003).

Proposed Wenatchee Habitat Projects - Biological Needs in Category 3 Sub-Watersheds

Chumstick Sub-Watershed	
Biological Priorities	***Project Name***
1) Restore passage for anadromous and inland fish. This should be done in a comprehensive, coordinated strategy, rather than a piecemeal approach.	McDevitt Diversion Project
	North Road Culvert - Chumstick Creek Fish Barrier
	Phase 2 Chumstick Culvert Replacements
2) Protect remaining floodplain and riparian habitat.	
3) Increase stream flow.	
4) Restore riparian habitat, primarily from Eagle Creek to Suntisch Canyon.	
5) Reduce road densities.	
6) Restore stream channel migration.	
7) Reduce nonpoint pollution from septic tanks and livestock.	
8) Reduce fine sediment input from roads and some land management activities.	
UNRATED	Chumstick Groundwater Study and Water Balance

Mission Sub-Watershed	
Biological Priorities	***Project Name***
1) Increase instream flows.	
2) Reduce nonpoint pollution from septic tanks and livestock.	
3) Other projects should be delayed until flow and water quality are addressed.	Mission Creek Streambank Project

In regards to Biological Needs: Category 1 sub-watersheds should receive priority allocation of financial and management resources. Subsequent allocation of resources should be given to Categories 2 and 3, in that order, once refuge habitats (Category 1) for the target species are protected and secured. This does not mean, however, that specific actions should not occur in Category 2 and 3 sub-watersheds until all activities in Category 1 sub-watersheds are completed. Any projects within those sub-watersheds that increase the range, life history diversity, or age cohorts of one or more species would contribute to the overall strategy of making them more robust to disturbances outside and within the region. Sub-watershed categories, and priorities of actions within each sub-watershed, are illustrated in Figure 1.

FIGURES

EXCERPT FROM THE WENATCHEE SUBBASIN PLAN, SECTION 2.5.1

Northwest Power and Conservation Council (NPCC). 2004. Wenatchee Subbasin Plan. Prepared for the Northwest Power and Conservation Council. Lead organizations: Chelan County and the Yakama Nation. Pages xviii – xxi.

2.5.1 Key Findings: Terrestrial

The terrestrial assessment viewed the subbasin from a perspective of key and major vegetative communities. Three community types were identified as focal habitat for this evaluation include: ponderosa pine, shrubsteppe and riparian ecosystems. Within each of these focal habitats, representative species that are directly associated with these vegetative communities are identified for monitoring.

Factors Affecting Ponderosa Pine Habitat

- Repeated timber harvest removed large diameter ponderosa pine and snags, and left the understory. This has resulted in accelerated successional advancement and increased the Douglas fir component.
- Urban and residential development has 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.
- Historically, extensive grazing by domestic sheep may have altered understory composition, resulting in loss of forbs and a decrease in shrub densities.
- Overgrazing has resulted in lack of recruitment of sapling trees, particularly pines.
- Invasion of exotic plants has altered understory conditions and increased fuel loads.
- Fragmentation of remaining tracts has negatively impacted species with large area requirements
- Hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird), exotic nest competitors (European starling), and domestic predators (cats), and may be subject to high levels of human disturbance.
- The timing (spring/summer versus fall) of restoration/silviculture practices such mowing, thinning, and burning of understory removal may be especially detrimental to singleclutch species.
- Spraying insects that are detrimental to forest health may have negative ramifications on lepidopterans (butterflies) and other non-target bird species.

Factors Affecting Shrubsteppe Habitat

- Permanent habitat conversions of shrubsteppe/grassland habitats (e.g., approximately 60 percent of shrubsteppe in Washington to other uses (e.g., agriculture, urbanization). Significant acreage of shrubsteppe habitat continues to be converted to residential development between Wenatchee and Monitor (USFS 1999b).

- Fragmentation of remaining tracts of moderate to good quality shrubsteppe habitat
- Degradation of habitat from intensive grazing and invasion of exotic plant species, particularly annual grasses such as cheatgrass and woody vegetation such as Russian olive
- Degradation and loss of properly functioning shrubsteppe/grassland ecosystems resulting from the encroachment of urban and residential development and conversion to agriculture. Best sites for healthy sagebrush communities (deep soils, relatively mesic conditions) are also best for agricultural productivity; thus, past losses and potential future losses are great. Most of the remaining shrubsteppe in Washington is in private ownership with little long term protection (57%).
- Loss of big sagebrush communities to brush control (may not be detrimental relative to interior grassland habitats)
- Conversion of Conservation Reserve Program (CRP) lands back to cropland
- Loss and reduction of cryptogamic crusts, which help maintain the ecological integrity of shrubsteppe/grassland communities
- High density of nest parasites (brown-headed cowbird) and domestic predators (cats) may be present in hostile/altered landscapes, particularly those in proximity to agricultural and residential areas subject to high levels of human disturbance.
- Agricultural practices that cause direct or indirect mortality and/or reduce wildlife productivity. There are a substantial number of obligate and semi-obligate avian/mammal species; thus, threats to the habitat jeopardize the persistence of these species.
- Fire management, either fire suppression (USFS 1999b), which has resulted in succession of vegetation communities, or overuse of fire, both of which have lead to loss of shrubsteppe
- Much of the low-elevation shrubsteppe vegetation is currently dominated by cheatgrass and other nonnative plants (USFS 1999b). Invasion and seeding of crested wheatgrass and other introduced plant species reduces wildlife habitat quality and/or availability.

Factors Affecting Riparian Wetland Habitat

- Loss of habitat due to numerous factors including riverine recreational developments, inundation from impoundments, cutting and spraying of riparian vegetation for eased access to water courses, gravel mining, etc
- Habitat alteration from 1)hydrological diversions and control of natural flooding regimes (e.g., dams) resulting in reduced stream flows and reduction of overall area of riparian habitat, loss of vertical stratification in riparian vegetation, and lack of recruitment of young cottonwoods, ash, willows, etc., and 2)stream bank stabilization which narrows stream channel, reduces the flood zone, and reduces extent of riparian vegetation
- Habitat degradation from conversion of native riparian shrub and herbaceous vegetation to invasive exotics such as reed canary grass, purple loosestrife, perennial pepperweed, salt cedar, and indigo bush
- Fragmentation and loss of large tracts necessary for area-sensitive species
- Hostile landscapes, particularly those in proximity to agricultural and residential areas, may have high density of nest parasites (brown-headed cowbird), exotic nest competitors (European starling), and domestic predators (cats), and be subject to high levels of human disturbance.

- High energetic costs associated with high rates of competitive interactions with European starlings for cavities may reduce reproductive success of cavity-nesting species such as Lewis' woodpecker, downy woodpecker, and tree swallow, even when outcome of the competition is successful for these species
- Recreational disturbances (e.g., offroad recreational vehicles (ORVs)), particularly during nesting season, and particularly in high-use recreation areas