

**Programmatic Proposal for  
Columbia Cascade Province Habitat Projects  
Identified in the 2008 Columbia Basin Fish Accords MOA**

**Section 10. Narrative**

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**Project ID:** [2009-003-00](#)

<b>Title:</b>	Columbia Cascade Province MOA Habitat Projects
<b>Project Number</b>	200900300
<b>Proposer</b>	Yakama Nation Fisheries Resource Management
<b>Short Description</b>	Upper Columbia Habitat Restoration Project
<b>Province(s)</b>	Columbia Cascade
<b>Subbasin(s)</b>	Wenatchee, Entiat & Methow
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**A. Abstract**

The goal of this project is to improve habitat for salmonids in the Wenatchee, Entiat, and Methow subbasins to a degree capable of supporting sustainable populations. Towards achieving this goal, the Yakama Nation proposes to begin implementing habitat protection and restoration actions in 2009 in these subbasins consistent with actions identified in Appendix B of the 2008 Fish Accord (The Accord). The Accord links actions to potential biological benefits accrued by addressing limiting factors for ESA-listed fish. Furthermore, actions identified in the Accord are consistent with the Regional Recovery Plan, which was incorporated by NMFS into the federal recovery plan and is aligned with subbasin plans, PUD HCPs, tribal recovery plans, and hydroelectric project relicensing agreements. This proposed project is specifically designed to restore ecological functions to stream habitat in the three identified subbasins to contribute to recovery of salmon, steelhead, and bull trout. The outcome of this project will not only benefit listed fish, but is holistic in nature and will improve habitat for other fish and aquatic and terrestrial species present in these areas.

In support of restoring ecological functions in identified subbasins, Yakama Nation staff has been actively involved in habitat protection and restoration planning in the region, including serving as board member on the UCSRB, serving on the UCRTT, and on PUD HCP technical and policy-level committees, and providing assistance and review in recovery planning and in the development of regional monitoring and evaluation strategies. Yakama Nation staff has also worked with stakeholders to identify restoration projects that are ready to implement in 2009. The Yakama Nation plans to contribute project staff and consultants to implement restoration actions and to maintain connections to concurrent planning and restoration efforts in the region. We will also assist other entities with their restoration work by offering cost share opportunities.

## **B. Technical and/or scientific background**

### *Location*

The geographic region addressed by this proposal is located in north-central Washington in the Columbia Cascade Province within the Columbia River Basin (Figure 1). The geology of this area is volcanically and glacially driven, and the climate exhibits wide fluctuations in temperatures and precipitation, including large amounts of snow and runoff, which drives the hydrologic regime (UCSRB 2007). Within the Columbia Cascade Province, consistent with the Accord, habitat actions will be considered for implementation within the Wenatchee, Entiat, and Methow subbasins.

### *Background and History*

In past decades, the Wenatchee, Entiat, and Methow subbasins have experienced many ecological perturbations leading to the decline of habitat quality and quantity for fish and wildlife (UCSRB 2007). Although habitat within many of the upper reaches of these subbasins is in relatively pristine condition, habitat in other portions of these subbasins has undergone extensive alteration caused by forest management practices and recreational, agricultural, municipal, and residential development. Human activities that have affected habitat conditions include water diversions, agricultural activities, stream channelization and diking, road and railway construction, timber harvest, and urban and rural development (Mullan et al. 1992; Chapman et al. 1994a, 1994b, 1995a, 1995b; Andonaegui 1999, 2000, 2001; NPCC 2004a, 2004b, 2004c; UCRTT 2008a). These activities have reduced habitat complexity, connectivity, water quantity and quality, and riparian function in many stream reaches in the Upper Columbia subbasins. Loss of habitat complexity and floodplain connectivity have reduced spawning and rearing habitat for Chinook, steelhead, and bull trout in the larger, mainstem rivers (e.g., Wenatchee, Entiat, Methow, and Okanogan rivers) and in their tributaries. Fish management, including past introductions and persistence of non-native (exotic) fish species, continues to affect survival for listed species.

The Interior Columbia Basin Technical Recovery Team (ICBTRT) defines three independent populations of endangered spring Chinook within the Upper Columbia Spring Chinook Evolutionarily Significant Unit (ESU) (Wenatchee, Entiat, and Methow populations) and five endangered steelhead populations (Wenatchee, Entiat, Methow, Okanogan and Crab Creek populations) within the Upper Columbia steelhead Distinct Population Segment (DPS) (ICBTRT 2003). There are three “core” areas supporting threatened bull trout populations (Wenatchee, Entiat, and Methow subbasins) and two areas designated as “unknown occupancy” (Lake Chelan and Okanogan subbasins) in the Upper Columbia Region (USFWS 2002). As identified by the ICBTRT, nine ESA-listed salmonid fish populations will benefit from this proposal: three Upper Columbia ESU endangered spring Chinook salmon populations (Wenatchee, Entiat, and Methow populations), three Upper Columbia DPS endangered steelhead populations (Wenatchee, Entiat, and Methow populations), and three core areas supporting Upper Columbia DPS threatened bull trout populations (Wenatchee, Entiat, and Methow).

Upper Columbia spring Chinook, steelhead, and bull trout populations within the subbasins are also influenced by hydroelectric project operations, artificial supplementation programs, and

harvest activities occurring both within and outside of the Columbia Cascade Province. The construction and operation of nine hydroelectric facilities on the Columbia River continue to have an effect on Upper Columbia salmonid populations. Presently, Chief Joseph Dam, constructed without fish passage in 1961, represents the most upstream extent of anadromous migration in the Columbia River basin. The Grand Coulee dam, 52 miles upstream of Chief Joseph Dam, has blocked access to over 1,000 miles of upstream habitat in the upper Columbia River basin since its construction in 1934 (Figure 2). Hatchery programs have been implemented in the Upper Columbia Region since construction of Grand Coulee Dam to offset the loss of anadromous salmonid production due to the federally-built hydroelectric projects. With construction of the privately owned Mid-Columbia PUD hydroelectric projects, additional production/hatchery facilities were developed in the Columbia Cascade Province. Ocean harvest and Columbia River harvest continues to affect Upper Columbia salmon and steelhead stocks although harvest has been greatly reduced and is closely managed by fisheries co-managers. In spite of hatchery mitigation efforts, changes in operations and construction of hydroelectric facilities, and curtailment of fish harvest, salmon, steelhead, and bull trout populations in the Upper Columbia continue to decline.

#### *Description of Subbasins and Specific Habitat Problems*

Extensive all-H assessment and planning efforts conducted in the Upper Columbia Region and captured in the Upper Columbia Spring Chinook and Steelhead Recovery Plan (Recovery Plan; UCSRB 2007) have identified the necessity of habitat protection and restoration actions to recovering and maintaining sustainable populations of salmon, steelhead, and bull trout in the region. Since completion of the Recovery Plan, the U.S. Bureau of Reclamation (Reclamation) initiated tributary and reach assessments starting in 2008 in the Upper Columbia region subbasins (Lyon et al. 2008; USBR 2008a, 2008b, 2009) based on priorities established under the Recovery Plan. Reclamation is conducting these assessments as partial fulfillment of their Federal Columbia River Power System (FCRPS) Biological Opinion obligations (NMFS 2008b). These assessments will contribute to the identification of specific habitat actions within prioritized stream reaches of watersheds as recommended in the Recovery Plan and described in the Implementation Plan. Reclamation's assessment process provides much needed hydraulic and geomorphic analyses and evaluation necessary to identify specific projects that was not available at the time of recovery planning. Since Reclamation is limited in its ability to conduct these assessments, the Yakama Nation proposes to assist in conducting reach assessments in 2009 and beyond (Appendix E of this proposal), consistent with methodologies used by Reclamation in previous tributary and reach assessments associated with implementation of Reclamation's FCRPS Tributary Habitat Program. These assessments use existing information such as that contained in subbasin and recovery plans to produce projects designed to improve habitat function and survival for the Wenatchee, Entiat and Methow populations consistent with the Action Agencies commitment under the BiOp (More information and Reach Assessment reports are available at <http://www.usbr.gov/pn/programs/fcrps/thp/ucao/>.)

Following is a summary of habitat conditions, key findings, hypothesis statements, objectives, and desired future conditions (by reference) for each subbasin considered under this programmatic proposal. Figure 3 illustrates the process by which priority reaches and limiting factors based on reach assessments and subbasin plans will be used to identify site-specific actions for implementation.

Based on information from Yakama Nation and Reclamation's Reach Assessments, habitat projects will be identified, incorporated into the UCSRB Implementation Schedule and prioritized for implementation. Habitat projects will address identified key habitat limiting factors by protecting functioning habitat and restoring degraded ecosystem functions or processes. This is consistent with the goals and objectives of the Northwest Power and Conservation Council (NPCC) 2000 Columbia Basin Fish and Wildlife Program (Fish and Wildlife Program) and the objectives in the Accord. Identified actions consistent with the Accord will be designed and implemented to benefit abundance, productivity, population spatial structure, and life history diversity parameters for fish species at the population scale consistent with the Recovery Plan and the UCRTT Biological Strategy.

### Wenatchee subbasin

The Wenatchee subbasin is the second largest of the three subbasins considered in this proposal (854,000 acres), consisting of nine primary watersheds: Mission, Peshastin, Chumstick, Icicle, Chiwaukum, and Nason creeks, the Chiwawa, White, and Little Wenatchee rivers; and two mainstem Wenatchee River "watersheds": the lower Wenatchee River and the upper Wenatchee River (the upper river includes Lake Wenatchee) (Figure 4). Spring Chinook, steelhead, and bull trout spawn and rear in the subbasin (UCSRB 2007).

State highways, railroads, and housing developments have substantially diminished the overall function of the stream channel and floodplains of the Wenatchee River and some of its major tributaries (e.g., Peshastin Creek and Nason Creek). This has impaired stream complexity, wood and gravel recruitment, floodwater retention, late summer flows, and water quality. The highest priority for habitat actions within the Wenatchee subbasin is the protection of highly functioning habitat in the watersheds of the upper Wenatchee subbasin, specifically the White River, Chiwawa River, and the upper and middle mainstem Wenatchee River (including Lake Wenatchee). Additional priorities are to increase and restore the functionality of watersheds such as Nason, Peshastin, and Icicle creeks, and the Lower Wenatchee River, by restoring and enhancing the natural capacity for channel-shaping events and habitat-maintaining activities, thereby contributing to abundance and productivity (e.g., reconnecting side channels; enhancing instream large woody debris [LWD]; restoring floodplain access; restoring mature, accessible, riparian habitat). Detailed descriptions of factors affecting habitat conditions in the various watersheds of the Wenatchee subbasin can be found in the Biological Strategy (UCRTT 2008a).

For the Wenatchee subbasin, actions implemented will be consistent with the Key Findings, focusing on addressing the summarized Limiting Factors and supporting the Hypothesis Statements (Wenatchee Subbasin Plan, 2004, Section 6.4, pp. 182–217). Habitat objectives and desired future conditions (Wenatchee Subbasin Plan, 2004, Section 7.8, pp. 257–260) will come primarily from "A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale" (USFWS 1999). Strategies, management objectives, and near-term opportunities (Wenatchee Subbasin Plan, 2004, Section 7.8.3–7.8.14, pp. 260–303) will be used as guidance when selecting site-specific actions. As indicated in the Subbasin Plan, the lists of near-term opportunities by assessment unit are not intended to be comprehensive, nor to provide the basis for prioritization. Rather, they are actions that could be accomplished within a 10-year time

frame and would significantly contribute to achievement of long-term objectives and desired future conditions related to salmon recovery. Site specific actions will be identified relying on Reclamation tributary and reach assessments and planned tributary and reach assessments to be conducted beginning in 2009 by the Yakama Nation.

#### Entiat subbasin

The Entiat subbasin is the smallest of the three subbasins considered in this proposal (298,000 acres), containing two primary watersheds: Entiat and Mad rivers (Figure 5). Spring Chinook, steelhead, and bull trout spawn and rear in the Entiat subbasin (UCSRB 2007).

The Entiat River has been affected by upland management activities throughout the subbasin and construction of flood control dikes in the lower mainstem. Upland erosion is a chronic problem in the Entiat Watershed. Reduced stream channel complexity is the primary limitation to productivity of salmonids on the lower 20 kilometers (km) of the mainstem Entiat River (downstream of the terminal moraine; Category 2). Stream sinuosity is low, with very few point bars for gravel accumulation. Instream habitat diversity is also low, with few pools, glides, pocket waters or LWD accumulations. As a result, there are few resting and rearing areas for both adult and juvenile salmon in the lower mainstem Entiat River. Efforts to improve stream sinuosity and channel forming processes in the lower reach should be continued.

Based on the Entiat Watershed Plan (2004) and the Recovery Plan, the most feasible means to restore habitat in the lower Entiat River is structure placement as an immediate improvement, and floodplain restoration as the long-term solution. This short-term/long-term approach is the most pragmatic restoration practice available for the lower Entiat River. Initially, managers should actively enhance the lower Entiat River by increasing stream habitat complexity and encouraging thalweg development and deposition of spawning gravels. The long-term approach should be to restore riparian and floodplain habitat in the lower Entiat River. Such measures would also be feasible in the lower Mad River (a Category 2 subwatershed). The lower Entiat River is one of the few areas in the Upper Columbia Region where active manipulation of the stream channel is appropriate, and it should only be done with a strategy in place to restore floodplain function on a permanent basis.

The most pressing needs on the lower Entiat River are to enhance instream complexity and riparian cover, yet there are other factors that adversely affect salmonids. Instream flows have also been identified as a limiting factor for salmonid production in the lower Entiat River (Recovery Plan, Appendix G). This is due to the natural characteristics of the watershed, upland slope condition, irrigation water withdrawals, and stream channel modifications in the lower Entiat River. Actions that increase late summer flows in the lower Entiat River should be a subbasin priority. Detailed descriptions of factors affecting habitat conditions in the watersheds of the Entiat subbasin can be found in the Biological Strategy (UCRTT 2008a).

For the Entiat subbasin, actions implemented will be consistent with the Key Findings by assessment unit (Entiat Subbasin Plan, 2004, Section 6.4.2, pp. 145–154) and the Near Term Opportunities for Habitat Needs (Entiat Subbasin Plan, 2004, Section 6.4.5, pp. 159–164). Habitat objectives and desired future conditions (Entiat Subbasin Plan, 2004, Section 7.6, pp. 171–174) will come primarily from “A Framework to Assist in Making Endangered Species Act

Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation Watershed Scale” (USFWS 1999). Strategies, management objectives, and near-term opportunities (Entiat Subbasin Plan, 2004, Section 7.6, pp. 174–185) will be used as guidance when selecting site-specific actions, along with the Working Hypotheses (Entiat Subbasin Plan, 2004, Section 7.7.2, pp. 188–199). As indicated in the Subbasin Plan, the lists of near-term opportunities by assessment unit are not intended to be comprehensive nor to provide the basis for prioritization. Rather, they are actions that could be accomplished within a 10-year time frame and would significantly contribute to achievement of long-term objectives and desired future conditions related to salmon recovery. Site specific actions will be identified relying on Reclamation tributary and reach assessments and planned tributary and reach assessments to be conducted beginning in 2009 by the Yakama Nation.

### Methow subbasin

The largest of these three subbasins is the Methow subbasin, which covers approximately 1,167,764 acres and consists of ten primary watersheds: Early Winters Creek, Upper Methow, Lost, Middle Methow, Chewuch, Twisp, Beaver Creek, Gold Creek, Libby Creek, and the Lower Methow rivers (Figure 6). Spring Chinook, steelhead, and bull trout spawn and rear in the Methow subbasin (UCSRB 2007).

The Methow River has a high proportion of pristine habitat in the upper portions of major tributaries that should be protected. The middle and lower mainstem and lower portions of major tributaries have been affected by state highways, county roads, and housing and agricultural development that have diminished the overall function of the stream channel and floodplain. This development has impaired stream complexity, wood and gravel recruitment, floodwater retention, and water quality. Additionally, late summer and winter instream flow conditions often reduce migration, spawning, and rearing habitat for native salmonids. This problem is partly natural (a result of watershed-specific weather and geologic conditions), but it is exacerbated by irrigation withdrawals.

The highest priority within the Methow subbasin is the protection of habitat that supports salmonid communities so that the populations are robust to environmental disturbances, can increase in abundance, and can expand their range to adjacent watersheds. Priority watersheds for protection actions within the Methow Subbasin are the Lost, Twisp, Chewuch, Upper and Middle Methow Rivers, and Early Winters Creek. Additional priorities are to increase the functionality of watersheds such as the Twisp, Chewuch, and Mainstem Methow Rivers, including important subwatersheds such as Wolf, Gold, Libby, and Beaver creeks. In the Methow, these watersheds offer the highest potential to increase abundance and productivity through restoration efforts. Detailed descriptions of factors affecting habitat conditions in the various watersheds of the Methow subbasin can be found in the Biological Strategy (UCRTT 2008a).

For the Methow subbasin, actions will be consistent with the Assessment Unit Summaries (Methow Subbasin Plan, Section 5.5, pp. 301–353) and the limiting factors strategies, working hypotheses, and habitat objectives described therein for each assessment unit. Site specific actions will be identified relying on Reclamation tributary and reach assessments and planned tributary and reach assessments to be conducted beginning in 2009 by the Yakama Nation.

In general, habitat projects throughout the Upper Columbia basin will be prioritized and address limiting factor classes as identified in the RTT's Revised Biological Strategy (UCRTT 2008). Furthermore, the YN intends to work with the UCSRB to develop the UC Implementation Plan into the single guide for project and funding coordination.

### **C. Rationale and significance to regional programs**

Both habitat protection and habitat restoration actions will be implemented under this project for streams that currently support or are capable of supporting ESA-listed spring Chinook salmon, steelhead, and bull trout in the Upper Columbia Region. Habitat restoration is defined as a process that involves management decisions and actions that enhance the rate of recovery of habitat conditions (Davis et al. 1984). The goal is to re-establish the ability of the ecosystem to maintain its function and organization without continued human intervention. Habitat protection will include the use of management decisions and actions to safeguard ecosystem function and required habitat features of listed species.

The vision of the Fish and Wildlife Program is “a Columbia River ecosystem that sustains an abundant, productive, and diverse community of fish and wildlife, mitigating across the basin for the adverse effects to fish and wildlife caused by the development and operation of the hydrosystem” (p. 9, draft Fish and Wildlife Program, Sept. 2008). This vision is consistent with the vision for the Recovery Plan which is to “develop and maintain a healthy ecosystem that contributes to the rebuilding of key fish populations by providing abundant, productive, and diverse populations of aquatic species that support the social, cultural, and economic well being of the communities both within and outside the recovery region” (The Recovery Plan, pg. 12 ). The Recovery Plan vision is consistent with the visions and goals stated in the Methow, Wenatchee, and Entiat subbasin plans and watershed plans, and aligns with the goal of the Yakama Nation Fisheries Program, which is to restore steelhead and salmon to harvestable levels in the Upper Columbia region of the Columbia Cascade Province and elsewhere in our ceded area.

In the Upper Columbia Region, the Recovery Plan represents the most comprehensive and programmatically integrated strategy for identifying and prioritizing habitat restoration actions with the goal of recovery of salmon, steelhead, and bull trout populations. Completed in August 2007 and incorporated by NMFS into the federal recovery plan on October 9, 2007 (Federal Register Notice Vol. 72, No. 194, RIN 0648-XD02, Endangered and Threatened Species; Recovery Plans), the Recovery Plan is derived from subbasin plans, tribal recovery plans, watershed plans, the Biological Strategy (UCRTT 2008a), and the draft Bull Trout Recovery Plan (USFWS 2002). The Recovery Plan was also developed to be consistent with the requirements of the Douglas County PUD and Chelan County PUD Anadromous Fish Agreement and HCPs, the Grant PUD Salmon and Steelhead Settlement Agreement, and other related hydroelectric relicensing agreements and license requirements.

The objectives and recommended actions in the Recovery Plan are linked directly to “primary” limiting factors/threats identified in subbasin plans, watershed plans, and the UCRTT Biological Strategy. Limiting factors may not be fully understood within each subbasin;

therefore, the Recovery Plan relies on monitoring and adaptive management to assist in the identification of limiting factors and to assess effects of habitat actions. Information used in the development of these documents included limiting factors assessments, Ecosystem Diagnosis and Treatment (EDT), empirical and derived data, and local knowledge and professional judgment. Adaptive management will not only be based on the evaluation of monitoring results but will also be based on tributary and reach assessments as they are completed within the subbasins. The objectives in the Recovery Plan (Recovery Plan, p. 194) were provided at both the regional scale and the subbasin assessment unit (AU) scale (Recovery Plan, Table 5.9, p. 236; and Recovery Plan, Appendix G).

In 2008, the “Federal Action Agencies” (the Bonneville Power Administration {BPA}, the U.S. Army Corps of Engineers {Corps} and Reclamation) and the Confederated Tribes of the Warm Springs Reservation of Oregon, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes and Bands of the Yakama Nation, and the Columbia River Inter-Tribal Fish Commission (CRITFC) signed the Columbia Basin Fish Accords Memorandum of Agreement (MOA) between the Three Treaty Tribes and FCRPS Action Agencies (The Accord). The goal for this Accord was to address direct and indirect effects of construction, inundation, operation, and maintenance of the FCRPS and Reclamation’s Upper Snake River Projects on fish resources of the Columbia River Basin. The Accord includes requirements that funded habitat actions are linked to biological benefits based on limiting factors for ESA-listed fish, and that actions be consistent with recovery plans and subbasin plans.

With the Recovery Plan vision and the funding provided by the Accord in mind, the Yakama Nation is in a position to play a vital role in the implementation of habitat protection and restoration actions that are set forth in the Recovery Plan and that were derived from the limiting factors analyses included in the subbasin plans. The AU summaries in the subbasin plans led to the implementation plan laid out in the Recovery Plan (Recovery Plan, Appendix M), and subsequently the habitat actions in the Recovery Plan were the basis for actions described in the Accord. Thus, the Accord has become the means for implementing many of the recommendations given in the AU summaries. The actions discussed under this programmatic project proposal are therefore consistent with the Recovery Plan and subbasin plan actions, which were directly linked to the anticipated survival benefits identified in the Accord. Proposed action types can be found in Attachment B of the Accord.

Consistent with the Independent Scientific Review Panel’s (ISRP’s) guidance for this section, the Yakama Nation provides the following information regarding the relationship of this project to regional programs, specifically to the objectives of the Accord, the Fish and Wildlife Program, the subbasin plans, and the Recovery Plan:

- The actions will align with those listed in Attachment B of the Accord or as modified in accordance with section III.E of the Accord.
- The actions will agree with the Fish and Wildlife Program, which incorporated the 2004 subbasin plans into the Fish and Wildlife Program as approved by the ISRP and adopted by the NPCC in the 2004 amendment process. Actions will address habitat limiting factors by protecting functioning habitat and restoring degraded ecosystem functions or processes consistent with the following subbasin plan sections: Key Findings (Section 6.2), Hypothesis Statements (Section 6.3), and Near Term Opportunities for Habitat



Needs (Section 6.5), as presented in the Entiat Subbasin Plan; Assessment Unit Summaries (Section 5.5) as presented in the Methow Subbasin Plan; and Key Findings and Hypothesis Statements (Section 6.4) as presented in the Wenatchee Subbasin Plan. Identified projects will be designed and implemented to benefit abundance, productivity, population spatial structure, and life history diversity parameters for fish species at the population scale. Projects will be consistent with fish habitat objectives (USFWS 1999) and desired future conditions, strategies, and near-term opportunities provided in Section 7.6 of the Entiat Subbasin Plan, Section 5.5 of the Methow Subbasin Plan, and Section 7.8 of the Wenatchee Subbasin Plan.

- Given that most of the Accord actions were taken directly from the 2007 Recovery Plan, actions will be implemented using the suites of potential habitat actions for each habitat action class identified in the Recovery Plan (Recovery Plan, Table 5.9, p. 236) as appropriate or as modified in accordance with section III.E of the Accord. The Recovery Plan identifies “classes” of restoration actions (Habitat Action Class)—for example, riparian restoration, side channel reconnection, or obstruction restoration—and links these Habitat Action Classes to “primary” limiting factors and application to the VSP parameters (Table 5.9, p. 236). A suite of potential habitat actions for each habitat action class is also provided. Restoration classes were identified through a collaborative process that included federal, state, and local governments, tribes, and local stakeholder participation. The Recovery Plan identified suites of actions for each restoration class (Potential Habitat Actions). It does *not*, at this time, identify which of those specific actions will be implemented within each assessment unit, nor does it identify specific locations within the assessment unit where an action will be implemented. Rather, the Recovery Plan provides a short list of specific actions that *could* be implemented within each restoration class (Table 5.9). The Recovery Plan does identify the appropriate restoration classes that are needed to address the primary limiting factors and threats within assessment units (Recovery Plan, Appendix G, Habitat Matrices). The tables in Appendix G of the Recovery Plan are organized by subbasin (a different table for each subbasin) and by geographic assessment unit. Each table identifies the primary limiting factor(s) by assessment unit, the primary causal factors or threats, the management objectives, appropriate restoration classes (from Table 5.9), specific restoration actions (from Table 5.9), species affected by the action (spring Chinook, steelhead, or bull trout), contribution of the action to VSP (A/P or SS/D), and effect time. Assessment units were also ranked according to their importance to recovery. At this time, the tables do not reflect the feasibility of implementing habitat actions.

As habitat actions are identified, they will be implemented according to the framework for sequencing or prioritizing actions described in Section 8.4 of the Recovery Plan. On January 9, 2009, the UCSRB adopted and consolidated the most recent versions of the WAT’s Implementation Plans for recovery planning. The consolidated Implementation Plans provide the most current and specific scheduled list of habitat actions for implementation in the Wenatchee, Entiat, and Methow subbasins. The Implementation Plan represents an organized attempt to build a strategy of action for the next 3-5 years.

#### **D. Relationships to other Planning Processes**

This project will provide the funding to implement habitat actions designed to achieve clearly identified and measurable objectives by addressing limiting factors identified in the subbasin plans. Ongoing monitoring and evaluation programs in the Upper Columbia Region (described in Section H below and in Appendix C of this proposal) will support adaptively managing habitat actions implemented under this project to achieve desired future conditions. These funded actions will be consistent with the Accord and with actions listed in Attachment B of the Accord.

Additionally, there are a number of conservation efforts, including the Recovery Plan, in varying stages of development and implementation that directly or indirectly protect or improve the viability of naturally produced spring Chinook, steelhead, and bull trout in the Upper Columbia Region. Actions under this project will be implemented to complement these ongoing, overlapping efforts. As co-managers of the fisheries resources in Washington State, the Yakama Nation has been actively involved in the conservation and recovery planning efforts in the Upper Columbia Region. Along with Douglas, Chelan, and Okanogan County commissioners and the Colville Confederated Tribes, the Yakama Nation serves as a board member on the UCSRB. The Yakama Nation also serves on the UCR TT, the PUD HCP technical and policy-level committees, and provides assistance and review in the development of regional monitoring and evaluation strategies. We have also worked with stakeholders through the WATs to identify actions that are ready to implement in 2009 as described in the Recovery Plan. WATs are local watershed groups comprised of residents, agency professionals and other stakeholders who work with the UCSRB to coordinate funding, project implementation schedules, monitoring, and adaptive management of the Recovery Plan. Described in Appendix A of this proposal are applicable conservation and recovery planning efforts in the Upper Columbia Region and their relationship to this project, which is built upon the foundation established by these efforts. The diagram in Figure 7 illustrates this relationship.

#### **E. Relationships to other Projects**

Habitat protection and restoration actions and reach assessments will be complementary to and coordinated with past and ongoing projects funded under the Fish and Wildlife Program. These actions will be designed to be consistent with the Recovery Plan and subbasin plans. Actions will have clearly defined, measureable habitat objectives (provided in USFWS 1999) that are consistent with the Monitoring Strategy for the Upper Columbia Basin (Hillman 2006; see Section H of this proposal). Actions will be selected, designed, and implemented to address limiting factors and support the working hypotheses as identified in the appropriate subbasin plan. Given that subbasin plans in the Columbia Cascade Province are integrated into the Recovery Plan, all actions will be consistent with the efforts to recover salmonids.

To provide some context of the types of projects ongoing in the Wenatchee, Entiat, and Methow subbasins at this time, Appendix B of this proposal summarizes key information for recent habitat projects funded in 2007–2008. The UCSRB has begun to collect and collate all habitat protection and restoration projects, regardless of funding source, into a single web-based database accessible to the public at <http://uc.ekosystem.us/>. These projects represent collaborative efforts by some of the following: the Yakama Nation, state and federal agencies,

and local project sponsors<sup>1</sup>, with the contribution of interested stakeholders and landowners. Each of these projects has furthered the objectives in the Recovery Plan, subbasin plans, watershed plans, and the Fish and Wildlife Program.

#### **F. Project history (for ongoing projects)**

Actions implemented under this proposal will continue to support the Fish and Wildlife Program's goals and objectives in the Columbia Cascade Province. As such, this programmatic proposal is a continuation and expansion of Fish and Wildlife Program efforts previously implemented and currently underway in the Province.

#### **G. Proposal biological/physical objectives, work elements, methods, and metrics**

##### **Objectives**

The overall objective of this programmatic project is to improve spawning, rearing, and migration habitat for salmonids in the Wenatchee, Entiat, and Methow subbasins through a reach-based approach to a level capable of producing and supporting sustainable populations. Any protection or restoration actions implemented will be identified through a reach assessment process and designed to address limiting factors using working hypotheses established in subbasin plans to achieve concise, measurable habitat objectives consistent with the Recovery Plan.

Habitat objectives for the Methow, Wenatchee, and Entiat subbasins are listed in detail in Sections 5.5, 7.8, and 7.6.3, respectively, of the subbasin plans. Bull trout objectives are intended to be consistent with the physical habitat objectives for functioning conditions described in "*A Framework to Assist in Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Bull Trout Subpopulation watershed Scale*" (USFWS 1999), for use in gauging the success of the actions. These habitat objectives are also consistent with methods and protocols described in the Upper Columbia Monitoring Strategy (Hillman 2006). If monitoring and evaluation results indicate a need for replacement actions, adaptive management may be applied per the Recovery Plan (see Section H below), which reflects ISRP guidance for Fish and Wildlife Program proposed projects (Section 3.0, ISRP 2006).

##### **Work Elements (tasks), methods, and metrics**

Under this project, tasks will be developed for each action on an action-by-action basis. Specific tasks will be identified through a reach assessment and designed to address limiting factors identified in subbasin plans and to achieve subbasin plan objectives. Where specific habitat actions have already been identified in subbasin plans or in Attachment B of the Accord, these actions will be implemented consistent with Adaptive Management as described in the MOA (see Section H, Adaptive Management, below). Beginning in 2009, as part of this project, the Yakama Nation will conduct reach assessments in reaches within nine identified tributaries using

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<sup>1</sup> The three project sponsors in these subbasins are the Chelan County Natural Resources Department (CCNRD), Cascadia Conservation District (CCD), and the Methow Salmon Recovery Foundation (MSRF).

techniques consistent with Reclamation’s reach assessment protocols (Appendix E of this proposal).

Working with the other fisheries co-managers (WDFW and USFWS,) we developed a table that that identified priority Assessments Units and the types of actions appropriate to address the identified limiting factors. The YN fisheries staff then used that table as the starting point from which we selected nine AU’s based on biological priorities and the likelihood that we would be able to get projects on-the-ground during the first year.

The co-managers are of the opinion that within the region, we need to move away from the old paradigm of implementing projects as isolated “targets of opportunity” (even if recommended in a reach-type assessment) and instead develop a comprehensive, coordinated and strategic approach to restoration, i.e. pick a reach, identify what needs to done, layout a path to make the repairs, and when it is done monitor the efforts and move on to a new area. When we talk of taking a reach-based approach, generally we’re talking about an assessment unit as a reach but it comes down more to selecting a manageable geomorphic area within which to focus efforts until the restoration strategy is accomplished. For example, instead of developing a single restoration strategy for Nason Creek, it might be more feasible to develop lower and upper reach strategies with implementation dates that are separated by a period of several years. The point being: focus on restoring a reach rather than looking for projects that you can do because they are most likely to be fundable in a given year.

Our intention during this initial year then is to work with the WATs to develop, design, and implement projects or strategies within the selected reaches that address the priority actions.

Peshastin

Priority Actions	Comments
Geomorphic assessment / Water Quantity/ Channel Complexity	Geomorphic assessment needs to include the entire area impacted by the highway (at least to Tronson Ck confluence). Need a restoration plan that includes restoration of normative flow levels and migration, holding and rearing to lower Peshastin Creek and addresses natural processes where possible.
	Select opportunities that protect or allow for sidechannel reconnection would be higher priority.

Three types of actions were identified in the MOA: Flow, Instream structure and Road management.

1. Flow – no immediate projects. There is a need to evaluate pumpback and storage as possible benefits. There is a need to coordinate with the irrigation district.
2. Instream structures – Hire consultant to conduct reach (geomorphic) assessment and develop projects.

3. Road management – This is mostly a USFS task for the area above Ingalls Creek. Work with the USFS to complete the road assessment and develop projects in 2010.

Nason Creek

Priority Actions	Comments
Off channel / sidechannel reconnection	Feasibility of implementing priority actions is very low in the first 3 years. Need to focus initial effort on making progress with DOT and the Railroad and putting together a restoration plan. Instream structures should not be implemented until progress is made with restoring natural processes and addressing the causes of limiting factors.
assessment / prioritization (yrs 1-2) ; pursue acquisitions and easements (yr 3-10)	Combine USBR assessment information with lower 4.6 miles and determine priority areas for protection based on biological function and risk of development.

The three components identified in the MOA are Instream structures, Side Channels, and project assessment. Our strategy here is to not fund any projects until the AU restoration strategy is complete.

Upper Wenatchee

Priority Actions	Comments
Increase LWD retention, recruitment, and complexity	Need assessment to determine appropriate locations and prescriptions. Preference for actions that enhance natural accumulations of LWD.
	Select opportunities that protect or allow for sidechannel reconnection would be higher priority.

Instream structures are the restoration actions identified for this AU. For 2008-2010, we will complete the pilot reach assessment begun by the Herrera consulting group

Entiat (Stillwaters)

Priority Actions	Comments
sidechannel off channel connection / increase LWD retention, recruitment, and complexity	Actions must address reestablishment of natural process and the causal mechanisms for limiting factors.


There is a current proposal to conduct a project assessment between RM 21-23 and design and build two structures. We are working with partners to evaluate the full reach (RM 17-23).

Mid-Methow (Twisp-Weeman)

Priority Actions	Comments
Off channel / sidechannel reconnection; Increase LWD retention, recruitment, and complexity	Work with USBR on implementation of the Big Valley Reach Assessment and the pending M2 assessment, in later years will need to extend down to Carlton. Hancock Creek also has enhancement opportunities that are good early implementation options.
	Conservation easements and acquisitions that are focused on the riparian and floodplain areas.

Lower Twisp

Priority Actions	Comments
Water Quantity; Off channel / sidechannel reconnection; Increase LWD retention, recruitment, and complexity	MVID west efficiencies. Where possible remove dikes and levees and manage roads to allow for natural channel migration.
Lower 12 miles	Conservation easements and acquisitions that are focused on the riparian and floodplain areas.

This is an important reach but no projects ready to go right now.

Lower Chewuch

Priority Actions	Comments
Water Quantity; Off channel / sidechannel reconnection; Increase LWD retention, recruitment, and complexity	Still may be some opportunities with the Chewuch and Fulton Irrigation withdrawals. Need to develop a watershed restoration strategy utilizing the PWI assessment and the USBR geomorphic assessment.
	Conservation easements and acquisitions that are focused on the riparian and floodplain

	areas.
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The same situation as in Lower Twisp.

### Gold Creek / Libby Creek

Priority Actions	Comments
	Where opportunities arise barriers should be a priority.

Needs a reach assessment.

The priority reaches will be recommended to the WATs for their use in developing action plans. Actions will be identified and selected through a habitat restoration action selection process as described in Appendix F of this proposal and described in terms of measureable objectives. Monitoring and evaluation protocols will be consistent with the Recovery Plan Monitoring and Evaluation Plan (Appendix P<sup>2</sup>) and with the Integrated Status and Effectiveness Monitoring Project (ISEMP; see Section H below).

Sequencing or prioritizing actions will occur according to the framework described in the Implementation Plan, Section 8.4 of the Recovery Plan. This framework was adopted by the UCSRB on January 9, 2009. The Implementation Plans provide the most current and specific scheduled list of habitat projects for implementation in the Wenatchee, Entiat, and Methow subbasins. According to the Implementation Plans, projects that address primary limiting factors, have high biological benefit, are relatively inexpensive, and are feasible to implement will receive highest funding priority. Projects that are expensive, have low biological benefit to listed fish species, and have relatively low feasibility will receive lowest funding priority. The Recovery Plan Implementation Schedule, Appendix M of the Recovery Plan, has been updated and is included as Appendix G of this proposal.

### H. Monitoring and Evaluation

Monitoring and evaluation of Project actions will be accomplished as described in the UC Monitoring and Evaluation Plan (NMFS 2008c) consistent with the Monitoring Strategy for the Upper Columbia Basin (Hillman 2006). A separate monitoring and evaluation plan is not proposed for this Project.

Status and trend monitoring will be implemented by Chelan, Douglas, and Grant PUDs under their respective HCPs and Settlement Agreements (further described in Appendix A and Appendix C of this proposal) as indicated in the UC Monitoring and Evaluation Plan.

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<sup>2</sup> The Recovery Plan Monitoring and Evaluation Plan (Appendix P) is a draft document. It has been reviewed by the RTT and is currently under review by the Recovery Implementation Science Team (RIST, previously the ICBTRT). The draft Recovery Plan Monitoring and Evaluation Plan has not yet been approved by the UCSRB.

Implementation and Compliance monitoring will be implemented by project proponents by using project tracking forms as indicated in the UC Monitoring and Evaluation Plan, section 6.

Effectiveness monitoring, to demonstrate that the project is achieving desired habitat results, will be addressed through the following programs consistent with the Effectiveness Monitoring Approach described in the UC Monitoring and Evaluation Plan (section 7):

- Methow Subbasin: USGS Effectiveness Monitoring, AREMP, PIBO
- Wenatchee Subbasin: ISEMP, AREMP, PIBO
- Entiat Subbasin: ISEMP, AREMP, PIBO

These on-going programs do leave data gaps. Current data gaps are identified in a compilation on the current state of monitoring in the Upper Columbia Region (UCRTT 2008b). Although hydro, harvest, and hatchery actions are, or will be, monitored for effectiveness because it is required through regulatory mandates (e.g., *U.S. v OR*, HCPs, BiOps, Relicensing Agreements, etc.), effectiveness monitoring of habitat actions are not funded beyond the monitoring programs identified immediately above for each subbasin and further described in Appendix C of this proposal. Monitoring plans will be developed for appropriate habitat actions as funding is made available. The UC Monitoring and Evaluation Plan outlines the steps needed to develop valid effectiveness monitoring plans.

Data for conducting monitoring and evaluation will be collated and QA/QC'd through the UC regional data management system. The data will be housed at the NWFSC's STEM data bank. Both the regional data management system and the STEM data bank are further described in Appendix C of this proposal under the subheading, UC Monitoring and Evaluation Plan.

## **Background**

To reduce redundancy and increase efficiency in monitoring efforts, the UCSRB, BPA, and NMFS commissioned the development of a regional monitoring strategy for the Upper Columbia Region. The Monitoring Strategy for the Upper Columbia Basin (Hillman 2006) is not another regional monitoring plan. Rather, the plan draws from existing regional monitoring plans and strategies and outlines an approach for coordinating monitoring efforts specific to the Upper Columbia Region. Further description of this document is provided in Appendix C of this proposal. Specifically, the following entities are implementing monitoring programs in the Upper Columbia Region: NMFS (Upper Columbia Monitoring and Evaluation Plan); Reclamation (USGS Effectiveness Monitoring); NOAA Fisheries (ISEMP); the Northwest Forest Plan Aquatic and Riparian Effectiveness Monitoring Plan (AREMP); USFS (Pacfish/Infish Biological Opinion Effectiveness Monitoring; PIBO); the Pacific Northwest Aquatic Monitoring Partnership (PNAMP); Collaborative System-wide Monitoring and Evaluation Project (CSMEP); Chelan and Douglas PUDs (Murdoch and Peven 2005); Washington Salmon Recovery Funding Board (SRFB; Washington Comprehensive Monitoring Strategy For Watershed Health and Salmon Recovery); the Okanogan Basin Monitoring and Evaluation Program (OBMEP), and Washington State Department of Ecology (IMW), or such updated or amended versions of these monitoring and evaluation efforts. A summary of each program is provided in Appendix C of this proposal.



Subsequently, NMFS completed a working draft monitoring and evaluation plan for the Upper Columbia Region (UC Monitoring and Evaluation Plan, NMFS 2008c) to be included as an appendix to the Recovery Plan. Further description of this document is provided in Appendix C of this proposal. NMFS acknowledges that it is not possible at this time to develop a monitoring and evaluation plan for ESA-listed salmon and steelhead species in the Upper Columbia Region that addresses *all* the questions identified in the Upper Columbia Monitoring and Evaluation Plan which NMFS considers essential to evaluating the status and trend of each ESA-listed population/ESU/DPS and to evaluating action implementation in the Upper Columbia Region. However, the UC Monitoring and Evaluation Plan does translate each question or set of questions into a monitoring objective. Under each objective, the following elements are described: a sampling design that will be used to address the objective (e.g., census or some type of probabilistic sampling); the spatial/temporal scale of the objective and sampling design; what variables will be measured in the field; what methods or protocols will be used to measure the variables; what metrics will be derived from the measured variables; what statistical method if any will be used to analyze the data; who is likely to fund the monitoring; and who will oversee implementation and coordination of the study. Hillman 2006 laid the groundwork for defining the sampling framework, defining habitat measuring protocols, and defining biological protocols for monitoring and evaluation in the Upper Columbia Region.

### **Adaptive Management**

The Recovery Plan incorporated an adaptive management framework (Section 8.3.6). This adaptive management approach will be followed for this project. The approach is consistent with the intent of the Accord, Section A.2, and with the general principle of replacement projects and adaptive management described in Section E of the Accord. The approach is also consistent with subbasin plans and the Fish and Wildlife Program.

Toward the goal of assessing the progress of recovery planning efforts in the Upper Columbia Region, the UCSRB and the UCRTT plan to hold a workshop in November 2009. During this workshop, information and data collected to date in the Upper Columbia Region subbasins will be provided to inform an update to the ICBTRT status assessments and to assess the progress of the Recovery Plan effort by subbasin. The target audience for this workshop is the UCRTT, scientific colleagues, and technical staff from the WATs.

### **I. Facilities and equipment**

Facilities currently at the disposal of Yakama Nation include:

#### **Office Facilities**

Currently the Yakama Nation maintains three office facilities in the Upper Columbia with staffing anticipated as:

Peshastin: 4 Biologists and varying numbers of Technicians

Wenatchee: 2 Biologists and 2 Technicians

Twisp: 3 Biologists and 2 Technicians

## **Vehicles**

The Upper Columbia Restoration Project will begin the 2009 field season with two pickup trucks and access to additional trucks as necessary. Project staff will also have access to a truck-mounted backhoe, a medium-sized tractor, two quad-type off-road vehicles (ORVs), and one six-wheeled ORV with dump bed.

## **Hand Tools**

The Upper Columbia Restoration Project will begin the 2009 field season with various hand tools at their disposal.

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## **K. Key personnel**

### **BRANDON ROGERS**

#### **Fisheries Biologist III, 1.0 FTE**

**Education:** B.A. Geography, Resource Management 1998  
Central Washington University, Ellensburg WA.

#### **Work Experience**

##### **Yakama Nation Fisheries, Fisheries Biologist II, Jul. 2004-Nov. 2005, and Fisheries Biologist III, Nov. 2005-Present:**

- Co-Manager, Yakama Reservation Watersheds Project.
- Identified and implemented stream restoration projects throughout the Toppenish, Ahtanum and Satus watersheds.
- Supervised the completion of three instream restoration projects in FY05. This included contracting, the bid process project implementation, and final project completion signoff.
- 4 years experience implementing and managing restoration projects.
- Familiar with all aspects of stream restoration including rock grade control, vegetation planting, local state and federal permitting, and working with consulting and construction contractors.
- Laid out and contracted over 15 miles of riparian and rangeland fencing.
- Contracted the construction and implementation of a solar powered stock well
- Worked as the lead contact for the Project's funding, including BPA, USFWS and NRCS.
- Applied for and received grant funding from NRCS EQUIP, USFWS Partners for Fish and Wildlife and Private Lands Stewardship programs and Pacific Coastal Salmon Recovery Fund.
- Responsible for creating and implementing the Project's Scope of Work for FY2005 and FY2006.
- Responsible for co-production of the FY06 budget.

##### **Yakama Nation Fisheries, Fisheries Biologist I, Jul. 2001-Jul.2004:**

- Ahtanum Creek Watershed Restoration Project biologist.
- Use GPS and GIS daily in order to gather and maintain the Satus, Toppenish and Ahtanum projects' GIS database.
- Coordinated with landowners to secure permission for construction of 8 miles of riparian fence. Contracted and supervised the construction of the fence.
- Trained technicians in the use of various applications.
- Worked closely with Washington Department of Fish and Wildlife staff to co-manage Ahtanum Creek.
- Write quarterly and annual reports for the BPA funded Ahtanum Project.

##### **Spokane Tribe of Indians, GIS Coordinator, Jan. 2000-July 2001:**

- Was responsible for the creation and management of the Tribe's GIS.
- Supervised 1 GIS technician.
- Was in charge of all GPS data collection, including collection protocol and quality control.
- Worked closely with the forestry and fisheries programs to meet their GIS needs.
- Designed and completed several large GIS projects including a comprehensive Lake Roosevelt bathymetry project and mapping all reservation roads.
- Performed system administration duties for the Department of Natural Resources.
- Installed and maintained new software on computers throughout the DNR.

**Washington State Department of Transportation, GIS specialist, Jun. 1999-Nov. 1999:**

- Operated ESRI Arc/Info and ArcView on Windows NT platform.
- Project lead on all GIS assignments.
- Developed ArcView interfaces for various environmental and engineering applications.
- Created environmental cartography focused on endangered species protection and wetland mitigation.
- Employed GPS and GIS to delineate wetlands.
- Used Arc/Info to process GIS coverages prior to overlaying them onto airphotos.

**Yakima County GIS Technician, Feb. 1999-Jun. 1999:**

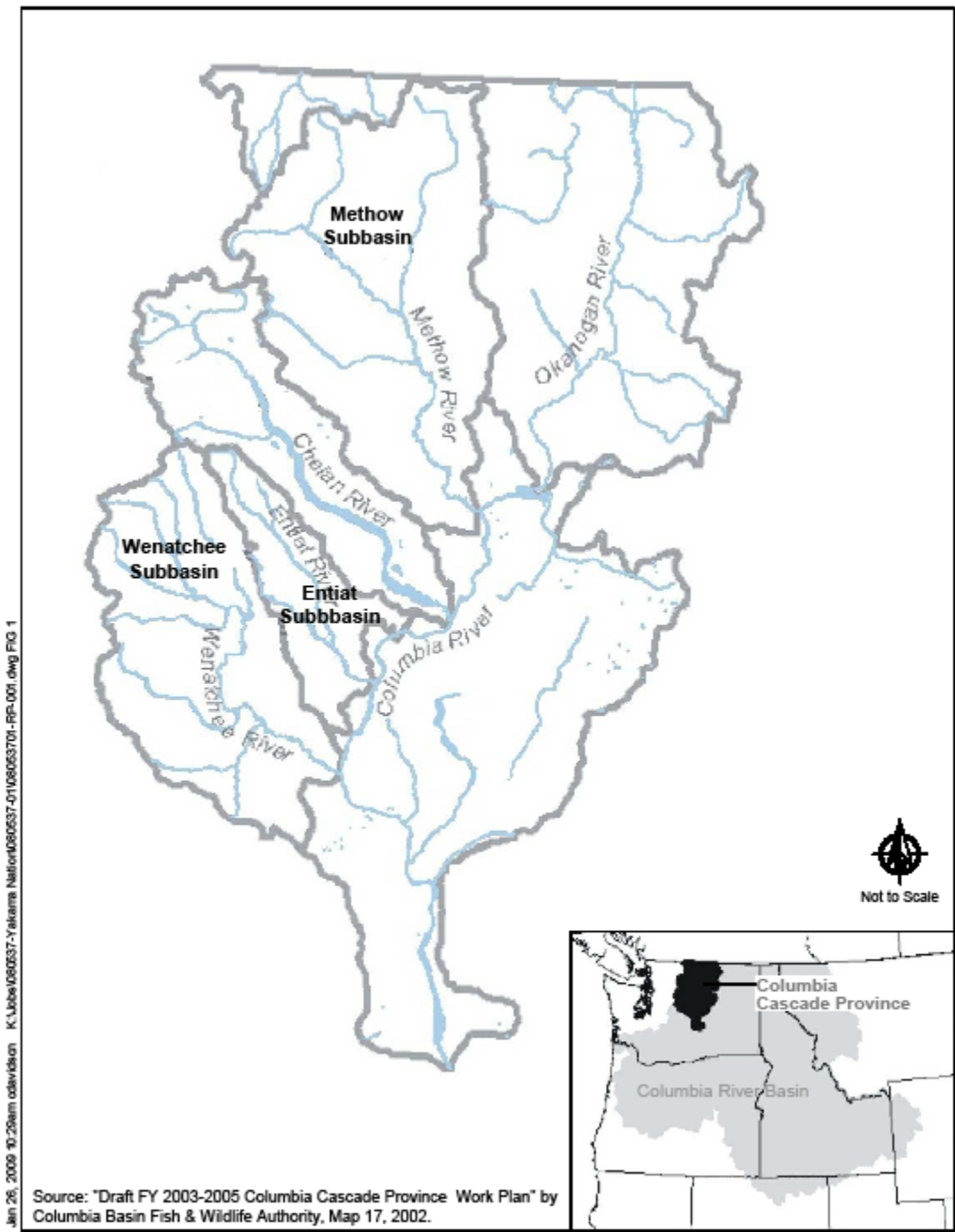
- Used UNIX based ESRI Arc/Info to update county parcel maps.
- Achieved good proficiency with ArcEdit.

**Yakama Nation Fisheries, Cherry Creek Project Volunteer, Oct. 1996-May 1998**

- Planted willow and dogwood cuttings, constructed fences.

## **FIGURES**





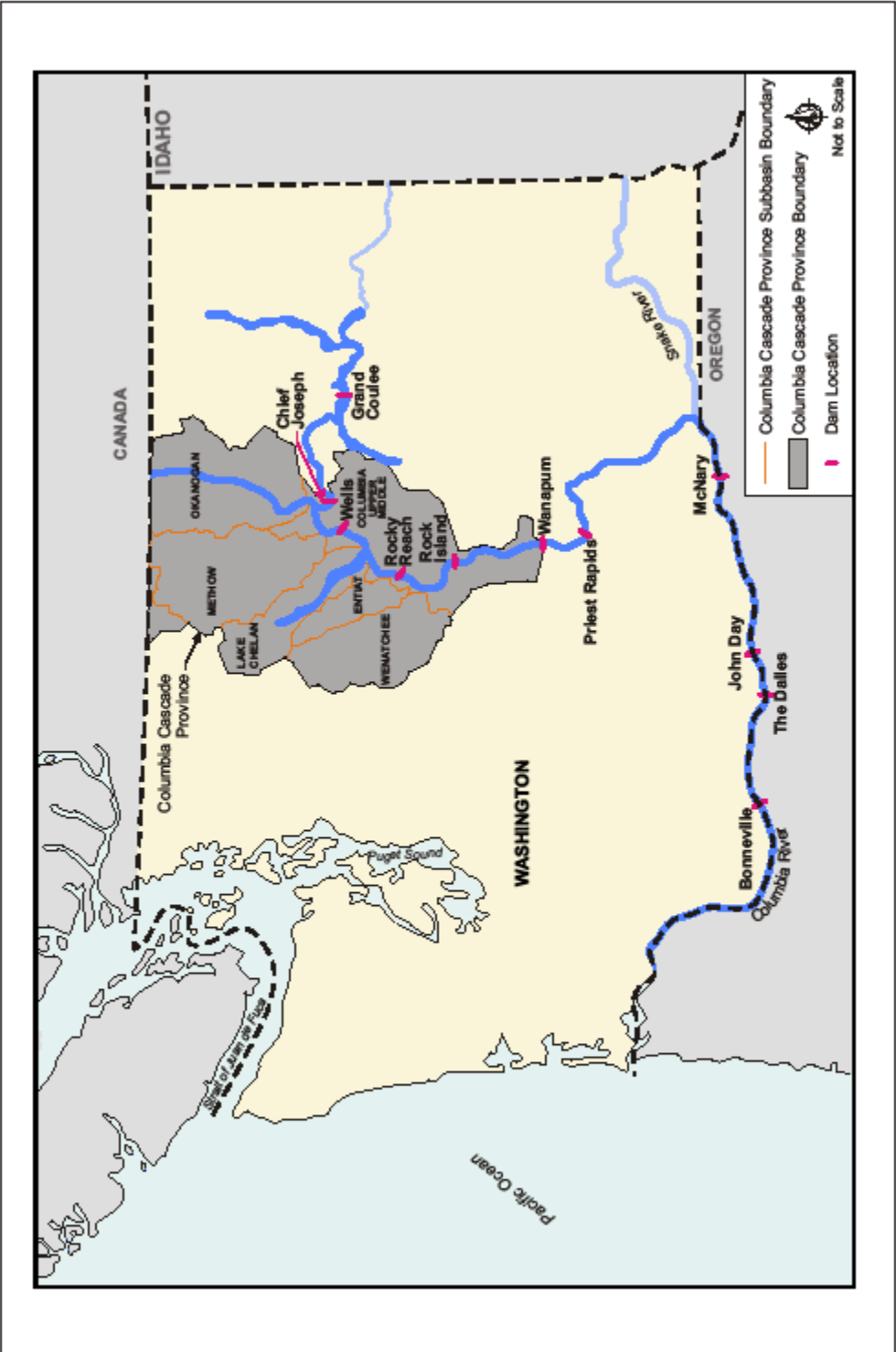
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Source: "Draft FY 2003-2005 Columbia Cascade Province Work Plan" by Columbia Basin Fish & Wildlife Authority, Map 17, 2002.

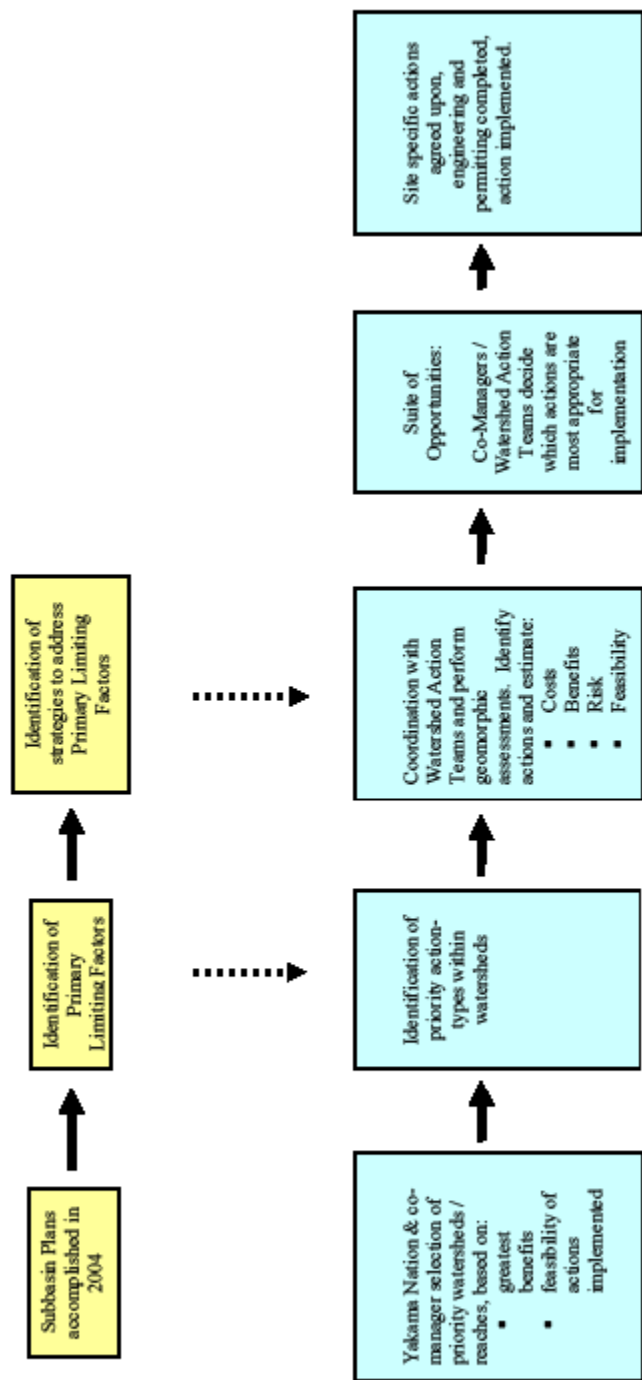
Figure 1

Columbia Cascade Province Map  
ISRP Programmatic Proposal

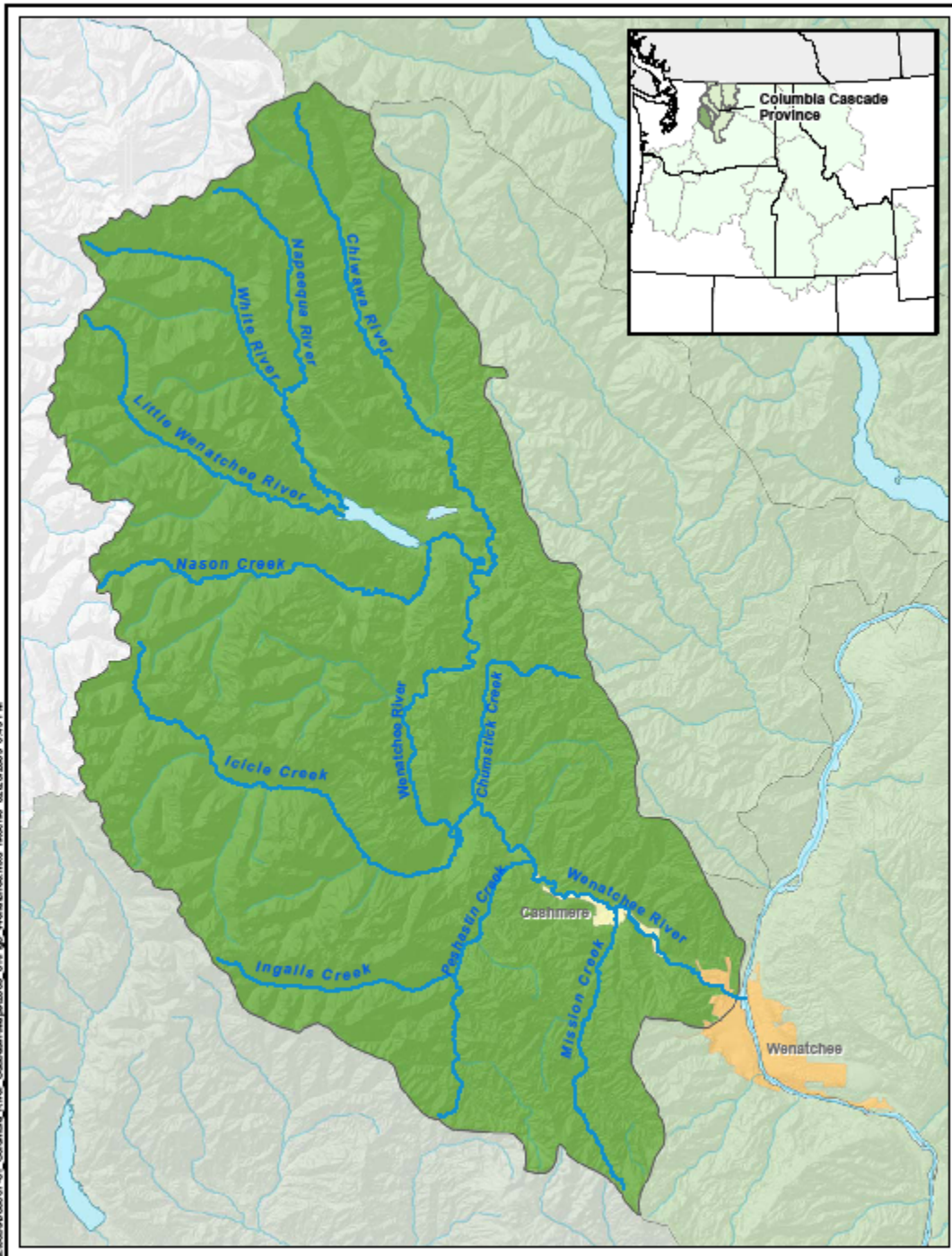




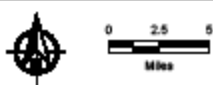
**Figure 2**  
Columbia Cascade Province Subbasins and Columbia River Dams  
ISRP Programmatic Proposal



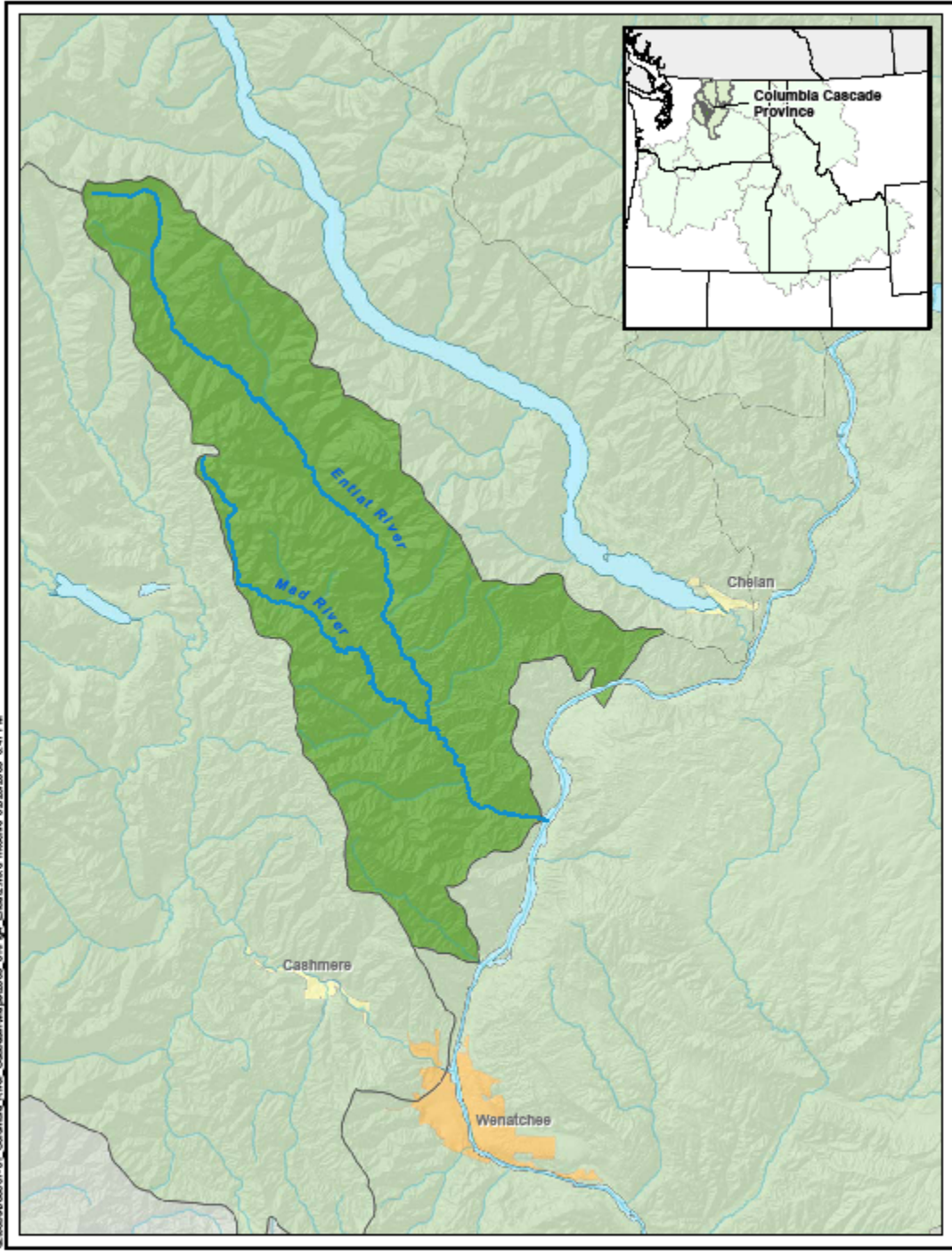
**Figure 3**  
Narrative Diagram  
ISRP Programmatic Proposal



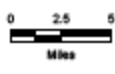
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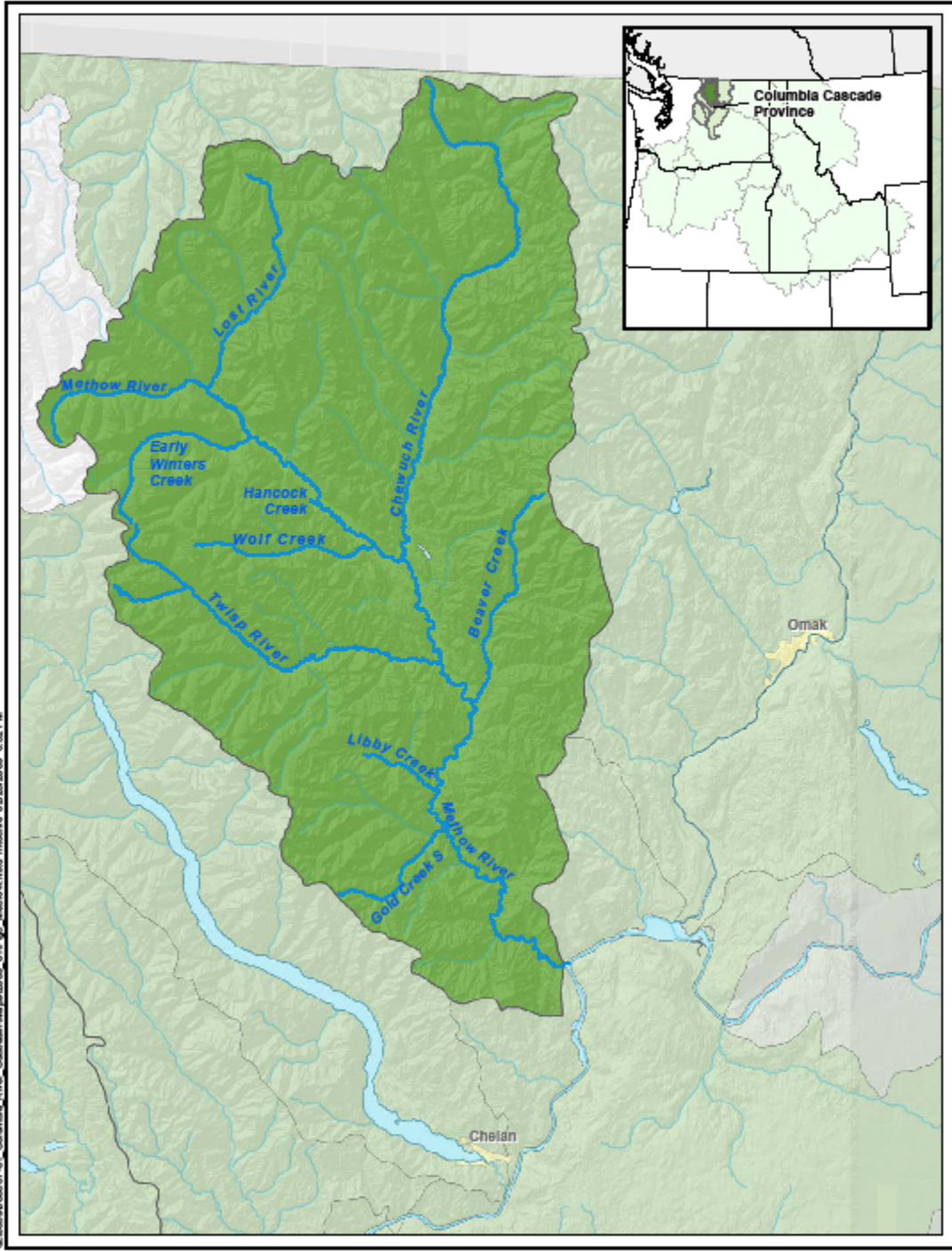
**Figure 4**  
Wenatchee Subbasin  
ISRP Programmatic Proposal



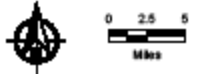
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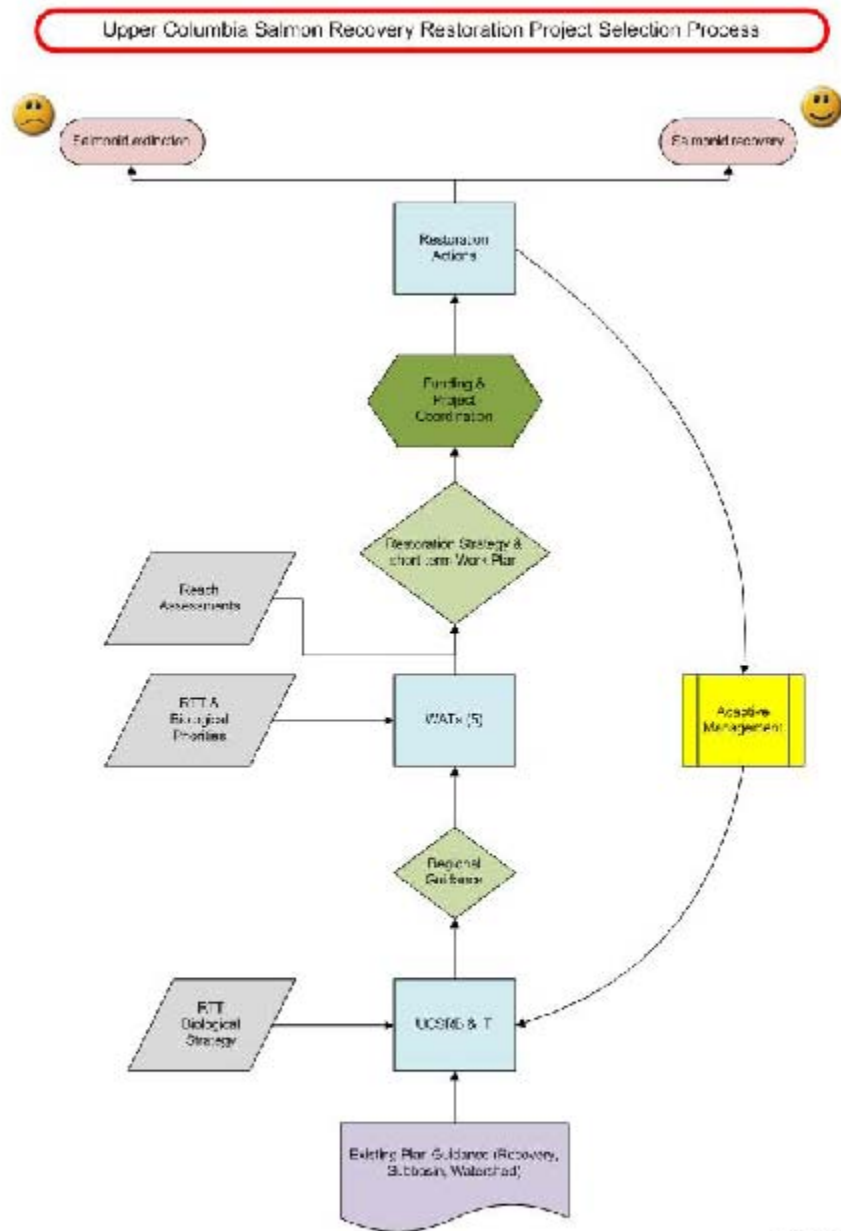
**Figure 5**  
Entiat Subbasin  
ISRP Programmatic Proposal



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**Figure 6**  
Methow Subbasin  
ISRP Programmatic Proposal



**Figure 7**  
 Upper Columbia Salmon Recovery Restoration Project Selection Process  
 ISRP Programmatic Proposal

**APPENDIX A**

**CONSERVATION AND RECOVERY PLANNING EFFORTS IN THE UPPER  
COLUMBIA REGION**



## **ESA Salmon and Steelhead Recovery Planning**

Salmon recovery planning began when the 1998 Washington State Legislature passed Engrossed Senate House Bill 2496 codified into RCW 77.85 (Salmon Recovery Act). RCW 77.85 required the production of salmonid habitat limiting factors reports as part of the critical pathway for a habitat work schedule for Washington State subbasins, as well as began the coordination of regional salmon recovery planning. Subsequently, salmonid habitat limiting factors reports were developed for the Wenatchee, Entiat, and Methow subbasins (Andonaegui 1999; Andonaegui 2000; Andonaegui 2001) and the Upper Columbia Salmon Recovery Board (UCSRB) lead entity began work to produce an Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan to support the recovery of spring Chinook salmon, steelhead, and bull trout listed under the Endangered Species Act. The Recovery Plan was developed in coordination with the National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) as an outgrowth and culmination of several conservation efforts in the Upper Columbia Basin, including current efforts related to the Endangered Species Act (ESA), state and tribal-sponsored recovery efforts, subbasin planning, and watershed planning. In May 2007, the Recovery Plan was completed, and was approved by NOAA in October 2007 (UCSRB 2007).

The Upper Columbia Spring Chinook and Steelhead Recovery Plan (UCSRB 2007) provides the most current evaluation of aquatic ecosystem functioning condition affecting all ESA-listed salmonid species in the Upper Columbia Region and includes a detailed implementation plan (section 8 of the Recovery Plan) to protect functioning habitat and restore degraded habitat. The implementation plan includes addressing data gaps through research, monitoring, and evaluation; establishing schedules; engaging stakeholders and landowners; identifying responsibilities, and securing funding. The Recovery Plan which will provide supporting information for use in prioritizing geographic areas and identifying, scheduling and implementing habitat actions in the Upper Columbia Region subbasins: Appendix H (A Biological Strategy to Protect and Restore Salmonid Habitat in the Upper Columbia Region, revised 2008); Appendix G (Habitat Matrices); Appendix M (Implementation Schedules for the Wenatchee, Entiat, and Methow subbasins, revised January 2008, [www.ucsrb.com](http://www.ucsrb.com)); and Appendix P (Upper Columbia Spring Chinook and Steelhead Monitoring and Evaluation Plan, October 2008 working draft). The Biological Strategy provides the technical foundation for setting geographic priorities for habitat protection and restoration actions. The Habitat Matrices identify primary limiting factors and habitat actions within subbasins at the HUC 5 Assessment Unit scale. The Implementation Schedules will identify specific actions, costs, and schedules for implementation as this information is developed, relying on reach assessments, Watershed Action Teams, and UCRTT review, as described in the Recovery Plan. The Monitoring and Evaluation Plan will allow fisheries managers to determine if management activities are contributing to the long-term persistence of viable populations of naturally produced salmonids.

## **Biological Strategy**

The Biological Strategy is based on available information and the professional judgment of fisheries biologists familiar with the Upper Columbia Region. Using the Biological Strategy, the UCRTT developed a system for prioritizing and sequencing actions and strategies based on their

biological benefit to multiple listed species. This prioritization method is simply a means to sequence, not a method of determining if certain actions should occur. Social and financial constraints can and will affect the sequencing. To provide a framework to set priorities consistent with the Biological Strategy, the UCRTT classified each watershed (HUC-5 level) in the Upper Columbia Region into categories, based on the functionality of the aquatic ecosystems in those watersheds, and the capability of the ecosystem to protect against ecological catastrophe for endemic populations, adapting the classification system used by Quigley and Arbelbide (1997).

In general, Category 1 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 secure. This does not mean that specific actions should not occur in Category 2 and 3 watersheds until all activities in Category 1 watersheds are completed. Any action within those watersheds that increase the range, life history diversity, or age cohorts of one or more species should contribute to the overall strategy of making them more robust to disturbances within and outside the region. As salmon recovery progresses, founder populations from core areas would colonize many watersheds that are suitable, yet unoccupied. Restoration of Category 4 watersheds should be considered in the regional recovery planning process, but immediate actions there would not be a priority.

## **Watershed Planning**

Watershed planning began when the 1998 Washington State Legislature passed House Bill (HB) 2514, codified into RCW 90.82, to set a framework for addressing the state's water resources issues. In 2001, HB 1336 amended the law. Currently RCW 90.82 states:

The legislature finds that the local development of watershed plans for managing water resources and for protecting existing water rights is vital to both state and local interests. The local development of these plans serves vital local interests by placing it in the hands of people: who have the greatest knowledge of both the resources and the aspirations of those who live and work in the watershed; and who have the greatest stake in the proper, long-term management resources. The development of such plans serves the state's vital interests by ensuring that the state's water resources are used wisely, by protecting existing water rights, by protecting instream flows for fish and by providing for the economic well-being of the state's citizenry and communities. Therefore the legislature believes it necessary for units of local government throughout the state to engage in orderly development of these watershed plans.

The purpose of the 1998 Watershed Management Act (WMA) is to provide a framework for local government, interest groups, and citizens to identify and solve water-related issues collaboratively in each of the 62 Water Resource Inventory Areas (WRIAs) of Washington State. Water quantity is a required element of the plan, with water quality, stream flows, habitat, and storage as optional elements to be included. Watershed plans in the Upper Columbia Region have been completed for the Wenatchee, Entiat, Methow, Foster Creek, and

Moses Coulee WRIAs and adopted respectively by Chelan, Okanogan, and Douglas counties. Portions of these plans are integral parts of the recovery plan.

The NPCC Fish and Wildlife Program calls for an ecosystem-based approach for planning and implementing fish and wildlife recovery which was incorporated into subbasin plans (see below NPCC Subbasin Planning section). Pertinent information from both subbasin plans and watershed plans formed the basis for much of the Recovery Plan. Other species, including resident, migrant, and anadromous species are expected to benefit from this plan.

### **Mid-Columbia HCPs**

On June 21, 2004, the Federal Energy Regulatory Commission (FERC) approved an Anadromous Fish Agreement and Habitat Conservation Plan (HCP) for the Rocky Reach, Rock Island, and Wells Hydroelectric Projects on the Columbia River, operated by Chelan County Public Utility District (Chelan PUD; Rocky Reach HCP 2004; Rock Island HCP 2004) and Douglas Public Utility District (Douglas PUD; Wells HCP 2004). The approval of the HCPs enabled legal coverage to operate the hydroelectric projects in compliance with the Endangered Species Act. The HCP documents provide a comprehensive and long-term adaptive management plan for species addressed in the plan and their habitat. The basis of the HCPs is a “no-net-impact” (NNI) standard consisting of two components: 1) 91 percent combined adult and juvenile project survival achieved by project improvement measures implemented within the geographic area of the project; and 2) 9 percent compensation for unavoidable project mortality provided through hatchery and tributary programs, with 7 percent compensation provided through hatchery and 2 percent through tributary programs. The HCP signatory parties, which include federal and state fish managers, tribes, and PUDs, continue to work to ensure that the processes and activities of HCP implementation remain consistent with the Recovery Plan.

### **Biological Opinion on the operation of the Priest Rapids Hydroelectric Project**

On February 1, 2008, NMFS released a Biological Opinion on the Federal Energy Regulatory Commission's (FERC) proposed license for the operation of the Priest Rapids Hydroelectric Project, operated by Public Utility District No. 2 of Grant County (Grant PUD; NMFS 2008a). This document enabled legal coverage to operate the Project in compliance with the Endangered Species Act. The document provides measures to be implemented at the Priest Rapids Hydroelectric Project and in the Upper Columbia Region to avoid jeopardizing the continued existence of UCR spring-run Chinook salmon and UCR steelhead as listed in the previous Biological Opinion (NMFS 2004). The measures contained in the Biological Opinion are similar to the measures contained in the HCP which direct the PUD to continue to work with federal and state fish managers and tribes to ensure that the processes and activities of these measures remain consistent with the Recovery Plan.

### **Priest Rapids Project Salmon and Steelhead Settlement Agreement**

On December 15, 2005, federal and state fish managers, the Yakama Nation, the Colville Confederated Tribes, and Grant PUD signed the Priest Rapids Salmon and Steelhead Settlement Agreement (Settlement Agreement) as part of the Grant PUD relicensing process. Similar to the HCP process as described above, the Settlement Agreement contains processes, activities, and

biological targets consistent with the Recovery Plan. Measures set forth in the Priest Rapids Project Biological Opinion are incorporated into the Settlement Agreement. Additionally, the Settlement Agreement includes measures to protect unlisted anadromous salmon species (summer and fall Chinook, sockeye, and coho).

### **Bull Trout Recovery Planning**

In response to the listing of bull trout under the Endangered Species Act in 1999, the U.S. Fish and Wildlife Service (USFWS) prepared a Draft Bull Trout Recovery Plan for the Upper Columbia Recovery Unit (USFWS 2002) in 2002 with the assistance of recovery unit teams, State and Tribal agencies, and others. The Service intends to finalize the plan with cooperation from federal, state and tribal partners, and with public input. In preparing the Upper Columbia Salmon and Steelhead Recovery Plan, the UCSRB recognized that the USFWS listed the bull trout as a threatened species throughout its range in the lower 48 states, not just the portion of bull trout residing in the Upper Columbia area. The UCSRB therefore submitted the Salmon and Steelhead Recovery Plan to the USFWS as its recommendation for assisting in the recovery of bull trout in the Columbia River with the understanding that the USFWS will consider these recommendations in its Draft Bull Trout Recovery plan for the entire listed species.

### **NPCC Subbasin Planning**

To address mounting energy issues in the Pacific Northwest, the Northwest Power Act was passed in 1980, creating a regional power planning council (Northwest Power and Conservation Council). The Council was directed to prepare a plan to assure an adequate, efficient, economical and reliable power supply. The Council adopted its first power plan in January 1983 and has revised it five times since then. The Council was also directed as part of this plan to prepare a program to amend, protect, mitigate, and enhance fish, wildlife, spawning grounds, and habitat affected by the construction and operation of Columbia River hydroelectric projects. This program, called the Fish and Wildlife Program, established biological objectives and action strategies for the entire Columbia River basin. Implementation of these objectives and strategies now occurs through subbasin plans that were developed for the various tributary subbasins by the Council, working with watershed councils, state and federal agencies and Indian tribes. The subbasin plans allow the program to be organized at three spatial scales: basinwide level, an ecological province level that addresses the 11 unique ecological areas of the Columbia River Basin, and at the subbasin level.

The actions of the subbasin plans are funded by BPA with the Council responsible for recommending projects to BPA for funding. There is a two-year funding cycle for these projects, which allow for an organized review of submitted proposals. The Fish and Wildlife Program may be amended by the Council's request to the fish and wildlife agencies and tribes for recommendations for measures for fish and wildlife. Because the Fish and Wildlife Program is legally an element of the Power Plan, these recommendations are required prior to any major revision of the power plan.

The Methow, Entiat, and Wenatchee subbasin plans developed in 2006 built upon work accomplished under watershed planning in 2004, including the EDT analyses used in watershed planning. The Recovery plan, in turn, aligned itself with the subbasin and watershed planning

efforts. Thus, subbasin plans are designed to contribute to the regional salmon recovery effort contained in the Recovery Plan. Subbasin plan, however, are broader in scope than recovery planning and address management issues for wildlife, resident fish species, and non-ESA-listed anadromous salmonids.

**APPENDIX B**

**SUMMARY OF RECENT METHOW, ENTIAT, AND WENATCHEE SUBBASIN  
PROJECTS**

<b>Funding Sources</b>	<b>Project #</b>	<b>Project Title</b>	<b>Relationship (brief)</b>
BPA / Reclamation / USFS	200705500	Entiat River - UPA - Lower Entiat River Off-Channel Restoration Project	Occurs in Entiat subbasin. Provides 0.28 miles of off-channel habitat to benefit Upper Columbia ESA listed steelhead, spring Chinook, and bull trout, as well as irrigation channel enhancement for rearing and spawning habitat.
BPA F / USFS	200723100	UPA Entiat Subbasin Riparian Enhancement Program	Occurs in Entiat subbasin. Involves Tillicum Creek Fence and programmatic riparian projects to benefit Upper Columbia spring Chinook, steelhead and bull trout.
BPA / Reclamation / USFWS / Grant PUD Habitat Fund	200731800	Entiat River - UPA - Knapp-Wham Hanan Detwiler Irrigation System Consolidation Project	Occurs in Entiat subbasin. Consolidates the Knapp-Wham and Hanan Detwiler irrigation systems to eliminate partial fish passage barriers associated with two surface water diversions, add instream habitat within the lower Entiat River, and enhance instream flows via water saved.
BPA / Landowner match / WDFW	200703500	UPA Project - Methow Basin Riparian Enhancement	Occurs in Methow subbasin. Identifies and prioritizes riparian enhancement projects to add value to passage, access and conservation projects. All projects focus on threatened and endangered species and habitat.
BPA / Reclamation	200723700	UPA Project - Elbow Coulee Floodplain Restoration	Occurs in Methow subbasin. Eliminates a dike; opens an existing side channel and floodplain; reconnects a wetland; and uses large woody debris and boulders to split flows, to increase habitat complexity and create more dynamic habitats for listed salmonids.
BPA / HCP Trib Fund / SRFB	200726400	UPA Project - Programmatic Habitat Complexity Projects in the Methow River Subbasin	Occurs in Methow subbasin. Eliminates dikes, opens side channels, and enhances floodplain connectivity at various sites in the Methow subbasin.
BPA	200708500	UPA Nason Creek Oxbow Reconnection Project	Occurs in Wenatchee subbasin. Installs two bottomless arch culverts in SR 207 to reconnect 0.64 miles of historic oxbow habitat to the mainchannel Nason Creek, to increase Spring Chinook salmonid abundance by 25-50% in the Nason Assessment Unit.
BPA	200708600	UPA Wenatchee Subbasin Riparian Enhancement Proposal	Occurs in Wenatchee subbasin. Involves planting native vegetation and fencing to establish a properly functioning riparian buffer in the Wenatchee Assessment Units, to benefit Upper Columbia steelhead, spring Chinook and bull trout.
BPA	200732500	UPA Wenatchee Subbasin Complexity Proposal	Occurs in Wenatchee subbasin. Implements five potential habitat complexity projects to benefit Upper Columbia spring Chinook, steelhead and bull trout.
SRFB / HCP Trib Fund	08-1984	Twisp River Riparian Protection II	Occurs in Methow subbasin. Involves a reach-based project to purchase conservation easements on 5 properties located along the Twisp River.
SRFB / HCP Trib Fund	08-1986	Twisp River Conservation Acquisition II	Occurs in Methow subbasin. Involves purchase of acquisition areas to complement prior purchase and protection efforts on the right bank opposite the subject properties
SRFB / Federal grant	08-1962	North Road Culvert	Occurs in Wenatchee subbasin. Replaces an existing partial fish passage barrier culvert with a bridge and natural stream channel to provide year-round passage to all fish species at all life stages.

<b>Funding Sources</b>	<b>Project #</b>	<b>Project Title</b>	<b>Relationship (brief)</b>
SRFB / HCP Trib Fund	08-1779	Cashmere Pond Off-Channel Habitat Project	Occurs in Wenatchee subbasin. Addresses the primary habitat limiting factor for juvenile steelhead and spring Chinook salmon on the lower Wenatchee River: the lack of off-channel habitat, by creating habitat in Cashmere Ponds in the Wenatchee floodplain.
SRFB / HCP Trib Fund	08-1782	Below the Bridge (Keystone Diversion/Moody Canyon)	Occurs in Entiat subbasin. Upgrades the existing Keystone Diversion and improves Entiat River salmon habitat diversity by replacing an instream push up dam that is reconstructed each year with a rock wing dam that directs water into a sluiceway.
SRFB / Federal, local, and other grant	08-2060	Lower Icicle Conservation Easement	Occurs in Wenatchee subbasin. Procures an easement on 65 acres of floodplain on Lower Icicle Creek, a tributary to Wenatchee River.
SRFB / HCP Trib Fund	08-1985	Poorman Creek Barrier Removal	Occurs in Methow subbasin. Involves a culvert replacement to restore year-round access to spawning/rearing habitat; restores appropriate bedload transport and LWD movement down Poorman Ck into the Twisp River.
SRFB / HCP Trib Fund	07-1788R	Entiat PUD Canal System Conversion Project	Occurs in Entiat subbasin. Decommissions faulty PUD irrigation system pipeline and delivery system and converts existing irrigation water users to wells to address water quantity and water quality issues, help moderate stream temperature extremes, improve water quality in the lower Entiat, and facilitate salmonid access to spawning and rearing habitats.
SRFB / HCP Trib Fund	07-1849R	Roaring Creek Flow Enhancement and Barrier Removal Project	Occurs in Entiat subbasin. Replaces two surface water diversions and leaking delivery system and serves irrigators with new groundwater wells, to benefit UCR summer steelhead adult holding and spawning, juvenile rearing to smoltification life history stages. Spring Chinook juveniles also benefit.
SRFB	07-1661A	Upper Methow Riparian Projection	Occurs in Methow subbasin. Protects 54 acres of high quality riparian habitat along the Upper Methow River through purchase of two voluntary, permanent conservation easements.
SRFB / State grant	07-1865R	Peshastin Irrigation District Pipeline	Occurs in Wenatchee subbasin. Convert approximately 9900 ft of the Peshastin Irrigation District Canal from an open canal to a closed Pipeline, to conserve water and enhance passage for Chinook salmon and bull trout.
SRFB / HCP Trib Fund	07-1761R	Harrison Side Channel	Occurs in Entiat subbasin. Reconnects relict side channel and floodplain area to restore geomorphology, floodplain function, habitat complexity/diversity, and off-channel habitat and shading.
SRFB / HCP Trib Fund	07-1866R	Keystone Canyon Habitat Restoration Project	Occurs in Entiat subbasin. Restores habitat complexity and promotes localized recruitment and retention of spawning gravels along channel margins to primarily benefit adult steelhead in the lower Entiat.



<b>Funding Sources</b>	<b>Project #</b>	<b>Project Title</b>	<b>Relationship (brief)</b>
SRFB / Local and other grant	07-1771R	Lower Wenatchee River Complexity Site 12/13	Occurs in Wenatchee subbasin. Implements a levee breach to connect 1.7 acres of off-channel refuge and foraging habitat to increase availability of off-channel habitat and instream habitat complexity.
SRFB / State grant	07-1885N	Burlington Northern Santa Fe RR	Occurs in Wenatchee subbasin. Develops a project proposal and review process with the Burlington Northern and Santa Fe (BNSF) Railroad that will facilitate the implementation of projects on BNSF land.
Grant PUD Habitat Fund	None assigned.	Upper Twisp River Hardesty Property Purchase	Occurs in Methow subbasin. Involves property purchase in a portion of a 2 mile long reach of valuable habitat for spring Chinook and steelhead, as well as, bull trout.
Grant PUD Habitat Fund / HCP Trib Fund / WDFW / DOE / Reclamation / Kittitas County Conservation District	None assigned.	Wenatchee River (Monitor) Irrigation Diversion Improvements; Jones Shotwell Irrigation System	Occurs in Wenatchee subbasin. Involves side channel improvement, construction of a permanent rock wing dam berm, berm improvements, and addition of an updated fish screen at the pumping station.
Grant PUD Habitat Fund / USFWS / Reclamation	None assigned.	Mission Creek Habitat Improvement	Occurs in Wenatchee subbasin. Installs 4 rock vanes with large woody debris to increase habitat diversity, control bank erosion, and to improve riparian habitat for juvenile steelhead and Chinook rearing.
Grant PUD Habitat Fund	None assigned.	Blackbird Island Habitat Enhancement	Occurs in Wenatchee subbasin. Implements two restoration actions to increase habitat diversity/channel stability and quantity for spring Chinook, steelhead, and Bull trout, as well as summer Chinook and sockeye.
Grant PUD Habitat Fund / BPA / SRFB / Upper Columbia Regional Fisheries Enhancement Group / HCP Trib Fund / USFWS Fisheries Restoration and Irrigation Mitigation program	None assigned.	Fulton Dam Fish Passage Barrier Removal Project	Occurs in Methow subbasin. Reconstructs the dam as a roughened channel to provide improved passage for listed species at all flow levels while maintaining irrigation viability.
Grant PUD Habitat Fund	None assigned.	Nason Creek Godwin Parcels Land Purchase	Occurs in Wenatchee subbasin. Involves purchase of 62.7 acres of prime riparian habitat.

**APPENDIX C**

**ONGOING MONITORING AND EVALUATION PROGRAMS IN THE UPPER  
COLUMBIA REGION**

*Upper Columbia Spring Chinook Salmon and Steelhead Monitoring and Evaluation Plan (UC Monitoring & Evaluation Plan).*

The UC Monitoring & Evaluation Plan is being prepared by NMFS for the UCSRB as Appendix P to the Recovery Plan<sup>3</sup>. The UC Monitoring and Evaluation Plan is designed to evaluate whether the status of a given UC ESA-listed salmonid population/ESU/DPS is improving and if the primary limiting factors of the population/ESU/DPS are increasing or decreasing (status and trend monitoring). Although the UC Monitoring and Evaluation Plan is specific to spring Chinook salmon and steelhead populations within the Upper Columbia Region, Recovery Plan actions should also contribute to the delisting of bull trout in the region<sup>4</sup>.

The UC Monitoring and Evaluation Plan focuses primarily on monitoring the status and trend of VSP parameters (abundance, productivity, spatial structure, and diversity) and changes in habitat and hatchery limiting factors. Less emphasis is placed on monitoring the status and trend of limiting factors associated with hydropower, harvest, disease and predation, regulatory mechanisms, and natural factors. This plan also emphasizes implementation monitoring. Questions identified in the UC Monitoring and Evaluation Plan to guide monitoring and evaluation are adapted from the ICBTRT viability criteria document for UC salmonid ESUs (ICBTRT 2005). The UC Monitoring and Evaluation Plan does not provide plans for monitoring the effectiveness of specific actions. It does, however, provide a framework for establishing valid effectiveness monitoring plans.

Five questions important to guiding reclassification or delisting decisions identified in the UC Monitoring and Evaluation Plan are:

- (1) Is the status of the population/ESU/DPS improving?*
- (2) Are the primary factors limiting the status of the population/ESU/DPS increasing or decreasing?*
- (3) Are the actions identified in the recovery plan being implemented correctly and according to the implementation schedule?*
- (4) Which actions are effective and should be continued?*

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<sup>3</sup> The UC Monitoring and Evaluation Plan is currently a working draft (October 2008). It has been reviewed by the UCRTT and is currently under review by the Recovery Implementation Science Team (RIST). Prior to being incorporated into the Recovery Plan, the UC Monitoring and Evaluation Plan must be adopted by the UCSRB. The UCSRB is awaiting technical review of this document.

<sup>4</sup> Bull trout monitoring plans will be developed and added to the Recovery Plan as an appendix after the USFWS and their Recovery Monitoring and Evaluation Technical Group provide guidance on monitoring objectives, methods, sampling designs, and analyses.

(5) *How will the data be managed and curated?*

Several sub questions attend each of the five questions. Monitoring objectives, indicators (measured and derived variables), sampling/statistical designs, and analytical decision rules are associated with most of the specific questions. Questions 1 and 2 require *Status and Trend Monitoring*. Question 3 requires *Implementation and Compliance Monitoring*. Question 4 requires *Effectiveness Monitoring*. The final question; “How will the data be managed and curated?” is concerned with transferring raw data from their varied origins into a common format that can be organized, checked, analyzed, and shared.

Regarding data management, a regional data management system has been developed for the Upper Columbia Region. Data entered and stored in this data management system will be available for evaluation of actions implemented under this Project as they relate to effects on population status, habitat limiting factors, and implementation compliance. The regional data management system is a collection of data management working documents, protocols, and agreements between the NWFSC’s ISEMP program and its partners. The UCSRB retains a data steward tasked with conducting QA/QC on data entered into the local data base and ultimately housed at the NOAA NWFSC in the Status, Trend, Effectiveness Monitoring (STEM) databank. Although currently password protected, this data is publically available upon request for the password from the NWFSC.

*Upper Columbia Monitoring Strategy (Hillman 2006).*

The Upper Columbia Monitoring Strategy is incorporates many of the monitoring methods from throughout the basin to reduce redundancy, increase efficiency, and meet the goals and objectives of the various entities implementing tributary actions and conducting monitoring studies in the Upper Columbia Region. The Upper Columbia Monitoring Strategy brings together existing programs being implemented to monitor the following: tributary habitat in Upper Columbia Region subbasins; hydropower actions in the Upper Columbia; Upper Columbia Region hatchery programs; and actions outside of the Upper Columbia tributary subbasins (e.g., Columbia mainstem hydropower, estuary conditions and salmon use, mainstem and ocean harvest) downstream to the mouth of the Yakima River. The plan is designed to test implementation, validation, status/trend, and effectiveness of habitat protection and restoration actions implemented in the Upper Columbia Region. The plan also provides a way to assess the recovery of ESA-listed fish species based on the VSP parameters by enabling scientists to detect fish population changes over a sufficient period of time (McElhaney et al. 2000). In addition, the Upper Columbia Monitoring Strategy coordinates through annual monitoring practitioners’ workshops in order to decrease redundancy and increase efficiency for those entities planning monitoring efforts in the Upper Columbia Region. The Upper Columbia Monitoring Practitioners Workshop occurs every winter to discuss the upcoming field season.

*USGS Effectiveness Monitoring.*

The USGS Columbia River Research Laboratory is conducting a 5-year evaluation of the effectiveness of vortex weirs for providing desired fish passage. This evaluation includes: 1) an

assessment of anadromous fish and bull trout production in Gold, Libby, and Beaver creeks in the Methow Subbasin, associated with the presence or removal of irrigation diversion passage barriers, and 2) an assessment of the subsequent change in fish populations in Beaver Creek associated with the modified irrigation diversion structures and its effect on fish passage.

The USGS evaluation documents the physical and biological responses to the modifications of diversion dams that were implemented by the Reclamation at four sites on Beaver Creek: Lower Stokes and Upper Stokes in 2003 (BOR 2004a and BOR 2004b, respectively) and Thurlow Transfer (BOR 2005,) in 2004 (as cited in Martens and Connolly 2008). This study was designed to specifically measure important parameters listed in the Research, Monitoring, and Evaluation (RME) Plan (Jordan et al. 2003): size and age structure of fish populations, freshwater productivity, proportions of hatchery and wild spawners, biological and physical condition of spawning and rearing habitat, and habitat conditions and fish passage at the diversion structures. Similar data are being gathered in the Libby Creek and Gold Creek watersheds. These two watersheds were sampled to serve as controls to help us judge the fish response to actions taken in Beaver Creek. Preliminary findings from work conducted by USGS during the summer of 2004 through spring 2006 are contained in an interim report (Martens and Connolly 2008).

Data gathered under this monitoring program will be used to improve future designs of fish passage structures to maximize passage efficiency. Juvenile fish are tagged with Passive Integrated Transponders (PIT-tagged) as part of this study. Data collected from these PIT-tagged fish, and from the pit tag detectors established as part of this study, may provide insight into juvenile and adult fish movement in the Methow Subbasin that could prove informative for evaluating the effectiveness of actions implemented in the Methow Subbasin.

#### *Integrated Status and Effectiveness Monitoring Project (ISEMP)*

NOAA Fisheries Northwest Fisheries Science Center (NOAA NWFSC), with funding from the BPA, initiated ISEMP in 2003 in response to the need for status and trend and effectiveness monitoring for Interior Columbia Basin watersheds called for by the 2000 FCRPS Biological Opinion (NMFS 2000). Along with the John Day and Salmon Creek drainages, monitoring under the ISEMP began in the Wenatchee subbasin in 2004 and in the Entiat subbasin in 2005 as pilot projects. In addition to monitoring salmon and steelhead populations and habitat within pilot subbasins, ISEMP is designed to test the robustness of monitoring protocols, indicator metrics, and sampling designs currently used in monitoring programs and is implemented in the Upper Columbia Region in collaboration with the UCRTT, providing data useful for recovery plan implementation.

Since 2004, ISEMP in the Wenatchee basin has focused on the design and implementation of the Recovery Plan monitoring strategy (Hillman 2006) sampling regime and which is a status and trend monitoring program with 67 monitoring indicators. Additionally, the design, implementation, and monitoring of an effectiveness monitoring project is being conducted collaboratively for habitat restoration projects in the Entiat basin associated with the Bridge to Bridge habitat improvement projects under Cascadia Conservation District. The Wenatchee-Entiat ISEMP program also includes a side-by-side comparison of habitat and fish protocol with PNAMP protocols (See below for a description of PNAMP).

### *Northwest Forest Plan Aquatic and Riparian Effectiveness Monitoring Plan (AREMP)*

The Aquatic and Riparian Effectiveness Monitoring Program (AREMP) is a multi-federal agency program developed to assess the effectiveness of the Aquatic Conservation Strategy in maintaining or restoring the condition of watersheds in the Northwest Forest Plan area, which covers a large portion of the mountain western U.S. The goals of the program include monitoring current condition of watersheds and changes in condition through time. Yearly and 5-yearly measurements are taken in certain watersheds to create and supplement watershed condition assessments and validate the models used to assess known stream conditions. This information provides useful status/trend information for the region's streams.

### *Pacfish/Infish Biological Opinion Effectiveness Monitoring (PIBO)*

The PACFISH/INFISH Biological Opinion (PIBO) Effectiveness Monitoring Program was initiated in 1998 to provide a consistent framework for monitoring effects of land management on aquatic and riparian resources on most Forest Service and Bureau of Land Management lands within the Upper Columbia River Basin. This information helps provide context on whether restoration projects are effective in maintaining or improving the structure and function of riparian and aquatic conditions in the region.

### *Pacific Northwest Aquatic Monitoring Partnership (PNAMP)*

Pacific Northwest Aquatic Monitoring Partnership (PNAMP) is not a monitoring program, but rather is a forum to coordinate state, federal, and tribal aquatic habitat and salmonid monitoring programs. PNAMP has developed a coordination plan called the Strategy for Coordinating Monitoring of Aquatic Environments in the Pacific Northwest. This project will coordinate with PNAMP throughout monitoring of restoration actions.

### *Collaborative, Systemwide Monitoring and Evaluation Project (CSMEP)*

CSMEP is a coordinated effort to improve the quality, consistency, and focus of fish population and habitat data to answer key monitoring and evaluation questions relevant to major decisions in the Columbia Basin. The CSMEP project was initiated in 2003 and is administered by the Columbia Basin Fish and Wildlife Authority, with participation from scientists from federal, state and tribal fish and wildlife agencies, and consulting firms. This project will follow CSMEP methods, as incorporated into the Recovery Plan M&E Plan.

### *Mid-Columbia HCP Monitoring and Evaluation Plans*

As described in Appendix A of this proposal, Chelan and Douglas PUDs are parties to HCPs that provide ESA coverage and mitigation requirements for the operation of Rocky Reach, Rock Island, and Wells Hydroelectric Projects. Because part of the mitigation for the HCPs involves hatchery production, the HCPs specify a general HCP hatchery program objective, which is to contribute to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest. Chelan and Douglas PUD have each developed a monitoring and evaluation plan (HCP M&E Plan) to provide the conceptual framework to monitor and evaluate the success of these hatchery programs (Murdoch and Peven 2005). An HCP M&E report is produced annually to support

adaptive management of these programs and to share information within the Upper Columbia Region. The data derived from the HCP M&E program provides crucial information useful for assessing the benefit of habitat improvements on biological objectives.

#### *Grant PUD Monitoring and Evaluation Plans*

As described in Appendix A of this proposal, the Priest Rapids Hydroelectric Project Biological Opinion and Settlement Agreement describe operational, hatchery and habitat measures that Grant PUD is required to implement to protect, mitigate, and enhance salmon and steelhead populations affected by Priest Rapids Hydroelectric Project operations. Similar to the HCP process described immediately above, the Priest Rapids Biological Opinion and the Priest Rapids Settlement Agreement require mitigation that involves hatchery production. Grant PUD, in consultation with federal and state fish management agencies and tribes is developing monitoring and evaluation plans to ensure that the processes and activities of Biological Opinion and Settlement Agreement measures remain consistent with the Recovery Plan. The data derived from the Grant PUD M&E programs will provide crucial information for assessing the benefit of habitat improvements on biological objectives.

#### *Washington Comprehensive Monitoring Strategy for Watershed Health and Salmon Recovery (CMS)*

The CMS incorporates monitoring recommendations provided by the state's Independent Science Panel (ISP) to the Governor and Legislature in December 2001. The intent of the strategy is to better coordinate existing monitoring activities and improve data exchange most relevant to local, state, and federal watershed health. The strategy helps the state to achieve its monitoring goals, and in the process, address key management issues or policy decisions. The monitoring implemented in this project will be consistent with the CMS strategy.

#### *Okanogan Basin Monitoring and Evaluation Program (OBMEP)*

The Okanogan Basin Monitoring & Evaluation Program (OBMEP) was created in 2004 to improve the resource management infrastructure for the upper Columbia region, the Colville Tribes, their resource management partners and the general public. This was done by implementing and conducting a basin-wide monitoring and evaluation program using a scientifically-based design. This project will coordinate with OBMEP through the practitioner's workshops as needed to maintain consistency in data collection for the region.

#### *Intensively Monitored Watersheds (IMW)*

To track the contribution of restoration projects to salmon recovery, the Washington State Department of Ecology administers an Intensively Monitored Watersheds (IMW) project designed to compare changes in salmon production among experimental treatment (restoration) and control (no restoration) watersheds. The Wenatchee and Entiat subbasins were identified as IMWs in the project, but unlike several other watersheds in the project, intensive monitoring is already ongoing in the Wenatchee and Entiat watersheds under the ISEMP program (see below). Thus, information for the IMW project for the Wenatchee and Entiat is collated from monitoring being conducted by various entities: U.S. Forest Service, U.S. Fish & Wildlife Service,

Washington Departments of Fish and Wildlife, and Ecology, Chelan County, and Chelan County Public Utility District. As such, data collated for the IMW project provides a statewide glimpse of habitat restoration effectiveness that is useful for subbasin planning and recovery plan implementation.

The development of some of these regional monitoring programs may result in modifications to the monitoring programs used in the Upper Columbia Region. These 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 Region, with the intent to make monitoring and evaluation programs more consistent throughout the Columbia Basin and Pacific Northwest.

Monitoring and evaluation in this project will be guided by the Upper Columbia Spring Chinook Salmon and Steelhead Monitoring and Evaluation Plan (Recovery Plan M&E Plan; Appendix P of the Recovery Plan). Specifically, monitoring in this project will be implemented by collating information from existing programs in the region described above and incorporating updated or amended plans as those plans develop. This information will be used to evaluate status/trend and effectiveness of the actions in addressing subbasin and Recovery Plan objectives.



**APPENDIX D**  
**LIST OF ACRONYMS**

## List of Acronyms

Accord	2008 Columbia Basin Fish Accords Memorandum of Agreement between the Three Treaty Tribes and FCRPS Action Agencies
A/P	abundance/productivity
AREMP	Aquatic and Riparian Effectiveness Monitoring Plan
AU	assessment unit
BPA	Bonneville Power Administration
CCD	Cascadia Conservation District
CCNRD	Chelan County Natural Resources Department
CMS	Comprehensive Monitoring Strategy
Corps	U.S. Army Corps of Engineers
CRITFC	Columbia River Inter-Tribal Fish Commission
CSMEP	Collaborative System-wide Monitoring and Evaluation Project
DOE	Washington State Department of Ecology
DPS	Distinct Population Segment
EDT	Ecosystem Diagnosis and Treatment
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FCRPS	Federal Columbia River Power System
FERC	Federal Energy Regulatory Commission
HB	House Bill
HCP	Habitat Conservation Plan
HUC	Hydrological Unit Code

ICBTRT	Interior Columbia Basin Technical Recovery Team
IMW	Intensively Monitored Watersheds
ISEMP	Integrated Status and Effectiveness Monitoring Project
ISP	Independent Science Panel
ISRP	Independent Scientific Review Panel
IT	Implementation Team
LWD	large woody debris
M&E Plan	Monitoring and Evaluation Plan
MOA	Memorandum of Agreement
MSRF	Methow Salmon Recovery Foundation
NMFS	National Marine Fisheries Service
NNI	no-net-impact
NPCC	Northwest Power and Conservation Council
NWFSC	Northwest Fisheries Science Center
OBMEP	Okanogan Basin Monitoring and Evaluation Program
ORV	off-road vehicle
PIBO	PACFISH/INFISH Biological Opinion
PNAMP	Pacific Northwest Aquatic Monitoring Partnership
PUD	Public Utility District
SRFB	Salmon Recovery Funding Board
SS/D	spatial structure/diversity
RCW	Revised Code of Washington
Reclamation	U.S. Bureau of Reclamation

Recovery Plan	Upper Columbia Spring Chinook and Steelhead Recovery Plan
Recovery Plan M&E Plan	Upper Columbia Monitoring and Evaluation Plan
RIST	Recovery Implementation Science Team
RMEG	Recovery Monitoring and Evaluation Technical Group
RME Plan	Research, Monitoring, and Evaluation Plan
UCRTT	Upper Columbia Regional Technical Team
UCSRB	Upper Columbia Salmon Recovery Board
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VSP	Viable Salmonid Populations
WAT	Watershed Action Team
WDFW	Washington Department of Fish and Wildlife
WMA	Watershed Management Act
WRIA	Water Resource Inventory Area

**APPENDIX E**

**DRAFT – REACH ASSESSMENT AND PROJECT SELECTION PROTOCOL**

# DRAFT – Reach Assessment and Project Selection Protocol

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*Provided for Yakama Nation Fisheries*

## Introduction

Stream reach assessment and project selection typically follows a sequence of analytical steps that leads investigators to the identification of enhancement projects that support the recovery of ecosystem processes and aquatic habitat. The strategy should be efficient and repeatable; building off of existing and newly collected data using contemporary analysis protocols to ensure that projects are compatible with basin and reach-scale processes.

The methodology should strive to achieve the following objectives:

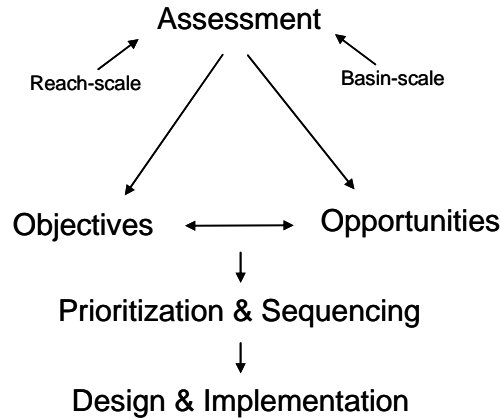
- ✓ Maximize the use of existing data
- ✓ Be scientifically-based and quantitative
- ✓ Be efficient, timely, and repeatable
- ✓ Provide the greatest habitat benefit

Become the foundation for design and implementation

- ✓ Identify projects that are compatible with geomorphic processes and land-use

## Methods

A reach assessment and project selection process should begin with a review/collection of existing information throughout the watershed as well as collection of any necessary habitat data at the stream reach scale. This information is analyzed to allow the investigators to compartmentalize the stream into individual reaches. Each reach is then characterized according to its unique physical, biological, and geomorphic conditions. The reach assessment culminates in a set of reach-level habitat enhancement objectives. Specific enhancement opportunities are then evaluated and selected according to the reach objectives. Formulation of opportunities unique to each reach assures that enhancements are appropriate to both reach level scales as well as basin wide. These opportunities are further prioritized at the basin scale and then advanced to the design and implementation phase. The following section describes these basic analysis steps. An overview is provided in the diagram below.



### **Step 1: Assessment**

Assessment should maximize the use of existing information. When available information is insufficient, additional information should focus on key metrics needed to characterize background conditions and trends necessary to provide context for project selection. The key metrics can be broken into basin and reach scales with subsets within each.

**Basin-scale:** Basin-scale assessment relies on GIS-based analysis and existing information often available from published governmental sources. This is not a detailed watershed analysis, but rather a characterization of the salient watershed conditions. It includes the following categories:

Hydrology – characterizes the runoff and disturbance regime using hydrograph data, flood frequency statistics, road density, land cover/ imperviousness, and the condition of forest vegetation.

Sediment – describes the basin sediment regime through the characterization of surficial geology, road density, ground cover, and delivery/disturbance mechanisms.

Land-use – historical, existing, and future land-use patterns and trends will be characterized with respect to their impact on ecological processes and stream habitat conditions. This assessment will rely on existing information, aerial photo analysis, and land-use designations.

**Reach-scale:** Reach-scale assessment relies on existing detailed information and oftentimes additionally collected information to characterize specific attributes such as physical habitat, geomorphology, fish use, and reach-level land-use impacts:

Physical habitat – a stream habitat survey conducted using the USFS Level II survey or similar protocol. The methodology employs a habitat unit survey along with general characterization of substrate, large woody debris, and riparian conditions. These surveys help to characterize stream channel and riparian habitat conditions. Existing stream habitat data may already exist for some reaches.

Geomorphology – a geomorphic analysis identifies channel types, sediment transport and response conditions, floodplain, channel migration zones, and off-channel connectivity, and the impacts of adjacent land-use. Trends in channel and planform evolution are often characterized. These evaluations rely on site observations, GIS analysis, and aerial photo analysis. Hydraulic modeling is often utilized where it is already available and may be conducted anew if deemed necessary based on site objectives and uncertainties.

Fish use and distribution – species life-stage uses and limiting factors should be summarized in order to inform the selection of enhancement projects that address the key issues facing fish populations. For many areas, existing data may be available from WA Department of Fish & Wildlife, Yakama Nation Fisheries, USGS-Biological Resources Division, US Forest Service, Ecosystem Diagnosis & Treatment analysis, or other sources. These data typically include spawning surveys, juvenile surveys, adult counts, and modeled information.

Land-use conditions and site constraints – The condition and impact of land uses (historic and current) on reach-scale processes and habitat should be determined/described. Risks and constraints associated with existing or planned land-uses should be documented.

## ***Step 2: Developing Restoration Objectives***

### **Synthesis – Telling the riverine landscape story**

This synthesis stage uses the assessment information to describe existing conditions at the watershed and stream-reach scales. Habitat, geomorphic, and land use conditions are summarized for each reach. The processes that create and sustain habitats are typically identified along with the limitations imposed by existing conditions and land-use.

Desired future conditions should also be described along with the general approaches and techniques that are needed to get there. Key constraints, opportunities, and sequencing considerations are necessarily included. The synthesis culminates with the development of reach-scale restoration objectives based on basin and reach-scale assessment and data analysis.

### **Reach-based ecosystem indicators (REI)**

To assist in the synthesis effort, the assessment data can be fed into a subset of reach-based ecosystem indicators (REI, see Bureau of Reclamation 2008) matrix that can help to further tell the habitat story. The REI is a platform for interdisciplinary collaboration, organization, and synthesis as a means to interpret river condition. Ultimately, the collection of data sufficient to populate the relevant indicators are used to rate the condition of the river ecosystem based on the various established metrics and protocols representing physical habitat, water quality, riparian conditions, and biological conditions offers consistency and repeatability. REI indicator thresholds (aka ‘criteria ranges’) may be adjusted as necessary to reflect the specific geomorphic setting of the reach of interest. REI values assist with: 1) summarizing reach-scale conditions, 2) supporting the development of reach objectives, and 3) evaluating potential benefits of specific projects. Using the REI allows for a consistent comparison of conditions across multiple reaches and provides consistency with already completed assessments such as the Methow Big Valley Reach Assessment (BOR 2008).



### ***Step 3: Describing Project Opportunities***

Project opportunities are the recommended measures that accomplish the reach-scale objectives. Projects might include in-the-ground restoration projects, protection projects, programmatic considerations, and recommended monitoring or additional assessment efforts. Specific in-the-ground enhancement projects that advance the cause of fish population recovery are a primary focus.

Project opportunities are often identified during the assessment/synthesis efforts and further vetted with field visits and aerial photo interpretation. Opportunities are also commonly identified during the stream habitat surveys. Project descriptions are compiled that describe the project location, extents, objectives, constraints, landownership, land management, and construction access conditions along with anticipated benefits. Projects are further documented through site photographs and maps (i.e. aerial photograph overlays, see Figure E-1). If applicable, multiple project alternatives are described. Conditions that may favor or preclude project work in a particular area should also be included.

### ***Step 4: Prioritization – Sequencing***

This phase compares project opportunities both within and between reaches in order to develop a final prioritized list of projects. A custom prioritization scheme is typically developed that evaluates projects according to reach-scale/watershed-scale objectives and other considerations such as costs, site constraints, access conditions, and sequencing. The REI can be used to predict how potential projects will affect key environmental indicators. A process-based ecosystem management philosophy should be followed, focusing first on projects that protect and restore processes, then on projects that re-connect isolated habitats, and next on projects that enhance or restore habitat features. If work is to be considered on private land, landowner contact and support must be gained early to properly evaluate priorities and sequencing.

### ***Step 5: Design and Implementation***

High priority projects are then carried forward to design and implementation assuming landowner support and implementation resources are available. Project design is guided by established ‘design criteria’ distilled directly from restoration objectives. For many projects, conceptual designs are developed as a first step, followed by refinement and advancement to final design and implementation.

#### **Design criteria**

Project development is guided by a set of established design criteria unique to each project. Design criteria reflect the reach-scale objectives and also account for site-specific considerations. Specific site conditions include landowner concerns, interface with infrastructure, relationships with land management practices, site construction logistics, and other considerations. These variables are explicitly addressed in design criteria to ensure the development of successful projects. Project design should follow an interdisciplinary approach that combines expertise in stream ecology, hydraulic engineering, fluvial geomorphology, and fisheries biology. The interdisciplinary

approach ensures that final designs reflect contemporary approaches to process-based restoration.

### **Conceptual designs**

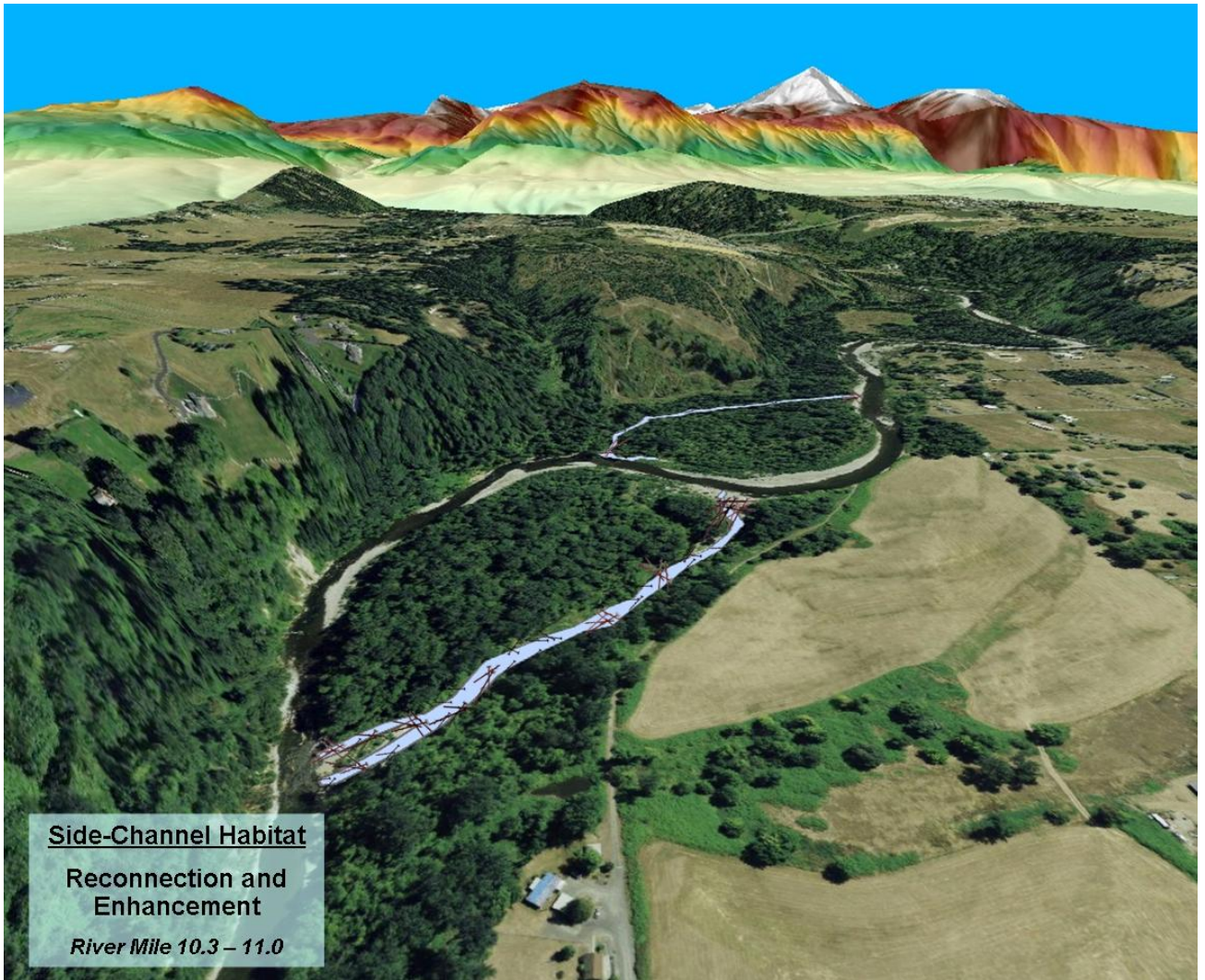
For some projects, the first step will be the development of project conceptual designs. Conceptual designs, which represent approximately a 30% level of design, are useful for beginning a dialogue about project specifics and can be used to solicit support and funding for a project. Conceptual designs outline the general strategy and alternatives to be employed and include a generalized site plan, drawings of typical treatments, and planning-level cost/material estimates. Review and refinement of conceptual designs leads to a final design that best accomplishes the reach-level restoration objectives while also satisfying project-specific design criteria.

### **Final design and implementation**

Projects with secured support and funding (with or without conceptual designs), may be advanced to final design and implementation. Contact and communication with regard to private landownership must continue through this stage. The type of final design will vary with project type and need. Some projects can be implemented with permit level drawings whereas other projects may require design-build level of drawings. The amount of design level of effort is determined on a case-by-case basis. Construction using permit level drawings generally requires more construction oversight than bid-level drawings.

### ***Step 6: Monitoring and Adaptive Management***

The approach to project identification, prioritization, and implementation outlined in the previous steps provides a systematic platform for linkage to reach-based effectiveness monitoring that can be coordinated through other regional efforts. Systematic project identification, prioritization, and implementation when linked with associated effectiveness monitoring efforts at the reach scale. Further, it establishes a mechanism to employ an adaptive management strategy to demonstrate which treatments meet biological objectives, which need to be modified to meet biological objectives, and to reach recovery goals in the most timely, cost-effective way.



**Figure E-1. Example Project Opportunity Map.**

**APPENDIX F**

**HABITAT RESTORATION ACTION SELECTION PROCESS**

## **5 Stage process (Brandon Rogers, Yakima Nation)**

Habitat Restoration Action Selection: Actions are found and selected through a science based process based on 5 stages.

Stage 1 involves a Tributary scale stream assessment. Tributary Assessments usually include the entire stream (i.e. the Methow River.) The Tributary Assessment has been designed by the Bureau of Reclamation and generally documents the geomorphology, geology, hydrology and physical nature of the stream. During this process smaller stream reaches are identified based on hydraulic controls like alluvial fans or geologically confinement. The data an assessment is reduced and reviewed by a group of technical experts. The final output from these assessments include physical stream and channel processes, stream reaches within the Tributary assessment area and a basic protection and restoration strategy for the assessed area.

Stage 2 involves a Reach scale stream assessment. In this assessment, the reaches identified in the Tributary Assessment are assessed in much greater detail. Obviously not all reaches in a stream need protection or restoration and so reaches to be assessed are chosen both through the basic protection and restoration strategy and with the guidance of the Watershed Action Team (WAT). The basic Reach Assessment includes data collection aimed at refining the understanding of local channel processes, and the Reach Ecosystem Indicators (REI.) A thorough understanding of local channel processes is necessary prior to initiating any restoration activities and the REIs provide a baseline of environmental conditions prior to restoration. During this stage restoration actions are identified and in some cases initial design is begun.

Stage 3 involves the presentation of the Reach Assessment findings to the WAT. Through a series of meetings, potential restoration actions are discussed and habitat action sponsors are assigned. Once habitat action sponsors are assigned to an action, landowner contacts are made and initial habitat action design begins.

Stage 4 involves the habitat action design being brought before the Regional Technical Team (RTT), a group of technical experts who have significant local knowledge and have been assigned the task of reviewing habitat action proposals and where possible suggesting improvements. The RTT reviews and comments on the habitat action proposals.

Stage 5: Project implementation.

**APPENDIX G**

**2009 WORKING DRAFTS OF THE  
UPPER COLUMBIA RECOVERY PLAN IMPLEMENTATION SCHEDULE**

*(see accompanying .pdf file)*

**Wenatchee (revised 6/2/09)**  
**Entiat subbasin (revised 5/1/09)**  
**Methow subbasin (revised 5/1/09)**  
**Okanogan subbasin (revised 5/1/09)**

Wenatchee Watershed Implementation Schedule  
Upper Columbia Salmon Recovery Plan and Wenatchee Watershed Plan

Assessment Unit	Action ID	Limiting Factor	Action Type	Specific Actions	Location	Years 2007-2010: Action Details	Project Proponent(s)	2007-2008 Scope (P=Planning, I=Implementation, M=Monitoring)	2007-2008 Funds Secured	2007-2008 Unapport Funds	2009 Scope	2009 Cost Secured	2009 Cost Needed	2010 Scope	2010 Cost Secured	2010 Cost Needed
Lower Wenatchee	LW-1000	Water Quality	Water Quality Improvement	Assessment	Throughout Assessment Unit	Work through TMDL process to evaluate / model affect of irrigation withdrawal on flow / water temperature relationship	CCNRD				I (modeling flow scenarios)	40,000 (WDOE)				
Lower Wenatchee	LW-1010	Water Quality	Water Quality Improvement	Implement phosphorus reduction actions	Throughout Assessment Unit		CCNRD and WWTP facilities (CCPUD, Cashmere, Leavenworth)				P (complete pH/DO TMDL WQIP)	46,000 (WDOE, regulatory strategy partners)	40,000	I (implement reduction strategies, begin monitoring)		50,000
Lower Wenatchee	LW-1020	Water Quality	Farm Planning	Check with TMDL	Throughout Assessment Unit	Nutrient, Fecal Coliform, Temperature, Water efficiency planning and BMP implementation	Cascadia Conservation District				P: Conduct conservation planning at Peter Burgoon site; others	10,000		P: Conduct conservation planning with willing landowners; I: Implement BMP projects for nutrients, fecal coliform, and stream temperature	15,000	30,000
Lower Wenatchee	LW-1030	Water Quantity	Instream Flow	Irrigation Practice Improvements	Throughout Assessment Unit	Implement as appropriate through current and future FSA programs in conjunction with WWPU	CCNRD and others									
Lower Wenatchee	LW-1040	Water Quantity	Instream Flow	Irrigation Practice Improvements	Throughout Assessment Unit	Improve irrigation delivery and use efficiency	CCNRD and others									
Lower Wenatchee	LW-1041	Water Quantity	Instream Flow	Irrigation Practice Improvements	Pioneer Water Users (diversion at RM 7.1) aka CMZ 7	Change point of diversion, increase efficiencies	WA Rivers	P (Preliminary Design completed)	20000 (Pioneer)		P (Engineering Design, refine cost estimates, landowner negotiations, partner coordination, establish baseline)		400,000	P (final design, permitting, secure funding)		5,000,000
Lower Wenatchee	LW-1050	Water Quantity	Instream Flow	Irrigation Practice Improvements	Throughout Assessment Unit	Conversion of small pumps to wells	CCD				P (Review diversion locations and feasibility)	10000 (USBR)		P (site selection of 5 wells, secure implementation funds, permitting) I (convert 5 surface diversion to wells)	10000 (USBR)	300,000
Lower Wenatchee	LW-1060	Water Quantity	Instream Flow	Irrigation Practice Improvements Water Leased or Purchased	Throughout Assessment Unit	Provide incentives for conserving water - municipal	CCNRD							P (develop outreach/education program)		10,000
Lower Wenatchee	LW-1061	Water Quantity	Instream Flow	Irrigation Practice Improvements Water Leased or Purchased	Throughout Assessment Unit	Provide incentives for conserving water - irrigation districts	CCNRD							P (develop outreach/education program)		15,000
Lower Wenatchee	LW-1070	Water Quantity	Instream Flow	Water Leased or Purchased	Throughout Assessment Unit	Develop administrative structure for a water bank	CCNRD							P (develop water bank)		15,000
Lower Wenatchee	LW-1080	Water Quantity	Instream Flow	Water Leased or Purchased	Throughout Assessment Unit	Investigate water right purchase or lease	WA Rivers, CCNRD, others									