Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

ENVIRONMENT, FISH AND WILDLIFE

March 2, 2010

In reply refer to: KEW-4

Mr. Mark Fritsch
Manager, Project Implementation
Northwest Power and Conservation Council
851 SW 6th Ave, Suite 1100
Portland OR 97204-1348

Mr. Erik Merrill
ISRP/ISAB Coordinator
Northwest Power and Conservation Council
851 SW 6th Ave, Suite 1100
Portland OR 97204-1348

Re: Upper Columbia Programmatic Habitat Project 2010-001-00
ISRP Narrative Proposal for Review (BiOp, non-Accord)

Dear Messrs. Fritsch and Merrill:

Would you please forward this letter and the accompanying narrative proposal to the Independent Scientific Review Panel (ISRP) for scientific review?

This new project is replacing 14 Biological Opinion (BiOp) non-Accord habitat projects from the FY07-09 solicitation cycle that represent approximately $3.5 million in annual funding. Bonneville Power Administration (Bonneville) must maintain this effort beyond 2009 to meet BiOp objectives, notwithstanding the Columbia Basin Fish Accords. We hope you agree that this programmatic approach will help us meet the challenges of maintaining an effective habitat protection and restoration effort in the Upper Columbia (Columbia Cascade Province).

The Upper Columbia Salmon Recovery Board (UCSRB) agreed to serve as this project's proponent. Over the last 10 years the UCSRB has garnered the confidence of local sponsors through its leadership in salmon recovery planning and its effective management of project selection processes for the Salmon Recovery Funding Board (SRFB) and the Mid-Columbia Habitat Conservation Plan Tributary (Trib) funds. Technical integrity of the UCSRB's work is assured by the Upper Columbia Regional Technical Team (RTT), which provides solid guidance ranging from identification of reach-specific limiting factors through quantified evaluation of project proposals and analytical workshops. In short, the UCSRB provides essential infrastructure and leadership for meeting the challenges of an expanding and increasingly holistic habitat strategy to support salmon recovery in the Upper Columbia.

The project's narrative proposal addresses how three of the most significant challenges will be met through a programmatic approach. First, multi-year planning and across-subbasin coordination will facilitate implementation of targeted large-scale and intensive reach-based restoration that requires substantial funds from multiple sources. Second, the annual RTT open competitive 6-step process for selecting and funding projects – the same as presently used for

SRFB and Trib funds – will provide flexibility to fund the best small-scale projects available to implement each year across all sponsors, action types, and subbasins within the Upper Columbia Evolutionarily Significant Units. Third, monitoring and evaluation also will shift to a programmatic approach that ensures implementation/compliance monitoring for all actions/projects as well as supports – through targeted restoration efforts – reach-based effectiveness monitoring by separate research, monitoring, and evaluation (RM&E) projects in the Entiat and Methow subbasin intensively monitored watersheds.

The monitoring and evaluation plan described in Section G of the proposal tries to capture dynamic regional initiatives in a way that can be applied programmatically. It identifies nascent projects for project-level implementation/compliance monitoring that Bonneville may fund to help satisfy BiOp requirements then backs them up with alternatives and contingencies if those plans are not realized. We anticipate that this M&E plan – if acceptable to the ISRP and to the Council – would be applied also to the Yakama Nation (YN) Accord project 2009-003-00, Upper Columbia Habitat Restoration (also referred to as Columbia Cascade Province MOA Habitat Projects). That YN Accord project was recently reviewed by the ISRP (ISRP 2010-2) and recommended for funding by the Council, with the condition that the M&E plan proposed for this project receives a favorable ISRP review. Therefore, the M&E plan in this proposal would have value beyond just this project.

We appreciate the ISRP's review and the Council's consideration of this proposal for the new Upper Columbia Programmatic Habitat Project. Both the UCSRB and Bonneville would be glad to answer any questions and provide supporting information. Please contact me (503-230-5213) if any additional information is desired from Bonneville.

Sincerely,

Roy Beaty
Fish Biologist/Project Manager

cc:
Ms. Julie Morgan, Mr. Derek Van Marter, and Mr. James White, UCSRB
Mr. Casey Baldwin, WDFW

UPPER COLUMBIA REGION

Columbia Cascade Province
Programmatic Habitat Narrative Proposal

(BiOp/Non-Accord/#2010-001-00)

PROPOSAL METADATA

Project Number	2010-001-00
Proposer	Upper Columbia Salmon Recovery Board
Short Description	Upper Columbia Programmatic Habitat
Province(s)	Columbia Cascade
Subbasin(s)	Methow/Wenatchee/Entiat/Okanogan
Contact Name	Julie Morgan
Contact Email	julie.morgan@ucsrb.com

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Hyperlinks

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GLOSSARY OF ACRONYMS

Accords Columbia Basin Fish Accords Memorandum of Agreement between the Three Treaty Tribes and FCRPS Action Agencies
BiOP FCRPS BO
BO Biological Opinion
AER Alternative Evaluation Reports
A/P abundance/productivity
AU assessment unit
BPA Bonneville Power Administration
CCD Cascadia Conservation District
CCNRD Chelan County Natural Resources Department
CMS Comprehensive Monitoring Strategy
CCT Colville Confederated Tribes
CPUD Chelan County Public Utility District
DPS distinct population segment
DPUD Douglas County Public Utility District
EDT ecosystem diagnosis and treatment
Recovery Plan Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan August 2007
ESA Endangered Species Act
ESU evolutionarily significant unit
FCRPS Federal Columbia River Power System
FR Federal Register
FRN Federal Register Notice
GPUD Grant County Public Utility District
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 Program
ISRP Independent Scientific Review Panel
IS Recovery Plan Implementation Schedule
IT Upper Columbia Salmon Recovery Implementation Team
LWD Large Woody Debris
M&E Plan Monitoring and Evaluation Plan
MOA Memorandum of Agreement
MSRF Methow Salmon Recovery Foundation
NCW North Central Washington
NMFS National Marine Fisheries Service
NOAA National Oceanic and Atmospheric Administration
NPCC Northwest Power and Conservation Council
NPPC Northwest Power Planning Council
MYAP Multi-Year Action Plans
OBMEP Okanogan Basin Monitoring and Evaluation Program
ORV off-road vehicle
PIBO PACFISH/INFISH Biological Opinion
PIT passive integrated transponder
PNAMP Pacific Northwest Aquatic Monitoring Partnership
PRCC Priest Rapids Coordinating Committee (HCP)
PUD Public Utility District
QAR Quantitative Analysis Report
RA Reach Assessment
Recovery Plan Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan
Reclamation U.S. Bureau of Reclamation
REI Reach-based ecosystem indicators
RME research, monitoring, and evaluation
RMEG Recovery Monitoring and Evaluation Technical Group
SAR smolt-to-adult return rate
SRFB Salmon Recovery Funding Board
SS/D spatial structure/diversity
TA Tributary Assessment
TRIB Tributary Committee (HCP)
TRT Technical Recovery Team (see ICBTRT)
UC Upper Columbia
UCRTT Upper Columbia Regional Technical Team
UCSRB Upper Columbia Salmon Recovery Board
USBR U.S. Bureau of Reclamation
USGS U.S. Geological Survey
WAT Watershed Action Team
USFS United States Forest Service
USFWS United States Fish and Wildlife Service
VSP viable salmonid population
WAT Watershed Action Teams
WDFW Washington Department of Fish and Wildlife
WDOE Washington Department of Ecology
WDOT Washington Department of Transportation
WMA Watershed Management Act
WRIA Water Resource Inventory Area
YN Yakama Nation

Upper Columbia Programmatic Habitat Narrative Proposal
(BiOP, non-Accord)
2010-001-00

NARRATIVE

Information transfer:

Mission Statement

To restore viable and sustainable populations of salmon, steelhead, and other at risk species through collaborative, economically sensitive efforts, combined resources, and wise resource management of the Upper Columbia region.
– Upper Columbia Salmon Recovery Board, 2007

A / Abstract

The recovery of Endangered Species Act (ESA)-listed salmon and steelhead populations in the Upper Columbia (UC) Region is dependent on the implementation of habitat restoration and protection actions identified in the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan (Recovery Plan) and the Upper Columbia Regional Technical Team's (UCRTT) Biological Strategy (UCSRB 2007; UCRTT 2008). A comprehensive framework is necessary to assure strategic allocation of funds to priority recovery efforts throughout the subbasins of the UC Region. This proposal outlines a programmatic process for funding projects that implement habitat improvement and protection actions in the UC Region consistent with, and in support of, the Recovery Plan. The process UC Regional partners have developed for the selection of projects and actions for funding is based on existing guidance about priority recovery actions and reaches. This guidance has been developed and refined through multiple planning processes and scientific assessments that culminated in the development of the Recovery Plan; this information has been further refined since Recovery Plan adoption through adaptive management. The proposed programmatic approach to identifying/selecting projects for funding will allow us to take advantage of effective ongoing efforts in the UC, from project development to technical review of final designs, to ensure implementation of high priority actions that address primary limiting factors associated with habitat degradation in the subbasins. Although the primary goal is to benefit ESA-listed UC spring Chinook and steelhead populations, we expect extensive habitat overlap and benefit for other native species in the UC Region. Finally, the framework presented in this proposal also includes post-implementation elements that utilize monitoring programs that are currently in place and are being proposed under the Categorical Review to allow us to understand the details of what was implemented, the effects on the physical environment, and the effects to biological characteristics at several spatial scales. When these monitoring results are fed into the Upper Columbia Salmon Recovery Board (UCSRB) Adaptive Management Framework, the certainty of success to address limiting factors and recover listed species increases significantly.

B / Problem Statement

TECHNICAL AND/OR SCIENTIFIC BACKGROUND

There are over 41 fish species in the UC Region and three of them are listed as threatened or endangered under the ESA: Upper Columbia spring Chinook salmon, and steelhead and bull trout. Many factors have contributed to the high extinction risk status for these salmonid species including fish harvest, hydropower development, hatchery operations, and degraded habitat conditions. Although substantial improvements have been made, persistent ecological alterations due to past and ongoing land and resource use within the tributary habitat of the UC Region have led to a decline in habitat quality and quantity for listed fish species. Habitat protection and restoration are two types of actions that will address the factors currently limiting the establishment and persistence of viable salmonid populations. When combined with previously implemented and ongoing improvements to harvest practices, hatchery operations, and hydropower management, strategic habitat restoration will help move listed species towards recovery.

B.1 Location

The UC Region is located in north-central Washington, primarily within the Columbia Cascade Province in the Columbia River Basin. The UC Region is composed of the mainstem Columbia River from Chief Joseph Dam downstream to the confluence with Crab Creek (just downstream of Wanapum Dam), including the tributaries. The UC Region includes six major "subbasins" (Crab Creek, Wenatchee, Entiat, Lake Chelan, Methow, and Okanogan), 37 smaller watersheds, and the mainstem Columbia River (See Figure B-1. Overview Map). This proposal proposes a programmatic approach to funding, implementation and adaptive management that will address limiting factors and result in habitat actions necessary to recover and maintain a Viable Salmonid Population (VSP) for spring Chinook and steelhead in the UC Region.

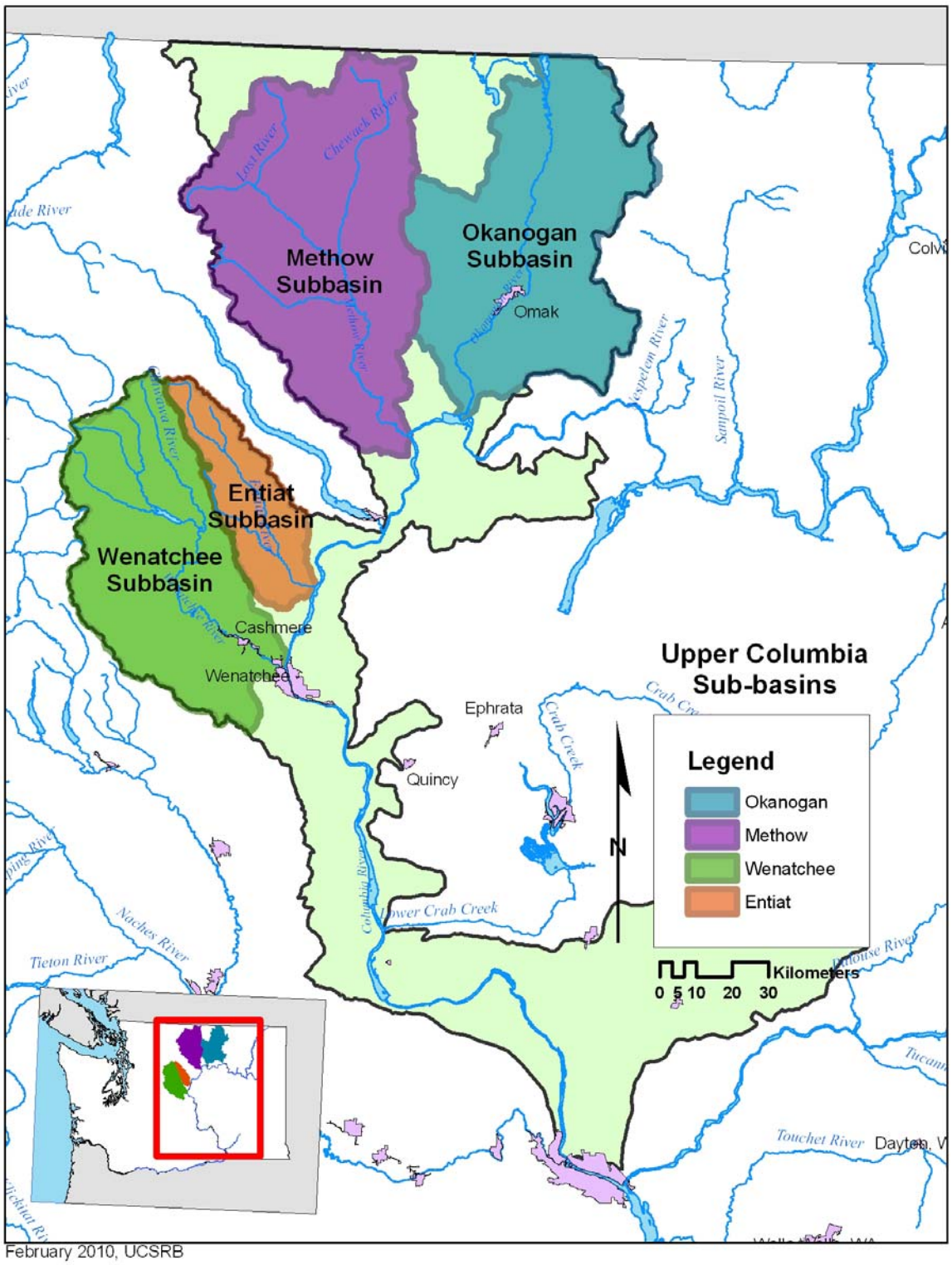


Figure B-1. The Upper Columbia Region and the four subbasins identified in this proposal.

B.2 Evolutionarily Significant Unit (ESU) Status

Since 1991, several species of anadromous salmonid populations inhabiting the Columbia Basin have been listed as "threatened" or "endangered" under the ESA. Upper Columbia steelhead (threatened) and Upper Columbia spring Chinook (endangered) populations have a high risk of extinction when considering the biological factors that contribute to VSP parameters: diversity, abundance, spatial structure and productivity (ICBTRT 2007). The UC steelhead Distinct Population Segment (DPS) was listed as endangered on August 18, 1997; reclassified as threatened on January 5, 2006; and as a result of a legal challenge, reinstated to endangered status on June 13, 2007. As of June 18, 2009, per U.S. District Court order, the status was again reclassified and downgraded to threatened status in response to an appeal filed by the National Marine Fisheries Service (NMFS). The UC spring Chinook Evolutionarily Significant Unit (ESU) was listed as endangered on March 24, 1999.

The Interior Columbia Basin Technical Recovery Team (ICBTRT) defined three independent populations of spring Chinook within the Upper Columbia spring Chinook ESU (Wenatchee, Entiat, and Methow populations). The Upper Columbia DPS for steelhead includes populations located in the Wenatchee, Entiat, Methow, Okanogan, and Crab Creek (ICBTRT 2003) (see Figure B-2. ESU Map). According to the Recovery Plan, spring Chinook and steelhead are considered to be at a high risk of extinction in the Wenatchee, Entiat, Methow, and Okanogan (steelhead) subbasins and functionally extirpated from the Okanogan (spring Chinook) and Crab Creek (steelhead) (See Viability Table B-1). A high risk of extinction is defined as a greater than 25% risk of extinction within the next 100 years. This proposal is intended to address habitat factors limiting spring Chinook and steelhead recovery in the UC Region at a programmatic scale. Upper Columbia River bull trout are also listed as threatened and are known to occur in the Wenatchee, Entiat, and Methow subbasins. Although they are not specifically addressed in this proposal, bull trout populations and other native aquatic and terrestrial species will also benefit from habitat actions for spring Chinook and steelhead.

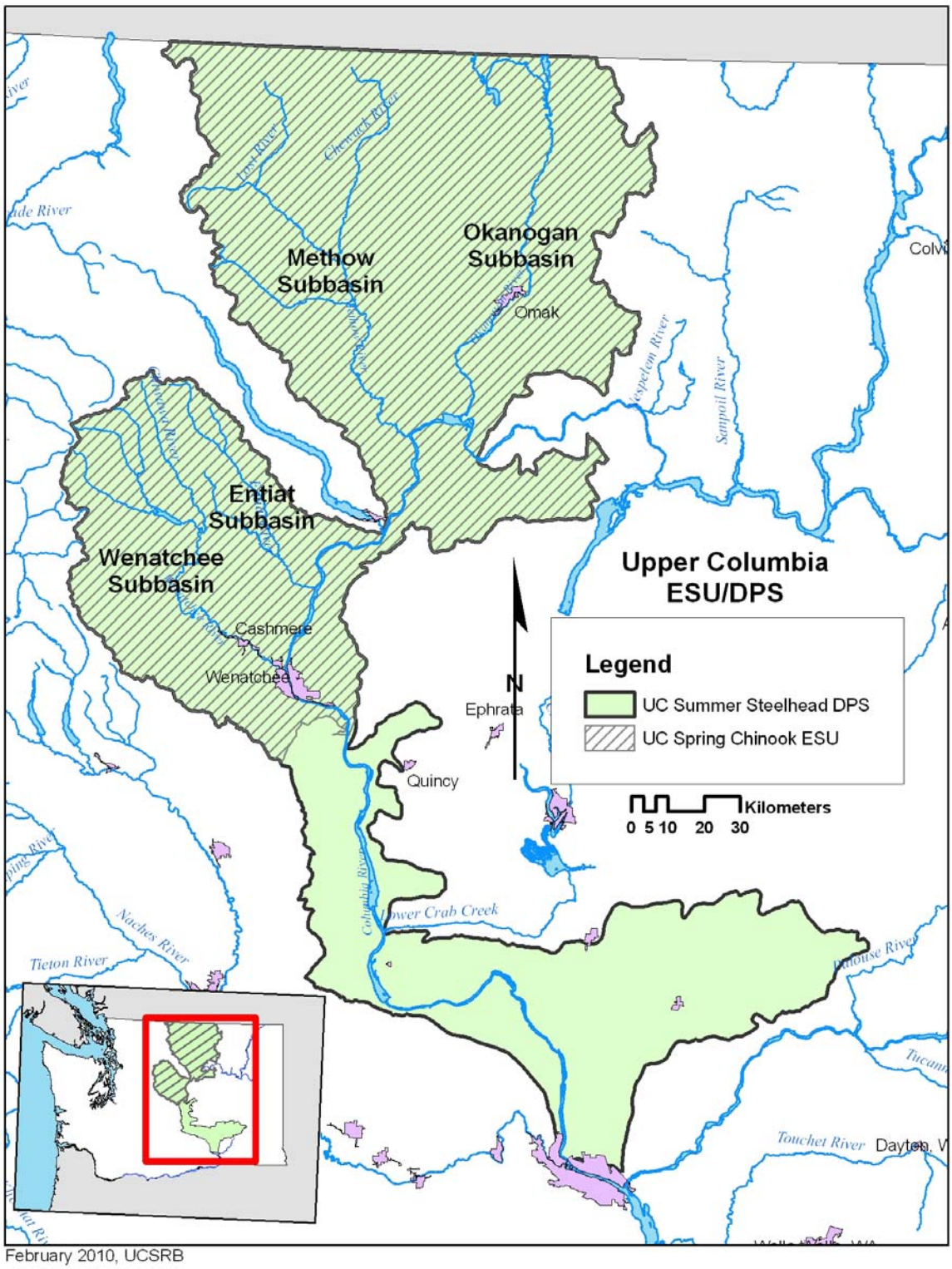


Figure B- 2. Upper Columbia ESU Map

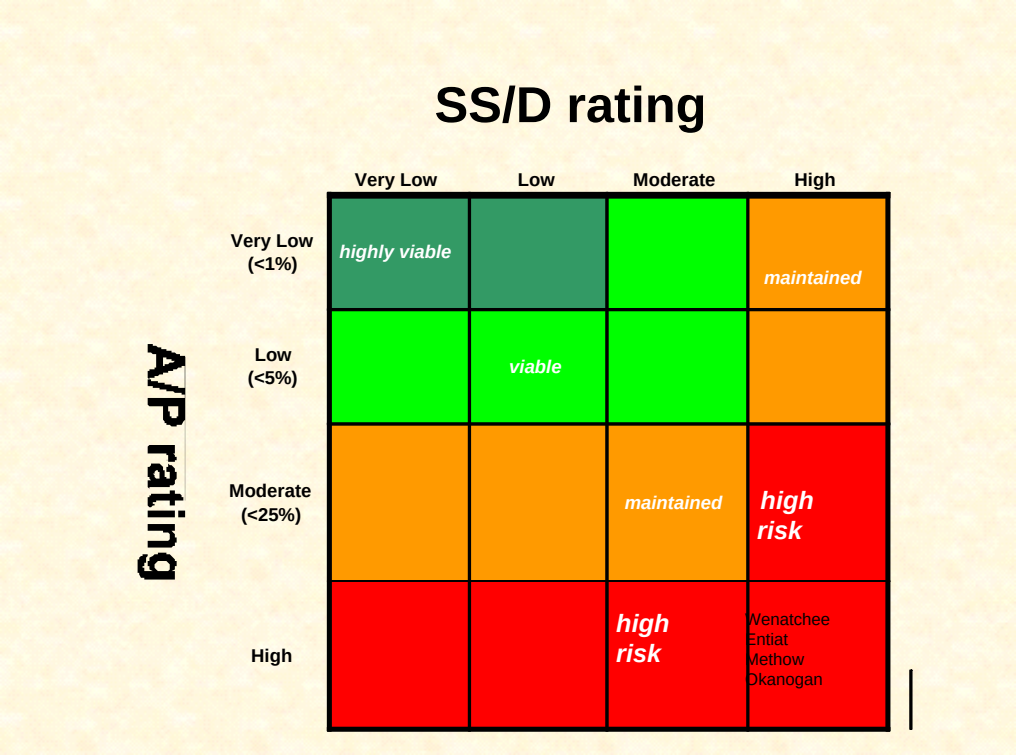


Table B-1. Comparison of A/P and SS/D Ratings. Viability ranking of current populations of Upper Columbia River steelhead and spring Chinook based on spatial Structure/Diversity and Abundance/Productivity (Table developed based on guidance from ICBTRT 2005a).

Viability assessment Tables B-2 and B-3 include data on the current abundance, productivity, spatial structure, and diversity of each population within the UC Basin. Species population data has not been updated since the adoption of the Recovery Plan (UCSRB) in 2007; however, at the January 2010 UCRTT Analysis Workshop, the ICBTRT provided abundance, productivity, spatial structure, and diversity updates for spring Chinook and steelhead. Using data available through 2008, the ICBTRT assessments showed that all of the listed populations in the UC were still at high risk of extinction (ICBRT 2008). Despite some positive and negative trends in individual parameters and a decrease in risk levels for some parameters and locations, it is evident that considerable improvement of survival conditions within and outside the UC watersheds is needed to achieve viable salmonid populations.

Table B-2. Viability assessments for Upper Columbia spring Chinook populations (UCSRB 2007)

Upper Columbia spring Chinook									
Population level	Abundance and Productivity					Spatial Structure and Diversity			Population Level: Overall Viability Rating
	Abundance		Productivity		Overall A/P	Goal A	Goal B	Overall SS/D	
Population	Current Natural Abundance	Minimum Threshold	Current Estimate (R/S)	Minimum R/S Threshold	Minimum R/S Threshold	Natural Processes Risk	Diversity Risk	Integrated SS/D Risk	
Wenatchee River	443	2,000	0.74	1.62	High	Low	High	High	High Risk
Entiat River	108	500	0.76	1.76	High	Moderate	High	High	High Risk
Methow River	645	2,000	0.51	1.62	High	Low	High	High	High Risk
Okanogan River	Extirpated								

Table B-3. Viability assessments for Upper Columbia steelhead populations (UCSRB 2007)

Upper Columbia steelhead									
Population level	Abundance and Productivity					Spatial Structure and Diversity			Population Level: Overall Viability Rating
	Abundance		Productivity		Overall A/P	Goal A	Goal B	Overall SS/D	
Population	Current Natural Abundance	Minimum Threshold	Current Estimate (R/S)	Minimum R/S Threshold	Minimum R/S Threshold	Natural Processes Risk	Diversity Risk	Integrated SS/D Risk	
Wenatchee River	716	1,000	.25	1.20	High	Low	High	High	High Risk
Entiat River	92	500		1.35	High	Low	High	High	High Risk
Methow River	202	1,000	0.9	120	High	Low	High	High	High Risk
Okanogan River	53	500		1.2	High	Low	High	High	High Risk

Table note: Abundance and productivity targets are based on a 12-year geometric mean and represent minimum thresholds to achieve a less than 5% risk of extinction over a 100-year period. The minimum threshold for Okanogan steelhead is for the U.S. portion of the population.

B.3 Limiting Factors

Historic and ongoing land and resource use has caused degradation to watersheds that adversely affects fish populations in various ways. Several planning processes have resulted in detailed assessments of habitat degradations in UC watersheds, e.g. Limiting Factors Analyses (Andonaegui 1999, 2000, 2001), watershed plans (CCCD 2004, WWPU 2006), Northwest Power and Conservation Council (NPCC) subbasin plans (NPCC 2004a-d), the Recovery Plan (UCSRB 2007), and the UCRTT Biological Strategy (UCRTT 2008). Within these assessments, various models (Ecosystems Diagnosis and Treatment (EDT), Shiraz, PHabSim)) have been applied to particular habitat attributes and species to quantify the extent of improvements to limiting factors that could be achieved based on restoration options. The Recovery Plan (UCSRB 2007) includes an Implementation Schedule (IS) containing suites of habitat restoration actions designed to address limiting factors. Local technical experts (UCRTT) have prioritized those actions and the IS has been updated annually since adoption of the Recovery Plan. Additionally, Appendix I of the Recovery Plan includes a logical matrix that links threats and causal mechanisms to habitat degradations, limiting factors, and impaired VSP parameters within each watershed of the UC ESU (UCSRB 2007). The most recent effort conducted by the UCRTT to prioritize habitat actions in the most important subbasin assessment units is presented in Appendix C (UCRTT Priorities Spreadsheet). Currently, work is underway to develop Multi-Year Action Plans (MYAPs; described in Section F. WE 174 -Produce Plans) for the Wenatchee, Entiat, Methow and Okanogan subbasins. MYAP development is the culmination of UC planning efforts to improve understanding of limiting factors and habitat alterations that are the most important to rectify, and help prioritize actions so that funding/projects will result in the greatest improvements to fish status in the UC Region. Figure B-3 illustrates how all these planning efforts are connected.

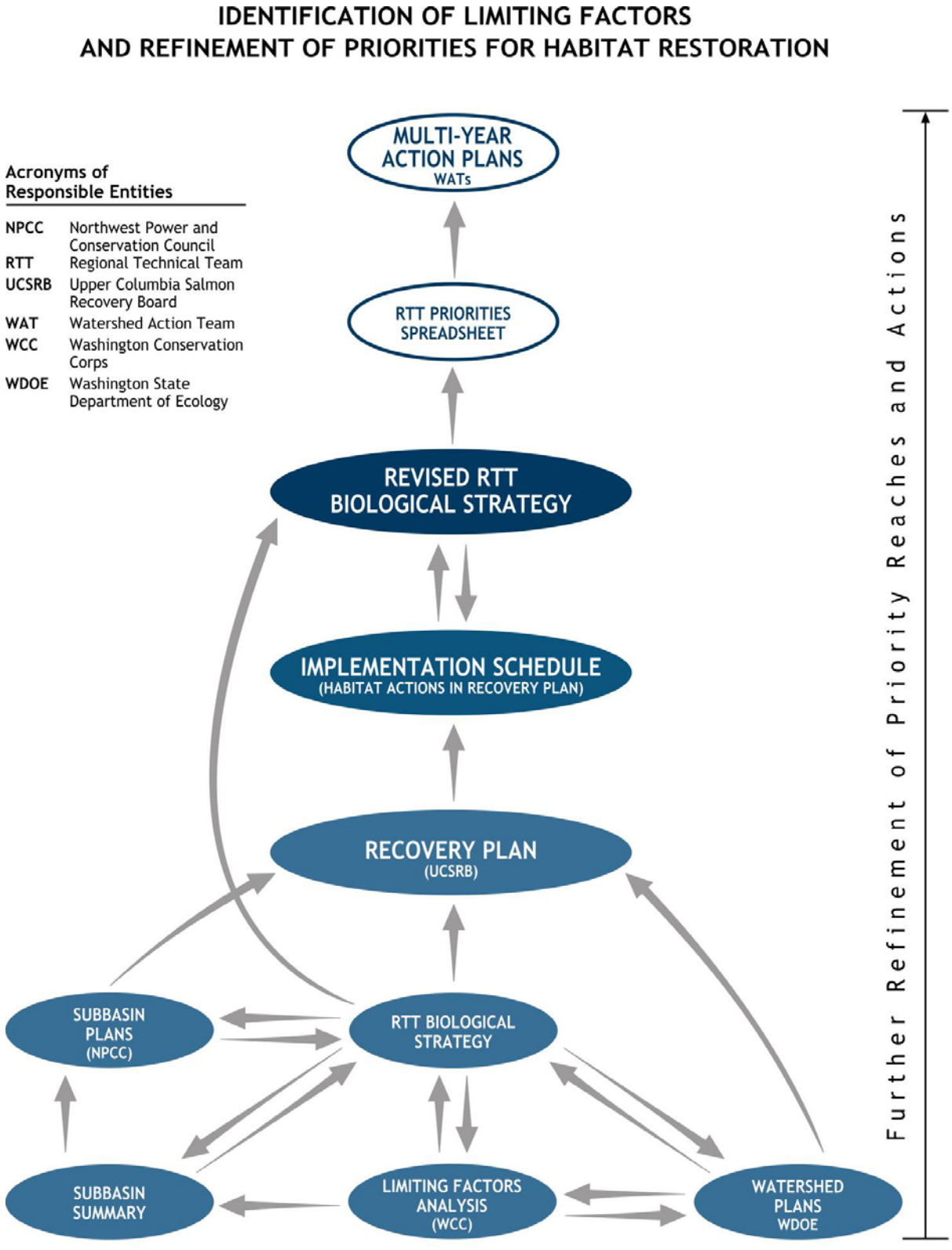


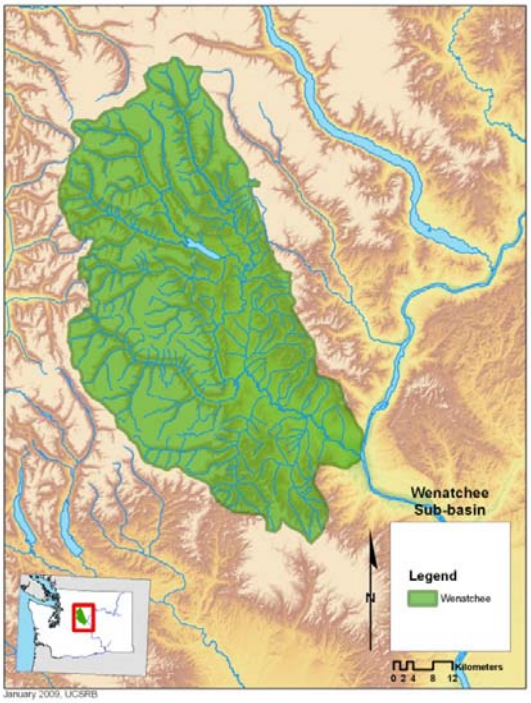
Figure B-3. Identification of limiting factors and refinement of priorities for habitat restoration

B.3.1 Limiting Factors in the Upper Columbia Basin

Although each watershed is diverse, there are some similarities in degraded habitat conditions throughout UC tributaries. For example, high road densities and historic logging practices have led to higher sediment levels, stream channel confinement, fish passage barriers, reduced riparian function and reduced recruitment of wood. Irrigation withdrawals have reduced instream flows, which subsequently reduce the quantity of habitat. The four UC subbasins (Wenatchee, Entiat, Methow, and Okanogan) discussed in this proposal span an area of over 8 million acres. Therefore, the limiting factors for fish habitat are only summarized in this document. Table B-4 presents a general landscape description of each subbasin. A summary of the primary limiting factors and management priorities identified by the Recovery Plan (UCSRB 2007) and the Upper Columbia Biological Strategy (UCRTT 2008) for the four UC subbasins is presented below. Detailed information for each subbasin is presented in the Habitat Matrices (UCSRB 2007, Appendix G, http://www.ucsrb.com/theplan.asp).

Table B-4. General landscape descriptions of the UC Region subbasins

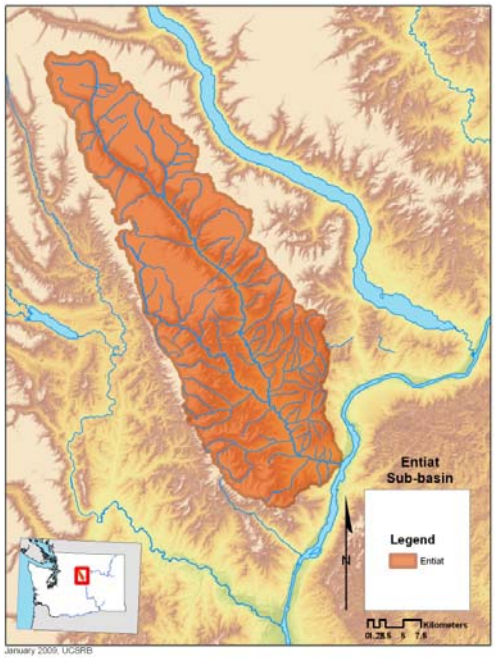
Subbasin	Landscape Description
Wenatchee	The Wenatchee subbasin and nine sub-watersheds (Mission, Peshastin, Chumstick, Icicle, Chiwaukum, Nason, Chiwawa, White, and Little Wenatchee rivers) drain 854,000 acres. Over 80% of the land is in public ownership. There are over 50,000 residents in this subbasin and private land ownership is concentrated in the valley bottoms and riparian areas. Land use consists of private and public timberlands, agriculture (primarily orchards), transportation corridors, and a few cities and towns.
Entiat	The Entiat subbasin, including the Mad River, drains an area of 298,000 acres. Over 90% of the land is in public ownership and the private ownership is concentrated in the valley bottoms and riparian areas. Land use within the Entiat subbasin consists of private and public timberlands, agriculture (primarily orchards and ranching), residential housing, and recreation. New home construction has doubled the population within the City of Entiat and rural populations have increased by 50% between1990-2000.
Methow	The Methow subbasin and seven sub-watershed tributaries (Early Winters Creek, Lost, Chewuch, Twisp, Beaver Creek, Gold Creek, and Libby Creek) drain 1,167,764 acres. Nearly 90% of the land is in public ownership with private land ownership concentrated in the valley bottoms. Approximately 5,000 residents live in the Methow Subbasin.
Okanogan	The Okanogan River subbasin is a large basin (exceeding 8,000 sq. miles) of which nearly 70% lies within British Columbia, Canada. The Okanogan River subbasin is the largest and most populated (300,000 residents) of the four subbasins within the UC ESU. One tributary, the Similkameen River, lies mostly within Canada, and contributes 75% of the flow to the Okanogan River. The land use within this subbasin consists of forestry, agriculture (range, crop, orchards), and residential areas. Land ownership is proportioned between public lands (41%), Tribal (21%) and private ownership (38%).



The Wenatchee Subbasin
Watershed Resource Inventory Area (WRIA) 45

The Wenatchee River is unique among subbasins in the Upper Columbia Region in that it supports the greatest population diversity and overall salmonid abundance, yet is facing the greatest risk of habitat loss and degradation. State highways, railroads, and housing developments have substantially diminished the overall function of the stream channel and floodplain. This has impaired stream complexity, wood and gravel recruitment, floodwater retention, late summer flows, and water quality.

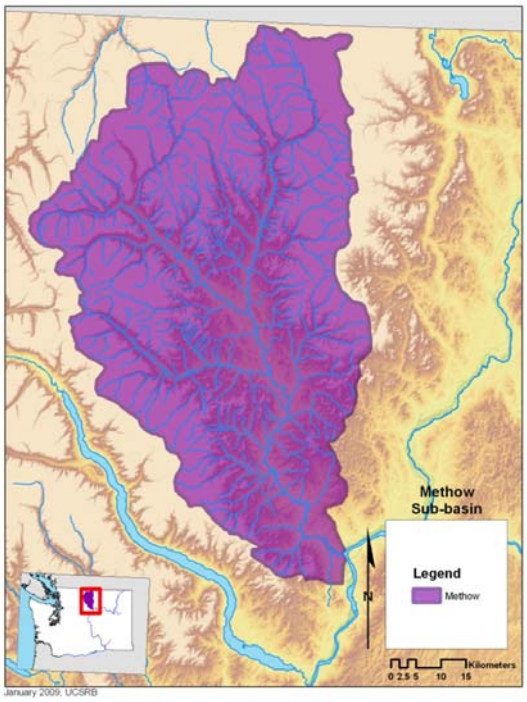
The highest priority within the Wenatchee subbasin is the protection of habitat that supports salmonid communities so that the populations are robust to environmental disturbances, can increase in abundance, and expand their range to adjacent watersheds. These high priority watersheds within the Wenatchee subbasin include the White River, Chiwawa River, and the upper and middle mainstem Wenatchee River (including Lake Wenatchee). Additional priorities are to increase the functionality of watersheds such as Nason, Peshastin, and Icicle Creeks, and the Lower Wenatchee River. In the Wenatchee, watershed restoration efforts have the highest potential to increase abundance and productivity.



The Entiat Subbasin (WRIA 46)

Flood control dikes, channelization, and lack of native riparian vegetation limit fish habitat in the lower Entiat River. Reduced stream channel complexity is the primary limiting factor for salmonid productivity in the lower 10 miles of the mainstem Entiat River. Stream sinuosity is low, with limited gravel accumulation. Instream habitat diversity is also low, with few pools, glides, pocket waters or large woody debris (LWD) accumulations. As a result, there are few resting and rearing areas for both adult and juvenile salmon in the lower mainstem Entiat River. Human development has also impacted water quality by removal of streamside vegetation and increased water withdrawals.

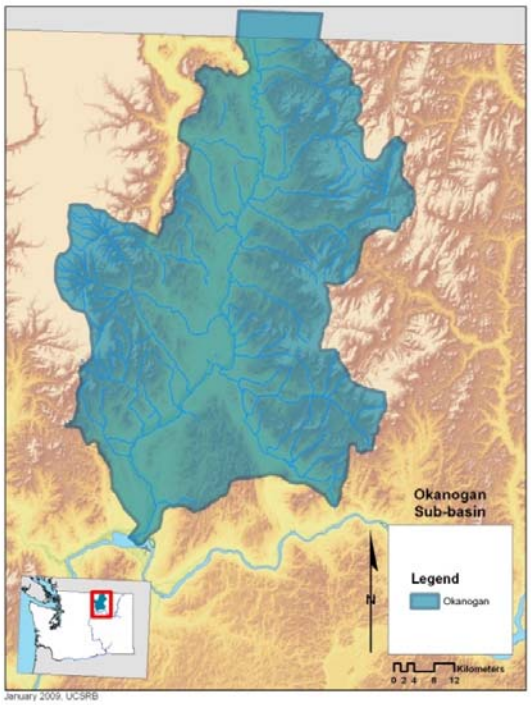
The most pressing needs on the lower Entiat River are to enhance the lack of instream complexity and riparian cover, yet there are other factors that adversely affect salmonids. Instream flows have also been identified as a limiting factor for salmonid production in the lower Entiat River.



The Methow Subbasin (WRIA 48)

The Methow River contains large amounts of pristine habitat in the headwaters of tributaries that should be protected; however, the middle and lower mainstem of the Methow River and lower reaches of tributaries have been adversely affected by state highways, county roads, housing, and agricultural development, diminishing the overall function of the stream channel and floodplain. Consequently, the stream channel has reduced complexity, limited wood and gravel recruitment, reduced floodwater retention, and impaired water quality. Additionally, reduction in late summer and winter flows impair migration, spawning, and rearing conditions for native salmonids.

The highest priority within the Methow subbasins is the protection of habitat that supports robust salmonid populations that have the capacity to be resilient to environmental disturbances, can increase in abundance, and expand their range to adjacent watersheds. Priority watersheds to protect 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 subwatersheds Wolf, Gold, Libby, and Beaver creeks. In the Methow, these watersheds offer the highest potential to increase abundance and productivity through restoration efforts.



The Okanogan Subbasin (WRIA 49)

Over the past century, ecosystem processes have been negatively impacted throughout the Okanogan River subbasin, creating a fragmented mixture of altered or barren fish and wildlife habitats. Disruptions to the hydrologic system have resulted in elevated water temperatures in the main stem substantially reducing the suitable migratory period for adult Chinook and sockeye salmon to access productive habitat. Furthermore, severe alterations to coldwater tributaries have diminished the amount of coldwater refugia in the mainstem and spawning and rearing habitat for summer steelhead. Consequently, other stream-type anadromous fish species, such as spring Chinook salmon are now extirpated in the Okanogan River. In addition to inhospitable thermal conditions in the mainstem and lack or loss of stream flow in the tributaries, excessive amounts of fine sediment and migration barriers are other factors limiting salmonid production within the Okanogan River subbasin.

The immediate strategy is to restore and protect the remaining steelhead, sockeye, and summer Chinook spawning and rearing habitat. In particular, high priority protection areas include the summer steelhead spawning and rearing habitat in Salmon and Omak Creek and several other small tributaries that could support spawning and rearing steelhead populations.

B.4 Successes and Challenges in Addressing Limiting Factors in the Upper Columbia Region

Over the last decade, implementers have completed over 360 projects, including habitat protection and restoration, assessments, and monitoring, to address limiting factors in the UC Region. Project implementers have gained valuable experience through their efforts; consequently, existing UC Region project development processes and restoration techniques have been and continue to be refined through adaptive management. The administrative infrastructure of project sponsors, the UCSRB and UCRTT, and direction provided by the Recovery Plan and several other comprehensive planning documents, are in place to facilitate implementation of strategic actions throughout the UC Region in a programmatic manner as described by this project proposal. The proposed programmatic project addresses some long-standing hurdles to implementation in UC Region and stages it to continue addressing priority actions and limiting factors. Two recently completed projects that have, at least initially, resulted in increased fish abundance, serve as good examples of implementation of high priority actions in the UC Region and are described in the narratives that follow.

B.4.1 NASON CREEK OXBOW, WENATCHEE SUBBASIN

The Chelan County Natural Resources Department (CCNRD) recently restored fish access to a 0.5 mile oxbow in Nason Creek (see Figure B-5. Aerial). Located between Lake Wenatchee and State Highway 2 this channel of Nason Creek was disconnected when the highway was constructed. Reactivating this side channel habitat was identified as a tier 1 (see Appendix C for tier definitions) priority in the Biological Strategy. The project involved the installation of two, 12-foot bottomless arch culverts resulting in fish access to 21.7 acres of off-channel refuge and over-wintering habitat for juvenile salmonids.

Restoring the Nason Creek oxbow provided the opportunity to monitor the biological benefits of implementing this type of action. To assess the response by fish populations, snorkel surveys were conducted one year following project construction in Nason Creek and a reference reach. In summer 2007, pre-treatment Chinook mean was 6.67, compared to summer 2008 post-treatment, where the Chinook mean was 100.0. In summer 2007, pre-treatment steelhead mean was 5.33, compared to summer 2008 post-treatment, where the steelhead mean was 56.7 (Murdoch et al. 2009). Additional long-term monitoring will be conducted again in 2010; however, preliminary observations indicate that juvenile Chinook and steelhead utilize the reconnected oxbow, particularly during low flow conditions in the summer.

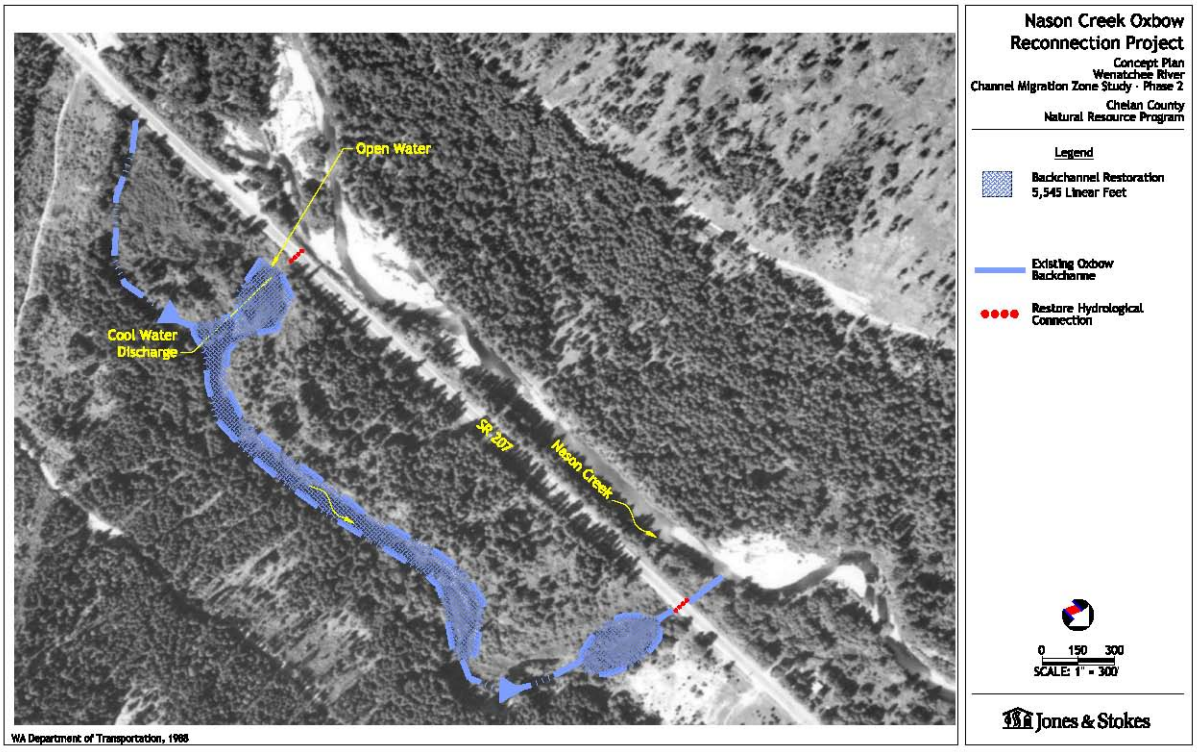


Figure B-5. Nason Creek oxbow reconnection, Wenatchee subbasin

B.4.2 BEAVER CREEK FISH PASSAGE, METHOW SUBBASIN

A fish passage barrier at Highway 20 previously blocked fish migration upstream in Beaver Creek. Once the Washington Department of Transportation (WDOT) updated this structure to facilitate fish migration, efforts to increase fish access focused on removal of various diversion dams upstream. Landowners, government agencies, and non-profit groups cooperatively developed and implemented a project to provide fish passage in Beaver Creek, which resulted in access to 23 miles of historic bull trout habitat, the lower 13 miles of which are suitable for anadromous steelhead spawning and rearing while the lower 8 miles are potentially suitable for reintroduced coho salmon and rearing juvenile spring Chinook salmon (J. Molesworth, Reclamation, personal communication). Completed in 2004, this project involved the removal and retrofitting of four irrigation diversions which were replaced with two to three rock vortex weirs (see Figure B-6 photo). The Fort Thurlow diversion dam was reduced from 5.5 feet to 3.75 feet and four rock vortex weirs were installed providing access to 0.5 miles of spawning and rearing habitat for summer steelhead, which at the time were federally-listed as "endangered" (Reclamation 2004a-c).

Figure B-6. Rock vortex weirs in Beaver Creek, Methow Subbasin

U.S. Geological Survey (USGS) Western Fisheries Resource Center Columbia River Research Laboratory (Martens and Connolly 2008) conducted a monitoring study on Beaver Creek to 1) to assess effectiveness of the modified irrigation diversion structures for passage of fish, and 2) and document subsequent changes in fish populations in Beaver Creek. Using passive integrated transponder (PIT) tags provided a

relatively new technology to measure change in fish assemblage, smolt production, and diversity of life history upstream of the rock vortex structures. The structures were effective at passing juvenile salmonids at all flow levels and connectivity was reestablished for a number of species. Data indicated a four-fold increase (2005-06 to 2007-08) in the number of adult steelhead utilizing the habitat in Beaver Creek, and re-colonization appears to be expanding.

B.4.3 CHALLENGES IN RECOVERY

Over the last decade, UC regional partners have completed numerous habitat protection and restoration projects, including the two described above, which have improved habitat characteristics in the UC Region; however, critical challenges to addressing the primary limiting factors that will lead to recovery in the UC Region have been identified, including:

1. the lack of funding flexibility;
2. the lack of ability to implement large-scale actions; and,
3. the lack of comprehensive effectiveness monitoring and evaluation (M&E) for habitat actions.

The first challenge is the lack of funding flexibility. For over a decade, salmon recovery funding in the UC Region has largely operated on an annual basis. Access to these annual funding sources has been competitive and dominated by single, discrete, single action-focused recovery actions that correspond to the short-term nature of funding commitments.

The second challenge is the inability to implement large-scale actions. There is a growing consensus among biologists, project managers, and funders that the most effective habitat restoration projects to address primary limiting factors are typically long-term, reach-based, complex, and large-scope recovery actions. These can be single, large expensive projects or groups of actions that, when implemented together, adequately address reach-based processes. By their very nature, these long-term projects are more difficult to design, fund, coordinate, and implement. It has also become increasingly clear that the UC Region cannot achieve listed species recovery without the implementation of these large-scale, reach-based projects.

The third challenge in the recovery of ESA-listed species is the lack of comprehensive M&E in the UC Region. Comprehensive effectiveness monitoring is critical to address scientific uncertainties identified through implementing priority actions. The UC Region has high-level project effectiveness monitoring efforts underway in some areas, e.g., the Integrated Status and Effectiveness Monitoring Program (ISEMP) and Intensively Monitored Watersheds (IMWs). Each subbasin in the UC has a program that monitors the status and trend of several habitat parameters; each of which varies depending on temporal and spatial effects that are considered critical in each subbasin, or the primary objective of the agency funding the research. One exception is that the Methow subbasin does not have a status and trend habitat monitoring program that includes sites not on federal lands; however, a program has been proposed under the Bonneville Power Administration (BPA) basinwide M&E evaluation that was facilitated by the Columbia Basin Fish and Wildlife Authority in 2009. It is anticipated that these large-scale M&E programs will detect changes at the population scale and correlate these changes to habitat restoration actions, though detectable changes are not expected for several years. Changes are expected to be detectable at a project level in a much more abbreviated time scale, yet currently there is a lack of consistent region-wide project-level effectiveness monitoring for habitat actions. A comprehensive project-level monitoring and evaluation plan has been developed to address the lack of consistent region-wide monitoring for habitat

actions (see Monitoring Section G) and is described as part of this proposal; however, funding for it is not being requested as part of the proposed programmatic project.

This programmatic project is structured to address the challenges described above, and perhaps for the first time, there is an opportunity in the UC Region to overcome the long-standing hurdles to recovery by providing a solid but agile financial base (with opportunities for cost sharing with other funding partners) to implement large-scale, long-term projects consistent with the Recovery Plan. The framework outlined in this project proposal will enable the UC Region to select the best actions in any given year to address top priority recovery actions and limiting factors and also provide the BPA with greater flexibility to meet its Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) obligations.

C / Rationale and Significance to Regional Programs

The proposed project is one element of a comprehensive UC regional goal to enhance and restore the productivity of ESA-listed steelhead and spring Chinook populations in the UC Region to delisting levels. The actions and programmatic project selection, funding and monitoring strategies described in this project proposal are consistent with, and derived from, assessments of limiting factors and remedies described in the Recovery Plan, NPCC subbasin plans, Public Utility District (PUD) mitigation plans and the FCRPS BiOp. This project proposal/process has also been coordinated with the Columbia River Basin Fish Accords (Accords).

C.1 Upper Columbia River Salmon Recovery Plan

The Recovery Plan was adopted by the National Oceanographic and Atmospheric Administration (NOAA) on October 9, 2007 (NOAA 2007). The Recovery Plan is also aligned with Douglas County PUD and Chelan County PUD Anadromous Fish Agreement and Habitat Conservation Plans (HCPs) for Rocky Reach, Rock Island and Wells hydroelectric projects (2004), and other related hydroelectric relicensing agreements and license requirements. Additionally, the regional Biological Strategy (UCRTT 2008) complements the Recovery Plan by providing further support and guidance, and serves as the technical foundation to set UC Regional priorities for habitat protection and restoration actions. Habitat actions implemented through the programmatic process described in this project will be consistent with the Recovery Plan and address limiting factors for ESA-listed fish in the UC Region.

C.2 Goals and Objectives of the 2000 Fish and Wildlife Program

Each UC subbasin plan was developed in accordance with the 2000 version of the NPCC Columbia River Basin Fish and Wildlife Program (Program). Since the Recovery Plan and Biological Strategy build upon the subbasin plans, habitat actions implemented under this project will also be consistent with the goals and objectives in the 2009 version of the Program. The text below provides additional discussion of how the existing work of the UC Region and the Program is a logical component of, and is integrated into, this project's proposed programmatic framework, which is designed to provide benefits to spring Chinook and steelhead in the UC Region.

The Recovery Plan, Biological Strategy, and Program are used to guide decision-making and provide a reference point for evaluating success. In other words, these plans include biological objectives that set the management strategies. The scientific basis for the framework explains why management actions result in physical habitat or ecological conditions that benefit fish and wildlife populations. The goals and objectives are based upon a scientific foundation and an integrated approach to UC regional fish and wildlife mitigation and recovery.

The Recovery Plan, Biological Strategy, and Program emphasize an adaptive management approach due to the significant level of uncertainty as to whether any single project or suite of actions contribute to salmonid recovery. A description of the Recovery Plan's adaptive management program is included in Appendix A of this proposal.

The Program states that:

> Implementation of strategies at all Program levels will be more effective if developed further into coordinated, *multi-year action plans* with a sufficient funding commitment and clear obligations for ongoing performance review and reporting. In 2008, Bonneville [BPA] and the other federal agencies made such implementation commitments to certain elements of the Council's [NPCC] Program, including the commitments made in the FCRPS and Willamette Biological Opinions as well as in the Columbia Basin Fish Accords [Accords]. As discussed in the Program's Implementation Provisions (Section VIII), the Council will work with Bonneville, fish and wildlife managers, and others to develop multi-year action plans for all areas of the Program (NPCC 2009)

The approach described in this project proposal furthers the goals of the Program with the development of MYAPs for each subbasin, which incorporate the Recovery Plan's IS (UCSRB 2007) and information contained in UCRTT Priorities for Reaches and Actions for Implementing Habitat Actions (UCRTT 2009) (Appendix B). The MYAPs, which are under development, focus on the highest biological priorities in each subbasin at a reach-scale. These multi-year (3 to 5 years) subbasin-specific planning/strategy documents will be updated annually by an adaptive management approach to refine the identification of limiting factors and actions based upon new information produced from tributary and reach assessments. The final component to the existing UC Region planning process is the monitoring, research, and evaluation phase to test the critical uncertainties associated with recovery objectives, strategies, and actions. Monitoring results will be evaluated and used as part of the existing UC Region adaptive management process to make adjustments to the MYAPs/IS and Recovery Plan, as needed.

C.2.1 SUBBASIN PLANS

Funded by the NPCC and completed in 2004, subbasin plans for the Wenatchee, Entiat, Methow, and Okanogan characterize existing conditions, identify management goals and objectives, and establish priorities for allocating mitigation and restoration funds to support and implement projects. The Entiat and Wenatchee subbasin plans outline the following goals: maintain existing high quality habitat; enhance and restore degraded areas and return natural functions; restore, maintain, and enhance fish and wildlife populations to sustainable and harvestable levels while protecting the biological integrity and genetic diversity of each species; increase public involvement; improve management, regulations, and funding for habitat protection and restoration efforts. The Methow and Okanogan subbasin plans describe the overall

goal as increasing fish run sizes to provide for stock recovery and mitigation of the effects of hydropower operations.

The Wenatchee, Entiat, Methow and Okanogan subbasin plans were integrated into the Recovery Plan thereby making the actions consistent in the recovery of UC salmonids. The primary limiting factors and threats identified in the subbasin plans contributed to the development of the Recovery Plan IS. Therefore, subbasin plan objectives and recommended actions are linked directly to the Recovery Plan and forthcoming MYAPs.

C.3 The Columbia River Basin Accords

The goals of the Accords are to provide biological benefits for Columbia Basin fish; acknowledge all of the participants; provide certainty for funding; support and enhance actions in the Biological Opinions (BOs)for recovery; create and support partnerships; and move from litigation to project implementation (Columbia Basin Fish Accords 2008). This project proposal outlines a process for distribution of Action Agency funds to project sponsors that complements the Accords' goals to fund projects that benefit fish, create partnerships among the salmon recovery participants, and support and implement habitat recovery actions in the UC Region.

C.4 FCRPS BiOp

The 2008 NOAA FCRPS BiOp requires the Action Agencies to implement a strategy to protect and improve tributary habitat based on biological needs and prioritized actions (NMFS 2008). The Reasonable and Prudent Alternative (RPA) 34 calls for implementation of several specific habitat projects in UC subbasins funded by BPA through the FY07-09 Fish & Wildlife Program solicitation cycle. To the extent that portions of these projects were infeasible, RPA 34 indicates that comparable replacement projects may be implemented in 2010-2013 to maintain habitat quality improvements. This portfolio of UC BiOp habitat projects, most of which were labeled as UPA during the FY07-09 funding cycle, are listed in Section D, below.

RPA 35 calls for the Action Agencies to identify and implement additional habitat projects during 2010 to 2018. These actions are expected to achieve the population-specific habitat quality improvements for UC River spring Chinook and steelhead listed in Table 5 of RPA 35, BiOp Appendix (NMFS 2008).

The BPA and the other Action Agencies have determined that achieving these regional habitat quality improvements will require maintaining the FY07-09 level of BiOp habitat effort (funding) in the UC into subsequent years. This effort, equivalent to approximately $3.5 million per year, is therefore needed in addition to the new effort associated with habitat projects being implemented under the Accords. In 2010, BPA was able to maintain the effort only partially by extending ongoing projects that could accomplish additional worthwhile work within the scope and intent of their FY07-09 proposals. The funding effort requested as part of this new programmatic project is proposed as the vehicle to continue most of the BPA-funded portion of the BiOp non-Accord habitat strategy in the UC Region beyond 2010.

C.5 Mid-Columbia Habitat Conservation Plans and Settlement Agreements

The hydroelectric projects owned and operated by Douglas County PUD (Wells), and Chelan County PUD (Rocky Reach and Rock Island) have developed HCPs under Section 10 of the ESA. Funds from the Rocky Reach and Rock Island HCPs are directed to the Columbia River and tributaries from Rock Island Dam to Chief Joseph Dam. Grant County PUD chose to develop the Priest Rapids Settlement Agreement (GPUD 2005) to provide mitigation and ESA coverage for its operation of Wanapum and Priest Rapids Dams. Funds from the Wells HCP are directed to the Columbia River and tributaries from Wells Dam to Chief Joseph Dam. Funds from all three HCPs include waters of British Columbia that flow into the Okanogan watershed. These funds are intended to compensate for 2% of the unavoidable mortality to steelhead and Chinook, sockeye, and coho salmon at each of the three hydroelectric projects. ESA "take" permits are issued by NMFS on the basis of approved HCPs and agreements, and approved actions are included as terms and conditions of the FERC licenses issued to the PUDs. The emphasis of these funds is on project implementation, rather than studies, planning, or administrative support. The HCPs include robust monitoring and evaluation components that require project operators to document that protection and mitigation measures do not adversely affect the status of listed populations.

The two HCP Tributary Funds (Chelan County PUD Rocky Reach and Rock Island) are part of the current UC Open 6-Step funding process (Appendix D) and another tributary fund (Grant County PUD Priest Rapids Settlement Agreement) is a potential funding and coordination partner.

D / Relationships to Other Projects

D.1 Ongoing and Future Implementation of Priority Habitat Actions in the Upper Columbia

The new proposed Upper Columbia Programmatic Habitat Project (2010-001-00) is modeled after the ongoing UCSRB SRFB and PUD HCP Tributary Fund processes, and projects implemented through the proposed programmatic framework will be closely coordinated with these existing efforts. The UC Region currently uses a reach-based action approach to ensure priority habitat projects are implemented with a clear understanding of the existing physical processes. This reach-based approach to project development incorporates information from the Tributary Assessments (TA) and Reach Assessments (RA) completed by Bureau of Reclamation (Reclamation) and Yakama Nation (YN), which assures restoration and protection actions are based on a sound scientific assessment of channel processes (see Assessment Schedule in Appendix D). As reach-level degradations and processes are defined, Alternative Evaluation Reports (AERs; see example in Appendix D) are produced in order to identify, sequence and prioritize specific actions to protect and/or restore channel and floodplain connectivity and complexity. In concert with this reach-based approach, the Entiat and Methow subbasins are implementing the IMW approach, which pairs reach-based actions with Level 3 effectiveness monitoring in order to assess the effectiveness of actions implemented within an experimental framework. The UC Region is moving from a reach-based towards a landscape-level approach to recovery. The programmatic project described in this proposal will help enable the UC Region to begin implementing more long-term, complex, and large-scope recovery actions with the highest biological benefit. Additionally, this project includes a strategy for addressing project-level monitoring to address the lack of consistent UC Region-wide monitoring for habitat actions (see Monitoring Section G).

All priority restoration actions identified in the UC Region subbasin MYAPs, which are currently under development, are derived from the Recovery Plan IS, UCRTT Priorities for Reaches and Actions for Implementing Habitat Actions (UCRTT Priorities) (Appendix B; UCRTT 2009), and assessment AERs. These actions will be included in the BPA/NPCC targeted solicitation that would occur under this programmatic project in FY2010.

Tables D-1 and D-2 characterize ongoing and future strategies within the four UC subbasins that will be covered by this programmatic project. Table D-1 describes projects related to future priority actions in each subbasin that would be covered by this programmatic project, and Table D-2 lists the BPA BiOp habitat restoration efforts that comprise the 12 UPA-labeled projects from the Fish and Wildlife Program's FY07-09 solicitation cycle that will be subsumed under the new programmatic, along with projects that have been funded by BPA, SRFB, HCP Tributary Committee and other funders that are related to ongoing and potential future projects under the new programmatic. Table D-2 also includes ongoing RM&E projects.

Table D-1. Future action implementation strategies in individual subbasins under this programmatic proposal

SUBBASIN	Future Action Implementation Strategies in Individual Subbasins Under the Programmatic Proposal
WENATCHEE	Future habitat restoration projects in the Wenatchee subbasin will follow a primarily reach-based approach for implementing habitat actions. For example, a significant effort will be made in Nason Creek, which is located within the highest priority reach in the Wenatchee subbasin (UCRTT 2009) and is consistent with the Reclamation's Nason Creek TA and Nason Creek Upper and Lower White Pine and Kahler RAs (Appendix E; Reclamation 2008a, 2009 b-d). Projects proposed in Nason Creek include numerous high priority large-scale habitat restoration actions such as reconnection of side-channel and/or off-channel habitats to restore natural processes that may begin as soon as 2011.
ENTIAT	Future habitat restoration actions in the Entiat subbasin are also moving towards a reach-based approach for implementing habitat actions. A significant restoration and synchronized IMW effort will be made in the mainstem Entiat with several restoration actions slated to commence in 2011. These actions are consistent with the Reclamation's Entiat TA and Preston RAs (Reclamation 2009a, 2009e). Phase one will be in Preston Reach (RM 21.2 to 23), located within the highest priority Stillwater reach in the Entiat subbasin (UCRTT 2009). Actions will be clustered to increase habitat quantity, channel structure, and complexity to detect a reach and population level response. Phase two (planned implementation in 2014) will focus on the lower Entiat River.
METHOW	Future habitat restoration actions in the Methow subbasin will address ongoing and remaining screen and barrier issues as opportunities arise. In addition, similar to the Wenatchee and Entiat subbasin strategies, sponsors are moving towards a reach-based approach for implementing habitat actions, with a focus on improving habitat complexity, channel reconnection, floodplain restoration, and increasing instream flow. A significant restoration and synchronized monitoring effort, referred to as M2, will be made in the Middle Methow River beginning in 2012. This substantial effort aims to assess reach and population level effects of several restoration actions slated to occur on the mainstem Methow between Twisp and Winthrop. The restoration actions for the M2 will be informed by the Middle Methow RA that will be completed by Reclamation in 2010. The pre-treatment monitoring phase of M2 began in 2008 and will continue through 2012. Implementation of restoration projects will take place in 2012 and 2013, followed by post-treatment monitoring through 2014. Similar to the Entiat's IMW monitoring effort, the monitoring component of M2 is a reach-scale effectiveness monitoring project (conducted by USGS and Reclamation.
OKANOGAN	Future habitat restoration in the Okanogan subbasin will continue to be directed towards the reconnection of tributary habitat. Resources dedicated to habitat improvements in tributaries will continue to support the re-establishment of summer steelhead in this basin and would also provide cold water refugia for migrating Chinook and sockeye salmon. The Colville Confederated Tribes (CCT), using MOA funding, have directed efforts to restore habitats in perennial tributaries of the Okanogan River. However, other opportunities to augment these restoration efforts were not recognized or were not developed and included within the Tribes' MOA. These include additional water savings through irrigation efficiencies programs which would be dedicated to instream flow in the tributaries. For example, the project partners are spearheading efforts to implement an irrigation efficiencies program throughout the basin. The results will likely increase stream flows in many of the tributaries in which the Tribe has reestablished habitat connectivity.

Table D-2. Relationship to existing projects

The following 12 UPA projects in the UC Region are being replaced under the new programmatic:			
FUNDING SOURCES	PROJECT #	PROJECT TITLE	RELATIONSHIP
BPA	2007-086-00	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 UC steelhead, spring Chinook and bull trout.
BPA	2007-325-00	UPA Wenatchee Subbasin Complexity Proposal	Occurs in Wenatchee subbasin. Implements five potential habitat complexity projects to benefit UC spring Chinook, steelhead and bull trout.
BPA	2007-400-00	UPA Wenatchee Subbasin Access Programmatic (Wenatchee Access)	Occurs in Wenatchee subbasin. The Wenatchee Access projects will be located in the Chumstick Creek watershed in the Wenatchee subbasin. Replacing the Chumstick Creek barrier culverts will primarily benefit UC steelhead
BPA / Reclamation / USFS	2007-055-00	Entiat River - UPA - Lower Entiat River Off-Channel Restoration Project	Occurs in Entiat subbasin. Provides 0.28 miles of off-channel habitat to benefit UC steelhead, spring Chinook, and bull trout, as well as irrigation channel enhancement for rearing and spawning habitat.
BPA / USFS	2007-231-00	UPA Entiat Subbasin Riparian Enhancement Program	Occurs in Entiat subbasin. Involves Tillicum Creek Fence and programmatic riparian projects to benefit UC spring Chinook, steelhead and bull trout.
BPA / Reclamation / USFWS / Grant PUD Habitat Fund	2007-318-00	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	2007-035-00	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 / MVID / SRFB / HCP Trib Fund	2007-172-00	UPA Project - MVID West Canal Diversion and Headworks	Occurs in Methow subbasin. Involves moving point of diversion 175' upstream by installing new concrete diversion headworks, realign 150' of West Canal intake and build new access road to connect new headworks, construct permanent channel-spanning natural rock roughened channel permanent diversion.
BPA / Reclamation	2007-214-00	UPA Project - Fender Mill Floodplain Restoration - Phase 1	Occurs in Methow subbasin. Restores natural channel process, reestablishes side channel rearing habitat, restores-improves riparian forest habitat, adds wood complexes in main stem, installs rock structure to keep majority of flow in main stem, breaches existing levee, connects side channels

BPA / Reclamation	2007-237-00	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 / Reclamation / MVID / SRFB / HCP Trib Fund	2007-251-00	UPA Project - Methow Valley Irrigation District East Diversion Dam Replacement	Occurs in Methow subbasin. Removes the present channel-spanning irrigation diversion dam and replaces it with a reinforced earth and rock wing dam parallel to the thalweg. This project will also re-open 1/4 mile of side channel habitat blocked by a pushup berm.
BPA / HCP Trib Fund / SRFB	2007-264-00	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	2007-325-00	UPA Wenatchee Subbasin Complexity Proposal	Occurs in Wenatchee subbasin. Implements five habitat complexity projects to benefit Upper Columbia spring Chinook, steelhead and bull trout. Includes completing implementation of the Channel Migration Zone (CMZ) Site 11, Site N4, Nason Creek and the future implementation of CMZ Site 6, Site 20.
BPA / WA State/ Landowner	2007-034-00	Columbia Cascade Pump Screen Correction	This project is an inventory of irrigation pump screens within the subbasins in the UC ESU. This is a voluntary compliance pump screen correction program in the four subbasins with a priority on the Okanogan River, since no prior assessment has been conducted. Upgrading screens on valid withdrawals will reduce juvenile fish losses due to entrapment in water diversions as called for in the most recent FCRPS BiOp.
BPA	2007-145-00	Okanogan Livestock & Water for Habitat Improvement	Provides a cost share program to assist producers in developing offsite water for livestock and provide assistance fencing riparian areas. Allowing producers to respond to and prevent complaints.
The following projects have been funded by BPA,SRFB, HCP Tributary Committee and other funders and are related to ongoing and future projects under the new programmatic:			
FUNDING SOURCES	PROJECT #	PROJECT TITLE	RELATIONSHIP
SRFB / State grant	SRFB 07-1885N	Burlington Northern Santa Fe RR Coordination Protocol Development	Developed a project coordination protocol and review process with Burlington Northern and Santa Fe (BNSF) Railroad to facilitate the implementation of the high priority large scale floodplain reconnection projects in Nason Creek on BNSF land.
SRFB/ Local and other grants	SRFB 09-1472	Nason Creek LWP Floodplain Reconnection Alternatives Analysis Phase 1	Project includes an Alternatives Analysis and stakeholder coordination as the first phase to reconnecting the two highest priority floodplain reconnection projects in Nason Creek. This assessment builds directly from Reclamation's TAs and RAs on Nason Creek and is related to the BNSF RR Coordination Protocol Development Project and future complexity priority actions in the Nason priority reach.
SRFB/DOE	SRFB 04-1503	Bridge to Bridge Phase 1 and 2	The "Bridge-to-Bridge" (B-to-B) reach (~RM 3.2 to RM 4.4) is the highest priority restoration area in Water Resource Inventory Areas (WRIA) 46 to restore geomorphology, floodplain function, habitat complexity/diversity, off-channel habitat, and shading, benefiting adult &

			juvenile Chinook, steelhead and coho. There are plans for a 3rd phase of this project to be implemented.
SRFB/ Reclamation/BPA/WA Rivers Conservancy (now WWP-TU)	SRFB 06-2216	Chewuch Canal Efficiencies	Multi-year phased project to reduce conveyance loss through canal seepage. The long-term goal of the project is to develop a fully piped, pressurized system. The canal efficiencies are needed to reduce diversion demands from the Chewuch River. This will result in increased stream flows in the lower 8 miles of the Chewuch River.
BPA	2002-013-01	Columbia Basin Water Transactions Program (CBWTP)	The project is used to fund water right transactions that restore streamflows in the Columbia Basin. To date, the project has supported well over 200 water transactions, with 4.3 million acre-feet of water committed to enhancing flow-limited tributaries in the Columbia Basin over the life of the water transactions. In 2008, over 3251 acre-feet and 49 cfs of flow was acquired through the water transactions project to benefit UC ESUs (UC Region steelhead and Chinook).

The following table includes 6 RM & E projects:			
FUNDING SOURCES	PROJECT #	PROJECT TITLE	RELATIONSHIP
BPA / NOAA / Reclamation / USFS / WDFW / WA DOE / Chelan PUD	2003-017-00	Integrated Status and Effectiveness Monitoring Program (ISEMP)	ISEMP is a collaborative effort to design, implement and evaluate Status and Trends Monitoring for salmon and steelhead populations and habitat and watershed-scale Effectiveness Monitoring for restoration actions impacting salmon habitat in the Columbia River Basin.
BPA	2003-02-200	Okanogan Basin Monitoring and Evaluation Protocol (OBMEP)	BPA funded the CCT to design and conduct a monitoring and evaluation program to provide status and trend data for all anadromous fish species in the Okanogan River subbasin for the next 20+ years that will also include monitoring, status, trend, and effectiveness of restoration actions.
BPA / Chelan PUD / Grant PUD	2003-039-00	Monitor Repro In Wenat/Tuc/Kal	Continued quantitative evaluation of the relative reproductive success and survival of naturally spawning hatchery and natural origin spring Chinook salmon in the Wenatchee River watershed above Tumwater Dam.
BPA / PSC / CDFO	2008-503	Studies into Factors Limiting the Abundance of Okanagan and Wenatchee Sockeye Salmon	This project seeks to expand the knowledge on the factors limiting production of Okanogan and Wenatchee sockeye salmon stocks.
BPA	2009-001	Expanded Multi-Species Acclimation in the Wenatchee/Methow Basins.	This acclimation project will further develop acclimation for UC steelhead and spring Chinook by developing new semi-natural ponds similar to what has been uniquely successful in the Mid-Columbia Coho Restoration Project (BPA Project #1996-04000).
BPA / NMFS / WDFW / CCPUD/ DCPUD / GCPUD	1996-040-00	Mid-Columbia Coho Restoration Project	The long term vision of this restoration project is to restore Coho salmon to the Wenatchee and Methow river basins at biologically sustainable levels that will support harvest in most years.

E / History of Ongoing Projects

Although this is a new programmatic project proposal, it combines and sustains BPA BiOp habitat restoration efforts that include UPA-labeled projects from the Fish and Wildlife Program's FY07-09 solicitation cycle (see list in Section D). Over the last decade, many of the habitat restoration actions in the UC have been directed towards targets of opportunity and characterized by single, discrete, projects identified in the Recovery Plan corresponding to the short-term nature of funding commitments. Over 360 projects have been completed including habitat protection (land acquisition, conservation easement), habitat restoration (access, riparian restoration, irrigation efficiencies, reduced sediment delivery, increased bank stability, etc.), assessments (limiting factors analysis, subbasin planning), and monitoring (status and trend, project effectiveness). While these single project-focused actions have provided critical contributions to recovery, many of the most cost-effective and immediately beneficial single, project-focused actions already have been accomplished. Future on-the-ground actions will be similar to those being implemented by the 14 FY07-09 BiOp projects, although planning, selection, and monitoring will be improved (see descriptions in Section F and Section G).

Table E-1 below presents a brief history of a portion of past actions that have been implemented in the individual UC subbasins. A reasonably extensive table entitled the "History of Past and Ongoing Projects" that presents many of the accomplishments/metrics of the FY07-09 BiOp projects funded by BPA, plus some examples of action projects funded by the SRFB, HCP Tributary Fund, and others is located in Appendix C, History of past and Ongoing projects . There are few effectiveness monitoring results to report for the BPA-funded projects because monitoring was not an integral part of the work originally proposed; that will change under this programmatic project (see Monitoring Section G). To view all UC projects in detail, visit the UC Salmon Habitat Implementation Schedule and Projects online database at http://uc.ekosystem.us/ .

Table E-1. Accomplishments in the UC Region subbasins

SUBBASIN	Accomplishments in the UC Region subbasins (See Appendix C for more information/metrics on past projects)
WENATCHEE	Habitat protection and restoration actions in the Wenatchee subbasin have focused on the removal of obstructions, habitat complexity, and increasing habitat quantity or protection of intact habitats. Recently, significant restoration actions have been implemented resulting in the replacement of 27 culverts opening up more than 38 miles of habitat (Wenatchee Passage Program (WPP) and Chumstick Culvert Replacements), 8 complexity projects to create 2.13 miles of off channel habitat (Channel Migration Zone Study (CMZ) and subsequent implementation) and the protection of over 400 acres and 3.6 miles of shoreline (White River and Little Wenatchee tributaries). When combined with other instream flow, irrigation improvements, and riparian planting projects, these efforts have enhanced conditions in this subbasin.
ENTIAT	Habitat protection and restoration actions in the Entiat subbasin have primarily focused on actions to increase habitat quantity, channel structure and complexity, and water quantity. These restoration actions have resulted in the replacement of 10 culverts opening up more than 20 miles of habitat (U.S. Forest Service (UFSFS) passage recovery efforts), 3 complexity projects to create 8 acres of off channel habitat (Wilson Creek Side Channel, Bridge to Bridge Phase 1 and 2, and subsequent implementation, the protection of over 400 acres and approximately 1 mile of shoreline (Stormy Creek Preserve, Middle Stillwater, and Troy parcel Acquisitions. When combined with other instream flow, irrigation improvements, and riparian planting projects these projects enhance fish habitat conditions in this subbasin.
METHOW	Habitat restoration actions in the Methow subbasin have primarily focused a large number of protection actions, the removal of obstructions, and complexity projects. For the early part of the program (through 2006), efforts focused primarily on addressing diversion screens and passage barriers. While miles of stream opened and acres of habitat improved are more difficult to quantify, we do know that during that time project sponsors addressed at least 8 screens and 9 partial or complete barriers. Significant restoration actions have been completed in 2007-2008 which have resulted in the 97.5 cfs acquired or enhanced to benefit UC Region Steelhead (63.4 to benefit UC Region spring Chinook), 1 screen addressed, 6 barriers addressed, 113.8 miles of stream opened, and 3.5 stream miles improved.
OKANOGAN	Habitat restoration actions in the Okanogan subbasin have focused on the removal of fish passage barriers and augment in-stream flows. Recently significant restoration actions have been accomplished in Salmon Creek which have resulted in access to 11 miles of suitable spawning and rearing habitat. More recently an increased effort to restore habitat within the Canadian portion of the Okanogan subbasin has occurred due to funding opportunities; McIntyre Dam, formerly the terminus for anadromous salmonids, was modified with “overshot” gates which allowed fish to pass, providing access to 7 miles of mainstem habitat. Previous habitat rehabilitation efforts, such as removing a fish passage barrier in 1999, which allowed access to 5 miles of habitat and excluding livestock within a 1.2 mile reach thereby increasing canopy closure and reducing stream temperatures in Omak Creek, have resulted in successful natural reproduction for both summer steelhead and spring Chinook salmon.

*Project information was provided by staff from Cascadia Conservation District (CCD), Chelan Douglas Land Trust (CDLT), Chelan County Natural Resources Department (CCNRD), Methow Salmon Recovery Foundation (MSRF), Methow Conservancy, and Colville Confederated Tribes (CCT).

F / Biological/Physical Objectives, Work Elements, Methods, and Metrics

F1. Biological/Physical Objectives

The overarching objectives described in this proposal are those defined for ESA recovery in the Recovery Plan (UCSRB 2007):

- Increase the abundance of naturally produced spring Chinook and steelhead spawners within each population in the UC ESU and DPS to viable levels.
- Increase the productivity (spawner:spawner ratios and smolts/redds) of naturally produced spring Chinook and steelhead within each population to levels that result in low risk of extinction.
- Restore the distribution of naturally produced spring Chinook and steelhead to previously occupied areas (wherever practical) and allow natural patterns of genetic and phenotypic diversity to be expressed.

The Recovery Plan's short-term and long-term habitat objectives could be considered a recovery strategy, but they also serve as the primary project-level objective:

- Protect and restore the ecosystem functions needed for recovery and long-term viability of naturally produced UC spring Chinook and steelhead.

The following objective – although not quantifiable or scientific – represents a core value and foundational philosophy for accomplishing the long-term recovery objectives:

- Enlist local stakeholders as caretakers of salmon and steelhead populations by supporting their fullest participation as stream stewards within their local watersheds.

At this time, quantifiable project objectives cannot be specified, such as accomplishments measured by habitat metrics. However, actions implemented in the four subbasins under the proposed programmatic project could contribute to over 40 different measured habitat metrics in Pisces. Thus, the approach described in this project proposal will apply resources to the best action opportunities available each year throughout the subbasins based on technical assessments of biological benefits and other factors (Section F, Work Element 114).

F2. Overview – Work Elements, Methods and Metrics

The following section provides an overall work schedule for all of the work elements (WE) (tasks), methods, and metrics associated with the proposed programmatic project.

FY2010
Transition from the original 14 FY07-09 BiOp projects to the new programmatic project, which would be fully implemented in FY2011. This year's (2010) primary WEs are listed below, with further details under each respective work element.

- 177 PRODUCE PLAN. Continue/complete development of MYAPs that integrate actions from all of the programs involved (see additional text under UC project planning, below).
- 114 IDENTIFY AND SELECT PROJECTS. The solicitation/selection process for FY2011 actions would begin in April 2010 and culminate in funding decisions in November 2010. Subsequent solicitation and selection processes would begin in October (Targeted Solicitation) or May (Open Solicitation) and end the following October for future fiscal years.
- 191 WATERSHED COORDINATION. Continue coordination among local action sponsors within the Watershed Action Teams (WATs), IT, UCRTT and the UCSRB in order to prepare for the new programmatic process.

FY2011 THROUGH FY2017
For the duration of the current BiOp period, all work elements may be active in each year.
Periodically, for example, every 3 to 5 years, this project would be included in the UC Region's regular Fish & Wildlife Program categorical reviews, including technical reviews of results.

UPPER COLUMBIA PROJECT PLANNING, IDENTIFICATION AND SELECTION
Sections B and C of this project proposal outline the limiting factors analyses and UC regional planning processes that have occurred to date. These efforts led to the Recovery Plan and Biological Strategy, which set the UC regional directives. To work towards viable salmonid recovery, the highest priority projects in the UC Region should be funded first. Thus, the IS in the Recovery Plan and Biological Strategy are being used to develop MYAPs for the UC subbasins. Each subbasin MYAP will identify and sequence projects for the annual BPA targeted solicitation and project funding from FY2011 through FY2017. Ongoing coordination among local sponsors will be required for annual project selection, monitoring, and adaptive management. The following text further describes the process and schedule for each work element.

F3. Work Element 174 – Produce Plan

As mentioned previously, MYAPs are the culmination of fundamental UC Region planning documents (identified in Section B, Figure B-3) and the footing for the solicitation and funding process described in this programmatic project.

Figure F-2 (is a comprehensive schematic that illustrates how these MYAPs fit within the process proposed in this programmatic project. The UC WATs are currently developing MYAPs based upon the actions in the Recovery Plan/IS and updated UCRTT Priority recommendations. MYAPs are 3-5 year action plans that

identify the upcoming implementation opportunities for high priority restoration actions. These MYAPs will be updated annually by the WATs, and then reviewed by the UCRTT to ensure proposed actions meet Recovery Plan and BiOp priorities. The MYAPs will also be refined by the UCRTT based on new information produced from the TAs and RAs, completed by Reclamation and YN, in order to develop restoration and protection strategies based on a sound scientific assessment of channel processes (see Assessment Schedule in Appendix D). Alternative Evaluation Reports (AERs; see example in Appendix D) will be produced from these assessments for the high priority actions and reaches, and be sequenced and prioritized to protect and/or restore channel and floodplain connectivity and complexity and address other limiting factors. Completed MYAP tables will be reviewed by the IT and will be the basis for targeted solicitation. The flow chart (Figure F-1) outlines the process for development of the MYAPs and resulting targeted solicitation.

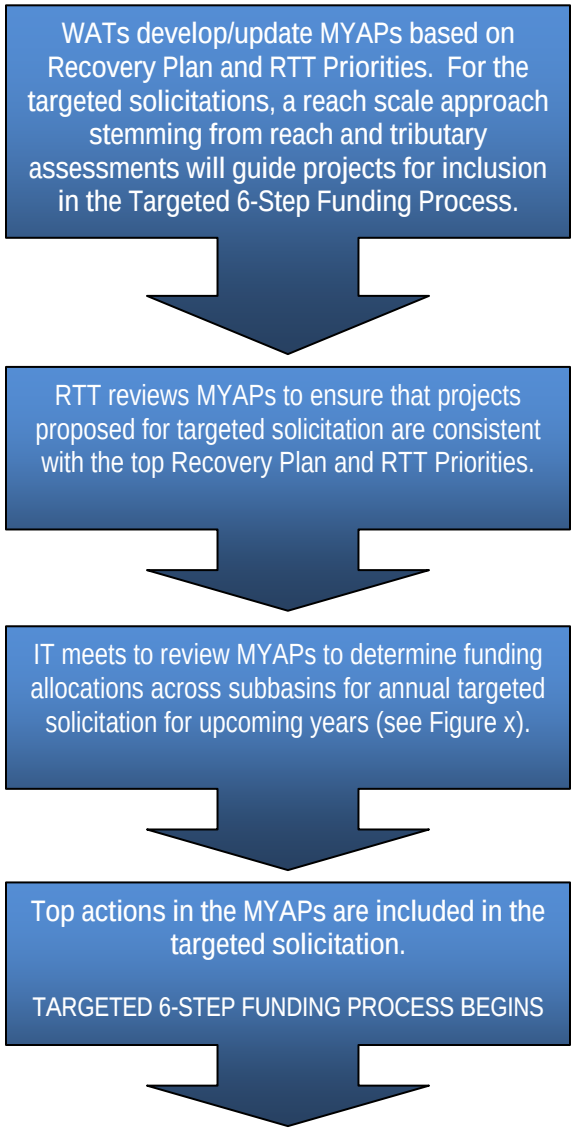
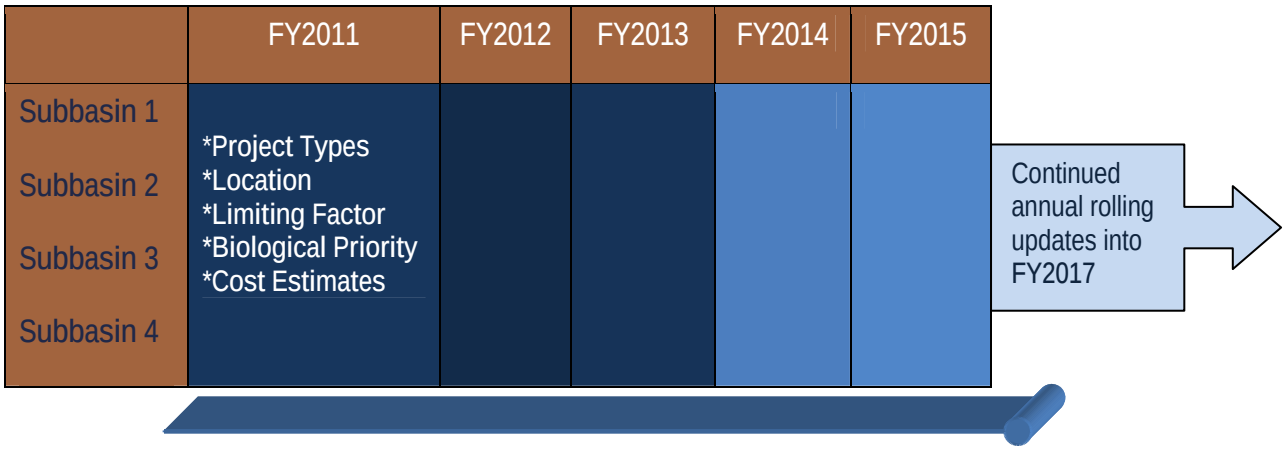


Figure F-1. Annual Multi-Year Action Plan development process

The MYAP tables will include project types, location, limiting factor, biological priority, and cost estimates. The WATs will provide annual rolling updates and revisions to the MYAP tables for the subsequent 3-5 years (Table F-1). The final product will be a programmatic table guided by the UCRTT's biological priorities table and re-integrated into the Recovery Plan's IS. The MYAPs will also be utilized in the coordination of funds across the subbasins and are a critical planning component in the reach scale approach discussed in this proposal.

Table F-1. Multi-Year Action Planning Tables - MYAPs will be populated 3-5 years in advance. Tables will be revised and updated annually by WATs and reviewed by UCRTT to ensure proposed actions meet the Recovery Plan's highest biological priorities.



SCHEDULE: MYAPs updated annually
DELIVERABLES: Develop 3-5 year strategic plans such as Multi-Year Action Plans for the UC Region subbasins that will be the basis for the targeted solicitation.

F4. Work Element 114 - Identify and Select Projects

Project actions will be identified for BPA/NPCC funding through an UC Region Annual 2-Cycle Solicitation. Table F-2 compares the 2 separate funding cycles and Figure F-2, Project Identification and Selection schematic, is a comprehensive illustration of the UC Annual 2-Cycle solicitation.

Upper Columbia Annual Funding 2-Cycle Solicitation

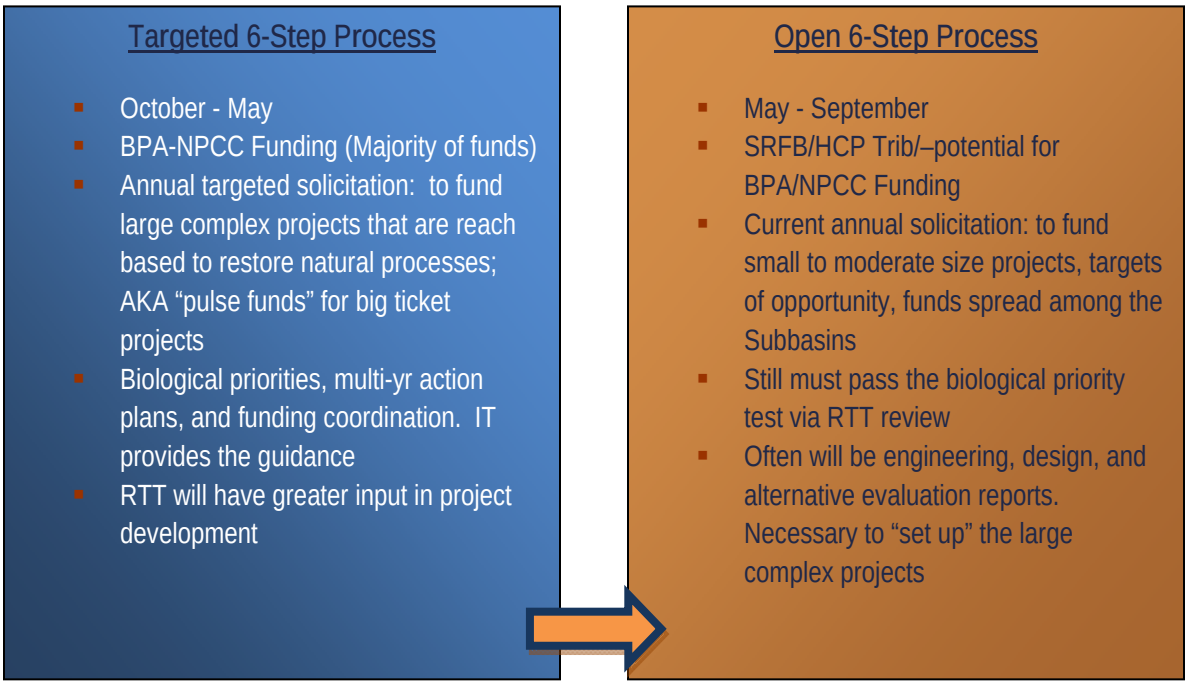
TARGETED 6-STEP FUNDING PROCESS (OCTOBER – MAY)

The first cycle is an annual targeted solicitation that will take place October through May and is intended to accommodate large, complex or reach-based actions to address the highest biological priorities in the UC Region. This solicitation cycle is new and has been modified from the current Open 6-Step Process for this proposed programmatic project. A majority of BPA/NPCC funds will be allocated to this targeted funding process. The solicitation is targeted, meaning the priority watersheds, stream reaches, and types of project actions are pre-defined. Actions included in the targeted solicitation will be selected from the priority actions identified in the MYAPs. The Targeted 6-Step Process will be very similar to the Open 6-Step Process (see description in next paragraph and detailed in Appendix D); however, the UCRTT's role in the targeted solicitation is one of greater input during the planning and project development process (see Role of the UCRTT, Appendix D). One of the principal roles of the UCRTT in both the Targeted and Open processes is a formal review of specific priority actions using the UCRTT Biological Strategy Project Evaluation Criteria detailed in Appendix D during the project solicitation and selection phase.

OPEN 6-STEP FUNDING PROCESS (MAY – SEPTEMBER)

The second cycle is the current UC regional Open 6-Step Process. This project selection process has a greater likelihood of spreading the BPA/NPCC, SRFB, and HCP Tributary funds across the UC Region subbasins to fund smaller scale actions. These actions will likely be lesser in scope and/or effort in terms of engineering, design, and alternatives analysis preparation than the larger complex projects. The current UC regional Open 6-Step Process is the result of years of collaborative work on the part of all interested parties to establish an effective and efficient process and the "Regional Process Guide" documents this process and provides guidance to project sponsors and partners. Figure F-2 outlines the Open 6-Step Process as well as the newly developed Targeted 6-Step Process; Appendix D includes a more detailed description of each of the steps.

Table F-2. Comparison of Targeted vs. Open 6-Step Process



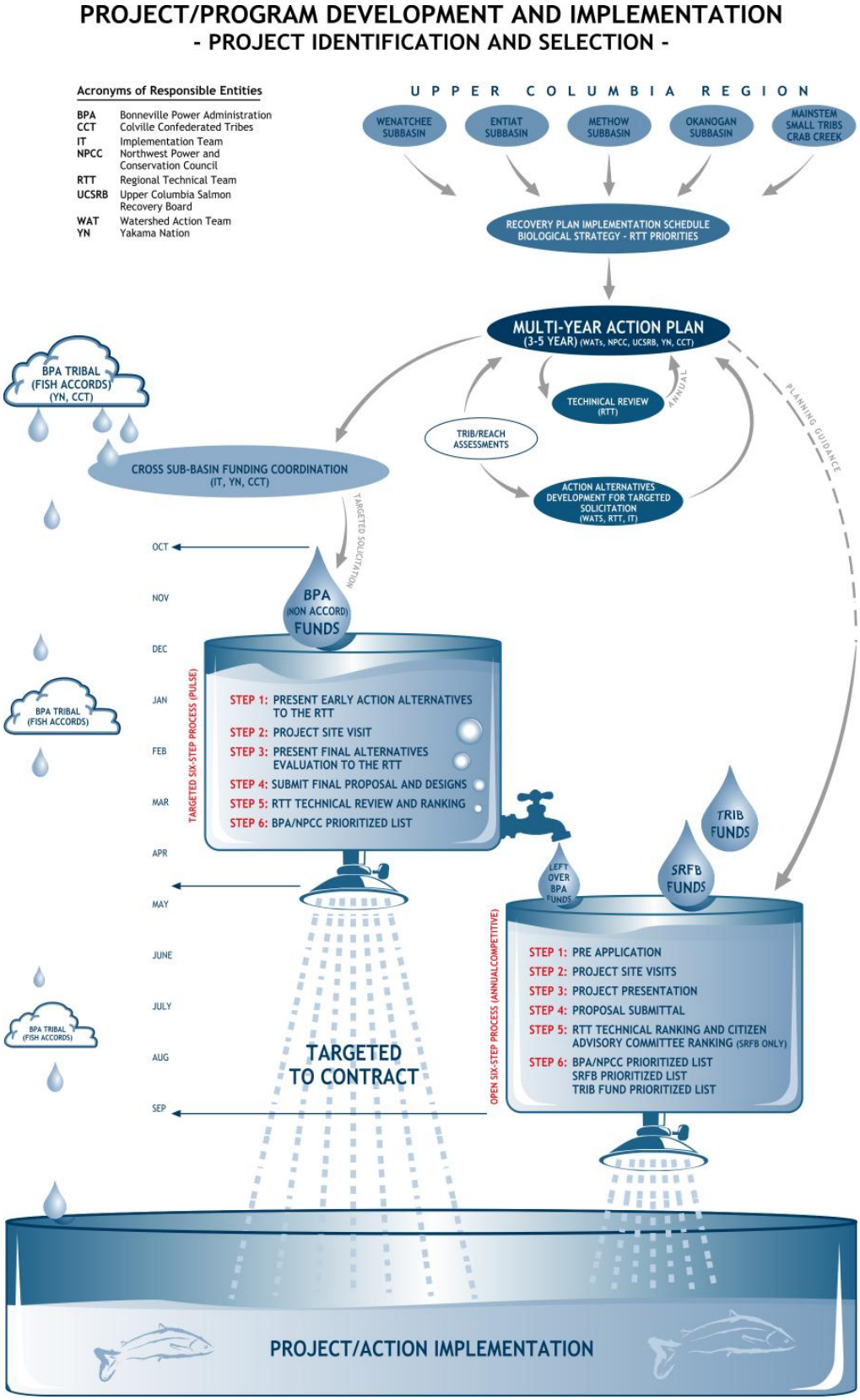


Figure F-2. Upper Columbia Project Planning, Identification, and Selection Process Diagram

Schedule: Transition from the original 14 FY07-09 BiOp projects to the new programmatic project will be fully implemented in FY2011. The first cycle, the BPA/NPCC Targeted 6-Step Process, will run annually from October to May - FY2010 to FY2017 and the subsequent Open 6-Step Process will begin in May and run through September.

DELIVERABLE: A prioritized list of actions addressing primary limiting factors from the targeted and open funding cycles.

F5. Work Element 175 – Produce Design and/or Specifications

DESCRIPTION: Surveys (e.g. topographic and fluvial geomorphology) will be needed to develop the project design and specifications. Project design and specifications will be created and submitted to obtain permits.
SCHEDULE: Annual
DELIVERABLES: Designs for specific habitat projects/actions. All work associated with the preparation of engineering or technical drawings, specifications and/or budgets required for the construction/installation of any structure; may include ancillary work such as land surveying, photogrammetric surveys, field surveys, etc.

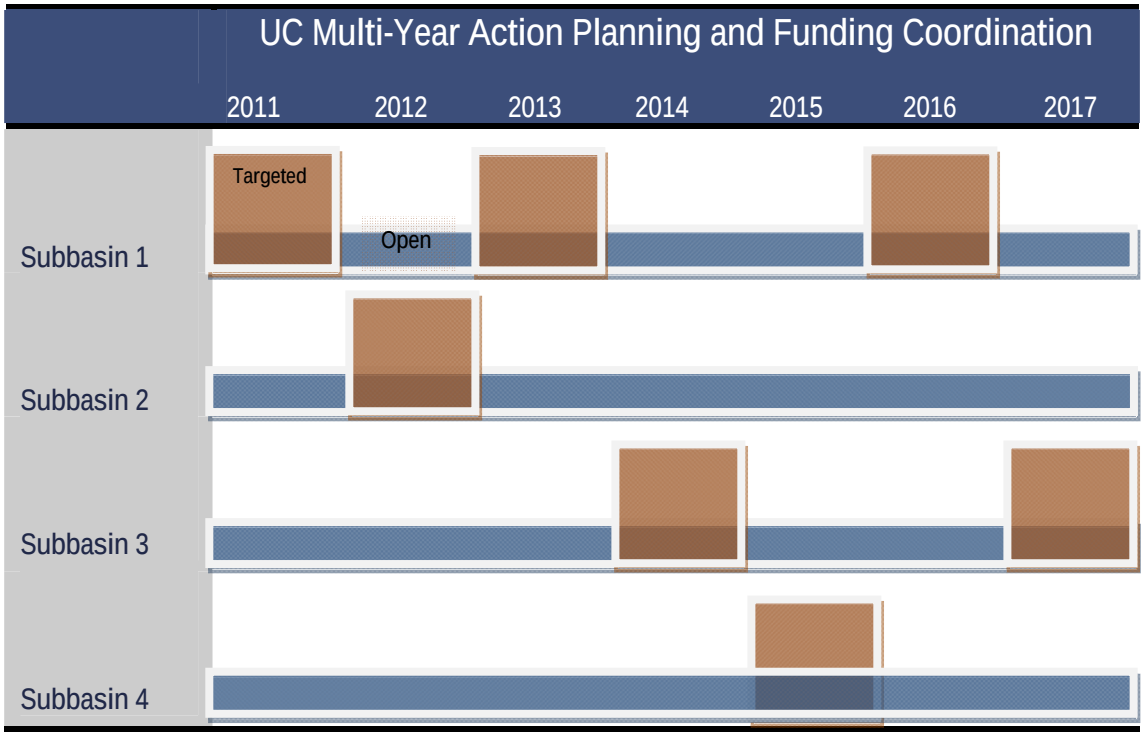
F6. Work Element 191 - Watershed Coordination (Subbasin)

DESCRIPTION: There is an established and coordinated recovery effort in the UC Region; however, BPA's commitment to distribute funds throughout the UC Region will further facilitate local coordination and planning. The UCRTT, IT and WAT's are currently increasing coordination efforts across the subbasins. Local WATs in the Wenatchee, Entiat, Methow, and Okanogan subbasins are currently developing MYAPs (3-5 years) focused on the highest biological priorities in their subbasin at a reach scale. These MYAPs will be updated annually using an adaptive management approach to refine the identification of limiting factors based on new information produced from the ongoing TAs/RAs and monitoring efforts.
SCHEDULE: Annual
DELIVERABLES: Coordinate work focused on a local watershed or subbasin. Under this programmatic proposal, watershed coordination will include the four subbasins: Wenatchee, Entiat, Methow, and Okanogan.

F7. Work Element 189 - Watershed Coordination (Regional)

DESCRIPTION: The improved planning effort and increased partner collaboration described in this programmatic project proposal will address the UC Region's long-standing challenges to achieving recovery by increasing the certainty and flexibility of funding to implement the most critical large scale recovery actions. The majority of the BPA/NPCC funds will be allocated to the reach-based or large, complex projects in the annual Targeted 6-Step solicitation AKA "pulse funds" for big ticket projects. The IT and UCRTT will meet annually to determine how these "pulse funds" will be allocated, based on input from the WATs (MYAPs). A smaller portion (or the remainder) of BPA/NPCC funds will be allocated towards the current Open 6-Step solicitation spread across the subbasins for smaller scale implementation, permitting, and design type projects.

Table F-4. Multi-Year Action Planning and funding coordination.
Open 6-Step Cycle. Spread across the subbasins for smaller scale implementation/permitting/design.
Targeted 6-Step Cycle. Directed toward large scale or reach based actions (Pulse Model).



Funding Coordination to Address Large Scale Projects

This programmatic proposal for dedicated funding will provide a solid financial base to develop opportunities for cost-sharing with other funding partners, in order to facilitate implementation of complex projects that address priority limiting factors in the UC Region. Examples of such actions include: the large scale Nason Creek channel reconnection projects in the Wenatchee Subbasin, reach-based IMW efforts in the Entiat and Methow, and large scale side-channel and floodplain reconnection in the Okanogan mainstem and flow restoration within its tributaries. The multi-year planning and action schedules (i.e. MYAP tables) will cover 3-5 years and will be fully vetted by the WATs, IT and UCRTT, thereby providing a high level of assurance to UC regional funding partners that large-scale, more complex projects are well coordinated, sequenced, and of high biological priority. One of the primary funding partners is the YN, which has proposed a potential plan to expend approximately $63 million of Accord money in the UC using the established UCSRB process, to the greatest extent possible, to address reach-based limiting factors in areas of high biological priority. The CCT is another prospective funding partner, having secured in excess of $200 million over a 10-year period of Fish Accord funds. Potentially, the CCT is interested in leveraging funds to address projects essential to the recovery of anadromous salmonids. Additionally, the scheduling process will increase coordination with long-standing recovery partners like Reclamation. Reclamation's entire annual FCRPS BiOp tributary habitat budget for 11 FCRPS BiOp subbasins throughout the Pacific Northwest region is about $6 to $7 million; approximately $4 million per year has been allocated to the UC Region in recent years.

Reclamation provides technical assistance directly through in-kind services or indirectly by providing financial assistance to local project sponsors who then provide a more limited suite of technical assistance to meet Reclamation and BPA salmon and steelhead survival commitments specified in the 2008 FCRPS BiOp.
SCHEDULE: Annual
DELIVERABLES: Coordination of funding throughout the UC Region to address large scale more complex actions with the highest biological benefit.

F8. Explanation for Other Necessary Work Elements

The work elements that will be used as necessary for each project funded through this programmatic project are as follows:

Environmental Compliance Work Element:

165	Produce Environmental Compliance Documentation	Covers any work by the Contractor to assemble, gather, acquire, or prepare documents in support of obtaining environmental compliance from BPA, providing maps, drafting a Biological Assessment, obtaining permits, conducting public involvement activities, completing an archaeological survey, etc.).

Habitat/Passage Operations and Maintenance (O&M) Work Elements:

22	Maintain Vegetation	Activities that include herbicide application, plant competition reduction (scalping, mats), mowing, irrigation, fertilization, prevention or reduction of animal damage (browse repellents, tree tubes).
27	Remove Debris	Removal of items such as trash, old buildings, and abandoned equipment from water or land. Does not include removal of a diversion or instream structure.
186	Operate and Maintain Habitat/Passage/Structure	Operation and maintenance of habitat features including, but not limited to, fences, instream structures, passage facilities, sediment control structures, and off-site water developments.

Instream Passage Improvement Work Elements:

69	Install Fish Screen	Work to install or replace a fish screen associated with a diversion or pump.
80	Install Siphon	Covers work that installs a siphon, flume or other structure to separate canal flow from stream flow where the two have been intermingled as part of past irrigation development, resulting in fish using the natural stream course for passage and rearing.
84	Remove/Install Diversion	Work that removes, replaces, or avoids creating a fish passage barrier associated with a stream diversion, including push-up dams.
85	Remove/Breach Dam	Work that facilitates fish passage over a natural (e.g., beaver) or human-made dam by breaching or removal.
184	Install Fish Passage Structure	Install, replace or modify structures when the intent is to improve fish passage and/or flow, typically by removing or modifying a full

		or partial instream barrier. Includes the following types of structures: fish ladders, bridges, culverts, jump pools, and weirs. Where anadromous fish are present, structure must meet current NOAA specifications and USFWS specifications for bull trout and USFWS recommendations for lamprey.

Habitat Improvement Work Elements:

29	Increase Instream Habitat Complexity and Stabilization	Work that adds natural materials instream to create habitat features or to improve channel morphology. Includes J-hooks, barbs, vortex weirs, and large woody debris (LWD). Can include work to stabilize or maintain a streambank, such as riprap.
30	Realign, Connect, and/or Create Channel	Active attempts to directly add sinuosity, meanders, side channels, and/or off-channel habitats (e.g., sloughs or oxbows). May include reconnection of historical channels (either via excavation or diversion of existing streamflow), excavation of new channels, and/or significantly improving the functionality of existing channels.
33	Decommission Road / Relocate Road	Any activity that makes a road or trail unusable including adding berms, pits, boulders or logs, and/or ripping or obliterating the road or trail with heavy equipment that may involve re-contouring the slope.
40	Install Fence	Work to install various types of fence and/or gates. Can also include cattle guards or water gaps for livestock.
47	Plant Vegetation	Install terrestrial or aquatic plants for purposes such as cover, erosion control, roughness recruitment, shading, restoring native habitat, forage enhancement, road removal, or run-off reduction. May be riparian or upland and includes seeding.
53	Remove Vegetation	Removal, mechanical, biological, or chemical, of one or more plant species or a number of individuals of a plant species. Often are exotic or non-native plants, naturalized plants, or undesirable native plants, all of which may be considered to be noxious, invasive or "weeds". Includes the removal of both aquatic and terrestrial plants. Includes tree stand manipulation in order to create forage openings.
55	Upland Erosion and Sedimentation Control	May include the installation of water bars, gully plugs and culvert outlets, grassed waterways, grade stabilization structures, sediment catchment ponds/basins, and removal of drainage pipes and other blockages to specifically prevent a sediment slump or landslide.
180	Enhance Floodplain/Remove, Modify, Breach Dike	Refers to the removal, breaching, or alteration/set-back of a dike to restore riparian/floodplain or wetland habitat.
181	Create, Restore, and/or Enhance Wetland	Refers to the creation, restoration, or enhancement of a wetland area or function.
190	Remove, Exclude, and/or Relocate Animals	Removal or relocation of non-native or undesirable fish and wildlife species and/or any actions employed to exclude non-native or undesirable fish and wildlife species from a particular area.

Land Acquisitions and Conservation Easements Work Elements:

172	Conduct Pre-Acquisition Activities	Note: Actual acquisition activities and costs are handled by BPA, not by a project's proponent/contractor.

Planning and Coordination Work Elements:

114	Identify & Select Projects	See above.
115	Produce Inventory or Assessment	Covers inventories and assessments specifically designed to support future implementation actions. Can include passage inventories, habitat condition inventories, or watershed assessments.
119	Manage & Administer Projects	Covers the administrative and technical work by the contractor to fulfill BPA's programmatic and contractual requirements such as financial reporting (accruals), and development of an Scope Of Work (SOW) package (includes SOW, budget, property inventory).
122	Provide Technical Review	The review of technical details, including but not limited to engineering plans, restoration plans, project selection, RM&E methods, and deliverable approval.
175	Produce Design and/or Specifications	Covers all work associated with the preparation of engineering or technical drawings, specifications and/or budgets required for the construction/installation of any structure. May include ancillary work such as land surveying, photogrammetric surveys, field surveys, etc.
189	Regional Coordination	Refers to coordination work that covers a large portion of the Columbia River Basin. Coordination which directly supports other project work.
191	Watershed Coordination	Refers to coordination work focused on a local watershed or subbasin.

Reporting Work Element:

185	Produce Pisces Status Report	Covers the reporting of status of milestones, reporting of implementation metrics, and deliverables in each contract. These milestone status reports shall be completed quarterly.

F9. WE 157 Collect/Generate/Validate Field and Lab Data

Research, Monitoring and Evaluation (RM&E) and Data Management Work Elements:

DESCRIPTION: This WE would be used for this project primarily if preferred and alternative projects for collecting monitoring data were not funded and functional, therefore requiring this project to fund and implement its own basic Level 1monitoring effort (see Section G, below, Monitoring and Evaluation. Information collected for Implementation/Compliance would be compiled into annual reports, and we do not consider it to be data collection in the context of this WE.
DELIVERABLES: Sets of monitoring data for Level 1 effectiveness monitoring maintained in databases by the UCSRB Data Steward.

F10. WE 132 Produce Annual Progress Report

DESCRIPTION: Reports will include all data necessary to address the performance standards.
Introduction:

- A brief discussion of the objectives and success criteria;
- A section summarizing the organizations involved in the implementation activities and their background/significance to the UC Region;
- An overview of all significant activities for each year;
- A general discussion of expenditures (Administration, implementation, and monitoring); and
- A section describing or summarizing regional coordination of activities.

Action Specific:

- A brief description of all actions;
- A discussion of the vegetation, hydrology, and in-water habitat conditions as they relate to corresponding success criteria;
- A presentation of any monitoring data collected on each individual action which was directly funded under this project; and
- A chronological photographic summary and comparison of photographs from established photo points.

Discussion/ Conclusions:

- A discussion of problems, lessons learned, recommendations, and contingency measures taken; and
- A summary and conclusions section.

Each report will focus on the accomplishments of the overall project, progress of each individual action, and any data collection funded by the project for the contract year. Reports will be submitted annually.

SCHEDULE: Annual
DELIVERABLES: A written report of results submitted to BPA at the end of a contract period. Produce Non-technical progress report for all actions completed under this project.

G / Monitoring and Evaluation

Habitat protection and restoration efforts implemented under this project will be monitored and evaluated in several ways, at multiple levels. Doing so requires charting a course through a rich and dynamic landscape of RM&E frameworks, strategies, plans, guidance, metrics, and protocols. Fortunately, the UC Region offers intensive monitoring projects already underway that can help provide high-level effectiveness monitoring. Some of those projects are described in Rogers 2009. The BPA will be funding further efforts through the regional collaborative BiOp RM&E prioritization process. These complementary M&E efforts, as well as those sponsored by this project, will flesh-out a monitoring and evaluation framework adapted from the suggested M&E guidelines of ISRP 2007-1 and Hillman (2005).

The M&E component for this project's habitat work is subject to dynamic regional processes. These include the NPCC's Columbia River Basin Monitoring, Evaluation, Research, and Reporting Framework, which may be available in 2011. Likewise, the regional collaborative BiOp RM&E prioritization process has identified new fast-track monitoring activities that are being proposed and reviewed by the ISRP now (Feb. 2010) and others that will be proposed and reviewed during the RM&E categorical review in coming months. We understand that BPA is committed to funding these BiOp RM&E enhancements, pending ISRP review and NPCC recommendations. The BPA has prepared a draft strategy (Geiselman and Scranton 2009) that will help inform the NPCC's, and BPA also intends to submit a proposal to the NPCC and ISRP review for third-party implementation monitoring and project-level effectiveness monitoring for habitat actions. We try to account for such uncertainties in regional RM&E policy and funding by identifying alternatives and contingencies in our M&E plans, below.

G.1 Implementation/Compliance Monitoring

We define this as monitoring at the project/action[1] level to document the action type, location, and magnitude to determine whether the action was implemented correctly, and to provide near-term feedback on whether actions and their designs adequately stand the tests of time, nature, and human effects. Implementation monitoring is based on design plans and/or action proposals, and relies on visual inspection, photo monitoring, and field notes (Hillman 2005).

Implementation and compliance monitoring are important for many administrative reasons and as a confirmation that actions being relied on to meet specific management goals are implemented as intended. Implementation monitoring is also important, when used together with information about limiting factors from habitat status and trend monitoring and information from Level 1 and Level 2 effectiveness monitoring, in helping to answer part of the management questions: 1) how much restoration is needed 2) and how much is left to be done.

[1] "Project" is an ambiguous term. The Fish and Wildlife Program (FWP) includes many projects, and a programmatic habitat project like this one may include several individual habitat restoration actions that are also called projects, especially by local sponsors. For clarity, we refer to an individual on-the-ground project as an "action." In other contexts where "project" is commonly used (e.g., project-level monitoring), we typically substitute the hybrid term, "project/action."

Information collected as part of implementation monitoring for each action will include, as a minimum, the metrics described in the tables Part I. General information fields for all projects and Part II. Project specific information fields in Katz et al. (2006). Photo monitoring for all sites will be conducted following procedures outlined in Hall (2000). Except where otherwise noted, ISEMP data management practices will be adopted.

- PISCES METRICS: Planned and actual metrics will be recorded in Pisces by action sponsors for all habitat actions and Work Elements (WEs) implemented through this project. Current habitat metrics in Pisces (extensions of those listed in ISRP 2007-1 (ISRP 2007) will be augmented beginning in 2010 with Katz et al. (2006) metrics mandated by BiOp RPA 73 (NMFS 2008). Protocols will be developed to ensure non-redundant metric reporting for cost-shared actions.
- CONSTRUCTION INSPECTION AND EVALUATION: Habitat features that are constructed based on engineering designs will be inspected to ensure that design specifications have been met. Local sponsors of construction actions typically have inspectors continually on-site during construction, coordinate any on-the-ground deviations with permitting agencies, and require as-built drawings upon completion.
- METRIC VERIFICATION: Metrics recorded by action sponsors in Pisces will be independently verified and, when necessary, revised. It will be implemented through one of the following means:
  - (preferred) NEW BIOP RM&E PROJECT FOR THE UPPER COLUMBIA: Implementation monitoring, data management, and reporting for restoration and protection projects funded by BPA and other sources. Monitoring currently conducted by USRB and SRFB at many action sites includes information equivalent to the implementation monitoring described here, and will be accepted as independent verification for actions at those sites. Independent verification of all other actions in the UC will be conducted as part of the new project. A proposal for this new project will be submitted during the RM&E categorical review.
  - (alternative) NEW PROJECT THAT PROVIDES INDEPENDENT THIRD-PARTY VERIFICATION and compliance monitoring for BiOp implementation across the UC Region. BPA would fund this work directly, and it intends to submit a proposal for this project to the NPCC and ISRP in coming months.
  - (contingency 1) BPA PROJECT MANAGER, as resources allow.
  - (contingency 2) UCSRB STAFF OR A SUBCONTRACTOR with funding support from this project.

- Long-term Implementation and Verification: The continued functioning of habitat actions will be tracked through time to provide feedback on the efficacy of designs and to identify conditions that may warrant remediation. For this monitoring, we make a practical distinction between protection actions and restoration actions:
  - PROTECTION ACTIONS (e.g., conservation easements, fee title acquisitions): Local sponsors of these actions and/or other easement holders will periodically inspect the properties, monitor property conditions, and enforce provisions of conservation easements and management plans (where applicable). Some nominal stewardship funds may be dedicated to this purpose, although many of the land trust sponsors have other funding for this purpose.

- RESTORATION: Monitoring in years subsequent to implementing the restoration actions will provide near-term feedback on whether actions and their designs adequately stand the tests of time, nature, and human effects. The emphasis will be on physical function/integrity, although biological function will be monitored for vegetative actions (e.g., plant survival). Frequency of monitoring will depend on action type, degree of risk, and catastrophic events, but most sites will be visited annually. Because this information is also collected as a part of effectiveness monitoring, separate long-term implementation and verification monitoring will not be conducted for most actions at effectiveness monitoring sites. This includes habitat actions implemented as part of the Entiat IMW. Long-term implementation and verification monitoring would be conducted as part of a new BiOp RM&E project for the UC: Implementation monitoring, data management, and reporting for restoration and protection projects funded by BPA and other sources, mentioned above.

Results of implementation/compliance monitoring will be reported in Pisces. Metrics are reported via Pisces quarterly status reports (WE 185), and thereafter they are available for queries and system-generated project- and program-level summary reports. Success, adjustments, and lessons learned from construction and other actions will be included in written annual progress reports (WE 132), which will be uploaded to Pisces for public access soon after completion of each contract period.

G.2 Effectiveness Monitoring

Effectiveness monitoring focuses on determining the physical and biological effects of recovery actions. If successful, effectiveness monitoring can help to answer several important questions, including: 1) are recovery actions successfully meeting their intended goals and objectives; 2) which types of actions are most effective; and 3) what is the magnitude of effect that can be expected from each project? The effectiveness of this project's actions will be monitored at three different levels defined by Hillman (2005). The most simple, Level 1 effectiveness monitoring, tries to determine the physical environmental response to actions at the action scale. This monitoring will provide some near-term feedback on project selection, design, and implementation (i.e., adaptive management). Slightly more complex, Level 2 effectiveness monitoring, looks at both physical and biological responses to actions at the action scale. Level 3 effectiveness monitoring attempts to determine the population response to recovery actions at watershed and subbasin scales. Level 3 effectiveness monitoring may take decades to detect subbasin/population-level responses, and therefore it is less likely to inform adaptive management of habitat efforts in the foreseeable future. Collaborative, RM&E dedicated projects will bear primary responsibility for effectiveness monitoring at scales larger than the individual action. Those efforts, described below, vary selectively among the UC Region subbasins/populations. Appendix E, Habitat Monitoring and Evaluation Efforts in the Upper Columbia Subbasins, describes the individual M&E efforts in detail for the Wenatchee, Entiat, Methow and Okanogan subbasins (Table G1 illustrates and compares the effectiveness monitoring efforts in the UC Region subbasins) and the expected outcomes of those efforts and tables of general characteristics and specific indicators monitored as part of ISEMP and related monitoring programs.

Level 1

Level 1 effectiveness monitoring looks specifically at the environmental responses to actions. For habitat restoration actions, Level 1 effectiveness monitoring focuses on changes to or creation of habitat features as the result of action implementation. This monitoring is able to help answer questions such as: 1) does action type x create habitat feature f as intended; and maybe even 2) does action type x create habitat feature f better/faster/cheaper than action type y.

- (preferred) NEW BIOP RM&E PROJECT FOR THE UPPER COLUMBIA: Action effectiveness monitoring, data management, and reporting for restoration and protection projects funded by BPA and other sources. A proposal for this new project will be submitted during the RM&E categorical review. This project would periodically monitor the physical habitat response to a sub-set of habitat actions within the UC at Level 1, with an emphasis on habitat complexity actions. Detailed sampling protocols and evaluation methods will be developed under the guidance of the UCRTT Monitoring and Data Management Committee. A statistical power analysis done by Tetra Tech EC suggests that an additional 30 sites will be needed in the UC (J. O'Neal, Tetra Tech, Personal Communication). Results of the Level 1 effectiveness monitoring would be reported in annual progress reports specific to this new BiOp RM&E project or in a comprehensive combined report with this programmatic habitat project. These two projects are complementary, and the UCSRB is the sponsor for both.
- (alternative) INDEPENDENT THIRD-PARTY MONITORING of a subset of actions would be hired directly by BPA and probably modeled after the SRFB's monitoring program for projects supported by the Pacific Coastal Salmon Recovery Fund (http://www.nwr.noaa.gov/Salmon-Recovery-Planning/PCSRF/Index.cfm). Discussions have just begun for this possible alternative, which would monitor just a subset of actions by type to complement those already being monitored by Washington. The BPA intends to submit a proposal to the NPCC and ISRP in coming months. This effort could include some Level 2 monitoring. Evaluation and reporting provisions are not known at this time.
- (contingency) UCSRB STAFF OR A SUBCONTRACTOR with funding support from this project. A monitoring plan within appropriate funding levels would be developed, probably from Hillman (2005).

Levels 2 and 3

The reaches and subbasins/populations within the scope of this project will be monitored for both habitat conditions and biological responses under related projects that will have or will undergo their own ISRP review. Habitat monitoring will focus on primary limiting factors and rely on existing and new monitoring efforts implemented by other projects. For example, a new YN Accord project, Status and Trend Annual Reporting, 2009-002-00, will assess the monitoring coverage of primary limiting factors across UC Region subbasins and ensure that those data are compiled and reported in ways that facilitate evaluation of changes. Also, a subcontract under the YN (Accord) Upper Columbia Habitat Project, 2009-003-00 is reexamining previously identified limiting factors using EDT runs with updated habitat and fish population status and trend data. Biological responses will be monitored by population-level status and trend monitoring and by IMWs in the Entiat and Methow subbasins that also include intensive reach-level monitoring.

The Entiat and Methow IMWs will share a mutualistic relationship with both this habitat project and with the YN's UC Habitat Restoration Project, 2009-003-00. Assuming that good restoration opportunities are not limiting, these two habitat projects will be able to focus relatively intense restoration efforts in years and reaches consistent with the IMW study plans, probably beginning in 2011. This co-planning of focused habitat actions and monitoring provides an exceptional opportunity to measure the effects of habitat restoration at the levels of reach/life stage and subbasin/population.

Table G1. Comparison of monitoring efforts in the UC Region subbasins.

	Fish Status & Trends	Habitat Status & Trends	Project Effectiveness	Reach	Population
Wenatchee Subbasin	X	X			X
Entiat Subbasin	X	X (-)	X	X	X
Methow Subbasin	X	(-) Pibo		X	
Okanogan Subbasin	X	X			X

A minus sign (-) indicates that some efforts are underway but are spatially or temporally inadequate for our purposes.

H / Facilities and Equipment

The UCSRB and staff maintain two fully equipped offices, a main office in Wenatchee, Washington and a field office in Twisp, Washington. Both offices are outfitted with state of the art technology including: high speed internet, network computers and printers, office space for staff members and the capacity to facilitate meetings. The UCSRB also maintains one GSA truck.

- Upper Columbia Salmon Recovery Board Main Office: 415 King Street, Wenatchee, WA 98801
- Twisp Field Office: 206 Glover Street, Twisp, WA 98856

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J / Key Personnel

UCSRB Organization Staff

JULIE MORGAN, MS, EXECUTIVE DIRECTOR

Ms. Morgan assists the UCSRB in guiding the development and implementation of a wide variety of initiatives, programs and policies to accomplish the agency's mission and responsibilities. She has a Master of Science in Resource Management from Central Washington University. Her responsibilities include the full range of managerial functions, including managing financial, personnel, and facility needs. This includes overseeing the development and execution of activities of the committees designated by the UCSRB such as the Implementation Team, Staff Work Group, and the UCRTT. She will lead all work efforts under this habitat programmatic project as they relate to the Board and other elected or agency officials.

DEREK VAN MARTER, MPA, ASSOCIATE DIRECTOR

Mr. Van Marter will be the project manager for the BPA non-accord habitat programmatic project in the Upper Columbia. Derek received his Bachelor of Science in public affairs/natural resource management from Indiana University, and his Master of Public Administration from the University of Washington. He will continue to provide regional coordination of the BPA/NPCC and SRFB/ Trib Committee funding processes in the UC Region. Mr. Van Marter is the key contact for the WATs in each of the UC subbasins, and is facilitating development of the Multi-Year Action Plans. In addition, Derek is the regional Implementation Team Leader for the Recovery Plan, including coordination of the updates to the implementation schedule, adaptive management of the plan, implementation reporting, and facilitation of the UC Implementation Team.

JAMES WHITE, BA & MS (CANDIDATE) DATA STEWARD

James White is the Data Steward for the UCSRB. James has a Bachelor of Arts in Geography and is a Candidate for a Master of Science in Resource Management from Central Washington University. James provides technical guidance and assistance to cooperating data generators in the UC Region, including database and data software training, troubleshooting and support, assistance in documenting monitoring protocols, and coordination of data submissions to the Status, Trend and Effectiveness Monitoring (STEM) databank. James' additional work includes participation in efforts to coordinate monitoring and evaluation activities across the UC Region.

CASEY BALDWIN, MS, REGIONAL TECHNICAL TEAM CHAIR (SUBCONTRACT WITH WDFW)

Mr. Baldwin manages, coordinates, and administers the work of the UCRTT and facilitates monthly meetings. Mr. Baldwin has a Masters Degree in Fisheries from Utah State University and 12 years of experience working as a Fish Biologist and Research Scientist for the WDFW. He was a contributing author and led the EDT modeling effort for several subbasins for the NPCC Subbasin Plans (2004) and the Recovery Plan (2007) as well as serving on the ICTRT. Currently, half of his time is dedicated to duties as Chairperson of the UCRTT. He will work closely with Derek Van Marter to coordinate the work of the UCRTT and its subcommittees to align the RTT's technical review priorities with those of the BPA/NPCC. Mr. Baldwin will facilitate the technical forum to review the habitat actions funded by this programmatic,

which will include: 1) review the subbasin WAT's MYAPs, 2) technical evaluations of specific project actions during the Targeted and Open 6-Step Processes, and 3) develop, guide, and coordinate salmonid monitoring plans when necessary.

UCSRB Decentralized Staff Work Group
Lee Carlson, Confederated Tribes and Bands of the Yakama Nation
Chris Fisher, Confederated Tribes of the Colville Reservation
Chuck Jones, Alliance Consulting Group, Inc., for Douglas County
Mike Kaputa, Chelan County
Mike Rickel, Cascadia Conservation District
Char Schumacher, Okanogan County

UCSRB Planning and Implementation Groups
See Appendix A

UCSRB Partners and Project Sponsors
http://uc.ekosystem.us/?p=Page_84cf1201-edec-4aee-bdc3-c208ab8c7513

APPENDIX A

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Upper Columbia Adaptive Management Framework

&

Planning and Implementation Groups

The Habitat Adaptive Management Framework

The Habitat Adaptive Management Framework for the Upper Columbia Spring Chinook Salmon and Steelhead as described below came out of Draft Appendix Q of the Recovery Plan (Hillman et al. 2008).

The Upper Columbia Salmon Recovery Board (the Board) intends to guide implementation of the Upper Columbia Spring Chinook Salmon and Steelhead Recovery Plan (Recovery Plan; UCSRB 2007) with an adaptive management process as suggested by the National Oceanic and Atmospheric Administration-Fisheries (NOAA) adaptive management guidance document (NOAA 2006). Adaptive management uses the scientific method "learning by doing," and then adapting accordingly, and can be an extremely useful tool for moving toward recovery when uncertainty exists regarding the threats to the species, the species' life history, or the effectiveness of various management actions (NOAA 2006). See Adaptive Management Schematic on page 53.

The primary purpose of this adaptive management framework is to facilitate meeting the Recovery Plan's goal to restore viable and sustainable populations of naturally producing salmon, steelhead, and bull trout in the Upper Columbia Basin. Adaptive management must be incorporated into the recovery plan because an exact protocol for achieving species recovery would become outdated as soon as projects are implemented because habitat actions will result in ecosystem changes and new information and project opportunities will arise over time.

The overall goal of Upper Columbia adaptive management is to:

> *Create a program that will enable the Upper Columbia region to learn from the results of salmon, steelhead, and bull trout recovery activities and to create a structure that will adjust decisions accordingly to ensure that Evolutionary Significant Units/Distinct Population Segments (ESU/DPS) and population-based recovery goals are met efficiently and effectively (UCSRB 2007)*

This adaptive management framework has the following objectives:

- Create an adaptive, decision-making structure with benchmarks and timelines.
- Support the salmon, steelhead, and bull trout delisting framework outlined in the Recovery Plan (Section 4) by providing data on Viable Salmonid Population (VSP) parameters and the status of listing factors.
- Design and implement monitoring, research, and evaluation that test the critical uncertainties associated with recovery objectives, strategies, and actions.

To develop an adaptive management structure that will achieve the goals and objectives identified above, the Board adopted a four-step approach, based on the Ecosystem Management Initiative developed at the University of Michigan (http://www.snre.umich.edu/ecomgt/). The approach cycles through the following four questions:

1. What are you trying to achieve?
2. How will you know you are making progress?
3. How will you get the information you need?
4. How will you use the information in decision-making?

The framework for answering these questions is represented in the following diagram. As demonstrated in this schematic, there are numerous entities involved in the evaluation process for incorporating adaptive management into salmonid recovery. Thus, the coordination among the UCSRB, public, WAT's, UCRTT, IT, lead entities, project sponsors, WDFW, USFWS, tribes, and NOAA will be a necessary part of the feedback loop for effective adaptive management.

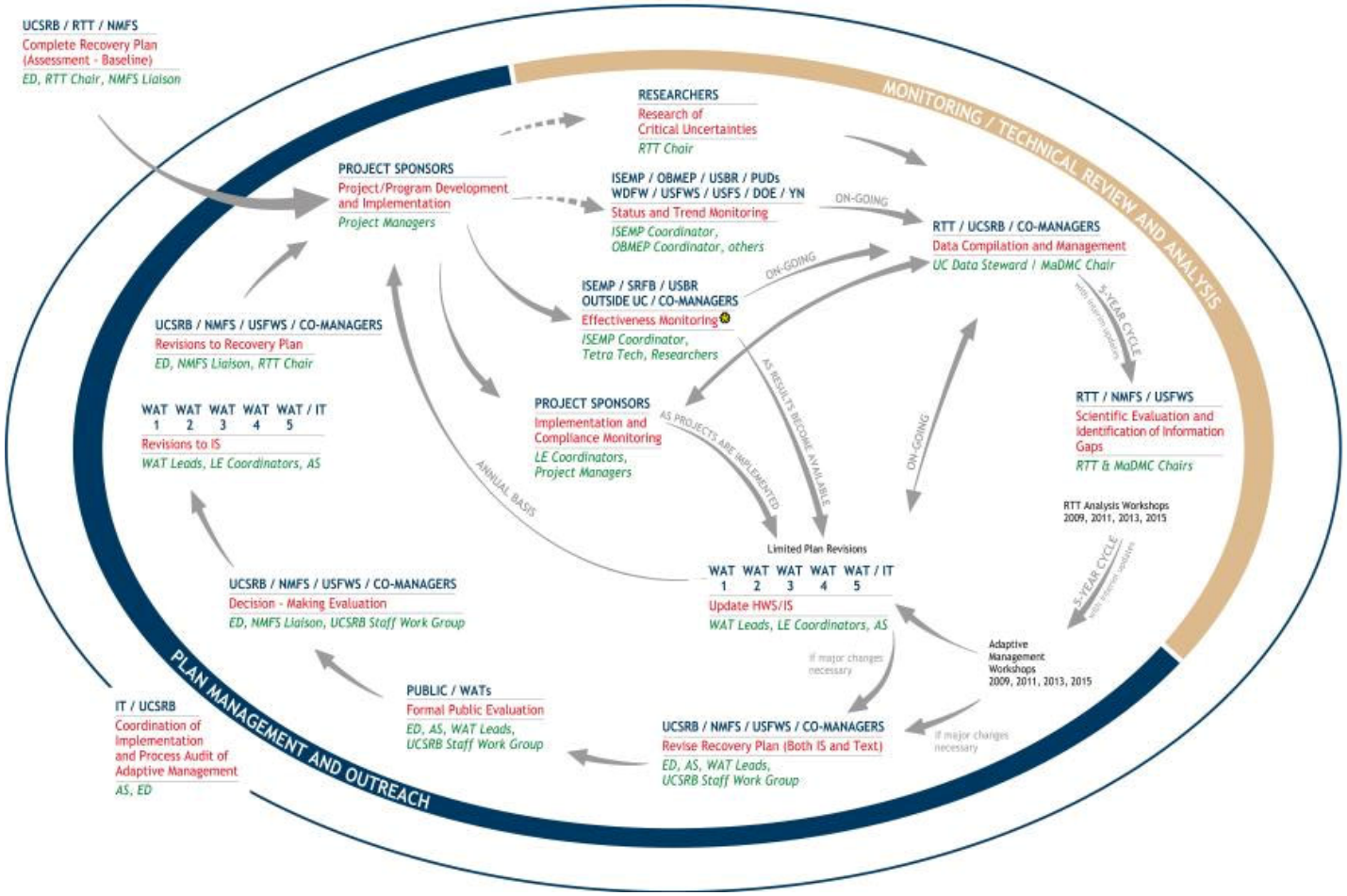
The Recovery Plan also outlines the key elements of a monitoring program that measures the success and progress of the following items:

- Implementation monitoring
- Effectiveness monitoring
- Monitoring the status and population trends for spring Chinook and steelhead
- Monitoring the changes in habitat conditions
- Research on uncertainties, habitat, and ecological interactions

The data collected from monitoring efforts will be managed through a regional database manager and all data will need to be compiled into reports. Results should be communicated to stakeholders through workshops and public meetings. Once the monitoring data has been compiled into reports and adequately vetted, then the monitoring results will be evaluated and adjustments will be made to the implementation schedule and recovery plan, as needed.

HABITAT ADAPTIVE MANAGEMENT FRAMEWORK

- FOR UPPER COLUMBIA SALMON RECOVERY -



LEGEND

- Responsible Entities
- Activity
- Facilitator/Coordinator
- From outside UC as well

The WATs of the Upper Columbia:

Wenatchee Subbasin
Wenatchee Habitat Subcommittee of the Wenatchee Watershed Planning Unit (WWPU)

Entiat Subbasin
Entiat Habitat Subcommittee of the Entiat Watershed Planning Unit (EWPU)

Methow Subbasin
Methow Restoration Council (MRC)

Okanogan Subbasin
Okanogan Restoration Council (ORC)

Douglas County Watersheds
Douglas County Watershed Planning Unit (DCWPU)

Acronyms

AS	Associate Director
DOE	Department of Ecology
ED	Executive Director
HWS	Habitat Work Schedule
IS	Implementation Schedule
ISEMP	Integrated Status and Effectiveness Monitoring Program
IT	Implementation Team
LE	Lead Entity
MaDMC	Monitoring and Data Management Committee
NMFS	National Marine Fisheries Service
OBMEP	Okanogan Basin Monitoring and Evaluation Program
PUD	Public Utility District
RTT	Regional Technical Team
SRFB	Salmon Recovery Funding Board
TRT	Technical Review Team
UCSRB	Upper Columbia Salmon Recovery Board
USBR	United States Bureau of Reclamation
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WAT	Watershed Action Team
WDFW	Washington Department of Fish and Wildlife
YN	Yakama Nation

Upper Columbia Planning and Implementation Groups

The Recovery Plan recommends an implementation strategy for recovery of viable salmonid populations (VSP). Specific actions in the Implementation Schedule are listed for each subbasin in Appendix M1 and M2 of the Recovery Plan and further refined in the "UCRTT Priorities for Reaches and Actions for Implementing Habitat Actions" (Appendix A, UCRTT 2009). This strategy will take several years to implement and require cooperation from numerous organizations and individuals. The groups charged with the implementation of the Recovery Plan are the Upper Columbia Salmon Recovery Board (UCSRB), Upper Columbia Salmon Recovery Implementation Team (IT), Upper Columbia Regional Technical Team (UCRTT), and the Watershed Action Teams (WATs).

THE UPPER COLUMBIA SALMON RECOVERY BOARD (UCSRB)

The UCSRB is a partnership between Chelan, Douglas, and Okanogan counties, the Yakama Nation, and Colville Confederated Tribes working in cooperation with local, state, and federal partners. This group works to restore viable and sustainable populations of salmon, steelhead and other aquatic species at risk in the Upper Columbia Region.

UPPER COLUMBIA SALMON RECOVERY IMPLEMENTATION TEAM (IT)

The IT was convened to facilitate implementation of the Recovery Plan in a coordinated manner across the entire ESU/DPS under direction from the UCSRB and is facilitated by UCSRB staff. The formation of the IT addresses the federal guidelines that measure recovery at an ESU scale rather than in one specific subbasin. The IT is comprised of representatives from a broad spectrum in the recovery of Upper Columbia salmonids including: State Lead Entity representatives from all three Counties, State and Federal agencies, Tribes, mid-Columbia Public Utility Districts, WAT's, and local stakeholders.

UPPER COLUMBIA REGIONAL TECHNICAL TEAM (UCRTT)

The UCRTT was formed by the UCSRB to complete the following objectives: 1) recommend region-wide approaches to protect and restore salmonid habitat, 2) develop and evaluate salmonid recovery projects within the Upper Columbia Region as appropriate, and 3) develop and guide salmonid recovery monitoring plans as appropriate (UCRTT 2009). A critical function of the UCRTT is habitat project review for the Upper Columbia Salmon Recovery Funding Board (SRFB) and HCP Tributary Committee project solicitation and funding process. The UCRTT has developed the scientific foundation for this process to identify projects that will best address priority limiting factors and contribute to the recovery of salmonids listed under the Endangered Species Act (ESA) as well as unlisted native salmonids.

THE WATERSHED ACTION TEAMS (WATS)

There are five WATs working within the Upper Columbia whose role in the Recovery Plan is to assist in updating the Recovery Plan's implementation schedule of actions, to ensure a coordinated and sequenced implementation of recovery actions in their respective watershed, and to engage in the adaptive management framework outlined in the Recovery Plan and this adaptive management framework. Each WAT has a lead person responsible for helping to ensure coordination with the Implementation Team and the Board. The five WATs are:

1. Wenatchee Subbasin: Habitat Subcommittee of the Wenatchee Watershed Planning Unit.
2. Entiat Subbasin: Habitat Subcommittee of the Entiat Watershed Planning Unit.
3. Methow Subbasin: Methow Restoration Council.

4. Okanogan Subbasin: Okanogan Restoration Council.
5. Douglas County Watersheds: Foster Creek-Moses Coulee Watershed Planning Unit.

PROJECT SPONSORS

Project Sponsors are the main point of contact for information regarding on-the-ground implementation details. Project Sponsors work with the Lead Entities, Watershed Action Teams, and the Implementation Team to identify future projects, sequence the biological priorities of those projects, update the Implementation Schedule, pursue funding from various sources, and implement funded projects. Project Sponsors are typically individuals, public or private groups, e.g., a Regional Fisheries Enhancement Group, city, county, tribe, state agency, or community groups, and non-government organizations or private parties.

CO-MANAGERS

In the Upper Columbia Region, the "Co-Managers" of salmonids include the Washington Department of Fish And Wildlife, Colville Confederated Tribes, Yakama Nation, NOAA Fisheries, and the U.S. Fish and Wildlife Service. Co-management is a term used to describe the government-to-government relationship between the state of Washington and Indian tribes whose fishing rights were established by the federal government in treaties or by Executive Order. The term is generally used to describe the state-tribal management of anadromous salmonids in the Northwest.

Non-Accord Programmatic Project Planning

PROJECT AND FUNDING COORDINATION WORK GROUP

A "Project and Funding Coordination Work Group" was established to outline the details for the BPA project solicitation and the project selection process to meet the needs of the FCRPS BiOp and Recovery Plan priorities for salmon recovery in the Upper Columbia Region. The working group included members from the UCSRB staff, UCRTT, WATs, local project sponsors, and BPA. This working group held a series of facilitated workshops in November and December 2009 and developed the following recommendations for inclusion in this programmatic approach:

1. Project solicitation and funding approach should be consistent with the regional Tribes' signed Fish Accords and the BiOp timeline.
2. The programmatic funding approach is consistent with the UCSRB's existing project and funding coordination effort.
3. Multi-year Action Plans (3-5 Year) derived from Recovery Plan Implementation Schedule/UCRTT biological Strategy and Priorities need to be developed that are focused on the highest reach scale biological priorities in each subbasin.
4. Design the funding process as an annual targeted solicitation (meaning the priority watersheds, stream reaches, and types of action projects are pre-defined).

APPENDIX B

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UCRTT Priority Reaches and Actions Table

Memorandum

UCRTT
UPPER COLUMBIA REGIONAL TECHNICAL TEAM

To: UCSRB, WATs, other interested parties
From: Casey Baldwin, UCRTT Chair (509-664-3148 casey.baldwin@dfw.wa.gov)
Date: 17 February 2009
Subject: UCRTT priority reaches and actions

Dear Interested Party,

This memo is to accompany and explain the spreadsheet embedded below that the Upper Columbia Regional Technical Team (UCRTT) has created to fulfill a request made by the staff of the Upper Columbia Salmon Recovery Board (UCSRB). The UCRTT was asked to recommend the most biologically important reaches and actions (see Upper Columbia Funding Coordination memo 1/16/2009). The UCRTT Biological Strategy (2008) includes an assessment of the all the actions and/or action types identified in the Salmon Recovery Plan (UCSRB 2007); however, the Implementation Schedules have been updated since the completion of the Recovery Plan. Additionally, a shorter more concise format, including more specific prioritization within the subbasins, was desired for this exercise.

The spreadsheet tables accompanying this memo do not provide a complete picture of threats and limiting factors that the action types and specific actions are intended to address. The background information for why particular reaches and actions are important can be found in appendix G of the Salmon Recovery Plan (UCSRB 2007), UCRTT Biological Strategy (UCRTT 2008), RECLAMATION Tributary and Reach Assessments, the Detailed Implementation Plan for the Entiat Water Resource Inventory Area (WRIA) 46, and other documents.

The UCRTT's objective was to create a concise product that would help to guide the Watershed Action Teams (WATs) in their task of updating the implementation schedules and developing a mid-range work plan. Priority levels for this exercise were determined based on the professional judgment of the UCRTT. It was our intention to be consistent with the general approach outlined in the UCRTT Biological Strategy, but to provide more specific guidance to the WATs. Many other actions and reaches have been identified for habitat improvements and we recognize that those actions could also make important contributions to recovery. However, we believe that the habitat related actions outlined here are the highest priority for maintaining, and contributing to the restoration of the viability of listed salmonid populations in the Upper Columbia Region.

A subset of UCRTT members will be at the February through May WAT meetings to help explain the priorities and work with the WATs on updating the Implementation Schedules.

Respectfully,
Casey Baldwin

UCRTT Chairperson

UCRTT Priority Reaches and Actions

The UCRTT Biological Strategy Priority Reaches and Actions Spreadsheet (UCRTT 2009)

UCRTT Priority Reaches and Actions.

Watershed Categories and Tier Levels Definitions

WATERSHED CATEGORIES

This section is taken from the Recovery Plan, Section 5.5., Habitat Recovery Actions- pg. 201.

The first step in prioritizing recovery actions was to characterize the assessment units according to their contribution to recovery. In this plan, assessment units that are relatively undisturbed and provide "healthy" ecosystems were ranked highest. The intent is to protect these areas from activities that would negatively affect the structure and function of the aquatic and riparian ecosystems. Disturbance in these areas could preclude recovery or worse increase the probability of extinction. Of the assessment units in need of restoration, those that have the greatest potential for habitat improvement and recovery of multiple listed species were ranked higher than those that provide little benefit to the species.[124] Thus, this plan does not necessarily attempt to restore the degraded or most visibly altered areas, unless they will contribute significantly to VSP parameters.

The Biological Strategy prepared by the UCRTT (2003 and updated 2009) provided a useful framework for prioritizing assessment units across varied landscapes. The strategy identified four categories, based on the functionality of the aquatic ecosystem and the resilience and resistance of ecosystems to disturbance. Category 1 areas were ranked highest. This does not mean that specific actions should not occur in Category 2, 3, and 4 areas until all activities in Category 1 areas are complete. Any action within Categories 2, 3, and 4 that increase the abundance, productivity, spatial structure, or diversity of listed species is encouraged and should contribute to recovery. The Biological Strategy described the categories as follows:

CATEGORY 1 *(Protection/Restoration)*: These areas represent systems that most closely ensemble natural, fully functional aquatic ecosystems. They comprise large, connected blocks of high-quality habitat that support more than two listed species. Exotic species may be present but are not dominant in abundance. Protecting these areas is a priority, although restoration in some areas is also needed.

CATEGORY 2 *(Restoration/Protection)*: These areas support important aquatic resources and are strongholds for one or more listed species. Compared to Category 1 areas, Category 2 areas have a higher level of fragmentation resulting from habitat disturbance or loss. These areas have a large number of subwatersheds where native populations have been lost or are at risk for a variety of reasons. Restoring ecosystem function and connectivity within these areas are priorities.

CATEGORY 3 *(Restoration)*: These areas may still contain subwatersheds that support salmonids, but they have experienced substantial degradation and are strongly fragmented by habitat loss, especially through loss of connectivity with the mainstem corridor. The priority in these areas is to rectify the primary factors that cause habitat degradation.

CATEGORY 4 *(Major Restoration or Minor Fish Use)*: These areas contain both functional and non-functional habitat that historically supported one or more listed species. Exotic species are numerically dominant in one or more subwatersheds. Native species are generally not present in sustainable numbers. Restoration of these areas is important, but it should not hinder restoration in the other categories. This plan adopted the framework outlined in the Biological Strategy. The rating of the assessment units within each subbasin are shown in Table 5.10 (pg. 242 of the Recovery Plan, UCSRB 2007). Note that there are no Category

assessment units in the Okanogan subbasin. This is primarily because the Okanogan currently supports only one listed species. As noted earlier, the fact that there are only Category 2, 3, and 4 areas in the Okanogan does not mean that they receive fewer resources than Category 1 areas in other subbasins. Indeed, the recovery of Okanogan steelhead is required before the DPS can be de-listed. However, to the extent possible, allocating resources for habitat actions in the Okanogan subbasin should follow the sequencing of categories identified in Table 5.10 (pg. 242 of the Recovery Plan, UCSRB 2007). Small tributaries that drain directly into the mainstem Columbia River do not clearly fit within any of the categories identified in the Biological Strategy.[126] Nevertheless, this plan identifies restoration and protection measures for these streams.

Tier Levels

This section is taken from the Recovery Plan, Section 8.4.1, Sequence of Actions – pg. 273

The framework categorizes projects or actions based on multiple objectives and characteristics. It also establishes a general model for selecting and implementing actions that will lead to recovery of Upper Columbia spring Chinook, steelhead, and bull trout. The approach is based on biological effectiveness and socio-economic feasibility. Actions listed in Appendix G will serve as the basis for project prioritization. ***This framework is intended as a guide. It is not intended to exclude any projects listed in Appendix G*** *(in the Recovery Plan, UCSRB 2007)* ***from implementation.*** This framework has been used successfully in the Entiat subbasin. The framework may evolve as new information from research, monitoring, and evaluation (RME) becomes available.

Project sequencing is organized into four general "tiers" of priority (Figure 8.3, pg. 281 of the Recovery Plan, UCSRB 2007):

Tier I: Higher biological benefit; lower cost; higher feasibility
Tier II: Higher biological benefit; higher cost; lower feasibility
Tier III: Lower biological benefit; lower cost; higher feasibility
Tier IV: Lower biological benefit; higher cost; lower feasibility

The process of sequencing actions includes:

Assigning a qualitative ranking of the biological benefits to each strategy. This ranking is based on how well each project addresses the VSP parameters. Rate the feasibility of each project. Criteria used to rate feasibility could range from professional and stakeholder input to an in-depth feasibility study. Criteria needed to describe feasibility should include at least: time to implement; constructability; acceptance by local governments; and acceptance by local stakeholders. Rate projects based on cost - Various methods can be used to estimate cost, but initially it can be quantitative. After projects are rated on feasibility and cost, they are then compared to biological benefit. Those projects that are relatively inexpensive and ordered relatively high on feasibility and biological benefit will appear as Tier I projects. Tier IV projects have the lowest biological benefits and feasibility and relatively high costs. Projects in this tier should be implemented only if there are no projects within other tiers. Appendix L provides an example of the use of the prioritization framework. Using this method, an implementation schedule for the Upper Columbia Basin was prepared (Appendix M, Recovery Plan, UCSRB 2007). The implementation schedule is a living document that will be revised annually by the local habitat groups and the UCSRB and UCRTT.

APPENDIX C

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History of Past and Ongoing Projects in the Upper Columbia Region

PROJECT #	PROJECT TITLE	PRIMARY LIMITING FACTOR	METRICS	MONITORING
Wenatchee Subbasin				
2007-086-00	UPA Wenatchee Subbasin Riparian Enhancement Proposal	• Riparian Enhancement • Water Quality – Improved Temperature • Water Quality – Sediment Reduction	• 0.66 miles of vegetation improved • 2.60 acres improved	• Photo Reference Points • Vegetation Measures
2007-325-00	UPA Wenatchee Subbasin Complexity Proposal	• Instream Habitat Diversity • Channel Complexity • Riparian Condition	• 0.10 miles of improved complexity • 0.20 acres improved	• Water Quality Data and Flow Measurements • Cross Sections and Channel Profile • Fish Population/eshock /snorkeling on some sites • Vegetation Monitoring • Photo Reference Points
2007-400-00	UPA Wenatchee Subbasin Access Programmatic (Wenatchee Access)	• Fish Passage • Instream Habitat Diversity • Riparian Condition • Streambank Stability • Water Quality - Sediment Reduction	5.4 miles of habitat accessed	• Photo Reference Points • Vegetation Monitoring • Fish Population • Fish spawning/rearing data collection through ISEMP
SRFB/08-1962	Chumstick/North Road Culvert Bridge Replacement	• Fish Passage • Instream Habitat Diversity • Riparian Condition • Streambank Stability • Water Quality - Sediment Reduction	5.4 miles of habitat accessed	• Photo Reference Points • Vegetation Monitoring • Fish Population • Fish spawning/rearing data collection
Multiple/provided upon request	The Upper Wenatchee Passage Program	• Fish Passage • Instream Habitat Diversity • Riparian Condition • Streambank Stability • Water Quality – • Sediment Reduction	9.7 miles of habitat accessed	• Photo Reference Points • Vegetation Monitoring • Fish spawning/rearing data collection on some streams through ISEMP
SRFB 08-1779	Cashmere Pond Off-Channel Habitat Project	• Instream Habitat Diversity • Channel complexity • Riparian Condition	• 0.32 miles of habitat accessed • 2.25 acres improved	• Photo Reference Points • Vegetation Monitoring • Fish spawning/rearing data collection planned • Other?
07-1865R	Peshastin Creek Irrigation District Pipeline	• Fish Passage • Instream Habitat Diversity	Over 26 miles of habitat accessed	• Photo Reference Points • Fish Population • Fish spawning/rearing data collection through ISEMP and State spawning surveys

PROJECT #	PROJECT TITLE	PRIMARY LIMITING FACTOR	METRICS	MONITORING
Entiat Subbasin				
2007-055-00	Entiat River - UPA - Lower Entiat River Off-Channel Restoration Project	• Off-channel rearing habitat conditions • Flood plain re-connection • Remove fish passage barrier • Improve substrate by placing spawning gravel in channel • Increase canopy and riparian area in disturbed area	Planned: • 0.28 miles of Increased Stream Habitat Complexity • 0.10 miles of habitat accessed • 1 Fish Barrier/Passage Removed • 6 Large Woody Debris Structures	• Photo Reference Points • Vegetation Monitoring • Fish Population/ISEMP • Fish spawning/rearing data collection through ISEMP
2007-231-00	Cement Program	• Riparian Condition • Streambank Stability • Water Quality - Sediment Reduction • Water Quality - Temperature Improvement	• 5.0 miles of riparian fencing • 15 acres improved • 4.4 miles of vegetation improved • 1.0 acre of slope stabilization	• Photo Reference Points • Vegetation Monitoring • Fish Population/ISEMP • Fish spawning/rearing data collection through ISEMP
2007-318-00	Entiat River - UPA - Knapp-Wham Hanan Detwiler Irrigation System Consolidation Project	• Instream flow • Channel complexity • Instream habitat diversity • Water Quality - Temperature Improvement	• 187 acre-feet/year of water screened • 3.0 cubic-feet per second (cfs) of water flow screened • 1,446 acre-feet/year of water conserved • 2.0 cfs of water flow conserved 5.8 miles of primary stream reach improved • 5.8 miles of total stream reach improved	• Fish habitat • Fish habitat utilization • Productivity of salmonid fishes
07-1761	Harrison Side Channel Project	• Instream Habitat Diversity • Channel complexity	• 0.26 miles of opened complexity	• Photo Reference Points • Vegetation Monitoring • Fish Population/ISEMP • Fish spawning/rearing data collection through ISEMP
00-1167	Jon Small Off-Channel Habitat	• Instream Habitat Diversity • Channel complexity	• 0.4 miles of complexity	• Photo Reference Points • Vegetation Monitoring • Fish Population/ISEMP • Fish spawning/rearing data collection through ISEMP
04-1503	Bridge to Bridge Phase 1 and 2	• Instream Habitat Diversity	• Restore 1000 contiguous ft. of riparian	• Photo Reference Points

		• Channel Complexity • Water Quality/ Temperature Improvements	vegetation to improve bank temperatures, bank condition, cover, nutrient inputs • enhance juvenile off-channel rearing habitat via rock/LWD placement in ~ 700 ft. irrigation ditch • install 2 instream structures to direct flow to the off-channel habitat and restore resting pools in the lowest portion of the reach	• Fish Population\ISEMP • Fish spawning/rearing data collection through ISEMP
PROJECT #	PROJECT TITLE	PRIMARY LIMITING FACTOR	METRICS	MONITORING
Methow Subbasin				
2007-035-00	UPA Project - Methow Basin Riparian Enhancement	• Riparian Enhancement • Water Quality - Sediment Reduction • Water Quality - Temperature Improvement	• 5.15 miles of fence installed • 5.81 miles of vegetation improved • 31.8 acres improved	• Photo Reference Points • Vegetation Measures
2007-172-00	UPA Project - MVID West Canal Diversion and Headworks	• Fish Passage • Instream flow	PLANNED: • 138 miles of habitat accessed	• Photo Reference Points • In Channel Habitat
2007-214-00	UPA Project - Fender Mill Floodplain Restoration -	• Channel complexity • Water Quality - Sediment Reduction • Water Quality - Temperature Improvement	• 0.68 miles of stream with improved complexity • 0.45 miles of vegetation improved • 0.50 acres improved	• Photo Reference Points • flows • In Channel Habitat • Fish Population
2007-237-00	UPA Project – Elbow Coulee Floodplain Restoration	• Channel complexity • Water Quality – Sediment Reduction • Water Quality – Temperature Improvement	• 0.50 miles of stream with improved complexity • 0.20 miles of vegetation improved • 0.50 acres improved • 1 in-stream structure installed; boulder	• Photo Reference Points • In Channel Habitat • Fish Population • Redd Surveys • River Morphology Surveys • Flow monitoring • Temperate monitoring
2007-251-00	UPA Project – Methow Valley Irrigation District East Diversion Dam	• Fish Passage	PLANNED: • 4 screens installed	• Photo Reference Points • Fish Passage • Redd Surveys • River Morphology

	Replacement			Surveys
00-1681	Beaver Creek	• Fish Passage • Instream Habitat Diversity	7 miles of habitat accessed	• Photo Reference Points • Fish Population • Fish spawning/rearing data collection through USGS
HCP Trib	Heath Floodplain Restoration	• Fish Passage	• 0.88 miles of off-channel habitat accessed (8.02 acres of pond habitat)	• Photo Reference Points • Fish Population
PROJECT #	PROJECT TITLE	PRIMARY LIMITING FACTOR	METRICS	MONITORING
Methow Subbasin				
Funders: SRFB/BPA (2005-007-00)/Douglas CO PUD/Grant CO PUD/UCRFEG/WDFW/Fulton Ditch Company	Fulton Dam Renovation	• Fish Passage • Instream Habitat Diversity	30 miles of habitat accessed	• Photo Reference Points • Fish Population • Fish spawning/rearing • data collection • Passage
Funders: Reclamation / BPA and NFWF facilitated by WWP-TU (formerly WRC)	Chewuch Canal Forbearance	Instream Flow	12-15 cfs returned annually to the Chewuch River during low flows	• None
BPA (project sponsor and funder)	MVID East Fish Screen Replacement	Screening	Installed WDFW and NOAA compliant fish screens at one of the major irrigation diversions on the Methow River	• None
BPA (project sponsor and funder)	MVID West Fish Screen Replacement	Screening	Installed WDFW and NOAA compliant fish screens at one of the major irrigation diversions on the Twisp River	• None
04-1489 Other Funders: BPA/Douglas CO PUD	Chewuch Dam Renovation	• Fish Passage • Instream Habitat Diversity	24 miles of habitat accessed	• Photo Reference Points • Fish Population • Fish spawning/rearing data collection • Passage

2005-010-00	Macpherson Side Channel	Floodplain function/channel complexity	Created 0.25 mile off-channel habitat	• Photo Reference Points • Fish Population • Fish spawning/rearing data collection • Temperature monitoring • Flow monitoring • Instream habitat monitoring
Funder: Reclamation	Chewuch Dam Adaptive	• Fish Passage • Boater Safety	Ensured continuing function of fish passage channel; addressed boater safety issue created by previous dam modification	• Photo Reference Points • Fish Population • Fish spawning/rearing data collection
	Tier 1, Level 1 land protection (through CEs)		For the years 2007-2009, we completed the following areas and amounts: • Acreage Riverfront/Miles Riparian • Chewuch 0.36/ 11.3 • Mid-Methow 1.29/141.5 • Upper Methow 2.24/135.8 • Twisp .93/28.3	
PROJECT #	PROJECT TITLE	PRIMARY LIMITING FACTOR	METRICS	MONITORING
Okanogan Subbasin				
1996-042-00	Salmon Creek-Restore and Enhance Anadromous Fish Populations and Habitat	• Instream flow • Fish Passage • Instream Habitat Diversity • Riparian Condition	11 miles of habitat accessed	• Photo Reference Points • Fish Population • Fish spawning/rearing data • collection through OCMEP
2007-034-00	Columbia Cascade Pump Screen Correction	• Fish screening	Planned 34.0 cfs of water flow screened	

Explanation for acquiring metrics:
Metric numbers were derived from the Pisces Report Center and extracted from reports which summarize project data in Pisces and obtained from project sponsors by personal communication.

APPENDIX D

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Upper Columbia Project Selection Process

Process for the Identification of Habitat Actions

A five-step planning process is used to identify limiting factors and determine habitat actions necessary to recover and maintain a Viable Salmonid Population (VSP) for spring Chinook and Steelhead in the Upper Columbia Region.

1. SPECIES STATUS – Priority species were based on ESA listings and their population status (abundance, productivity, spatial structure, and diversity).
2. DETERMINING LIMITING FACTORS – Past and present threats were determined using empirical information when available, or in cases where empirical information was lacking, preliminary analysis, local knowledge or professional judgment and modeling were used to identify threats (UCSRP 2007). Additionally, ecosystems diagnosis and treatment (EDT) was applied in all 4 subbasins in the development of the Subbasin Plans.
3. THE UC REGION SALMON RECOVERY PLAN (UCSRB 2007) – Categories of recovery actions were then recommended that addressed primary limiting factors within each sector (Harvest, Hatcheries, Hydro, and Habitat) and includes a detailed Implementation Schedule, a living document, that identifies specific habitat actions, costs, and schedules for implementation (Link to http://www.ucsrb.com/theplan.asp -for Implementation Schedules for the Upper Columbia Region subbasins.
4. THE BIOLOGICAL STRATEGY (UCRTT 2008) – This work compliments the Recovery Plan by providing further support, guidance and technical foundation for setting geographic priorities for habitat protection and restoration actions. 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. See Appendix C "UCRTT Priorities for reaches and Actions for Implementing Habitat Actions" (UCRTT 2009) for the recent prioritization of habitat actions found in the Recovery Plan's Implementation Schedule.
5. MULTI-YEAR ACTION PLANS, ASSESSMENTS AND THE ADAPTIVE MANAGEMENT APPROACH – By utilizing the resources described in the previous Steps, IT and UCRTT and WATs in the 4 subbasin's are currently developing multi-year action plans (3-5 Years) focused on the highest biological priorities in their subbasin at a reach scale. These multi-year plans will be updated annually by an adaptive management approach to refine the identification of limiting factors based on new information produced from the tributary and reach assessments. The final component to the planning process is monitoring, research, and evaluation to test the critical uncertainties associated with recovery objectives, strategies, and actions. Monitoring results will be evaluated and adjustments made to the multi-year plans/implementation schedule and recovery plan, as needed.

Upper Columbia Region Tributary and Reach Assessments

As described in WE 177, each of the WATs are developing multi-year action plans for the Upper Columbia Region subbasins. These plans focus on the highest biological priorities in each subbasin at a reach scale. This reach-based approach will be consistent with the UCRTT's biological priorities and the Recovery Plan's Implementation Schedule. Tributary and Reach assessments completed by the U.S. Bureau of Reclamation and Yakama Nation will also be used to identify site-specific actions for implementation, because this information helps prioritize stream restoration and identify specific habitat actions (See Assessment Table below). These assessments contain the hydraulic and geomorphic analysis, which will be used to identify limiting factors for fish habitat. Some of these detailed reach assessments were not available during the development of the most current Implementation Schedule project lists; thus, these tributary and reach assessments provide more detail on the projects that address limiting factors and improve the Upper Columbia Region's ability to prioritize projects.

In 2008, Reclamation initiated tributary and reach assessments (Lyon et al. 2008; Reclamation 2008a, 2008b, 2009) to increase the certainty that habitat actions identified by Reclamation for implementation would contribute to improving VSP parameters for salmonid populations in the Upper Columbia Region. To see Reclamation's Assessment Reports visit http://www.usbr.gov/pn/programs/fcrps/thp/ucao/index.html. Reclamation is conducting these assessments as partial fulfillment of their Federal Columbia River Power System (FCRPS) Biological Opinion obligations (NMFS 2008). In 2009, as part of the Yakama Nation Columbia Basin Fish Accord MOA, the Yakama Nation also began conducting reach assessments in reaches within nine Upper Columbia Region tributaries using Reclamation's assessment protocols. The priority reaches and actions identified in these assessments will be used by the WATs and IT to develop and refine the multi-year action plans.

The primary product produced from the tributary and reach assessments is an alternatives analysis, the Bureau of Reclamation refers to this as an Alternatives Evaluation Report (AER; see example on page 72). As a part of the UC Region targeted 6-step project selection process, the UCRTT will review the AER in those priority reaches where reach assessments have been completed. The UCRTT will select the one or two top priority alternatives in the AER that are consistent with the priorities from the Biological Strategy, Recovery Plan, and the UCRTT priority reaches and actions spreadsheet. The AER will contain sufficient detail to include rough cost estimates and preliminary designs. WAT's will use the UCRTT's priority alternatives to update and revise their multi-year plans.

Figure 1. Timetable for Reach and Tributary Assessments in the Wenatchee, Entiat, and Methow Subbasins for completed, in progress, or future priorities.*

SUBBASIN	LOCATION	ASSESSMENT TYPE	ENTITY
Wenatchee Subbasin			
Completed	Lower Wenatchee RM 0-4	Channel Migration Zone Study	Jones and Stokes
	Nason Creek RM 0-4	Channel Migration Zone Study Habitat Assessment	Jones and Stokes Reclamation
	Nason Creek RM 4-14	Tributary Assessment	Reclamation
	Upper White Pine RM 12-14.5	Reach Assessment	Reclamation
	Lower White Pine RM 9.45-11.55	Reach Assessment	Reclamation
	Kahler RM 4.65 - 8.9	Reach Assessment	Reclamation
In Progress	Peshastin RM 0-7	Reach Assessment	Yakama Nation
Future Priorities	Upper Wenatchee RM from lake, 18 miles downstream	Reach Assessment	Yakama Nation
	Icicle (RM TBD)	Reach Assessment	Reclamation
Entiat Subbasin			
Completed	Entiat RM 0-26	Tributary Assessment	Reclamation
	Preston RM 22.7-23.3	Reach Assessment	Reclamation
	Stormy RM 17.9-18.1	Reach Assessment	Reclamation
In Progress	Entiat 3D RM 24-25	Reach Assessment	Yakama Nation
Future Priorities	Entiat 2A, 3C, 3F RM 16.1-17.9, 23.3-24, 25.6-26	Reach Assessment	Yakama Nation (complete by 2017)
	Entiat 1B, 1C, 1E RM 0.8-4.3, 6.3-6.9	Reach Assessment	TBD (complete by 2014)
	Entiat 1D, 1F RM 4.3-6.3, 6.9-10.6	Reach Assessment	TBD (complete by 2020)
Methow Subbasin			
Completed	Methow Subbasin RM 0-80	Tributary Assessment	Reclamation
	Big Valley RM 54.2-60	Reach Assessment	Reclamation
In Progress	Methow mainstem to Winthrop RM 40-51.5	Reach Assessment	Reclamation
	Chewuch RM 0-20	Reach Assessment	Yakama Nation
	Lower Twisp RM 0-15	Reach Assessment	Yakama Nation
Future Priorities	Methow, Weman Bridge to Mazama	Reach Assessment	Yakama Nation
	Goat Creek mainstem Methow RM 61-67	Reach Assessment	TBD
	Methow Silver RM 29-40	Reach Assessment	Reclamation

- Okanogan Subbasin does not have any reach or tributary assessments completed or planned at this point.

6-Step Project Selection Process for the Targeted and Open Solicitation

Upper Columbia Region Two Cycle Funding Process

The current Upper Columbia regional 6-step annual funding process is the result of years of collaborative work on the part of all interested parties to establish an effective and efficient process. The Upper Columbia Process Guide (Process Guide) documents the process and provides guidance to project sponsors and partners (note the schedule changes for each new funding cycle). The 2010 guide will be updated to incorporate the additional Targeted 6-Step Process described in this programmatic. In addition, the UCRTT will have a new and expanded role in the targeted solicitation for "pulse" funds described in detail on the following page.

UCR 6-Step Process Guide 2009.pdf

6-Step Process

The following text describes the steps in the current Open 6-Step Process and the new Targeted 6-Step Process that were introduced in Section F. WE 114, Identify and Select Projects.

STEP 1: PRE-APPLICATION – Project proponents fill out a pre-application form for each project being proposed in order to pursue funds from the non-accord BPA funds or other regional funding sources. The pre-application process provides an opportunity for the project proponent to seek technical assistance and identify additional cost-share programs that most effectively leverage the resources needed to implement projects. The UCRTT has the option to recommend a proposal not continue in the review process if the project does not adequately address priority limiting factors. *Targeted 6-Step Process- project sponsors present early action alternatives to UCRTT.*

STEP 2: PROJECT SITE VISITS – Once the suite of potential projects are finalized, the UCSRB will work with local entities to develop an agenda and itinerary for the field tours. Project proponents present information to the UCRTT and other reviewers regarding proposed projects, answer questions, and receive additional technical feedback on the site tours that are frequently followed-up with reviewer comments.

STEP 3: PROJECT PRESENTATIONS – Following the site visits sponsors present projects to technical reviewers. These presentations allow the proponent to continue to receive technical feedback from the UCRTT to further refine project proposals before the final project applications are submitted. *Targeted 6-Step Process- present final alternatives evaluation to the UCRTT.*

STEP 4: PROPOSAL SUBMITTAL – Following reviewer comments, project proponents have the opportunity to refine the final project proposals before the final submittal.

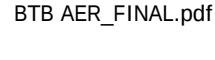
STEP 5: TECHNICAL RANKING – After final project proposals have been submitted, the UCRTT convenes to rate the technical merits of the proposals. The technical review criteria for rating projects are included as Appendix E. The final technical ratings and notes from the UCRTT are distributed to the partners in the Upper Columbia Region.

STEP 6: FINAL STEP – UCSRB will provide BPA/NPCC with a prioritized list of proposed actions that will be recommended for complete or partial funding.

Targeted 6-Step Process: Role of the UCRTT

The UCRTT's newly developed role as a result of this BPA/NPCC non-Accord habitat programmatic project is one of input during the planning process, MYAPs, and AER project development, followed by a project specific formal review. UCRTT will review the MYAPs annually to ensure the plans are addressing priority limiting factors. The UCRTT will also review AERs produced from the Tributary and Reach Assessments completed by Reclamation, Yakama Nation, and the Colville Confederated Tribes (see icon below for AER example). More specifically, for large complex projects in reaches which have been adequately assessed (i.e. Reclamation Reach Assessment), the UCRTT would review the AER's and select the one or two top priority alternatives, as a part of the annual Targeted 6-Step Process, that best address limiting factors, restore natural processes, and have the highest biological benefit. The AERs will have enough detail to include rough cost estimates and preliminary designs. Additional recommendations may be rendered regarding the risks and shortcomings of the other alternatives. If appropriate, this review may include a "pre AER" presentation by an inter-disciplinary (ID) team for initial feedback from the UCRTT before the development of the AER. Additional presentations and feedback sessions during regular UCRTT meetings may occur before the formal assessment of the AER by the UCRTT. Before the application is submitted to the funding source there will be, at a minimum, a feedback loop with the UCRTT and/or a formal scoring of the project using the UCRTT project scoring criteria.

Example of AER, Reclamation's Alternatives Evaluation Report from Below the Bridge Habitat Restoration Project in the Entiat Subbasin is embedded below, double click to open.



UCRTT Project Evaluation Criteria

Operating Procedures of the Upper Columbia Regional Technical Team

Operating Procedures of the UC

Project Review Policy of the Upper Columbia Regional Technical Team

Project Review Policy of the UCRTT.pdf

Project Ranking Criteria of the Upper Columbia Regional Technical Team

Project Ranking Criteria of the UCRTT

APPENDIX E

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Habitat Monitoring and Evaluation Efforts in the Upper Columbia Subbasins

Wenatchee Subbasin Habitat Monitoring and Evaluation

The implementation of monitoring activities in the Wenatchee River subbasin is organized by the three levels of monitoring considered in Jordan (2003) and Hillman (2005, 2006):

1. STATUS MONITORING: A description of the current conditions for specific habitat metrics in the Wenatchee Basin.
2. TREND MONITORING: An analysis of how the habitat conditions change over time.
3. EFFECTIVENESS MONITORING: An analysis of how restoration actions affect fish populations and habitat conditions.

The status, trend, and effectiveness of habitat restoration actions are being monitored and evaluated in the Wenatchee subbasin through funding provided by the Bonneville Power Administration (BPA) Integrated Status and Effectiveness Monitoring Program (BPA Project #2003-017-00; ISEMP). Additional efforts to monitor habitat metrics are being conducted by the USFS (physical habitat, temperature), WDOE (water quality, water quantity), and USGS (water quantity). ISEMP in the Wenatchee basin follows the design and implementation protocols outlined in the Recovery Plan monitoring strategy sampling regime and includes the indicators in Table 1 (Nelle and Ward 2009). Much of the ISEMP information in this section has been referenced from the Draft Entiat Intensively Monitored Watershed Implementation Strategy (ISEMP 2009).

In the Wenatchee, ISEMP is focused primarily on monitoring the status and trend of habitat conditions. There will be a subbasin level evaluation to determine if the improved habitat conditions are affecting fish populations. Extensive fish population monitoring is occurring throughout the watershed and at the population level through the Public Utility Districts Habitat Conservation Plan commitments, augmented with additional fish monitoring by ISEMP, the Yakama Nation, USFWS, BPA, 7and others (Table 1). Habitat monitoring efforts within the ISEMP framework are being coordinated by the UCRTT and Terraqua, Inc. and implemented by various entities including WDFW, Yakama Nation, USFWS, USFS, WDOE, Cascadia Conservation District, Chelan Co PUD, and private consultants. Restoration actions are not implemented within an experimental framework within the Wenatchee River subbasin, which presents challenges from an effectiveness monitoring standpoint; however, ISEMP is specifically designed to use an observational-studies approach to overcome these challenges (Jordan 2003). In the Wenatchee River subbasin ISEMP will integrate status, trend and effectiveness monitoring to assess the aggregate impact of all habitat restoration projects (ongoing or recently completed) in target watersheds within the Wenatchee River subbasin. Thus, the status monitoring program overlaps significantly with the effectiveness monitoring program, and as such, both programs are being implemented concurrently in the Wenatchee River subbasin. To locate additional Wenatchee Subbasin ISEMP information and Publications link to: http://www.nwfsc.noaa.gov/research/divisions/cbd/mathbio/isemp/docs_wenatchee.cfm

Expected Outcomes: (taken directly from Nelle and Ward 2009) "Data from status and trend monitoring will be used for a variety of resource management purposes. The primary utility of the information will be the annual assessment of status and the resulting trends over time for these fishes and their habitat. However, these categories of monitoring also support restoration action planning and assessment by serving as the baseline information used to validate and refine the kinds of actions that are needed and where to locate those actions and the baseline against which the habitat and species response indicators can be measured in the future." Status and trend summaries will be re-evaluated every 2-5 years during the RTT Analysis Workshop portion of the adaptive management cycle. The data and summaries associated with the status and trend habitat metrics will be very useful for feeding ecological models, such as EDT and Shiraz, that have been used in the past to link habitat conditions with fish performance estimates. These tools or others like them will likely be an important component of evaluating the habitat status and trend as it relates to fish use and needs.

Table 1. A list of general characteristics and specific indicators monitored as part of ISEMP and related monitoring programs.

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
Adults	Escapement/Number	WDFW/USFWS/YN Programs	Annual	Decades	Subbasin
	Age structure	WDFW/USFWS/YN Programs	Annual	Decades	Subbasin
	Size	WDFW/USFWS/YN Programs	Annual	Decades	Subbasin
	Sex ratio	WDFW/USFWS/YN Programs	Annual	Decades	Subbasin
	Origin	WDFW/USFWS/YN Programs	Annual	Decades	Subbasin
	Genetics	WDFW/NOAA Pedigree Study for spring Chinook; CCPUD M&E study	Annual	Decades	Subbasin
	Fecundity	WDFW	Annual	Decades	Subbasin
Redds	Number	WDFW and CCPUD for Chinook; ISEMP and WDFW for steelhead; YN for coho; WDFW for sockeye	Annual	Decades	Subbasin
	Distribution	WDFW and CCPUD for Chinook; ISEMP and WDFW for steelhead; YN for coho; WDFW for sockeye	Annual	Decades	Subbasin
Parr/Juveniles	Abundance	ISEMP	Annual	5 to 20 years	Subbasin
	Distribution	ISEMP	Annual	5 to 20 years	Subbasin
	Size	ISEMP	Annual	5 to 20 years	Subbasin
Smolts	Number	ISEMP and WDFW/USFWS/YN Programs	Annual	10 to 20 years	Subbasin
	Size	ISEMP and WDFW/USFWS/YN Programs	Annual	10 to 20 years	Subbasin
	Genetics	ISEMP; WDFW/NOAA Pedigree Study for spring Chinook; CCPUD M&E study for spring Chinook and steelhead	Annual	10 to 20 years	Subbasin
Macroinverte-brates	Composition	ISEMP	Annual	at least 5 years	Subbasin
	Transport from Headwaters	ISEMP	Annual	completed in 2008	Subbasin
Water Quality	MWMT and MDMT	ISEMP and WDOE TMDL Programs	Continuous	at least 5 years	
	Turbidity	ISEMP and WDOE TMDL Programs	Continuous	at least 5 years	
	Conductivity	ISEMP and WDOE TMDL Programs	Continuous	at least 5 years	
	pH	ISEMP and WDOE TMDL Programs	Continuous	at least 5 years	
	Dissolved oxygen	ISEMP and WDOE TMDL Programs	Continuous	at least 5 years	
	Nitrogen	ISEMP and WDOE TMDL Programs	Monthly	at least 5 years	
	Phosphorus	ISEMP and WDOE TMDL Programs	Monthly	at least 5 years	
Habitat Access	Road crossings	ISEMP	2006	1 year	Subbasin
	Diversion dams	WDFW	2006	1 year	Subbasin
	Fishways	WDFW	2006	1 year	Subbasin
Habitat Quality	Dominant substrate	ISEMP	Annual	10 to 20 years	Subbasin
	Embeddedness	ISEMP	Annual	10 to 20 years	Subbasin
	Depth fines	USFS	Periodic	unknown	Subbasin
	LWD (pieces/km)	ISEMP	Annual	10 to 20 years	Subbasin

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
	Pools (pools/km)	ISEMP	Annual	10 to 20 years	Subbasin
	Residual pool depth	ISEMP	Annual	10 to 20 years	Subbasin
	Fish cover	ISEMP	Annual	10 to 20 years	Subbasin
	Side channels/backwaters	ISEMP	Annual	10 to 20 years	Subbasin
Channel Condition	Stream gradient	ISEMP	Annual	10 to 20 years	Subbasin
	Width/depth ratio	ISEMP	Annual	10 to 20 years	Subbasin
	Wetted width	ISEMP	Annual	10 to 20 years	Subbasin
	Bankfull width	ISEMP	Annual	10 to 20 years	Subbasin
	Bank stability	ISEMP	Annual	10 to 20 years	Subbasin
Riparian Condition	Riparian structure	ISEMP	Annual	10 to 20 years	Subbasin
	Riparian disturbance	ISEMP	Annual	10 to 20 years	Subbasin
	Canopy cover	ISEMP	Annual	10 to 20 years	Subbasin
Flows and Hydrology	Streamflow	ISEMP	Annual	Decades	Subbasin
Ecoregion Classification	Bailey classification	ISEMP	Once, or as science advances	--	Regional setting
	Omernik classification	ISEMP	Once, or as science advances	--	Regional setting
Physiography Classification	Province	ISEMP	Once, or as science advances	--	Regional setting
Geology Classification	Geologic districts	ISEMP	Once, or as science advances	--	Regional setting
Geomorphic Feature Classification	Basin area	ISEMP	Once, or as science advances	--	Drainage basin
	Basin relief	ISEMP	Once, or as science advances	--	Regional setting
	Drainage density	ISEMP	Once, or as science advances	--	Regional setting
	Stream order	ISEMP	Once, or as science advances	--	Regional setting
Valley Segment Classification	Valley bottom type	ISEMP	Once, or as science advances	--	Valley segment
	Valley bottom width	ISEMP	Once, or as science advances	--	Valley segment
	Valley bottom gradient	ISEMP	Once, or as science advances	--	Valley segment

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
	Valley containment	ISEMP	Once, or as science advances	--	Valley segment
Channel Segment Classification	Elevation	ISEMP	Decadal	10 to 20 years	Channel segment
	Channel type (Rosgen)	ISEMP	Decadal	10 to 20 years	Channel segment
	Bed-form type	ISEMP	Decadal	10 to 20 years	Channel segment
	Channel gradient	ISEMP	Decadal	10 to 20 years	Channel segment
Riparian Classification	Primary vegetation type	ISEMP	every 5 years	10 to 20 years	Channel segment
Watershed Condition	Watershed road density	ISEMP	every 5 years	10 to 20 years	Subbasin
	Riparian-road index	ISEMP	every 5 years	10 to 20 years	Subbasin
	Land ownership	ISEMP	every 5 years	10 to 20 years	Subbasin
	Land use	ISEMP	every 5 years	10 to 20 years	Subbasin

Entiat Subbasin Habitat Monitoring and Evaluation

The Entiat subbasin has a strong history of rigorous restoration and recovery planning and as a result the ISEMP initiated an effectiveness monitoring pilot project in 2005. Monitoring and evaluation in the Entiat subbasin also follows the ISEMP protocols described above for the Wenatchee subbasin; however, it was recognized there was an opportunity to implement an effectiveness monitoring program that more intensively evaluated the effectiveness of habitat actions at the reach and subbasin/population scale. After several years of data collection under a Before-After-Control-Design, a power analysis revealed the need to re-structure both the implementation of actions and the monitoring design. By 2009, a plan had been developed and vetted with the UCRTT and the watershed groups to implement an Intensively Monitored Watershed (IMW) in the Entiat River subbasin (Nelle et al. 2009). Under an IMW approach, salmonid population responses to watershed scale restoration actions are evaluated in an experimental fashion, where implementation and monitoring are tightly coordinated to maximize the ability to detect fish responses to changes in their habitat. Such an approach seeks to maximize contrast and reduce noise to increase the ability to detect an effect.

The Entiat IMW will evaluate action effectiveness at several spatial scales including level 1-3 effectiveness monitoring as described in Hillman (2005). The objectives of this monitoring program are to determine if there are physical changes to habitat conditions resulting from restoration actions, and if so, to link those physical changes to improvements in fish population status, including both juvenile and adult stages (ISEMP 2009). Restoration actions will be implemented in a spatially and temporally explicit way to provide contrast to non-treated areas in space and time. The Entiat IMW will follow a hybrid of a stairstep and hierarchical approach to implementing habitat actions (ISEMP 2009). Actions will be implemented on a 3-year time frame, with implementation starting upstream (Stillwaters reach) in 2011, then downstream in 2014, upstream in 2017, and finishing in downstream in 2020.

ISEMP has designed a robust and flexible implementation and monitoring strategy that will:

- Implement the full suite of restoration actions in the lower 26 miles of the Entiat River in a 10-year time period.
- Maximize the resolution of effects from different action types and reveal multi-scale mechanisms (e.g., effects of action types, geomorphic reaches, land use).
  Detect a response at a lower resolution (i.e., watershed scale) if a higher resolution is not possible due to, for example, implementation of restoration actions outside the experimental design.
  See Table 2. For a list of general characteristics and specific indicators monitored as part of ISEMP.

To locate additional Entiat Subbasin ISEMP/IMW information and Publications link to:
http://www.nwfsc.noaa.gov/research/divisions/cbd/mathbio/isemp/docs_wenatchee.cfm

Expected Outcomes: The Entiat IMW will answer the following questions:

- Did habitat restoration improve freshwater productivity at the watershed scale?
- What was the impact of the varying restoration types? (This question directly supports the UCSRB's Adaptive Management Framework).
- What were the mechanisms by which physical habitat changes improved freshwater productivity?

- Can we transfer the knowledge to other locations? i.e., were actions deployed within an experimental design that enables statistically valid inference beyond the local scale? (This question also supports the UCSRB's Adaptive Management Framework). Intensive monitoring is used to identify mechanisms by which habitat manipulations impact fish, so that these strategies may be extrapolated to other systems.

Table 2. A list of general characteristics and specific indicators monitored as part of ISEMP and related monitoring programs.

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
Adults- not currently monitored in the Entiat River subbasin but USFWS discussing partial weir at ENFH	Escapement/Number	Not currently monitored	Annual	Decades	Subbasin
	Age structure	Not currently monitored	Annual	Decades	Subbasin
	Size	Not currently monitored	Annual	Decades	Subbasin
	Sex ratio	Not currently monitored	Annual	Decades	Subbasin
	Origin	Not currently monitored	Annual	Decades	Subbasin
	Genetics	Not currently monitored	Annual	Decades	Subbasin
	Fecundity	Not currently monitored	Annual	Decades	Subbasin
Redds	Number	USFWS for Chinook; ISEMP and USFWS for steelhead	Annual	Decades	Subbasin
	Distribution	USFWS for Chinook; ISEMP and USFWS for steelhead	Annual	Decades	Subbasin
Parr/Juveniles	Abundance	ISEMP	Annual	5 to 20 years	Subbasin
	Distribution	ISEMP	Annual	5 to 20 years	Subbasin
	Size	ISEMP	Annual	5 to 20 years	Subbasin
Smolts	Number	ISEMP and USFWS	Annual	10 to 20 years	Subbasin
	Size	ISEMP and USFWS	Annual	10 to 20 years	Subbasin
	Genetics	ISEMP and USFWS	Annual	10 to 20 years	Subbasin
Macroinverte-brates	Composition	ISEMP	Annual	at least 5 years	Subbasin
	Transport from Headwaters	ISEMP	Annual	completed in 2008	Subbasin
Water Quality	MWMT and MDMT	ISEMP, USFS-ERD	Continuous	at least 5 years	
	Turbidity	Not currently monitored	Continuous	at least 5 years	
	Conductivity	ISEMP and USFS-PNRS	Continuous	at least 5 years	
	pH	ISEMP and USFS	Continuous	at least 5 years	
	Dissolved oxygen	ISEMP and USFS	Continuous	at least 5 years	
	Nitrogen	Not currently monitored	Monthly	at least 5 years	
	Phosphorus	Not currently monitored	Monthly	at least 5 years	
Habitat Access	Road crossings	ISEMP	2006	1 year	Subbasin
	Diversion dams	WDFW	2006	1 year	Subbasin
	Fishways	WDFW	2006	1 year	Subbasin
Habitat Quality	Dominant substrate	ISEMP	Annual	10 to 20 years	Subbasin
	Embeddedness	ISEMP	Annual	10 to 20 years	Subbasin
	Depth fines	USFS-ERD	Periodic	unknown	Subbasin
	LWD (pieces/km)	ISEMP	Annual	10 to 20 years	Subbasin

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
	Pools (pools/km)	ISEMP	Annual	10 to 20 years	Subbasin
	Residual pool depth	ISEMP	Annual	10 to 20 years	Subbasin
	Fish cover	ISEMP	Annual	10 to 20 years	Subbasin
	Side channels/backwaters	ISEMP	Annual	10 to 20 years	Subbasin
Channel Condition	Stream gradient	ISEMP	Annual	10 to 20 years	Subbasin
	Width/depth ratio	ISEMP	Annual	10 to 20 years	Subbasin
	Wetted width	ISEMP	Annual	10 to 20 years	Subbasin
	Bankfull width	ISEMP	Annual	10 to 20 years	Subbasin
	Bank stability	ISEMP	Annual	10 to 20 years	Subbasin
Riparian Condition	Riparian structure	ISEMP	Annual	10 to 20 years	Subbasin
	Riparian disturbance	ISEMP	Annual	10 to 20 years	Subbasin
	Canopy cover	ISEMP	Annual	10 to 20 years	Subbasin
Flows and Hydrology	Streamflow	ISEMP	Annual	Decades	Subbasin
Ecoregion Classification	Bailey classification	ISEMP	Once, or as science advances	--	Regional setting
	Omernik classification	ISEMP	Once, or as science advances	--	Regional setting
Physiography Classification	Province	ISEMP	Once, or as science advances	--	Regional setting
Geology Classification	Geologic districts	ISEMP	Once, or as science advances	--	Regional setting
Geomorphic Feature Classification	Basin area	ISEMP	Once, or as science advances	--	Drainage basin
	Basin relief	ISEMP	Once, or as science advances	--	Regional setting
	Drainage density	ISEMP	Once, or as science advances	--	Regional setting
	Stream order	ISEMP	Once, or as science advances	--	Regional setting
Valley Segment Classification	Valley bottom type	ISEMP	Once, or as science advances	--	Valley segment
	Valley bottom width	ISEMP	Once, or as science advances	--	Valley segment
	Valley bottom gradient	ISEMP	Once, or as science advances	--	Valley segment

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
	Valley containment	ISEMP	Once, or as science advances	--	Valley segment
Channel Segment Classification	Elevation	ISEMP	Decadal	10 to 20 years	Channel segment
	Channel type (Rosgen)	ISEMP	Decadal	10 to 20 years	Channel segment
	Bed-form type	ISEMP	Decadal	10 to 20 years	Channel segment
	Channel gradient	ISEMP	Decadal	10 to 20 years	Channel segment
Riparian Classification	Primary vegetation type	ISEMP	every 5 years	10 to 20 years	Channel segment
Watershed Condition	Watershed road density	ISEMP	every 5 years	10 to 20 years	Subbasin
	Riparian-road index	ISEMP	every 5 years	10 to 20 years	Subbasin
	Land ownership	ISEMP	every 5 years	10 to 20 years	Subbasin
	Land use	ISEMP	every 5 years	10 to 20 years	Subbasin

Methow Subbasin Habitat Monitoring and Evaluation

In the Methow subbasin, over 12 organizations (including agencies, tribes and non-governmental entities) are monitoring the status and trends of salmonid populations through a multiple monitoring programs. The Methow Restoration Council (MRC), which includes representatives from local, state, tribal, federal and non-profit groups are working to help coordinate monitoring in the Methow, along with planning and implementing restoration and protection projects. The combined monitoring effort in the Methow subbasin is broad in geographic scope and encompasses numerous status and trend and effectiveness monitoring programs. While there is not currently a regionally coordinated monitoring plan, the Methow Subbasin Monitoring Inventory (Crandall 2009) conducted a baseline inventory and analysis of current monitoring programs and concluded that even without an extensive effort to coordinate monitoring at both the local and regional level, monitoring in the Methow is addressing many aspects of recovery planning set forth in the Recovery Plan (UCSRB 2007) as well as nearly all of the core indicators recommended by the Monitoring Strategy (Hillman 2006). See Table 3 for a list of general characteristics and specific indicators monitored as part of the Methow's monitoring programs.

The USFS has historically conducted physical habitat monitoring on Federal lands, but there has not been a watershed wide effort to monitor the status and trends of habitat in the Methow. The PacFish-Infish Biological Opinion (PIBO) effort led by the USFS also includes a suite of habitat and water quality monitoring metrics collected at randomly selected sites. Unfortunately that effort is also only on Federal lands and therefore is not representative of the whole Methow watershed. A subbasin level habitat status and trend monitoring program has been proposed for the Methow through the basin wide collaborative M&E effort to meet a BiOp RPA requirement. It is expected that this project will bring the Methow to a similar level of habitat status and trend monitoring as is ongoing in the Wenatchee.

An extensive habitat action effectiveness project was implemented by the USGS in conjunction with the barrier restoration work on Beaver Creek (Martens and Connolly 2008). This study focused on fish response to increases in access to Upper Beaver Creek and the effectiveness of rock weirs used as irrigation diversion structures. This project offers insight as to the effectiveness of a suite of passage actions in a watershed as well as responses to individual structures.

A significant restoration and monitoring effort that seeks to monitor the effects of reach scale restoration activities is referred to as M2 and is located in the Middle Methow River, within the highest priority reach in the Methow subbasin (UCRTT 2009). Similar to the Entiat's IMW monitoring effort, the monitoring component of M2 is a reach-scale effectiveness monitoring. This substantial effort aims to assess reach level effects of several restoration actions slated to occur on the mainstem. The outcome will be a better understanding of fish productivity in response to a suite of actions when an entire reach is treated. This effort will inform the funding agencies of the effectiveness of the actions they paid for and will provide guidance to future efforts that intend to use similar methods of habitat restoration. Several years of baseline data will be collected prior to the implementation of several restoration actions within the Middle Methow reach after which several more years post-project data will be collected. The monitoring uses reference sites in the Chewuch and upper Methow and will incorporate other monitoring efforts (i.e. WDFW smolt trapping, USGS Streamflow) in its analyses (Crandall 2009). The pre-treatment monitoring phase of M2 began in 2008 and will continue through 2012. Implementation of restoration projects will take place in 2012 and 2013, followed by post-treatment monitoring through 2014.

Table 3. A list of general characteristics and specific indicators monitored as part of ISEMP and related monitoring programs (see embedded document).

Indicator Variables Monitored in the Meth

Okanogan Subbasin Habitat Monitoring and Evaluation

The status, trend, and effectiveness of habitat restoration actions are being monitored and evaluated in the Okanogan subbasin through funding provided by the Bonneville Power Administration (BPA) Okanogan Basin Monitoring and Evaluation Program (BPA Project #2003-022-00; OBMEP). Additional efforts to monitor habitat metrics are being conducted by Environment Canada (water quality, water quantity), WDOE (water quality, water quantity), and USGS (water quantity). OBMEP in the Okanogan basin follows the design and implementation of specific standardized protocols posted on the OBMEP web site: http://nrd.colvilletribes.com/obmep/Reports.htm. These protocols include: Physical Habitat (Arterburn et al. 2006), Water Quality (Arterburn et al. 2005), Rotary Screw Trapping (Rayton and Wagner 2006), Snorkel Survey (Arterburn and Kistler 2007), Macro invertebrate (Hayslip 2007), Redd survey (Arterburn et al. 2007), and Underwater video enumeration (Nass 2007). Specific habitat related metrics monitored are listed in Table 4.

In the Okanogan, OBMEP is focused primarily on monitoring the status and trend of habitat conditions. There will be a subbasin level evaluation of effectiveness to determine if the improved habitat conditions are affecting fish populations. Extensive summer steelhead population monitoring is occurring throughout the watershed and at the population level through OBMEP. Summer Chinook monitoring is mainly occurring through the Public Utility Districts Habitat Conservation Plans most directly through hatchery monitoring carried out by Chelan and Douglas PUD's. Annual reports of these efforts carried out by Bio Analyst since 2004 are posted to the OBMEP web site at: http://nrd.colvilletribes.com/obmep/Reports.htm. Sockeye populations are mainly monitored in Canada through funding arrangements with Douglas PUD. Existing summer Chinook and sockeye population data are augmented with additional fish monitoring by OBMEP.

Habitat monitoring efforts within the OBMEP framework are being coordinated by the Colville Tribes, Okanogan Nation Alliance, Bio-analyst, WDFW, WDOE, USGS, Environment Canada and the Upper Columbia RTT which includes representatives from WDFW, Yakama Nation, USFWS, USFS, WDOE, Douglas PUD, Chelan Co PUD, Grant PUD and private consultants. Restoration actions are not implemented within an experimental framework within the Okanogan River subbasin, which presents challenges from an effectiveness monitoring standpoint. In the Okanogan River subbasin ISEMP will integrate status, trend and effectiveness monitoring to assess the aggregate impact of all habitat restoration projects (ongoing or recently completed) in target watersheds within the Okanogan River subbasin. Thus, the status monitoring program overlaps significantly with the effectiveness monitoring program, and as such, both programs are being implemented concurrently in the Okanogan River subbasin.

Expected Outcomes: The outcome will be a better understanding of fish productivity in response to a suite of actions when each project, reach, and the sum of all areas within the population are treated. This effort will inform the funding agencies of the effectiveness of the actions they paid for and will provide guidance to future efforts that intend to use similar methods of habitat restoration. Analysis of habitat status and trend data will be used for a variety of purposes. The major focus will be status assessments and temporal trends for both fish and habitat. The monitoring efforts also support restoration planning by identifying the locations and actions that were most effective and should continue to be implemented.

Table 4. A list of general characteristics and specific indicators monitored as part of OBMEP and related monitoring programs.

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
Adults	Escapement/Number	WDFW, OBMEP,Bio-analyst, ONA, DFO and other Colville Tribal programs	Annual	Decades	Subbasin
	Age structure	WDFW,Bio-analyst, DFO and other Colville Tribal programs	Annual	Decades	Subbasin
	Size	WDFW, OBMEP,Bio-analyst, ONA, DFO and other Colville Tribal programs WDFW/USFWS/YN Programs	Annual	Decades	Subbasin
	Sex ratio	WDFW, OBMEP,Bio-analyst, ONA, DFO and other Colville Tribal programs	Annual	Decades	Subbasin
	Origin	WDFW, OBMEP,Bio-analyst, ONA, DFO and other Colville Tribal programs	Annual	Decades	Subbasin
	Genetics	WDFW/CRITFC Pedigree Study for Summer Steelhead and kelts in Omak Creek	Annual	Decades	Subbasin
	Fecundity	WDFW, Bio-analyst, DFO and other Colville Tribal programs	Annual	Decades	Subbasin
Redds	Number	OBMEP for steelhead, CCPUD for Chinook; *ONA and DFO* for sockeye	Annual	Decades	Subbasin
	Distribution	OBMEP for steelhead, CCPUD for Chinook; *ONA and DFO* for sockeye	Annual	Decades	Subbasin
Parr/Juveniles	Abundance	OBMEP	Annual	5 to 20 years	Subbasin
	Distribution	OBMEP	Annual	5 to 20 years	Subbasin
	Size	OBMEP	Annual	5 to 20 years	Subbasin
Smolts	Number	OBMEP, DFO for Sockeye	Annual	10 to 20 years	Subbasin
	Size	OBMEP, DFO for Sockeye	Annual	10 to 20 years	Subbasin
	Genetics	WDFW/CRITFC Pedigree Study for Summer Steelhead and kelts in Omak Creek	Annual	10 to 20 years	Subbasin
Macroinverte-brates	Composition	OBMEP	Annual	at least 5 years	Subbasin
	Transport from Headwaters	OBMEP	Annual	completed in 2008	Subbasin
Water Quality	MWMT and MDMT	OBMEP, WDOE, USGS in US and ONA, Environment Canada in Canada	Continuous	at least 5 years	Subbasin
	Turbidity	OBMEP and WDOE Programs	Continuous	at least 5 years	Subbasin
	Conductivity	OBMEP and WDOE Programs	Continuous	at least 5 years	Subbasin
	pH	OBMEP and WDOE Programs	Continuous	at least 5 years	Subbasin
	Dissolved oxygen	OBMEP and WDOE Programs	Continuous	at least 5 years	Subbasin
	Nitrogen	OBMEP and WDOE Programs	Monthly	at least 5 years	Subbasin

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
	Phosphorus	OBMEP and WDOE Programs	Monthly	at least 5 years	Subbasin
Habitat Access	Road crossings	OBMEP	2006	1 year	Subbasin
	Diversion dams	OBMEP	2006	1 year	Subbasin
	Fishways	OBMEP	2006	1 year	Subbasin
Habitat Quality	Dominant substrate	OBMEP	Annual	10 to 20 years	Subbasin
	Embeddedness	OBMEP	Annual	10 to 20 years	Subbasin
	Depth fines	OBMEP	Periodic	unknown	Subbasin
	LWD (pieces/km)	OBMEP	Annual	10 to 20 years	Subbasin
	Pools (pools/km)	OBMEP	Annual	10 to 20 years	Subbasin
	Residual pool depth	OBMEP	Annual	10 to 20 years	Subbasin
	Fish cover	OBMEP	Annual	10 to 20 years	Subbasin
	Side channels/backwaters	OBMEP	Annual	10 to 20 years	Subbasin
Channel Condition	Stream gradient	OBMEP	Annual	10 to 20 years	Subbasin
	Width/depth ratio	OBMEP	Annual	10 to 20 years	Subbasin
	Wetted width	OBMEP	Annual	10 to 20 years	Subbasin
	Bankfull width	OBMEP	Annual	10 to 20 years	Subbasin
	Bank stability	OBMEP	Annual	10 to 20 years	Subbasin
Riparian Condition	Riparian structure	OBMEP	Annual	10 to 20 years	Subbasin
	Riparian disturbance	OBMEP	Annual	10 to 20 years	Subbasin
	Canopy cover	OBMEP	Annual	10 to 20 years	Subbasin
Flows and Hydrology	Streamflow	OBMEP	Annual	Decades	Subbasin
Ecoregion Classification	Bailey classification	OBMEP	Once, or as science advances	--	Regional setting
	Omernik classification	OBMEP	Once, or as science advances	--	Regional setting
Physiography Classification	Province	OBMEP	Once, or as science advances	--	Regional setting
Geology Classification	Geologic districts	OBMEP	Once, or as science advances	--	Regional setting
Geomorphic Feature Classification	Basin area	OBMEP	Once, or as science advances	--	Drainage basin
	Basin relief	OBMEP	Once, or as science advances	--	Regional setting
	Drainage density	OBMEP	Once, or as science advances	--	Regional setting
	Stream order	OBMEP	Once, or as science advances	--	Regional setting

General characteristics	Specific indicators	**Name of Monitoring Program(s) Examining the Specific Indicator**	Sampling frequency	Expected Duration of Monitoring	**Spatial Scale**
Valley Segment Classification	Valley bottom type	OBMEP	Once, or as science advances	--	Valley segment
	Valley bottom width	OBMEP	Once, or as science advances	--	Valley segment
	Valley bottom gradient	OBMEP	Once, or as science advances	--	Valley segment
	Valley containment	OBMEP	Once, or as science advances	--	Valley segment
Channel Segment Classification	Elevation	OBMEP	Decadal	10 to 20 years	Channel segment
	Channel type (Rosgen)	OBMEP	Decadal	10 to 20 years	Channel segment
	Bed-form type	OBMEP	Decadal	10 to 20 years	Channel segment
	Channel gradient	OBMEP	Decadal	10 to 20 years	Channel segment
Riparian Classification	Primary vegetation type	OBMEP	every 5 years	10 to 20 years	Channel segment
Watershed Condition	Watershed road density	OBMEP	every 5 years	10 to 20 years	Subbasin
	Riparian-road index	OBMEP	every 5 years	10 to 20 years	Subbasin
	Land ownership	OBMEP	every 5 years	10 to 20 years	Subbasin
	Land use	OBMEP	every 5 years	10 to 20 years	Subbasin