

FY 1999 Draft  
Annual Implementation Work Plan

Volume II  
Project Descriptions

Submitted by

Columbia Basin Fish & Wildlife Authority

to the

Northwest Power Planning Council

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9131

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**Evaluate Fall Chinook & Chum Spawning, Production & Habitat Use  
in Col R**

Subregion: Systemwide      Subbasin: Systemwide

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**Sponsor:** Joe Hymer, WDFW, 360-906-6740

**Target stocks:**

Fall chinook and chum

**Description:**

What spawning habitat characteristics are they looking for and how is that habitat affected by river discharge? Where did they come from? The goal is to answer this question by measuring the spawning habitat they select and using hydraulic and habitat models to quantify the effect of river discharge. These methods are consistent with those used by WDFW, ODFW, and USFWS in other areas of the Columbia River. Hydraulic and habitat conditions would be measured adequately to characterize the areas, and the data would be used to construct models to quantify spawning and rearing habitat for evaluation of the effect of river discharge. This project would run from October 1998 to March 1999. Results would be summarized in a written report. Annual observations and funding would be needed to monitor any populations that are found. Hydraulic and habitat models would be constructed as data collection is completed in each area. Data collection would likely not be completed until after the second season. Models and model results would begin to be available during FY2000.

What type of habitat do spawning and rearing fall chinook and chum salmon use, how much is there, how does river discharge and hydrosystem operation affect it, and is the amount of habitat related to the number of fish? Habitat work conducted below Bonneville Dam would be similar to that discussed above for the other areas. In addition, we will quantify flows needed to protect spawning and incubating fall chinook and chum salmon during and following the spawning season.

**NPPC Measure:** 2.2A, 3.3D, 5.4A, 5.9A, 6.1A, 6.1C, 7.1, 7.1C, 7.1D, 7.5D, 7.6, 7.8G, 7.8J, 8.4A, 8.4D, 9.1A

**Partners:**

WDFW, ODFW, USFWS

9132

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**Implement Wy-Kan-Ush-Mi Wa-Kish-Wit Watershed Restoration Plan  
Now**

Subregion: Systemwide      Subbasin: Systemwide

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**Sponsor:** Don Sampson, CRITFC, 503-238-0667

**Target stocks:**  
Not provided

**Description:**  
The CRITFC Watershed Program Workplan is designed to provide effective and efficient coordination, process review, standardized subbasin watershed assessment and analysis, expedite on-the-ground implementation, and promote public awareness and education of watershed restoration and protection projects in eight major subbasins of the Columbia River. The workplan was developed in coordination with tribal fisheries programs of the Umatilla, Yakama, Warm Springs, and Nez Perce Tribes to implement focused watershed habitat restoration in coordination with salmon production in the Yakima, Klickitat, Walla Walla, Umatilla, Salmon, Clearwater, Hood, and Deschutes subbasins. The project is a 3 year pilot project beginning in 1998 to 2000. Project activities are the result of a workplan developed from and organized and consistent with the Wy-Kan-Ush-Mi Wa-Kish-Wit and the NPPC Fish & Wildlife Program.

**NPPC Measure:** Not provided

**Partners:**  
Not provided

8201300

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**Coded-Wire Tag Recovery Program**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Pam Kahut, PSMFC, 503-650-5400

**Target stocks:**  
Not provided

**Description:**

The Coded-Wire Tag (CWT) Recovery Project is an on-going data collection and data management program by ODFW, WDFW, and PSMFC that contributes to a west coast U.S./Canada CWT information system for salmonid fish. The coded wire tag is the most important salmonid stock identification tool used on the west coast and has been the primary methodology used by all management entities since the mid 1970's for assessing both stocks and fisheries. In the Columbia Basin, CWT recovery data are used for evaluating the status of hatchery and wild anadromous salmonid stocks, including those stocks that are threatened, endangered or ESA listed. In addition, the CWT data are used to assess a wide variety of studies designed to improve survival of hatchery produced salmonids.

CWT recovery information provides critical data for evaluating stock rebuilding programs sponsored by NPPC's Fish and Wildlife Program. Section 8.4D, for example, urges fishery managers to "Develop expanded marking and catch sampling programs for ocean and inriver fisheries where Columbia River weak stocks are caught", while Bonneville and appropriate federal agencies are asked to "Share the cost on a 50/50 or other mutually agreed basis for expanding marking and sampling programs to improve precision of additional coverage".

ODFW and WDFW carry out a coordinated sampling effort (minimum 20% rate) to collect CWTs from mature salmon and steelhead which return to fishery (sport and commercial) and escapement areas (natural spawning grounds, hatcheries, and Bonneville Dam fishways). Sampled heads of tagged fish are transported to tag recovery labs at Clackamas and Olympia for CWT recovery and decoding. The CWT recovery and related catch/sample data are forwarded to PSMFC's Regional Mark Processing Center where it is validated and made available to users via the on-line 'Regional Mark Information System'.

**NPPC Measure:** 3.3B;4.3C;5.0F.15;7.1C;7.2B.2;7.2D.3;7.5B.3;8.2A;8

**Partners:**  
Not provided

**8331900**

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**New Fish-Tagging System**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Earl Prentice/Bradley Peterson, NMFS/NWFSC, 206-842-4289

**Target stocks:**

None

**Description:**

The proposed work has three main objectives: 1) develop an extended-range PIT-tag interrogation system for adult salmon and other fish; 2) assist BPA in the transition to a 134.2-kHz ISO-based PIT-tag system for the entire Columbia River Basin; and 3) install and evaluate a 3-way side-to-side PIT-tag diversion system. The first objective is divided into three tasks: A) development of 134.2-kHz ISO-based pass-by and pass-through PIT-tag interrogation systems; B) develop plans and obtain approval for installation of a pass-by adult PIT-tag interrogation system at a dam; and C) develop plans, model, and obtain approval, to construct a test facility for evaluating extended-range PIT-tag interrogation systems.

For each of the project's work elements, realistic milestones have been established in conjunction with a decision tree. Because of the complexity of Objectives 1 and 2, they will not be completed during the performance period FY99. However, a 134.2-kHz ISO-base pass-by PIT-tag interrogation system should be ready for installation at a dam in FY1999. In addition, progress toward developing large pass-by and pass-through PIT-tag interrogation systems will have been made and a test facility for field evaluation of extended-range PIT-tag interrogation systems will be designed, but not constructed. Objective 3 will be completed by 30 September 1999. The products from Objective 3 will be available to the fisheries community at the conclusion of the performance period given no unforeseen problems.

The continued development of the PIT tag and ancillary equipment will further expand the PIT-tag system's capabilities and thus enable managers to address issues expressed in both the Biological Opinion for operation of the Federal Columbia River Power System and the proposed Snake River Recovery Plan (examples are 2.ID, 2.3.b.4, 2.4.a, 2.6.c.2, and 2.9.d).

**NPPC Measure:** 5.0F.9,10.11,12,13

**Partners:**

None

8810804

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**Streamnet: The Northwest Aquatic Information Network**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Drew O. Parkin, PSMFC, 503-650-5400

**Target stocks:**

Not provided

**Description:**

StreamNet seeks to create, maintain, and distribute regionally consistent biological information for use in monitoring Fish and Wildlife Program effectiveness as well as for a wide range of other FWP-related purposes. Data are delivered via the Internet and custom products. StreamNet also provides technical assistance and services to a range of FWP activities and projects. The StreamNet Library maintains original source materials for data in the StreamNet system and provides a full range of library services to Columbia River Basin fish and wildlife scientists, managers, and policy makers.

StreamNet is a cooperative venture of the region's fish and wildlife agencies and tribes and serves as a principal vehicle for coordinating data activities among these organizations. Data development targets critical FWP and related data needs. Data categories include anadromous species production and survival trends, anadromous and resident species distribution and life history, habitat, dams and other facilities, historic river operations, and mitigation projects.

In response to ISG and ISRP recommendations, the StreamNet data plan is being revised to include population and genetics, age and sex composition, and additional resident fish and habitat parameters. StreamNet is also intensifying efforts on support services for other FWP activities and projects. Services may include technical support, custom products, and data storage and delivery. Service will specifically target 1) tracking of FWP projects, 2) monitoring and evaluation activities, and 3) watershed, stock assessment, and research projects. Other services will include maintaining project records through the StreamNet Library and increased use of the StreamNet Internet site to deliver FWP-related information.

**NPPC Measure:** Primary: Sections 3.2 and 3.3 as follows: 3.2A.1, 3.2A.2, 3.2B.1, 3.2F.1, 3.2G.2, 3.3A.1, 3.3A.2, 3.3B.1, 3.3C.1, 3.3D.1, 3.3E.1. Additional: 2.2A, 2.2D, 4.3C.1, 5.0F.15, 7.0C.2, 7.1C1, 7.1C2, 7.1C3, 7.6D, 8.1, 8.5E.1, 10.8B, 10.8C, 12.2

**Partners:**

Not provided

8906200

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**Prepare Draft Annual Implementation Work Plan**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Brian J. Allee, Ph.D., CBFWA, 503-326-7031

**Target stocks:**

Not provided

**Description:**

CBFWA is made up of four state, two federal, and 13 tribal members working cooperatively to provide regional coordination in comprehensive regional planning and implementation of fish and wildlife programs in the Columbia River basin. These entities are the legally recognized managers of the fish and wildlife resources and as such have a major role in the implementation of projects which support the NPPC's Fish and Wildlife Program. CBFWA is charged with the coordination of mitigation activities between the fish and wildlife managers and all water and land planning and management authorities of the Columbia River Basin. CBFWA specifically has the responsibility for preparing the Draft Annual Implementation Work Plan which involves coordinating and facilitating the fish and wildlife managers' development of a prioritized list of BPA-funded projects to best reflect the intent of the NPPC's Fish and Wildlife Program. CBFWA is currently coordinating the development of a Multi-year Plan, with the active participation of member and non-member agencies, that integrates fish and wildlife programs, budgets, goals, objectives, and a unifying conceptual framework for the Basin through 2001. Non-member agencies that have contributed to the MYP include the Corps of Engineers, NPPC, BPA, FPC, U.S. Forest Service, Bureau of Reclamation, Public Power Commission and various independent consultants and contractors. Due to increased workload requirements, resulting from federal government and Northwest Power Planning Council initiatives, the CBFWA is recommending funding for the fish and wildlife managers' participation in the planning process for the implementation of these regional tasks.

**NPPC Measure:** Addresses all measures

**Partners:**

Not provided

**8906500**

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**Annual Fish Marking - Missing Hatchery Production Groups**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Walt Ambrogetti, USFWS, 360-696-7605

**Target stocks:**

Salmonids

**Description:**

Over 26.3 million juvenile salmonids have been marked by USFWS for evaluation in the Columbia River basin as a result of this project. The various purposes of evaluation include: to estimate the survival of each release group, to estimate the contribution of each release group to ocean and in-river fisheries, to estimate straying rate of hatchery fish, to estimate smolt migration speed, to evaluate hatchery practices, and individual broodstocks.

Under this 1999 proposal the USFWS will continue to mark fish for evaluation studies and also continue to rear spring chinook salmon for release for the Umatilla Fisheries Program. The USFWS will also conduct all the fish health exams necessary to meet fish disease requirements for these fish to be planted in the Umatilla River.

The USFWS will continue to mark fish for PSMFC/Fish Passage Center (Project #8401400 Smolt Monitoring Program-multiple agencies). Fish will be PIT tagged at Dworshak, Leavenworth, Wells, Priest Rapids and Winthrop hatcheries.

**NPPC Measure:** 7.2D.1, 7.2D.3, 7.2D.4, 7.41(Umatilla Production), 8.4c.2, 8.4D.1

**Partners:**

PSMFC, Fish Passage Center, Yakima Indian Nation, Confederated Tribes of the Umatilla Indian Reservation, WDFW, ODFW, Clatsop Economic Development Council, NMFS and the Army COE.

8906600

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**Annual Coded Wire Tag Program-Missing Production WA HTCH  
(WDF)**

Subregion: Systemwide      Subbasin: Systemwide

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**Sponsor:** Howard J. Fuss, WDFW, 360-902-2664

**Target stocks:**  
Not provided

**Description:**

The goal of the program is to tag a statistically valid number of individual fish of each species from each hatchery such that accurate estimates of survival, contribution and stray rates can be made, and allow comparison between groups of fish released from each hatchery. For multiple group comparison the release numbers have been determined to have sufficient power such that the probability of detecting at a 50% difference in survival between groups is  $p=1-0.95/2$ .

The expected outcome of this project is a long time series of survival data as well as sufficient tag recoveries of strays to comply with guidelines of hatchery production outlined in the Snake River and other to be developed recovery plans. This information is particularly important to meeting the goals of the Fish and Wildlife Program and will provide data for other scientific analysis to be done at later dates.

A long, continuous time series of data on survival, contribution, and straying of hatchery salmon currently does not exist for Columbia River hatcheries. Time series data is essential to understanding trends in salmonid abundance caused by environmental and other factors as well as analyzing the effectiveness of hatcheries in meeting production goals in a cost effective manner and determine the ecological effects of hatchery fish on wild fish.

**NPPC Measure:** 7.2D.4

**Partners:**  
Not provided

**8906900**

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**Annual Coded Wire Tag Program - Missing Production OR Htc  
(ODFW)**

Subregion: Systemwide      Subbasin: Systemwide

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**Sponsor:** Mark Lewis, ODFW, 541-757-4263

**Target stocks:**

Chinook and Coho salmon stocks reared at Oregon Columbia Basin Hatcheries.

**Description:**

This program began in 1989 with the understanding that the current level of marking of juvenile hatchery salmon did not provide the necessary data for the level of management decisions needed. The program proposed including a marked group with each production salmon release from Oregon Columbia Basin hatcheries. This increase in marking would provide data for three main goals: evaluate and improve hatchery methods at each facility, contribute to the ability to regulate harvest management, evaluate the use of artificial production in the basin. The adipose fin clip + coded-wire tag (Jefferts et al 1963) was chosen as the method of marking. This program is expected to continue as long as artificial production is used to provide salmon for the Columbia Basin, and there is a need to monitor and evaluate such production.

**NPPC Measure:** 8.4C.3; 8.4D.1; 8.4D.3

**Partners:**

Not provided

9005200

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**Performance/Stock Productivity Impacts of Hatchery Supplementation**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Reg Reisenbichler, BRD, 206-526-6282 x334

**Target stocks:**

Anadromous *Oncorhynchus* spp. (particularly steelhead and spring chinook salmon) throughout the Columbia River basin (and throughout their range).

**Description:**

The methods involve crossing adult fish to produce genetically marked progeny of hatchery x hatchery, hatchery x wild, and wild x wild parentage. The progeny are incubated in identical conditions in the hatchery until button-up when the groups are mixed together. Mixed populations are divided; some fish are released into natural streams, others are reared in the hatchery. The progeny are sampled before or during their downstream migration or as returning adults to determine relative growth and survival of the treatment groups. The relative performances will be used to infer effects on stock productivity from using progeny of wild fish in the hatchery and hatchery fish in streams, and to design evaluations. The study will be completed in December 2002.

**NPPC Measure:** 7.3B.2

**Partners:**

Not provided

**9007800**

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**Evaluate Predator Control and Provide Technical Support For PATH**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** James H. Petersen, USGS, 509-538-2299

**Target stocks:**

Not provided

**Description:**

Work in this project falls into two objectives: 1) conduct an analysis of existing data to test the hypothesis that removal of northern squawfish does not cause compensatory feeding by predators that remain in the system, and, 2) provide technical assistance to PATH. Predation is recognized as the primary source of mortality for juvenile salmon passing through the mainstem Snake and Columbia rivers, aside from direct dam mortality. The Fish and Wildlife Program, Return to the River, and other regional planning documents support the northern squawfish management program, but recent evaluations acknowledge that feeding compensation could reduce some of the benefits of the program. We propose to conduct analyses of pre- and post-removal data (1983-86 versus 1993-96) on the local density of predators, feeding rates on juvenile salmon, and diets of predators. Results could be used to corroborate the efficiency of the current removal efforts or to plan and adjust future efforts.

For the second objective, staff will provide technical assistance to PATH for spring and fall chinook salmon and steelhead. Assistance will be in the form of meeting and workshop attendance, data, data analyses, and possibly research plans. Results will be incorporated into PATH analyses and documents.

**NPPC Measure:** 5.7, 5.7A, 5.7B (Predation), 3.2C, 3.2F (PATH Support)

**Partners:**

Not provided

9202604

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**Spring Chinook Salmon Early Life History**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Richard W. Carmichael, ODFW, 541-962-3777

**Target stocks:**

Not provided

**Description:**

The goal of this project is to investigate the abundance, migration patterns, survival, and alternate life history strategies exhibited by spring chinook salmon juveniles from distinct populations in the Grande Ronde and Imnaha River basins. Our methods include collecting juveniles with migrant traps and passive seining techniques.

This study will provide such information as directed under three separate measures of the Columbia River Fish and Wildlife Program. This study pertains to program measures 7.1C and D in that it will provide information on abundance of parr and estimates for egg to parr and parr to smolt survival. This information is important in evaluating, critical life stages, population status, and sustainability of naturally spawning populations. This study will also provide a means for long term monitoring of juvenile production in the Grande Ronde and Imnaha River basins. Furthermore, program measure 7.4L funded the establishment of Northeast Oregon Hatcheries project (NEOH). Task 3.3.4, identified in the Northeast Oregon Hatchery Grande Ronde River Final Report is the completion of early life history studies in the upper Grande Ronde system.

**NPPC Measure:** 7.1C, 7.1D, 7.4L

**Partners:**

Not provided

9203200

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**Life-Cycle Model Development and Application to System Planning**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Danny C. Lee, USFS, 208-373-4386

**Target stocks:**

Not provided

**Description:**

Proposed new work for FY 1999 builds upon recent progress in five arenas: 1) the recently completed ICBEMP scientific assessment, 2) the ongoing PATH process, 3) development of a Bayesian viability assessment model (BayVAM), 4) the NPPC's model watershed process, and 5) recent advances in monitoring techniques and methods of analysis. Collectively, these efforts significantly improve and expand the information and analytical tools available to support ecosystem management in the Columbia River Basin. Further work is needed to fully realized the benefits of these efforts. In particular, a concerted research program is needed to integrate some of the disparate parts of these efforts into a more seamless decision-support system. To assist in this effort, we propose research directed at enhancing the BayVAM model, and improving protocols for watershed assessment and monitoring of instream habitat conditions. Planned enhancements in the BayVAM model include increased flexibility of the model to accommodate alternative model forms, improved parameter estimation procedures, and increased user-friendliness. Efforts to improve watershed assessment and monitoring will focus on validating existing monitoring protocols, developing optimal sampling designs, and developing protocols for information updating. This continuing research effort has been jointly funded by the Forest Service, NMFS, EPA, and BPA since 1992.

**NPPC Measure:** BPA SUPP

**Partners:**

Not provided

9303701

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**Technical Assistance With Life Cycle Modeling**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Charles M. Paulsen, PER Ltd, 503-699-4115

**Target stocks:**

Not provided

**Description:**

This project is part of the PATH (Plan for Testing and Analyzing Hypotheses) program. It has three overall goals. The first is to improve our understanding of the effects several important factors on wild fish survival: habitat quality, hatchery releases, and ocean conditions. The second is to develop methods to gain the most information possible from adaptive management actions and associated monitoring activities. The third is to ensure that the results are communicated effectively to both specialist and management audiences.

Research under the first goal is needed to address concerns raised in the FWP, the Gorton Amendment, and in Return to the River. The ISG report in particular raises concerns about the effectiveness of habitat enhancement actions, the potential impacts of hatchery production on wild stocks, and the way that ocean survival is viewed as a "black box" in FWP planning.

The statistical methods employed are modifications of work done in FY97 and ongoing research in FY98. These past results have been favorably reviewed by PATH's outside review team (Jeremy Collie, Brian Dennis, Saul Saila, and Carl Walters). Work for FY99 will take reviewers' into account in planned analyses. We expect further reviews of the FY99 and future results as well. Results from these and other PATH research will be used in developing adaptive management models.

The results from FY99 will be tested with new data in subsequent years. If the models are reasonable, they should be able to predict future effects (of habitat, hatchery releases, and ocean conditions) accurately. We expect that related research will extend to FY03.

**NPPC Measure:** 3.2F2, 4.3, 5.0A, 7.1E

**Partners:**

Not provided

**9305600**

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**Assessment of Captive Broodstock Technology**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Penny Swanson, NMFS, 206-860-3282

**Target stocks:**

Snake River Spring and Summer Chinook Salmon, Redfish Lake Sockeye Salmon, and any other listed stocks.

**Description:**

In response to Task 4.1.c in the NMFS Proposed Recovery Plan and to Measure 7.4D.1 in the NPPC F & W Program, this research project develops information needed to overcome some of the problems that limit the yield of viable offspring from Pacific salmon stocks reared in captivity and assesses some of the genetic consequences of captive broodstock programs. While basic fish husbandry techniques are well established and widely used for rearing juvenile salmonids from gametes collected from returning adults and domesticated stocks of salmonids in the commercial aquaculture industry, numerous problems have persisted when rearing wild stocks of Pacific salmon in captivity throughout the life cycle. These problems include poor survival of adults to spawning, poor quality gametes, and abnormal seasonal timing of spawning. The success of captive broodstock programs for stock restoration purposes is largely dependent on producing large numbers of offspring that do not differ substantially from the founder stock in genetics, behavior, appearance, or physiology. Solutions to the problems encountered by broodstock programs are needed to maximize the effectiveness of these programs as rehabilitative tools. In addition, the reproductive success of captively reared fish must be evaluated to determine if release of captively reared adults is a viable strategy. The overall goal of this project is to develop diets, rearing regimes, hatchery practices, and drug therapies that improve survival of adults to spawning, gamete quality, and viability of offspring and that can be applied to captive broodstock programs for depressed stocks of Pacific salmon. Results from this research will be published in peer-reviewed journals, annual reports and scientific meetings.

**NPPC Measure:** 7.4D.1

**Partners:**

University of Washington, University of Idaho, Suquamish Tribe, Washington Dept. of Fish and Wildlife, Biological Research Division of U.S. Geological Service

9402600

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**Pacific Lamprey Research and Restoration**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

A Pacific lamprey status report, which was completed in 1995, determined that Pacific lamprey populations were generally depressed in mid to upper Columbia and Snake River tributaries, and made recommendations for research and management to restore populations. The Pacific Lamprey Research and Restoration Project, a cooperative effort between CTUIR and CRITFC (and initially OSU), was formed with the goal to increase Pacific lamprey populations above Bonneville Dam. An initial objective is to determine the past and current magnitude and location of lamprey populations in the Columbia River Basin. Limiting factors of Pacific lamprey will be identified and ultimately restoration plans will be developed and implemented for NE Oregon/SE Washington. Adult counts are monitored at several mainstem Columbia and Snake River dams to assess populations status and trends. Through historical information, interviews, compilation of recent fish sampling, screening records, and site sampling, data is showing that most previously abundant areas now have critically low populations. General habitat conditions in tributaries will be compared to presence/absence findings to better understand lamprey habitat preference. In 1996 and 1997, OSU assessed lamprey tagging techniques and resultant stress for application in passage research. In 1998, development of a genetic database for determination of lamprey population structure in the Columbia Basin will be made. All information will be considered in development and implementation of specific subbasin lamprey restoration plans. A multi-agency lamprey technical work group has been formed to discuss various questions and needs regarding lamprey restoration.

**NPPC Measure:** 7.5F.1

**Partners:**

Not provided

**9403300**

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**The Fish Passage Center**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Michele Dehart, FPC & Pam Kahut, PSMFC, PSMFC, 503-230-4288

**Target stocks:**

Not provided

**Description:**

The FPC provides technical analysis and recommendations for fish passage management to the agencies and tribes. The FPC designs and oversees the implementation of the Smolt Monitoring Program, including the dissolved gas trauma monitoring, and distributes the data daily to public and private entities in the region. The FPC maintains historical and current data bases of hatchery release, hydrologic, project operation, reservoir operations, adult salmon passage, juvenile salmon passage, gas bubble trauma, water temperature and dissolved gas data. The FPC provides specific analysis of fish passage alternatives as requested by the FPC Board of Directors and the Anadromous Fish Managers. FPC staff participates in the NMFS Regional ESA process as requested by the agencies and tribes specifically, the Implementation Team process, the Dissolved Gas Team, the Technical Management Team. The FPC is responsible for management of the Comparative Survival Study and FPC staff participates on the interagency Oversight Committee for the project. FPC staff provides analysis and presentation to state water quality agencies as requested by the agencies and tribes.

**NPPC Measure:** NPPC Fish & Wildlife Program Measures 3.6F 10, Sections 5.1.B.1 303,403b, 1403.2.8

**Partners:**

Not provided

**9600500**

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**Operate Independent Scientific Advisory Board**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Kathie Titzler, CBFWF, 503-326-7031

**Target stocks:**

Not provided

**Description:**

The Independent Scientific Advisory Board (ISAB) was established by the Northwest Power Planning Council (the Council) and the National Marine Fisheries Service (NMFS) to provide independent scientific advice and recommendations on issues related to regional fish and wildlife recovery programs under the Northwest Power Act and the Endangered Species Act. The ISAB is designed to foster a scientific approach to fish and wildlife recovery and to ensure the use of sound scientific methods in the planning and implementation of research related to these projects. NMFS and the Council request that the ISAB review specific projects, proposal, and plans. Thus, the extent and subject matter of ISAB reviews varies from year to year. Each review has a schedule for completion. In completing a review, the ISAB follows specific procedures and adopts recommendations by consensus. ISAB reports are submitted to and distributed by NMFS and the Council.

**NPPC Measure:** 3.2B, 3.2C.1

**Partners:**

Not provided

9600600

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**Path-Facilitation, Technical Assistance, and Peer Review**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** David Marmorek, ESSA, 604-733-2996

**Target stocks:**

Spring-summer chinook, fall chinook, and steelhead in the Snake River and mid-Columbia.

**Description:**

The Plan for Analyzing and Testing Hypotheses (PATH) was created by the NMFS' 1995-1998 Biological Opinion on operation of the FCRPS (NMFS 1995) to coordinate modeling activities and test key hypotheses. The region's need for analytical results in decision-making was also recognized by the NWPPC Fish and Wildlife Program (Strategy for Salmon Vol. II sec. 2.2-4, 7.3). PATH fulfills this need by ensuring that the region has the benefit of the best available scientific methods in analyses supporting salmon recovery/rebuilding. PATH's objectives are to (1) Determine the overall level of support for key alternative hypotheses; (2) Assess the ability to distinguish among competing hypotheses from future information; and (3) Advise regulatory agencies on management actions to restore endangered salmon stocks.

PATH has made tremendous progress in bringing together scientists from agencies with conflicting opinions and positions. The increase in trust is due to the neutral facilitation and co-ordination provided by ESSA, and to the objective opinions provided by the independent scientists working either as PATH team members or as members of the Scientific Review Panel. While disputes and alternative hypotheses still exist, they are debated and evaluated in a scientific and quantitative manner. This forces a higher view of scientific disputes, and frames the level of evidence required to change decisions.

As a result of this constructive approach, and peer-reviewed analyses that have been produced, PATH has increased our understanding of the distribution of mortality across life history stages, and is beginning to identify biological performance measures needed to achieve population recovery. Furthermore, PATH's development of hypothesis and decision support frameworks provide a means of harnessing a wide array of information, tools and scientific knowledge to inform management decisions, and provide a concrete foundation for designing adaptive management programs and coordinating research initiatives.

**NPPC Measure:** 3.2.A, 3.2.F, 4.2a, 4.3, 7.1E

**Partners:**

Not provided

9600800

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**PATH-Participation by State and Tribal Agencies**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Dr. Howard Schaller, ODFW, 503-872-5252

**Target stocks:**

Not provided

**Description:**

The NMFS 1995-1998 Biological Opinion on operation of the Federal Columbia River Power System created a process called PATH--Plan for Analyzing and Testing Hypotheses. The PATH process was designed to clarify the nature of differences among salmon management models, and point the way towards helping to resolve them. The PATH process is intended to ensure that the region has the benefit of the best available scientific information in analyses supporting salmon recovery/rebuilding efforts, including: development of recovery plans for listed Endangered Species Act (ESA) salmon and steelhead populations; ESA section 7 consultations; and development of rebuilding programs under the Columbia Basin Fish and Wildlife Program. The first phase of PATH is retrospective and involves explicitly stating hypotheses about mortality over the life cycle, evaluating strengths and weaknesses of supporting evidence and testing those hypotheses which have significant management implications. Prospective analyses estimate the improvement needed in life cycle survival to achieve recovery objectives; forecast future stock responses for different management actions under the range of alternative hypotheses; document a biological rationale for each alternative hypothesis which can then be used in weighting in the formal decision analyses. The formal decision analyses assess the effects of different combinations of actions, to provide guidance to fishery management decision makers in an adaptive management framework. PATH's schedule and objectives are prioritized by needs for NMFS 1999 decision on the Biological Opinion. The PATH products are rigorously reviewed by an independent scientific review team.

**NPPC Measure:** 3.2.A, 3.2.F , 4.2a, 4.3, 7.1E

**Partners:**

Not provided

**9600801**

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**Provide Scientific Input to the PATH Process**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** John G. Williams, NMFS/NWFSC, 206-860-3277

**Target stocks:**

Spring/summer spring chinook salmon, fall chinook salmon, and steelhead stocks in the Columbia River Basin upstream of Bonneville Dam and listed under the Endangered Species Act.

**Description:**

Scientific input into the PATH assists in the development of identifying and assessing key alternative hypotheses relating to the Columbia River salmon ecosystem. The Northwest Fisheries Science Center (NWFSC) scientists provide empirical data for use in modeling exercises and provide critiques on use of all data and processes used in the modeling that leads toward recommendations about the utility of modifying harvest, habitat, hatcheries, and hydropower as means to recover stocks of anadromous fish in the Columbia River Basin listed as threatened or endangered under the Endangered Species Act.

**NPPC Measure:** 3.2, 4.2A, 5.0A

**Partners:**

Not provided

**9601700**

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**Provide Technical Support in the Plan For Analyzing and Testing  
Hypotheses**

Subregion: Systemwide      Subbasin: Systemwide

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**Sponsor:** Albert Giorgi, Ph.D., BioAnalysts Inc, 425 883-8295

**Target stocks:**  
Not provided

**Description:**

Fisheries scientists at BioAnalysts, Inc. are to conduct a variety of analytical activities within PATH, emphasizing hydroelectric effects on fisheries resources. Staff members will conduct reconnaissance of fall chinook and steelhead data sets and estimates for potential use in PATH analyses and model development. Act as facilitator and coordinator for the Fall Chinook Hydro/Early Life History Work Group. Responsibilities include coordinating activities of modeling groups, synthesizing output from model analyses, disseminating information to all work group members, scheduling work sessions, and coordinating the assembly of work products into documents for PATH. BioAnalysts, Inc. is responsible for drafting research documents as instructed by the PATH Planning Group. They are to review and critique technical materials produced by other members participating in the PATH process, including; models, hypotheses and assumptions within those models, and analyses that may support or refute certain hypotheses. Dr. Albert Giorgi is the primary analyst involved in PATH.

**NPPC Measure:** 3.2, 4.2A, 5.0A

**Partners:**  
Not provided

9700200

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**PATH-UW Technical Support**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** James J. Anderson, UW, 206-543-4772

**Target stocks:**

Not provided

**Description:**

University of Washington Support of the Plan for Analyzing and Testing Hypotheses (PATH).

The overall goal is to assist the region in developing the ability to identify and assess key alternative hypotheses relating to salmon stock recovery and rebuilding in the Columbia River ecosystem. This project will provide tools and analyses for the scientific ecosystem-based evaluation of the impacts of specific fish and wildlife program actions.

Specific objectives of this project are the development and use of statistical and mechanistic models of salmon life-cycle stages in various habitats: the mainstem (including passage of juveniles and adults), tributaries, estuary, and ocean. Both anthropogenic and environmental factors at each salmon life stage will be approached in a multi-faceted fashion involving qualitative descriptions, statistical data analysis, Bayesian maximum likelihood estimation techniques, and mechanistic models. Through these approaches, alternative hypotheses will be tested according to their mathematical rigor, the realism of their ecological mechanisms and their ability to fit available data and data patterns.

An important outcome will be the development of tools to assist managers in assessing the strategic implications and validity of management decisions. The results will include reports describing hypotheses and their evaluations and models which will be available through the World Wide Web that managers can use to evaluate actions.

**Partners:**

Not provided

9800100

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**Analytical Support-PATH and ESA Biological Assessments**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Richard A. Hinrichsen, HES, 206-633-5725

**Target stocks:**

spring/summer chinook, fall chinook, steelhead

**Description:**

The recent precipitous declines of several salmon and steelhead populations in the Columbia basin have prompted the need to understand what role management actions can play in recovering stocks. Decision-makers seek information about the expected effectiveness of management actions in the face of enormous uncertainties. Our modeling effort is underway to contribute to the understanding of those uncertainties, with the goal of identifying management techniques that are robust to various alternative hypotheses for explaining salmon declines. As part of a large modeling effort underway through PATH, we will develop model structures that allow a large array of hypotheses to be included. We will include alternative hypotheses on the role of climate variability in salmon and steelhead production, using historical productivities to estimate climate/ocean variability on the future success of index salmon and steelhead populations.

We also bring a wide array of techniques to challenge and test the assumptions of the models used in the decision support -- a part of the modeling effort that has been lacking until recently. With our techniques, we seek further quantification of the uncertainties in the decision analysis. We ask two questions: (1) Are there exceptional data of low quality that are driving the performance of management alternatives? and (2) How well do the models predict data unused in their calibration? (This is crucial because prospective models are used to measure probabilities of persistence and recovery in the future.) After identifying these key uncertainties, we apply the results to answer basic design adaptive management questions: How long should the experiment last (sample size?). How large a response is needed to deem the experiment a success (statistical power)? Most basically, how do we alter management schedules to derive the most useful information on key uncertainties?

**NPPC Measure:** 3.2C.1, 3.2C.2,4.2A,4.3A,5.0A,7.1A.1,7.1E.1

**Partners:**

Not provided

**9808001**

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**PIT Tag Purchase and Distribution**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Carter Stein, PSMFC, 503.650.5400

**Target stocks:**

Not provided

**Description:**

Purchase and distribute PIT tags to BPA funded projects.

**Partners:**

Not provided

9084

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## Assessing Genetic Variation Among Columbia Basin White Sturgeon Populations

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Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Madison S. Powell, UOI, 208-837-9096

**Target stocks:**

Not provided

**Description:**

The genetic relationships of white sturgeon (*Acipenser transmontanus*) populations within the Columbia Basin remain unclear. To date, there has been no comprehensive genetic assessment of sturgeon populations in the Columbia, Snake and Kootenai River systems using any analytical method. The objective of this project is to assess inter- and intrapopulation genetic variation among white sturgeon in the Columbia, Snake, and Kootenai River Basins. This project will employ both nuclear and mitochondrial DNA analyses to test the null hypothesis; white sturgeon populations in the Columbia Basin represent (a) a single gene pool, and (b) one ESU of the species. This project is essential to most aspects of the Columbia Basin Fish and Wildlife Program and directly addresses section 10.4A “Study and evaluate Sturgeon Populations.” The outcome of these analyses will critically effect the management of white sturgeon populations within these watersheds. Management actions can be directly translated from results. For example, divergent populations (separate gene pools) will have to be considered for management as significant components of overall white sturgeon diversity, possibly requiring additional measures, such as supplementation, to ensure their long term stability or recovery. Alternatively, a “single gene pool” conclusion will effect management decisions much differently. This comprehensive genetic assessment will require three years to complete (ending FY2001). The results will be reviewed and assessed by those currently involved in BPA funded white sturgeon research and recovery throughout the Columbia Basin.

**Relation to MYIP:**

Not provided

**NPPC Measure:** 10.4, 10.4A.1 through 10.4A5, 10.6C, 10.6C.1, 10.8B15, 10.8B16.

**Relation to NPPC:**

Not provided

**Partners:**

Not provided

**9609400**

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**Washington Department of Fish & Wildlife Habitat Units Acquisition**

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** Jenene Ratassepp, WDFW, 360-753-1690

**HUs:** 32,940

**Acres:** 100,000

**Hydroproject:** All Washington projects

**Description:**

The BPA and other entities, including WDFW, have entered into a Washington Wildlife Mitigation Agreement which obligates BPA to make available to WDFW \$21,840,000. WDFW uses its share for protection, mitigation, and enhancement of wildlife and wildlife habitat that has been adversely affected by the construction of Federal hydroelectric dams on the Columbia River or its tributaries. The Agreement was extended until October 1, 2000 for WDFW to assist BPA in partially meeting its responsibilities under the Power Act. Under the Agreement, WDFW will enhance over 100,000 acres using funds provided by BPA to achieve an estimated minimum 32,940 habitat units.

9705900

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## Securing Wildlife Mitigation Sites - Oregon

Subregion: Systemwide

Subbasin: Systemwide

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**Sponsor:** John Beck, ODFW, 503-872-5260

**HUs:** To be determined

**Acres:** To be determined

**Hydroproject:** All Oregon projects

**Description:**

The long-term goal of this project is full mitigation of all losses to wildlife in Oregon as a result of the development and operation of the federal Columbia Basin hydropower system. Under the Northwest Power Planning Council's (NPPC's) Fish and Wildlife Program, this means providing Habitat Units (HUs) of the highest priority habitat types for target species in a sustainable, cost-effective manner so that Bonneville receives mitigation credit.

Since 1991, Oregon's wildlife managers (i.e., the Oregon Wildlife Coalition [OWC]) have been working together to coordinate the planning, selection, and implementation of BPA funded wildlife projects under the NPPC's Fish and Wildlife Program as outlined in Sections 7 and 11, specifically measures 7.6, 11.2D, 11.3E, and 11.3F.

The intent of this on-going project is twofold. First, to facilitate coordination and planning between Oregon wildlife managers via individual funding of wildlife planning and coordination staff for each OWC member. This varies by need of the individual entity, and should remain stable or decline as mitigation goals as attained. The GAP Analysis, along with other federal, state, and tribal wildlife mitigation plans are used by the OWC to evaluate potential projects. Projects selected are given further scientific, policy, and economic review, and those agreed upon by the OWC are brought forth to the WWG and the Council for approval, leading to funding by Bonneville. The second component of this project is the implementation of the wildlife mitigation projects that have come through the above process. This will include acquisitions, easements, enhancement, and operation and maintenance (O&M).

In 1991, the Oregon Trust Agreement (OTA) Planning Project was initiated by Oregon's wildlife managers to bring Oregon wildlife managers together to develop an Oregon trust similar to what was done in Montana and Washington. This effort resulted in the "Brown Book" which identified and assessed potential wildlife mitigation opportunities throughout Oregon. Later, this effort was refined via a statewide Gap Analysis, a Bonneville funded research project used to reevaluate the previously identified wildlife mitigation sites and identify new sites. The results of this project, as well as other federal, state, and tribal wildlife management plans, are being used in this current phase to select, evaluate, and implement wildlife mitigation opportunities in Oregon.

Oregon's wildlife managers, working within the Wildlife Working Group (WWG), have developed a budget for Bonneville dollars to implement Oregon wildlife mitigation projects through the year 2001. Initially funds were used for coordination and planning in FY98, FY99, and beyond; the majority of funds will be used for implementation projects. Oregon's wildlife managers believe that implementation projects listed below are the result of a rigorous planning process. They have been evaluated using tested, regionally accepted scientific methods and criteria. They have been reviewed closely for consistency with the Council's program; existing federal, state, and tribal wildlife management plans; BPA Wildlife and Watershed Programmatic EISs; etc. Their potential to provide the highest priority HUs in an economical and fiscally responsible manner has been assessed and reviewed. It is important to note that most of the implementation projects proposed build upon existing activities, whether by expansion or complementing existing Bonneville funded watershed and wildlife projects.

Oregon's wildlife managers understand that while the proposed implementation projects are some of the best wildlife mitigation opportunities in Oregon, not all of them may be implemented for a variety of reasons. Additionally, new sites may be identified that are equal or better than those proposed, and may require immediate action to secure. In light of this, the managers will continually review and monitor the database of existing sites, but more importantly, will work with Bonneville to develop a funding arrangement that will provide Oregon's wildlife managers the flexibility to respond appropriately.

Initial HEP estimates have or will be taken on all sites identified by the planning process. Once sites are acquired or under management, a full baseline HEP analysis for current and potential HUs will be taken and agreed to by the project proponents and Bonneville. Throughout the life of this project, HEP analysis will be done regularly to ensure Bonneville and the region that contracted habitat goals are met. Additionally, Oregon's wildlife managers will work with the WWG to develop monitoring protocols for populations of target and non-target species, as called for by the Independent Scientific Review Panel (ISRP).

Proposed Implementation Projects for FY99 and Beyond

Mitigation Area/Site	Primary Project Proponent(s)	Activity
Tualatin River Refuge Additions	USFWS, Metro, ODFW	Acquisition
Wapato Lake Additions	USFWS	Acquisition
Pine Creek Acquisition	CTWSRO	Acquisition
Cox Butte	USFWS, ODFW, NRCS	Acquisition/easement
Multnomah Slough	Metro, ODFW	Enhancement
Wenaha WMA Additions	ODFW	Acquisition/easement
EE Wilson WMA Additions	ODFW	Acquisition/easement
Granite Creek	ODFW	Acquisition/easement
Mitchell Point	ODFW, CTWSRO	Gift
GI Ranch (So. Fork Crooked River)	TNC, CTWSRO, ODFW	Easement/enhancement
Logan Valley	BPT, ODFW, TNC	Acquisition
Trout Creek Canyon	ODFW, CTWSRO	Acquisition
Ladd Marsh WMA Additions	ODFW, TNC	Acquisition
Irrigon WMA Additions	ODFW	Acquisition
McKenzie River Island	ODFW, MRT, MRWC	Acquisition
McNary District ACOE Lands	CTUIR	Enhancement
Malheur River	BPT, ODFW	Acquisition
Horn Butte	ODFW, TNC, BLM	Acquisition/trade

[No changes to the project proposal were made.]

9117

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## Facilitation Services for the Regional Forum

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Brian J. Brown, NMFS, 503-230-5417

**Target stocks:**

Not provided

**Description:**

The National Marine Fisheries Service has established a Regional Forum which coordinates and oversees implementation of the 1995 Biological Opinion on Hydro Operations. The committees and teams that comprise the Forum are made up of Federal, State, and Tribal sovereigns, fish and wildlife co-managers and others. These bodies deal with real time issues regarding operation of the Federal Columbia River Power System to protect salmon, consistent with the Biological Opinion. The Forum operates on a ?consensus? basis. Issues not receiving consensus may be elevated to the next level, i.e., the Implementation Team or the Executive Committee. When consensus cannot be achieved, the entity with the authority makes the decision. This project provides for professional facilitation of meetings of committees and teams comprising the Regional Forum. The purpose of facilitation is to improve the process of discussion and decision through the use of more effective meeting management techniques and by fostering greater clarity regarding issues and potential alternative solutions so that they might be more timely resolved.

**NPPC Measure:** Not provided

**Partners:**

Not provided

8332300

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## Monitor Smolts at the Head of Lower Granite Reservoir and Lower Granite Dam

Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** Edwin Buettner, IDFG, 208-799 3475

**Target stocks:**

Snake River spring, summer, and fall chinook salmon and summer steelhead trout.

**Description:**

The Smolt Monitoring Program (SMP), which is mandated in the Northwest Power Planning Council's (NPPC) Program, provides data on movement of smolts out of major drainages and past the series of dams on the Snake and Columbia rivers. Indices of migration strength and migration timing are provided for the run-at-large at key monitoring sites. In addition, marked smolts from hatcheries and traps provide measures of smolt speed and in-river survival through key index reaches.

These data are used for in-season operational decisions relative to flow and spill management, particularly during periods when spill is being provided to improve smolt passage.

This project, as part of the SMP, provides important information on salmon and steelhead movement at the upper end of the Snake River's series of dams. Fish PIT-tagged at these sites are used to measure migration speed in key reaches of the Snake and Columbia rivers. The determination of the current year's migration timing of ESA listed Snake River salmonid stocks is a key aspect of the year's in-season SMP management decisions. Also documented, is the arrival timing of anadromous smolts at the head of Lower Granite pool and the migration timing and rate through the Snake and Salmon rivers and Snake and Columbia River reservoirs using the PIT-tagged juveniles captured and marked at the Salmon and Snake River traps. This information is critical for in-season management decisions relative to operations of the FCRPS for fish protection, flow augmentation, facility power operations, fish collections, and transportation programs.

**NPPC Measure:** 5.9A.1

**Partners:**

Not provided

**8401400**

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**Smolt Monitoring at Federal Dams**

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Rick Martinson, NMFS, 541-296-8989

**Target stocks:**

All mainstem anadromous stocks

**Description:**

This project provides daily fish capture and condition data (including gas bubble exams), as well as dam operations and river flow data real-time to the Fish Passage Center to improve the scientific information on which to base in-season flow and spill management decisions directed toward improving protection and passage conditions for juvenile salmon and steelhead in the lower Columbia river. This project is providing a historical time series of smolt monitoring information that contributes to a better understanding of the relationship between environmental conditions, smolt migration characteristics, smolt passage survival and adult production. Specifics on the yearly contributions of this project can be found in the annual reports.

**NPPC Measure:** 5.9A.1

**Partners:**

Fish Passage Center

8712700

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**Smolt Monitoring By Non-Federal Agencies**

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Pam Kahut/Michele Dehart, PSMFC, 503-650-5400

**Target stocks:**

Not provided

**Description:**

The smolt monitoring program (SMP) provides data on movement of smolts out of major drainages and past the series of dams on the Snake and Columbia rivers. Indices of migration strength and migration timing are provided for the run-at-large at key monitoring sites. In addition, marked smolts from hatcheries, traps, and dams provide measures of smolt speed and in-river survival through key index reaches. Fish quality, descaling, and gas bubble trauma measures are taken on samples of fish collected at each monitoring site, and provide indicators of the health of the run. These data are used for in-season operational decisions relative to flow and spill management, particularly during periods when spill is being provided to improve smolt passage. The 1998 SMP incorporates the Hatchery PIT Tag Study, referred to in the SMP as the Comparative Survival Study, for evaluating adult return rates of smolts emigrating under the BiOp mitigation measures in place for the current year.

**NPPC Measure:** NPPC Fish and Wildlife Program 3.6F. 10, Sections 303, 403b, 1403.2.8

**Partners:**

Not provided

8712702

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**Comparative Survival Rate Study (CSS) of Hatchery Pit Tagged  
Chinook**

Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** Michele Dehart, Fish Passage Center., PSMFC, 503 230-4288

**Target stocks:**  
Not provided

**Description:**

The Comparative Survival Study is the fourth year of a long term PIT tag study to develop smolt-to-adult survival indices for spring and summer stream type chinook originating above Lower Granite Dam to evaluate smolt migration mitigation measures and actions (such as flow augmentation, spill, and transportation) for the recovery of listed salmon stocks. The objective of developing smolt-to-adult survival indices is consistent with the recommendations of the PATH (Plan for Analyzing and Testing Hypotheses) process being carried out by the regional, state, federal and tribal salmon managers with the Northwest Power Planning Council (NPPC). The PATH recommendations address the question, “can transportation of fish to below Bonneville Dam compensate for the effect of the hydro system on juvenile survival rates of the Snake River spring and summer chinook salmon during their downstream migration?” The PATH recommended research includes the following; 1) Estimate smolt-to-adult survival rate (SAR) for transported wild and hatchery stream type chinook, 2) Determine if SAR rates are significantly different from the interim SAR hydro goal, 3) Compare SARs of transported and downriver indicator stocks, 4) Estimate transport/control ratio and in-river survival concurrently over a number of years in order to span a range of environmental conditions.

**NPPC Measure:** 3.6F.10, Sections 303, 403b, 1408.2.8

**Partners:**  
Not provided

**8740100**

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**Assess Smolt Condition for Travel Time Analysis: Physiology, Health  
Survival**

Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** Robin M. Schrock and Alec G. Maule, CRRLUSGS-BRD, 509-538-2299 x231

**Target stocks:**

Snake River and Columbia River wild and hatchery juvenile salmonid migrants including run-at-large chinook, coho, and sockeye salmon and steelhead. Specific stock locations include: Snake River steelhead; Snake River fall chinook; Wenatchee River steelhead; Elochoman coho; Cowlitz River spring chinook, coho and steelhead; Tucannon River spring chinook; Lyons Ferry fall chinook; Wind River steelhead.

**Description:**

Time Analysis (ASCTTA) evaluates the effects of physiology on smoltification as related to juvenile migration of Columbia and Snake River salmon and steelhead. The broad approach of the project addresses research and monitoring measures of the FWP, providing physiological standards for production fish, evaluation of production practices, and assessment of environmental effects on salmon survival. Innovative non-invasive methods for smolt assessment, designed for field application, are developed and validated against standard biochemical procedures by rigorous replication and correlation. Smolt assessment is conducted in cooperative efforts between production, research, and management agencies to determine strategies to improve smolt-to-adult survival. A comprehensive database is maintained (1987 - ). The project assists in the design of monitoring or research experiments to provide specific answers to management questions regarding smolt development and its effect on the success of juvenile migrants. Current tasks include a review of rearing practices at ASCTTA reference hatcheries to determine practices that promote smoltification. Central to this evaluation is a determination of causes of residualism and precocity leading to reduced numbers of migrants and migration rates, factors leading to negative interactions between hatchery and wild fish. Development of non-invasive methods has become more critical because of listings under the Endangered Species Act. Demands for our technical assistance have increased as agencies institute changes in rearing and management practices that require physiological monitoring to determine the effects on smoltification.

**NPPC Measure:** 4.2A, 5.0A, 5.7A.4, 5.7B17, 5.8A.8, 5.9A.1, 7.2D.1, 7.2D.3.

**Partners:**

Physiological evaluation is provided for the following juvenile salmonid research projects investigating fall chinook, spring chinook, coho, and steelhead in the Columbia basin: associated USGS-BRD, Columbia River Research Laboratory projects funded by BPA (2) and COE (1); USFWS projects by the Abernathy Salmon Culture Technology Center, Idaho Fishery Resource Office, Dworshak National Fish Hatchery, and the Dworshak Fish Health Center; Washington Department of Fish and Wildlife projects including the Rock Island Evaluation (Mid-Columbia Field Office), Hatcheries Program NATURES Study, Cowlitz Falls Anadromous Fish Reintroduction Project, Hatcheries Program – Snake River Laboratory; USGS-Oregon Cooperative Fishery Research Unit (2) US Army COE radio telemetry projects.

**8910700**

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**Statistical Support for Salmonid Survival Studies**

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** John R. Skalski, UW, 206-616-4851

**Target stocks:**

Snake River and Mid-Columbia chinook salmon and steelhead

**Description:**

Project 8910700 was initiated in 1989 to improve monitoring and evaluation capabilities of the Columbia River Fish and Wildlife Program (FWP) by developing better measurement tools and study designs to evaluate relationships between ambient environmental conditions and the survival of juvenile and adult salmonids. The 1994 FWP states that the relationship between spring and summer flow, velocity, and fish survival should receive highest priority in the region's research efforts. Throughout its history, this project has provided statistical support and guidance on the design and analysis of PIT-tag survival studies to the Northwest fisheries community.

Estimators of smolt and adult salmon survival rates are developed using maximum likelihood methods and generalized least-squares regression models based on release-recapture theory. Tests of survival hypotheses and estimation of survival relationships are based on state-of-the-art statistical analyses devised specifically to assess relationships within capture data. Statistical software (e.g., SURPH.1) is developed and distributed to support ongoing survival investigations.

The ultimate outcome of increased passage survival through the FCRPS depends upon the effectiveness of these survival measures to monitor migration success, investigate river management decisions, and to provide baseline information to evaluate future mitigation options. This project is anticipated to continue in some form beyond 2002 as part of the adaptive management monitoring and evaluation framework of the FWP.

Monitoring and evaluation of products comes from annual post-season evaluations performed by the contractor, direct users of the products, e.g., NMFS, PATH and other regional entities, and independent scientific peer reviews.

**NPPC Measure:** NPPC Doc 94-55: 3.2, 3.2F, 4.3B, 4.3C.1, 5.0F, 5

**Partners:**

National Marine Fisheries Service

9007700

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## Northern Squawfish Management Program

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Russell Porter, PSMFC, 503-650-5400

**Target stocks:**

Not provided

**Description:**

Development of the hydropower system in the lower Columbia and Snake rivers has resulted in increased losses of juvenile salmonids to resident fish predators. Impoundments delay the downstream migration of juveniles, increasing their exposure to predators and high water temperatures. Migrating fish are concentrated and endure stress as they pass dams, increasing their vulnerability to predation. The native northern squawfish *Ptychocheilus oregonensis* is the dominant predator of juvenile salmonids, but introduced smallmouth bass *Micropterus dolomieu* and walleye *Stizostedion vitreum* are also abundant.

A large-scale management program for northern squawfish was begun in 1990 to increase survival of juvenile salmonids in the Columbia and Snake rivers. The Northern Squawfish Management Program consists of a public sport-reward fishery, and agency-operated dam-angling and gillnet fisheries that target northern squawfish >250 mm fork length, approximately the size at which northern squawfish become important predators on juvenile salmonids. Because consumption of juvenile salmonids generally increases with size of northern squawfish, low exploitation rates may result in relatively large reductions in predation. The goal of the program is to sustain annual exploitation of “predator-size” northern squawfish at 10-20%, which may reduce losses of juvenile salmonids by as much as 50%.

During 1997, program data from the 1990-1996 seasons was evaluated to determine if annual exploitation of northern squawfish was maintained in the target range. Predator populations were monitored to describe the response of northern squawfish, smallmouth bass, and walleye to the management program. Benefits of the management program would be less than expected if surviving northern squawfish or other predators increased their rates of predation, growth, or reproduction. The findings were used to estimate the benefits of the management program in terms of reduced predation on juvenile salmonids.

It was found that the Northern Squawfish Management Program in the Columbia and Snake rivers is effective at removing large northern squawfish. From 1990-96, over 1.1 million northern squawfish >250 mm fork length were removed from the lower Columbia and Snake rivers. Annual exploitation averaged 12.0%, and ranged from 8.1% to 15.5%. Exploitation was greater than 10% all years except 1993. The sport-reward fishery accounted for 86.5% of the harvest. All fisheries targeted large, piscivorous, northern squawfish (96.1-99.5% of reported catch); however, mean fork length was higher in the gillnet (409mm) and dam-angling (401mm) fisheries than in the sport-reward fishery (346mm). No evidence was found that surviving northern squawfish compensated for sustained removals. No evidence of smallmouth bass or walleye response to sustained removals of northern squawfish was found. Finally, no evidence was found that diets of northern squawfish, smallmouth bass, or walleye changed in response to sustained removals of northern squawfish.

**NPPC Measure:** 5.7B.1, 5.7B.2, 5.7B.3, 5.7B.4, 5.7B.5, 5.7B.6, 5

**Partners:**

Not provided

9008000

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## Columbia Basin Pit-Tag Information System

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Carter Stein, PSMFC, 503.650.5400

**Target stocks:**

Not provided

**Description:**

The Columbia River Basin Passive Integrated Transponder (PIT) Tag Information System (PTAGIS), provides for the operation and maintenance (O&M) of transponder interrogation systems located at juvenile fish bypass facilities located at hydro-electric dams on the Columbia and Snake Rivers. PTAGIS also provides data base systems management and operations for the collection and distribution of PIT data to all interested parties.

The PTAGIS program supports the PIT Tag Operations Center (PTOC) which maintains software and documentation and provides user support and training for PTAGIS related tools. The PTOC works with the Columbia River Basin PIT Tag Steering Committee (PTSC) to establish data standards, system development priorities, and operational priorities related to the operations and maintenance of the PIT tag interrogation systems at juvenile fish bypass facilities. The PTSC also provides PTOC with input and advice related to the operations and maintenance of the central PTAGIS database.

A PIT tag interrogation system is called for in NPPC planning documents. The PTAGIS O&M activities support the needs of the PIT tag research community represented by the PTSC. O&M activities are documented in the PTAGIS Database Administration Standard Operating Procedures Manual and the PTAGIS Field Interrogation System Standard Operating Procedures Manual. PTAGIS intends to provide 99.9% uptime of interrogation systems and data system as measured during the peak of the outmigration year. Target response time to problem situations is four hours from the time the problem is reported or detected.

**NPPC Measure:** 5.0F.10

**Partners:**

Not provided

9009300

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**Life History and Genetic Analysis of *Oncorhynchus nerka***

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Madison S. Powell, U of I, 208-837-9096

**Target stocks:**

Snake River sockeye salmon (ESA)

**Description:**

This ongoing project seeks to: (a) comprehensively identify the genetic structure of Redfish Lake *O. nerka* outmigrant-originating populations; (b) provide long term information about the genetic identity of returning anadromous sockeye as this run is restored; (c) define the relatedness of populations of *O. nerka* in Redfish, Stanley, and Snake River lakes and the Columbia Basin lakes; (d) provide information to monitor the change or loss of genetic biodiversity among *O. nerka* populations throughout the Columbia Basin and in particular, Redfish Lake, Idaho. This project directly addresses program measure 7.5A.1 and results directly effect management actions for Snake River sockeye salmon. Thus far, a total of 1373 tissue samples from 39 populations have been characterized using mitochondrial DNA analyses. Additionally, several nuclear DNA sequences have also been examined for their utility in delineating *Oncorhynchus nerka* stocks. Presently available genetic markers have been satisfactory in separating beach spawning, resident sockeye from Fishhook Creek kokanee. DNA analyses have also provided evidence demonstrating Fishhook Creek kokanee appear to contribute little if any to the *O. nerka* outmigrants from Redfish Lake. Outmigrant assemblages appear to be primarily composed of progeny from resident sockeye and captively bred smolts released into the lake. Mitochondrial and nuclear DNA analyses have provided additional evidence that beach spawning, resident sockeye are most closely related to anadromous sockeye. A total of 35 composite mitochondrial haplotypes have been observed from populations of *O. nerka* sampled throughout the Columbia River Basin. Mitochondrial genetic data from 1996 and 1997 Redfish Lake creel samples putatively indicate the incidental take of a listed resident sockeye. Most recently, mitochondrial genetic data were used to demonstrate stray sockeye returning to the NMFS Big Beef Creek facility were not of Redfish Lake origin. Following FY1999, this project will substantially reduce its expenditures (>50%) as it transitions into a genetic monitoring phase.

**NPPC Measure:** 7.5A.1

**Partners:**

Not provided

9102900

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## Life History and Survival of Fall Chinook Salmon in Columbia River Basin

Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** Dennis W. Rondorf, USGS, 509-538-2299

**Target stocks:**  
Fall Chinook Salmon

**Description:**

The goal of this project is to help recover Snake River fall chinook salmon populations by providing real-time data and published, peer-reviewed information for adaptive management. There are five objectives including: 1) relating early life history timing of natural fall chinook salmon to smolt survival; 2) investigating residualism (i.e., holdover or yearling emigration) by natural fall chinook salmon; 3) evaluating post-release attributes and survival of out planted yearling and subyearling Lyons Ferry Hatchery fall chinook salmon; 4) defining the effects of post-release attributes and environmental conditions on natural and hatchery smolt survival; and 5) examining growth, predation, rearing habitat carrying capacity, and migratory behavior as mechanisms of survival as related to supplementation and flow augmentation. These objectives are consistent with measure number 7.3B.2 of the CBFWP.

Objectives are being accomplished by releasing hatchery fish in the Hells Canyon Reach, by continued research on natural fish. The information produced by this project will help 1) increase smolt survival; 2) guide supplementation planning; 3) phase in hatchery releases of subyearling fall chinook salmon; and 4) assess the capacity of Snake River rearing areas to produce fall chinook salmon smolts. Results will continue to be monitored and evaluated annually through real-time analyses, annual progress reports, peer-reviewed journal articles, and presentations.

**NPPC Measure:** 7.5B.3, 7.3B.5

**Partners:**

Idaho Fishery Resource Office (U.S. Fish and Wildlife Service)

9202401

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## Enhanced Harvest & Habitat Law Enforcement for Anadromous Salmonids & Resid

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Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** Captain John B. Johnson, CRITFC/CRITFE, 503-386-6363

**Target stocks:**

Anadromous Salmonid/Steelhead and Sturgeon

**Description:**

The goals and objectives of the enhanced CRITFE law enforcement program are to implement an expanded enforcement program to provide additional protection against illegal takes of Columbia River salmon species throughout their life cycle with an emphasis on weak stocks passing through the hydro-power corridor (e.g., between Bonneville and McNary Dams).

The Columbia Basin Fish and Wildlife Program was amended in 1991 to include a measure providing for increased levels of harvest law enforcement. The increased law enforcement measure was included in the "Strategy for Salmon (NPPC 1992): i.e., Measure 5.5C "Law Enforcement and Public Education on Impacts of Illegal or Wasteful Fisheries." This enhanced law enforcement measure is also included in 1994 NPPC amendments as measure 8.5C.

The approach is threefold. First, CRITFE will maintain field levels (1997 level of effort) of harvest and habitat law enforcement protection. Second, CRITFE will enhance the efficiency of this increased enforcement by promoting cooperation and assistance from other regional fisheries enforcement entities. Third, the effort to educate the public on the plight of specific fish stocks and of the importance and effectiveness of enhanced law enforcement protection in stopping violations before they occur (deterrence and voluntary compliance).

Expected outcomes include: (1) Increased passage survival of adult salmonids during their upstream migration through the Columbia River with an emphasis in the hydro-power corridor (Zone 6 -- which is CRITFE's core area of operation); (2) Increased protection of critical habitats of anadromous salmonids; (3) Increased life cycle survival of depleted species of endemic resident fish and protection of their critical habitats throughout the subbasins of the Columbia Basin; (4) Increased public awareness of problems associated with illegal take and habitat degradation, increased public participation in reporting and deterring violations; (5) Increased deterrence for criminals and the general public in violating laws and rules and improved voluntary compliance with state, tribal and federal fish and wildlife protection laws.

Results will be monitored as a result of the ongoing development of performance standards and specific quantitative and qualitative criteria in conjunction with tribal and regional fish and wildlife management processes and objectives.

The BPA-funded CRITFE enforcement program has been very effective in detecting and deterring unlawful fishing activities within our primary area of operation (i.e., Zone 6 of the mainstem Columbia River):

? From 1992 – 1997, tribal arrests have decreased by 59%.

? From 1992 – 1997, non-Indian sport arrests made by CRITFE officers have increased by 2000%.

? From 1992 – 1997, tribal gillnet, setline and hoopnet seizures have decreased by 63%.

? From 1991 – 1997, patrol effort (expressed in actual field patrol time) has increased 70%.

? From 1991 – 1997, total fish seizures (salmon, steelhead and sturgeon) have decreased by 59%.

**NPPC Measure:** 8.5C

**Partners:**

Fish & Wildlife Enforcement Divisions of the following: Umatilla, Nez Perce, Warm Springs & Yakama Tribes, Washington Department of Fish & Wildlife, Oregon State Police, Idaho Department of Fish & Game, U.S. Fish & Wildlife, National Marine Fisheries Service, Montana Fish, Wildlife & Parks and the Shoshone/Bannock Tribe.

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**Evaluate Adult Migration in Lwr Col. River and Tributaries**

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Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Bob Dach, COE, 503-808-4774

**Target stocks:**  
Not provided

**Description:**

Adult salmon and steelhead migrating to their natal streams in tributaries of the Columbia River must pass eight or nine dams and reservoirs, four each in the lower Columbia and Snake rivers and five in the mid Columbia River. Losses and delays in migration at each hydroelectric project must be minimized to succeed in maintaining the native runs of fish and achieve the Northwest Power Planning Council's goal of doubling the abundance of fish in the future.

This study was developed in response to a request for a preliminary proposal issued by the U.S. Army Corps of Engineers (CORPS) in June of 1994, and addresses concerns of the CORPS, the Council in section 6 of the 1994 Columbia River Basin Fish and Wildlife Program, and NMFS in the Proposed Recovery Plan for Snake River Salmon. The study was developed in consultation with the CORPS, and in response to the high priority assigned to adult passage research in the Columbia and Snake rivers by the former Fish Research Needs and Priorities subcommittee of the Fish Passage Development and Evaluation Program.

Adult salmon, steelhead, and lamprey were captured at Bonneville Dam in 1996 and 1997, outfitted with radio transmitters and released downstream from the dam to better define: (1) the use of fishway entrances and passage through the fishways, (2) the effect of spill and powerhouse discharge patterns on the entry of fish into the fishways and on passage rates, (3) the effect of the new Bonneville navigation lock on fish passage at the dam and movement into Bonneville Hatchery, (4) the rate of fallback over the dams with various flow conditions, and (5) the distribution, migration rates, and survival of fish after they are tagged and released near Bonneville Dam.

From the start, 1998 has been planned as a year that would be devoted to analysis of the large amounts of data collected in 1996 and 1997 to develop recommendations for studies in later years. However, river flows, spill, and turbidity are factors that we cannot control, but they can affect migrations of salmon, steelhead and lamprey. Spring runoffs in 1996 and 1997 were significantly above average, with large amounts of spill, and the timing of the spring chinook salmon run past Bonneville Dam was delayed by two to three weeks. Estimates of passage rates at the dams and through the reservoirs, fallback at the dams, and minimum survival will be available for both 1996 and 1997. We now need similar data for years with average or below runoffs. Because it is impossible to predict the size of future runoffs, we propose being prepared to continue field studies in 1998 and 1999, and proceed with tagging spring chinook salmon if an average or lower runoff is forecast on 1 March 1998.

Although fewer spring chinook salmon will return to Bonneville Dam in 1998 than in 1997, we believe there will be enough fish to allow continuation of the field studies. Based on counts of "jack" salmon in 1997 and returns of chinook salmon that spent two years in the ocean before returning in 1997, the Snake River run of chinook salmon in 1998 may be about 35,000 fish, mostly 3-ocean fish that migrated seaward in 1995 (Gene Matthews, NMFS). Returns of 2-ocean chinook salmon in 1998 will be small, partly because of the small number of smolts that migrated seaward in 1996.

The project leaders will be responsible for preparation and submission of all project proposals, documents, and reports. Personnel of the Idaho CFWRU and NMFS will develop detailed study designs for each segment of the project. NMFS personnel will lead in processing the data downloaded from receivers, CFWRU personnel will code the records, and both groups will share in the field work, analysis of data, and preparation of reports.

Personnel of the Idaho CFWRU and NMFS developed this preliminary study plan for review by representatives of various interested groups. The study plan includes proposed objectives for work and studies to be continued in 1999, fish to be studied, methods of study, and geographic scope of the work. Reviewers are requested to provide suggestions on all aspects of the study. The proposed study plan will then be revised and prepared for final review in fall 1998.

If we continue field studies in 1999, protocols for radio tracking, downloading of data from receivers, recovery of information of recaptured fish, and processing of the data will be similar to those developed for 1996, 1997 and 1998. Computer programs prepared and tested in 1996 and 1997 for processing the data and getting it into summary form for analysis and report preparation will be used.

Transmitters were placed in 853 spring/summer chinook salmon, 100 lamprey, and about 800 steelhead during 1996, and the movements of the fish were monitored at all the lower Columbia River dams and into the tributaries. In 1999, we plan to release about 900 spring/summer chinook salmon, 200 lamprey, 600 sockeye, and 800 steelhead with transmitters. Field work will continue through 1999 and into the spring of 1998 to complete tracking of steelhead tagged in the summer and fall of 1997. In 1999, we propose outfitting about 800 spring/summer chinook salmon and 200 lamprey with transmitters if river flows in the spring are near average or below average.

If we tag fish in 1999, we would monitor passage of fish at the lower Columbia River dams in a manner similar to 1996 and 1997, with specific sub-studies yet to be determined. Studies are also planned for 1999 at the lower Snake River dams by the Walla Walla District that require salmon outfitted with transmitters. Salmon tagged at Bonneville would provide the fish needed for the Snake River studies, otherwise, salmon would likely be trapped for tagging at Ice Harbor Dam. We are not aware of any studies planned for the mid Columbia River at Public Utility District dams, but if they develop, we will coordinate with people conducting those studies. We will coordinate with all research groups using radio telemetry for both adult and juvenile salmon and steelhead and other fishes to insure efficient use of the equipment and resources available. As we did in 1996 and 1997, we will coordinate use of transmitter frequencies and codes by all groups using radio telemetry in the main stem study areas to prevent duplicate use of frequencies and codes that would lead to confounded data.

Maintenance and repairs for the more than 120 receiver sites at the dams and in tributaries will be accomplished during fall-winter of 1998-99 when flows and tailrace elevations are low and when fishways are normally dewatered for maintenance.

**Partners:**

Not provided

9300802

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## Symptoms of GBT Induced in Salmon by TDGS of the Columbia and Snake Rivers

Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** Dr. Thomas W.H. Backman, CRITFC, 503 731-1267

**Target stocks:**

All

**Description:**

This is a continuation of a multi-year project, contract number 95BI39861. Spill is provided to expedite the migration of juvenile salmon past hydroelectric dams in the Columbia River basin. Under spill conditions, juvenile salmon are expected to experience less direct mortality, due to injury, than if they pass through the turbines or screened bypass systems. However, additional indirect mortality may occur during spill operations due to elevated levels of total dissolved gas supersaturation. Two key unknowns are the potential exposure to supersaturation and the proportion of fish with gas bubble trauma symptoms. The ultimate goal of this study is to determine the relation between supersaturation levels, flow rates, fish movements, fish distribution, and symptoms.

The 1999 field activities will focus on three objectives: 1) Measuring the frequency and severity of GBT symptoms in adult salmonids as part of the adult monitoring program at the Bonneville Dam Fisheries Engineering and Research Laboratory and during the tribal ceremonial and subsistence fishery. 2) Measure the frequency and severity of GBT symptoms in in-river juvenile salmonids. 3) Validate the multi-factor structural regression tool developed from data collected and analyzed from a full scale, multi-factor experiment. The results will aid in developing simulation models and will generate empirical data to test models being developed. These data will provide managers with a better picture of the actual ecological conditions fish experience and indicate potential sources of mortality. Furthermore, if the findings indicate a monitoring program is necessary, then results will provide a basis for managers to design such a program.

**NPPC Measure:** 5.6E.1

**Partners:**

Not provided

9302900

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## Survival Estimates for Passage of Juvenile Salmonids Through Dams & Res.

Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** William D. Muir, NMFS/NWFSC, 509-538-2626

**Target stocks:**  
Not provided

**Description:**

The goal of this study is to provide up-to-date, precise estimates of survival of juvenile salmonids migrating through reservoirs, dams, and free-flowing reaches of the Snake and Columbia Rivers. This information is critical in determining which restoration strategies to use to recover depressed stocks.

To accomplish this goal, we will continue to PIT tag yearling chinook salmon and steelhead at Lower Granite Dam as needed to estimate their survival through the hydropower system. When possible, we will utilize fish PIT-tagged in other studies to reduce tagging needed specifically for our study. We will also continue to PIT tag hatchery subyearling fall chinook salmon for release above Lower Granite Dam to estimate their survival. As the PIT-tag system expands on the Columbia River, we will estimate survival over longer reaches of the hydropower system. Using combination radio/PIT tags, we will determine where losses and delay occur for yearling chinook salmon between the hatchery and the head of Lower Granite Reservoir.

We will also explore the relationships among survival, travel time, environmental variables, and dam operations using the expanding data base generated by this study.

**NPPC Measure:** 5.0F, 5.8A.8

**Partners:**

University of Washington

9602100

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## Gas Bubble Disease Research & Monitoring of Juvenile Salmonids

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Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** John W. Beeman and Alec G. Maule, USGS-BRD, 509-538-2299 x257

**Target stocks:**

All Snake River spring chinook and steelhead stocks

**Description:**

This project has two main goals. They are to determine the risk of GBD of juvenile salmonids by determining in-situ exposures to total dissolved gas (TDG), and to provide training and QA/QC for the biological monitoring program.

The first goal benefits fish through analysis of GBD risk based on actual exposure of individual migrants. This approach is the most appropriate manner to determine signs and mortality. Current methods, based on fish collected via dam bypass systems and purse seines, are limited to a “snapshot” of the overall picture. Our method results in a more complete picture based on actual exposure histories (e.g., in 1997 results indicated exposure varied with reservoir area and time of year, and that vertical movement of individuals was common; this information was previously undocumented).

Current decisions and models about the exposures to GBD are based on an untested theory of a static vertical distribution of fish. Research in 1997 indicated this view was incorrect, which could result in overestimates of GBD incidence and fish mortality. Results will indicate if prevalence and severity of GBD signs detected through the monitoring program are reasonable given actual exposures of fish. This research requires exposure histories from 1-2 additional years.

**NPPC Measure:** Not provided

**Partners:**

Not provided

**9701000**

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**PIT Tag System Transition**

Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** John H. Rowan - EWI-4, BPA, 503-230-4238

**Target stocks:**

Not provided

**Description:**

The Transition Project is part of the Columbia River Basin-wide replacement of the 400 kHz PIT tag interrogation system for juvenile salmonids with a 134.2 kHz ISO-based system. The existing 400 kHz system is based on 15-year-old technology and is becoming obsolete as critical replacement parts are increasingly difficult to locate, if they can be found at all. Converting to the new ISO-based system should provide significant benefits in read/detection distances with less power input and lower FCC restrictions on RF emissions. In addition, the diagnostic capabilities will significantly improve the ease with which the system is operated and maintained. Adopting the ISO standards should lead to cost savings as expanded participation from multiple manufacturers and vendors occurs. The new system should also move the region closer to being able to detect adult salmonids under more natural conditions than is currently possible with the 400 kHz system.

A Transition Team has been established to guide the transition process. The Transition Team has representation from Pacific States Marine Fisheries Commission, National Marine Fisheries Service, U.S. Fish and Wildlife Service, Bonneville Power Administration, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, Fish Passage Center and the U.S. Army Corps of Engineers. The current plan is to have 134.2 kHz stationary transceivers installed at the mainstem Federal hydroelectric projects in time to detect the juvenile salmonid outmigration during spring 2000. These projects include Lower Granite, Little Goose, Lower Monumental, McNary, John Day and Bonneville dams. In addition, Tribal, state and Federal anadromous fish managers will need a limited number of 134.2 kHz portable (hand-held) transceivers available for use in tagging juveniles as early as the summer/fall of 1998.

The following activities are scheduled for FY98:

- 1) Evaluation will continue of Destron-Fearing's 134.2 kHz stationary transceivers installed in 1997 at McNary Dam and repackaged stationary transceivers installed in 1998 at McNary and John Day dams. This field test is designed to measure, among other things, the reliability of the PIT-tag detection equipment while installed at juvenile salmonid bypass facilities. Fish tests will be conducted to examine the system's ability to read tags under normal operating conditions.
- 2) Procurement of portable ISO-based readers for use while tagging juvenile salmonids.
- 3) Evaluation of ISO tags (tag construction will be based on technical transponder requirements currently being developed by PSMFC).
- 4) Identification of infrastructure modifications at Corps' bypass facilities necessary to support the new ISO-based system.

Most of FY99 will involve the infrastructure modifications required at each project to replace the 400 kHz system with the new Destron-Fearing 134.2 kHz system.

**NPPC Measure:** 5.0F.9, 5.0F.10, 5.0F.11, 5.0F.12, 5.0F.13

**Partners:**

Pacific States Marine Fisheries Commission  
National Marine Fisheries Service

U.S. Fish and Wildlife Service  
Bonneville Power Administration  
Washington Department of Fish and Wildlife  
Idaho Department of Fish and Game  
Columbia Basin Fish and Wildlife Authority - Fish Passage Center  
U.S. Army Corps of Engineers

9701400

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## Evaluation of Juvenile Fall Chinook Stranding on the Hanford Reach

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Subregion: Mainstem

Subbasin: Mainstem

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**Sponsor:** Paul Wagner, WDFW, 509-734-7101

**Target stocks:**

Wild Upriver Bright Fall Chinook

**Description:**

The primary objective of this project is to assess juvenile chinook mortality on the Hanford Reach resulting from hydroelectric power generation changes. This work is consistent with objectives identified in both the 1994 CBFWP and the BIOP and will serve to minimize fish losses resulting from hydroelectric generation activities. This evaluation began in 1997 and is scheduled to conclude in December of 1999. Direct juvenile chinook mortality was observed most often as a result of exposure to warm water in entrapment zones during the pilot year (1997). A combination of physiological and behavior tests will be conducted via subcontract by the USGS/BRD Columbia River Research Laboratory to fully assess this. Objectives 2 and 3 are to assess the effect of water fluctuations on resident fish species (2) and on the benthic community (3). The benthic evaluation will be conducted via subcontract by the University of Idaho Department of Fish and Wildlife and Streamside Program Consultants (C.E. Cushing). A juvenile chinook susceptibility model for the Hanford Reach will also be developed for this project (Objective 4) by the Pacific Northwest National Laboratories. This model will integrate four primary components from collaborating agencies. This is a cooperative study with WDFW acting as the lead agency but involving several agencies also conducting work in the Hanford Reach. Sharing of personnel, equipment, and data is and will continue to occur between collaborating agencies. The results of this evaluation are expected to yield 1) an assessment of the impact of diel water fluctuations on: A) juvenile chinook, B) resident fish, and C) the benthic community of the Hanford Reach as well as recommendations for corrective action (operational constraints). A comprehensive GIS based susceptibility model will also be created to determine the duration in which operational constraints will be imposed. This will require annual monitoring.

**NPPC Measure:** 5.1D.4

**Partners:**

The Public Utility District of Grant County, USGS/Biological Resource Division – Columbia River Research Laboratory, Pacific Northwest National Laboratories, University of Idaho Department of Fish and Wildlife, Streamside Programs Consultation, USFWS.

**9702400**

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**Avian Predation on Juvenile Salmonids in the Lower Columbia R:  
Phase II M&E**

Subregion: Mainstem      Subbasin: Mainstem

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**Sponsor:** Dr. Daniel D. Roby, OSU/CRITFC, 541-737-1955

**Target stocks:**

All Columbia Basin salmonid stocks consumed by piscivorous waterbirds

**Description:**

Piscivorous waterbirds can have a significant impact on survival of juvenile salmonids in mainstem Columbia and Snake rivers. Data collected in 1997 indicated that one bird colony in the Columbia River estuary consumed 5-20 million smolts. Recovery Plans for Columbia Basin salmonids have recommended that avian predation be thoroughly investigated and managed if necessary. In FY99, we will develop and implement a management plan to reduce avian predation on juvenile salmonids, should predation rates be deemed unacceptable. We will evaluate the efficacy of management initiatives and monitor the responses in targeted populations of piscivorous waterbirds and their diets. We will use a bioenergetics approach to monitor the numbers of juvenile salmonids consumed by managed colonies of fish-eating waterbirds. We will also assess those conditions and locales where avian predation on smolts continues to be most prevalent, and test the feasibility of potential new management techniques. Finally, we will continue to monitor population size and diet composition of those unmanaged piscivorous waterbird populations that could potentially contribute to significant smolt mortality now or in the near future. This project focused on assessing the magnitude of avian predation on juvenile salmonids in FY97 and FY98. Field work can be completed in 2 more years (FY99 and FY00) of implementing the management plan, unless otherwise indicated by the results, and final reports will be submitted one year following the completion of field work

**NPPC Measure:** 5.7A.6, 5.7B.20, 5.7B.21, 5.7B.22, 5.7B.23

**Partners:**

OCFRU, USFWS, NMFS, CCEDC, ADC, PSMFC

9063

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## Ocean Survival of Salmonids Relative to Migrational Timing, Fish Health...

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Subregion: Mainstem

Subbasin: Ocean/estuary

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**Sponsor:** Michael Schiewe, Ph.D., NMFS/NWFSC, 206-860-3270

**Target stocks:**

Chinook (ocean & stream type) and coho (when available)

**Description:**

Interannual variation in ocean recruitment of salmon is high and thought to be associated with variation in nearshore ocean conditions. The nearshore ocean environment, particularly that associated with the Columbia River plume, is a critical habitat to outmigrating juvenile salmon. Several investigators have suggested that survival during the first year of ocean life is a key to establishing year-class strength. In the case of salmonids originating in the Columbia River Basin, survival success hinges on the complex interaction of smolt quality and the abiotic and biotic ocean conditions at the time of entry and during their first year of ocean existence. We hypothesize that variation in the physical and biological conditions of the nearshore environment, particularly that associated with the Columbia River plume, affects overall survival of Columbia River stocks. We further hypothesize that primary factors driving the variation in the nearshore environment include (a) food availability and habits and (b) time of entry, smolt quality, and growth and bioenergetic status at the time of entry and during the first growing season in the ocean and (c) predation (a companion study on predation on juvenile salmon is ongoing). We propose to characterize, over a 10-year period, the physical and biological features of the nearshore ocean environment with real-time and modeling projections of the Columbia River plume as it interacts with the coastal circulation regime, and to relate these features, both spatially and temporally, to variation in salmon health, condition, and survival.

**NPPC Measure:** 4.2, 5.0E, 5.0F

**Partners:**

Oregon Graduate Institute of Science & Technology, Oregon State University

9702600

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**Identify Marine Fish Predators of Salmon and Estimate Predation Rates**

Subregion: Mainstem

Subbasin: Ocean/estuary

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**Sponsor:** Robert L. Emmett, NMFS/NWFSC, 541-867-0109

**Target stocks:**  
Not provided

**Description:**

Ocean survival of salmonids from the Columbia River and other Pacific Northwest rivers has declined markedly in the last 15 years. Although specific factors causing reduced survival are poorly understood, predation by large marine fishes (hake and mackerel) is suspected to be a major factor. Of particular note has been the increasing abundance of Pacific mackerel off the Oregon coast in recent years. To better understand the role of large marine fishes as a potential source of mortality of juvenile salmon, we propose to collect these fishes off the mouth of the Columbia River, estimate their abundance, and determine their feeding habits. Fish will be collected by mid-water trawl from April through September using a chartered commercial fishing vessel for 2 days every 2 weeks. A representative sample of these large marine fish will be identified, measured, weighed, and their stomach contents retained for analysis. We expect to collect a minimum of 100-200 stomachs per predator species during each sampling cruise, from which we will estimate the number of salmonids these fish consume. In addition to collecting predators, we will monitor selected oceanographic conditions (salinity, temperature, and chlorophyll a) to begin to describe the environmental factors associated with high rates of predation.

**NPPC Measure:** Not provided

**Partners:**  
Not provided

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## Determine if Salmon are Successfully Spawning Below Lower Columbia MS Dams

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Subregion: Lower Columbia

Subbasin: Lower Columbia Mainstem

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**Sponsor:** Joe Hymer, WDFW, 360-906-6740

**Target stocks:**

Fall chinook and chum

**Description:**

Are fall chinook and chum spawning in the existing habitat downstream The Dalles, John Day, and McNary dams? Are they spawning successfully? How large are the fall chinook and chum populations spawning below Bonneville Dam and is it growing? Where did they come from? The goal is to answer these questions by looking for evidence of spawning fish/redds and by the collection of carcasses. These methods are consistent with those used by WDFW and ODFW in other areas of the Columbia River. Live fish and redd counts would be made by technicians/aides from a boat. Spawning redds would be recorded on a GPS which use satellites to record locations within a few feet. Carcasses collected by boat or walking the banks would be sampled for scales to determine age composition. Numbers of remaining eggs would be used to determine spawning success. Additionally, each carcass would be examined for the presence/absence of an adipose fin (CWT fish). CWT recoveries would be used to determine stock composition. Genetic and DNA samples would be used in conjunction with CWT recoveries to confirm stock origin. The results would document presence/absence and origin of fall chinook spawning below lower Columbia dams in the fall of 1998. The adult portion of this project would run from October 1998 to March 1999. Results would be summarized in a written report. Annual observations and funding would be needed to monitor any populations that are found.

Are spawning adults producing fry? When do the juveniles emerge from the gravel? When and at what size do the juveniles begin moving downstream to the ocean? How long does it take the juveniles to move from their rearing area to the ocean? How many juveniles survive to return as adults? What are the environmental conditions necessary for successful spawning, incubation, emergence, rearing, migration, and juvenile to adult survival? The purpose is to answer these questions by sampling and marking juvenile fall chinook rearing in areas where redds are observed. A randomly selected portion of all redds will be sampled using emergent traps to determine emergence timing. Weekly surveys of shallow water areas will occur to determine if juvenile fall chinook and chum are susceptible to stranding. Weekly juvenile seining trips in rearing areas near the documented spawning grounds will be performed to determine if and for how long juvenile fall chinook rear in this area before moving downstream. In conjunction with the juvenile seining, genetic and DNA samples will be obtained to determine the stock origin. Mark rates (ad clips) will be determined to identify the presence of juvenile hatchery fish, but CWT's will not be collected. If feasible a subsample of juvenile fall chinook will be marked with CWT's. Juvenile to adult survival rates will be determined from CWT's recovered from returning adults.

**NPPC Measure:** Sections 3.3, 3.3A.2, 3.B, 7.0D, 7.1A, 7.1C, 7.1F, 7.5D.1, 8.1, 8.1A.1, 8.1A.2, 8.1A.3, 8.4B.1, 8.4D, 8.4D.1, 8.4D.3

**Partners:**

WDFW, ODFW, USFWS

9306000

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## Evaluate Columbia River Select Area Fisheries

Subregion: Lower Columbia

Subbasin: Lower Columbia Mainstem

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**Sponsor:** Paul Hirose, ODFW/WDFW/CEDC, 503-657-2000 x251

**Target stocks:**

All ESA "listed" salmon species and candidate species

**Description:**

In its 1993 Strategy For Salmon, the Northwest Power Planning Council recommended that select area (formerly terminal area) fishing sites be identified and developed to harvest abundant fish stocks while minimizing the incidental harvest of weak stocks. The Council, through its Fish and Wildlife Program, called on the BPA to: "Fund a study to evaluate potential terminal fishery sties and opportunities. This study should include: general requirements for developing those sites (e.g., construction of acclimation/release facilities for hatchery smolts so that adult salmon would return to the area for harvest); the potential number of harvesters that might be accommodated; type of gear to be used; and other relevant information needed to determine the feasibility and magnitude of the program"(NPPC, '94).

Beginning in 1993, BPA initiated the Columbia River Terminal Fisheries Project (now the Columbia River Select Area Fishery Evaluation Project), a 10-year comprehensive program to investigate the feasibility of select area fisheries in Youngs Bay and other sites in Oregon and Washington (BPA 1996). Select area fisheries are being explored as a means to increase the sport and commercial harvest of hatchery fish while providing greater protection of weak wild salmon stocks. The project is being conducted in three distinct stages: an initial 2-year research stage to investigate potential sites, salmon stocks and methodologies (1994-95); a second 3-year stage of expansion in Youngs Bay and introduction into areas of greater potential as shown from the initial stage (1996-98); and a final 5-year phase of establishment of select area fisheries at full capacity at all acceptable sites (1999-2003).

The goal of the project is to determine the feasibility of creating and expanding select area, known stock fisheries in the Columbia River Basin to allow harvest of strong anadromous salmonid stocks while providing greater protection to depressed fish stocks.

Water quality parameters are monitored through utilization of electronic automated probe and benthic sampling following Washington DOE and Oregon DEQ requirements. Results will be monitored and evaluated through regionally standardized and required coded-wire tagging and recovery procedures.

**NPPC Measure:** 8.3 C

**Partners:**

Salmon for All, Col. R. Fisherman's Protective Union, Columbia River Gillnetters, Clatsop College, Clark College, Clatsop County

9705904

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**Securing Wildlife Mitigation Sites-Oregon, Horn Butte**

Subregion: Lower Columbia

Subbasin: Lower Columbia Mainstem

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 2,000-3,500

**Acres:** 7,000

**Hydroproject:** John Day

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

The project would protect approximately 7,000 acres of shrub-steppe and native bunch grass habitat in the Horn Butte area. The project would be a combination of acquisition and easement of one or two separate private properties. The adjacent 4,300 acres of land is owned and managed by the Bureau of Land Management Prineville District. Management plans for the acquired lands will be developed in concert with the federal properties in an attempt at providing a well managed large contiguous tract of native habitat. Less than 1 % of the ecoregion in which the properties lie is managed with wildlife protection and enhancement as a priority. Less than 10% of the native shrub-steppe habitat remains in the ecoregion. Restoration activities would entail the development of a sound grazing management plan to improve all habitat types, planting of native grasses and shrubs where determined to be effective, spot spraying of noxious weeds and exotic plant species, and other new techniques aimed at revitalization of this rare habitat type in Oregon. Partnerships would occur with the Bureau of Land Management, Washington Department of Fish and Wildlife, The Trust for Public Lands, and The Nature Conservancy. Mitigation target species include western meadowlark, mule deer, and California valley quail. Other sensitive species of interest include long-billed curlew, ferruginous hawk, Swainson's hawk, burrowing owl, loggerhead shrike, grasshopper sparrow, sagebrush lizard, and Washington ground squirrel. Expected HEP mitigation gains through the two projects are from 2,000 - 3,500 HUs and would be applied to BPA's habitat debt at John Day reservoir.

[This revised project description clarifies that the proposed project would be comprised of acquisition and/or easement of one or two separate private properties in the Horn Butte area. A 200-acre property is not necessarily involved as specified in the original project proposal. The Trust for Public Lands is an additional partner in the implementation of this project.]

9705909

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**Securing Wildlife Mitigation Sites-Oregon, Mitchell Point**

Subregion: Lower Columbia

Subbasin: Lower Columbia Mainstem

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 20

**Acres:** 9

**Hydroproject:** Bonneville

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

The project would protect approximately 9 acres of talus shrub land, riparian, and mixed deciduous and evergreen, riparian forest on two donated parcels just west of Hood River along the mainstem Columbia River. This is one of only a few areas which is on-site and available for inclusion into BPA's mitigation program at this time. The riparian habitats are currently in relatively pristine conditions. The property would be donated to one of multiple land management agencies thus eliminating most acquisition costs. Project implementation would be achieved through the cooperative efforts of the Trust for Public Lands, ODFW, the U.S. Forest Service, the Confederated Tribes of the Warm Springs in Oregon, and the Columbia River Gorge Commission. The site is expected to provide habitat for all mitigation target species identified in the loss assessment documents for Bonneville Dam and Reservoir. These include great blue heron, Canada goose, spotted sandpiper, yellow warbler, black-capped chickadee, western meadowlark, and mink. About 20 HUs are expected from this site. Mitigation credit would be applied to BPA's habitat debt at Bonneville Dam and Reservoir.

[The original project proposal was based on the acquisition of an 80-acre parcel on the mainstem Columbia River near the Mitchell Point area. The project proposal has been revised because the parcel is actually near the Ruthton Point, a couple of miles east of Mitchell Point. The private landowner would donate the property. Habitat types and benefits to species are the same as originally described, but estimated HU gains have been revised based on the new location and smaller size of the project site.]

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## Conduct Baseline Habitat and Pop. Dynamics Studies on Lampreys in Cedar Cr.

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Subregion: Lower Columbia      Subbasin: Lewis

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**Sponsor:** Travis C. Coley, USFWS-CRFPO, 360-696-7605

**Target stocks:**  
Pacific lamprey

**Description:**

Pacific lampreys (*Lampetra tridentata*) in the Columbia River Basin (CRB) have declined to a remnant of their pre-1940s populations. The ecological, economic, and cultural significance of this species is underestimated by most casual observers. NPPC-FWP sections 7.5F and 7.5F.1 noted this decline and requested a status report identifying research needs. Among identified needs were abundance, current distribution and habitat limitation studies. Studies of the biology, population dynamics, ecology, identification, and relationships of Pacific lamprey with the two other species of lampreys (*L. ayresi*, and *L. richardsoni*) coexisting in the CRB will assist in rehabilitating the Pacific lamprey populations. Quantitative baseline data including lamprey population dynamics, length-frequency relationships, abundance estimates of spawning-phase adults, and habitat requirements will be collected from a Pacific lamprey population that has open access to the ocean. Because this stream is downstream of Bonneville dam, the characteristics of this population will form a baseline against which to compare populations of lamprey above mainstem Columbia River dams. Habitat for reproduction and for rearing larval lampreys will be quantitatively described. Temperature effects on lamprey embryos will be evaluated because habitats where reproduction can be successful would be easily identifiable if temperature is a major factor regulating development as it is in sea lampreys (*Petromyzon marinus*). Characteristics of the three species of larval *Lampetra* found in the CRB will be examined to develop a precise key for the identification of these fish. Methods will be taken from the literature developed from 40 years of studying sea lampreys. Specific products of this study will include: year two, an identification key for larval *Lampetra* in the CRB and a manuscript describing the importance of specific temperatures in the embryonic development of Pacific lampreys; and years three and four, manuscripts describing species-specific age, growth and fecundity, migration timing of anadromous lampreys, and ecological and inter-specific interactions of larval lampreys, including habitat selection and limiting factors. The quality of the work will be judged by the peer review of the written and verbal information presented.

**NPPC Measure:** 7.5F, 7.5F.1, and the report proceeding from 7.5F.1

**Partners:**

Washington Department of Fish and Wildlife

8612400

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**Inspection Service For Little Fall Creek Passage**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Paul Johnson, ODFW, 503-872-5299

**Target stocks:**

Not provided

**Description:**

Measure 704(d)(1), Table 2 of the amended (1984) Columbia River Basin Fish and Wildlife Program identified Little Fall Creek for anadromous fish passage improvement funding. The project would provide offsite mitigation for fish losses resulting from the Columbia River hydroelectric system.

The Little Fall Creek Fish Passage Project is located on Little Fall Creek, a tributary to the Middle Fork Willamette River. The purpose of the project, constructed under a previous Bonneville Power Administration (BPA) funded agreement (Project No. 86-90, Contract No. DE-FC79-86BP63313), is to provide anadromous fish passage above two falls. The falls, located at river mile (RM) 11.8 (T18S, R1E, S12) and RM 16.4 (T17S, R2E, S34), blocked steelhead and spring chinook salmon access to 12.5 miles of potential spawning and rearing habitat (4 miles of National Forest (N.F.) lands and 8.5 miles of private lands.

In 1981 the U.S. Forest Service (USFS), Willamette N.F., contracted with the Oregon Department of Fish and Wildlife (ODFW) to develop and design specifications for the project. In 1986 BPA signed a cooperative agreement with the landowner, Weyerhaeuser Company (Weyerhaeuser), to build a Denil fish ladder at the lower falls (RM 11.8) and to excavate (rock cut) jump pools at the upper falls (RM 16.4) to improve access for fish migrating upstream. This project is expected to result in an additional 5,429 steelhead smolts (543 adults) and 6,435 spring chinook smolts (256 adults).

Upon completion of the project in December 1986, ownership of both facilities was assumed by Weyerhaeuser. In May 1987 Weyerhaeuser granted an easement to ODFW for the operation and maintenance (O&M) of both fish passage facilities.

**Project Objectives**

The objective of this agreement is to provide for the O&M and repair of the Little Fall Creek fish passage facilities.

**Partners:**

Not provided

**8816000**

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**Willamette Hatchery Oxygen Supplementation**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Dr. Harold Wm Lorz, ODFW, 541-757-4186

**Target stocks:**

Willamette Spring Chinook

**Description:**

The hypothesis to be tested was that the rearing capacity of chinook salmon in a surface water hatchery could be increased through use of supplemental oxygen without reduction in survival to adulthood. The project examined the effects of density, oxygen supplementation, and raceway design on water quality, rearing, and survival of chinook salmon at Willamette Hatchery, Oakridge, Oregon. Duplicate raceways contained juvenile chinook salmon at normal rearing conditions without oxygen, fish reared at normal density with oxygen supplementation, fish reared at triple density with oxygen supplementation, and fish reared in a series of three Michigan ponds with oxygen supplementation. Representative samples of fish were tagged with coded wire tags. Water quality was recorded weekly, with a continuous monitoring system throughout the rearing period. Growth, size distribution, and mortality were followed throughout the rearing period. Returning adults will be collected, heads removed, and coded wire tags decoded for determination of survival of the various groups. Analysis of data and final report will be completed by September 2000.

**NPPC Measure:** 703(e)1 (1987 NPPC)

**Partners:**

Not provided

9607000

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## McKenzie River Focus Watershed Coordination

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** John Runyon, MWC, 541-758-0947

**Target stocks:**

Upper Willamette spring chinook, bull trout

**Description:**

The proposal requests continued Bonneville Power Administration funding for FY 99 coordination of McKenzie Focus Watershed Council planning, education, assessment, research, monitoring, and fish and wildlife enhancement projects. The specific objectives are to: 1) continue to coordinate McKenzie Watershed project prioritization and planning among federal, state, and local government agencies, and landowners; 2) coordinate implementation of watershed assessment, research, acquisition, restoration, and monitoring projects; 3) secure other funding for long-term support of ongoing council operations; and 4) continue watershed education/outreach program for improvement of fish and wildlife habitat and water quality. Watershed Council actions will improve resource stewardship and protect fish and wildlife habitat through outreach and education activities and, where appropriate, restoring or acquiring key areas. The Council is developing a strategy for acquiring the highest quality habitats in the watershed that do not have protection and to restore critical pieces of habitat with the objective of restoring watershed-wide connectivity. Specific measurable outcomes of Council actions include: 1) an increase in ecologically functioning riparian zones; 2) an increase in the protection and restoration of in-channel and riparian habitats for resident and anadromous fish and wildlife; 3) an increase in rearing habitat for juvenile spring chinook; 4) monitoring data for assessment of water quality during base-flows and storm-events; and 5) increased public awareness and implementation of actions necessary to protect fish and wildlife habitat and water quality. The progress of the Council coordinator's work program is evaluated every six months. Evaluation of the Council's fish and wildlife programs will be through ongoing monitoring.

**NPPC Measure:** Focus - 3.1, 4.1, 7.6, 7.7, 7.8

**Partners:**

Local: Audubon Society of Lane County, City of Eugene, City of Springfield, East Lane Soil and Water Conservation District, Eugene Water & Electric Board, HMT Technology, Lane County, McKenzie Fisheries Restoration Project, McKenzie Valley Residents' Association, Mohawk Community Council, Springfield Utility Board, University of Oregon Outdoor Program/McKenzie RiverTrust, Watershed Educator/Lower River Resident, Weyerhaeuser

State: Oregon Department of Fish and Wildlife, Oregon Division of State Lands

Federal: U.S. Army Corps of Engineers, U.S. Bureau of Land Management, U.S. Forest Service

9405300

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**Bull Trout Assessment - Willamette/Mckenzie**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Jeff Ziller, ODFW, 541-726-3515

**Target stocks:**

bull trout (proposed ESA listing)

**Description:**

The goal of this project is to attain population health and long term sustainability of bull trout and their habitat in the Upper Willamette Basin by the acquisition of quantifiable population information and the rehabilitation of depressed bull trout stocks. This project is being conducted under Section 9.3G (1) of the Northwest Power Planning Council's Resident Fish and Wildlife amendments. The project will describe the range of bull trout in the Upper Willamette Drainage Basin system by snorkeling or electrofishing surveys on tributaries. We will monitor the population size using downstream migrant traps and snorkel counts, conduct spawning surveys and estimate the number of spawning bull trout, monitor the movements of radio-tagged bull trout to determine habitat use and locate spawning areas, and evaluate the effectiveness of habitat improvement projects for bull trout within the basin. A small percentage of bull trout captured in the downstream migrant trap will be transferred to unoccupied habitat in the Middle Fork Willamette River and monitored for survival and growth. This project will provide timely information about bull trout populations to resource managers in the McKenzie and Middle Fork Willamette watersheds. Information concerning distribution, population trends, and habitat use of bull trout populations will aid in rebuilding depressed populations and in mitigation of hydroelectric/flood control projects. This project proposes to continue through FY 2002, and, with associated habitat improvement projects and management decisions, bull trout populations are expected to slowly increase over the project period. The results of this project are monitored and evaluated annually by the Upper Willamette Bull Trout Working Group; whose members include all agencies with management responsibility for bull trout in the Willamette Basin.

**Relation to MYIP:**

This project explicitly addresses objectives and strategies for native resident fish populations in subbasin tributaries of the Lower Columbia Subregion (Section 6.6.1.1.A).

**NPPC Measure:** 10.5A.1

**Relation to NPPC:**

This project is explicitly identified in this bull trout mitigation measure which states "fund bull trout population and habitat surveys in the Middle Fork Willamette and McKenzie River systems and habitat improvements identified in the surveys to benefit bull trout"

**Partners:**

Contributed costs and personnel are provided by the Oregon Department of Fish and Wildlife (ODFW), Willamette National Forest (WNF), Eugene Water and Electric Board (EWEB), Oregon Department of Transportation (ODOT), Oregon Trout, and the Federation of Flyfishers. Transportation (ODOT), Oregon Trout, and the Federation of Flyfishers.

**9107800**

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**Burlington Bottoms Wildlife Mitigation Project**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Sue Beilke, ODFW, 503-657-2000

**HUs:** 1,319

**Acres:** 417

**Hydroproject:** Green Peter

**Description:**

Burlington Bottoms was purchased in 1991 by the BPA to mitigate for wildlife habitat losses in the Willamette Basin of the lower Columbia River Basin. Overall project goals and objectives include: 1) maintain and enhance wildlife habitat typical of that found in the Willamette and lower Columbia River basins; 2) maintain a diversity of fish and wildlife and fish and wildlife habitat typical of a riverine floodplain; 3) maintain or improve water quality; and, 4) meet BPA's obligation under provisions of the Pacific NW Electric Power Planning and Conservation Act of 1980.

The methods used to control non-native invasive plant populations include the use of mechanical equipment such as a field mower in upland habitats, and manpower supplied by field crews to assist in the hand removal of non-native plant species. In addition, the installation of a water control structure is being considered in order to control water levels to flood out invasive non-native plant species such as reed canary grass. Coordination with other agencies, groups, etc. will also continue in order to share information and explore all avenues for new methods to carry out enhancement work.

The expected outcome from the above proposed methods includes: 1) the enhancement of wildlife habitat, with a resulting increase in habitat units as projected in the habitat evaluation (HEP) completed in 1993 (see separate report titled "Burlington Bottoms Habitat Evaluation", prepared by ODF&W, August, 1993); and, 2) the site is maintained according to direction from the management plan. Enhancement projects began in 1996, with projects being carried out on a yearly basis, and are expected to be completed by fiscal year 2001, at which time operations and maintenance of the habitat would ensure the maintenance of existing habitat values over the lifetime of the project.

Results of the enhancement activities will be evaluated and monitored by: 1) conducting a modified HEP in order to analyze changes in habitat units over time; 2) analyzing species presence and occurrence both before, during, and after project implementation in response to habitat enhancement (methods used include point count surveys and monitoring and mist netting); and 3) evaluating cost effectiveness of comparative methodologies used during the implementation phase.

**NPPC Measure:** 11.3F.1

9205900

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**Amazon Basin/Eugene Wetlands Phase II**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Edward R. Alverson, TNC, 541-682-5586

**HUs:** 815

**Acres:** 350

**Hydroproject:** Lookout Point

**Description:**

This proposal is to continue to implement restoration and enhancement activities as defined in the Willow Creek Wildlife Mitigation Project Environmental Assessment. This project has been designed to provide for protection and improvement of wildlife habitat for mitigation of habitat loss as outlined in the Northwest Planning Council's 1994 Fish and Wildlife Program. The Willow Creek EA was developed in 1995 to implement this project on the 350 acre Willow Creek Natural Area. The EA describes five management alternatives and quantifies the increase in habitat units for the target species that would occur under each alternative. The alternative that was selected for implementation was designed to maximize wildlife and biodiversity values on the site. This would be accomplished by restoring, enhancing, or maintaining, sufficiently large areas of a variety of habitats occurring on the site. For FY 99 we anticipate achieving native wet prairie and savanna habitat restoration, enhance oak woodland, reduce target non-native plant species abundance, improve populations of native aquatic species by removing bullfrogs and applying data from hydrologic monitoring to improve aquatic habitat conditions. These management actions are intended to increase available habitat units at Willow Creek for the following target wildlife species: beaver, black-capped chickadee, red-tailed hawk, valley quail, western meadowlark, yellow warbler, and western pond turtle. The results will be monitored by performing a habitat analysis (HEP) to compare the habitat units provided after implementation with the habitat units provided prior to the start of the project.

9206800

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**Implementation of Willamette Basin Mitigation Program--Wildlife**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** To be determined

**Acres:** To be determined

**Hydroproject:** All Willamette projects

**Description:**

The goal of the Willamette Basin Mitigation Program is to cooperatively develop and implement measures to mitigate for wildlife habitat losses associated with the construction of the Willamette basin federally licensed hydro-electric dams and facilities. While implementing easements, acquisitions, management plans and enhancement activities designed to achieve the Council's mitigation target species and habitat goals maintain and improve water quality and quantity, habitat connectivity, integrity and functionality, biodiversity and overall ecosystem health.

Overall Objectives: Through the use of Restorative Ecology, Conservation Biology, Landscape Ecology, and passive restoration techniques implement approximately 5-10 mitigation projects in the Willamette basin with the expected minimum gain of 500 - 1500 Habitat Units (HUS) each year. These habitat "gains" will be applied to each of the hydro-electric facilities based upon habitat type and location.

Calculate baseline, actual, and future HUs through the use of HEP field sampling, GIS data collection and analysis, and other Monitoring and Evaluation techniques accepted by the Council, BPA, and CBFWA's Wildlife Working Group. Provide information, findings, and new techniques about the project through multiple means including reports, presentations, digital data and maps, papers, and "over-the-Internet".

9705906

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**Securing Wildlife Mitigation Sites-Oregon, McKenzie River Islands**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 100-150

**Acres:** 180

**Hydroproject:** Cougar

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

**McNutt Island**

Description: RM 26. 180 Acres. This property is a large mid-channel island. Some side-channels have been diked and most of the island's trees have been removed. Upon restoration this property will provide spawning and rearing habitat for spring chinook salmon; restoring side channels will provide additional flood flow dissipation. Wildlife values include riparian, deciduous forest, wetland, and grassland habitat types. Mitigation target species include black-tail deer, ruffed grouse, chinook salmon, rainbow trout, cutthroat trout, California valley quail, and great blue heron.

Objective: Restore and maintain this mid-channel island and create, backwater and side-channel habitat. Provide approximately 100 - 150 HUs through protection and enhancement which will be applied to BPA's habitat debt at Cougar reservoir.

9705907

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**Securing Wildlife Mitigation Sites-Oregon, E.E. Wilson WMA  
Additions**

Subregion: Lower Columbia      Subbasin: Willamette

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 200-350

**Acres:** 200

**Hydroproject:** Lookout Point

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

The acquisition will protect approximately 200 acres of flood plain and riparian habitat on Winter Creek. The restoration of this property will entail the removal of a small reservoir and enhancement of the wetland areas downstream. Currently, the hydrology has been modified through the creation and operation of this reservoir and associated ditches. Fish passage is not provided at this time. The adjacent 70 acres of land is being purchased during FY 1998. That property has a seven year history of enhancement activities conducted on the site. The two properties will be managed similarly and jointly to replicate natural systems as much as possible. The 200 acre property will be enhanced through the planting of native deciduous tree species, light discing to discourage exotic grasses, some planting of grasses and forbs, spot spraying of exotics, and water manipulation to exclude reed canary grass and provide wetland habitats. Partnerships are highly likely through the Oregon Wetlands Joint Venture program and the local Natural Resource Conservation Service. Mitigation target species include California valley quail, ruffed grouse, waterfowl, great blue heron, and black-tailed deer. Other species of interest include many songbird species, cutthroat trout, chinook salmon, and possibly western pond turtle and Oregon chub. Expected HEP mitigation gains through the two projects are from 200-350 HUS to be applied to BPA's habitat debt at Lookout Point reservoir.

9705908

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**Securing Wildlife Mitigation Sites-Oregon, Multnomah Channel**

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** Jim Morgan, Metro, 503-797-1727

**HUs:** 400-500

**Acres:** 309

**Hydroproject:** Detroit

**Description:**

Combining the efforts of BPA and Metro, over 1100 acres of Willamette River bottomland along the Multnomah Channel is or will soon be under public ownership for wildlife habitat protection and enhancement. This complex of emergent tidal marshes, forest wetlands, sloughs, and small lakes are diverse and species-rich. On the 306 acres Metro has acquired to date, there is very high potential for wetland enhancement. Over 24 acres of degraded riparian habitat area along the Multnomah Channel and creeks on Metro's property will be re-vegetated with native plant material in 1998. More information is needed to characterize the bottomland's ecosystem and to develop appropriate enhancement objectives and opportunities. Topographic, hydrologic, and wildlife habitat assessment information will be acquired in 1998 and 1999. Utilizing Metro's GIS, this data will be used to develop site plans and designs for wetland enhancement projects. A watershed management plan for streams draining the adjacent Tualatin Mountains onto Burlington Bottoms will be developed.

9705916

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## Tualatin River National Wildlife Refuge Additions

Subregion: Lower Columbia

Subbasin: Willamette

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**Sponsor:** John Beck, OWC, 503-872-5260

**HUs:** 300

**Acres:** 150

**Hydroproject:** Detroit Dam

**Description:**

Refer to "Securing Wildlife Mitigation Sites - Oregon" for baseline information.

Located within the North Pacific Coast Ecoregion, the Tualatin River NWR was established as an urban refuge in 1992 to serve a purpose of development, advancement, management, conservation, and protection of fish and wildlife resources. Specifically, it will restore, protect, and manage wetland, riparian, and upland habitats for a variety of migratory birds, anadromous fish, threatened and endangered species, and for the enjoyment of people.

When acquisition is complete, this new refuge will total over 3,000 acres of primarily floodplain habitats within the lower-mid section of the Tualatin River basin located at the northern most end of the Willamette Valley. It will preserve a wetland ecosystem and provide a wildlife center in the shadow of Oregon's largest metropolitan area, Portland. This city and surrounding area of approximately 1.5 million people is experiencing rapid growth and extensive development. The concept of creating the refuge originated from local citizenry, cities, and governments, therefore, it enjoys a tremendous amount of public support.

The refuge's landscape is predominately flat bottomland bordered by uplands. Habitats consist of rivers and streams, seasonal and permanent wetlands, forested wetlands, riparian areas, grasslands, and forested uplands.

The refuge is recognized for importance in wintering arctic nesting Canada geese which include dusky, cackling, taverner's, and lesser sub-species. Aleutian Canada geese winter in small numbers as well. The Pacific greater white-fronted goose migrates through the area during spring and fall migration. In addition, the refuge serves as a migration and wintering area for continental populations of northern pintail and mallard. Wood ducks are an abundant breeding species on the refuge and many other species of waterfowl are migrant and winter users. High quality seasonal and permanent emergent wetlands, forested wetlands, riparian areas, oak woodlands, and transitional grass/forb uplands will serve breeding, migrating, and wintering marsh and shorebirds, breeding neo-tropical migrants, and migrating steelhead and coho salmon in addition to waterfowl. Biological requirements of the Aleutian Canada goose, peregrine falcon, bald eagle, northern red-legged frog, and the western pond turtle will be partially fulfilled enhancing recovery of each species.

Two high priority areas of management emphasis are to restore native riparian, riverine and wetlands habitat associated with the Tualatin River floodplain and to provide wildlife-dependent public use emphasizing environmental education and interpretation. Riparian, riverine and wetlands are all high priority sub-regional habitat types as identified by the Council. At least ten wildlife species identified in the sub-region are represented in this area. Land acquisition and habitat restoration have dominated refuge activities early-on in refuge development. The refuge has an active acquisition program well underway with approximately 1/3 of the approved 3,058 acres already owned by the Service. A large 400 acre complex of wetland floodplain has been restored as well.

Goals of the Tualatin River NWR include the following:

1. Protect and restore a diversity of native habitats and associated populations of indigenous fish, wildlife, invertebrate and plant species of the Lower Columbia Sub-region and Tualatin River basin.
2. Provide high quality opportunities for wildlands and wildlife dependent recreation and environmental education to enhance public appreciation, understanding and enjoyment of refuge fish, wildlife, habitats and cultural resources with an emphasis towards urban residents.
3. Protect, restore and develop a diversity of habitats for migratory birds such as neotropical songbirds, wading birds and shorebirds with special emphasis on wintering waterfowl.
4. Protect and restore floodplain type benefits associated with the Tualatin River including water quality, flood storage, water recharge, etc.
5. Protect, restore and develop habitats for and otherwise support recovery of Federally listed endangered and threatened species and help prevent the listing of candidate species and species of management concern.

Acquisitions of tracts would allow efforts to proceed for restoring permanent wetlands, seasonal marsh, riparian flooded woodland communities with oxbow wetlands and upland oak woodland/savanna.

Habitats to be restored and managed from the funding initiative consist of seasonal and permanent emergent wetlands, Oregon ash forested wetland, Oregon white oak woodland, riparian corridors, and transitional upland habitats. Emergent wetlands and adjacent transitional uplands will benefit arctic nesting geese, continental populations of northern pintail and mallard, other species of waterfowl, and marsh and shorebirds by providing loafing areas, nocturnal roost sites, and foraging grounds to meet breeding, migratory, and winter maintenance requirements. These habitats will provide an increased population prey base for both peregrine falcon and bald eagle and shall supplement foraging and resting needs of Aleutian Canada geese. The western pond turtle and northern red-legged frog will benefit from added emergent wetlands. Beaver, river otter and mink will also benefit. Oregon ash forested wetlands and white oak woodlands are severely depleted habitat communities of the Willamette Valley which historically supported a diverse group of neo-tropical migrants. These habitats are considered highest priority for restoration in the Valley. Ash forested wetlands are essential habitat for breeding wood ducks. Oak woodlands provide potential for enhancing nesting habitat of the western pond turtle. Restoration of riparian corridors will improve water quality enhancing passage functions of the Tualatin River for migrating steelhead and coho salmon.

It is imperative baseline and monitoring data be collected to document and assess habitat conditions/restoration efforts and associated wildlife species.

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**River Wetlands Restoration and Evaluation Program**

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Subregion: Lower Columbia

Subbasin: Sandy

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**Sponsor:** Virginia Kelly, USFS-CRGNSA, 541-386-2333**HUs:** To be determined**Acres:** 200**Hydroproject:** Bonneville**Description:**

Proposed Action: The overall 5 year program consists of Lower Columbia River wetlands GIS mapping, habitat restoration, and evaluation and monitoring. This proposal requests funds to restore 200 acres of wetland and associated upland habitat at Sandy River Delta, and monitor and evaluate restoration success. Restoration, monitoring and evaluation at Sandy River Delta would be part of a series of large scale lower Columbia River habitat restoration and evaluation experiments.

Expected Benefits (1994 FWP program goals): Wetland restoration (increased wetland acreage, increased open water, longer wet season, and increased plant diversity) will improve habitat for a community of native plants and animals, including breeding/migrating waterfowl, herptiles, raptors, and other native wildlife and plants. Sandy River Delta is on the Pacific Flyway and is used by a variety of waterfowl and shorebirds. The great blue heron, Canada goose, Spotted sandpiper, yellow warbler and black-capped chickadee have been observed at Sandy River Delta. The band-tailed pigeon, Western pond turtle, lesser scaup and mink potentially occur. A large population of herptiles (including red-legged frogs) is present (Salix, 1992).

Mitigation: Replace riparian forest habitat inundated above Bonneville Dam (in-kind, not in-place).

Methods: Apply US Fish and Wildlife Service (USFWS) developed and tested wetland restoration strategies on a landscape basis.

**Outcomes:**

1. A wetland restoration and management model that can be implemented in other watersheds of the Pacific Northwest.
2. Restoration of 200 wetland acres at Sandy River Delta.

**Monitoring:**

Evaluate restoration response based on:

1. Aerial photography interpretation.
2. Ground based surveys.

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**Sandy River Delta Riparian Reforestation**

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Subregion: Lower Columbia

Subbasin: Sandy

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**Sponsor:** Virginia Kelly, USFS-CRGNSA, 541-386-2333

**HUs:** To be determined

**Acres:** 50

**Hydroproject:** Bonneville

**Description:**

Proposed Action: Restore 250 acres of 'gallery' riparian forest (dense, unbroken stands of black cottonwood, willow, ash) which have been extensively cleared and invaded by undesirable species. Riparian forest habitat has almost entirely disappeared from this stretch of the Columbia, and what remains is generally patchy. The Delta represents one of the very best opportunities to re-establish a large block of dense, riparian forest.

The desired future condition is 600 acres of riparian forest and shrub-scrub community. This proposal targets 250 acres, or 50 acres per year for five years, because the work can be reasonably accomplished with current staffing levels.

Expected Benefits: Improve habitat for riparian forest species, particularly neo-tropical migrant birds, amphibians, herons and bald eagles.

Mitigation: Replace riparian forest habitat inundated above Bonneville Dam (in-kind, not in-place).

Methods: Site preparation and planting methods are based on previous Forest Service experience.

Outcomes: A 5 year plan which plants 50 acres per year in native riparian forest tree and shrub species (a total of 250 acres planted in 5 years). 50 plus acres per year maintained. Annual reports on planting success and neo-tropical monitoring.

**Monitoring:**

1. Annual photo documentation of reforestation to build long term visual record of reforestation results.
2. Annual measurement of planting success, and evaluation of any causes of planting failure. Corrective action taken as needed.
3. Annual population counts of neo-tropical migrants to determine affect on wildlife populations.

9202200

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**Physiological Assessment of Wild and Hatchery Juvenile Salmonids**

Subregion: Lower Mid-Columbia

Subbasin: Lower Mid-Columbia Mainstem

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**Sponsor:** Walt Dickhoff, Ph.D., NMFS, 206-860-3234

**Target stocks:**

Not provided

**Description:**

Our overall goal is to reduce negative impacts of hatchery salmon on wild salmon and evaluate supplementation by 1) improving the smolt quality and smolt-to-adult recovery (SAR) of fish reared in hatcheries, and 2) producing a more wild-type hatchery smolt in supplementation programs. Items addressed in the 1995 FWP include 7.2D1,3,5; 7.3B.2,6,7,; 7.4K.1; 8.3c. High smolt quality is defined operationally as fish that migrate rapidly after release and survive to adulthood at relatively high rates. Rapid downstream movement after release reduces time for hatchery fish to interact and compete with wild fish. Fish that migrate rapidly downstream will not residualize and imprint on stream sites adjacent to the hatchery. Reduced residualism means less straying of adults on their homing migration and less breeding and genetic introgression with wild fish. Improving SAR of hatchery production fish will allow reduced numbers of juveniles released to realize the same number of adults contributed, and reduce impacts of hatchery on wild fish. Our previous research found correlations between smolt quality indices, spring growth rates, and SAR of spring chinook salmon in production hatcheries. Furthermore, we demonstrated that accelerating spring growth improved instream migration of smolts. We also characterized the developmental physiology of wild chinook salmon in the Yakima River Basin. The experimental objectives of our proposed work include 1) improving SAR of the Columbia River terminal fishery by growth rate manipulation of juvenile salmon, 2) improving our understanding of how growth rate affects smoltification, 3) evaluate the physiology of salmon reared under conventional and natural-rearing systems in the supplementation program of the Cle Elum Hatchery (Yakama Indian Nation and WDFW).

**NPPC Measure:** Not provided

**Partners:**

Not provided

9406900

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## A Spawning Habitat Model to Aid Recovery Plans for Snake River Fall Chinook

Subregion: Lower Mid-Columbia

Subbasin: Lower Mid-Columbia Mainstem

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**Sponsor:** David R. Geist, PNNL, 509-372-0590

**Target stocks:**

Fall Chinook Salmon and Steelhead

**Description:**

We will investigate the role of interstitial flow pathways and ground-water/surface-water interactions in spawning site selection by salmonids in the mainstem Columbia and Snake rivers. The information is needed to refine our definition of spawning habitat and develop recovery goals for Columbia River salmonids that are listed under the Endangered Species Act (ESA), including Snake River fall chinook salmon (*Oncorhynchus tshawytscha*) and Upper Columbia River steelhead (*O. mykiss*). The benefits of this information include an estimate of the production potential for Hanford Reach fall chinook salmon, a population that is critical for the recovery of Columbia River salmon; an evaluation of Hanford Reach spawning habitat used by ESA-listed steelhead; and an evaluation of the ground-water/surface-water interactions and spawning site selection by Snake River fall chinook salmon. We expect the project results from each of the objectives to be published in peer reviewed journals. We will synthesize this information into a project completion report to be used by fishery managers to improve production estimates for Snake River fall chinook salmon, and to provide information to critically evaluate recovery options for Columbia River salmonids.

**NPPC Measure:** 7.5B.3, 7.5B.5

**Partners:**

Not provided

## 9603201

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### **Begin Implementation of Year 1 of the K Pool Master Plan Program**

Subregion: Lower Mid-Columbia

Subbasin: Lower Mid-Columbia Mainstem

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**Sponsor:** Lynn Hatcher, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

This project initiates white sturgeon and Pacific lamprey supplementation activities specified in the K Pool Master Plan, which was prepared by the YIN under contract 96-BI-94489 with BPA to implement Section 7.4J.4 of the NPPC Fish and Wildlife Program. The K Pool Master Plan is currently under review and is fully expected to be approved in FY98. The overall project objective is for this supplementation program to become a valuable tool for reestablishing naturally spawning populations of white sturgeon and Pacific lamprey in the Columbia Basin. The goal for the white sturgeon portion of the project is to prepare facilities and initiate spawning and egg hatching, broodstock development, and juvenile rearing activities. The goal for the lamprey portion is to prepare detailed plans and conceptual designs for pilot rearing tests and to initiate capture of wild juveniles. At the end of FY99, it is expected that the project will be well underway and proving critical concepts and assumptions. The project approaches and methods will be genetically sound and will test natural rearing environment concepts, as explained in the Master Plan. The project will be initiated at several facilities and in phases so as to be very cost effective and to provide the flexibility for adaptive management to make changes when they become necessary. The monitoring and evaluation activities and plans are described in the Master Plan.

**NPPC Measure:** 7.4J.4, 7.4J.5

**Partners:**

Not provided

8605000

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## White Sturgeon Mitigation and Restoration in the Columbia and Snake Rivers

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Subregion: Lower Mid-Columbia

Subbasin: Lower Mid-Columbia Mainstem

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**Sponsor:** Dave Ward/Tom Rien, ODFW, 503-657-2000 x405

**Target stocks:**  
white sturgeon

**Description:**

Goals of this project are to: 1) implement and evaluate measures to protect and enhance white sturgeon populations and mitigate for effects of the hydropower system downstream from McNary Dam; and, 2) determine the need and identify potential measures for protecting and enhancing white sturgeon populations and mitigate for effects of the hydropower system upstream from McNary Dam. Objectives are: 1) develop and implement mitigation actions that do not involve changes to hydrosystem operation and configuration; 2) develop and implement mitigation actions that involve changes to hydrosystem operation and configuration; 3) monitor and evaluate response of white sturgeon populations to mitigation actions by reassessing stock status in Bonneville Reservoir; and, 4) assess losses to white sturgeon productivity caused by development and operation of the hydrosystem in lakes Rufus Woods and Roosevelt.

We will undertake a planning process to guide decisions regarding white sturgeon mitigation, restoration, and production activities above Bonneville Dam. We will continue development of a plan for operating the hydropower system to provide flows that maximize spawning and recruitment in The Dalles and John Day reservoirs, and evaluate effects of these flows on white sturgeon production. We will describe the relationship between daily dam operations and the onset of spawning, develop specific recommendations for in-season water management; determine the location and quantity of spawning and rearing habitat and the timing and duration of spawning upstream from McNary Dam; describe annual variation in white sturgeon recruitment between Bonneville and McNary Dam dams and in the lower Snake River; describe the potential effect of proposed reservoir drawdown on white sturgeon productivity, and update relationships between river flow, available habitat, and recruitment.

**Relation to MYIP:**

This project explicitly addresses objectives and strategies for white sturgeon in the mainstem of the Lower Mid-Columbia, Upper Mid-Columbia, Upper Columbia, and Lower Snake subregions (sections 6.6.2.1.A, 6.6.3.1.A, and 6.6.5.1.A).

**NPPC Measure:** 10.4A.7

10.4A.1, 10.4A.2, 10.4A.3, 10.4A.6, 10.4A.8, 10.4A.9

**Relation to NPPC:**

Project explicitly addresses measures directing that research be funded to determine impact of development and operation of the hydropower system in the Columbia basin and to develop specific recommendations for protection, mitigation, and enhancement. Project will implement a program of harvest monitoring, transplants, and experimental hatchery releases to restore lost productivity.

**Partners:**

Project is cooperatively implemented by the Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Columbia River Inter-Tribal Fish Commission, National Marine Fisheries Service, U.S. Fish and Wildlife Service, and U.S. Geological Survey Biological Resources Division.

9009200

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**Wanaket Wildlife Mitigation Project**

Subregion: Lower Mid-Columbia

Subbasin: Lower Mid-Columbia Mainstem

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**Sponsor:** Carl Scheeler, CTUIR, 541-278-5267

**HUs:** 3,934

**Acres:** 2,750

**Hydroproject:** McNary

**Description:**

The CTUIR is proposing to continue protecting, enhancing, and mitigating wildlife and wildlife habitat impacted by construction of the McNary Hydroelectric Power Project. Later phases of the project contemplate potential additions of adjacent BLM and private lands to the project.

Primary objectives of the project proposal are to protect and mitigate wildlife and wildlife habitat. The project is located within the McNary Project area and provides a unique opportunity to mitigate wildlife habitat losses in-kind and on-site where the original inundation impacts from hydropower development occurred.

Key habitat located on the Wanaket Wildlife Area includes upland shrub steppe and riparian habitat. The project includes habitat for eight (8) McNary target wildlife mitigation species including: spotted sandpiper (*Actitis macularia*); Canada goose (*Branta canadensis*); yellow warbler (*Dendroica petechia*); mink (*Mustela vison*); western meadowlark (*Sturnella neglecta*); California quail (*Lophortyx californicus*); mallard (*Anas platyrhynchos*); and downy woodpecker (*Picoides pubescens*). Wanaket consists of approximately 2,750 acres and could provide an estimated 2,334 Habitat Units (HU's) of protection credit and 1,600 Habitat Units of enhancement credit against BPA's Hydro related debt.

9705915

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**Juniper Canyon and Columbia Gorge Wildlife Mitigation Project**

Subregion: Lower Mid-Columbia

Subbasin: Lower Mid-Columbia Mainstem

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**Sponsor:** Carl Scheeler, CTUIR, 541-278-5267

**HUs:** 672

**Acres:** 1,266

**Hydroproject:** McNary

**Description:**

The CTUIR is proposing to lease existing public land owned and operated by the U.S. Army Corps of Engineers in the McNary Project area for purposes of protecting, enhancing, and mitigating wildlife and wildlife habitat impacted by construction of the McNary Hydroelectric Power Project. Later phases of the project contemplate addition of BLM and private lands to the project.

Primary objectives of the project proposal is to protect, enhance, and mitigate wildlife and wildlife habitat. The project is located within the McNary Project area and provides an opportunity to mitigate wildlife habitat losses in-kind and onsite where the original inundation impacts from hydropower development occurred.

Key habitat located on the Juniper Canyon and Columbia Gorge units includes upland shrub steppe and riparian habitat. The project includes habitat for eight (8) McNary target wildlife mitigation species including: spotted sandpiper (*Actitis macularia*); Canada goose (*Branta canadensis*); yellow warbler (*Dendroica petechia*); mink (*Mustela vison*); western meadowlark (*Sturnella neglecta*); California quail (*Lophortyx californicus*); mallard (*Anas platyrhynchos*); and downy woodpecker (*Picoides pubescens*). The Juniper Canyon HMU consists of approximately 329 acres and could provide a minimum of 260 Habitat Units (HU's). The Columbia Gorge HMU consists of 937 acres and could provide a minimum of 412 HU's.

Project objectives also include incorporating adjacent Bureau of Land Management (BLM) lands encompassing nearly 3,750 acres. Primary habitat types include upland shrub steppe and riparian/wetland habitat.

Monitoring and evaluation will include: U.S. Fish and Wildlife Service Habitat Evaluation Procedures (USFWS, 1980).

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**Wind River Ecosystem Restoration**

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Subregion: Lower Mid-Columbia

Subbasin: Wind

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**Sponsor:** Steve Stampfli, UCD, 509-493-1936**Target stocks:**

Not provided

**Description:**

The quality and quantity of salmonid habitat in the Wind River subbasin has been reduced by Bonneville Dam's inundation of the lower two miles of river along with timber harvest, road building, and other land use activities within the watershed. In 1992, the American Fisheries Society rated summer and winter steelhead as a moderate and high risk of extinction, respectively, and they listed the Wind River sea-run cutthroat trout as extinct. In 1997 WDFW rated the Wind River summer run steelhead as critical. Due to the status of this stock, the Wind River summer steelhead have the highest priority for restoration in the State of Washington's Lower Columbia Steelhead Conservation Initiative.

The proposed projects are a joint product of public and private stakeholders. The goal of these projects is to preserve, protect, and restore the Wind River steelhead and its habitat. This goal will be achieved by utilizing a holistic, community-based watershed restoration approach. Proposed restoration efforts will address known degraded streams, riparian, and up-land areas. An adaptive management strategy will build upon past successes in restoring degraded water quality and habitat within the Wind River subbasin. The collection of biological, physical habitat, and water quality data will fill critical gaps on private and public lands necessary to assess the overall condition of the watershed and prioritize future restoration efforts. Coordination and education of land owners, the community, and other stakeholders will be an important part of achieving our goal.

**NPPC Measure:** 2.2A, 2.2H, 3.2A, 4.3C, 5.9A, 7.1, 7.1C, 7.6C, 7.7**Partners:**

Not provided

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**Document Native Trout Populations**

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Subregion: Lower Mid-Columbia

Subbasin: Wind, Little White Salmon, Klickitat

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**Sponsor:** Nick Gayeski , WT, 425-788-1167**Target stocks:**

Not provided

**Description:**

The 1994 Fish and Wildlife Program is to recover and preserve the health of native resident fish. Among the native resident species of concern noted in the Resident Fish section are bull trout, redband trout, and westslope cutthroat trout. All are or are likely candidates for actions under the ESA.

Before at-risk populations can be protected, their presence and status must be documented. Where introgression from introduced species is a concern, as in the case of both westslope cutthroat and redband rainbow, genetic issues must be addressed as well. Most of the remaining pure populations of these species are in relatively remote, headwater drainages which present surmountable, but not slight, logistical obstacles to properly documenting/assessing such populations.

Washington Trout proposes to conduct field visits to remote habitats throughout the Washington State sub-basins of the Columbia still occupied by these native trout populations, for the purpose of cataloguing and photo-documenting the remaining native trout ecotypes. Taxonomy-quality photographs of living specimens will be made with the aid of a portable field aquarium. In addition, non-lethal methods will be used to take and preserve adipose or caudal fin tissue samples in a manner suitable for subsequent genetic analysis using modern DNA techniques. Dr. Pat Trotter will lead this fieldwork. He has extensive experience in, and credentials for, doing the work proposed. Fieldwork will be begun in 1998 and extend over the course of 5 field seasons. Results will be written up by Dr. Trotter for peer reviewed publication.

**Relation to MYIP:**

Not provided

**NPPC Measure:** 10.1, 10.2A1, 10.2B.1-5, 10.2C, 10.5A, 10.8, 10.8A, 10.8B.19.**Relation to NPPC:**

Not provided

**Partners:**

Not provided

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**Bull Trout Population Assessment in the Columbia River Gorge, WA**

Subregion: Lower Mid-Columbia

Subbasin: Wind, Little White Salmon, Klickitat

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**Sponsor:** Craig Burley, WDFW, 360-902-2406

**Target stocks:**

bull trout

**Description:**

This project will provide critical information to determine the status of bull trout populations in the Wind, Little White Salmon, White Salmon and Klickitat subbasins and to develop and implement required management actions to ensure healthy populations are restored and maintained. These actions are called for in section 10.5A.6 of the Fish and Wildlife Program. Methods used are technically sound and are used basin wide. A management plan will be completed with actions implemented. Standards for performance measures will be set in the statement of work.

**Relation to MYIP:**

Not provided

**NPPC Measure:** Not provided

**Relation to NPPC:**

Not provided

**Partners:**

Not provided

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**Klickitat Passage/Habitat Improvement M&E**

Subregion: Lower Mid-Columbia

Subbasin: Klickitat

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**Sponsor:** Mel Sampson, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

A. Integrated watershed analysis of Klickitat Basin using fisheries, population, habitat, and engineering surveys to develop a preliminary design of passage and habitat improvements which directly benefit salmonids and provide information used for patient/template style analysis and future supplementation activities.

B. The YKFP's core objectives are as follows:

- 1) To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits;
- 2) To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
- 3) To implement and be consistent with the Council's Fish and Wildlife Program; and
- 4) To implement the Project in a prudent and environmentally sound manner.
- 5) Provide knowledge of habitat/passage improvement projects and supplementation, so that it may be used to enhance anadromous fisheries throughout the Columbia River Basin.

C. The Yakima/Klickitat Fisheries Project has been included in the Council's Fish and Wildlife Program. The Council's 1987 Fish and Wildlife Program presented measures specifically for the Klickitat River. This Project initiates the preliminary design work needed to complete a Preliminary Design Report for the Klickitat Subbasin.

D. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production: 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and, 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

Characterize physical attributes of each stream and tributary surveyed.

Determine summer distribution and abundance of juvenile fish by species within basin. Conduct salmon spawner ground surveys. Evaluate effectiveness of current monitoring sites in terms of logistics and to meet YKFP monitoring needs. Collect life history data from wild and hatchery salmonid outmigrants. Collect historical information beneficial to model template for future patient-template analysis. Develop specifics from Phase I engineering investigations into primary passage problems at Lyle and Castile Falls.

E. Increase number of returning adults and naturally reproducing adults to the target population. Increase information on the feasibility of using supplementation to rebuild natural populations. Baseline life history information on spring and summer/fall chinook, coho, and summer and winter steelhead. Expanding use of anadromous stocks to newly accessible areas opened through passage and habitat improvement projects. Increased natural production and resultant carcasses will add nutrients to the entire subbasin.

F. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The YKFP's PSR and the Monitoring and Evaluation Plan lay out an integrated multi-level monitoring program for supplementation activities.

Use standard fisheries inventories for monitoring short and long-range goals of project. Fisheries and habitat survey data used to resolve critical uncertainties that developed. Monitor increase in natural production of salmonids stocks associated with particular habitat/passage improvements or supplementation activities. Conduct standardized fisheries surveys to determine if habitat and passage improvement projects result in increased natural production. Monitoring of riparian habitat projects conducting using photo documentation. Use YKFP patient-template analysis to direct habitat and passage improvements as well as any future supplementation activities

**NPPC Measure:** 7.1.A.1, 7.1.C-, 7.6A, 7.6.A.2-, 7.7-

**Partners:**

Not provided

9705600

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**Lower Klickitat River Riparian & In-Channel Habitat Enhancement  
Project**

Subregion: Lower Mid-Columbia

Subbasin: Klickitat

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**Sponsor:** Mel Sampson, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

Through restoration efforts, it is expected that critical habitat for salmonid production will be increased and can be demonstrated. Through monitoring, the project can be assessed for its ability to meet target objectives for riparian conditions and in-channel habitat, as well as judge effects on production of salmonids. This knowledge can be applied to future projects for determining expected outcomes and benefits to habitat enhancement. The objective of the project is to improve spawning, rearing and holding habitat, stabilize stream banks and channels, revegetate riparian corridors with beneficial deciduous and coniferous species, deter grazing impacts, and provide adequate summer flows for fish passage and rearing. The project work is also expected to improve water quality by reducing erosion, filtering and storing fine sediments, augmenting canopy cover for temperature moderation and reducing livestock waste from entering waters. Through restoration efforts on the channel, available habitat is anticipated to increase by at least two-three fold for spawning, juvenile rearing, velocity refugia, and adult holding. This project ties specifically to 1994 CBFWP goals of an ecosystem approach to species recovery through protection and improvement to habitat conditions. This coordinated approach brings together land managers and landowners to develop a habitat plan to protect an important natural resource.

These improvements will benefit both anadromous and resident salmonid populations (steelhead, chinook and coho salmon, rainbow and cutthroat trout) in the Klickitat River. Project duration will be from September 1997 through September 2010. TFW Ambient Monitoring of habitat conditions and fish populations before and after completion of project work will quantify whether objectives were attained.

**NPPC Measure:** 7.6A, 7.6A2, 7.6B.3, 7.6B.6, 7.6D, 7.7, 7.8E.

**Partners:**

Not provided

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**Hood River Fish Habitat Project**

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Subregion: Lower Mid-Columbia

Subbasin: Hood

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**Sponsor:** Michael Lambert, CTWS, 541-296-6866

**Target stocks:**

winter steelhead, spring chinook and coho salmon, and resident trout

**Description:**

The current habitat project consists of several components: deconstruction of a water diversion dam and intake box on Tony Creek, eliminating a man-made barrier and restoring three miles of winter steelhead, coho salmon, and resident trout spawning and rearing habitat; construction and installation of a water diversion fish screens, eliminating direct fish mortality; fencing one-half mile of riparian, allowing recovery from livestock. Riparian fencing will enhance water quality, stabilize streambanks, and reduce sediment in Neal Creek and in the mainstem Hood River. In addition, this project will include 50% cost share funding with the Hood River Soil and Water Conservation District for a habitat coordinator on the Hood River. Landowners have agreed to participate and will except operation and maintenance costs upon completion of the projects. Success of individual projects will be evaluated with the existing CTWS M&E program (project 88-053-03) and reported annually in project reports submitted to BPA. The Hood River Production Program (HRPP) is a fish supplementation project in the lower Columbia Basin funded by BPA and jointly implemented by the CTWS and ODFW. The primary goals of the HRPP are to (1) re-establish naturally sustaining spring chinook salmon using Deschutes stock in the Hood River subbasin, (2) rebuild naturally sustaining runs of summer and winter steelhead in the Hood River, (3) maintain genetic characteristics of the population, and (4) contribute to tribal and non-tribal fisheries, ocean fisheries, and the Northwest Power Planning Council's (NPPC) goal of doubling salmon runs in the Columbia Basin. In Section 7 of the 1994 version of the Columbia River Basin Fish and Wildlife Program, the NPPC recommended that implementation of production and habitat actions be fully coordinated (NPPC 1994). In addition, an EIS was completed in 1996 for the HRPP. A record of decision was signed supporting the importance and need of habitat improvements (DOE and BPA 1996).

**NPPC Measure:** 7.4L.1, 7.4L.2, 7.4N.1, 7.4N.2, 7.6A (All), 7.6B (All), 7.6C.1, 7.6C.2, 7.6C.5, 7.6D, 7.7A.1, 7.8A (All), 7.8D.1, 7.8F.2, 7.8G.1, 7.10A.2, 7.10A.5, 7.10A.7, 7.10K.1

**Partners:**

Hood River Watershed Group, Oregon Department of Fish and Wildlife, and U.S. Forest Service

8805303

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## Hood River Production Program (HRPP)

Subregion: Lower Mid-Columbia

Subbasin: Hood

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**Sponsor:** Michael Lambert, CTWS, 541-296-6866

**Target stocks:**

spring chinook salmon, summer and winter steelhead

**Description:**

The HRPP is a fish supplementation project in the lower Columbia Basin funded by BPA and jointly implemented by the CTWS and the ODFW (Project #88-053-04). The goal of the HRPP is to restore summer and winter steelhead populations and reestablish spring chinook salmon using supplementation techniques in accordance with the Hood River Production Master Plan (1991). In February, 1991, the NPPC separated the Hood River portion of the NEOH and linked it with the Pelton Ladder Project. This was because: (1) the Pelton Ladder Master Plan identified the Hood River subbasin as a destination for spring chinook salmon smolts produced by the Pelton Ladder Project (Smith 1991), and (2) the Hood River Production Master Plan identified a need for the spring chinook salmon production (O'Toole 1991). The NPPC approved the Hood River and Pelton Ladder Master Plans in 1992. In accepting the Hood River Production Master Plan, the NPPC recommended a three-phased approach which included collecting baseline information, project implementation and facilities construction, and follow-up monitoring and evaluation studies. Comprehensive collection of data began in December, 1991, including information on the natural production, smolt to adult survival, escapement, harvest, life history, and several morphological and meristic parameters needed to characterize wild and hatchery anadromous salmonid stocks and resident trout (CTWS and ODFW 1997). Information collected by the HRPP was used to prepare an environmental impact statement evaluating the program's impact on the human environment (DOE and BPA 1996). Studies for Pelton Ladder to evaluate the effect of the new cells on the existing production were implemented in 1996. Information collected by this M&E project will be used to (1) determine the current status of indigenous populations of resident and anadromous salmonids, (2) identify measures that will minimize any potentially detrimental impacts the HRPP could have on indigenous populations of resident trout and anadromous salmonids, and (3) develop and fine tune management guidelines that will optimize the benefits associated with the HRPP.

**NPPC Measure:** 7.4L.1, 7.4L.2, 7.4N.1, 7.4N.2

**Partners:**

Oregon Department of Fish and Wildlife

8805304

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**Monitor Actions Implemented Under the Hood River Production Program.**

Subregion: Lower Mid-Columbia

Subbasin: Hood

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**Sponsor:** Erik Olsen, ODFW, 541-296-8045

**Target stocks:**

Not provided

**Description:**

A monitoring and evaluation (M&E) project was implemented in December 1991 to collect life history and production information on stocks of anadromous salmonids returning to the Hood River subbasin. This information is being used to evaluate various activities of the Hood River Production Program (HRPP) and to develop management guidelines that will minimize the HRPP's impact on indigenous populations of fish. ODFW funded the project until July 1992, after which time funding was provided by the BPA (Project #88-053-04). Jack and adult escapements and selected jack and adult life history patterns, and meristic and morphometric characteristics, have been estimated for six complete run years of winter steelhead, spring and fall chinook salmon, and coho salmon and five complete run years of summer steelhead. Subbasin jack and adult anadromous salmonid harvest and exploitation rates have been estimated for two calendar years. Rainbow-steelhead rearing densities, mean fork length, mean weight, and condition factor have been estimated for four years in selected reaches of stream located throughout the Hood River subbasin. Estimates of subbasin steelhead smolt production and data on selected types of steelhead smolt life history, meristic, and morphometric characteristics, has been collected for four years. Estimates of in-basin hatchery summer and winter steelhead smolt mortality have also been estimated for four years. Information collected by this project has been used to 1) determine the current status of indigenous populations of resident and anadromous salmonids, 2) identify measures that will minimize any potentially detrimental impacts the HRPP could have on indigenous populations of resident trout and anadromous salmonids, and 3) develop and fine tune management guidelines that will optimize the benefits associated with the HRPP.

**NPPC Measure:** 7.4L.1, 7.4L.2, 7.4N.1, 7.4N.2

**Partners:**

Not provided

8902900

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## Hood River Production Program - Pelton Ladder - Hatchery

Subregion: Lower Mid-Columbia

Subbasin: Hood

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**Sponsor:** Trent W. Stickell, ODFW, 503-872-5252

**Target stocks:**

Deschutes river Stock spring salmon

**Description:**

The purpose of the expansion of propagation in Pelton Ladder is to contribute, in a low cost manner, to the spring chinook salmon production goal outlined in the Deschutes River and Hood River subbasin plans and to the Council's system-wide goal of substantially increasing salmon runs to the Columbia River Basin. Studies will be conducted comparing the following: (1) Pelton Ladder vs. Round Butte Hatchery reared spring chinook; (2) spring chinook reared in the old cells of Pelton Ladder vs. the new cells of Pelton Ladder; (3) survival of 8 fish per pound spring chinook smolts vs. 12 fish per pound at release from both Pelton ladder and the hatchery. All experimental groups will be coded-wire tagged and reared under as identical conditions as possible. A total of 454,000 spring chinook smolts are used in this study annually. Products of the project will contribute to: 1) re-establishment of spring chinook populations in the Hood River Basin; 2) evaluating critical uncertainties about re-establishing anadromous fisheries in the Hood River Basin; and, 3) the evaluation of new rearing methods that may have implications for production in the Collumbia River Basin.

**NPPC Measure:** Measure 703 (f)(5) of the Northwest Power Planning Council's (NPPC) 1987 Fish and Wildlife Program recommended BPA investigate the feasibility of developing artificial production facilities for chinook salmon and steelhead in the Hood River.

**Partners:**

Portland General Electric (PGE) along with non-financial supporters represented by the Oregon Department of Fish and Wildlife (ODFW), Confederated Tribes of the Warm Springs Reservation, (CTWSRO), Washington Department of Fish and Wildlife, (WDFW), National Marine Fisheries Service (NMFS), Bureau of Reclamation (BoR), Pacific States Marine Fisheries Commission (PSMFC), Fish Passage Center (FPC), Hood River Soil and Water Conservation District, Hood River Watershed Group, Farmers Irrigation District, Columbia Gorge Fly Fishers, Hood River Rotary Club, Parkdale Lions Club, Hood River County Parks and Forestry Department, Columbia Gorge Commission, Columbia Gorge Scenic Area-USDA Forest Service, and the Northwest Power Planning Council (NPPC).

9301900

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**Hood River Production Program - Oak Springs, Powerdale, Parkdale  
O&M**

Subregion: Lower Mid-Columbia

Subbasin: Hood

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**Sponsor:** Michael D. Jennings, CTWS/ODFW, 541-296-6866

**Target stocks:**  
Not provided

**Description:**

The goal of HRPP is to restore summer and winter steelhead trout populations and reestablish spring chinook using supplementation techniques in the Hood River subbasin in accordance with the Hood River Production Master Plan of July, 1991. Project objectives include a phased-in level of production that will eventually produce 150,000 summer steelhead, 85,000 winter steelhead and 250,000 spring chinook smolts. Supplementation of steelhead utilizes hatchery reared smolts derived from wild stocks of the respective races. Reintroduction of spring chinook will be achieved through use of Deschutes stock which are from an adjacent subbasin and likely to be best suited to habitat conditions found in the Hood River subbasin. The techniques of supplementation will allow increased spawner escapement and distribution of adults which should result in increased numbers of naturally produced juveniles to emigrate from the system. Ongoing and planned habitat restoration activities will result in improved egg to smolt survival. Cooperation with other entities has resulted in improved upstream and downstream fish passage. Some of the stock recovery/restoration measures implemented in this project include: restricting passage of out-of-basin and excess hatchery adults at Powerdale Dam (Rm 4), use of Hood River broodstock, matrix spawning, acclimation and volitional releases.

The ultimate measure of project success will be the achievement of adult return goals found in the Hood River Master Plan. ODFW and CTWS M&E projects on Hood River have gathered five years of baseline information and will be used to evaluate project implementation.

**NPPC Measure:** Not provided

**Partners:**  
Not provided

9500700

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**Hood River Production Program - PGE: O&M**

Subregion: Lower Mid-Columbia

Subbasin: Hood

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**Sponsor:** Gary Hackett, PGE, 503-464-8005

**Target stocks:**

Not provided

**Description:**

Hood River Production Program - Hatchery O&M

This cost sharing contract pays for the use, repair, and upgrades, as needed, of existing hatchery and extended rearing facilities at the Pelton Hydro-electric Project. These facilities are owned by PGE. ODFW was contracted by PGE to operate the original hatchery and ladder facilities to meet the mitigation assigned to the construction and operation of the Pelton Hydro-electric Project.

The cost to BPA of using these facilities to meet its mitigation responsibilities, as determined by the Fish and Wildlife Plan of NPPC, is based on the relative percentage of fish reared at the hatchery and in extended rearing cells in Pelton Ladder for BPA. Approximately 25 percent of the fish reared at the hatchery and 50 percent of the fish reared in the ladder are to BPA mitigation requirements. Thus, BPA reimburses PGE 25 percent and 50 percent of the O&M hatchery and ladder costs, respectively. The costs of any facility upgrades are reimbursed in a similar manner depending on the location of the upgrades (Hatchery or Ladder). BPA also reimburses PGE 25 percent of the costs of maintaining the living facilities occupied by ODFW hatchery staff and 25 percent of the rental and fuel of vehicles used by ODFW staff in the conduct of the rearing fish for BPA and PGE.

The expected results are the continued production of about 220K age 1 plus spring chinook that are released annually into the Deschutes (95K) and Hood River (125K) systems.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9087

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**Acquire 1860 Fifteenmile Cr Irrigation Water Right and Convert to Instream**

Subregion: Lower Mid-Columbia

Subbasin: Fifteenmile

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**Sponsor:** Leslie Bach, OWT, 503-226-9055

**Target stocks:**  
Winter Steelhead

**Description:**

Fifteenmile Creek supports the eastern-most run of wild winter steelhead, and a population of pacific lamprey. Past land use practices have resulted in habitat and water quality degradation. A major limiting factor for fish production and survival is severe low flow conditions due to irrigation withdrawal. The goal of this project is to increase production and survival of wild winter steelhead and pacific lamprey by increasing instream flows and improving habitat and water quality conditions. Specific objectives include purchasing an 1860 irrigation water right and transferring it to instream use, monitoring and protecting the instream right to prevent removal by junior appropriators, and outreach to other senior water right holders to identify additional acquisition opportunities. Acquiring instream water rights on a willing buyer, willing seller basis, and converting those rights to instream water rights meets the goals and objectives of the NPPC Fish and Wildlife Program measures 7.6D, 7.8G1 and 7.8G2. This project is also consistent with a number of assessment and restoration plans for Fifteenmile Creek, and compliments a collaborative restoration effort by ODFW, CTWSRO, USFS and the Wasco County SWCD that is funded by BPA. OWT will use the 1987 Instream Water Right Law to legally transfer the irrigation right to an instream right. Steps include finalizing the purchase agreement, obtaining a transfer map from a Certified Water Rights Examiner, and developing and submitting the transfer application to OWRD. OWT will work closely with the state watermaster to monitor the instream right and ensure protection relative to junior irrigation rights. This will include regular site visits and streamflow monitoring. OWT will also work with local agencies, organizations and the watershed council to develop a monitoring strategy for evaluating the ecological benefits of the instream flow. The instream water right transfer will be completed by the 1999 irrigation season. The increased instream flow will provide immediate benefit to fish habitat and water quality, and will provide a minimum flow to build on in the long-term.

**NPPC Measure:** 7.6D, 7.8G1, 7.8G2

**Partners:**  
Not provided

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**Evaluate Effects of Habitat Work Conducted in Fifteenmile Creek**

Subregion: Lower Mid-Columbia

Subbasin: Fifteenmile

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**Sponsor:** Erik Olsen, ODFW, 541-296-8045

**Target stocks:**

Not provided

**Description:**

This project proposes estimating wild winter steelhead smolt production and obtaining selected types of life history, meristic, and morphometric characteristics for the Fifteenmile Creek subbasin. A mark and recapture program will be implemented at a downstream migrant screw trap to estimate subbasin wild winter steelhead smolt production. The relative abundance and selected life history information of pacific lamprey and other nonsalmonid fishes from the Fifteenmile Creek subbasin will be collected at the downstream migrant trap. Information collected by this project will be used to 1) determine the current status of fishes endemic to the Fifteenmile Creek subbasin 2) monitor trends in abundance of the endemic fishes 3) monitor the watershed health.

**NPPC Measure:** 3.1B,3.2,3.3D.1

**Partners:**

Not provided

9304000

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## Fifteenmile Creek Habitat Restoration Project

Subregion: Lower Mid-Columbia

Subbasin: Fifteenmile

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**Sponsor:** Raymond E. Hartlerode, ODFW, 541-296-8026

**Target stocks:**

Wild Winter Steelhead, Pacific Lamprey

**Description:**

The Fifteenmile Creek Habitat Improvement Project is an ongoing "on the ground" operation & maintenance project. With funding requested for FY 1999 the project intent is to maintain all habitat treatment measures installed in the Fifteenmile Basin to date. This will be accomplished by continuing to maintain the 100 plus miles riparian protection fences and the existing 900 fish habitat structures. This project will continue to address factors limiting production as long as it is given the needed funding to properly maintain it. Continue to provide technical assistance to local landowners and other agency personnel doing fish habitat restoration work in the Fifteenmile Creek Basin. We will attempt to leverage BPA funding to acquire additional funding from other granting sources to accomplish additional habitat restoration projects within the Fifteenmile Creek Basin.

We request BPA funding for this operation and maintenance project for three years. This will allow us to manage the project in a more effective manner.

The goal of the implementation phase was to provide improved fish habitat, increased habitat diversity, increased stream shading, reduced water temperatures, reduced sedimentation, provide for unobstructed fish passage, and screen all irrigation withdrawals. The goal of the project is to improve natural production of the eastern most run of wild winter steelhead in the Columbia River Basin. This is being accomplished in the Fifteenmile Creek Basin, under the Columbia River basin Fish and Wildlife program, Measures 7.6, 7.6A.1, 7.6B.1, 7.6B.2, 7.6B.3, 7.6B.4, 7.6C. This project operates under the assumption that the Fifteenmile Basin will never again be pristine because of human alterations to the ecosystem but, can still be very productive in terms of fish production. This can only happen if we continue to address the factors limiting production basin wide.

Cooperators in the habitat enhancement project include 70 private landowners, USFS, WCSWCD, NRCS, NMFS, and OWR. OWT, Confederated Tribes of Warm Springs Reservation of Oregon, USFWS, and the Fifteenmile Creek Watershed Council.

? Habitat improvements made under this project include:

? 100 miles riparian fencing constructed

? 45 miles of stream protected

? 900 fish habitat structures constructed

? 6 spring developments constructed

? 6 pump screens installed

? 2 rotary drum screens installed

? 3 fish passage projects constructed

Stream temperature data and photpoint documentation are being collected throughout the basin. In addition there was a FY 1998 proposal submitted to evaluate the effects of habitat work conducted in the Fifteenmile Creek Basin. Implementation of habitat treatment measures are expected to be completed in FY 1998, The operation and maintenance phase is expected to start in FY 1999 and continue through 2013.

**NPPC Measure:** 7.1, 7.1D.1, 7.6, 7.6A, 7.6A.2, 7.6B.1, 7.6B.2, 7.

**Partners:**

Partners in the habitat enhancement project include 70 private landowners, USFS, WCSWCD, NRCS, NMFS Oregon Department of Water Resources, Oregon Water Trust, Confederated Tribes of Warm Springs Reservation of Oregon, USFWS, and the Fifteenmile Creek Watershed Council.

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**Irrigation System Replacement Trout Cr. @ Willowdale II 1999 Funds**


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Subregion: Lower Mid-Columbia

Subbasin: Deschutes

**Sponsor:** Marie Horn, JCSWCD, 541-475-3144

**Target stocks:**

Steelhead, Redband Trout

**Description:**

The Trout Creek Watershed Council is developing a long range plan to reduce sedimentation, reduce temperature and increase water quantity and quality. This will be accomplished by riparian restoration/enhancement projects and working with private landowners/managers to improve livestock management and reduce the impacts on riparian vegetation.

Push-up dams will be consolidated by constructing cement diversions and/or infiltration sump/pump systems. The goals of projects in Trout Creek are to improve steelhead and redband trout habitat.

The improvements will be decreased sedimentation due to less disturbance in the stream by ridding push-up dams, improved water quantity and quality remaining in the stream, enhanced fish and wildlife habitat.

The project is expected to be completed in Fall 1999.

Landowners are developing or updating their Farm plans with NRCS. The Trout Creek Council, JCSWCD and Oregon Dept. of Fish and Wildlife along with private landowners/landmanagers will be responsible for monitoring and evaluating the project. Funds will be solicited for monitoring and data recording.

Similar projects have been completed in Cave Junction and John Day, Or. ODFW has played a major role in this construction , with matching funds and technical advice.

**NPPC Measure:** Section 7 7.6,7.7

**Partners:**

Trout Creek Watershed Council; Project Support.

Private Landowners; Labor, Project Support.

Jefferson County Soil and Water Conservation District; Administrative Support.

Natural Resources Conservation Service; Design, Technical Support.

Oregon Department of Fish and Wildlife; Technical Support.

US Forest Service; Council/Project Support.

Ochoco Lumber; Council/Project Support.

Woodward Companies; Council/Project Support.

Prairie Wood Products; Council/Project Support.

Bonneville Power Administration (1998 project); Watershed Support

OSU Extension Service; Education

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## Jefferson Co./Middle Deschutes Watershed Coordinator/Council Support 1999

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Subregion: Lower Mid-Columbia

Subbasin: Deschutes

**Sponsor:** Marie Horn, JCSWCD, 541-475-3144

**Target stocks:**

Steelhead, Redband Trout

**Description:**

The Middle Deschutes Watershed Coordinator will cover watersheds in Jefferson County. Our watersheds are located in the Deschutes Basin of Central Oregon. At this time we have two active Watershed Councils, Trout Creek & Willow Creek. The Coordinator will develop working relationship with the "Friends of the Metolius", who are an active group addressing concerns in the Metolius watershed. All results from coordinated projects will be shared and evaluated for use in other projects in the watersheds.

Willow Creek watershed covers approximately 117,000 acres. The primary use is agriculture, approximately 30% is forested. The Willow Creek watershed Council was formed in Early Spring of 1997 and formally recognized by Jefferson County Commissioners in May of 1997. The Council is made up of local landowners and land managers who have concerns in Willow Creek watershed. They meet regularly and are in the process of developing an assessment of needs funded by GWEB. The Council is also in the process of developing Goals, Objectives and priority Lists. The Watershed Coordinator is assisting Willow Creek Council with the development of Action Plans and a Work Plan. There are twelve landowner/landmanagers in Willow Creek willing to participate in coordinated efforts of making Willow Creek a fully functioning watershed.

Trout Creek watershed covers approximately 285,000 acres. It is partially located in three counties, Jefferson (145,460), Wasco (108,383) and Crook (31,357). Willow Creek consist primarily of rangeland and forest. Trout Creek Council meets monthly and is being assisted by the watershed Coordinator to develop Goals, Objectives, Priority Lists, Action Plans and a Work Plan. Trout Creek was funded by GWEB (\$20,000) for an assessment of needs and concerns, it was published in 1996. In Sept. 1997, Bureau of Reclamation funded (\$10,000) for an on-site evaluation of Trout Creek and this document is forth coming. Trout Creek has twenty landowner/landmanagers who are willing to cooperate to see Trout Creek is restored to a viable watershed.

Willow Creek & Trout Creek Watershed Councils are actively seeking funding for on-the-ground projects in both watersheds. Jefferson Co. SWCD will be the fiscal agent for the Coordinator and all related cost for the Councils.

The Coordinator was hired by JCSWCD in Sept. 1997 and has been working part-time and when funding is available will be utilizing more hours to assist Watershed Councils in developing Action Plans & Work Plans. The Coordinator will work with ODFW and other interested agencies to coordinate projects, so duplication will not occur and all projects will provide a continuity of restoration and enhancement projects.

**NPPC Measure:** Section 7 7.6,7.7

**Partners:**

Trout Creek Watershed Council; Council Support.

Willow Creek Watershed Council; Council Support.

Private Landowners; Labor, Council Support.

Jefferson County Soil and Water Conservation District; Administrative Support.

Natural Resources Conservation Service; Council Support.

Oregon Department of Fish and Wildlife; Council Support.

US Forest Service; Council Support.

Ochoco Lumber; Council Support.

Woodward Companies; Council Support.

Prairie Wood Products; Council Support.  
Bonneville Power Administration (1998 project); Watershed Support  
OSU Extension Service; Council Support.

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**Bakeoven Riparian Assessment**

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Subregion: Lower Mid-Columbia

Subbasin: Deschutes

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**Sponsor:** Ron Graves, WCSWCD, 541-296-6178

**Target stocks:**  
Summer Steelhead

**Description:**

a. FY99 PROPOSAL

b. Goals: Improve watershed health, improve water quality, restore degraded habitat and increase natural steelhead production.

Objectives: Develop detailed riparian restoration plans and associated monitoring plan.

Implement demonstration riparian exclosure fencing.

c. Project will set stage for implementing fish habitat improvement measures. It follows NWPPC policies and addresses many measures of the 1994 Fish and Wildlife Program.

d. This project initiates riparian work as the second phase of a comprehensive watershed treatment approach. Land treatment, fencing, livestock water developments, and management systems are being implemented now using other funding sources.

e. This project will construct 1.5 miles of riparian exclosure fencing as a demonstration project, and produce plans necessary to implement a three year riparian restoration effort aimed at boosting natural steelhead production in Bakeoven Creek from less than 200 returning adults to 600 conservatively.

f. Results will be documented and reviewed. Monitoring plan will be based on EPA monitoring protocols.

**NPPC Measure:** 7.6A1, 7.6A2, 7.6B1, 7.6B3, 7.6B4, 7.6B5, 7.6B6, 7.6C5, 7.6D

**Partners:**

Participating groups/organizations in this project include Wasco County SWCD, USDA NRCS, Private Landowners, Bakeoven Watershed Council, the Oregon Governor's Watershed Enhancement Board, ODFW, BLM, Oregon Trout, Wasco County Union High School.

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**Warm Springs Reservation 1999 Watershed Enhancement Project**

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Subregion: Lower Mid-Columbia

Subbasin: Deschutes

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**Sponsor:** Patty O'Toole, CTWSRO, 541-553-3233

**Target stocks:**

Not provided

**Description:**

The CTWSRO is proposing to implement BPA funded watershed enhancement activities on the reservation in conjunction with activities funded by CTWSRO and other entities. Objectives include restoration activities designed to reduce sediment input into the Warm Springs River and completing habitat inventories. BPA would fund approximately 85 percent of the project and the remaining 15 percent would be contributed by the CTWSRO, BIA, NRCS and others.

The project will benefit native populations of spring and summer/fall chinook salmon, summer steelhead, Pacific lamprey, rainbow trout, bull trout and other resident fish species in the Warm Springs River, Shitike Creek and Deschutes River watersheds. The Warm Springs River and Shitike Creek, support the only naturally spawning population of spring chinook salmon in the Deschutes River and one of the last truly wild populations in the region. No hatchery produced fish are allowed to spawn above the weir at river mile ten.

Road eradication and improvements and upland prescribed fire and seeding are proposed to treat watershed conditions that contribute significant sediment to the fish bearing Warm Springs River. Habitat inventories are proposed and data collected will be incorporated in tribal watershed assessment efforts such as the Ecosystem Diagnosis and Treatment process and the Cumulative Impact Analysis.

**NPPC Measure:** Measures: 7.6A.1., 7.6A.2, 7.6B.1, 7.6B.3, 7.6B.4

**Partners:**

Not provided

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**Trout Creek Habitat Restoration Project**

Subregion: Lower Mid-Columbia

Subbasin: Deschutes

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**Sponsor:** Ray Hartlerode , ODFW, 541-296-8026

**Target stocks:**

Not provided

**Description:**

A This project is an operating "on the ground" project that has accomplished instream and riparian habitat improvement. Livestock riparian exclosures on over 70 miles stream has benefited stream bank integrity and has contributed to increased riparian vegetation density, health, and vigor. Installation of several thousand instream structures within the Trout Creek basin has also served to decrease actively eroding streambanks and has contributed to increasing the instream habitat complexity. Both of these restoration components have served to address several of the limiting factors that are present in this system, but primarily high summer water temperatures and large amounts of fine sediment.

B With the funding requested for fiscal 1999 the project goals are to maintain and continue the ongoing riparian and instream habitat improvement to the Trout Creek watershed ultimately resulting in increased numbers of returning adult steelhead to the Trout Creek Basin. Utilizing the watershed approach achieving this goal will also benefit native resident redband trout and wildlife species that are dependent on riparian areas. This will be accomplished by: 1) continuing to maintain and repair the existing structures and fencing. 2) working with the interested parties in the basin to leverage BPA funds with other granting sources to accomplish additional watershed wide habitat enhancement projects. 3) An increased effort to monitor and regulate water usage in diversions and to monitor stream flows will be conducted by Water Resources, and 4) An enhanced presence of State Police to assist in the reduction of poaching on adult and juvenile steelhead.

C In the September 10, 1996 Return to the River document the hypothesis that, "Human alteration to the salmonid bearing ecosystem has contributed to the decline in salmon and steelhead." Was corroborated by, "Thoroughly established, generally accepted, good peer-reviewed empirical evidence". This project addresses that hypothesis. This project has sought to alleviate the human alterations, and addresses habitat restoration on a basin wide approach utilizing the results obtained from 1983 basin survey to guide efforts so that the greatest benefit will be realized. In the 1996 "Return to the River" the approach of Trout Creek project by attempting to restore habitat on a logically thought out, economically justifiable, basin wide scale is also regarded as, "Thoroughly established, generally accepted, good peer-reviewed empirical evidence".

Salmonid populations in this basin are naturally reproducing and hatchery stocking does not occur. In section 7.1 in the 1994 CBFWP the policy states, "To conserve, manage and rebuild the basin's remaining wild and naturally spawning populations, a policy giving such populations explicit priority is needed." This project addresses intent of this policy through basin wide habitat restoration. Additionally, restoration efforts of this project hope to attain what is desired in section 7.6 of the CBFWP which states that, ' restoring degraded habitat in areas where there are naturally reproducing salmonid populations it is necessary to increase the amount of fish surviving to reach smolt size.' Additional sections of the 1994 CBFWP plan that are being addressed by this project include: 7.7 cooperating with private landowners, and 7.8 Initiating actions where water quality standards are not met. Since this project is closely tied to the fish passage project section 7.10K.1 continued funding of fish screening and passage into historic habitat also applies. Also by restoring the riparian and instream habitat this project is also benefiting numerous wildlife species. It is believed that the riparian /stream side ecosystem is the single most productive type of wildlife habitat, benefiting the greatest number of species (Kauffman and Krueger, 1984)

D The approach to this project is based on the sound principal that if we can remove and or reduce some of the anthropogenetic factors to habitat degradation the habitat condition will improve and, consequently,

so will fish populations. The two methods that have been largely incorporated are installation of riparian cattle exclosure fencing, and installation of various instream structures. The purpose of these fencing exclosures includes; bank stabilization, reduced sediment input, increased habitat complexity, increased vegetation, shading, lower water temperatures, stabilizing head cuts, and increasing water storage capacity in meadows. The instream structures were installed to, increase bank stabilization, reduce sediment input, increase instream habitat complexity. One of the main reasons for the installation of several structures was to reduce bank erosion along agricultural fields. Scientifically it could be argued as to what and where structures were placed. However given the constraints both socially and politically no one can argue with the benefit that has occurred, and will continue to occur. Other factors that this project will attempt to gain a better understanding of is the amount and timing of water withdrawal. This will be done through various stream and diversion measurements. The project will attempt to establish an increased law enforcement presence to deter and reduce the amount and quantity of poaching that takes place on the limited number of adult and smolting steelhead. Additional, enforcement will center around the monitoring and prevention of environmental violations (i.e. fill and removal).

E The expected outcome is to reduce fine sediment input, increase riparian shading, reduce summer stream temperatures, improve instream habitat complexity, and increase late season flows. As a result of these measures it is expected that steelhead, resident redband trout and several wildlife species will increase in numbers. The time frame for the desired outcome for each habitat component is variable. Some areas of the project have already made marked improvement. But there are some areas both inside and outside the leased areas that will need either more time for recovery, or some additional type of restoration effort (this includes addressing problems in the uplands). Areas that are in need of recovery outside of the BPA riparian leased ground are being addressed via the Trout Creek Watershed Council (Asst. Project Leader is an active participant). Additional projects inside and outside the riparian leased areas will be identified as to causative factors and appropriate methods for habitat restoration techniques. Any potential funding sources will be investigated and cost sharing opportunities thoroughly explored.

F One of the frustrations on this project has been the historical lack of funding to implement monitoring and evaluation on the work that has been accomplished. There is scant baseline or post implementation data. In the past we have tried, to incorporate and request funding for monitoring and evaluation. Due to lack of funding we have been unable to generate the data we feel is necessary to adequately assess the various aspects of this project. Emphasis has now been placed on monitoring the results of BPA projects, and there is a real need to review the work that has been accomplished. For this fiscal year we will assess the results of the funding for the fifteenmile monitoring and evaluation proposal. If this type of project is funded, we will submit a similar type of monitoring and evaluation proposal. Similarly, if the fifteenmile project is rejected we will evaluate the aspects that were not up to snuff, and develop a different monitoring and evaluation project. ODFW strongly supports the concept of assessing the project and learning what has been accomplished and what need to be reassessed. This is vital in the efficient allocation of limited resources to hasten the recovery of native salmonid stocks.

**NPPC Measure:** 7.1, 7.1D, 7.1D.1, 7.1D.2, 7.6, 7.6A, 7.6A.2, 7.6B

**Partners:**

Not provided

9405400

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**Bull Trout Genetics, Habitat Needs, L.H. Etc. in Central and N.E. Oregon**

Subregion: Lower Mid-Columbia

Subbasin: Deschutes, John Day, Grande Ronde, Umatilla...

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**Sponsor:** David V. Buchanan, ODFW, 541-757-4263

**Target stocks:**  
bull trout

**Description:**

The goal of the project is to provide scientific information that will help develop a protection and recovery plan for weak stocks of native bull trout in Oregon's proportion of the Columbia Basin. The factors addressed in the study; status, habitat needs, genetics, life history characteristics, interactions with exotic species and other limiting factors have been identified by many authors as key factors in the survival and recovery of bull trout populations (Howell and Buchanan, 1992; Rieman and McIntyre, 1993; Kostow, 1995; Buchanan et al. 1997). From these considerations we have derived specific objectives and tasks.

1. Determine genetic characteristics of bull trout populations.
2. Determine distribution of juvenile and adult bull trout and associated habitats.
3. Determine relationships between stream temperature and bull trout distribution.
4. Determine fluvial and resident life history patterns in the upper John Day subbasin.
5. Characterize interactions between bull trout and introduced brook trout.
6. Establish guidelines to monitor abundance of bull trout populations using spawning surveys.

Each of these objectives are addressed using established techniques including DNA analysis, systematic sampling of streams, habitat surveys, spawning surveys, radio tagging, and trapping. Data are summarized and statistical analysis performed to test specific hypothesis. The project is planned through 2001. We will have addressed all objectives by this time and provide guidance to fisheries managers on these subjects. The results of our research will be presented in the form of annual reports; presentations at professional meetings and publications in peer-reviewed journals. This project has already produced a final report on nuclear DNA analysis of Oregon's bull trout and a statewide bull trout status report of Oregon's historical and current distribution patterns. Preliminary movement studies found that some bull trout radio-tagged in the upper Wenaha River system spawned, then migrated downstream through the Grande Ronde River into the Snake River.

**Relation to MYIP:**

This project explicitly addresses objectives and strategies for native resident fish populations in subbasin tributaries of the Lower Mid-Columbia, Lower Snake, and Upper Snake subregions (Sections 6.6.2.2.A, 6.6.5.2.A, and 6.6.6.2.A).

**NPPC Measure:** 10.5A.2

**Relation to NPPC:**

This project is explicitly identified in this bull trout mitigation measure which states "fund a study of the status, life history, habitat needs, and limiting factors for bull trout populations in the Deschutes, Grand Ronde, Hood, John Day and Umatilla subbasins."

**Partners:**

Project is coordinated through bull trout working groups for each basin or subbasin involving the Oregon Department of Fish and Wildlife, U.S. Forest Service, Portland General Electric, Bonneville Power Administration, and the Warm Springs and Umatilla tribes. Project is implemented by the Oregon Department of Fish and Wildlife, the Confederated Tribes of the Warm Springs Reservation, and the US Forest Service..

9705910

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## Securing Wildlife Mitigation Sites-Oregon, Trout Creek Canyon

Subregion: Lower Mid-Columbia

Subbasin: Deschutes

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 1,000-1,500

**Acres:** 3020

**Hydroproject:** The Dalles

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

This project would protect approximately 3,020 acres of riparian wetland, grassland, shrub-steppe, and rocky cliff habitat in the Trout Creek Canyon area through acquisition and enhancement of private property. Trout Creek, a major steelhead-spawning tributary of the Deschutes River, flows through the property for 2.5 miles. Part of the property is irrigated; wild barley, dry-land wheat, and some alfalfa are cultivated. The current landowner has not grazed the property since 1994 and much of the riparian zone is currently fenced. The riparian habitat found on this site represents some of the most highly impacted habitat types by The Dalles Dam. The tree species include white alder, cottonwood, and birch. Project planning and negotiations with landowners are occurring during FY 1998. An option to buy is possible during this time. Currently, the Trout Creek watershed is degraded through the grazing of livestock in riparian areas and wetlands and excessive water-right allocation. In addition, uplands in some areas are grazed extensively. An on-going anadromous fish project has protected one-half of the stream miles in the basin. However, the limiting factor in the basin appears to be availability of water to fish and other wildlife. The proposed acquisition would not only secure terrestrial mitigation habitats but also a substantial senior water right in the lowest part of the basin. The senior water right in the lowest portion of the basin ensures in-stream flows through the basin above the subject property. The Oregon Water Trust would be approached to develop an in-stream water right. Other restoration activities of this property would entail the continued management of grazing practices which has altered the grassland, shrub/steppe, and riparian habitats. Existing agricultural practices would also be altered. Restoration of wetlands would likely include revitalization of stream channels and riparian vegetation planting where natural regeneration is not occurring due to severe degradation. Habitat enhancements of uplands would include some control of exotic weedy species and suppression of western juniper where determined appropriate by the management plan. Adjacent to the property is land owned and managed by the Bureau of Land Management (BLM) Prineville District. Management plans for the acquired lands will be developed in concert with the federal properties in an attempt at providing a well managed large contiguous tract of native habitat. Partnerships would occur with the BLM, Confederated Tribes of the Warm Springs Reservation in Oregon, private landowners, Trout Creek Watershed Council, The Nature Conservancy, Mukle Deer Foundation, Quail Unlimited, National Wild Turkey Foundation, and Oregon's Hunter's Association. All mitigation target species for The Dalles Dam are found on the site including western meadowlark, shorebirds, waterfowl, mule deer, and mink. Other sensitive species of interest include ferruginous hawk, Swainson's hawk, burrowing owl, Merriam's shrew, and white-tailed jackrabbit. Expected mitigation gains through the protection and enhancement of the site are 1,000 - 1,500 HUs and would be applied to BPA's habitat debt at The Dalles Dam and Reservoir.

[The original project proposal was for the acquisition of a 3,000-acre parcel. The property of interest is actually 3,020 acres. Additional information has been provided on current management practices. Additional project cooperators are also listed.]

9705913

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**Securing Wildlife Mitigation Sites-Oregon, South Fork Crooked River**

Subregion: Lower Mid-Columbia

Subbasin: Deschutes

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 800-1,000

**Acres:** 2,000

**Hydroproject:** The Dalles

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

During the FY 1998 project period, the potential enhancement property is being considered as a candidate for a conservation easement. If an easement is not determined to be desirable or possible, a cooperative management plan is very likely. Enhancement activities would begin once the management goals and objectives are fully developed in a management plan. The proposed conservation easement would restore approximately 2,000 acres of alkaline wetlands, shrub-steppe, grassland, riparian wetland, and salt desert scrub habitat on the South Fork Crooked River in Oregon. The 2,000-acre site, which encompasses the headwaters of the South Fork Crooked River, is part of a 185,000-acre privately owned ranch. Some of the most threatened vegetation species occur on the site and in the ecoregion, including black greasewood and Great Basin wildrye grass. Restoration of the 2,000-acre site would entail the removal and/or management of grazing and agricultural practices which are presently altering the wetland and scrub habitats on the site. Some noxious weed control may occur. A cost/benefit analysis of fencing and providing alternative water sources will be conducted. The habitat types found on this piece of property are remnants of what were once occurrences throughout the Columbia Basin (formerly Columbia Plateau) and High Lava Plains ecoregions (formerly Columbia Plateau). Like most habitats historically common in the ecoregion, those listed above have been lost to development of hydro-electric facilities and the resultant agricultural developments. The adjacent land surrounding the ranch is owned and managed by the Bureau of Land Management (BLM), Prineville District. The federal land are designated as Wilderness Study Areas (WSAs). The adjacent WSAs are the two largest of such sites found in central Oregon. Management plans for the enhanced lands would be developed in concert with the federal properties in an attempt at providing a well managed large contiguous tract of native habitat. Partnerships would occur with the BLM, private landowner, Confederated Tribes of Warm Springs in Oregon, and The Nature Conservancy. Mitigation target species that would benefit from enhancement activities include waterfowl, shorebirds, mule deer, sage grouse, and western meadowlark. Other species of interest that would benefit from the project include western burrowing owl, ferruginous hawk, and Swainson's hawk. Expected HEP mitigation gains are 800 - 1,000 HUs and would be applied to BPA's habitat debt at The Dalles Dam.

[It is clarified that the 2,000-acre easement site is part of a 185,000-acre privately owned ranch and encompasses the headwaters of the South Fork Crooked River. There are no other changes to the original project proposal.]

9012

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## Mitigate Effects of Runoff & Erosion on Salmonid Habitat in Pine Hollow

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Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Jeff Hopkins-Clark, SSWCD, 541-565-3216

**Target stocks:**

Not provided

**Description:**

Pine Hollow Watershed provides twenty miles of potential steelhead habitat which has been degraded by high peak flows, low summer water levels, and high peak temperatures. Riparian soil and vegetation have been removed in certain places by flood events and by maintenance activities on a natural gas pipeline through the lower six miles of the canyon. The goal of this project is to encourage the recovery of the stream by slowing runoff during the peak flow events, allowing the slow, safe release of water during the summer and further allowing buildup of sediment and riparian vegetation. After this has been achieved, the project would actively plant woody riparian species in critical areas. These actions would improve spawning and rearing habitat by increasing flow during critical months, reducing damage to riparian vegetation, reducing summer water temperatures, and allowing recovery of channel morphology. Deer, elk, and upland birds would also benefit by enhanced water sources in the uplands. Specific projects include development of grazing management plans, riparian pastures, exclosures, cross fencing, water/sediment control structures, and native grass and tree plantings. The method emphasizes the top-down approach to watershed recovery – begin at the ridge top, and work toward the stream. This method has repeatedly been shown to be the most cost effective. Upland work will be completed by 2001, and active riparian plantings completed by 2004. Monitoring would consist of spawning surveys, continuous temperature readings, photopoints, and physical stream surveys. This would continue for ten years past the end of the last implementation phase.

**NPPC Measure:** 2.2A, 3.3D, 4.1A, 7.0B.1, 7.1A.1, 7.1B, 7.1C.2-3, 7.1D, 7.6, 7.6A, 7.6B.1, 7.6B.3, 7.6B.4, 7.6B.6, 7.6C, 7.6D, 7.7, 7.8A, 7.8B, 7.8D, 7.8H, 7.8J, 10.2B, 11.1, 11.2D, 11.2E

**Partners:**

Not provided

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**Eliminate Gravel Push-Up Dams on Lower North Fork John Day**

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Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Robert Stubblefield, NFJDWC, 541-934-2141

**Target stocks:**

Spring Chinook Salmon, Summer Steelhead, Resident Redband Trout.

**Description:**

The goal of this project is the elimination of gravel push-up dams on the lower North Fork John Day over the next four years. Elimination of push-up dams will remove impediments to anadromous (Spring Chinook salmon, Summer Steelhead trout) fish migration, improve water quality and habitat for both anadromous and resident fish, reduce sediment load from construction and washouts, and shrink surface area of water during annual periods of highest temperatures and solar radiation. Installation of infiltration galleries in other subbasins of the John Day has been successful both scientifically and aesthetically. Water quality will be monitored throughout each phase of the project with turbidity and temperature as the primary criteria. Landowner participation and satisfaction is also a primary criterion for success of the project. The North Fork John Day Watershed Council will begin eliciting landowner participation and support in January of 1998 with the goal of removing four push-up dams from the Wall Creek--Kimberly reach annually through 2001. Monitoring of water quality and landowner satisfaction will continue through December of 2001.

**NPPC Measure:** 5.4d.8, 7.8h.2, 7.10, 10.2c.2

**Partners:**

Monument SWCD, ODFW, NRCS, Confederated Tribes of the Warm Springs (John Day Basin Office), Monument High School.

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**John Day Watershed Restoration**

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Patty O'Toole, CTWSRO, 541-553-3233

**Target stocks:**

Not provided

**Description:**

The project objectives are intended to increase in-season river flows through a combination of irrigation efficiency measures, reduce bank instability, sedimentation, and bedload movement thereby improving water quality, reducing or eliminating migratory delays from passage impediments, improve riparian condition and implement an annual monitoring program. Forty-seven percent of costs will come from sources other than BPA.

This project responds to and is consistent with tribal, state and federal goals and objectives within the regions plans and programs. Previous projects of this type have demonstrated success in addressing limiting factors identified for aquatic resource production in the basin. They follow a comprehensive assessment of the watershed and a detailed stream restoration plan. The benefits are to an entirely wild stock and habitat.

The projects utilize standard design criteria, and were selected using an interagency evaluation and prioritization process. The effects of project implementation scenarios on river flows and stream temperatures were analyzed through studies of the basin hydrology. Hydrologic and temperature models were prepared for the mainstem to assist in the evaluation. The effects of individual projects were also assessed for impacts on stream flow, temperature, sediment, and other resources.

These projects will be incorporated into the annual monitoring plan and follow standard methods for the examination of water and water quality. Channel and riparian surveys will follow standard methods of assessment.

In addition to the on-the-ground objectives, the long term restoration needs of the basin will be addressed. Planning will include developing a trust fund based on the restoration needs of the basin.

**NPPC Measure:** 5.4D.8, 7.8H.2, 7.8G.2, 7.10, 10.2.C, 7.8.2

**Partners:**

Not provided

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**Acquisition of Pine Creek Ranch**

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Terry Luther, CTWSRO, 541-553-3233

**Target stocks:**  
Not provided

**Description:**

The CTWSRO is proposing to acquire the Pine Creek Ranch, thus allowing management of the entire Pine Creek watershed. Objectives would include: removal of livestock from damaged riparian and upland areas, fencing, noxious weed control and burning to remove juniper. BPA watershed funds in conjunction with BPA wildlife funds would be used for purchase and future out year funding.

The project will benefit a rich and diverse group of fish, wildlife, and plant species. Pine Creek watershed supplies habitats for at least 36 animal and plant species that are listed as sensitive, threatened or endangered. Pine Creek provides spawning and rearing habitat for one of the few remaining native steelhead populations in the lower John Day River basin. The property also provides important wintering habitat for deer and elk. Nine of the target wildlife species identified in conjunction with the John Day project are present at Pine Creek. There is the potential to reintroduce several native wildlife species.

Currently streams in the project area suffer from grazing impacts. Removal of livestock will allow the stream and riparian areas to stabilize over time. Upland enhancement activities will include noxious weed control on some farmed tracts and juniper removal through burning.

Previous enhancement activities by GWEB indicates the watershed responds well to treatment. In the future “passive restoration” will be the direction used to manage this watershed. Since there is a wealth of baseline information on this project, some going back as far as 45 years, monitoring and evaluation should be easily accomplished.

**NPPC Measure:** 7.6.A, 7.6.B, 7.6.C, 11.3.A, 11.3D

**Partners:**  
Not provided

9144

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## Monitor Natural Escapement & Productivity of John Day Basin Spring Chinook

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Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Richard W. Carmichael, ODFW, 541-962-3777

**Target stocks:**  
spring chinook

**Description:**

The John Day sub-basin supports one of the healthiest populations of spring chinook in the Mid-Columbia River Basin. The study of life history and natural escapement conducted from 1978 to 1984 (Lindsay, et. al. 1986) provided valuable information on production and productivity of John Day spring chinook. With the exception of two years since completion of the study in 1984 (1989 and 1995) spring chinook spawning surveys were conducted in index areas only and have not provided adequate information to assess age-structure, progeny-to-parent production values, and estimate natural spawning escapement. The PATH Project has identified the John Day basin spring chinook population as an index population for assessing the effects of alternative future management actions on salmon stocks in the Columbia Basin. We believe the John Day spring chinook are the most important lower river index stock and the PATH Project will rely heavily on data from this population in the future. To meet the data needs as an index stock, sufficient annual estimates of spawner escapement, age-structure, and smolt-to-adult survival are essential. There is a need to determine the annual spawner escapement and age structure for the John Day Basin spring chinook to provide us the ability to estimate progeny-to-parent production for each broodyear. This need can be met by expanding the annual chinook spawning surveys, estimating annual escapement, determining age composition by scale analyses, and PIT tagging naturally produced smolts in the John Day Basin.

**NPPC Measure:** 4.3C “Population Monitoring” and 7.1C “Collection of population status, life history and other data on wild and natural spawning populations.”

**Partners:**  
Not provided

## 8402100

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### Protect and Enhance John Day River Fish Habitat

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Jeff Neal, ODFW, 541-575-0561

**Target stocks:**

Spring Chinook Salmon, Summer Steelhead, Bull Trout

**Description:**

This program provides long term protection, maintenance and restoration of fish habitat on private lands in the John Day sub basin through landowner agreements, fencing, instream structures, riparian plantings, critical stream bank stabilization and passage structures. Program provides coordination of activities to implement new projects, repair damaged and aging fences and habitat structures, monitor and report results, administrate and market the program, serve as a resource for landowners and watershed councils to operate effective riparian/watershed projects and to coordinate with other agencies. All work performed contributes to the 1994 Columbia Basin Fish and Wildlife Program (FWP) goal of improving spawning and rearing habitat to increase overall fish runs in the Columbia River.

**NPPC Measure:** 7.6, 7.7, 7.8, 7.10

**Partners:**

Grant County Soil and Water Conservation District  
Umatilla National Forest

**9303800**

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**North Fork John Day Area Riparian Fencing**

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** John Sanchez, USFS, 541-278-3819

**Target stocks:**

Not provided

**Description:**

The North Fork John Day seasonal electric fence project is critical to riparian recovery on streams throughout the North Fork John Day watershed that are impacted by livestock grazing. The project has multiple benefits including water quality, floodplain restoration, wildlife habitat, streambank recovery, and fish habitat restoration. Since 1993, about 76 miles of seasonal electric livestock enclosure fence has been constructed to protect and restore approximately 60 miles of riparian habitat. Monitoring results indicate that the fences were 98 percent effective in excluding livestock.

**NPPC Measure:** 7.6B.5

**Partners:**

Not provided

9306600

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**Oregon Fish Screening Project FY99 Proposal**

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Roy Elicker, ODFW, 503-872-5252

**Target stocks:**

Not provided

**Description:**

This project provides immediate and long term protection for anadromous and resident fish species in Oregon Water Basins 5,6&7 by the installation or replacement of fish protection and passage devices on private irrigation diversions. It directly follows the 1994 Columbia Basin Fish and Wildlife Program Measure 7.10-Provide Passage and Protective Screens on Tributaries, particularly measures 7.10A.2 and A.3, which mandate:

- a. Screening and passage criteria based on NMFS standards;
- b. The use of existing expertise of federal, state, and private entities to accelerate implementation of fish screening and passage measures; and,
- c. The maintainance of a prioritized list of tributary screening and passage facility improvements – which will include both the construction of new facilities, and the upgrading and maintenance of existing facilities. The expected outcome over the next ten (10) years will include the construction and/or replacement of 450 individual fish screening and passage devices or projects. Select individual fish screening and passage projects will be monitored and evaluated on an annual basis.

**NPPC Measure:** Measures 7.10, 7.10A.2, 7.10A.3.

**Partners:**

Not provided

**9605300**

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**North Fork John Day River Dredge Tailings Restoration**

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** John Sanchez, USFS/CTUIR, 541-278-3819

**Target stocks:**

Not provided

**Description:**

Gold miners in the late 1930's through the early 1950's operated a dragline dredge on the North Fork John Day River and its tributaries, essentially turning the river upside down and leaving the river bottom in piles near the bank. This left behind thousands of cone-shaped piles of river rock and a degraded floodplain. This project is the continuation of a multi-year project to restore the floodplain by re-depositing the tailings allowing the river to flow over portions of the floodplain previously unavailable. Channel complexity and fish habitat quality and quantity will increase as the river reclaims its floodplain, dissipating the energy of high flow events and depositing sediment that promotes riparian vegetation growth.

The strategy for monitoring and evaluating the project results will continue to be through suspended sediment samples, macro-invertebrate sampling, photo point, and stream cross-section profiles.

**NPPC Measure:** 7.6B.5

**Partners:**

Not provided

9703400

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**Monitor Fine Sediment and Overwinter Sedimentation in John Day & Gr Ronde**

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Jon Rhodes, CRITFC, 503-731-1307

**Target stocks:**

Not provided

**Description:**

For five years, the proposed project will annually measure surface fine sediment and overwinter sedimentation of fine sediment in salmon spawning habitat during the incubation period in portions of the Grande Ronde and John Day Rivers in sites constructed to mimic salmon redds. Objectives are to: a) determine temporal trends in surface fine sediment and relation to substrate goals of CRITFC (1995) and NMFS (1995); b) determine magnitude and temporal trends over five years in overwinter sedimentation and relationship to NPPC (1994) substrate goals; c) estimate effect of overwinter sedimentation on salmon survival using existing information; d) investigate relationship between overwinter sedimentation and surface fine sediment and other environmental variables; e) investigate potential differences in trends in surface fines and overwinter sedimentation in different rivers and reaches. Prior to the onset of spawning, surface fine sediment will be measured by the grid method (Bauer and Burton, 1993); overwinter sedimentation will be measured by burying containers filled with cleaned gravels at the depth of egg centrum in areas excavated to mimic salmon redds. After fry emergence, containers will be collected and samples analyzed for the magnitude of fine sediment.

A peer-reviewed article (Rhodes and Purser) in press.

**NPPC Measure:** 3.3D1, 7.6C, 7.6C2, 7.6D

**Partners:**

Not provided

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**Acquisition of Pine Creek Ranch**

Subregion: Lower Mid-Columbia

Subbasin: John Day

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**Sponsor:** Terry A. Luther, CTWSRO, 541-553-3233

**HUs:** 13,000

**Acres:** 24,304

**Hydroproject:** John Day

**Description:**

The CTWSRO is proposing to acquire the Pine Creek Ranch, thus allowing management of the entire Pine Creek watershed. Objectives would include: removal of livestock from damaged riparian and upland areas, fencing, noxious weed control, and burning to remove juniper. BPA watershed funds in conjunction with BPA wildlife funds would be used for purchase and future outyear funding.

The project will benefit a rich and diverse group of fish, wildlife, and plant species. Pine Creek watershed supplies habitats for at least 36 animal and plant species that are listed as sensitive, threatened or endangered. Pine Creek provides spawning and rearing habitat for one of the few remaining native steelhead populations in the lower John Day River basin. The property also provides important wintering habitat for deer and elk. Nine of the target wildlife species identified in conjunction with the John Day project are present at Pine Creek. There is the potential to reintroduce several native wildlife species.

Currently, streams in the project area suffer from grazing impacts. Removal of livestock will allow the stream and riparian areas to stabilize over time. Upland enhancement activities will include noxious weed control on some farmed tracts and juniper removal through burning.

Previous enhancement activities by GWEB indicates the watershed responds well to treatment. In the future, "passive restoration" will be the direction used to manage this watershed. Since there is a wealth of baseline information on this project, some going back as far as 45 years, monitoring and evaluation should be easily accomplished.

**NPPC Measure:** 7.6.A, 7.6.B, 7.6.C, 11.3.A, 11.3D

9092

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## Umatilla Tribal Fish and Wildlife Enforcement

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Ron D. Harnden, CTUIR, 541-278-0550

**Target stocks:**

Not provided

**Description:**

Law enforcement is an integral and essential component of natural resource management. Enforcement of existing fish, wildlife and habitat regulations is needed to insure compliance rates and protect fish stocks, wildlife populations and their critical habitats. Coordination of State and Tribal government operations, public awareness and public participation are all benefits of natural resource enforcement.

A CTUIR Fish and Wildlife Enforcement division will provide three enforcement officers for enforcement activities on 1855 Treaty reserved mainstems and tributaries. Coordination between all jurisdictions involved in the enforcement effort will increase effectiveness and alleviate duplication of efforts. Officers will enforce fisheries and habitat regulations on reservation and ceded lands. Enforcement officers will protect anadromous fish, resident fish and critical habitats on reservation and ceded lands. An organized evaluation of desired and actual achievement (budget, personnel, equipment, coordination, contacts, warnings, arrests, seizures and critical habitat protected) will analyze the impact of the program.

Increased enforcement presence will act as a deterrent to illegal activity and public awareness programs will increase support and understanding of the goals of the program. Increased survival rates of both juvenile and adult salmonids and protection of critical habitats are the goal of this program.

**NPPC Measure:** 7.6; 8.5C.2

**Partners:**

Not provided

**8343600**

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**Umatilla Passage O&M**

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** USBR

**Target stocks:**

Not provided

**Description:**

Fish screen and ladder O&M

**NPPC Measure:** Not provided

**Partners:**

BPA

## 8710001

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### Enhance Umatilla River Basin Anadromous Fish Habitat

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

a. Funds are being sought to identify watershed deficiencies, prioritize habitat needs, offer public education, implement and maintain fisheries habitat enhancement projects and monitor habitat conditions in the Umatilla River Basin.

b. The goal is to protect and enhance habitat for improved natural production of anadromous fish in the Umatilla River Basin. Objectives include watershed planning, public scoping and education processes, implementation and maintenance of habitat enhancement projects, and monitoring habitat conditions.

c. This project is consistent with NPPC Measure Numbers 7.6, 7.7 and 7.8. The project entails coordinated, cooperative efforts to protect and improve anadromous fisheries habitat on a comprehensive watershed management basis. Improved habitat quality will allow greater juvenile and adult freshwater survival and result in greater offspring out-migration survival.

d. The CTUIR have undertaken a watershed scale approach to identifying land uses that are damaging to ecosystems or detrimental to riparian habitat recovery. Rather than focusing solely on in-channel modifications, the Tribes have utilized natural recovery to preserve and restore stream habitat. Bio-engineering approaches have been reserved for areas that will not sufficiently recover in a natural manner.

e. Short-term (three to five years) project effects include native plant recovery, increased streambank stability and increased macroinvertebrate populations and diversity.

Long-term (25 to 100 years) project effects include changes in hydrological features, vegetation succession, channel narrowing, increased channel shading, improved water quality, increased wood recruitment and increased habitat.

f. Monitoring includes:

- stream channel transects
- photo points
- physical surveys
- macroinvertebrate surveys
- stream temperatures
- suspended sediments.

Results will be evaluated in annual reports submitted to BPA

**NPPC Measure:** Not provided

**Partners:**

Not provided

## 8710002

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### Protect & Enhance Coldwater Fish Habitat in the Umatilla River Basin

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Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Troy Laws, ODFW, 541-276-2344

**Target stocks:**

Summer steelhead, spring/summer chinook, coho, and resident fishes.

**Description:**

The Umatilla Fish Habitat Improvement program establishes long term stream/fish habitat improvement projects on private lands through riparian leases, cooperative agreements, and easements with private landowners. Individual projects contribute to ecosystem/basin wide watershed restoration/management efforts that are underway by state, federal and tribal agencies. Project planning includes the participation/involvement of private landowners, state/federal agencies, tribes, stakeholders, and watershed council(s) as called for in measure 7.7 of the 1994 CBFW Program.

The Umatilla program goal is to rehabilitate and improve anadromous fish spawning/rearing habitat, and tributary passage as outlined in Program Measure 7.6 & 7.10 to contribute to the NPPC's interim goal of doubling anadromous fish runs in the Columbia River basin. Individual projects incorporate Best Management Practices (BMP's) as called for in Program Measure 7.8.

Initiated by ODFW in 1987, this project protects and enhances coldwater fish habitat primarily using passive restoration techniques. Riparian enclosure fencing is a primary tool for this work. Where applicable, active remediation techniques are used. These strategies incorporate bioengineering techniques, plantings, off-site water developments, and site specific instream structures.

While the focus of this project is on summer steelhead, spring/summer chinook, coho, and resident fishes, many species of wildlife also benefit. The Umatilla program in FY1999 will complete flood restoration work initiated during FY97-98 on its existing projects and break away from its six year O&M/M&E status to begin implementing new projects in FY2000.

Long term monitoring and evaluation is an ongoing and vital element of this program. Monitoring includes: stream temperature data, physical & biological stream surveys, photopoints, and habitat transects.

**NPPC Measure:** 7.6, 7.7, 7.8, 7.10

**Partners:**

Not provided

**8802200**

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**Trap and Haul in the Umatilla and Walla Walla Basins**

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

In the 1980's, CTUIR and ODFW began implementing the Umatilla Fisheries Restoration Plan. An integral part of that effort was to address the inadequate flow and migration conditions (which led to salmon extirpation) by constructing fish passage facilities, initiating a trap and haul program, and implementing the Umatilla Basin flow enhancement project.

The Trap and Haul Project goal is to maximize adult and juvenile migrant survival in the Umatilla and Walla Walla basins. The project provides survival benefits for both hatchery and natural production by operating and maintaining ladders, bypasses, trap facilities, and hauling equipment and coordinating these operations with flow enhancement measures. The project also provides valuable support to other projects by refining fish passage criteria, collecting return and migration data, and collecting and transporting broodstock. Similar passage improvement measures are now being initiated in the Walla Walla Basin and the project will provide the same benefits there.

The project began in 1989. Since then, up to 3,800 adults and 100,000 pounds of juveniles have been trapped and hauled annually. These increases in juvenile and adult survival contribute directly to the NPPC rebuilding goal. In addition, recommendations based on project observations of adult returns and migration are incorporated into subbasin management documents. The project is viewed as a long term O&M project required for maintaining the survival advantages achieved by implementation of the fish passage and flow enhancement projects in the two basins.

**NPPC Measure:** Not provided

**Partners:**

Not provided

8902401

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## Evaluate Juvenile Salmonid Outmigration and Survival in the Lower Umatilla

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Richard Carmichael, ODFW, 541-962-3777

**Target stocks:**  
Not provided

**Description:**

Projects to enhance and reestablish salmonid populations in the Umatilla River are addressed in the FWP as contributors to the Council's goal of increasing Columbia River basin salmon returns. This project's goal is to determine the overall effectiveness of the fisheries rehabilitation plan by evaluating the outmigration success of hatchery and natural juvenile salmonids in the lower Umatilla River. It provides knowledge for adaptive management of hatchery, river, and canal operations and supplements and complements ongoing or completed evaluations of specific rehabilitation projects. Specific project objectives include 1) determining migrant abundance, migration patterns, health, and survival of species or races of fish representing different hatchery rearing and release strategies and natural production groups, and investigating relationships between environmental variables and fish migration, 2) sampling fish during summer transport operations, 3) determining routes used by juvenile fish to pass Three Mile Falls Dam, and 4) conducting PIT tag studies to determine release site effects on fish survival. Year-round monitoring uses various traps for which species-specific efficiencies are determined to estimate migrant abundance and survival of juvenile fish. Fish are sampled daily to obtain biological information and assess seasonal trends. We use video and sampling to assess passage routes of juvenile fish past Three Mile Falls Dam. Results will provide estimates of abundance and survival for specific groups of fish, descriptions of daily and seasonal migration patterns, the relationships between fish movement and river variables, determinations of fish health and condition, and an overview of passage dynamics at Three Mile Falls Dam.

**NPPC Measure:** 7.0C.4, 7.1C, 7.2D, 7.2D.1, 7.4I, 7.4I.1, 7.4L, 7.4L.1, 7.10, 7.10A.2

**Partners:**  
Not provided

**8902700**

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**Power/Repay O&M For USBR CPR Pumping Project**

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** PPL/UECA

**Target stocks:**

Not provided

**Description:**

Payment of power costs for pumping project.

**NPPC Measure:** Not provided

**Partners:**

BPA

8903500

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## Umatilla Hatchery Operation and Maintenance

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Trent W. Stickell, ODFW, 503-872-5252

**Target stocks:**

Carson stock spring chinook, Upriver bright stock fall chinook, Umatilla River stock summer steelhead

**Description:**

Umatilla Hatchery was authorized under the Northwest Power Planning Council's (NPPC) Fish & Wildlife Program and began operation in 1991. Hatchery funding (100%) is provided by BPA. The hatchery is used for egg incubation and rearing of spring chinook, fall chinook, and summer steelhead. Umatilla Hatchery serves as the foundation for rehabilitating chinook salmon and enhancing steelhead in the Umatilla River. Fish released into the Umatilla River are expected to contribute significantly to the NPPC doubling goal in the Columbia River Basin. Monitoring and evaluation of the hatchery rearing (Project #9000500) includes: 1) information provided on culture and release of hatchery fish, harvest regulations, and natural escapement that will lead to the accomplishment of long-term natural and hatchery production goals in the Umatilla River Basin in a manner consistent with provisions of the Council's Fish & Wildlife program; and 2) assess the success of achieving the management objectives in the Umatilla River Basin that are presented in the Master Plan and the Comprehensive Rehabilitation Plan. Hatchery studies focus on the production of fish reared in the Michigan raceways using oxygen supplementation, and the success of different rearing and release strategies. This rearing system has not been thoroughly evaluated and the results may have systemwide application in the Columbia River Basin. Experiments and methods follow the criteria established in the comprehensive study plan. It is expected that the Umatilla Hatchery production program will ultimately provide the desired numbers of adult returns to the Umatilla River as identified in the Umatilla Hatchery Master Plan (1989) and supplement (1993). However with reduced water flows, Umatilla Hatchery will be operating at reduced fish production levels. The reduced production level goals for FY 1999 are: 360,000 spring chinook yearlings (45,000 pounds), 2,682,000 fall chinook subyearlings (44,700 pounds), and 150,000 summer steelhead (25,000 pounds).

**NPPC Measure:** 7.0C.4, 7.2D, 7.2D.1, 7.4I.1, 7.4L, 7.4L1

**Partners:**

Interagency coordination/communication is through the following forums: The Production Advisory Committee (PAC), under US vs. Oregon, Technical Advisory Committee (TAC) under US vs. Oregon Pacific Northwest Fish Health Protection Committee (PNFHPC), United States Army Corps of Engineers (USACE), In-River Agreements with parties to US vs. Oregon, and communications involving staff from the Confederated Tribes of the Umatilla Indian Reservation (CTUIR) and ODFW to discuss the operation and management of the hatchery and satellite facilities. Other non-financial supporters include the Washington State Department of Fish and Wildlife (WDFW), NMFS, FPC, Pacific States Marine Fisheries Commission (PSMFC), USFWS, BoR, Umatilla River Basin Irrigation Districts, and the NPPC.

9000500

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## Umatilla Hatchery Monitoring and Evaluation

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Richard Carmichael, ODFW, 541-962-3777

**Target stocks:**

Not provided

**Description:**

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Umatilla Hatchery is the foundation for rehabilitating chinook salmon and enhancing steelhead in the Umatilla River. Fish released in the Umatilla River are expected to contribute significantly to the NPPC doubling goal in the Columbia basin. Monitoring and evaluation of hatchery rearing is essential to achieving basin goals and include: 1) provide information for culture and release of hatchery fish, harvest regulations, and natural escapement that will lead to the accomplishment of long-term natural and hatchery production goals in the Umatilla River basin in a manner consistent with provisions of the Council's Fish and Wildlife program; and 2) assess the success of achieving the management objectives in the Umatilla River basin that are presented in the Master Plan and the Comprehensive Rehabilitation Plan. Hatchery studies focus on the production of fish in Michigan raceways using oxygen supplementation, and the success of different rearing and release strategies. This Michigan system has not been thoroughly evaluated and may have systemwide application in the Columbia basin. Experiments and methods follow the criteria established in the comprehensive study plan. Outcomes produced from this project will be: measurement and analyses of juvenile rearing performance, juvenile and adult survival, fish health, catch contribution to commercial, tribal, and sport fisheries, effects of mass marking and straying for chinook salmon and steelhead. The expected performance is 21,000 fall chinook, 11,000 spring chinook, and 9,670 steelhead. A minimum of 15 years is expected to be required to meet goals for fall chinook salmon (2006)

**NPPC Measure:** 7.0C.4, 7.2D, 7.2D.1, 7.4I, 7.4I.1, 7.4L, 7.4L.1

**Partners:**

Not provided

9000501

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**Umatilla and Walla Walla Basin Natural Production M&E Project**

Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

Our project goal is to provide information to managers and researchers working to restore anadromous salmonids to the Umatilla and Walla Walla River Basins. This is the only project that monitors the restoration of naturally producing salmon and steelhead in either basin. The project objectives are to measure, estimate and report the spawning success, rearing densities and abundance, habitat quality and quantity, basin production capacity, life history characteristics, and migration timing and success of salmon and steelhead. This project also monitors tribal harvest (roving creel and telephone surveys) and water temperatures (Ryan and Vemco thermographs) in coordination with ODFW, USFS and other CTUIR projects.

In coordination with researchers and managers from the basin, we examine and modify the project annually to provide the best information to adaptively manage local salmon and steelhead. The information generated by this project also has utility for salmonid restoration efforts throughout the Columbia River Basin.

While certain monitoring activities are conducted each year, others objectives are deferred to future years because of limitations in personnel, funding, prioritization and need. Genetic sampling is an example of this. During 1992 and 1994 Currens and Schreck (1993, 1995) conducted baseline genetic sampling (allozyme electrophoresis and mtDNA) of endemic steelhead in the Umatilla Basin. We propose to sample both the Umatilla and Walla Walla River endemic steelhead in 1999 to examine genetic characteristics. We plan to collect samples and coordinate the processing, analysis and reporting with established laboratories and genetic scientists. We plan to use both electrophoresis and DNA techniques to establish genetic baseline data for Walla Walla steelhead and to re-examine Umatilla steelhead genetics. Both endemic populations are subject to potential risks through artificial propagation projects. Subsequent genetic monitoring is planned for both basins in 2004 and 2009.

In addition, this project completed a radio telemetry project evaluating the passage of fall chinook, spring chinook, and coho salmon, and summer steelhead over irrigation dams and through fish ladders in the lower Umatilla River (1993-1996). We plan to evaluate summer steelhead passage through fish ladders in the Walla Walla Basin and to spawning areas during 2000, 2001 and 2002. Evaluations of Walla Walla spring chinook will begin when adults begin to return.

We communicate findings to researchers and managers through formal reports, monthly oversight committee meetings, annual basin operation meetings, and formal presentations at various conferences and forums.

**NPPC Measure:** 703 (f)(1)(b)

**Partners:**

Not provided

9506001

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## Enhance Squaw Creek Watershed for Anadromous Fish & Wildlife Habitat

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Subregion: Lower Mid-Columbia

Subbasin: Umatilla

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**Sponsor:** Carl Scheeler, CTUIR, 541-276-5268

**HUs:** 3,832

**Acres:** To be determined

**Hydroproject:** John Day

**Description:**

The Squaw Creek Watershed Project is designed as a watershed-based effort—encompassing the entire Squaw Creek subbasin (about 24,198 acres) of the Umatilla River Basin. A mixture of land ownership patterns exist in the subbasin and include: CTUIR Trust lands, individual Indian allotments, non-Indian private land held in fee title, and National Forest System lands administered by the Umatilla National Forest (UNF).

The subbasin contains approximately 23 miles of anadromous and resident fish habitat and over 50 miles riverine habitat. The subbasin supports spring chinook and coho salmon, summer steelhead, and native redband and bull trout. The area also supports a wide variety of wildlife including Rocky Mountain elk, mule deer, white-tailed deer, black bear, cougar, numerous birds of prey species, beaver, primary and secondary cavity excavators and various other forest ecosystem species including several species of threatened, endangered, and sensitive fish, wildlife, and plant species. Primary target wildlife HEP species include: mink, California quail, downy woodpecker, spotted sandpiper, Western meadowlark, yellow warbler, black-capped chickadee and great blue heron.

Key objectives of the watershed effort include:

? consolidating ownership of available lands through fee title acquisition to protect resources and improve consistent management. Particular emphasis is placed on acquiring lands containing riparian and riverine habitats

? protecting, enhancing, and mitigating wildlife and wildlife habitat impacted by hydroelectric development in the Columbia River basin

? protecting and enhancing cold-water aquatic resources and instream diversity and productivity--contributing to Umatilla River salmon restoration efforts

Primary methods to achieve the objectives include:

? land acquisition, development of conservation easements, and promotion of effective land and resource stewardship

? leasing of existing BIA administered range units within subbasin (two units involved encompassing approximately 16,000 acres) and resting from livestock use to encourage recovery of both upland and riparian resources

? development of a comprehensive management plan that addresses biological objectives, identifies appropriate enhancement and restoration activities.

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## Assess Fish Habitat & Salmonids in Walla Walla Watershed in Washington

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Subregion: Lower Mid-Columbia

Subbasin: Walla Walla

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**Sponsor:** Glen Mendel, WDFW, 509-382-1005

**Target stocks:**

Mid-Columbia River Natural Steelhead, Wild Bull Trout

**Description:**

Fish habitat in streams within the Walla Walla watershed of southeast Washington and northeast Oregon has been severely degraded by urban and domestic development, farming, grazing, irrigation, logging, recreational activities, floods and flood control efforts.

Historically, the Walla Walla basin produced substantial runs of both spring chinook and summer steelhead. Chum and coho also were likely present. Salmon have been absent from the basin since approximately the 1920's due to irrigation dams, extensive water withdrawals and habitat degradation (CTUIR 1989). Native steelhead runs have also declined. Steelhead and bull trout in the Walla Walla watershed are candidate species, or proposed for listing, respectively, under the Endangered Species Act (ESA).

The Northwest Power Planning Council Fish and Wildlife Program (NPPC 1995) calls for regular updating of subbasin plans (7.0C) and collection of population status, life history and other data on wild and naturally spawning populations (7.1C and 7.1C.3), which includes bull trout (10.5A). It also calls for improved hatchery production, or developing new hatchery supplementation programs, while proceeding with extreme caution to avoid damaging remaining wild and naturally spawning populations (7.2). The Fish and Wildlife Program (FWP) recommends developing, implementing and evaluating supplementation plans and risk assessments (7.3, 7.3B.1, 7.4A). It also requires writing a hatchery production Master Plan (7.4B, 7.4L) that includes identification of factors limiting production and setting project goals and objectives. A watershed assessment and coordination of habitat planning efforts is recommended (7.6C). The FWP also states that instream flow needs should be established and protected (7.8G). The Independent Scientific Review Panel (ISRP 1997) and the NPPC (1997) recommended that watershed assessments precede implementation of restoration projects (III.B.11).

The NPPC has funded several projects in the Walla Walla basin (9601100, 9601200, 9604600, 8805302) with the Confederated Tribes of the Umatilla Reservation (CTUIR), and the Walla Walla Conservation District (9606400). Additional aquatic resource efforts are underway in the basin by Corps of Engineers (COE) for resource planning and environmental restoration (COE 1997, COE 1992) and by a citizen watershed council in Oregon (BOR 1997). The Columbia and Walla Walla County Conservation Districts submitted a proposal to the Washington Department of Ecology (WDOE) for funding a watershed planning effort in 1998. A Subbasin Plan (CTUIR 1989) and a draft hatchery production Master Plan (CTUIR 1993) have also been compiled for the watershed. All these efforts in the Walla Walla watershed are for planning or implementing watershed and fish stock restoration programs.

The WDFW is proposing to conduct a watershed habitat and salmonid fish stock assessment in the portion of the Walla Walla Basin within Washington State (>70% of the basin). The project would assess the habitat conditions (particularly stream flows, water temperatures, and water quality) that affect steelhead and bull trout use and passage in the lower portion of the basin, as well as the potential for adult and juvenile passage should spring chinook or other salmon species be reintroduced. Habitat and fish stock assessment in the middle and upper watershed within Washington would evaluate the amount of potential rearing and spawning habitat available, habitat limiting factors for steelhead, bull trout and salmon (if they are reintroduced in the future), and habitat conditions, habitat use, distribution, abundance and genetic

stock identification for existing natural populations of steelhead and bull trout. The specific objectives are as follows:

1. Assess habitat conditions for anadromous and resident salmonids in the Washington portion of the Walla Walla watershed.
2. Determine salmonid distribution and relative abundance in the Washington portion of the Walla Walla watershed.
3. Identify, and genetically characterize stocks of naturally produced steelhead and bull trout in the Walla Walla watershed (including part of Oregon).
4. Compile and disseminate results and conclusions for watershed restoration planning.

Methods proposed for this study include habitat and fish components. A series of fixed monitoring sites for measurement of stream discharge and spring and summer water temperatures and water quality would be established and operated. Additional measurements will be taken periodically at other locations. Habitat surveys such as Hankin and Reeves (1988) or use of habitat suitability models for spring chinook (Raleigh et al. 1986) and rainbow/steelhead trout (Raleigh et al. 1984) will be conducted at selected sites throughout the basin to determine the number and quality of pools and cover as well as quantify other habitat measures and habitat limiting factors. Data collection for the distribution and abundance of salmonids will include steelhead and bull trout spawning surveys and electrofishing or snorkeling for juvenile fish during the summer. Genetic stock identification for natural steelhead and bull trout will consist of taking samples of tissue or fin clips at existing adult trap sites, from recovered carcasses, or from juveniles during electrofishing surveys. A DNA sequencer, or gel electrophoresis will be used to analyze allele frequencies and compare with other steelhead and bull trout populations.

The information proposed for collection is critical for planning and implementing watershed restoration, resource management for sensitive and depressed salmonid populations, as well as for planning hatchery supplementation or continuing hatchery mitigation for steelhead, or for reintroduction of spring chinook or other salmon in the Walla Walla basin. Some results would be available within one year, and the final project report would be available in 2002. Annual summaries and coordination with CTUIR, ODFW, COE, WDOE and the Walla Walla and Columbia Conservation Districts, as well as others, would receive high priority.

**NPPC Measure:** 7.0C, 7.1C, 7.1C.3, 7.2, 7.3, 7.3B.1, 7.4A, 7.4B, 7.4L, 7.6C, 7.8G, 10.5A

**Partners:**

ODFW, WDOE, USFS

8343500

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**Operate and Maintain Umatilla Hatchery Satellite Facilities**

Subregion: Lower Mid-Columbia

Subbasin: Walla Walla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

In the early 1980's, CTUIR and ODFW began implementing a comprehensive plan to supplement steelhead and re-establish salmon runs in the Umatilla River Basin. Artificial production, including the need for Umatilla Hatchery and associated satellite facilities, was identified as a key component in this effort.

This project provides for the operation and maintenance of the satellite facilities. The goals and objectives are to acclimate juvenile salmon and steelhead prior to release into the Umatilla River Basin and to provide salmon and steelhead eggs necessary to meet the Umatilla Basin artificial production goals.

The reduced stress and increased imprintation of juvenile salmon and steelhead released from acclimation ponds into the Umatilla Basin will increase smolt to adult survival back to the Columbia and Umatilla Rivers which specifically addresses the Columbia Basin Fish and Wildlife Program by contributing to increased adult returns to the Columbia Basin. Acclimation also imprints fish back to natural production areas.

Results of the project are monitored and evaluated as part of the Umatilla Hatchery and Natural Production Monitoring and Evaluation Programs. Data collected by this project is shared with the Monitoring and Evaluation Programs and is also summarized in an annual report to BPA. The information is analyzed by CTUIR and ODFW managers and researchers, and each year, adaptive management decisions are made and incorporated into the Umatilla Hatchery and Basin Operation Plan.

**NPPC Measure:** Not provided

**Partners:**

Not provided

8805302

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**Plan, Site, Design & Construct NEOH Hatchery-Umatilla/Walla Walla  
Component**

Subregion: Lower Mid-Columbia

Subbasin: Walla Walla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

CTUIR and ODFW have implemented a comprehensive plan to bring back extirpated spring chinook and depressed summer steelhead runs in the Umatilla and Walla Walla River Basins. A hatchery facility on the South Fork Walla Walla and two or three juvenile acclimation/release facilities in the Walla Walla Basin were identified as an integral part of this plan.

This project will provide for the design and construction of these facilities. The goals and objectives of the project are to finalize designs and construct a summer steelhead and spring chinook hatchery on the Walla Walla River and to design juvenile acclimation/release facilities in the Walla Walla Basin.

Upon completion, the facilities will be operated under project number 8343500. They will complete the components necessary to produce all summer steelhead and spring chinook juveniles necessary to achieve overall Umatilla and Walla Walla River adult return goals and they will allow all juvenile salmon and steelhead to be acclimated prior to release into the Umatilla and Walla Walla Basins. Increased juvenile production and reduced stress and increased imprintation from acclimation will increase returns and smolt to adult survival back to the Columbia, Umatilla and Walla Walla Rivers which specifically addresses the Columbia Basin Fish and Wildlife Program by contributing to increased adult returns to the Columbia Basin.

CTUIR, ODFW, BPA, NMFS, engineers, architects and other interested parties will participate in the planning, design and review process for the proposed facilities. CTUIR, BPA and others will follow up with the engineers, architects and contractor(s) during construction.

**NPPC Measure:** Not provided

**Partners:**

Not provided

**9601100**

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**Screens and Traps on the Walla Walla and Touchet**

Subregion: Lower Mid-Columbia

Subbasin: Walla Walla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

The Walla Walla River is heavily diverted for agricultural use. Inadequate flow and passage conditions are a primary factor in the decline of native summer steelhead runs and extirpation of spring chinook in the basin.

The goal of this project is to improve juvenile passage conditions in the Walla Walla River by providing trap and haul facilities, decreasing the number of surface diversions, and improving juvenile screens and bypasses. A juvenile trap and haul facility is to be constructed in FY98 and new screens/bypasses are to be installed at two diversions under this project. The ditch consolidations to be completed under this proposal are the last two structural juvenile passage improvements currently identified in the basin.

Provisions for addressing the juvenile passage problems in the basin are a key component of the overall plan to rehabilitate and restore fish runs in the Walla Walla River. Outmigration survival benefits realized from completion of these projects should result in an increase in adult returns that will contribute directly to the NPPC rebuilding goal.

**NPPC Measure:** Not provided

**Partners:**

Not provided

**9601200**

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**Adult Fish Passage Improvement - Walla Walla River**

Subregion: Lower Mid-Columbia

Subbasin: Walla Walla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

The Walla Walla River is heavily diverted for agricultural use. Inadequate flow and passage conditions are a primary factor in the decline of native summer steelhead runs and extirpation of spring chinook in the basin.

The goal of this project is to enhance adult passage conditions in the Walla Walla River by removing passage barriers and improving adult ladders. Two diversion dams were removed in FY97 and two ladders were improved in FY98 under the project. The fish ladder to be constructed under this proposal is the last structural adult passage improvement currently identified for the basin.

Correction of the adult passage problems in the basin is a key component of the overall plan to rehabilitate and restore fish runs in the Walla Walla River. Adult survival benefits to production areas realized from the project's completion will contribute to the NPPC rebuilding goal.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9604601

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## Walla Walla Basin Fish Habitat Enhancement

Subregion: Lower Mid-Columbia

Subbasin: Walla Walla

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**Sponsor:** Gary James, CTUIR, 541-276-4109

**Target stocks:**

Not provided

**Description:**

Efforts have begun to restore extinct salmon and remnant populations of summer steelhead in the Walla Walla River Basin. Ongoing and completed projects include a new hatchery, new ladders and screens, and instream flow enhancement.

This project proposes to integrate habitat restoration with ongoing watershed improvements. Through habitat restoration and protection, critical salmonid spawning and rearing areas will be regained, naturally spawning populations of salmonids elevated, and juvenile outmigration increased.

CTUIR is working with Federal, State, and local parties including the local watershed council, and the CTUIR native plant nursery. CTUIR is also cooperatively developing a watershed assessment for the basin; the Oregon portion was completed in 1997. These efforts are providing a method for overcoming obstacles and identifying priority areas for habitat restoration. Continued and adaptive efforts will insure that implementation dollars focus on results that provide future benefit to salmonid fishes.

Projects begin by obtaining long-term easements with private landowners. When possible, passive natural riparian healing approaches are implemented. Where bioengineering is necessary, designs are created cooperatively by the landowner, CTUIR and NRCS. Pre and post project monitoring (transects, photo-points, population surveys, and occasionally macro-invertebrate and water quality) are included. Results are provided in quarterly and annual reports to BPA and exchanged and presented to cooperating agencies so that adaptive management may be incorporated.

This project is consistent with measures 7.6, 7.7, and 7.8 of the 1994 Columbia Basin Fish and Wildlife Program. The project will strive to follow guidelines outlined in these measures and practice sound habitat restoration efforts.

**NPPC Measure:** Not provided

**Partners:**

Not provided

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**Coordinate/Facilitate Watershed Project Planning/Implementation**

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Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Mel Wagner, YRWC, 509 576 9042

**Target stocks:**

Not provided

**Description:**

The YRWC is a consensus-governed, open forum of diverse watershed interests (tribal, business, timber, environmental, irrigators, land owners, food processors, electric utilities, recreation) that provides opportunity for community learning and dialogue concerning watershed viability and coordinates/facilitates community actions to restore and preserve watershed health, i.e. water quality, quantity, conservation, and habitat restoration.

Tasks are accomplished, in part, through coordination with, and support of, local, state, federal, and tribal agencies, information transfer, and public/private collaboration.

Since inception in 1994, YRWC has pursued a watershed approach, has educated its 400 members, its 125 volunteer committee members, and community stakeholders about watershed resource issues; developed a comprehensive watershed plan to address ecosystem and economic viability within prevailing constraints; and formed an interagency council comprised of state, local, federal, and tribal representatives to achieve collaboration information sharing, and resource pooling among agencies.

Coordination/facilitation of IAC and YRWC's watershed project planning/implementation to enhance water quality/quantity, habitat restoration are primary activities for which funding is sought.

The IAC's stated goal is to cooperatively identify and conduct projects to improve watershed health. Focus is on anadromous fish restoration via improving habitat, water quality, water conservation and instream flow values. IAC cooperative efforts will share information, leverage resources, strengthen partnerships, and facilitate access to one another and to the public.

Continuing coordination/facilitation of public watershed involvement accomplished by identifying existing technology transfer programs through IAC; YRWC design and development of public media advertising, direct mail campaigns, speakers bureau, and target group programs. Content to promote watershed approach, identify resource problems; outline and promote action strategies, and collaborate with public agencies to implement. Goal is to produce informed and motivated watershed stewards in the Yakima basin.

Program success will be assessed by environmental improvements already being monitored by watershed agencies; by public reviews and acceptance of watershed plan 20/20 Vision, by levels of public participation in watershed programs and by changes in on-farm practice yielding water quality improvements, and other local activities expected to result in a healthy watershed.

**NPPC Measure:** Chapter 7.6

**Partners:**

Yakima Basin Inter-Agency Council

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**Reestablish Safe Access into Tributaries of the Yakima Subbasin**

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Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Scott Nicolai, YIN/WDFW, 509-865-6262 x6689**Target stocks:**

Not provided

**Description:**

Items to be funded include the following

In project year #1-

1. Construction of five fishways and five irrigation screens in the lower eight miles of the Wilson Creek watershed;
2. Field surveys of passage barriers and unscreened diversions in 10 Yakima subbasin tributaries that do not experience chronic dewatering problems;
3. Completion of barrier and unscreened diversion reports based on field surveys in #2;
4. Solicitation of additional cost-share funding to construct additional fishways and screens based upon the findings of the barrier report;
5. Formulation of an construction plan to implement findings of the barrier report; and,
6. Tributary habitat protection through fencing of roughly 9 miles of riparian habitat, and/or conservation easements or property purchase of roughly 50 acres of floodplain.

In project year #2 -

1. Construction of additional fishways and screens in some or all of the surveyed tributaries; and,
2. Additional tributary habitat protection through fencing of roughly 9 miles of riparian habitat, and/or conservation easements or property purchase of roughly 50 acres of floodplain.

Project years #3 and #4 would continue as in project year #2, and would complete the action recommendations of the barrier report produced in year #1. The only activity in project year #5 is placement of funds in a trust fund, for the maintenance and eventual replacement of the fishways and irrigation screens.

The goal of the project is to rebuild Yakima River spring chinook and steelhead populations. Project objectives include establishing safe passage into tributary habitats that have artificial barriers at their confluence. The target tributaries do not have chronic instream flow problems, and they historically had several hundred of miles of anadromous habitat. At present, only 11 miles remain. However, these tributaries have tremendous rearing potential in comparison to the mainstem. Many miles of tributary habitat still expresses healthy channel sinuosity, width/depth ratios, and thermally benign winter temperatures due to groundwater inflow. The mainstem Yakima's hydrograph is regulated, i.e. flows are too high during summer releases, and too low during the winter to provide optimal rearing habitat. The Yakima Species Interaction Studies group has maintained population survey sites below the lowest migration barrier of some of the tributaries targeted through this proposal, and they have found relatively high densities of juvenile salmonids, including spring chinook and steelhead, compared to mainstem locations.

Due to the rapid conversion of many streamside properties from commercial farming to suburban development, the project would also allocate \$90,000/year to habitat protection through property acquisition, conservation easements and fencing. Thus this project also intends to "protect the best" from permanent loss.

The project is relevant to the 1994 Columbia Basin Fish and Wildlife program in that it will contribute to the protection and restoration of anadromous fish stocks in the Yakima Basin. Reconnecting functional habitat is an important component of the fish restoration effort. The project will also protect terrestrial wildlife species through riparian habitat fencing, and purchase of conservation easements and property.

The project is based upon the scientific principle that reconnecting more than 100 miles of potentially productive tributary habitat to the mainstem, when only eleven miles can be accessed currently, will contribute to the rebuilding of natural Yakima River salmon and steelhead stocks. This is the overarching goal of the Yakima Klickitat Fisheries Production Facility. Tributary habitat reconnection in stream that do not currently have chronic instream flow problems is the main objective of this project. The final product will be reconnection of more than 100 miles of tributary habitat to the mainstem by the end of FY2003.

The results of fishway construction will be monitored through snorkle and redd surveys in the treated streams. The snorkle survey results will be included in annual and final reports. Screening will be monitored through direct observation.

**NPPC Measure:** Not provided

**Partners:**  
Not provided

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**Restore Upper Toppenish Creek Watershed**

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Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Lynn Hatcher, Fisheries Program Manager, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

We propose to expand the Yakama Indian Nation's current watershed restoration efforts into the Toppenish watershed. Restoration of the Toppenish watershed is critical to restoring healthy runs of steelhead to the Yakima subbasin, and the next logical step in expanding the scope of the Satus Watershed Project. Entirely within the Yakama Indian Reservation, the adjacent Satus and Toppenish watersheds comprise 20% of the Yakima basin, offers a unique opportunity for landscape-scale restoration. Toppenish Creek has steelhead spawning and rearing potential rivaling that of the Satus watershed (which currently accounts for 1/3 or more of adult steelhead returning to the Yakima subbasin) but the Toppenish run is presently less than 1/2 the size of the Satus run. Three major restoration efforts are underway in the lower, agricultural area of the Toppenish watershed: two projects funded by BPA and one by the Bureau of Reclamation.

Restoration activities follow a FY98 analysis, and are based on the assumption that aquatic and riparian habitat are an expression of watershed functioning. Our goal is to improve steelhead habitat in Toppenish Creek by increasing base flows and decreasing peak flows from the upper watershed. The most efficient means is to restore the retentiveness of those areas, such as headwater meadows and floodplains, which formerly provided natural water storage in the soil profile. The objectives are to reduce erosion, aggrade downcut channels, and reconnect alluvial stream reaches with their floodplains. By increasing the retentiveness of the upper watershed, flow regimes are moderated, benefiting the entire stream/riparian system, and all associated species.

**NPPC Measure:** 7.6A-D, 7.8A, B, E

**Partners:**

Not provided

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**Ahtanum Creek Watershed Assessment**

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Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Lynn Hatcher, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

Ahtanum Creek was historically important for production of salmon and steelhead. The creek and its southernmost tributaries form part of the north boundary of the Yakama Indian Reservation. Spring chinook and coho are found in small numbers today; there is no current information on steelhead presence. Bull trout have been found as far downstream as the lowermost major irrigation diversion.

A watershed analysis for the upper, forested portion of the watershed is nearing completion. The lower, largely agricultural portion of the watershed is adversely affected by water withdrawal, by diking and channelization, by grazing practices and by residential development on the floodplain. Restoration of significant salmon and steelhead production in the watershed can be accomplished, but science-based strategies are needed for protecting stream flow, stream channels and floodplains.

We propose to map irrigated lands and water delivery systems, measure water discharge and temperature, compare water diversion and loss with on-farm water needs, and estimate the efficiency of irrigation water conveyance and use. At the same time we will gather historical and current data on stream channel condition, riparian function and salmonid populations.

We will use this information to determine how water use and riparian management in lower Ahtanum Creek may be limiting production of anadromous salmonids in the watershed as a whole, and to determine the most effective measures for salmon and steelhead restoration. We will recommend restoration measures that could include improved irrigation facilities, land and water management changes, and purchase or lease of land and water rights.

**NPPC Measure:** 7.6A Habitat Goal, 7.6B Habitat Policies, 7.6C Coordinated Habitat Planning, 7.8B Best Management Practices

**Partners:**

Not provided

8506200

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**Evaluate the Effectiveness of Fish Screens**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Duane A. Neitzel, PNNL, 509-376-0602

**Target stocks:**

Not provided

**Description:**

This project has been in place since 1985. The project objective is to evaluate the effectiveness of fish protection facilities as they built and revisit screens to ensure that the screens continue to protect fish after years of operation. The Council's Program includes actions to correct structural problems at irrigation diversion dams, canals and ditches that interfere with the passage of anadromous fish. Evaluations are guided by provisions of Council Measure 7.11 (NPPC 1994) which follows from previous Council Measures [Section 800 (NPPC 1987) and Section 900 (NPPC 1984)]. Video cameras and multidirectional flow meters, will be used to monitor screen facilities to determine if the sites are equipped to provide safe fish passage and operated within design limits. Fyke nets will be placed in the canals to determine if the sites are maintained in a "fish-tight" condition. Design improvements for fish screens will be tested using salmonids in controlled behavioral and conditional response tests. During the irrigation season (March-October), we expect to monitor fish behavior and document sedimentation, debris buildup, and flow-patterns at all Phase II screens and any other screens requested by the BPA or other agencies. Information collected will be presented to BPA as technical reports and open literature publications. Additionally, results will be sent to other agencies involved with screening facilities. Reports will be placed at <http://rebar.bpa.gov/Environment/> and <http://www.pnl.gov/ecology/>. Problems with operations and maintenance will be reported immediately to agencies responsible for daily operation of a screening facility.

**NPPC Measure:** Council Measure 7.11 (NPPC 1994) which follows from previous Council Measures [Section 800 (NPPC 1987) and Section 900 (NPPC 1984)]

**Partners:**

Not provided

8811500

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## Yakima Hatchery Construction

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Melvin R. Sampson, YIN YFP, 509-865-6262

**Target stocks:**

Not provided

**Description:**

a. The operation and maintenance of the YKFP's Cle Elum Research and Supplementation Facility (CERSF), including its three acclimation sites (to be constructed in the upper Yakima River Basin).

b. The YKFP's core objectives are as follows:

1. To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits.
2. To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
3. To implement and be consistent with the Council's Fish and Wildlife Program; and
4. To implement the Project in a prudent and environmentally sound manner.
5. As YKFP continues to implement the all stock initiative, additional construction requirements may be needed. The project is currently not at a stage where the construction needs can be identified, as requested in Section 5. Outyear costs, therefore, it was not answered.

a. All activities conducted by the YKFP, including the operation and maintenance of the CERSF; are consistent with the NPPC's Columbia River Basin Fish and Wildlife Program ("Program") Measure 7.4K.1.

d. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production: 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and, 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

e. The expected outcome of the project is to have supplementation fish return as adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The first smolts will be released in 1999, and the majority of the adults will return in 2001 from that release. The project plans to evaluate several generations of releases to obtain a statistically significant result.

A River Water Cooling Facility (RWCF) is planned for the Cle Elum Supplementation and Research Facility. THE RWCF will cool the warm Yakima River water during summer as required for fish rearing. The exact size and configuration of the RWCF will be determined after an extensive test on the facility well

system is completed this summer. The well test will establish the amount of cold well water available to temper the warm river water.

As a minimum, the RWCF will consist of pumps and heat exchangers that will cool the warm river water by transferring river water heat to the cooler hatchery discharge water. If the heat exchangers along with the available cold well water is not adequate to maintain the hatchery water at the required temperature, a mechanical chiller facility will be included as part of the RWCF.

f. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The YKFP's PSR and the Monitoring and Evaluation Plan lay out an integrated multi-level monitoring program for supplementing upper Yakima spring chinook. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties are contained. The Project's upper Yakima spring chinook monitoring plan addresses the following five monitoring categories: 1. Quality control will monitor the performance of the facilities and their operators. 2. Product specification attributes will be monitored at the Cle Elum facility, the acclimation ponds, and the juvenile monitoring facilities to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival. 3. Research monitoring activities will be designed to test the performance of two treatments of artificially reared fish (OCT vs. SNT) and to compare their performance with naturally reared fish.

Research monitoring would include measurements of performance in four main areas:

- o post-release survival (survival from time of release until the fish return to spawn);
- o reproductive success (number of offspring produced per spawner);
- o long-term fitness (genetic diversity and long-term stock productivity); and
- o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment, and 5. Monitoring of stock status. Details can be found in YKFP's M&E Project #9506300.

**NPPC Measure:** 7.4K.1

**Partners:**

Not provided

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**Yakima/Klickitat Fisheries Project Management**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Melvin R. Sampson, YIN YFP, 509-865-6262

**Target stocks:**

Not provided

**Description:**

- a. The operation and maintenance of the YKFP's Cle Elum Research and Supplementation Facility (CERSF), including its three acclimation sites (to be constructed in the upper Yakima River Basin).
- b. The YKFP's core objectives are as follows:
  1. To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits.
  2. To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
  3. To implement and be consistent with the Council's Fish and Wildlife Program; and
  4. To implement the Project in a prudent and environmentally sound manner.
- a. All activities conducted by the YKFP, including the operation and maintenance of the CERSF; are consistent with the NPPC's Columbia River Basin Fish and Wildlife Program ("Program") Measure 7.4K.1.
- b. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness for the target populations and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production : 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended to evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

- c. The expected outcome of the project is to have supplementation fish return adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The first smolts will be release in 1999, and the majority of the adults will return in 2001 form that release. The project plans to evaluate several generations of releases to obtain a statistically significant result.
- d. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The YKFP's PSR and the Monitoring and Evaluation Plan lay out an integrated multi-level monitoring program for supplementing upper Yakima spring chinook. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties re contained. The Project's upper Yakima spring chinook monitoring plan addresses the following five monitoring categories: 1. Quality Control will monitor the performance of the facilities and their operator. 2. Product specification attributes will be monitored at the Cle Elum facility, the acclimation ponds, and the juvenile monitoring facilities to determine whether the fish produced by the project meet goals with respect to: fish health, morphology (size and shape); behavior; and survival. 3. Research monitoring activities will be designed to test the performance of two

treatments of artificially reared fish (OCT vs SNT) and to compare their performance with naturally reared fish. Research monitoring would include measurements of performance in four main areas:

- post release survival (survival from time of release until the fish return to spawn);
- reproductive success (number of offspring produces per spawner);
- long-term fitness (genetic diversity and long-term stock productivity); and
- ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment and 5. Monitoring of stock status. Details can be found in YKFP's M & E project #9506300.

**NPPC Measure:** 7.4K.1

**Partners:**

Not provided

8812005

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**Video Fish Monitoring Project**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Melvin Sampson, YIN, 509-865-6262

**Target stocks:**  
Not provided

**Description:**

The Fish Video Monitoring Project (FVMP) is an key M/E task under the Yakima/Klickitat Fisheries Project (YKFP) in the Yakima basin. The YKFP is a hatchery supplementation project designed to test the hypothesis that supplementation is a viable method to restore salmonid populations in the Columbia Basin, while maintaining long term genetic fitness, and to manage adverse ecological interactions. The YKFP is an identified project in the 1994 FWP under "Coordinated Salmon Production and Habitat" (7.4K). It is an experimentally based project designed to monitor and evaluate the performance of various hatchery treatment groups relative to each other, and to the natural populations.

The FVMP provides the ability to M/E adult returns to Prosser Dam and Roza Dam. Thus, various survival rates to adult return (ie., smolt-to-adult, parr-to-adult) can be evaluated for both hatchery and naturally produced fish.

The main objective of the VFMP is to enumerate the spring and fall chinook, coho and steelhead adult spawner runs and to collect life history data associated with these runs. The summarized data is provided to the YKPF managers and researchers.

The VFMP uses a video camera that is located at each fish viewing window which is linked to a time-lapse video deck. The video "stream" is captured to a VHS tape, and is played-back and data recorded by a fisheries technician. The VFMP is currently being upgraded to digitally based system that will provide shaper images, image enhancement capabilities, automated image editing (hopefully) and PC based image storage.

**NPPC Measure:** 7.4K

**Partners:**  
Not provided

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**Fisheries Technician Field Activities**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Mel Sampson, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

a. The technicians will be used in on going and future research/monitoring projects associated with YKFP. The data they collect will be used to test the assumption that new supplementation techniques can be used in the Yakima River Basin to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the native salmonid populations and keeping adverse ecological interactions within acceptable limits. This data will also provide knowledge about supplementation, so that it may be used to enhance anadromous fisheries throughout the Columbia River Basin. The data collected will be analyzed and evaluated by the MIPT team of the YKFP.

b. The YKFP's core objectives are as follows:

- 1) To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits;
- 2) To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
- 3) To implement and be consistent with the Council's Fish and Wildlife Program; and
- 4) To implement the Project in a prudent and environmentally sound manner.

c. All activities conducted by the YKFP, including the operation and maintenance of the CERSF, are consistent with the NPPC's Columbia River Basin Fish and Wildlife Program ("Program") Measure 7.4K.1.

d. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production: 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and, 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

e. The expected outcome of the project is to have supplementation fish return as adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The first smolts will be released in 1999, and the majority of the adults will return in 2001 from that release. The project plans to evaluate several generations of releases to obtain a statistically significant result.

f. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The YKFP's PSR and the Monitoring and Evaluation Plan lay out an integrated

multi-level monitoring program for supplementing upper Yakima spring chinook. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties are contained. The Project's upper Yakima spring chinook monitoring plan addresses the following five monitoring categories: 1. Quality control will monitor the performance of the facilities and their operators. 2. Product specification attributes will be monitored at the Cle Elum facility, the acclimation ponds, and the juvenile monitoring facilities to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival. 3. Research monitoring activities will be designed to test the performance of two treatments of artificially reared fish (OCT vs. SNT) and to compare their performance with naturally reared fish. Research monitoring would include measurements of performance in four main areas:

- o post-release survival (survival from time of release until the fish return to spawn);
- o reproductive success (number of offspring produced per spawner);
- o long-term fitness (genetic diversity and long-term stock productivity); and
- o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment, and 5. Monitoring of stock status. Details can be found in the YKFP M&E project # 9506300.

**NPPC Measure:** Not provided

**Partners:**  
Not provided

9105500

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**Supplementation Fish Quality (Yakima)**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Thomas A. Flagg, NMFS, 206-553-4208

**Target stocks:**

Columbia River spring/summer/fall chinook salmon and steelhead

**Description:**

The overall goal of the project is to develop a Natural Rearing Enhancement System (NATURES) that allows hatcheries to produce fish that can be used to maintain the biological diversity and genetic integrity of Pacific salmon. The project's primary objectives are to determine if seminatural raceway habitats, exercise current velocities, automated underwater feeders, live food supplemented diets, and predator avoidance training can be used by fish culturists to produce wild-like fish with increased postrelease survival.

The project's methodology includes the following steps: 1) develop fish rearing protocols, 2) evaluate each protocol on a pilot scale to determine if it produces wild-like salmon with increased instream survival, 3) refine the protocols and reevaluate them, 4) select the best protocol, and 5) evaluate its effect on smolt-adult survival with production-scale releases. The evaluation process generally takes less than 3 years to prove that a protocol increases instream survival and an additional 4 or more years to determine if the technique also increases smolt-to-adult survival.

The project has already developed several fish culture practices that produce wild-like fish with a 25-50% higher instream survival than conventionally reared salmon. The natural rearing enhancement system will enable supplementation and conservation hatcheries to produce wild-like salmon with high postrelease survival that can be used to rapidly rebuild naturally spawning runs. This project will both help return a productive fishery to the river and conserve the salmonid resources of the Columbia River Basin.

**NPPC Measure:** 7.2D.1, 7.2D.3 7.4K.1

**Partners:**

Washington Department of Fish and Wildlife, Yakama Indian Nation, Nez Perce Tribes

**9105700**

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**Yakima Phase 2 Screen Fabrication**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** John A. Easterbrooks, WDFWYSS, 509-575-2734

**Target stocks:**

Yakima Basin Spring Chinook, Steelhead, and Coho

**Description:**

Obsolete fish screens from the 1930's, 40's, 50's and 60's must be replaced or updated to comply with current, regional fish screen biological protection criteria adopted by CBFWA's Fish Screening Oversight Comm. (FSOC) in 1995. The project objective is to provide protection approaching 100% for all species and life stages of anadromous (and resident) salmonids. Old screens in the Yakima basin, and in other Columbia R. subbasins, may provide fair protection for large (4-6 inch long) yearling smolts, but poor protection for fry and fingerling life stages. Mortality of fry and fingerlings by irrigation diversions may reduce subsequent smolt production and inhibits efforts to restore depressed salmon and steelhead populations through natural production or hatchery supplementation. Biological evaluation of completed Phase 2 fish screen facilities by PNNL under Project# 8506200 has quantified survival and guidance rates approaching 100% (range: 90-99%). Consequently, the state and federal fish agencies and Yakama Indian Nation propose to complete replacement or upgrade of all obsolete fish screen facilities in the Yakima Basin by the end of FY 2002.

**NPPC Measure:** 7.11B.1

**Partners:**

US Bureau of Reclamation, Yakama Indian Nation.

9107500

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**Yakima Phase II Screens - Construction**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** R. Dennis Hudson, USBR, 208-378-5250

**Target stocks:**

fall chinook salmon, spring chinook salmon, coho salmon, steelhead

**Description:**

All Phase II diversion sites will be screened to meet current agency design criteria for effective fish protection and fish passage by the year 2001. The target objectives of adequate juvenile fish passage are designed to meet three criteria which will: (1) reduce delay to a degree approaching zero; (2) reduce the possibility of injury to a degree approaching zero; and (3) allow fish to pass with little additional expenditure of energy. Selected Phase II screens have been (and others will be) monitored and evaluated using live fish to determine effectiveness of the new screens.

This program directly relates to measure 7.11B.1 of the 1994 Columbia Basin Fish and Wildlife Program as amended in 1995.

**NPPC Measure:** 7.11B.1

**Partners:**

Washington Department of Fish and Wildlife

**9200900**

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**Yakima Screens - Phase II - O & M**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** John A. Easterbrooks, WDFWYSS, 509-575-2734

**Target stocks:**

Yakima Spring Chinook, Fall Chinook, Steelhead, and Coho

**Description:**

Obsolete fish screens from the 1930's, 40's, 50's and 60's are being replaced or updated under the Yakima Phase 2 fish screen construction program to comply with current, regional fish screen biological protection criteria adopted by CBFWA's Fish Screening Oversight Comm. (FSOC) in 1995. The objective of the Phase 2 program is to provide protection approaching 100% for all species and life stages of anadromous (and resident) salmonids. Old screens in the Yakima basin may provide fair protection for large (4-6 inch long) yearling smolts, but poor protection for fry and fingerling life stages. Mortality of fry and fingerlings at irrigation diversions may reduce subsequent smolt production and inhibit efforts to restore depressed salmon and steelhead populations through natural production or hatchery supplementation. Biological evaluation of completed Phase 2 fish screen facilities by PNNL under Project# 8506200 has quantified survival and guidance rates approaching 100% (range: 90-99%), provided that an adequate operation and maintenance program is implemented following construction. This on-going project's (9200900) objective is to assure that BPA's capital investment in fish screens is realized by performing operations that assure optimum fish protection and long facility life through a rigorous preventative maintenance program.

**NPPC Measure:** 7.11B.1

**Partners:**

US Bureau of Reclamation, Yakama Indian Nation

9405900

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**Yakima Basin Environmental Education**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Julie Bradley, EDS 105, 509-575-2885

**Target stocks:**

spring chinook, coho, steelhead, fall chinook

**Description:**

The Environmental Education Training Program offers teachers throughout the Yakima Valley the opportunity to become involved with their students in real life projects to protect, enhance, analyze and provide solutions to water resource problems in their community. This ongoing program is in sixth year of operation. In excess of 200 teachers throughout the region have been involved and annually over 2000 students are actively involved in hands-on activities related to understanding the on-going stewardship of our watershed. Activities range from math and science investigations to language arts, journal writing, historical investigations of the watershed, civics, economics, and responsible citizenship through knowledge of water issues like water quality monitoring, salmon life cycle needs, stream hydrology, riparian habitat functions, wetlands, etc.

Students have developed community partnerships to monitor water quality, restore riparian corridors, raise salmon in their classroom for release into various tributaries, monitor storm run-off, collect data annually on salmon redds in the upper Yakima River. Each year additional teachers will be trained adding additional schools and students to the evergrowing number of involved participants. An independent evaluation of the program was conducted in 1998 and will be an on-going part of the program documenting program outcomes, teacher reaction, and community involvement as well as the long term impact of the program on teaching best practices.

**NPPC Measure:** 7.6B.6

**Partners:**

Yakama Nation Fish & Wildlife, North Yakima Conservation District, Washington Fish & Wildlife, Dept. of Ecology, Nature Conservancy, Boise Cascade, Pacific Power & Light, and U.S. Forest Service

9503300

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**O&M of Yakima Fish Protection, Mitigation & Enhancement Facilities**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Jim Faith, USBR, 509-575-5848 x215

**Target stocks:**

Not provided

**Description:**

Yakima River basin anadromous fish populations once supported significant tribal and non-tribal harvests. However these populations have declined to where only minimal tribal harvests are allowed, and to where some stocks may be headed for eventual extinction without intervention. In accordance with the Pacific Northwest Electric Power Planning and Conservation Act, BPA is funding the design, construction, operation and maintenance of fish protective and monitoring facilities in the Yakima River Basin as part of a program to mitigate impacts to anadromous fish by BPA owned mainstem Columbia River structures. Facilities include irrigation diversion fish screens and one major adult fish trapping complex. These structures are intended to help reverse this decline by monitoring and controlling adult anadromous fish movement, and by preventing fish from moving into and thus being lost in dead-end irrigation system waterways. Migrating smolt are particularly prone to follow water currents into these dead-end waterways. A good O&M program is needed to closely monitor and properly maintain these facilities to assure that fish are being monitored and protected. Approximately 60 facilities are planned for construction or modification by the year 2003. Construction has been completed and O&M begun on 23 facilities to date, with 6 more expected to come on-line by the end of 1998. As sites are brought on-line, custody is assigned to Reclamation for operation and maintenance, with BPA reimbursing Reclamation for all costs via an intergovernmental contract funded by their fish & wildlife program.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9506300

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**Yakima/Klickitat Monitoring and Evaluation Program**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Melvin Sampson, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

Supplementation is a key feature of the 1994 Fish and Wildlife Program. This project is part of a long-term comprehensive effort to monitor the performance of a large supplementation program, the YKFP, in terms of four basic elements of the ecology of anadromous salmonids: natural production, harvest, genetics and ecological interactions. For each of these four elements, we propose empirical studies that will have been subjected to rigorous power analysis before implementation. Results of these studies will both guide adaptive management within the project and assist other fisheries managers throughout the Region in developing effective supplementation programs. The expected outcomes of this work and related YKFP projects are to demonstrate rigorously: 1) success or failure to increase natural production and harvest opportunity; 2) unacceptable impacts to nontarget species; 3) whether supplementation success or failure is attributable to intrinsic factors (those directly controllable by project managers) or extrinsic factors (those outside the control of project managers); 4) the performance of semi-naturally versus conventionally reared smolts. Natural production will be monitored ultimately at the level of natural origin recruits as well as the component levels of egg-fry, fry-smolt, smolt-adult survival. Maintenance of genetic resources will be monitored by DNA and/or allozyme profiling. Project impacts on nontarget species will be monitored by comparing pre- and post-supplementation stock status (size, age structure and geographic distribution of populations). Impacts of nontarget species on project fish will be monitored by generating indices of impacts from five classes of strong interactors: predators, pathogens, competitors, mutualists, and prey.

**NPPC Measure:** 7.4K.1

**Partners:**

Not provided

9506402

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**Upper Yakima Species Interactions Studies**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Bill Hopley, WDFW, 360-902-2749

**Target stocks:**

Not provided

**Description:**

This ongoing task is one of an integrated suite of tasks which, collectively, implement the Yakima/Klickitat Fisheries Project (YKFP). The goal of the YKFP is to test the assumption that supplementation can be used to restore natural production and increase harvest opportunities while keeping genetic and ecological impacts within specified limits, as stipulated by the Northwest Power Planning Council (Measure 7.4K). This task establishes the baseline status of resident trout, steelhead, and spring chinook salmon and associated species and implements experiments to help define the competitive and ecological interactions that may occur between non-target taxa and supplemented anadromous species. Key risk factors are identified in the context of target and non-target species objectives and monitoring procedures and plans are developed and implemented to assess ecological responses to supplementation. The goals, objectives, and tasks of this project are developed and described by a multi-disciplinary team of scientists, the Monitoring and Evaluation Planning Team (MIPT). The supplementation monitoring framework is provided in the Upper Yakima Spring Chinook Monitoring Plan (Busack, et al., 1997; hard copy attached).

**NPPC Measure:** 7.4K; 2.2A, 2.2H; 7.2D

**Partners:**

Yakama Indian Nation, BPA, and NMFS

9506404

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**Policy/Technical Involvement & Planning for YKFP**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Bill Hopley, WDFW, 360-902-2749

**Target stocks:**

Not provided

**Description:**

The goal of this proposal is to provide for Washington Department of Fish and Wildlife (WDFW) participation in all aspects of the Yakima/Klickitat Fisheries Project (YKFP) management in terms of policy and the impact of technical matters on policy. Participation in management of the YKFP is consistent with direction of the Northwest Power Planning Council (letter Brusett to Jura, 1987, Attachment 2, task 8). The WDFW will, in accord with the Yakama Indian Nation (YIN) and Bonneville Power Administration (BPA) contribute to development and implementation of prefacility design measures; foster policy development and coordination with tribal, state and federal fisheries agencies having a vested interest in the Yakima/Klickitat Fisheries Project; coordinate efforts specifically addressing fishery management policies; and assist in development, oversight and review of technical issues involved in experimental design, monitoring, evaluation, facility design, operations, and project implementation.

**NPPC Measure:** 7.4K; 2.2A, 2.2H, 7.2D

**Partners:**

Not provided

9506406

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**Monitor Supplementation Response Variable For the YKFP**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Bill Hopley, WDFW, 360-902-2749

**Target stocks:**

Not provided

**Description:**

This ongoing project is one of an integrated suite of tasks which, collectively, implement the Yakima/Klickitat Fisheries Project. (YKFP). The goal of the YKFP is to test the assumption that supplementation can be used to restore natural production and increase harvest opportunities while keeping genetic and ecological impacts within specified limits, as stipulated by the Northwest Power Planning Council (Measure 7.4K). Under this project, Washington Department of Fish and Wildlife scientists will lead the development of detailed monitoring plans stating major objectives, experimental hypotheses, risk containment measures, and specific field protocols to guide evaluation of supplementation success in the Yakima/Klickitat Fisheries Project. Agency scientists will also perform power analyses to evaluate the strength of experimental designs developed through the Monitoring Implementation Planning Team (MIPT). In addition, scientists will conduct field research to begin monitoring and evaluation of various response variables as described in the Yakima Fisheries Project Spring Chinook Monitoring Plan. Results will be reported to the YKFP Policy Group through the Project's Scientific and Technical Advisory Committee (STAC).

**NPPC Measure:** 7.4K; 2.2A, 2.2H; 7.2D

**Partners:**

Not provided

9603301

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## Supplement and Enhance the Two Existing Stocks of Yakima R. Fall Chinook

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Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Mel Sampson, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

a. The operation and maintenance of fall chinook acclimation/supplementation sites. These sites will be developed in strategic areas to optimize fish rearing activities, and in areas determined most productive for successful adult returns..

b. The YKFP's core objectives are as follows:

- 1) To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits;
- 2) To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
- 3) To implement and be consistent with the Council's Fish and Wildlife Program; and
- 4) To implement the Project in a prudent and environmentally sound manner.

c. All activities conducted by the YKFP are consistent with the NPPC's Columbia River Basin Fish and Wildlife Program ("Program") Measure 7.4K.1.

d. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production: 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and, 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

e. The expected outcome of the project is to have supplementation fish return as adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The project plans to evaluate several generations of releases to obtain a statistically significant result.

f. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The YKFP's PSR and the Monitoring and Evaluation Plan lay out an integrated multi-level monitoring program for supplementing upper Yakima spring chinook. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties are contained. The Project's upper Yakima spring chinook

monitoring plan addresses the following five monitoring categories which the fall chinook project will be modeled after. Not all of these steps may be used: 1. Quality control will monitor the performance of the facilities and their operators. 2. Product specification attributes will be monitored at the Cle Elum facility, the acclimation ponds, and the juvenile monitoring facilities to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival. 3. Research monitoring activities will be designed to test the performance of two treatments of artificially reared fish (OCT vs. SNT) and to compare their performance with naturally reared fish. Research monitoring would include measurements of performance in four main areas:

- o post-release survival (survival from time of release until the fish return to spawn);
- o reproductive success (number of offspring produced per spawner);
- o long-term fitness (genetic diversity and long-term stock productivity); and
- o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment, and 5. Monitoring of stock status.  
Details can be found in the YKFP's M&E Project No. 9506300.

**NPPC Measure:** 7.3B, 7.4A, 7.4F, 7.4O, 7.4K.1

**Partners:**

Not provided

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**Evaluate the Feasibility and Potential Risks of Restoring Yakima R. Coho**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Mel Sampson, YIN, 509-865-6262

**Target stocks:**  
Not provided

**Description:**

a. The operation and maintenance of coho acclimation/hatchery sites. Including the surveying and development of additional acclimation sites. These sites will be developed in strategic areas to optimize fish rearing activities, and in areas determined most productive for successful adult returns.

b. The YKFP's core objectives are as follows:

- 1) To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits;
- 2) To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
- 3) To implement and be consistent with the Council's Fish and Wildlife Program; and
- 4) To implement the Project in a prudent and environmentally sound manner.

c. All activities conducted by the YKFP, are consistent with the NPPC's Columbia River Basin Fish and Wildlife Program ("Program") Measure 7.4K.1.

d. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness of the target population and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production: 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and, 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

e. The expected outcome of the project is to have supplementation fish return as adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The project plans to evaluate several generations of releases to obtain a statistically significant result.

f. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The Yakima coho M&E plan will be modeled after the following spring chinook plan. 1. Quality control will monitor the performance of the facilities and their operators. 2. Product specification attributes to determine whether the fish produced by the project meet goals with respect to: fish health; morphology (size and shape); behavior; and survival. 3. Research monitoring activities will be

designed to test the performance treatments of artificially reared fish to compare their performance with naturally reared fish. Research monitoring would include measurements of performance in four main areas:

- o post-release survival (survival from time of release until the fish return to spawn);
- o reproductive success (number of offspring produced per spawner);
- o long-term fitness (genetic diversity and long-term stock productivity); and
- o ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment, and 5. Monitoring of stock status.

**NPPC Measure:** 7.4 K.1

**Partners:**

Not provided

9603501

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**Satus Watershed Restoration**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Lynn Hatcher, Fisheries Program Manager, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

Satus Creek, contained entirely within the Yakama Indian Reservation, is the most productive steelhead stream in Yakima subbasin, in recent years accounting for more than 1/3 of returning adults. The Satus watershed, comprising approximately 10% of the Yakima subbasin, is largely undeveloped and has no irrigation diversions. This setting offers a unique opportunity to proceed with the landscape-scale restoration and monitoring undertaken by the Yakama Nation Satus Watershed Project. Several major complementary projects, funded by six state and federal agencies, are also underway in the Satus watershed.

The Satus Watershed Project was conceived as a long-term, large-scale watershed restoration and monitoring effort designed to develop, apply, and evaluate cost-effective methods for restoring fish habitat degraded by impaired watershed functioning. This approach was accepted by the BPA, and the project was initiated in June 1996. We are increasing the productivity of anadromous fish habitat by restoring ecological function of the Satus Creek watershed (Brooks et al. 1991; FWP 1995). Restoration activities will also favor riparian dependent wildlife species and reestablishment of coho and spring chinook. Coordinated projects are addressing stream channel stability and complexity, riparian structure, diversity and productivity, and upland source areas.

This proposal outlines specific restoration and monitoring tasks which will effect improvements in ecological function. Project staff work closely with BIA and Tribal programs to assure that management activities in the watershed will be complementary. An extensive monitoring system is in place, quantifying the value of coordinated watershed-scale restoration.

**NPPC Measure:** 7.6A-D, 7.8A, B, E

**Partners:**

Not provided

9701300

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## Operation & Maintenance For Upper Yakima River Supplementation Facility

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Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Mel Sampson, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

- a. The operation and maintenance of the YKFP's Cle Elum Research and Supplementation Facility (CERSF), including its three acclimation sites (to be constructed in the upper Yakima River Basin).
- b. The YKFP's core objectives are as follows:
  1. To test the hypothesis that new supplementation techniques can be used in the Yakima and Klickitat River Basins to increase natural production and to improve harvest opportunities, while maintaining the long-term genetic fitness of the wild and native salmonid populations and keeping adverse ecological interactions within acceptable limits.
  2. To provide knowledge about the use of supplementation, so that it may be used to mitigate effects on anadromous fisheries throughout the Columbia River Basin;
  3. To implement and be consistent with the Council's Fish and Wildlife Program; and
  4. To implement the Project in a prudent and environmentally sound manner.
- a. All activities conducted by the YKFP, including the operation and maintenance of the CERSF; are consistent with the NPPC's Columbia River Basin Fish and Wildlife Program ("Program") Measure 7.4K.1.
- b. Supplementation is defined as utilizing artificial propagation in an attempt to maintain or increase natural production while maintaining long-term fitness for the target populations and while keeping ecological and genetic impacts on nontarget species within specified limits (RASP 1991).

YKFP operations have been designed to test the principles of supplementation. Its experimental design has focused on the following critical uncertainties affecting hatchery production : 1) the survival of hatchery fish after release from the hatchery; 2) the impacts of hatchery fish as they compete with wild populations; and 3) the effects of hatchery propagation on the long-term genetic fitness of fish stocks.

One of the YKFP's primary objectives is to provide regional resource managers with knowledge regarding these issues, and identify and apply improved methods for carrying out hatchery production and supplementation of natural production. The YKFP's monitoring activities are intended to evaluate the relative survival and success of various release groups of supplementation fish and to compare their success with that of naturally produced fish.

- c. The expected outcome of the project is to have supplementation fish return adults in sufficient numbers, and to have a reproductive rate of success that will contribute to the enhancement of the natural populations. The first smolts will be release in 1999, and the majority of the adults will return in 2001 form that release. The project plans to evaluate several generations of releases to obtain a statistically significant result.
- d. Project scientists and managers realize that effective monitoring is the key to a successful adaptive management program. The YKFP's PSR and the Monitoring and Evaluation Plan lay out an integrated multi-level monitoring program for supplementing upper Yakima spring chinook. This structure ensures that strategies are implemented as intended, that experimental studies produce reliable results, and that risks associated with unresolved uncertainties re contained. The Project's upper Yakima spring chinook monitoring plan addresses the following five monitoring categories: 1. Quality Control will monitor the performance of the facilities and their operator. 2. Product specification attributes will be monitored at the Cle Elum facility, the acclimation ponds, and the juvenile monitoring facilities to determine whether the fish produced by the project meet goals with respect to: fish health, morphology (size and shape);

behavior; and survival. 3. Research monitoring activities will be designed to test the performance of two treatments of artificially reared fish (OCT vs SNT) and to compare their performance with naturally reared fish. Research monitoring would include measurements of performance in four main areas:

- post release survival (survival from time of release until the fish return to spawn);
- reproductive success (number of offspring produces per spawner);
- long-term fitness (genetic diversity and long-term stock productivity); and
- ecological interactions (population abundance and distribution, growth rates, carrying capacity, survival rates, transfer of disease, and gene flow).

4. Risk containment and 5. Monitoring of stock status. Details can be found in YKFP's M & E project #9506300.

**NPPC Measure:** 7.4K.1

**Partners:**

Not provided

9704900

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## **Teanaway River Instream Flow Restoration**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Lynn Hatcher, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

- a. This proposal addresses instream flows in the Teanaway River.
- b. The overall goal of this project is to increase instream flows in the Teanaway River. The ultimate goal is to increase natural salmon and steelhead production in this stream.
- c. This project supports the Fish and Wildlife Program's general goal of "a healthy Columbia Basin, one that supports both human settlement and the long-term sustainability of native fish and wildlife species in native habitats...." (Section 2.1) Specific Program measures addressed by this project include 7.1, 7.7, 7.8G, 7.8H, and 7.11.C. Improved instream flows in the Teanaway River will increase both juvenile rearing habitat and improve passage conditions for adult salmon. In addition, improved instream flows will assist in restoring a healthy riverine ecosystem that is essential for the natural production of salmon and steelhead.
- d. Low summer instream flows have been recognized by Tribal, state, and Federal fisheries agencies as a serious problem with respect to salmon and steelhead production in the Teanaway River for many years. In May 1996, the Teanaway River was listed on the Washington State Clean Water Act Section 303(d) list as both flow and temperature impaired. Water acquired through cooperative water conservation projects will be dedicated to instream flows in the Teanaway River.
- e. Water conservation programs will be implemented with cooperating landowners and the conserved water dedicated to instream flows. Conservation programs are expected to be operational by September 1999.
- f. Water measuring devices will be placed on all water diversions involved in the water conservation program. Continuous monitoring will ensure that diversions are reduced in order to increase instream flows.

**NPPC Measure:** 2.1, 7.7, 7.8G, 7.8H, 7.11.C

**Partners:**

Not provided

9705100

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## Yakima Basin Side Channels

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Scott Nicolai, YIN, 509-865-6262 x6689

**Target stocks:**

Not provided

**Description:**

Items included in this proposal include:

1. Protection of important off-channel rearing habitats associated with the Yakima and Naches mainstems;
2. Reconnection of currently inaccessible off-channel rearing habitats;
3. Protection and reconnecting stream channels with their attendant floodplain; and,
4. Restoration of off-channel rearing habitat function through riparian revegetation.

The goal of the project is to rebuild Yakima River spring chinook and steelhead populations, by working in concert with other fish recovery efforts in the basin. Most notably, the Yakima Klickitat Production Facility, now in place, intends to rebuild naturally spawning populations of wild anadromous salmonids. To reach this overarching goal, watershed protection and recovery efforts, such as this proposal, must be implemented.

Off-channel and floodplain habitats in the target reach have been severely reduced through construction of transportation corridors, irrigation development, diking, and through control of the river hydrograph. Project objectives include protection, reconnection and habitat restoration in off-channel rearing habitats (side channels and backwater alcoves) associated with the Yakima and Naches Rivers. Where practical, stream channels will be reconnected with their associated floodplains through levee obliteration, or levee relocation.

The project is relevant to the 1994 Columbia Basin Fish and Wildlife program in that it will contribute to the protection and restoration of anadromous fish stocks in the Yakima Basin. Further, the project will protect and restore terrestrial wildlife species through riparian habitat fencing, and purchase of conservation easements and property.

The project is based upon the scientific principle that protecting, reconnecting and restoring off-channel rearing habitats and floodplains will provide fry/parr with more opportunities to access optimal rearing habitats, ultimately contributing to the rebuilding of Yakima Subbasin spring chinook salmon and summer steelhead populations. This will be achieved by the end of FY2001.

The results of reconnection and restoration will be monitored through snorkle surveys in the treated streams.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9706200

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**Development /Refinement of Natural Production Objectives &  
Strategies**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Melvin Sampson, YIN, 509-865-6262

**Target stocks:**  
Not provided

**Description:**

The overall project goal is to develop the most rational possible initial enhancement strategy for species/stocks not yet targeted by the YKFP. This rationality derives from a rigorous integration of known seasonal habitat characteristics in environmentally distinct portions of the basin, known lifestage-specific habitat requirements for a given species, and known lifestage-specific movement patterns. The integration takes the form of a reach by season survival landscape, which represents all possible survival probabilities for fish during the egg-to-smolt portion of their life cycle. Well-established principles of population dynamics are used to estimate productivity and carrying capacity for each distinct egg-to-smolt trajectory through the landscape, and for any combination of trajectories (Moberg and Lestelle, 1997). This kind of "landscape ecology" has recently been strongly recommended by Regional biologists (NRC, 1996; ISG, 1996). This analysis requires the use of a computer program, the Ecosystem Diagnosis and Treatment (EDT) model (Lestelle et al., 1996) and, because of the time required to estimate season- and lifestage-specific survival probabilities from known habitat attributes for every reach in the basin, requires about one man-year per species.

**NPPC Measure:** 7.4K.1

**Partners:**  
Not provided

**9106100**

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**WDFW Projects**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** WDFW

**HUs:** see project 9609400

**Acres:** see project 9609400

**Hydroproject:** see project 9609400

**Description:**

Submitted to BPA as part of project 9609400.

9206200

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**Yakama Nation - Riparian/Wetlands Restoration**

Subregion: Lower Mid-Columbia

Subbasin: Yakima

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**Sponsor:** Tracy Hames, YIN, 509-865-6262

**HUs:** 1,750

**Acres:** 5,600

**Hydroproject:** Ice Harbor, Lower Monumental, McNary, John Day, The Dalles, Bonneville

**Description:**

This project has been designed to restore wetlands and riparian habitats along anadromous fish-bearing streams on the Yakama Indian Reservation. Overall goals include the protection, restoration and management of 27,000 acres of floodplain lands along the Yakima River, Satus and Toppenish Creeks. Direct mitigation is being realized for losses identified in the 1994 Columbia Basin Fish and Wildlife Program relating to the construction of the lower 4 Columbia River Dams. Extensive partnership and cost-share components provide extensive savings to this Project.

Land securing methods include purchase, easement, or long-term lease depending on the nature of the land ownership and the cost-effectiveness of the activity. Approximately 2,000 - 3,000 acres are secured each year. Restoration activities seek to restore historic conditions. Land disturbing activities are subject to cultural and archaeological surveys, and are used only on properties which have suffered past disturbances. Native vegetation re-establishment, and a return to some semblance of historic hydrology are the goals on the restoration sites. Restoration efforts are designed to be as self-sustaining as possible to minimize the O&M needed to maintain habitat values.

The expected outcomes of the project are native riparian and wetland floodplain complexes along the anadromous fish-bearing streams on the Yakama Indian Reservation. Results will be monitored using HEP to account for the direct mitigation earned toward the construction losses of the Columbia River hydropower system. Specific vegetational, population and hydrologic results will also be monitored at each property to ensure that restoration goals are being met in a cost-effective manner.

**NPPC Measure:** 11.3F.5 - Ongoing Wildlife Mitigation projects, 7.6 - Habitat Goal, Policies and Objectives

9044

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## Replace Chumstick Creek Culvert

Subregion: Upper Mid-Columbia

Subbasin: Wenatchee

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**Sponsor:** Bob Steele, Area Habitat Manager, WDFW, 509-662-0503

**Target stocks:**

Spring Chinook salmon, Summer steelhead, bull trout, and coho (with possible reintroduction of coho into Wenatchee Subbasin in the near future)

**Description:**

The entire Chumstick Watershed is blocked to anadromous and resident fish passage by a 178 foot long, 10 foot diameter culvert on North Road, at the creek's confluence with the Wenatchee River. This prevents use of 78 square miles of historic habitat to spring chinook salmon and bull trout (both presently proposed for federal listing) summer steelhead (presently listed as "endangered" under the Endangered Species Act) and other fish life. Washington Department of Fish and Wildlife and Chelan County Public Works will replace the culvert with a large bottomless arch structure to allow both adult and juvenile salmonid passage into the watershed under all flow conditions. Additionally, WDFW in cooperation with Chelan County, USFWS, Trout Unlimited, The Chumstick Watershed Association, and the Washington State Regional Fisheries Enhancement Group will install several instream fish habitat structures and commence riparian restoration work at the project site.

**NPPC Measure:** 7.6; 7.7; 7.9

**Partners:**

Chelan County Public Works, USFWS, Trout Unlimited, Chumstick Watershed Association and Washington Regional Fisheries Enhancement Group.

9604000

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## Evaluate the Feasibility and Risks of Coho Reintroduction in Mid-Columbia

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Subregion: Upper Mid-Columbia

Subbasin: Methow

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**Sponsor:** Lynn Hatcher, YIN, 509-865-6262

**Target stocks:**

Not provided

**Description:**

The management and scientific principles guiding the Yakama Nation's ceded-area salmon restoration programs are fully described in the Columbia River tribes' salmon restoration plan, Wy-Kan-Ush-Mi Wa-Kish-Wit, Spirit of the Salmon. Within the Mid-Columbia River Basin, the overall goal is to restore salmon populations, including coho, and their natural habitats to levels of abundance and productivity sufficient to support sustainable annual harvests by Tribal and other fishers.

The protection, mitigation, and enhancement of fish and wildlife resources of the Columbia River and its tributaries is one of the major goals of the Northwest Power Act. The Act requires that the Northwest Power Planning Council (NPPC) develop a program to protect and rebuild Columbia Basin fish and wildlife resources (NPPC, 1994). As part of this effort, the NPPC directed the region's fish and wildlife agencies, and Indian tribes to develop a system wide plan for rebuilding fishery resources. This included development of 31 integrated subbasin plans for major river drainages in the Columbia Basin.

The NPPC also recognized the value of scientifically supported supplementation programs for the rehabilitation of weak wild and naturally spawning populations. In summarizing recent amendments to their Fish and Wildlife Program the NPPC stated, "As part of updating the subbasin plans, agencies and tribes will propose supplementation projects to help rebuild naturally spawning salmon populations" (NPPC, 1994).

It is expected that progress toward meeting the goal of this plan will be realized through the use of implementation plans. Implementation plans (IPs) will be developed or reviewed with relevant fishery managers. The IPs will specifically describe proposed resource management actions including information such as the size, lifestage, objectives/constraints/risks and locations of Mid-Columbia basin coho releases and M/E objectives. Frequent reviews of the IPs will allow use of the most current information (i.e., expected escapements, habitat conditions, monitoring and evaluation results, etc.) to ensure the effectiveness of the IPs in achieving the stated goal of this plan. It is further expected that IPs will be modified as necessary to accommodate changing management priorities and restoration opportunities.

Because coho are extirpated from the mid-Columbia, it is anticipated that the project will require upto a couple of decades to achieve its overall goal of restoration. The initial phase is focused on feasibility/risks with intensive M & E to evaluate expected outcomes.

**NPPC Measure:** 7.1H, 7.4A, 7.4O, 7.4F

**Partners:**

Not provided

9604200

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## Restore and Enhance Anadromous Fisheries and Habitat in Salmon Creek

Subregion: Upper Mid-Columbia

Subbasin: Okanogan

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**Sponsor:** Hilary Lyman, Watershed Coordinator, CCT, 509-826-1294

**Target stocks:**

Summer Steelhead, Spring Chinook

**Description:**

The watershed coordinator spent 1997 and part of 1998 building support for habitat restoration in a tributary of the Okanogan River, Salmon Creek. The coordinator met with key stakeholders numerous times to explain why Salmon Creek was such a good candidate for restoration activities. In addition, the coordinator cultivated a relationship with the most important stakeholder group in Salmon Creek, the Okanogan Irrigation District, who divert 100% of the instream flow into their irrigation canal except during periods of high spring runoff. The district also operates a diversion dam that is a barrier to fish passage. These two barriers make up the greatest percentage of impediments to anadromous fish in Salmon Creek; other problems are related to activities on private lands—overgrazing, lack of vegetative cover, high sediment load (cause unknown).

In early 1998 a memorandum of understanding between the irrigation district and the tribes was developed to form a partnership to address improving instream flows. A workplan and timeline for completion was agreed upon by both partners. The expected outcome will be a water management plan for the irrigation district that would provide instream flows suitable to re-establish anadromous fish runs. The water management plan will be completed in 1999. Funding is requested through this proposal to enable the irrigation district to hire planning and engineering staff and provide counsel on legal issues associated with any changes to current water distribution (\$50,000).

Other agencies with management responsibilities for natural resources will work with the tribes to address increasing instream flows, streambank stabilization problems, sedimentation issues and increasing vegetative cover along the riparian corridor. We aim to partner with the U.S. Fish & Wildlife Service to educate private landowners about cost-sharing programs available to address these issues and to carry out two demonstration projects. In addition we aim to contract with the Natural Resource Conservation Service to conduct a hydrological study that looks at land use practices that negatively affect instream flows. A prescriptive report detailing projects to be undertaken and how their effectiveness will be monitored and evaluated will be included in the study. Funding requested for this element of the proposal totals \$50,000.

**NPPC Measure:** Sections 7.6B.1, 7.7B, 7.8

**Partners:**

To be approached: Okanogan Irrigation District, Okanogan Conservation District, Natural Resources Conservation Service, Washington Dept. of Fish and Wildlife, U.S. Dept. of Fish and Wildlife, private landowners in Salmon Creek, the Town of Okanogan,

9502800

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## Restore Moses Lake Recreational Fishery

Subregion: Upper Mid-Columbia

Subbasin: Crab

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**Sponsor:** Joe Foster, WDFW, 509-754-4624

**Target stocks:**

bass  
crappie  
bluegill  
rainbow trout

**Description:**

The Moses Lake Fishery Restoration Project (NWPPC Measure 10.8B.19) would determine factors contributing to the decline of important recreational resident species fisheries in Moses Lake and implement a restoration program that would eliminate current constraints and restore once abundant fish populations and recreational fisheries. The project affords an ideal opportunity to increase recreational angling for resident fish stocks in the Columbia Basin to compensate for the loss of similar opportunity in the region due to hydropower development and operation within the mainstem Columbia River, where the habitat has been so severely altered that opportunities for compensation cannot be realized.

The project will be carried out in three phases, starting in FY98 and continuing through an implementation phase lasting through FY03. Phase one will examine all existing fishery, population and environmental information and collect critical non-existent data for limiting factors analysis. Phase two will investigate the most likely limiting factors utilizing sampling procedures and analysis methods developed by WDFW management and research staff for reservoir analysis, and phase three will involve implementation of recommended measures such as population control, habitat alteration, fishery regulation, stocking or others as determined by the study. Principles of adaptive management will be applied as various management strategies are applied and evaluated for effect. The expectation is that we will be able to identify key factors limiting production and implement some management strategies that will eliminate these constraints and restore the fishery in Moses Lake to its former level, producing more than 500,000 days of recreational angling annually.

**Relation to MYIP:**

This project addresses the objectives and strategies for warmwater fish identified in Section 6.6.4.3.A.

**NPPC Measure:** 10.8B.23

**Relation to NPPC:**

Not provided

**Partners:**

This project will be undertaken in cooperation and consultation with the Grant County Fisheries Advisory Committee, the Moses Lake Irrigation and Rehabilitation District, Big Bend Economic Development Council, and the US BOR.

9094

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**Produce Kokanee Salmon in Net Pens for Release into Lake Roosevelt**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Keith Underwood, STOI, 509-258-7020

**Target stocks:**

Not provided

**Description:**

This program is directly called for in Section 10.8B.4 of the 1994 Fish and Wildlife Program, and includes construction and maintenance of 20 net pens for rearing of kokanee salmon in Lake Roosevelt, Washington. The net pens will be supplied with fish from the Spokane Tribal and Sherman Creek Hatcheries as part of mitigation efforts in Lake Roosevelt. The use of net pens will allow more kokanee salmon to be raised to larger (post-smolt) sizes prior to release, as post-smolts are less susceptible to entrainment from Lake Roosevelt. The Lake Roosevelt Monitoring / Data Collection Program (LRMDCP; BPA 9404300) has found net pens to be an effective method of raising rainbow trout that contribute significantly to the creel in Lake Roosevelt. The LRMDCP will monitor and evaluate the success of stocking kokanee salmon from net pens in terms of both survival and their contribution to the creel.

**Relation to MYIP:**

Not provided

**NPPC Measure:** 10.8B.4

**Relation to NPPC:**

Not provided

**Partners:**

Not provided

8503800

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## Colville Hatchery

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Kirk Truscott, CCT, 509-634-8845

**Target stocks:**

rainbow trout

brook trout

lahontan cutthroat trout

cutthroat trout

**Description:**

The Colville Tribal Fish Hatchery is a project within the North West Power Planning Council's Fish and Wildlife Program that partially mitigates for anadromous fish losses in the "blocked areas" of the Columbia River Basin. The hatchery project was adopted into the Council's fish and wildlife Program in 1984 as resident fish substitution for anadromous fish losses. The goal of the project is to provide artificial production of fish that will help support and enhance tribal subsistence fisheries and non-tribal recreational sport fisheries within the Colville reservation including its boundary waters. The fish provided by the facility are intended to be capable of not only direct creel contribution, but to contribute to the natural production component of the reservation fisheries in areas compatible with native fish conservation. The majority of the hatchery production provides a "carry-over fishery" rather than a "put-and-take" fishery. Specific hatchery objectives include: 1) 22,679 kg to include 160,000 fingerling rainbow trout (90 fish/lb.), 330,000 sub-catchable rainbow trout, 80,000 legal size rainbow trout, 196,000 fingerling brook trout, 330,000 sub-catchable brook trout and 100,000 lahontan cutthroat trout; 2) fishery Catch Per Unit Effort (CPUE); subsistence fishery of 1.0 fish/hr and recreational/sport fishery of .8-1.0 fish/hr; 3) creel fish condition factors: Brook trout ( $K > 152 \times 10^{-7}$ ), rainbow trout ( $K > 152 \times 10^{-7}$ ) and lahontan cutthroat trout ( $K > 152 \times 10^{-7}$ ); 4) increase natural production of brook and rainbow trout (10% and 15% respectively) by the year 2010; 5) brood stock objectives: maintain current free-ranging brood stock sources, develop a free-ranging rainbow trout brood stock source; 6) fish culture objectives: provide rearing conditions that prevent the manifestation of bacterial and viral diseases and minimize fin erosion; 7) fishery monitoring objectives: access the fishery contribution of natural and hatchery production; and, 8) maintain coordinated fisheries management within the reservation and other affected areas within the Columbia River Basin.

**Relation to MYIP:**

This project is identified in the current MYIP (Sections 6.6.4.1.A, 6.6.4.2.A, 6.6.4.2.B, 6.6.4.2.C) and meets the plan's overall goals and objectives. Specifically the project mitigates for anadromous fish losses in the "blocked area" utilizing artificial production to enhance tribal and non-tribal fisheries. The utilization of artificial production for enhancement is being conducted in a manner consistent with the native species conservation. The project also meets project specific goals and objectives that have been adopted into the Power Councils Fish and Wildlife Program and are identified in the MYIP, including a monitoring and evaluation phase.

**NPPC Measure:** 10.8B.6

**Relation to NPPC:**

The Colville Tribal Fish Hatchery was constructed to satisfy program measure 10.8B.6

**Partners:**

Not provided

9001800

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## Evaluate Rainbow Trout Habitat/Passage Improvements of Tribs. to L. Roosevelt

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Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** David Alexis, CCT, 509-634-8845

**Target stocks:**

adfluvial rainbow trout

**Description:**

The Lake Roosevelt Rainbow Trout Habitat/Passage Improvement Project is a resident fish substitution project to mitigate for anadromous fish losses above Chief Joseph and Grand Coulee Dams. The goal of the project is to increase natural production of adfluvial rainbow trout in tributaries to Lake Roosevelt through habitat and fish passage improvements in selected tributaries. Specific over-all Program objectives include: Increase parr production consistent with habitat availability to help achieve a 12,000 fish harvest of adfluvial rainbow trout by the 2000; manage adfluvial rainbow trout populations as self-sustaining populations (escapement of 6,000 adults by the year 2000); identify future habitat/passage improvement opportunities in the "blocked areas" above Chief Joseph and Grand Coulee Dams; monitor and evaluate habitat/passage improvements. The project includes three phases: Phase I- Develop base-line information of existing conditions and strategies/opportunities for enhancement; Phase II- Implement selected actions/strategies described in Phase I; and, Phase III- Monitor and evaluate the impacts of implementation actions. The current project scope includes Phase III, which began in 1996 and will continue through 2000. Phase III will develop a comparative analysis of pre- and post-implementation of habitat/passage improvements by monitoring fish populations (both juvenile and adult), examining fish passage effectiveness, instream habitat effectiveness on channel morphology fish habitat, and fish habitat utilization and effectiveness of riparian habitat improvement actions.

**Relation to MYIP:**

This project is identified in the current MYIP (Sections 6.6.4.1.B and 6.6.4.1.C) and meets the plan's overall goals and objectives. Specifically, the project focuses upon improving passage conditions and habitat for adfluvial rainbow trout (native fish species) in an effort to improve the population status of this important stock. The stock is and continues to be an important component to a limited tribal fishery and has the potential to provide a substantial Tribal and non-tribal fishery.

**NPPC Measure:** 10.8B.7

**Relation to NPPC:**

This project is program measure 10.8B.7

**Partners:**

Currently, cooperation exists between related projects through data sharing and sub-contracting. Projects currently share personnel to complete their scope of work, particularly during the spring and fall field seasons. Limited equipment sharing exists, primarily adult and juvenile fish trapping equipment.

9104600

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**Spokane Tribal (Galbraith Springs) Hatchery O&M**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Tim Peone, STOI, 509-258-7297

**Target stocks:**

kokanee

rainbow trout

**Description:**

The Spokane Tribal Hatchery was constructed in 1991 to restore and enhance kokanee salmon (*Oncorhynchus nerka*) and rainbow trout (*Oncorhynchus mykiss*) populations in Lake Roosevelt and Banks Lake (Grand Coulee Dam Impoundment). Hatchery production goals and objectives are recommended to the Spokane Tribe (manager) and Bonneville Power Administration (funding agency) by fishery managers from the Spokane Tribe, Colville Tribe and Washington Department of Fish & Wildlife. The current annual production goal includes 500,000 kokanee yearlings, 960,000 kokanee fingerlings and 530,000 rainbow trout fingerlings. The hatchery is operated in conjunction with the Sherman Creek Hatchery and Lake Roosevelt Net Pen Program which serve as transfer, acclimation and release sites. The hatchery programs effectiveness on the Lake Roosevelt fishery is evaluated by the Lake Roosevelt Data Collection and Monitoring Program. Since 1991, kokanee runs to Lake Roosevelt tributaries have been established/restored and angler hours, harvest of kokanee salmon and rainbow trout and the economic value have increased. This project serves as partial mitigation for the extinction of salmon and steelhead incurred by the development of the Grand Coulee Dam Hydro Electric Project. Funding for this project is received from the Bonneville Power Administration through mandates included in the Northwest Power Planning Council's 1987 Columbia Basin Fish and Wildlife Program, Phase IV Resident Fish & Wildlife Amendments and accordingly the 1994 Columbia Basin Fish and Wildlife Program.

**Relation to MYIP:**

This project is listed in the MYIP (Sections 6.6.4.1.A, 6.6.4.1.B, and 6.6.4.1.C) and meets the goals of resident fish managers by providing subsistence and recreational fisheries in Lake Roosevelt (Upper Columbia Subregion) as substitution for lost anadromous fish runs above Chief Joseph and Grand Coulee Dams. This program assists the Lake Roosevelt Fisheries Monitoring Program by providing the opportunity for mass marking of fish for various studies conducted in Lake Roosevelt.

**NPPC Measure:** 10.8B.5

**Relation to NPPC:**

Provides funds for the operation and maintenance of Spokane Tribal Hatchery.

**Partners:**

The Spokane Tribe has provided \$220,000 dollars (FY 97 figure) for building an adult kokanee salmon collection facility on the southeastern boundary of the reservoir (Little Falls Dam). The facility will be constructed in 1998 and will enable the Tribe to collect kokanee salmon eggs from migrating adults. This in conjunction with the Sherman Creek Hatchery should provide enough kokanee salmon eggs to meet the biological objectives of the cooperative programs on Grand Coulee Reservoir. The Tribe is affiliated with Lake Roosevelt Forum which serves as a public interface and is also involved with Lake Roosevelt Development Association who is rearing Spokane Tribal Hatchery raised rainbow trout in net pens.

9104700

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**Sherman Creek Hatchery O&M**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** John Kerwin, WDFW, 360-902-2623

**Target stocks:**

Lake Whatcom/kokanee

Spokane stock rainbow

**Description:**

The role of the Sherman Creek Hatchery is to: 1) establish a kokanee broodstock; 2) create and enhance the kokanee fishery within Lake Roosevelt; and, 3) assist in rainbow trout rearing for net pens on Lake Roosevelt and enhance the rainbow trout recreational fishery. The hatchery is one of two resident fish facilities constructed to provide partial mitigation for the loss of anadromous fish habitat due to the construction of Grand Coulee Dam in 1941. The BPA, Spokane Tribe of Indians, Colville Confederated Tribes, Upper Columbia United Tribes Fisheries Research Center, and WDFW work conjunctively towards the fishery enhancement on Lake Roosevelt and Banks Lake. These members form the Lake Roosevelt Hatchery Coordination Team that provides program objectives, direction and oversight for the program at the Sherman Creek and Spokane Tribal hatcheries.

**Relation to MYIP:**

This project specifically addresses kokanee and rainbow trout production objectives ( Sections 6.6.4.1.A and 6.6.4.1.B) to provide high quality sport and subsistence fisheries.

**NPPC Measure:** 10.8B.2

**Relation to NPPC:**

Not provided

**Partners:**

Lake Roosevelt Development Association (LRDA). Hatchery coordination decisions that affect the Spokane Tribal Hatchery and the Sherman Creek Hatchery are reached through coordination meetings with the Washington Department of Fish and Wildlife, Spokane and Colville Indian tribes.

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## Monitor, Evaluate, and Research the Lake Roosevelt Fishery

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Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Keith Underwood, STOI, 509-258-7020

**Target stocks:**

kokanee salmon

rainbow trout                      Natural production assisted by artificial outplanting, contributes to rebuilding weak but recoverable native population, production returning to hatchery or adult collection site, or artificial production for fisheries enhancement.

walleye

All other resident fishes in Lake Roosevelt

Naturally spawning fish without targeted artificial enhancement.

**Description:**

The Lake Roosevelt Monitoring / Data Collection Program specifically addresses section 10.8B.5 of the NPPC Fish and Wildlife Program. The current vision of the program is to establish ecological conditions and fish populations in Lake Roosevelt that provide long-term readily accessible tribal subsistence fisheries and sport angler fisheries to substitute for the loss of anadromous fishes caused by the creation of Grand Coulee Dam. Program goals are two fold: 1) develop an informed fisheries management plan with mitigation and water management recommendations that maximize the Lake Roosevelt fisheries while providing for the needs of other resources downstream; and, 2) monitor and evaluate the effects of stocking hatchery fish on the ecology of Lake Roosevelt and identify stocking strategies that maximize harvest opportunity and egg production. Program objectives include: 1) monitor and evaluate the efficacy of current fisheries management actions in Lake Roosevelt; 2) Model the effects of lake operations and management actions on various trophic levels within Lake Roosevelt; and, 3) Based on model results, develop a Lake Roosevelt Fisheries Management Plan (including biological and integrated rule curves) among co-managers and other stakeholders. Data collection is performed utilizing standardized methods for fish, water quality and laboratory analyses, and data collection and modeling efforts should be complete by 2003. A monitoring and evaluation phase will follow to assess model performance and resultant management actions.

**Relation to MYIP:**

This project is listed in the MYIP (Section 6.6.4.1.A, 6.6.4.1.B, and 6.6.4.1.C) and meets the goals of resident fish managers by providing subsistence and recreational fisheries while maintaining wild stocks of kokanee salmon and rainbow trout. This project monitors and evaluates the success of various stocking strategies for kokanee and rainbow trout to maximize both harvest and egg take at production facilities. The long-term monitoring of fishery in Lake Roosevelt is necessary to define progress towards the biological objectives as defined in the MYIP, and to establish the effects of hydro operations on the fishery.

**NPPC Measure:** 10.8B.2-4, 10.8B.9,11, 10.3E.3-5  
10.8B.5, 10.8A.11, 10.3E.5, 2.2E5 through 2.2E.7

**Relation to NPPC:**

Collects necessary data to monitor and evaluate biota in and to construct required rule curves for Lake Roosevelt. Data will also be used to assess success and/or effectiveness of other program measures (10.8B.2 to 10.8B.4, 10.8B.9, 10.8B.11 and 10.3E3 to 10.3E.5).

**Partners:**

The Spokane Tribe has provided \$220,000 dollars (FY 97 figure) for building an adult kokanee salmon collection facility on the southeastern boundary of the reservoir (Little Falls Dam). The facility will be constructed in 1997 and will enable the Tribe to collect kokanee salmon eggs from migrating adults. This in conjunction with the Sherman Creek Hatchery should provide enough kokanee salmon eggs to meet the biological objectives of the cooperative programs on Lake Roosevelt. All related BPA projects are

currently sharing equipment and personnel to the extent possible as defined by project objectives, time schedules, and equipment needs.

9500900

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## Volunteers Rear 500,000 Net Pen Rainbow Trout Above Grand Coulee Dam

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Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Gene Smith, LRDA, 509-725-8416

**Target stocks:**  
rainbow trout

**Description:**

Project Description: The 1994 FWP allows for the mitigation for salmon and steelhead runs that have been lost to the area above Grand Coulee Dam. Lake Roosevelt net pen program is being funded as a resident fish substitution project under Section 10.8B 1994 FWP. The program substitutes for loss of salmon and steelhead, but also for wild stock rainbows which were declining due to fishing pressure and habitat problems in spawning areas. The release of 500,000 net pen reared rainbow provides anglers with a substitute for salmon and reduces pressure on wild stocks of rainbow. The net pen program is operated according to and in conjunction with the biological objectives set forth in the FWP 1994, Sec 10.8B.4. Utilizing rainbow trout rearing by net pens to help rebuild wild stock populations is also a CBFWA subbasin management objective.

**Relation to MYIP:**

Section 6.6.4.1.

**NPPC Measure:** 10.8, 10.8B,10.8B3, 10.8B.4, 10.8B.11.

**Relation to NPPC:**

The biological objectives at Lake Roosevelt allow for an annual target of 500,000 harvestable adult rainbow trout reared in net pens with an annual harvest target of 190,000 adult rainbows.

**Partners:**

LRDA has the support of many entities. We are dependent upon maintaining the cooperative spirit and the grass roots enthusiasm of volunteers. Through this cooperation the Washington State Department of Fish and Wildlife, the National Park Service, the Bureau of Reclamation, the Spokane Tribe of Indians, and the Colville Confederated Tribes along with the Corps of Engineers have all supported the net pen program as a valued means of enhancing the Lake Roosevelt fishery. We have met NEPA requirements and other environmental concerns. LRDA is presently operating with 42 volunteers who help with maintaining the net pens and docks and feed the fish.

9501100

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## Chief Joseph Kokanee Enhancement Project

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Kirk Truscott, CCT, 509-634-8845

**Target stocks:**

kokanee

**Description:**

The construction of Grand Coulee and Chief Joseph Dams in 1939 and 1956 completely and forever blocked the anadromous fishery above these Federal hydropower projects ("Blocked Areas"). The Confederated Tribes of the Colville Indian Reservation are working cooperatively with the Spokane Indian Tribe and the Washington Department of Fish and Wildlife in fisheries enhancement programs for Lake Roosevelt utilizing resident fish substitution for anadromous losses (resident fish substitution). The Chief Joseph Kokanee Enhancement project is one such resident fish substitution project that is being implemented in the "blocked area". This project was amended into the council's Fish and Wildlife program during the 1995 amendment process and began its first year of operation in 1996. The goal of the Chief Joseph Kokanee Enhancement Project will be to protect and enhance the naturally producing kokanee populations above Chief Joseph and Grand Coulee Dams in an effort to support the tribal subsistence and non-tribal recreational sport fishery in the blocked areas. The project further intends to preserve a potentially unique stock of kokanee. The status of the naturally producing kokanee population is not well documented, however spawning populations have been recorded in at least eight (8) different tributaries and in Lake Roosevelt proper. The primary objective of this project will be to determine the current status of the naturally producing populations and examine potential limiting factors to the natural production component that have not been addressed in other enhancement projects in the "blocked area" and propose potential actions based on the research findings. Potential limiting factors and research include: 1) determine specific entrainment losses through Grand Coulee Dam and establish species composition of entrained fish; 2) determine spawner escapement (status/strength) at all historical and unknown spawning sites; 3) determine egg to fry survival rates and subsequent contribution to local fishery; and, 4) determine genetic status of the current naturally production population. Research data has been collected during 1996-1997 and is currently being analyzed. Data collection is ongoing. Project findings may indicate a stock in jeopardy and will identify hydropower operation, powerhouse and turbine/turbines responsible for greatest entrainment. Final outcomes may include recommendations regarding power generation, fishery regulation changes, development of captive brood program, etc.

**Relation to MYIP:**

This project is identified in the current MYIP (Section 6.6.4.1.B) and meets the plan's overall goals and objectives. It focuses upon evaluating the status of the "unique" natural production kokanee stocks above Chief Joseph and Grand Coulee dams (blocked area) and identifying potential limiting factors to this population. This kokanee stock is an important component to a tribal and non-tribal fishery.

**NPPC Measure:** 10.8B.3

**Relation to NPPC:**

The project meets project specific goals and objectives adopted into the NPPC Fish and Wildlife Program.

**Partners:**

Project timing could be affected if recruitment of natural production kokanee are insufficient for continued stock propagation. We are dependent upon the Washington Department of Fish and Wildlife for scientific collection permits. Currently this project shares information collected by screw trapping operations with the Lake Roosevelt Habitat Improvement Project (LRHIP) and with the Ambient Monitoring Project. Wier panels and equipment are shared with the LRHIP.

9013

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**Hellsgate Big Game Winter Range Continuing Acquisition**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Steven L. Judd, Senior Wildlife Biologist, CCT-FWD, 509-634-8845

**HUs:** To be determined

**Acres:** To be determined

**Hydroproject:** Grand Coulee

**Description:**

This project is a continuing segment of the Tribes Hellsgate Winter Range Wildlife Mitigation Project. This is under our overall goal of mitigating for as much of the wildlife losses suffered from Grand Coulee and Chief Joseph Dam Projects as is possible.

It will add additional land to the existing mitigation base by acquiring management rights to adjacent or similar lands within the project area. Approximately 2,000 to 4,000 acres will be acquired depending on cost of agreements.

These lands will enhance and buffer current efforts. They will be managed to protect, enhance and partially mitigate for habitat losses due to Hydropower developments as provided under the Northwest Power Act of 1980 and the 1994 FWP. Primary emphasis is on deer winter range and sharp-tailed grouse habitat. However, a large number of other species will receive benefit due to habitat protection and enhancement which will lead to overall increase of bio-diversity.

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**Rasor Ranch Acquisition/Crab Creek Watershed Restoration Project**

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Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Greg Hughes, USFWS, CNWR, 509-488-2668**HUs:** 1000**Acres:** 4,200**Hydroproject:** Grand Coulee**Description:**

The USFWS is proposing to acquire shrub-steppe uplands of the Rasor Ranch under a cooperative effort with NRCS, USBR and DU. The purchase would link WDFW and USFWS lands to the west with USFWS lands to the east and include approximately 5 miles of Lower Crab Creek stream bottom and adjacent riparian and upland habitats within the Crab Creek Watershed. Objectives would include: the removal of farming and livestock operations from damaged wetland, riparian, and upland areas, wetland, riparian and upland restoration, noxious weed control, fencing and compatible wildlife oriented public use and education. BPA wildlife funds would be used for restoration and future outyear funding for operation and maintenance activities.

The project will benefit a rich and diverse group of fish, wildlife and plant species. The Crab Creek watershed supplies habitats for at least 20 animal and plant species that are listed as sensitive, threatened, or endangered. The property provides important migratory waterfowl, shorebird and other migratory bird habitats as well as year-round habitats for resident fish and wildlife species.

Currently the stream suffers from the effects of dredging and channelization and the adjacent wetlands suffer from draining for and from agricultural practices. The uplands suffer from grazing impacts. Retiring this land from farming and grazing, and restoration of the wetland, riparian and upland habitats will be an instrumental first step in restoring this property and the Lower Crab Creek Watershed.

Previous enhancement activities by NRCS, USFWS, WDFW, USBR and DU indicates that the watershed responds well to treatment and this property could be restored within two years for the wetland/riparian habitats and within 3-5 years for the upland component. A baseline HEP evaluation will be accomplished within the first year and monitoring will be accomplished following restoration activities.

**9204800**

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**Hellsgate Big Game Winter Range**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Steven L. Judd, Senior Wildlife Biologist, CCT, 509-634-8845

**HUs:** 9,322

**Acres:** 16,652

**Hydroproject:** Chief Joseph, Grand Coulee

**Description:**

The Hellsgate Project has been approved as a wildlife mitigation project to address adverse impacts caused by the federal hydropower system on the Columbia River, specifically Chief Joseph and Grand Coulee Dams. The Hellsgate Project is funded by the BPA and carried out in cooperation with WDFW, NBS, NRCS, BIA, CBFWA, and NPPC. The Project is consistent with Section 11 of the NPPC's Fish and Wildlife Program of 1994 and addresses mitigation for losses due to the Federal Columbia River Power System. The Project contains 16,652 acres acquired for wildlife mitigation. A programmatic management plan was developed to protect, manage, and enhance critical winter range for mule deer and elk as well as shrub-steppe habitat for sharp-tailed grouse and other shrub-steppe obligate species. The Habitat Evaluation Procedure (HEP) was used to establish baseline conditions and to monitor habitat conditions over time for mitigation crediting. A site specific management plan is in the draft stage and will define and schedule protection and enhancement activities, monitoring and evaluation criteria, and budget requirements.

**9206100**

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**Albeni Falls Wildlife Mitigation Project**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** H. Jerome Hansen, IDFG, 208-334-3180

**HUs:** 1,050

**Acres:** 600

**Hydroproject:** Albeni Falls

**Description:**

Protect, enhance, and maintain wetland and riparian habitat in Lake Pend Oreille vicinity as on-going mitigation for construction and operation of the Albeni Falls hydroelectric project (NWPPC Program Measures 11.2D.1, 11.2E.1, 11.3D.4, 11.3D.5). The overall objective is to provide 5,204 Habitat Units (HUs) by protecting and enhancing 2,834 acres through the acquisition of fee-title and/or conservation easements through the year 2003.

Potential mitigation sites around Lake Pend Oreille were initially prioritized in the mid 1980's by the Albeni Falls Interagency Work Group, an interagency/tribal team of biologists. Priority areas were established by taking into consideration in-place/in-kind opportunities, juxtaposition to other management areas, and availability of protection opportunities. Each individual mitigation parcel is subjected to the CBFWA regional wildlife criteria by the Work Group to ensure that it meets regional wildlife program standards. While the original list of mitigation sites continues to guide mitigation implementation, more local criteria serve as an additional filter to determine whether mitigation parcels meet more contemporary wetland conservation strategies.

Two projects were identified by the Albeni Falls interagency workgroup since the Jan. project proposal submittal. These two projects were then brought to the CBFWA for approval under the Albeni Falls Mitigation Budget for FY99.

Mitigation progress will be monitored by measuring standardized target species habitat variables from Habitat Evaluation Procedure (HEP) models (USFWS 1980). Target species population trends also will be monitored to evaluate long-term species-habitat relationships.

**9506700**

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**Coville Confederated Tribes Performance Contract (Credits For  
Habitat)**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Steven L. Judd, Senior Wildlife Biologist, CCT, 509-634-8845

**HUs:** 9,322

**Acres:** 16,652

**Hydroproject:** Chief Joseph, Grand Coulee

**Description:**

The project funds the purchase of habitat to permanently protect, manage and enhance wildlife habitats and areas for specific target species. It also funds a portion of the enhancement and O&M for the Hellsgate Big Game Winter Range Project #9204800. A wide array of non-target wildlife species will also benefit through the protection of habitat. Habitat protection improves water quality, reduces erosion, and natural sustaining vegetative community conditions can be maintained. Portions of acquired lands contain miles of river and stream frontage that will directly benefit resident fish habitat. This along with protection and management of the adjacent uplands will indirectly benefit anadromous fish through improved water quality.

**NPPC Measure:** Project conforms to Section 11 as stated in the 1994 program as amended in 1995

9705911

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**Securing Wildlife Mitigation Sites-Oregon, Irrigon WMA Additions**

Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 40

**Acres:** 62

**Hydroproject:** McNary

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

This project would acquire and enhance a 62-acre parcel of private land adjacent to the ODFW Irrigon Wildlife Area. This land is located in an area which contains natural alkaline wetlands, grasslands, and some shrub/steppe habitats. The habitats are becoming increasingly rare in the local area. The wildlife area, Conforth Ranch, Horn Butte, and a few federal military facilities make up the vast majority of larger patches of these endangered habitats in Oregon. Most of the habitat has been lost to irrigated agriculture as a result of cheap and abundant Columbia River reservoir water and fertile soil. Conversion to rural housing and light industrial land uses is common on other properties adjacent to the wildlife area. Purchase of the 62-acre site would eliminate that threat. The parcel is currently heavily grazed pasture and wetland habitat. Restoration of the property would include the removal of approximately 4,420 feet of fence (along the Irrigon Wildlife Area boundary) and the removal of cattle. Vegetation management would include the removal of Russian olive trees and other exotic species species (e.g., scotch thistle, yellowstar thistle, knapweed, purple loosestrife) which will respond to enhancement measures. Native herbaceous, shrub, and tree species would be planted where determined to be effective. Passive restoration would dominate the enhancement activities. Once the threats were removed, little additional work would be necessary beyond minimal operation and maintenance. The mitigation site would be enhanced and managed by existing Irrigon Wildlife Area staff. The Trust for Public lands, Ducks Unlimited, and Pheasants Forever are committed to donating staff, supplies, and/or funds to help implement mitigation activities. The project would benefit all of the target species for McNary Dam (e.g., mallard, Canada goose, mink, western meadowlark, spotted sandpiper, yellow warbler, downy woodpecker, and California quail). Other sensitive species of interest that would benefit from the project include bobolink, Swainson's hawk, long-billed curlew, and painted turtles. Expected HEP mitigation gains are 40 HUs which would be applied to BPA's habitat debt at McNary Dam.

[The 240-acre parcel originally proposed for acquisition is no longer available. The proposal has been revised to address the proposed acquisition and enhancement of a smaller parcel also adjacent to the Irrigon Wildlife Area. Project costs and estimated HU gains have been changed accordingly. Since existing habitat conditions on the smaller property are very similar to those described in the original project proposal, proposed restoration activities have not changed. Project partners have been identified, and it has been clarified that mitigation credit would be applied to McNary Dam (vs. McNary Dam or John Day Dam as stated in the original project proposal).]

9800300

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**O & M Funding of Wildlife Habitat on STOI Reservation for Grand Coulee Dam**

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Subregion: Upper Columbia

Subbasin: Upper Columbia Mainstem

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**Sponsor:** Chris Merker, STOI, 509-258-7055

**HUs:** To be determined

**Acres:** 1,173.5

**Hydroproject:** Grand Coulee

**Description:**

Efforts of the Spokane Tribe Grand Coulee Wildlife Mitigation project are a portion of the Northwest Power Planning Council's overall Wildlife Mitigation Program Goal. This is to achieve and sustain levels of habitat and species productivity in order to fully mitigate for the wildlife losses that have resulted from construction and operation of the federal and non-federal hydroelectric system. Grand Coulee Dam is the largest storage facility in the federal Columbia River power system. It flooded over 80,000 acres of floodplain wildlife habitat. The Spokane Tribe lost 3,900 of these acres within their reservation. The Tribal project goal is to partially mitigate for the 3,900 acres. The project finds relevancy under the interim 1993 Washington Wildlife Coalition Agreement signed between Bonneville Power Administration and tribes and agencies having wildlife management responsibilities in Washington (see Section 11.3D.2 in the 1994 NPPC Fish and Wildlife Program). A loss statement was completed and accepted into the 1994 FWP (see Table 11-4). Methods applied are/will follow accepted protocols as defined by the NPPC/CBFWA Wildlife Working Group, including that defined under the Wildlife Plan (Appendix G of FWP). The latter is the standard operating procedure for wildlife projects. Expected Outcomes include protecting up to 1,768 acres of wildlife habitat as prioritized under guidelines developed under the 1996 Spokane Tribe – BPA Agreement. Limiting factors to preferred future habitat condition will be addressed and improved. Indicator wildlife species response will be measured and correlated with habitat improvements measured using Habitat Evaluation Procedures (HEP). This will be accomplished under a timeframe of 5 years post-protection for enhancement practices, then in perpetuity/life of Grand Coulee project for Operations & Maintenance activities. M&E will be conducted using the Wildlife Plan guidelines.

**NPPC Measure:** 11.2E.1, 11.3A.1

9404700

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## Lake Pend Oreille Fishery Recovery Project

Subregion: Upper Columbia

Subbasin: Pend Oreille

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**Sponsor:** Melo Maiolie, IDFG, 208-683-3054

**Target stocks:**

bull trout

Kamloops rainbow trout

kokanee

warm water fish

**Description:**

Lake Pend Oreille is the largest natural lake in Idaho; 90,000 acres. Sport fisheries in the lake have been severely impacted by hydropower development on both the inflow and the outflow of the lake (Maiolie and Elam 1993, Fredericks et al. 1995, Paragamian 1991). Since the 1960's, the lake has been drawn down 6 feet to meet the flood control rule curve and then drawn down an additional 5 feet for electric power production. This last 5 feet of drawdown has significantly impacted both kokanee (and the fish that prey on them) and warm water fish species in 23 miles of the Pend Oreille River. This project experimentally raises the lake level 4 feet during 3 winters to determine whether or not lake levels (developing new rule curves) could be used to recover these impacted fisheries. A second part of the project is to determine if predation, competition with shrimp, or competition with hatchery kokanee is responsible for the low fish populations.

The goal of the project is to "improve the Lake Pend Oreille ecosystem to the benefit of fish and wildlife, thereby enhancing fishing, recreational opportunities, and other resource values, while managing the lake levels for the balanced benefit of fish, wildlife, flood control, and power production". Our objectives are to: 1) recover kokanee abundance so that a harvest of 750,000 fish can be maintained on an annual basis; this would require an adult kokanee population of 3.7 million fish; 2) have no net change in the amount of shoreline spawning gravel (maintain 1.7 million sq. ft.); 3) increase the warm water fish population in the Pend Oreille River seven fold; 4) determine whether other factors could be limiting the kokanee population by either competition or predation; does natural mortality due to predation exceed 50% and do Mysis shrimp increase kokanee fry mortality more than 20%; and, 5) keep Eurasian milfoil from becoming a significant problem in Lake Pend Oreille. Our goals are relevant to the 1994 fish and wildlife program because it mitigates the impact of the federal hydropower system on the lake's resident fish populations.

This project uses an adaptive management methodology; lake level drawdowns are changed and the resulting changes to the ecosystem (habitat and fish populations) are monitored. The project is designed to run for 5 years, which is one generation of kokanee. This will give kokanee a chance to grow and become more vulnerable to our sampling gear. We will estimate fish abundance by mid-water trawling, hydroacoustics, gillnetting, electrofishing (see tasks in section 4). Our expected outcome is to see statistically significant increases in both cold and warm water fish abundance.

**Relation to MYIP:**

This project meets the overall goals and vision of the resident fish managers (RFM) as defined in the MYIP (page 16) by helping to improve the health of the entire Lake Pend Oreille ecosystem by recovering kokanee (the major prey base in the lake) to near historic levels. The project will also help to provide sustainable fisheries. It also addresses all the specific RFM goals listed on page 17 and the upper Pend Oreille Subbasin objectives (numbers 1 - 4) for bull trout (Section 6.6.4.6.A.), all the objectives for rainbow trout (Section 6.6.4.6.B), and all the objectives for kokanee (Section 6.6.4.6.C).

**NPPC Measure:** 10.6E, 10.6E.1, 5.4D.7

**Relation to NPPC:**

Program measures changes in the winter elevation of Lake Pend Oreille for 3 years. It also instructs IDFG to study kokanee, mysis shrimp, predators, Eurasian water milfoil and lake energy budgets. This project addresses each item specified by the Council.

**Partners:**

Project is relying on cooperation from the US Army Corps of Engineers who are responsible for changing lake levels each winter as specified in the Council's program. This project and Dworshak Fishery Research Project 8709900 share equipment and temporary labor.

9500100

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**Kalispel Tribe Resident Fish**

Subregion: Upper Columbia

Subbasin: Pend Oreille

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**Sponsor:** Joe Maroney, KNRD, 509-445-1147

**Target stocks:**

bull trout (proposed ESA listing)

largemouth bass

westslope cutthroat trout

**Description:**

The Kalispel Resident Fish Project (NWPPC Program Measures 10.8B.14,15,16,18 and19) was designed to assess and determine the habitat conditions in the tributaries to the Pend Oreille that are limiting to the native bull trout and cutthroat trout populations. Based on the habitat assessments, recommendations for enhancement measures were developed to increase the quality and quantity of habitat for these native salmonids. All enhancement measure sites were subjected to an intensive pre-assessment of habitat and fish populations that will be used in comparison to three years of post assessments to determine the types of enhancement that provide the most benefit to habitat conditions.

In conjunction with the tributary enhancement efforts, this project has a mainstem enhancement component. A largemouth bass hatchery has been constructed to facilitate the production and rearing of juvenile bass for supplementation and thereby increase the production of harvestable bass within the reservoir. To enhance the overwinter survival of juvenile bass, artificial habitat is being added to the almost structure free reservoir. Subsequent habitat and population assessments will be used to determine the effectiveness of enhancement measures toward meeting the established biological objectives for both the tributaries and mainstem.

**Relation to MYIP:**

This project is listed in the MYIP (Section 6.6.4.5). Tasks associated with this project are very important in achieving stated MYIP goals and objectives for the Pend Oreille Subbasin, the Upper Columbia Subregion, and the Columbia Basin Region.

**NPPC Measure:** 10.8B.14,15,16,18 and 19

**Relation to NPPC:**

This is a resident fish substitution project as a partial mitigation for the loss of anadromous fish above Chief Joseph and Grand Coulee Dams.

**Partners:**

USFS (removal of exotic brook trout from Cee Cee Ah Creek), Trout Unlimited Chapter (potential help in installing instream structures), Local bass club (structure placement in Box Canyon Reservoir), and Rocky Mountain Elk Foundation (planting trees).

9700300

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**Box Canyon Watershed Project**

Subregion: Upper Columbia      Subbasin: Pend Oreille

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**Sponsor:** Gregory S. Olenik, KNRD, 509-445-1147

**Target stocks:**

bull trout (proposed ESA listing)  
westslope cutthroat trout

**Description:**

The Box Canyon Watershed Project (BCWP) (NWPPC Program Measure 10.8B.15) was initiated by the Kalispel Natural Resource Department to assist in meeting biological objectives of the Kalispel Resident Fish Project. Initial focus of the project is Cee Cee Ah Creek watershed due to its proximity to the reservation, importance as a traditional fishery, and potential for bull and cutthroat trout recovery. The ongoing Kalispel Resident Fish Project is focused mainly on instream assessment and improvements. Implementing upland watershed protection and enhancement through the BCWP will reduce negative impacts of upland management strategies and increase protection and enhancement efforts of the ongoing Kalispel Resident Fish Project.

**Relation to MYIP:**

This project is listed in the MYIP (Section 6.6.4.5). Tasks associated with this project are very important in achieving stated MYIP goals and objectives for the Pend Oreille Subbasin, the Upper Columbia Subregion, and the Columbia Basin Region.

**NPPC Measure:** 10.2B, 10.8B.15

**Relation to NPPC:**

This project is focused on identifying upland areas impacting or having the potential to impact fisheries activities currently addressed through in-stream measures. Once identified, these areas are to have project measures proposed to reduce and/or eliminate those impacts to the fishery resource.

**Partners:**

Potential project cooperation from USFS, private land owners, and private timber companies.

9700400

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## Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams

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Subregion: Upper Columbia

Subbasin: Pend Oreille, Spokane, Upper Columbia Mainstem

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**Sponsor:** Jason R. Scott, KNRD, 509-445-1147

**Target stocks:**

All species in the blocked area.

**Description:**

The Resident Fish Stock Status Above Chief Joseph and Grand Coulee Dams project (NWPPC Program Measure 10.8B.26) is designed and guided jointly by Washington Department of Fish and Wildlife (WDFW), Kalispel Natural Resource Department (KNRD), Spokane Tribe of Indians (STI), and Confederated Tribes of the Colville Reservation (CCT). The project was proposed in 1993 by the four participants to address the need of coordinated ecosystem management in the blocked area. The project will focus on collecting and assessing blocked area fisheries information using similar methods. Housing information in a central location will allow coordinated management recommendations based on information collected throughout the blocked area.

Implementation of the project will take place in phases. Each phase addresses a component of the scientific method. The initial project planning and organization phase was completed in 1997. This phase defined project direction and identified critical components needed for project success based on the need established in 1993. Phase one (1998) will begin implementing critical components identified in 1997. Critical components include centrally located office space, central computer system/ database, formalized coordination group, input existing fisheries information, and coordinated data collection methodology. The planning phase of the project also identified compiling fisheries information on the Spokane River and assessing migratory salmonids in Box Canyon Reservoir as immediate research needs to be implemented in 1998. Phase two (1999-2001) will develop analysis tools, assess data, fill data gaps, and recommend management efforts. Phase 3 is an ongoing phase beginning in 2002 that will implement management recommendations and monitor and evaluate project recommendations

**Relation to MYIP:**

This project is listed in the MYIP (Section 6.6.4). Tasks associated with this project are very important in achieving stated MYIP goals and objectives for the Upper Columbia Subregion, and the Columbia Basin Region.

**NPPC Measure:** 10.8B.26

**Relation to NPPC:**

This is a resident fish substitution project as a partial mitigation for the loss of anadromous fish above Chief Joseph and Grand Coulee Dams

**Partners:**

USFS, Spokane Tribe, Colville Tribes, WDFW, and possibly IDFG, MDFWP, Couer d' Alene Tribe, British Columbia, and USFWS. Because this project will focus on managing the blocked area as an ecosystem, all connected water bodies and associated management agencies should be incorporated at some capacity.

**9106000**

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**Kalispel Pend Oreille Wetlands Wildlife Mitigation Project**

Subregion: Upper Columbia

Subbasin: Pend Oreille

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**Sponsor:** Ray D. Entz, KT, 509-445-1147

**HUs:** 1,217

**Acres:** 600

**Hydroproject:** Albeni Falls

**Description:**

The Pend Oreille Wetlands Wildlife Mitigation project was proposed as partial mitigation for wildlife losses associated with the construction of Albeni Falls Dam. Approximately 600 acres of floodplain property were purchase by the BPA in 1992 (440 acres) and 1997 (160 acres) and are being managed by the Kalispel Tribe to benefit wildlife habitats and associated species. Seven habitat types exist on the project. These habitat types are; forested wetland, scrub-shrub wetland, emergent wetland, wet meadow or floodplain pasture, open water, upland forest, and riparian deciduous forest. These cover types represent Habitat Suitability Index (HSI) models for target species as part of Habitat Evaluation Procedures (HEP). This procedure is used to monitor and evaluate the habitat and as an accounting measure to credit the BPA for wildlife mitigation. Restoration and enhancement activities include riparian reforestation, bio-engineered bank stabilization, hardwood stand enhancement, water control structures/water level management, prescribed burning, native vegetation enhancement, coniferous stand improvements, pasture management, nesting island construction, and general operations and maintenance activities. Each habitat cover type relates to a target species used in HEP to determine losses and gains. The target species are Bald eagle (breeding and wintering), Black-capped Chickadee, Canada Goose, Mallard, muskrat, white-tailed deer, and Yellow Warbler. Other species/guilds benefiting include, reptilian and amphibian guilds, resident fish populations, black bear, neotropical migratory birds, and small mammal populations.

**NPPC Measure:** 11.3D.6 and 11.3E

9004400

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**Implement Fisheries Enhancement Opportunities :Coeur d'Alene  
Reservation**

Subregion: Upper Columbia      Subbasin: Coeur d'Alene

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**Sponsor:** Kelly Lillengreen, CDA Tribe, 208-686-6803

**Target stocks:**

bull trout (proposed ESA listing)  
westslope cutthroat trout  
rainbow trout

**Description:**

The Bonneville Power Administration is funding necessary stream habitat improvement projects on tributaries within the Coeur d'Alene Indian Reservation to facilitate recovery of westslope cutthroat trout and bull trout populations. Baseline stream surveys conducted from 1990-1994 have identified several population limiting factors, including: high summer water temperatures, suboptimal baseflows, reductions in pool volume, and low abundance of woody debris. Critical habitat areas have been identified based on existing land-use patterns and cutthroat trout abundance and distribution. Recommendations for treating limiting factors are presented as a three phase implementation process. Phase one emphasizes watershed restoration techniques including: 1) changing land use practices that are causing habitat degradation; and 2) reestablishing riparian/stream linkages. Phase two involves active manipulations of habitat structure that address site specific problems. Phase three evaluates alternatives for supplementation and construction of supplementation facilities. Restoration strategies combine: conservation of remaining high quality habitat; reclamation of degraded riparian and upland areas; development of interim harvest opportunities; and increasing public awareness, landowner involvement and public education.

**Relation to MYIP:**

This project specifically addresses the objectives and strategies for the Coeur d'Alene subbasin described in detail in Section 6.6.4.4.

**NPPC Measure:** 10.8B.4

**Relation to NPPC:**

This measure details escapement and harvest levels, and current and optimal habitat conditions for the Coeur d'Alene Reservation. (Section 10.8.B (pages 10-34 to 10-36) of the September 13, 1995 version of the Council's Program.)

**Partners:**

Watershed working groups, local school districts, EPA, IDFG, NRCS, local conservation districts, other Coeur d'Alene Tribal Programs (i.e. forestry).

9004401

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**Lake Creek Land Acquisition and Enhancement**

Subregion: Upper Columbia

Subbasin: Coeur d'Alene

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**Sponsor:** Kelly Lillengreen, CDA Tribe, 208-686-5302

**HUs:** 760

**Acres:** 250

**Hydroproject:** Albeni Falls

**Description:**

Project proposes the acquisition of approximately 2,100 acres in the Lake Creek Watershed. The focus of the project is the enhancement and conservation of high value habitat for species which were affected by construction and operation of Albeni Falls. Acquisition is intended to complement ongoing stream restoration work and establishes a precedent for watershed management efforts on the reservation. BPA will receive wildlife credit for approximately 760 habitat units (preliminary estimate) as a result of acquisition of 250 acres wetlands habitat. Additional habitat units may be gained as a result of subsequent enhancement efforts. Enhancement and protection of riparian and upland areas will provide measurable improvements in channel stability, sediment abatement, water quality, and habitat suitability for wildlife and fish. Benefits to wildlife under the mitigation plan address habitat losses attributed to construction of Albeni Falls. Benefits to resident fish will mitigate for Coeur d'Alene Tribal subsistence losses related to construction and operation of Grand Coulee Dam.

**NPPC Measure:** Sections 11.3.F.3, 10.8.B, 10.8.B.20, 10.8B.21

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**Libby and Hungry Horse Modeling Technical Analysis**

Subregion: Upper Columbia

Subbasin: Kootenai, Flathead

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**Sponsor:** Brian Marotz / Craig Althen (Contractor), MFWP, 406-751-4546

**Target stocks:**

bull trout (proposed ESA listing)

mountain whitefish

rainbow trout: Naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

Kootenai River white sturgeon: ESA listed as endangered, natural production assisted by artificial outplanting.

westslope cutthroat trout: Naturally spawning native fish without targeted artificial enhancement, restoration of wild runs through imprint planting of natural re-colonization, contributes to rebuilding weak but recoverable native population.

interior redband trout: Naturally spawning native populations, initiation of spawning runs in historic range using experimental imprint planting.

kokanee: Naturally spawning fish without targeted artificial enhancement.

Kootenai River burbot: Natural production possibly assisted by artificial outplanting, contributes to rebuilding weak but recoverable native population.

**Description:**

This subcontract funds a part-time computer programmer / modeler needed to keep computer models of the Flathead and Kootenai River Systems up to date. These empirically calibrated, quantitative biological models estimate trophic responses due to reservoir fluctuation in Hungry Horse and Libby Reservoirs, and downstream river reaches. Thermodynamics models simulate the operation of selective withdrawal structures installed on both dams to regulate water discharge temperature. The models also calculate the hydrologic balance at downstream projects; Kerr Dam on the outlet from Flathead Lake, and Corra Linn and Duncan Dams in the Kootenai drainage. Results were used to establish Integrated Rule Curves (IRCs) for operations at Hungry Horse and Libby and a tiered approach for flow augmentation to aid in the recovery of the endangered Kootenai white sturgeon. The IRCs and Tiered Flows were designed to balance hydropower and flood control with resident fish and their habitat, and to strike a balance with flow augmentation for anadromous species. A simplified hydraulic balance model (without the biological and thermodynamics components) was developed for use by dam operators or system analysts to calculate IRC targets and sturgeon flows based on monthly inflow forecasts. The models estimate fish entrainment through Libby Dam, zooplankton entrainment through Hungry Horse, and riverine fish growth associated with thermal regulation. An IFIM-based river model nearing completion on the Kootenai, and similar work initiated on the Flathead, will be linked to the existing model framework by this project subcontract.

**Relation to MYIP:**

Pertains to Sections 6.6.4.7. and 6.6.4.8. of the MYIP. Modeling is used to simulate and evaluate Kootenai River operations designed to stimulate natural reproduction in white sturgeon (6.6.4.7.A), and balance operations from a watershed perspective (6.6.4.7.B.). Models reservoir and river operations to benefit species in the Flathead drainage (6.6.4.8. part A).

**NPPC Measure:** 10.3A.4, 10.3A.18, 10.3B.3, 10.3B.5

**Relation to NPPC:**

This project partially funds computer programming / modeling needed to keep the quantitative biological models (HRMOD and LRMOD) up to date, and provides model output required for many system-wide applications. These reservoir models were used to develop and modify Integrated Rule Curves for Hungry Horse and Libby Reservoirs (Marotz et al. 1996). These models also result in the development and refinement of the Tiered Flow Approach for recovery of the endangered Kootenai River white sturgeon. The IRCs and Tiered Flows were designed to balance hydropower and flood control with resident and anadromous fish, and their habitat.

**Partners:**

Modeling efforts have demonstrated cooperative opportunities between the University of Montana, private consultants, the state of Montana, NPPC, BPA, BOR, Army Corps, USFWS, NMFS, and Tribes.

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## Mitigation for the Construction and Operation of Libby Dam

Subregion: Upper Columbia

Subbasin: Kootenai

**Sponsor:** Brian Marotz / Steve Dalbey, MFWP, 406-751-4546

**Target stocks:**

bull trout (proposed ESA listing): Naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

Kootenai River white sturgeon: ESA listed, artificial production to delay or avoid extinction.

mountain whitefish: Contributes to rebuilding weak but recoverable native population, restoration through hatchery production or imprint planting to restore wild runs.

westslope cutthroat trout: Naturally spawning native fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

interior redband trout: Naturally spawning native populations, initiation of spawning runs in historic range using experimental imprint planting. Some areas naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

kokanee: Naturally spawning fish without targeted artificial enhancement.

Kootenai River burbot: Naturally spawning fish with possible experimental outplanting, contributes to rebuilding weak but recoverable native population

**Description:**

Libby Dam, completed in 1972, interrupted the second largest tributary to the Columbia River by creating the 90-mile Libby Reservoir. The primary benefits of this project are power production (91.5%), flood control (8.3%) and other (0.2%). Reservoir surface elevation ranges from 2,287 feet msl to 2,459 feet msl (full pool). Between 1974 and 1996, drawdowns averaged 112.44 feet, with a maximum of 152 feet. Libby Reservoir inundated 109 miles of the mainstem Kootenai River and 40 miles of critical, low gradient tributary habitat. Annual drawdowns affect revegetation of the reservoir varial zone, resulting in a littoral zone of nondescript cobble/mud/sand bottom with limited available structure and limited biological production. River operations for power production cause rapid flow fluctuations (as much as 400% change in daily discharge), which are inconsistent with the normative river concept. Primary objectives of this project are to 1) Correct impacts caused by hydropower operations and mitigate fisheries losses attributed to the construction and operation of Libby Dam using watershed-based, habitat enhancement, fish passage improvements and offsite measures, 2) Integrate computer models into a watershed framework using MFWP's quantitative reservoir model (LRMOD), Integrated Rule Curves (IRC), Instream Flow Incremental Methodology (IFIM) and Libby Dam fish entrainment model (ENTRAIN). Implement operational changes, and 3) Recover native resident species including the endangered Kootenai River white sturgeon, bull trout, westslope cutthroat trout, interior redband rainbow trout, and burbot. A loss statement, site-specific mitigation actions, and monitoring strategies were compiled in the Libby Mitigation and Implementation Plan.

**Relation to MYIP:**

Relates to Sections 6.6.4.7. A and 6.6.4.7.B of the MYIP. Project conducts field work to evaluate white sturgeon reproduction and survival. Monitors spawning runs of westslope cutthroat and bull trout. Relates river operation with system health (invertebrates and fish). Provides data for and develops a river model to link with the existing reservoir model to balance operations. Initiates pilot habitat, passage and offsite projects to guide Libby Mitigation. Conducts pilot mitigation projects to guide the Libby Mitigation Program.

**NPPC Measure:** 10.1B, 10.1C.1, 10.3B, 10.3B.2, 10.3B.3, 10.3B.5, 10.3B.6, 10.3B.7, 10.3B.10 and 10.3B.11, 10.4B.5.

**Relation to NPPC:**

The IFIM research is calibrating a riverine model that allows hydraulic simulations (stage/discharge and velocities) from Libby Dam to Kootenay Lake, British Columbia, Canada at various discharges from Libby Dam. Furthermore, this model allows the quantification of fish habitat at the simulated discharges. The IFIM model will ultimately be linked with the existing reservoir model LRMOD. An optimization program is scheduled for development to allow managers to assess tradeoffs between the requirements of reservoir and riverine biota, when conflicts occur between reservoir operation and river flow limits. This project provides data used to develop and evaluate Integrated Rule Curves for Libby Reservoir operation and Tiered Flow augmentation for the recovery of the endangered Kootenai River white sturgeon, Montana's component of the cooperative monitoring program for white sturgeon. This project is in transition to the Libby Mitigation Program for the construction and operation of Libby Dam.

**Partners:**

Mitigation actions under this program will be cooperative between MDFWP, CSKT and KTOI. IRCs and tiered sturgeon flows are contingent on the Corps adopting and implementing VARQ flood control. The NMFS Biological Opinion must be modified to recognize the needs of resident fish and take on a basin-wide multiple species perspective. This program has already demonstrated that mitigation opportunities can assume a watershed approach, fostering cooperation with the U.S.F.S., Corps, BPA, sporting and environmental groups, industry and private landowners. We move forward on many projects simultaneously so that when some projects delay in permitting, contracting or funding, other projects can still come to fruition. Our goal is to produce a constant string of completed projects.

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**Kootenai River White Sturgeon Studies and Conservation Aquaculture**

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Subregion: Upper Columbia

Subbasin: Kootenai

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**Sponsor:** Susan Ireland, KTOI, 208-267-3620**Target stocks:**

Kootenai River white sturgeon (ESA listed)

kokanee

**Description:**

The white sturgeon (*Acipenser transmontanus* Richardson) population in the Kootenai River was listed as endangered by the U.S. Fish and Wildlife Service on September 6, 1994, due to a virtual lack of recruitment during the last two decades. The Kootenai River White Sturgeon Study and Conservation Aquaculture Project was initiated to preserve the genetic variability of the population, begin rebuilding natural age class structure, and prevent extinction while measures are implemented to restore natural recruitment. A breeding plan will be implemented to guide management in the systematic collection and spawning of wild adults before they are lost from the breeding population. The implementation of the breeding plan includes measures to minimize potential detrimental effects of conventional stocking programs. The objectives of the conservation aquaculture program are to produce 4-9 separate families per year and use preservation stocking criteria to produce 4 to 10 adults per family that survive to breeding age. Monitoring and evaluation using genetic sampling, sonic tracking, gill-netting, and angling will assess genetic variability, survival, growth, movement, and habitat use of juveniles released into the Kootenai River. Success of the project will be determined by: 1) an increase in the number of juvenile sturgeon in the Kootenai River drainage; 2) survival of hatchery fish to sexual maturity; 3) retention of wild sturgeon life history characteristics and genetics in the hatchery reared population; and, 4) an understanding of the life history characteristics and factors limiting natural recruitment of sturgeon in the Kootenai River. This project also proposes to provide recommendations and an implementation program for improving kokanee spawning habitat in Kootenai River tributaries, as well as reintroduction of native kokanee into streams where they have been extirpated. Reintroduction will be accomplished using a native stock of kokanee from the North Arm of Kootenay Lake. The goal will be to improve habitat conditions in tributaries to provide for natural spawning, thereby increasing prey items for sturgeon, as well as improved fishing opportunities for kokanee.

**Relation to MYIP:**

One of the overall goals of the resident fish program, as stated in the executive summary, is to promote the long-term viability of native fish in native habitats where possible. This project directly addresses this goal, as well as the basin-wide goals listed under Section 6.4.1 of the resident fish section of the Multi-Year Plan. In addition, this project meets specific objectives 1, 2, 4, and 5 outlined in Section 6.5.5.7 for the Kootenai River Subbasin.

**NPPC Measure:** 10.3B.11, 10.4B.1, 10.4B.2, 10.4B.5, 10.8B, 2.2G.**Relation to NPPC:**

This project operates and maintains a white sturgeon hatchery on the Kootenai Reservation in Idaho. The white sturgeon conservation aquaculture program has been identified as a Priority 1 action for implementation by the USFWS to prevent extinction of white sturgeon in the Kootenai River.

**Partners:**

This project is part of the overall recovery plan for the white sturgeon in the Kootenai River. Several other related projects in the drainage address other important aspects of recovery. IDFG Project 8806500 assesses the natural spawning of the white sturgeon, MFWP Project 8346500 develops and refines experimental flow releases for sturgeon, and KTOI Project 9404900 identifies opportunities for ecosystem recovery. Together the projects further the overall goal of the FWP to protect native fish in their native habitats. All work is coordinated through the federal Kootenai River White Sturgeon Recovery Team.

8806500

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## Kootenai River Fisheries Investigations

Subregion: Upper Columbia

Subbasin: Kootenai

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**Sponsor:** Vaughn L. Paragamian, IDFG, 208-769-1414

**Target stocks:**

Kootenai River white sturgeon: ESA listed, natural production assisted by artificial outplanting.

Burbot: Genetically distinct stock which spawns naturally without targeted artificial enhancement.

Whitefish

Rainbow trout: Naturally spawning fish without targeted artificial enhancement.

**Description:**

The Kootenai River has undergone many physical changes. The most recent changes are due to operation of Libby Dam for hydropower and flood control. The operation of this dam and its impoundment has altered the river ecosystem by reversing the hydrograph; the river is warmer during winter, and the reservoir is a nutrient trap. Results have been reduced productivity of the river, an altered fish community (more omnivores), inadequate recruitment of white sturgeon (ESA listed), collapse of the burbot fisheries, and a reduction in the quality of rainbow trout fishing. Many resident species were listed as species of special interest in the 1994 Columbia Basin Fish & Wildlife Program. Our main goal is the restoration of the ecosystem and these important fisheries through designed research, flow experiments, and monitoring target fish populations and environmental variables. The USACE provides mitigative flows for spawning and rearing of Kootenai River white sturgeon and research efforts have shown sturgeon responded to improved springtime flows. Numerous eggs have been collected and several juvenile white sturgeon, hatched during mitigative flow years, were captured. It will take a minimum of one generation (20 years) to restore the white sturgeon.

The burbot population is imperiled. Only one tributary is known to support burbot spawning and it is in B.C. The burbot stock in Idaho is genetically distinct from fish farther upstream in Montana. Research information indicates burbot spawning migrations may be impeded by high winter water velocities created during hydropower production and floodwater evacuation. Also, warmer winter water temperature may be disrupting spawning synchrony of burbot.

Rainbow trout are the most popular sportfish, but few juvenile trout are found in the river and the source of recruitment is poorly understood. Although surveys indicate tributaries may be fully seeded, reduced productivity may be limiting juvenile trout survival once they reach the Kootenai River from nursery tributaries.

**Relation to MYIP:**

This project meets the overall goals and vision of the Resident Fish Managers (RFM) as defined in the MYIP (page 16) by restoring the native resident fish populations in the Kootenai River to healthy, self-sustaining levels. It also addresses all the specific RFM goals listed on page 17, the Kootenai River Subbasin objectives for white sturgeon as listed in Section 6.6.4.7.A, and objectives 1, 2, and 4 for resident species (rainbow trout, burbot, whitefish) in Section 6.6.4.7.B. The project is meeting these goals and objectives by focusing on water management at Libby Dam as a limiting factor to the survival of the native fish assemblage, and assessing habitat conditions in the river, and identifying important habitats for the various species.

**NPPC Measure:** 10.4B.1 - 5, 10.6C.1.

**Relation to NPPC:**

The Kootenai River Fisheries Investigation (KRFI) is comprised of several companion studies with interagency cooperation with other related studies. The KRFI targeted white sturgeon (ESA listed), burbot, whitefish, and rainbow trout in the Kootenai River and tributaries to determine factors limiting these depressed populations and improving habitat. Tasks outlined in the KRFI Work Plan also include assisting the Kootenai Tribe of Idaho with brood fish collections, monitoring and evaluation of sturgeon spawning and rearing, and evaluation of hatchery stockings of sturgeon from the tribal hatchery M&E. This is a cooperative study by IDFG, Kootenai Tribe of Idaho, and the Montana Department of Fish Wildlife and Parks.

**Partners:**

Kootenai Tribe of Idaho, IDFG, Montana Department of Fish, Wildlife, and Parks, and British Columbia Ministry of Environment- Fisheries are sponsoring an Adaptive Ecosystem Assessment Workshop to help form future management goals for the Kootenai River ecosystem. Ongoing cooperation continues with the above mentioned agencies with white sturgeon research and propagation and burbot research with hypothesis testing of experimental flows.

## 9401001

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### Mitigation for Excessive Drawdowns at Hungry Horse & Libby Reservoirs - Lib

Subregion: Upper Columbia      Subbasin: Kootenai

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**Sponsor:** Scott Snelson, MFWP/CSKT, 406-293-4161

**Target stocks:**

bull trout (proposed ESA listing)      Naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

Kootenai River white sturgeon      ESA listed as endangered, artificial production to delay or avoid extinction.

mountain whitefish      Contributes to rebuilding weak but recoverable native population, restoration through hatchery production or imprint planting to restore wild runs.

westslope cutthroat trout      Petitioned for ESA listing. Naturally spawning native fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

interior redband trout      Naturally spawning native populations, initiation of spawning runs in historic range using experimental imprint planting. Some areas naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

kokanee      Naturally spawning fish without targeted artificial enhancement.

Kootenai River burbot      Naturally spawning fish with possible experimental outplanting, contributes to rebuilding weak but recoverable native population.

**Description:**

Extreme reservoir drawdown impacts all biological trophic levels as the pool volume shrinks, and reduces the probability that the reservoir will refill during spring runoff. Refill failures are especially harmful to the fishery resource during the productive warm months. Resulting discharges influence biological productivity in the Kootenai River downstream. Dam operation and other anthropogenic factors have resulted in population declines in native fish species. Kootenai River white sturgeon are listed as endangered species and bull trout are proposed for listing under the Endangered Species Act. Westslope cutthroat trout have been petitioned for listing, and burbot in the middle and lower Kootenai are likely candidates for petition before the turn of the century. This project executes monitoring and mitigative actions designed to improve the survival and growth of these native fish species and protect, as genetic reserves, stable to increasing bull trout and burbot populations in the upper Kootenai. Habitat improvements in tributary streams focus on natural reproduction, rearing and integrated, multi-agency watershed planning. Results complement and extend the Libby Mitigation Program (project 8346700) and Kootenai Focus Watershed Program (project 9608720). Cooperative projects are designed to improve the likelihood of long-term persistence, survival and growth of native trout populations by protecting, recovering and modifying environmental conditions in the Kootenai Watershed.

**Relation to MYIP:**

Relates to Sections 6.6.4.7.A and 6.6.4.7.B of the MYIP. Project conducts field work to evaluate Kootenai burbot reproduction and survival. Completes pilot habitat, passage and offsite mitigation projects to mitigate excessive reservoir drawdowns and guide the Libby Mitigation Program. Monitors spawning runs of westslope cutthroat and bull trout in treatment areas.

**NPPC Measure:** Not provided

**Relation to NPPC:**

This project began as a result of language in the Columbia Basin Fish and Wildlife Program (Measures 903(a), 903(b) and 903(b)(1)(D)) which states that if drawdown limits are exceeded for power purposes (85 feet at Hungry Horse and 90-110 feet at Libby), BPA shall fund mitigation of fisheries losses caused by reservoir drawdowns in excess of the limits (NPPC 1987). In 1994, the NPPC adopted the IRCs for the operation of Hungry Horse and Libby Dams (NPPC 1994). The earlier drawdown limits remain in effect until the IRCs are implemented.

**Partners:**

Hungry Horse and Libby Mitigation Programs, Flathead and Kootenai Focus Watershed projects, US Forest Service, County Commissioners, Kootenai River Network, Bobtail Creek Watershed Group.

## 9401200

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### Kootenai River Fisheries Investigation M&E Supplemental Budget

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Subregion: Upper Columbia

Subbasin: Kootenai

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**Sponsor:** Vaughn L. Paragamian , IDFG/KTI, 208-769-1414

**Target stocks:**

Kootenai River white sturgeon

**Description:**

Refer to 8806500 and 8806400.

**Relation to MYIP:**

This project meets the overall goals and vision of the Resident Fish Managers (RFM) as defined in the MYIP (page 16) by monitoring and evaluating the effectiveness of flow releases from Libby Dam for sturgeon spawning and rearing, and monitoring and evaluating the effectiveness of the hatchery supplementation program. The project addresses all five specific RFM goals listed on page 17 and the Kootenai River Subbasin objectives for white sturgeon as listed in Section 6.6.4.7.A.

**NPPC Measure:** 10.4B.4, 10.4B.5, 10.6C.1

**Relation to NPPC:**

This is a single study with several companion studies and interagency cooperation with additional related studies. The M&E study targets white sturgeon (ESA listed), in the Kootenai River. Tasks outlined in the M&E Work Plan include assisting the Kootenai Tribe of Idaho with brood fish collections, monitoring and evaluation of sturgeon spawning and rearing, and evaluation of hatchery stockings of sturgeon from the tribal hatchery. Monitoring and evaluation primarily involves experimental flows provided by the U.S. Army Corps of Engineers for sturgeon spawning and rearing. This project is a cooperative study by IDFG, Kootenai Tribe of Idaho, and the Montana Department of Fish, Wildlife and Parks.

**Partners:**

Permits must be obtained under Section 7 and Section 10 of the Endangered Species Act in consultation with USFWS. Kootenai Tribe of Idaho, Montana Dept. of Fish, Wildlife and Parks, Idaho Dept. of Fish and Game and British Columbia Ministry of Environment. Participation in Kootenai River Basin Steering Committee and the federal Kootenai River White Sturgeon Recovery Team will assist with monitoring and evaluation program.

9404900

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## Improve the Kootenai River Ecosystem

Subregion: Upper Columbia

Subbasin: Kootenai

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**Sponsor:** Diana Richards, KTOI, 208-267-3620

**Target stocks:**

Kootenai River white sturgeon (ESA listed)

bull trout

westslope cutthroat

redband trout

burbot

kokanee

**Description:**

The Kootenai River ecosystem in Idaho, Montana, and British Columbia (B.C.) Canada has been degraded severely over the past 50 years. The aquatic ecosystem has changed from being nutrient-rich, to one that is lacking in nutrients. A few of the possible reasons for the degradation include separation of the river from its floodplain (channelization and diking), impoundment (construction and operation of Libby dam) and pollution abatement in the watershed. The interaction of these factors and the resulting trophic effects over a period of decades appear to be responsible for the collapse of the Kootenai River ecosystem, and the measurable symptoms of declining and endangered fish populations.

In the 1995 Columbia River Basin Fish and Wildlife Program (Section 10.8b.22), The NPPC calls on the Kootenai Tribe of Idaho to “Perform a five year Kootenai River ecosystem status determination and improvement study. The study should include elements that will: 1) provide a comprehensive ecosystem status report; 2) evaluate the biological feasibility of restoring system productivity; 3) identify effects of hydropower operations (Libby Dam) on aquatic biota and fish assemblages; and, 4) develop, evaluate, test and analyze solutions to ecosystem problems caused by factors currently limiting system productivity, such as nutrient limitation and hydropower effects.” The overall objective for this continuing project is to identify the best management options in order to enhance the aquatic ecosystem and provide future harvest opportunities of white sturgeon, kokanee salmon and burbot in the Kootenai River system, historically fished by the Kootenai Tribe of Idaho.

**Relation to MYIP:**

This project uses an ecosystem approach to recovery of native fish in the Kootenai river drainage and addresses all the objectives listed in section 6.4.1 in the resident fish chapter of the multi-year implementation plan. In addition, this project meets specific objectives 1, 3, 4, and 5 for Kootenai white sturgeon and objectives 1, 2, and 4 for other resident fish species outlined in section 6.5.5.7 for the Kootenai River subbasin.

**NPPC Measure:** 10.8B.16, 10.8B.22

**Relation to NPPC:**

This project will assess resident fish populations and identify ecosystem enhancement opportunities in the Idaho portion of the Kootenai River.

**Partners:**

Cooperation exists between related projects through data and resource sharing. Coordination occurs with Idaho Fish and Game, the Kootenai River Network, and the Kootenai River White Sturgeon Recovery Team to further the goal of ecosystem improvement. Workshops to develop a predictive model using the Adaptive Ecosystem Assessment process were coordinated through this project and included international, federal, provincial, state, and tribal agencies.

9608720

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## Focus Watershed Coordination-Kootenai River Watershed

Subregion: Upper Columbia

Subbasin: Kootenai

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**Sponsor:** Brian Marotz, Scott Snelson, MFWP/CSKT, 406-751-4546

**Target stocks:**

bull trout (proposed ESA listing)

westslope cutthroat (petitioned for ESA listing)

Kootenai River burbot Naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native populations.

Kootenai white sturgeon (ESA listed as endangered) Artificial production for fish population enhancement, naturally spawning fish without targeted artificial enhancement.

interior redband trout

mountain whitefish Contributes to rebuilding weak but recoverable native populations, restoration through hatchery production or imprint planting to restore wild runs.

rainbow trout Contributes to rebuilding naturalized populations, naturally spawning fish without targeted artificial enhancement, some offsite supplementation.

**Description:**

The Kootenai Drainage in Montana has experienced a severe decline in the range and number of four of five native trout species (bull trout, westslope cutthroat trout, mountain whitefish and inland redband trout). Endangered species (ESA) protection is currently afforded the native white sturgeon and bull trout in the drainage and the USFWS have been petitioned to list the inland redband trout. Petition for listing is expected for westslope cutthroat trout in the entire drainage and burbot are likely candidates below Libby Dam.

Considering:

- 1) All major listed and potentially listed ESA fish species in the drainage exist in populations that are both international and interstate in nature and long-term persistence of these stocks will rely heavily on interstate and international cooperation and coordination and;
- 2) The current rapid rate of subdivision and land management conversions in key subbasins taking place in the next 1 to 10 years and;
- 3) Local Focus Watershed plans have the best chance to be implemented successfully and are likely to be the most cost-effective long-term alternatives for native species recovery, particularly in the light of current anti-government sentiments of the local populous and;
- 4) Opportunity exists to cost-effectively increase the chance of persistence of weak but recoverable stocks of westslope cutthroat trout, mountain whitefish and bull trout in the Kootenai through watershed based habitat improvement and channel reconstruction efforts.

It is therefore important for the FWP to fully fund the Kootenai Focus Watershed Project for the remainder of FY98 through FY2002.

**Relation to MYIP:**

This project produces a detailed document describing non-operational mitigation to be accomplished under Libby Mitigation, similar to documents provided to the NPPC for Hungry Horse Implementation. It

launches pilot projects to improve habitat, fish passage, offsite mitigation and monitoring. This document complements the intent of the MYIP to provide a logical framework and justification for work in the Kootenai drainage including Libby Reservoir. Relates to Section 6.6.4.7.A and 6.6.4.7.B.

**NPPC Measure:** 7.7A.1, 7.7A.4, 7.7B.2, 7.7B.3, 7.7B.4.

**Relation to NPPC:**

Directs states to develop focus watershed coordination initiatives and report on these efforts to the NPPC. This project began as a result of language in the Columbia Basin Fish and Wildlife Program, Document 94-55 section 7.7 A and B, page 7-40 through 7-43. Measures 10.1B, 10.2A.2, 10.2B, 10.3B, 10.3B.12, 10.4B, 10.6C.1

**Partners:**

Final form of the plan depends on NPPC approval. See Libby mitigation cooperative agreements in project 8346700. Cooperative efforts and cost-shares have already been demonstrated in public scoping, pilot projects and through state/tribal contacts. The plan will be jointly submitted by FWP, CSKT and the Kootenai Tribe of Idaho. Many projects have and will be jointly prepared with the U.S. Forest Service, U.S. Natural Resource Conservation Service, U.S. Army Corps of Engineers, Lincoln County Conservation District, Libby Area Conservancy District, Montana Department of Transportation, Montana Department of Natural Resources and Conservation (State Lands), Montana Department of Environmental Quality, Montana Conservation Corps (AmeriCorps), Montana Fish, Wildlife and Parks Future Fisheries, Habitat Montana and Wildlife Mitigation Programs, as well as numerous private organizations such as the Kootenai River Network, local rod and gun clubs, Montana Chapter of the American Fisheries Society, and many private landowners and citizen volunteers.

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## Hungry Horse Fisheries Mitigation Plan Flathead Lake

Subregion: Upper Columbia

Subbasin: Flathead

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**Sponsor:** Barry Hansen, CSKT, 406-675-2700

**Target stocks:**

cutthroat  
bull trout  
lake trout  
kokanee

**Description:**

This project strives to mitigate the impacts of Hungry Horse Dam on the fisheries of Flathead Lake by direct habitat improvement, monitoring of the results of mitigation measures to provide a feedback loop for future decisions, and research to reveal the limiting factors that influence the success or failure of both proposed and implemented mitigation measures. The technical merit of this project may be judged on the following responses to the RFM technical criteria. The project is based on scientifically valid strategies in the sense that it employs statistically rigorous procedures for monitoring and evaluation, and implements improvements of habitat with narrowly defined and measurable objectives. The monitoring tools used have been adopted from earlier work when useful for defining long-term trends and have been redesigned when they were not of the highest standard and utility for defining biological trends. All objectives in the project are measurable, and for most there is already a history of documentation. Adequate staffing levels exist to accomplish the project's objectives as evidenced by several job completions to date. Monitoring and evaluation results have been reported on annually for the last six years, and a supplementation experiment was terminated based on monitoring results. All tasks are designed to better quantify trends in target species or to directly benefit the habitats those species require. Benefits of the project are planned in the watershed context so that they do not act in isolation or in potential conflict with one another. Habitat improvement activities to date have been designed to restore native westslope cutthroat trout to direct tributaries of Flathead Lake. Monitoring activities are designed to quantify the population trends of native species as well as their competitors to clarify the role of species interactions in native and target species restoration. The 1999 budget projections are consistent with past years in which funding was adequate to accomplish planned activities. Annual reporting will continue, consistent with past performance, and additional publications and conferences will be utilized for further dissemination of information.

This mitigation program is directly in line with Tribal management priorities which are to protect native species and secondarily to enhance recreational fisheries. In fact, management and mitigation objectives for Flathead Lake have been developed jointly over the past six years, a period when the rapidly changing fishery of Flathead Lake and attempts to restore species have required close involvement between management and mitigation.

Past accomplishments include: 1) annual native trout monitoring; 2) monitoring of the experimental kokanee reintroduction; 3) completion of the Polson Golf Course Spring Creek project in 1995 and annual planting of 20,000 cutthroat eggs to start a migratory spawning run; 4) initial planning, distribution of information, scoping of landowners, and inventory of resources in the Dayton Creek drainage; 5) initial planning for restoration work on Skidoo Creek; 6) determination of lake trout age at maturity and fecundity, a predator whose high densities have precluded successful mitigation of losses of other species; and, 7) completion of a yearlong creel survey of Flathead Lake anglers in 1992-93.

Tasks include: 1) spring gillnetting to determine the relative abundance of bull and cutthroat trout; 2) a yearlong creel survey to determine angler pressure, catch and harvest rates of four target species in Flathead Lake; 3) stream channel and watershed restoration in direct tributaries to Flathead Lake to improve habitat conditions and biological productivity; 4) monitoring of the kokanee experiment; and, 5) collection of lake trout to evaluate six parameters of lake trout biology in Flathead Lake.

Expected outcomes for this project include: 1) increases in indices of habitat condition in direct tributaries of Flathead Lake; 2) increases in abundance of native species residing in those direct tributaries; 3) improved understanding of the cause and effect relationship between mitigation measures and the stated objectives those measures are designed to achieve; and, 4) improved understanding of the complex biology and limiting factors of the Flathead Lake fish community which is critical for effective mitigation.

**Relation to MYIP:**

See Section 6.5.5.8 of the MYIP.

**NPPC Measure:** 10.3A.11

**Relation to NPPC:**

See Measure 10.3A.11

**Partners:**

Monitoring of complex fisheries in Flathead Lake requires cooperation and coordination with MFWP and the University of Montana Biological Station. Evaluation of the kokanee test and off-site mitigation opportunities require production of salmonids by USFWS Creston Hatchery. Habitat improvement projects have been conducted with cooperation and support from numerous private landowners, independent conservation groups, the City of Polson, Natural Resources Conservation Service, and the Bureau of Reclamation. The USFWS is consulted on issues regarding the Endangered Species Act, primarily concerning effects on bull trout.

9101903

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## Hungry Horse Dam Mitigation - Watershed Restoration and Monitoring

Subregion: Upper Columbia      Subbasin: Flathead

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**Sponsor:** Ladd Knotek, MFWP, 406-752-5501

**Target stocks:**

bull trout (proposed ESA listing) Naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

westslope cutthroat trout Petitioned for ESA listing. Naturally spawning native fish with targeted artificial enhancement to initiate new wild runs, contributes to rebuilding weak but recoverable native population.

mountain whitefish Contributes to rebuilding weak but recoverable native population, restoration through hatchery production or imprint planting to restore wild runs.

**Description:**

In 1993, the Council adopted the Hungry Horse Dam Fisheries Mitigation Implementation Plan. This plan contains approved losses for bull trout, westslope cutthroat trout and stream habitat, and describes specific measures to protect and enhance resident fish and aquatic habitat. Knotek et al. (1997) updated and formalized a plan that guides our watershed restoration efforts in the Flathead Basin, primarily through implementation of habitat and fish passage improvement projects. Current fish passage projects reconnect access to blocked spawning and rearing habitat. Habitat projects in spring creek, stream, lake, and reservoir environments emphasize passive restoration with conventional, biotechnical, and experimental approaches. Projects address riparian degradation, major sediment and nutrient sources, channel and bank instability, and non-native fish introductions.

A specific monitoring strategy, including pre- and post-treatment sampling, is designed for each restoration project. These are combined with watershed level spawning substrate, redd count, electrofishing, and gill net monitoring series to assess direct and indirect effects of the program. Installation of selective withdrawal at Hungry Horse Dam has successfully restored normative temperatures to the Flathead River. We are assessing the effect of this change on zooplankton entrainment through the dam and on invertebrate and fish communities downstream. Offsite projects, particularly lake rehabilitations, have been successful in creating genetic reserves for native fish, drastically improving fisheries, and eliminating ?source? populations for further illegal introductions. Completed and ongoing projects were identified primarily through past watershed assessments and research. These remain active components of the program to help ensure quality projects in the future.

**Relation to MYIP:**

Pertains to Section 6.6.4.8. of the MYIP.

**NPPC Measure:** 10.1B, 10.1C, 10.3A.1-4, 10.3A.6-8, 10.3A.10-13, 10.3A.17

**Relation to NPPC:**

The council program contains specific language directing Montana Fish Wildlife & Parks and the Confederated Salish and Kootenai Tribes to implement the Hungry Horse Mitigation and Implementation Plans that were approved by the Council in 1991 and 1993, respectively. This project is a component of the overall mitigation program, designed to improve habitat and reconnect blocked habitat in the Flathead watershed and monitor results. The approved loss statement provides a target for restoration goals. The basin-wide habitat and passage plan (Knotek et al. 1997) contains site-specific information for completed, ongoing and planned projects. Criteria for selecting and prioritizing new projects were approved as part of the Implementation Plan and were further clarified in the Habitat Plan. This project was reviewed by the ISG in 1994.

**Partners:**

Mitigation actions under this program are cooperative among many agencies and interest groups. This program has already demonstrated that mitigation opportunities can assume a watershed approach, fostering cooperation with the USFS, BOR, Corps of Engineers, BPA, Fish and Wildlife Foundation, sporting and environmental groups, industry and private landowners. We move forward on many projects simultaneously so that when some projects delay in permitting, contracting or funding, other projects can still come to fruition. Our goal is to produce a constant string of completed projects. Implementation of IRCs is contingent on the Corps adopting and implementing VARQ flood control. The NMFS Biological Opinion must be modified to recognize the needs of resident fish and take on a basin-wide multiple species perspective.

9101904

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## Hungry Horse Mitigation - Hatchery-Based Impl. of Native Fish Recovery

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Subregion: Upper Columbia      Subbasin: Flathead

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**Sponsor:** Wade Fredenberg, USFWS, 406-758-6868

**Target stocks:**

bull trout                      Proposed ESA listing, contributes to rebuilding weak but recoverable native population.

westslope cutthroat trout      Natural production assisted by artificial outplanting, contributes to rebuilding weak but recoverable native population.

kokanee                      Monitoring of previous outplants and final evaluation.

**Description:**

This project implements NPPC Program Measures 10.3A.10, 10.3A.11, and 10.3A.12; employing hatchery-based mitigation strategies to produce, stock, and monitor fish and conducting experimental hatchery work to develop new techniques to mitigate for hydro-related impacts from Hungry Horse Dam. Due to ongoing habitat modifications and expanding populations of introduced fish species, NPPC-approved losses of 65,000 juvenile westslope cutthroat trout, 250,000 juvenile bull trout, and 100,000 adult kokanee cannot be fully mitigated with dam operational changes and ongoing habitat and passage projects. Selective stocking of offsite waters, imprint planting of native species in restored habitats, and experimental fish culture work are being scientifically applied and monitored to maximize successful implementation. Expected outcomes are increased populations of self-sustaining target species and additional angler opportunity within 2-5 years. Monitoring will occur by traditional fisheries management techniques (netting, redd counts, trapping, electrofishing, etc.) and will be evaluated annually to implement adaptive changes as required.

**Relation to MYIP:**

This project is consistent with the MYIP strategy, goals, and objectives and is incorporated into Section 6.6.4.8.A .

**NPPC Measure:** 10.3A.10, 10.3A.11, 10.3A.12

**Relation to NPPC:**

1995 Resident Fish Amendment 10.3A.11: "Implement the mitigation measures in the long-term implementation plan as approved by the Council in March 1993 and in subsequent amendments."

1995 Resident Fish Amendment 10.3A.12: "Initially, limit hatchery supplementation activities called for in the implementation plan to kokanee only. Limit supplementation activities for other species to research aimed at development and refinement of supplementation techniques for westslope cutthroat trout and bull trout. Submit recommendations to the Council regarding supplementation of these species based on results of this research."

Comment: The project is being implemented as per Council and management directives. Current efforts involve three specific areas: 1) Continued experimental efforts to develop the best process for restoring weak but recoverable stocks of native westslope cutthroat trout (imprint planting, on-site incubators, etc.); 2) Offsite stocking of westslope cutthroat trout and rainbow trout in waters not directly connected to the contiguous Flathead system; and, 3) Continued hatchery and lab experimentation (no outplanting) with bull trout. In addition, final monitoring and evaluation of the kokanee test is proceeding.

**Partners:**

Montana Department of Fish, Wildlife and Parks, Confederated Salish and Kootenai Tribes of the Flathead Reservation

## 9401002

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### Mitigation for Excessive Drawdowns: Hungry Horse Component

Subregion: Upper Columbia

Subbasin: Flathead

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**Sponsor:** Brian Marotz, MFWP/CSKT, 406-751-4546

**Target stocks:**

bull trout (proposed ESA listing) Naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

mountain whitefish Naturally spawning fish without targeted artificial enhancement.

rainbow trout Artificial production for fisheries enhancement in offsite areas, naturally spawning fish without targeted artificial enhancement.

westslope cutthroat trout Natural production assisted by experimental imprint planting to initiate wild runs, naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

**Description:**

Extreme reservoir drawdown impacts all biological trophic levels as the pool volume shrinks, and reduces the probability that the reservoir will refill during spring runoff. Refill failures are especially harmful to the fishery resource during productive warm months. Resulting discharges influence biological productivity in the Flathead River downstream. Dam operation and other anthropogenic factors have resulted in population declines in native fish species. Bull trout are proposed for listing under the Endangered Species Act in the upper Columbia Basin (encompassing the entire Flathead Basin). Westslope cutthroat have also been petitioned for listing. This project executes research and mitigative actions designed to improve survival and growth of these fish species. Habitat improvement efforts proposed for tributary streams will improve natural reproduction and rearing. A cooperative wetland creation effort in the reservoir viral zone enhances food production and juvenile security habitat. Research and biological sampling in the Flathead River will correlate seasonal distribution, movements and predator-prey interactions with river flow and temperature. Results from these objectives complement and extend related IFIM and thermodynamics modeling (projects 9402500 and 8346500) and Hungry Horse Mitigation Program (project 9401903). Cooperative projects were designed to improve survival and growth of native trout by modifying environmental conditions in the Flathead Watershed. These objectives are expected to be completed within the time-frame of this proposal. Results will be evaluated objective-by-objective. Habitat objectives will be evaluated by post improvement monitoring. Research objectives will be evaluated by monitoring the effects of selective withdrawal on species interactions in the river.

**Relation to MYIP:**

Relates to Sections 6.6.4.7.A and 6.6.4.7.B of the MYIP. Project conducts field work to evaluate the survival of westslope cutthroat and bull trout juveniles in the Flathead River relative to the operation of selective withdrawal and discharges from Hungry Horse Dam. Completes assessments of habitat, passage, and offsite mitigation projects to mitigate excessive reservoir drawdowns. Monitors spawning runs of westslope cutthroat and bull trout in treatment areas.

**NPPC Measure:** Not provided

**Relation to NPPC:**

This project began as a result of language in the Columbia Basin Fish and Wildlife Program (Measures 903(a), 903(b) and 903(b)(1)(D)) which states that if drawdown limits are exceeded for power purposes (85 feet at Hungry Horse and 90-110 feet at Libby), BPA shall fund mitigation of fisheries losses caused by reservoir drawdowns in excess of the limits (NPPC 1987). In 1994, the NPPC adopted the IRCs for the operation of Hungry Horse and Libby Dams (NPPC 1994). The earlier drawdown limits remain in effect until the IRCs are implemented.

**Partners:**

Hungry Horse and Libby Mitigation Programs, Flathead Focus Watershed coordination, US Forest Service, Bureau of Reclamation, Flathead River IFIM project, StreamNet.

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**Flathead River Instream Flow Project**

Subregion: Upper Columbia      Subbasin: Flathead

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**Sponsor:** Brian Marotz And Contractor (To Be Selected), MFWP, 406-751-4546

**Target stocks:**

bull trout (proposed ESA listing) Naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

mountain whitefish Naturally spawning fish without targeted artificial enhancement.

rainbow trout Artificial production for fisheries enhancement in offsite areas, naturally spawning fish without targeted artificial enhancement.

westslope cutthroat trout Natural production assisted by experimental imprint planting to initiate wild runs, naturally spawning fish without targeted artificial enhancement, contributes to rebuilding weak but recoverable native population.

**Description:**

Construction of Hungry Horse Dam on the Flathead River (completed in 1952), caused many physical and biological changes in the Flathead River downstream. Hypolimnetic releases from the dam artificially cooled the river from 1952 through 1996 when a selective withdrawal structure was installed on the dam, allowing dam operators to control the water temperature in the tailwater. Now that the thermal pollution from Hungry Horse Dam can be mitigated, a primary manageable threat to watershed health is dam operation. Flow fluctuations from power and flood control operations create an extensive, low productivity, varial zone, greater substrate imbeddedness and species shifts in the aquatic insect community which has become less diverse and less productive. A combination of man-caused factors resulted in the decline in native gamefish species mountain whitefish, westslope cutthroat and bull trout, and a significant increase in abundance of non-game native species, the Columbia River chub or peamouth, northern squawfish and introduced rainbow trout and northern pike. Pursuant to Measure 10.3A.18 of the FWP, this project will use a modified form of the Instream Flow Incremental Methodology (IFIM) to examine the mechanisms by which dam operation effects the riverine community and their environment, and propose operational guidelines to mitigate negative effects. Results will expand the utility of the existing reservoir model HRMOD, and verify and refine the Integrated Rule Curves developed for Hungry Horse Dam. This project will be directly contracted by BPA through competitive bid.

**Relation to MYIP:**

Pertains to section 6.6.4.8.A of the MYIP. Provides adjustments to river operation to benefit aquatic organisms and terrestrial wildlife. River model to be linked to existing reservoir / river model. This work dovetailed with other field research on predator/prey interactions (excessive predation on native species) and seasonal movements, to increase the utility of both efforts.

**NPPC Measure:** 10.2A.2, 10.2B, 10.3A.1 - 10.3A.4, 10.3A.6, 10.3A.9, 10.3A.11, 10.3A.18.

**Relation to NPPC:**

The NPPC program calls for consultations with MFWP and CSKT when conflict occurs between reservoir and river requirements.

**Partners:**

The ability to implement an appropriate flow regimen is dependent on a balanced system operation. River work compliments ongoing research on selective withdrawal and predator/prey interactions. Partnerships can be formed with the Flathead Basin Commission, Bureau of Reclamation, Flathead River action groups, and landowners along the river. Partnerships have already been demonstrated with BOR and BPA

(including ramping rates, minimum flows and kokanee spawning flows). Modeling efforts have fostered cooperative work with three Universities, several agencies and private consultants.

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**Focus Watershed Coordination-Flathead River Watershed**

Subregion: Upper Columbia

Subbasin: Flathead

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**Sponsor:** Lynn S. Ducharme, CSKT, 406-675-2700 x264

**Target stocks:**

All species residing in the Flathead River drainage

**Description:**

This program specifically fulfills the watershed approach and watershed coordination specified in sections 7.7A and B, pages 7-40 through 7-43, and 10.2B in the Columbia Basin Fish and Wildlife Program. This program also plays a crucial role in integrating and building upon ongoing Hungry Horse mitigation activities (Programs 9101901, 9101903, 9101904, 940100).

The Flathead drainage in Montana has been radically altered by hydropower development and operations, legal and illegal species introductions, forest management, agriculture, urbanization, and other land use activities. The negative biological results of these activities are now rapidly becoming more apparent. Many streams in the drainage have become remarkably unstable during the last two decades resulting in increasing watershed fragmentation. These changes have caused a severe decline in the range and number of both native bull trout and westslope cutthroat trout species. Bull trout are currently proposed for listing under the Endangered Species Act and westslope cutthroat have been petitioned for listing. A balanced system-wide watershed approach to achieve ecosystem equity is necessary to reverse the downward trends in native species and protect healthy populations within the Flathead River watershed.

In order to properly address the issues above, other segments of society and other (non-BPA) funding sources must be incorporated into the solution. This project will result in a coordinated effort toward addressing resource concerns within the Flathead River basin from a watershed perspective. Pilot projects initiated under this project will help guide future fisheries and wildlife mitigation activities associated with Hungry Horse Dam construction and operation. This project will also include on-the-ground habitat improvement and protection measures toward the same goal. BPA seed money for project implementation will help to improve habitat for bull trout and westslope cutthroat and other associated fish and wildlife species.

A watershed coordinator helps to initiate and facilitate efforts for addressing the issues mentioned above and pulling together a plan for mitigation. If recovery of the fisheries resources is to be successful in the drainage, locally lead recovery plans are going to provide the greatest chance for success. This program fosters “grass roots” public involvement to achieve the goal of habitat restoration. Without local support, it is unlikely that local governments and individual citizens are going to allow government initiatives to be implemented and maintained into the future. We will incorporate the principles of consensus, collaborative effort, and interagency cooperation. Public scoping will be conducted by approaching existing public groups and individual private landowners to assess their needs and soliciting cooperation.

Monitoring will include utilizing existing work and work currently in progress by the Flathead Basin Commission (FBC), University of Montana Yellow Bay Biological Station, the Bull Trout Restoration Team, and the Confederated Salish and Kootenai Tribes. This includes water quality monitoring conducted by FBC as well as work conducted in conjunction with Montana Fish, Wildlife, and Parks (MFWP) through FBC’s Volunteer Monitor Program. Yellow Bay Biological Station conducts water quality analyses in their mid-Flathead Lake studies. The Bull Trout Restoration Team has published Bull Trout Status Reports for the Flathead Basin. The CSKT Water Quality Program closely monitors water quality within the Reservation’s boundaries. Monitoring of site specific restoration activities will be conducted using methods such as redd surveys, photo points, habitat surveys and population assessments. Please refer to related projects 9101903 (Hungry Horse Mitigation/Habitat Improvements), 9101901 (Hungry Horse Fisheries Mitigation, Flathead Lake) and CSKT Tribal Fisheries Management Plan for a more detailed explanation.

A Model Watershed Plan will result from the efforts of this program. This plan will provide background, identify limiting factors, areas of priority and concern, resource issues, etc., within the Flathead River basin and implementation strategies to address each limiting factor. The plan will be an umbrella document encompassing existing and ongoing information from state, county and local offices and organizations. Throughout the course of putting together the Model Watershed Plan, the above groups will be consulted and intrinsically involved in the formation, structure and content of the plan as well. Public scoping will be conducted by approaching existing public groups and private landowners to solicit their input into the plan.

Conservation easements and long-term management plans will ensure that our efforts are long lasting. Other assurances that our efforts will be long lasting are CSKT ordinances such as; Aquatic Lands Conservation Ordinance, Draft Forest Management Plan, Water Quality Management Ordinance, Lower Flathead River Corridor Management Plan, Shoreline Protection Ordinance, Comprehensive Resource Plan, and Surface Water Quality Standards and Antidegradation Policy. Other policies include; Flathead County Lake and Lakeshore Protection Regulations, Montana's Antidegradation Policy, and the Natural Streambed and Land Preservation Act.

It is therefore important to fully fund the Flathead Focus Watershed Project for the remainder of FY98 through the completion of the project.

**Relation to MYIP:**

This project is consistent with the basin-wide goals and Section 6.6.4.8.

**NPPC Measure:** 10.2B, 7.7A, 7.7B pages 7-40 through 7-43, Measures 10.1B, 10.2B, 10.3B, 10.3.12, 10.4, 10.6C.1

**Relation to NPPC:**

See NPPC Measure

**Partners:**

A coordinated effort will be established between CSKT and United States Fish and Wildlife Service (USFWS), Natural Resource Conservation Service (NRCS), MFWP, local conservation districts, state and county governments, individual landowners, and other entities with an interest in watershed resources.

**9102800**

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**Monitoring Smolt Migration of Wild Snake River Spring/Summer  
Chinook**

Subregion: Lower Snake

Subbasin: Lower Snake Mainstem

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**Sponsor:** Stephen Achord/Gene Matthews, NMFS/NWFSC, 509-547-7518

**Target stocks:**

Snake River spring/summer chinook salmon

**Description:**

The overall project goals are to: 1) characterize the migration timing of selected wild stocks of Snake River spring/summer chinook salmon smolts at dams on the Snake and Columbia Rivers, 2) determine if consistent migration patterns are apparent, and 3) determine what environmental factors influence migration timing. The FWP states that a monitoring program will provide information on the migrational characteristics of various stocks of salmon and steelhead within the Columbia Basin and further urges conservation of genetic diversity, which will only be possible if wild stocks are preserved. Wild chinook salmon parr are PIT tagged in their natal streams in late summer, and smolts are monitored at downstream dams the following spring and summer. Migrational timing patterns of individual and combined populations are mapped over time and examined for relationships with various environmental and climatic conditions.

**NPPC Measure:** 5.9A.1; and 5.8A.8 (partially). Other Measures: NMFS Biological Opinion--NMFS BO RPA 13a and 13f, 2.1.d.5 of Snake River Salmon Recovery Plan.

**Partners:**

Not provided

9801003

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**Monitor and Evaluate the Spawning Distribution of Snake River Fall  
Chinook**

Subregion: Lower Snake      Subbasin: Lower Snake Mainstem

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**Sponsor:** Aaron Garcia, USFWS, 208-476-7242

**Target stocks:**

Snake River fall chinook salmon

**Description:**

Yearling Snake River fall chinook salmon from Lyons Ferry Hatchery were acclimated and released upstream of Lower Granite Dam for three consecutive years (1996-1998) to artificially increase natural production. Three acclimation/release sites were used in an attempt to distribute spawners throughout areas normally used by fall chinook salmon. In accordance with the Snake River Recovery Plan (4.1.d.), NPPC (7.5B.1.), and Wy-Kan-Ush-Mi-Wa-Kish-Wit (Volume II, page 98), our study was designed to determine whether or not this distribution is achieved. We will make this determination based on the movements of radio-tagged fish, the distribution of spawned-out fish and carcasses, and the distribution of redds. In addition to the final determination, we will produce the following three outcomes: (1) a description of the spawning distribution of fall chinook released as yearlings; (2) statistical analysis of the differences in spawning distribution within, and between, release groups of yearlings; and (3) a description of redd distribution. We will also collect comparable information from fish released as subyearlings, and natural fish, when possible. In 1997, we successfully tested our approach by tagging 16 one-ocean fish (jacks) from the 1996 release, and tracking them throughout the study area. Based on the current release schedule, return timing, and expected return rates, this project will require five years (FY 1997-2001) to obtain conclusive results.

**NPPC Measure:** 7.5B.1

**Partners:**

WDFW

**9801004**

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**Monitor and Evaluate Yearling Snake R Fall Chinook Upstream of Lwr Granite**

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Subregion: Lower Snake

Subbasin: Lower Snake Mainstem

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**Sponsor:** Bill Arnsberg, NPT, 208-476-7296

**Target stocks:**

Snake River fall chinook

**Description:**

Fall chinook supplementation above Lower Granite Dam consists of acclimating and releasing 150,000 Lyons Ferry yearling fall chinook at facilities at Pittsburg Landing, Big Canyon Creek, and Captain John Rapids. This proposal will continue the cooperative study to monitor and evaluate fall chinook released above Lower Granite Dam as recommended in the FWP, NMFS Proposed Recovery Plan and Wy-Kan-Ush-Mi Wa-Kish-Wit.

We will monitor, evaluate, and compare pre-release and release conditions, post-release behavior, migration timing, survival to Lower Snake River dams, contribution and distribution of adult returns and smolt-to-adult survivals of yearling hatchery fall chinook released at the acclimation facilities with each other and with releases at Lyons Ferry Hatchery (LFH).

A cooperative annual report with the FWS and WDFW and quarterly progress reports that evaluate the success of fall chinook supplementation above Lower Granite Dam will be prepared.

A representative sample of all release groups will be PIT tagged and radio tagged at each acclimation facility and released at similar sizes and times as releases at LFH. Growth and condition of PIT tagged fish will be evaluated during migration for fish recaptured at Snake River dams. Outmigration survival will be estimated from PIT tag interrogations at mainstem dams using the Survival Under Proportional Hazards (SURPH) model. Post-release dispersal and outmigration behavior will be assessed using radio telemetry. We will assist the LFH program in their evaluation of Snake River Basin fall chinook smolt-to-adult survivals and adult contributions and distribution by monitoring the supplementation yearlings.

**NPPC Measure:** 3.2, 7.0A, 7.7A.1, 7.1C.3, 7.1D.2, 7.3B.2, 7.4C.1, 7.5B.1, 7.5B.2

**Partners:**

U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife

9801005

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**Pittsburg Landing, Capt. John Rapids, Big Canyon Fall Chinook  
Acclim. Fac.**

Subregion: Lower Snake      Subbasin: Lower Snake Mainstem

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**Sponsor:** Grant Walker, NPT, 208-843-7320 x3

**Target stocks:**

Snake River Fall Chinook Salmon

**Description:**

A. Overall project goals are to enhance natural production of Snake River fall chinook above Lower Granite Dam through acclimation and final rearing of Lyons Ferry yearlings and subyearlings at two sites on the Snake River and one site on the Clearwater River. Success of this project depends on maintaining smolt to adult survival at current levels. The length of the project will depend on whether smolt to adult survival can be improved. The project could be concluded when Snake River Fall Chinook can be removed from ESA listing and returns are sufficient to provide a regular harvestable surplus. Past accomplishments include acclimation and release of: 114,000 yearling fall chinook at Pittsburg Landing in 1996; 198,000 yearling fall chinook & 253,000 subyearling fall chinook at Big Canyon in 1997; 147,000 yearling fall chinook at Pittsburg Landing in 1997 and 1998; 135,000 yearling fall chinook at Capt. John Rapids in 1998; 69,000 yearling fall chinook at Big Canyon in 1998. Total yearling releases: 408,000 from Pittsburg Landing; 267,000 from Big Canyon; 135,000 from Capt. John Rapids.

B. Projects require funding for operations and maintenance for as many years as it takes to evaluate smolt to adult survival. Early indications from two years of releases at Pittsburg Landing are that juvenile yearling survival through the hydrosystem is very high. Jacks have been recovered at Lower Granite Dam and seem to indicate that smolt to adult survival may also be high. Data to evaluate smolt to adult survival from releases at all three sites will not be available until 2001. Decisions changing production should be deferred until at least three years of returns have been recorded, or until 2004.

C. See section titled: "NPPC Program Measure Number(s) which this project addresses". Specific benefits to the program include delisting and mitigation of Snake River Fall Chinook.

D. Methods and materials for acclimation and release of fish have been reviewed by US v OR PAC members, WDFW, LSRCP, USACOE, FISHPRO Inc., USFWS, and NMFS. Fish size, transfer methods, transfer dates, release dates, and release methods are reviewed by the monitoring and evaluation group in conjunction with the manager of Lyons Ferry Hatchery, WDFW. USFWS performs fish health checks prior to release and secures fish transfer permits from IDFG.

E. The expected outcome is that fall chinook returns will increase and allow NMFS to delist. Another expected outcome is that fall chinook harvest by the Nez Perce Tribe and Idaho sportsman can be re-established.

F. Adult returns to Lower Granite Dam will be monitored. All fish released have visible implant tags. Spawning ground survey flights in the Clearwater and Snake Rivers will continue to be made until project is terminated.

**NPPC Measure:** 7.3B; 7.3B7; 7.4F; 7.5B

**Partners:**

WDFW: Broodstock collection, spawning, incubation, rearing and transportation of 450,000 yearling fall chinook from Lyons Ferry Hatchery to acclimation facilities.

US Congress: Provided funds for construction via Congressional Add-on, FY95.

USACOE: Permitting, NEPA, design, and construction of all facilities.

USFWS: Collects pre-release fish health samples, secures fish transport permits, M&E of Pittsburg Landing releases. Funding of fish health services subcontracted from project funds.  
LSRCP: Provides fish transport trucks and coordination with Lyons Ferry Hatchery.  
USFS: Authorized use of Pittsburg Landing site via special use permit.  
NPT Land Services: Authorized use of Peck boat launch parking area for Big Canyon Facility.

9700900

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## Evaluate Means of Rebuilding White Sturgeon Populations in Lower Snake R

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Subregion: Lower Snake

Subbasin: Lower Snake Mainstem

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**Sponsor:** Paul Kucera, NPT, 208-843-7320

**Target stocks:**  
white sturgeon

**Description:**

The goal is to restore and rebuild the white sturgeon populations in the Snake River between Hells Canyon and Lower Granite dams to support a sustainable annual harvest of white sturgeon equivalent to 5 kg/ha/yr. This Project addresses Measure 10.4A.4 of the Northwest Power Planning Council Fish and Wildlife Program to "...fund an evaluation, including a biological assessment (Section 7.3B.1) of potential means of rebuilding sturgeon populations in the Snake River between Lower Granite and Hells Canyon dams." In 1996, a biological risk assessment of the lower Snake River white sturgeon was conducted by the Nez Perce Tribe. This assessment identified: 1) regional sturgeon management objectives; and, 2) potential mitigation actions needed to restore and protect the population. The risks and uncertainties associated with implementation of potential mitigative actions could not be fully assessed, however, because critical data concerning the status of the population and their habitat requirements are unknown. We are currently collecting the identified needed data. Based on results of the data collection, an adaptive management plan will be formulated that will: 1) reassess potential mitigative actions; 2) recommend the implementation of needed mitigative action(s); and, 3) present a monitoring and evaluation plan.

**Relation to MYIP:**

This project directly relates to achieving the objectives (Section 6.6.5.1) that address white sturgeon in the Lower Snake Subregion. This project ultimately seeks to: 1) restore abundance and productivity of naturally-produced white sturgeon to the maximum extent in accordance with habitat capacity; 2) restore long-term sustainable white sturgeon yield equal to or greater than 5kg/ha/yr for tribal and non-tribal fisheries; and, 3) identify and implement additional mitigation if abundance and yield of naturally-produced sturgeon cannot be restored to levels sustainable under pre hydro-development conditions.

**NPPC Measure:** 10.4A.4

**Relation to NPPC:**

Measure 10.4A.4 calls for the Bonneville Power Administration to "...fund an evaluation (including a biological risk assessment, see Section 7.3B.1) of potential means of rebuilding the sturgeon population in the Snake River between Lower Granite and Hells Canyon dams." The Snake River White Sturgeon Biological Risk Assessment (NPT 1997) indicates that moving toward a normative (naturalized) river hydrograph and configuration as conceptualized in Return to the River (ISG 1996) would be consistent with providing sturgeon habitat and food production conditions for achieving biological objectives.

**Partners:**

We have coordinated and will continue to coordinate white sturgeon evaluation activities under this project with IDFG, ODFW, WDF, and the Idaho Power Company (IPC). Ongoing sturgeon data collection activities of the IDFG and the IPC will be incorporated for efficiency and to eliminate redundancy. The Nez Perce Tribe has a partnership with the Asotin County PUD that provides a sturgeon rearing facility with potential research/management applications.

9202602

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**Implement Eastern Washington Model Watershed Plans**

Subregion: Lower Snake

Subbasin: Tucannon

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**Sponsor:** Robert P. Bottman, WCC, 360-407-6204

**Target stocks:**

Not provided

**Description:**

Project Goals and Objectives – In 1992, acting for the State of Washington, the Conservation Commission selected the Asotin County, Columbia, and Pomeroy conservation districts to act as lead agencies to prepare and implement plans for the Asotin Creek, Tucannon River, and Pataha Creek watersheds, respectively. The primary goal of these plans is to enhance the restore habitat for the Snake River spring chinook, Snake River fall chinook, summer steelhead, and bull trout.

Relevance to 1994 Columbia Fish and Wildlife Program – The model watersheds relate to 7.7B.2 and 7.7B.3 in that specific fish habitat problems have been identified, and measures are being taken to correct them through implementation of the three model watershed plans. The habitat problems include: high stream temperature, lack of resting and rearing pools containing large woody debris, sediment deposition on spawning gravels, high fecal coliform counts, and streambank and geomorphic stability.

Sound Scientific Principles – The problem sites and needed remedial actions were identified by technical staff of the Washington State departments of Fisheries and Wildlife (WDFW), Natural Resources (DNR), and Ecology, and the federal USDA Natural Resources Conservation Service (NRCS), and the US Forest Service (USFS).

Timeframe – By the year 2000, reliable habitat and water quality databases will be in place, and biological results will be available. Completion date is estimated to be 2005.

Monitoring and Evaluation – The model watershed technical leads, together with the technical staff of agencies mentioned above, are monitoring status of target stocks, availability of suitable habitat, and success of the projects.

**NPPC Measure:** 7.7.b.1; 7.7.b.2: 7.7.b.3

**Partners:**

Not provided

9401806

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## Enhance Habitat For Spring & Fall Chinook, Summer Steelhead and Bulltrout

Subregion: Lower Snake      Subbasin: Tucannon

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**Sponsor:** Terry Bruegman, CCD, 509-382-4773

**Target stocks:**

Spring Chinook, Fall Chinook, summer Steelhead and Bulltrout

**Description:**

Tucannon River Model Watershed Plan was developed to identify, protect, and restore fish habitat by utilizing sound technical information and citizen input.

The Plan's habitat restoration, protection, and enhancement goals are consistent with identified elements in "Strategy For Salmon," "Wild Salmonid Policy," and "Wy Kan Ush Mi Wa Kish Wit". Plan implementation, guided by Landowner Steering and Technical Advisory Committees, emphasizes habitat goals - the only element in salmonid restoration that non-governmental entities can impact positively.

Plan and project goals of increasing salmonid habitat complexity and stream bank and geomorphic stability, reducing stream temperature and sedimentation in spawning gravels, promoting cooperation and agreement between landowners and resource agencies for restoring resource conditions as identified in the Tucannon River Model Watershed Plan are supported in related planning efforts referenced within the Plan.

Project implementation is relevant to the 1994 Columbia Fish and Wildlife Program in that critical limiting factors were identified during the planning assessment. Individual, on site, project assessments with an Inter-Disciplinary Team will identify corrective actions to effectively enhance habitat conditions for ESA listed weak populations without adversely effecting biological diversity, while emphasizing total watershed health.

Monitoring/evaluation of project effectiveness, critical for adaptive management, will be accomplished cooperatively by Watershed Technical Lead, WDFW, NRCS, USFS, and WSU staff.

Projects developed under this proposal are expected to be completed by 12/99. Implementation of the Watershed Plan will continue until critical limiting factors are addressed, and landowner cooperation and funding availability maximized.

**NPPC Measure:** 7.0 (7.6D, 7.7, 7.7A, 7.8B1)

**Partners:**

NRCS, USFS, WDFW, Private and Public Landowners, Salmon Corps, WSU, Volunteer Sports Clubs

**9401807**

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**Enhance Habitat For Fall Chinook, Steelhead and Bulltrout**

Subregion: Lower Snake

Subbasin: Tucannon

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**Sponsor:** Duane G. Bartels, PCD, 509 843 1998

**Target stocks:**

Fall Chinook, Steelhead, Bulltrout

**Description:**

The Pataha Creek Watershed was designated as a “model watershed” in 1993 by the Northwest Power Planning Council and the Bonneville Power Administration.

Chinook salmon have never been documented in Pataha Creek. It does not presently support adults and juveniles because of high water temperature, excessive turbidity and sediment deposition. It is considered “critical habitat” because it drains into the Tucannon River which supports both spring and fall chinook. The Pomeroy Conservation District has provided a cost-share program to encourage further use of approved conservation practices that will treat temperature and sediment problems to lessen their negative impacts to the Tucannon River fish population.

Although the primary emphasis of the watershed plan is on the improvement of chinook salmon critical habitat, the involved parties realize that populations of other fish species, such as steelhead and bulltrout have declined and that implementation of the plan should improve habitat quality for them.

As practices are implemented, both upland and in the stream and riparian area, a monitoring and evaluation process is being used to document success or failure of the practice. Water temperature and total suspended solids is currently be analyzed and documented in the districts local soil testing lab. Future testing for fecal coliforms, ammonia and other selected elements will be done as testing programs with the local soil lab and high school is completed. Before and after photo documentation of project sites is ongoing. Quarterly reports of costs of implemented practices will be sent to funding authorities.

**NPPC Measure:** 7.7b3, 7.6d, 7.7a4, 7.8b1

**Partners:**

Washington State Department of Fish and Wildlife, National Marine Fisheries Service, Garfield County, Washington State Department of Transportation, US Fish and Wildlife

9401805

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## Enhance Habitat For Spring Chinook, Summer Steelhead, and Bulltrout

Subregion: Lower Snake      Subbasin: Asotin

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**Sponsor:** Bradley J. Johnson, ACCD, 509-758-8012

**Target stocks:**

Spring chinook salmon, summer steelhead, and bulltrout

**Description:**

The Asotin Creek Model Watershed Plan which was printed in 1995, was the first to be developed in Washington which specifically addressed habitat protection and restoration for salmonids. The plan is consistent with the habitat elements of the "Strategy for Salmon" and the draft "Wild Salmonid Policy." The Plan improves on "grass roots" public involvement and interagency cooperation for habitat restoration to offset impacts to fisheries resources in Asotin Creek watershed. Established cost-share programs with governmental agencies and private groups must continue to be funded. Credibility and trust gained would be lost if funding was ceased.

Our mission as stated in the Asotin Creek Model Watershed Plan is to: "Complete and implement an integrated plan for the Asotin Creek watershed which will meet landowner objectives and agency acceptance, in order to protect and enhance all resource bases with concern for long-term sustainability."

High stream temperatures, lack of resting and rearing pools containing large woody debris, sediment deposition in spawning gravels, and elevated fecal coliform counts were problems identified during the watershed analysis and are addressed in the Plan. The Plan provides a framework for improving the overall health of the Asotin Creek watershed, with an emphasis on improving fish habitat. Improved habitat quality will allow greater juvenile and adult survival at each freshwater lifestage and can result in more offspring surviving to begin migration to the ocean.

Improving and maintaining critical habitat requires cooperation and long-term commitment between landowners, and state and federal agencies to undertake comprehensive watershed management. The District just completed its second year of habitat installation and adaptive management measures are being implemented.

HOBOTemperature meters are deployed during the spring and record in-stream temperatures on a daily basis. ISCO sediment samplers are currently taking samples at four locations in the watershed daily for total suspended solids. Grab samples for fecal coliforms, ammonia, nitrate, total nitrogen and total phosphorous are being collected by WSU staff on a monthly basis. Discharge, snorkling surveys, habitat assessments, pebble counts, pool size and frequency and before and after pictures at project sites (photo documentation) are also underway. The District has entered into an agreement with WSU Lab to analyze the data and quarterly reports will be sent to funding authorities.

**NPPC Measure:** 7.0 (7.7B3, 7.8A2, 7.8A5)

**Partners:**

NRCS, WDFW, Umatilla USFS, Nez Perce Tribe, DOE, Salmon Corps, students, citizens, landowners, and WSU - Center for Environmental Education and Analytical Lab.

9150

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**Captive Broodstock Artificial Propagation**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Paul A. Kucera, NPT, 208-843-7320

**Target stocks:**

Not provided

**Description:**

The Lostine River chinook salmon population has declined from an estimated 893 redds in 1957 to 11 redds in 1995 and the population now exists below a threshold number of spawning adults (150). A captive broodstock program was initiated to attempt to maximize the species reproductive potential and to preserve the population through use of acclimated smolt releases to return a threshold number of spawning chinook salmon adults to the Lostine River.

Project goals are to: 1) prevent extirpation of the Lostine River native chinook salmon population, 2) preserve and enhance the Lostine River chinook salmon population through implementation and use of the captive broodstock program, 3) maintain genetic diversity in the artificially propagated captive broodstock chinook population, 4) maintain genetic diversity in the natural population of salmon in the Lostine River. This program plans to rear and release 150,000 acclimated smolts in an attempt to return at least 150 spawning adults to the Lostine River.

**NPPC Measure:** Not provided

**Partners:**

Not provided

8402500

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**Protect and Enhance Fish Habitat in Grande Ronde Basin Streams**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Vance R. McGowan, ODFW, 541-963-2138

**Target stocks:**

Snake River Spring/Summer Chinook and Summer Steelhead

**Description:**

The primary goal of the "Grande Ronde Basin Fish Habitat Enhancement Project" is to protect, enhance, and restore riparian and instream habitat for anadromous salmonids, thereby maximizing opportunities for natural fish production. This project provides for implementation of Program Measures 7.6, 7.7, 7.8 and 7.10 of the Columbia River Basin Fish and Wildlife Program. These measures call for coordinated efforts to protect and improve spawning and rearing habitat, improve fish passage, and provide offsite mitigation for mainstem fishery losses caused by the Columbia River hydroelectric system. Accomplishing this goal will partially mitigate these losses.

Initiated by the Oregon Department of Fish and Wildlife in 1984, this project protects habitat on private lands in selected tributaries, through long term lease agreements. This project calls for passive regeneration of habitat, using riparian enclosure fencing as the primary method to restore streams to a normative condition. Active remediation using plantings, off-site water developments, and site-specific instream structures are also utilized where applicable.

Individual projects contribute to ecosystem and basin-wide watershed restoration efforts that are underway by state, federal and tribal agencies, the Grande Ronde Model Watershed Program and local watershed groups. While the focus of this project is on endangered Snake River spring/summer chinook and threatened summer steelhead, resident fishes and many species of wildlife also benefit. Long term maintenance is an ongoing and vital element of this program, and a monitoring program has been in place that includes: stream temperatures, habitat transects, physical and biological surveys, and photopoints.

**NPPC Measure:** 7.6, 7.7, 7.8, 7.10

**Partners:**

Not provided

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**Northeast Oregon Hatchery Master Plan**

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Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Becky Ashe, NPT, 208-843-7320 x2433**Target stocks:**

Not provided

**Description:**

The goal of this project is to identify and develop artificial propagation facilities to protect and enhance anadromous salmonid species native to the Imnaha and Grande Ronde River subbasins as authorized by the NPPC in 1987 (NPPC). Actions authorizing and directing this project are found in the Columbia Basin Fish and Wildlife Program, NPPC 94-55, Section 7.4. The strength of these mandates is intensified by the inclusion of Imnaha and Grande Ronde River spring and fall chinook populations under the Endangered Species Act in 1992.

Master plans for facilities in the Imnaha and Grande Ronde River subbasins (Ashe et al., in prep.) will be submitted to the NPPC for approval in 1998. Species addressed in the master plans include spring chinook, fall chinook, coho, and sockeye salmon. Support documents to the master plans include: genetic risk assessments (Neeley et al. 1993 and Neeley et al. 1994), feasibility studies for reintroducing coho and sockeye salmon (Cramer and Witty, in prep.), fisheries management plans (Mundy, in prep.), facility conceptual design (Montgomery Watson 1995), facility siting (Montgomery Watson 1995), cultural resource surveys (Lyon, in prep.)

Facilities detailed in the above documents are low cost, small scale, portable facilities designed for conservation and supplementation of native fish stocks. Rearing techniques will utilize NATURE's techniques and mimic natural rearing conditions with the intent to improve post-release and smolt-to-adult survival and decrease potential impacts on wild fish. Production will be integrated with LSRCP program. Supplementation under this project is planned for a minimum of five salmon generations or 25 years.

A monitoring and evaluation plan modified from Steward (1996) will be developed for this project in 1999. This plan will integrate M&E occurring under LSRCP and needs specific to this supplementation project. It will include at a minimum data collection on life history information, ecological interactions, genetics, fish health, adult returns, spawning ground surveys, juvenile releases, juvenile outmigration and survival. The plan will be used as an adaptive management tool and to gauge the effectiveness of the program relative to its purposes.

**NPPC Measure:** Section 7.4**Partners:**

Not provided

8805305

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**NE Oregon Hatchery Master Plan and Facilities - ODFW**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** James V. Phelps, ODFW, 541-963-2138

**Target stocks:**

Not provided

**Description:**

This project was initiated as one of the Northeast Oregon Hatchery Projects to improve fish production in the Imnaha, Grande Ronde and Walla Walla basins via hatchery and satellite facility development.

Originally this project focused on contributing to the council's doubling goal. With the listing of Snake River chinook and steelhead under the federal Endangered Species Act, efforts have been refocused on contributing to recovery before attempting to meet the Council's doubling goal.

The objective is to contribute to an upward trend in spawning ground counts. This will be accomplished through increased outmigration of wild smolts, while avoiding unintended changes to population structure, fitness and genetics. Without intervention, loss of biodiversity and inbreeding depression due to small population size may put these stocks further at risk. Project implementation is expected to result in the return of increased numbers of wild adults, reducing those risks and hastening recovery and delisting. We expect recovery of these weak populations over the next 5+ generations (20+ years), to population sizes supporting ESA delisting.

Specifics developed in the Master Plan will include: Evaluate success of returning adults from the Captive Brood and conventional hatchery programs, their resultant natural smolt production and adult returns.

Success will be measured by progress toward recovery, delisting and healthy populations capable of supporting Tribal and Nontribal harvest.

**NPPC Measure:** 7.4L

**Partners:**

Not provided

8909600

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## Monitor, Evaluate Genetic Characteristics of Supplemented Salmon & Steelhead

Subregion: Lower Snake      Subbasin: Grande Ronde

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**Sponsor:** Robin S. Waples, NMFS, 260-860-3254

**Target stocks:**

Snake River spring/summer chinook salmon and steelhead

**Description:**

This genetic monitoring program is designed to evaluate the effects of outplanting hatchery-reared fish on natural and wild populations of spring/summer chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) in the Snake River Basin. The two major goals are 1) to evaluate the nature and extent of genetic changes in hatchery stocks to be used for outplanting, and 2) to quantify the genetic impact of outplanting on targeted natural stocks and non-targeted wild stocks. These goals address important components of the Fish and Wildlife Program, the proposed Snake River Recovery Plan, and other regional planning documents. Information developed in this study will also provide valuable insight into the spatial and temporal scale of genetic structure in natural and wild populations.

The basic study plan includes eight different supplementation programs (two for each species). Yearly samples are taken from the hatchery stocks used for supplementation and selected natural and wild populations. Samples are analyzed for a suite of protein and DNA characters, and data obtained will be used to test the hypothesis that the outplanted stock has no significant genetic impact on natural or wild populations. Allele frequency change over time will be used to estimate effective population size and rates of inbreeding. Avoiding deleterious effects of inbreeding is of considerable importance, particularly in stocks used in attempts to establish self-sustaining natural populations.

In addition to monitoring the effects of the individual enhancement programs, the study will provide a broader perspective of the kind of results to be expected from different methods of supplementation. Results thus should be of general use in planning and implementing enhancement programs throughout the Columbia River Basin.

**NPPC Measure:** 7.2, 7.3B.2, 7.4D.2, 7.4L.1

**Partners:**

IDFG, ODFW, USFWS, WDFW, CTUIR

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**Grande Ronde Model Watershed - Project Planning Support**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Patty Perry, GRMWP, 541-962-6590

**Target stocks:**

Snake River spring chinook salmon; Snake River summer steelhead

**Description:**

This proposal requests continued funding for the comprehensive Grande Ronde Model Watershed Program (GRMWP). The GRMWP brings relevant interests together to address the needs of declining fish populations of the Grande Ronde Basin. The projects focus on habitat degradation, which has been a contributing factor to the decline of anadromous fish populations in the Grande Ronde basin as well as in the Columbia River basin.

The mission of the GRMWP is to "develop and oversee the implementation, maintenance, and monitoring of coordinated resource management that will enhance the natural resources of the Grande Ronde Basin." Goals are: 1) to provide for restoration and enhancement of anadromous salmonid habitat, 2) to provide recommendations for management of basin resources to improve water quality and quantity, 3) to conduct a public involvement program for landowners, land managers, and resource users, and 4) to assure that watershed restoration projects are monitored and evaluated on a coordinated basis.

The project is in direct support of project #9402700 which addresses the following habitat parameters and management activities identified in the 1994 Columbia Fish & Wildlife Program, Section 7.6D: sediment, bank stability, water quality & quantity, large woody debris, livestock management, riparian vegetation, stream morphology, roads, agricultural practices, recreation management, large pools, and land management. All of the proposed actions fit within the scope of the GRMWP assessment & planning documents.

The GRMWP has a strategy and is focusing to restore critical pieces of habitat with the objective of restoring watershed-wide connectivity. Specific measurable outcomes include: 1) an increase in properly functioning riparian zones and flood plains; 2) restoration of in-channel and riparian habitats for anadromous and resident fish and wildlife; 3) increase in spawning and rearing habitat for spring chinook and steelhead; 4) project monitoring information and basin-wide water quality monitoring data compiled & published (integrated with all entities in the basin); 5) increased landowner awareness and public education about activities necessary to restore fish habitat and water quality in the basin. The Board of Directors? hold an annual work/planning session to review the programs progress and direction.

In 1996, at the direction of the Board of Directors, the technical committee developed a coordinated monitoring strategy for the Grande Ronde basin. The objective of the monitoring program is to determine cumulative effects of restoration work over time and provide credible data on which to base management decisions. By collecting key water quality information, trends will begin to be developed throughout the watershed.

**NPPC Measure:** 7.0 (7.0B.1,7.6,7.6C,7.6D,7.7B.2-3,7.8A.4-5)

**Partners:**

Bureau of Reclamation, Governor's Watershed Enhancement Board, U. S. Forest Service (BMNRI), Eastern Oregon University, Oregon Dept. of Agriculture, Oregon Water Resources Dept., Technical support local, state, and federal agencies, Tribes (Nez Perce Tribe, Confederated Tribes of the Umatilla Indian Reservation), Boise Cascade Corp., and R-Y Timber Co.

9402700

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## Grande Ronde Model Watershed Habitat Projects

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Patty Perry/Lyle Kuchenbecker, GRMWP, 541-962-6590

**Target stocks:**

Snake River spring chinook salmon; Snake River summer steelhead

**Description:**

This proposal continues the comprehensive watershed restoration program for the Grande Ronde Basin. The Grande Ronde Basin was selected in 1992 by the Northwest Power Planning Council as the model watershed for Oregon. The mission of the Grande Ronde Model Watershed Program (GRMWP) is to develop and oversee the implementation, maintenance, and monitoring of coordinated resource management that will enhance the natural resources of the Grande Ronde River Basin. This proposal implements approximately 40 individual habitat restoration projects under the GRMWP. The projects target specific salmonid habitat problems on critical stream reaches in the basin. Habitat restoration and protection are critical links to restoring anadromous fish populations in the Columbia River Basin.

Projects developed address habitat parameters and management activities identified in the 1994 Columbia Basin Fish and Wildlife Program. Objectives of the projects are to improve fish passage at in-stream blockages; improve in-stream habitat diversity; enhance riparian conditions; improve streambank stability; protect spawning adult salmon; improve upland watershed conditions; increase flows to improve stream temperatures; and to improve overall water quality.

Project development follows a structured process which focuses limited resources to critical streams and locations where habitat benefits can be optimized. Projects undergo a thorough internal review to assure implementation of priority needs in the basin. Implementation and effectiveness monitoring is an integral component of all restoration projects. A basin-wide monitoring strategy also has been implemented in cooperation with the Union and Wallowa Soil and Water Conservation Districts.

**NPPC Measure:** 7.0 (7.0B.1,7.6,7.6C,7.6D,7.7B.2-3,7.8A.4-5)

**Partners:**

Governors Watershed Enhancement Board, Confederated Tribes of the Umatilla Indian Reservation, Bureau of Reclamation, Oregon Dept. of Fish & Wildlife, Oregon Dept. of Transportation, Oregon State Parks, Union Soil and Water Conservation District, Wallowa Soil and Water Conservation District, Wallowa County Public Works Department  
Union County Public Works Department, City of Union, Union County, Boise Cascade Corp., U.S. Forest Service, Misc. Private Landowners.

9403900

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## Wallowa Basin Project Planning

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Don Bryson, NPT, 541-426-0119

**Target stocks:**

Not provided

**Description:**

The question is, can we live with salmon (or any other species)? The overall goals and objectives of this project are to show that resource use, healthy economies, and healthy

eco-systems are compatible and to provide quality habitat for natural production of salmonids.

The FWP concepts that this project supports are: 1) a healthy Columbia Basin, 2) maintain biological diversity, and 3) provide needed habitat protection. The FWP (Section 7) emphasizes the need to seek cooperative habitat protection and improvement with private landowners. The problem is that Wallowa County can not save the Snake River salmon because the major issues relating to salmon survival are outside of the county.

What can the County do? We will take a watershed approach, work through political boundaries, and provide the best habitat possible for the fish and other species present in the county.

How will this be accomplished? Coordination is a key element in the successful accomplishment of the above objectives. This project provides coordination through the following avenues:

? works with the Grande Ronde Model Watershed through its technical committee, standing committee, and board,

? coordinates within Wallowa County through:

? monthly coordination meetings between managers in the county,

? the Wallowa County Natural Resource Advisory Committee,

? Wallowa Resources (affiliated with Sustainable Northwest), and

? Landowner meetings.

The above efforts are expected to result in habitat projects and action plans/CRMPs. The expected benefits are healthy watersheds with shaded riparian areas and streams with cool, clean water that benefit fish and wildlife but that the residents of the county and the visitors to the county can also enjoy. This process will take decades to complete but initial benefits of improving instream flows and eliminating passage problems are immediate

All projects have a monitoring component and a watershed level monitoring plan is being developed for the Grande Ronde Model Watershed. Monitoring coordination is essential and will consist of: 1) uniform monitoring protocols (ODEQ and EPA), 2) sharing equipment, and 3) a cooperatively developed comprehensive watershed level monitoring program.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9608300

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## Upper Grande Ronde Habitat Enhancement

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Allen Childs, CTUIR, 541-278-5267

**Target stocks:**

Snake River Spring chinook salmon and summer steelhead trout

**Description:**

The CTUIR Grande Ronde Subbasin Watershed Restoration Project (5507000) is an ongoing, multiple cooperator/partner effort with key objectives of restoring and enhancing water quality, instream structural diversity, floodplain/geomorphological functions, riparian/wetland quality and quantity, and rearing and spawning habitat for anadromous fish including threatened Snake River Spring chinook salmon and summer steelhead trout. Key NPPC FWP Measures address include: 7.6B.3; 7.6B.4; 7.6C.5; 7.7; 7.8A.5.

The CTUIR propose to focus FY98 and 99 NPPC funding on the ongoing restoration efforts on the McCoy Meadow Ranch and continue detailed designs and preparations for project construction on the Mainstem Upper Grande Ronde Enhancement project involving the Stone and Kunha Ranches in the middle Upper Grande Ronde subbasin.

Methods involve state-of-art bioengineering techniques that embrace the scientific principles of watershed and floodplain morphological processes. The two project areas considered in this proposal exhibit severe instability primarily as a result of past land use practices such are agriculture, ranching, channelization, and transportation system development.

Project development and implementation is phased in over a period of an estimated 3-4 years on the McCoy Creek Ranch and 2-3 years on the Mainstem Grande Ronde Enhancement Project. Expected outcomes include: increased geomorphic stability and more natural channel forming/maintenance process; increased instream habitat and structural diversity including approximately 3 miles of reestablished stream channel/holding, rearing, and spawning habitat in McCoy, McIntyre, and Meadow Creeks, restoration of 300-500 acres of mid-montane wetland habitat, and enhanced holding and rearing habitat along approximately 10 miles of mainstem Upper Grande Ronde River. Benefits such as increased channel length and enhanced structural additions will be, and have been, realized immediately following construction. Benefits such as reestablishing riparian and wetland habitats will likely require over a decade to become fully realized.

Monitoring and evaluation includes groundwater, fish habitat and populations survey/sampling, and photo point monitoring. An extensive water quality monitoring network is maintained by ODEQ and includes temperature and chemistry as well as macroinvertebrate community monitoring. Additional M&E includes coordination with ongoing and planned research by Oregon State University.

**NPPC Measure:** 7.6B.3; 7.6B.4; 7.6C.5; 7.7; 7.8A.5.

**Partners:**

Not provided

9702500

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## Implement the Wallowa County/Nez Perce Tribe Salmon Recovery Plan

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Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Don Bryson, NPT, 541-426-0119

**Target stocks:**

Not provided

**Description:**

The Wallowa County/Nez Perce Tribe Salmon Habitat Recovery Plan (County/Tribe Plan) was developed by a local ad-hoc committee comprised of the County Court (government), Nez Perce Tribe, Oregon Department of Fish and Wildlife, local landowners (including ranching and timber interests), U.S. Forest Service, Bureau of Land Management, and the environmental community. The Committee analyzed all watersheds in Wallowa County for habitat problems and ranked the problems as a high, medium, or low priority, or as needing study. A list of possible solutions was developed for each problem identified. The committee recognized that watershed health could only be achieved if the watershed was treated as a whole (ie. from ridge top to ridge top).

This project is to help implement the County/Tribe Plan. As such, there is close coordination between the County Court and the Tribe on prioritizing expenditures from this project. A Natural Resource Advisory Committee has been established by the County Court, with an associated technical committee, that reviews issues relating to natural resources and advises the Court. The Technical Committee will review all on-the-ground projects prior to their implementation.

The objectives and expected outcomes for this project are: 1) foster watershed stewardship through education, 2) work with local landowners to develop habitat projects that will improve watershed conditions, and 3) provide watershed conditions suitable for salmonids in Wallowa County.

The FWP concepts that this project supports are: 1) a healthy Columbia Basin, 2) maintain biological diversity, and 3) provide needed habitat protection.

Monitoring will consist of uniform monitoring protocols (ODEQ and EPA), with equipment being shared by the Wallowa Soil and Water Conservation District, County Extension, Oregon Department of Fish and Wildlife, and the U.S. Forest Service. A comprehensive watershed level monitoring program is being developed for the Grande Ronde Model Watershed Program and all projects will have a monitoring component.

The process of restoring watersheds will take decades to complete but initial benefits of improving instream flows and eliminating passage problems are immediate

**NPPC Measure:** Not provided

**Partners:**

Not provided

9800702

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**Grande Ronde Supplementation - O&M/M&E - Nez Perce Tribe  
Lostine**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Becky Ashe, NPT, 208-843-7320

**Target stocks:**  
Not provided

**Description:**

The NPT, in coordination with ODFW, is responsible for operating supplementation facilities (adult collection and holding and juvenile acclimation and release) on the Lostine River to facilitate the Grande Ronde Basin Spring Chinook Supplementation Program. This is a cooperative project between NPT, ODFW, CTUIR, and USFWS that utilizes supplementation with conventional and captive brood production to prevent extinction of and begin rebuilding of ESA listed spring chinook. This project was identified by tribal, state and federal managers as one of the 15 high priority projects warranting immediate implementation.

The Lostine River was historically one of the most productive spawning and rearing areas for spring chinook salmon in the Grande Ronde basin. Redd counts for spring chinook in the Lostine River have declined from 893 in 1958 to 16 in 1994 and 11 in 1995. These fish are currently listed under the Endangered Species Act. In 1994, fisheries co-managers implemented a captive broodstock program utilizing indigenous stock. In 1997, sufficient adult spring chinook salmon were available for collection and initiation of conventional supplementation. Supplementation under this project is planned for 5 full salmon generations or 25 years.

A monitoring and evaluation plan for this project is currently being prepared by ODFW, NPT, and CTUIR and will be completed by March, 1998. The plan will include life history information, baseline population assessment prior to supplementation, ecological interactions, genetics, fish health, adult returns, spawning ground surveys, juvenile releases, juvenile outmigration and survival. The plan will be used as an adaptive management tool and to gauge the effectiveness of the program relative to its purposes

**NPPC Measure:** Not provided

**Partners:**  
Not provided

9800703

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**Conduct Satellite Facility O&M and Program M&E for Grande Ronde  
Spr Chinook**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Gary James, CTUIR, 541-278-5269

**Target stocks:**  
Not provided

**Description:**

Runs of chinook salmon to the Grande Ronde River basin that were once in excess of 10,000 as late as the 1950's (USACOE 1975) have declined precipitously.

The goals of the Grande Ronde River Endemic Spring Chinook Salmon Program (Program) (under 7.4.L.1 of the 1994 Columbia Basin Fish and Wildlife Program) are to prevent extinction and restore spring chinook salmon runs in Catherine Creek and the upper Grande Ronde and Lostine rivers. Through a diversified approach with both conventional and captive brood, it is our desire to return adults to natural spawning and rearing areas with the objectives of increasing natural production, fulfilling brood stock needs and eventually restoring harvest opportunities. CTUIR will operate satellite facilities in the upper Grande Ronde River and Catherine Creek and evaluate the success of restoration and mitigation efforts. The Program has two components. The captive brood component seeks to increase the number of adult salmon returning to the basin to decrease demographic probability of extinction. The conventional component of the Program has a higher demographic risk, but provides a smaller genetic risk (due to a shorter part of the life cycle with artificial selection). When anticipated increases in population size are realized, the conventional component is expected to provide a majority of this production. The first meaningful contribution to production (increased females returning) from the Program is expected to be observed in 2002.

Results will be monitored by comanagers with a coordinated evaluation plan which is currently under development.

**NPPC Measure:** Not provided

**Partners:**  
Not provided

9801001

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**Grande Ronde Basin Spring Chinook Captive Broodstock Program**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Richard W. Carmichael, ODFW/NPT, 541-962-3777

**Target stocks:**

Not provided

**Description:**

This program was initiated as a conservation measure in response to severely declining runs of chinook salmon in the Grande Ronde Basin. Our goal is to prevent extinction of the three populations and provide a future basis to reverse the decline in stock abundance of Grande Ronde River chinook salmon and ensure a high probability of population persistence well into the future once the causes of basin wide population declines have been addressed. Associated objectives include: 1) to prevent extinction of native wild chinook populations in the Lostine, upper Grande Ronde River and Catherine Creek, 2) maintain genetic diversity of indigenous artificially propagated chinook populations, 3) maintain genetic diversity in wild chinook populations and 4) assess the effectiveness of captive broodstock programs for use in recovery of chinook salmon.

We have collected naturally-produced juveniles for three years (1995-97), and reared these juveniles to near smolt stage at Lookingglass Fish Hatchery (LGFH). Two-thirds of these smolts will then be transferred to Bonneville Fish Hatchery (BOH) and one-third to NMFS Manchester Marine Lab (MML) respectively. These fish are reared at those facilities to maturity. We plan to continue collecting juveniles on an annual basis. Maturing adults are transported from MML to BOH and all fish spawned at BOH. Captive broodstock progeny will be reared to the smolt stage at Lookingglass Hatchery. We anticipate our first smolt release in 2000 from spawn in 1998. Resulting smolts (150,000 per stock) will be released into the river of parent origin and/or other chinook producing streams within that drainage. One to three years following these releases a minimum of 150 adults should return to the river of parent origin.

**NPPC Measure:** 6.2 Production, 6.26.2 Other Production Measures

**Partners:**

Not provided

**9801006**

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**Captive Broodstock Artificial Propagation**

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Paul A. Kucera, NPT, 208-843-7320

**Target stocks:**

Grande Ronde River Spring and Summer Chinook Salmon

**Description:**

The Lostine River chinook salmon population has declined from an estimated 893 redds in 1957 to 11 redds in 1995 and the population now exists below a threshold number of spawning adults (150). A captive broodstock program was initiated to attempt to maximize the species reproductive potential and to preserve the population through use of acclimated smolt releases to return a threshold number of spawning chinook salmon adults to the Lostine River.

Project goals are to: 1) prevent extirpation of the Lostine River native chinook salmon population, 2) preserve and enhance the Lostine River chinook salmon population through implementation and use of the captive broodstock program, 3) maintain genetic diversity in the artificially propagated captive broodstock chinook population, 4) maintain genetic diversity in the natural population of salmon in the Lostine River. This program plans to rear and release 150,000 acclimated smolts in an attempt to return at least 150 spawning adults to the Lostine River.

**NPPC Measure:** 7.4D

**Partners:**

Oregon Department of Fish and Wildlife

9608000

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## Northeast Oregon Wildlife Mitigation Project

Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Loren A. Kronemann, NPT, 208-843-2253

**HUs:** 10,000

**Acres:** 16,500

**Hydroproject:** Lower Snake

**Description:**

The NEOR Wildlife Mitigation Project is expected to mitigate for approximately half the outstanding wildlife losses amended into the NPPC's Fish and Wildlife Program attributed to the Lower Snake River Complex of Dams. The NPT working with the Trust for Public Lands identified an opportunity to acquire a ranch in NEOR which would provide habitat diversity, native grasslands, riparian habitat for a wide variety of wildlife species. The property had somewhat limited access and the possibility of future land acquisitions. The overall goal of the project would be to protect and preserve the property for the benefit of native species (elk, big horn sheep, quail, etc.) while protecting the native vegetation and watershed.

An inventory of the property will be completed along with the design of a management plan following a public format will outline future activities which may occur on the property for the benefit of wildlife. A monitoring program will be outlined to measure the success of the management plans and provide feedback for adaptive management. A baseline HEP and periodic HEP evaluations will be used to document habitat improvements consistent with the Power Council's Program.

Initially, the property will be managed for limited access, (by foot, horseback, etc.) until a management plan can be put in place. The full extent of the resources available on the property will need to be inventoried first, then management plans and implementation plans could be expected to be finished and implementation fully under way within 3 to 5 years. The property is expected to be managed for the benefit of wildlife in perpetuity.

**NPPC Measure:** This proposal will provide O&M funding for the NPT's NEOR mitigation properties, a project which mitigates for wildlife losses caused by hydropower production at federal facilities within the Columbia River Basin.

9705905

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**Securing Wildlife Mitigation Sites-Oregon, Ladd Marsh WMA  
Additions**

Subregion: Lower Snake      Subbasin: Grande Ronde

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 200-300

**Acres:** 308

**Hydroproject:** McNary

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

This project would enhance 308 acres of wetland and riparian habitats adjacent to the Ladd Marsh Wildlife Area in the Grand Ronde River valley. The Nature Conservancy (TNC) currently has title to the parcel, TNC will be reimbursed through the Wetlands Reserve Program and other funds. At that point, the title will be transferred to ODFW. The majority of the 308-acre property is currently marginal farmland because of periodic flooding. The remainder of the property is grazed pasture and idle ground (fence rows, ditch banks, etc.). Ladd Creek, which flows on the south and east sides of the property, has been straightened and ditched. A dike has been built along the creek to reduce seasonal flooding. Historically, this areas was part of a large wetland complex known as Tule Lake. It was drained in the early 1900's for agriculture. Restoration would include removing grazing and haying which are presently altering the site. Approximately 1 ¾ miles of Ladd Creek would be restored into a natural channel. Control structures would be placed in the stream to create seasonal wetlands. All structures would be designed for fish passage. Both the wetlands and uplands would be planted to native species. The site would be enhanced and managed by existing staff at the Ladd Marsh Wildlife Area. Coordination partners include The Nature Conservancy, the Natural Resource Conservation Service, the Wetlands Reserve Program, the Grande Ronde Model Watershed, Ducks Unlimited, and Partners for Wildlife. Proposed enhancement would benefit a variety of wildlife species including the mitigation target species for McNary Dam (e.g., mallard, Canada goose, mink, western meadowlark, spotted snadpiper, yellow warbler, downy woodpecker, and Clifornmia quail). Other sensitive species of interest that would benefit from proposed mitigation activities include bobolink, Swainson's hawk, and painted turtles. Expected HEP mitigation gains are 200 - 300 HUs and would be applied to BPA's habitat debt at McNary reservoir.

[The original project proposal is based on the acquisition of a 160-acre vernal lake/wetland parcel and the acquisition and restoration of a 308-acre grazed and hayed property. The project description has been revised to focus on the enhancement of the 308-acre property. Acquisition of the 160-acre parcel will be addressed separately and at a later time. Estimated HU gains in the original project proposal were for both parcels. Current HU estimates are the same, but are expected on just the proposed 308-acre property. The Nature Conservancy currently has title to the 308-acre property; title will soon be transferred to ODFW.]

9705912

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## Securing Wildlife Mitigation Sites-Oregon, Wenaha WMA Additions

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Subregion: Lower Snake

Subbasin: Grande Ronde

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**Sponsor:** Gregory B. Sieglitz, ODFW, 541-757-4186

**HUs:** 700 - 1,500

**Acres:** 3,000 - 4,000

**Hydroproject:** McNary

**Description:**

This project is one of many which are considered ongoing acquisition and enhancement activities funded through the Securing Wildlife Mitigation Sites - Oregon 9705900 project. The project description fully explains the history, scientific background, and methods used for all projects which fall under the umbrella project. This abstract describes the details of this site specific project.

This project would involve the protection and enhancement of grassland, riparian/riverine, shrub/steppe, open forest, and rocky habitats on two separate parcels of private land in the lower Grande Ronde watershed. Both properties contain riparian and riverine habitat along the mainstem Grande Ronde and other small tributaries. This area contains diverse habitats that are important to a variety of wildlife species including bighorn sheep, elk, mule deer, white-tailed deer, black bear, cougar, and bald eagle. The project would add 3,000 - 4,000 acres to the adjacent ODFW Wenaha Wildlife Area. The Umatilla National Forest and the Bureau of Land Management, Baker District manage much of the surrounding land. Purchase of all or part of a 2,000-acre property and a conservation easement on about 2,000 acres of a 4,000-acre property is being pursued. Negotiations for the purchase of all or part of the 2,000-acre property adjacent to the Wenaha Wildlife Area and BLM Baker District lands have begun and will continue. The property which would be purchased would require restorative work while the easement land would require little enhancement. Restoration on both parcels would entail modification of grazing and agricultural practices which are presently altering and degrading the site. Additional enhancement work would include some planting of native grasses and forbs where deemed cost effective, installation and repair of boundary fencing, and control of exotic plant species. Some habitat improvement work has been conducted on and near the lands through cooperation with the Rocky Mountain Elk Foundation, Wild Turkey Federation, North American Quail Association, and others. Many partnering opportunities are possible and would continue to be used to the greatest extent possible on these lands in the future. All mitigation target species associated with McNary Dam, with the possible exception of downy woodpecker, would benefit from the proposed project. Other species of interest that would benefit from the project include bighorn sheep, elk, many hawk and owl species, black bear, cougar, bald eagle, chinook salmon, and bull trout. Expected HEP mitigation gains from the two sites are 700 - 1,500 HUs and would be applied to BPA's habitat debt at McNary Dam.

[The original project proposal discusses the acquisition and enhancement of a 1,400-acre parcel. This parcel is actually about 2,000 acres; acquisition of all or a portion of the parcel is being pursued. There are no other changes to the original project proposal.]

8712703

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## Imnaha River Smolt Monitoring Program Project

Subregion: Lower Snake

Subbasin: Imnaha

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**Sponsor:** Paul Kucera, NPT, 208-843-7320 x2

**Target stocks:**

Natural and Hatchery Summer Chinook Salmon and Steelhead Trout

**Description:**

The Imnaha River smolt monitoring program provides tributary specific in-season information on the spring outmigration timing, travel time, and relative survival of natural and hatchery chinook salmon and steelhead trout smolts from the Imnaha River to Snake River and Columbia River dams. Salmon managers use this information to base in-season water budget and spill requests and management.

The smolt monitoring program is mandated by the Northwest Power Planning Council's program for water budget and spill management and to evaluate future drawdown of Lower Granite Reservoir. It further directs the Fish Passage Center to: 1) plan and implement the annual SMP program, 2) develop and implement flow and spill requests, and 3) monitor and analyze smolt monitoring results to assist in water budget and spill planning and reporting. Data from the Imnaha River assists in these directives.

Expected outcome is providing information on the outmigration timing of smolts from the Imnaha River and dam arrival timing, daily fish condition and smolt performance characteristics past the series of hydroelectric projects on the Snake and Columbia Rivers. Indices of migration strength and timing are provided for Imnaha River smolts at key monitoring sites. Fish quality and descaling information are also collected and provide indicators of the health of emigrating smolts. PIT tagged smolts provide measures of smolt travel time and estimates of in-river survival through key index reaches. These tributary specific data are used for in-season operational decisions relative to flow and spill management, particularly during periods when spill is being provided to improve smolt passage and survival.

Results of each years investigations are provided in an annual report format for review and dissemination.

**NPPC Measure:** 5.1B, 5.1B.1

**Partners:**

Oregon Department of Fish and Wildlife, U.S. Fish and Wildlife Service LSRCP Program.

9009

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## Restore Salmon River (Challis, ID) Area to Healthy Condition

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Mark Olson, CCWG, 208-879-4428

**Target stocks:**

Chinook, steelhead, bull trout, rainbow trout, westslope cutthroat trout.

**Description:**

Twelve miles of the Salmon River have been straightened, diked, and show the effects of poor vegetation management. The result is a continuing loss of private land and degrading fisheries habitat. To correct the problem an overview plan was developed by Forest Service hydrologists and soil scientists working with NRCS and IDFG biologists to take a wholistic approach for restoring the entire river reach. The plan basically calls for restoring a healthy riparian corridor along the river and restoring the natural floodplain. A county watershed group was formed with representation from all interested parties. This is a collaborative effort, with cost share funding from NRCS, IDFG, USFWS, USFS, BLM, BoR, US Army Corp of Engineers and possibly grants from private organizations. Funding will be administered by the Custer Soil and Water Conservation District. Private landowners will cost-share their portion by reserving land within the corridor, providing labor to manage livestock, and being responsible for long-term maintenance of fences, vegetation, and construction works.

**NPPC Measure:** 7.6, 7.6B, 7.6C, 7.6D, 7.7A, 7.8A

**Partners:**

NRCS, IDFG, USFG, USFWS, USFS, BLM, BoR, US Army Corp of Engineers, 32 local landowners, Custer SWCD.

9064

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## Analyze the Persistence and Spatial Dynamics of Snake River Chinook Salmon

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Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Russell F. Thurow, RMRS, 208-373-4377

**Target stocks:**

Wild Snake River Spring and Summer Chinook Salmon

**Description:**

We propose new research to describe factors influencing the spatial distribution and persistence of wild chinook salmon. Emerging conservation theory suggests that recolonization and persistence of widely ranging species may be strongly influenced by the spatial geometry of remaining habitats. As our central hypothesis, we propose that habitat area, quality, or context (location in relation to other spawning populations) strongly influences the occurrence of spawning chinook salmon. We propose to test this hypothesis by describing the distribution of chinook salmon redds and spawning habitats within the Middle Fork Salmon River drainage, Idaho. A global positioning system (GPS) will be used to spatially locate redds and spawning patches that will be mapped using a geographic information system (GIS). Tests will be applied to determine the most appropriate spatial statistical analyses. If spatial concepts are important to persistence of declining chinook salmon stocks, the distribution of redds within suitable spawning habitats should significantly deviate from a random distribution. The 1994 Columbia River Basin Fish and Wildlife Program calls for the acquisition of long-term monitoring, indexing, and life history information for Snake River chinook salmon. While this research will focus on larger scale spatial questions about persistence, it will simultaneously provide information useful for intensively monitoring an ESA listed chinook salmon stock. Our annual estimates of the total number of wild chinook salmon redds will enable managers to estimate annual adult escapement in order to monitor stock status and evaluate the influences of various mitigation and restoration efforts. Three years of data have already been gathered. The project will require at least 5 years to follow one generation of spawning fish in order to complete the analysis of spatial structure.

**NPPC Measure:** 2.1A, 4.2A, 4.3C, 7.13C, 7.14C, 7.1E

**Partners:**

Collaborators include the Idaho Department of Fish and Game, Nez Perce Tribe, Shoshone-Bannock Tribe, and central Idaho National Forests.

8909800

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## Salmon Supplementation Studies in Idaho Rivers

Subregion: Lower Snake

Subbasin: Salmon, Clearwater

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**Sponsor:** Peter F. Hassemer, IDFG, 208-465-8404

**Target stocks:**

Spring/summer chinook salmon

**Description:**

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Salmon River and Clearwater River basins, working to help define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small-scale studies designed to evaluate specific hypotheses. Approaches one and two measure population responses to supplementation and are long-term studies. Approach three determines specific impacts of supplementation such as competition, dispersal, and behavior; and are short-term studies conducted in "controlled" environments. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook have become extirpated. We expect supplementation effects and recommendations to be different for each stream. The study design called for a minimum of 15 years of research (three generations). Sampling was initiated in 1991 and implementation began in 1992. The supplementation effects will be monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameter

**NPPC Measure:** 7.3B.2, 7.0A, 7.1B.1, 7.1C.3, 7.2A

**Partners:**

Shoshone-Bannock Tribes, Nez Perce Tribe, U.S. Fish and Wildlife Service

8909801

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## Salmon Supplementation Studies in Idaho Rivers

Subregion: Lower Snake

Subbasin: Salmon, Clearwater

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**Sponsor:** Jill M. Olson, USFWS-IFRO, 208-476-7242

**Target stocks:**

Spring and Summer Chinook Salmon

**Description:**

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Salmon River and Clearwater River basins, working to help define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small-scale studies designed to evaluate specific hypotheses. Approaches one and two measure population responses to supplementation and are long-term studies. Approach three determines specific impacts of supplementation such as competition, dispersal, and behavior; and are short-term studies conducted in "controlled" environments. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook have become extirpated. We expect supplementation effects and recommendations to be different for each stream. The study design called for a minimum of 15 years of research (three generations). Sampling was initiated in 1991 and implementation began in 1992. The supplementation effects will be monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameters.

**NPPC Measure:** 7.3B.2, 7.0A, 7.1B.1, 7.1C.3, 7.2A

**Partners:**

Shoshone-Bannock Tribes (8909803)

Nez Perce Tribe (8909802)

Idaho Dept. of Fish and Game (8909800)

8909802

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**Salmon Supplementation Studies in Idaho Rivers**

Subregion: Lower Snake

Subbasin: Salmon, Clearwater

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**Sponsor:** Jay A. Hesse, NPT, 208-634-5290

**Target stocks:**

Not provided

**Description:**

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Salmon River and Clearwater River basins, working to help define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small-scale studies designed to evaluate specific hypotheses. Approaches one and two measure population responses to supplementation and are long-term studies. Approach three determines specific impacts of supplementation such as competition, dispersal, and behavior; and are short-term studies conducted in "controlled" environments. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook have become extirpated. We expect supplementation effects and recommendations to be different for each stream. The study design called for a minimum of 15 years of research (three generations). Sampling was initiated in 1991 and implementation began in 1992. The supplementation effects will be monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameters.

**NPPC Measure:** Not provided

**Partners:**

Not provided

8909803

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## Salmon Supplementation Studies in Idaho Rivers

Subregion: Lower Snake

Subbasin: Salmon, Clearwater

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**Sponsor:** Christopher A. Reighn, SBT, 208-238-3762

**Target stocks:**

Snake River Spring/Summer Chinook Salmon

**Description:**

The goal of the Idaho Supplementation Studies Project is to evaluate the usefulness of supplementation as a recovery/restoration strategy for depressed stocks of spring and summer chinook salmon in Idaho. The project is a multi-agency effort, covering 30 streams throughout the Salmon River and Clearwater River basins, working to help define the potential role of chinook salmon supplementation in managing Idaho's natural spring and summer chinook populations, and identify genetic and ecological impacts to existing natural populations. The ISS experimental design is split into three main approaches: (1) Large scale population production and productivity studies designed to provide Snake River basin wide inferences. (2) Using study streams to evaluate specific supplementation programs. (3) Small-scale studies designed to evaluate specific hypotheses. Approaches one and two measure population responses to supplementation and are long-term studies. Approach three determines specific impacts of supplementation such as competition, dispersal, and behavior; and are short-term studies conducted in "controlled" environments. We expect this research to demonstrate the best methods for supplementing existing natural populations of chinook salmon and re-establishing natural populations in streams where chinook have become extirpated. We expect supplementation effects and recommendations to be different for each stream. The study design called for a minimum of 15 years of research (three generations). Sampling was initiated in 1991 and implementation began in 1992. The supplementation effects will be monitored and evaluated by comparing juvenile production and survival, fecundity, age structure, and genetic structure and variability in treatment and control streams of similar ecological parameters.

**NPPC Measure:** 7.3B.2, 7.0A, 7.1B.1, 7.1C.3, 7.2A

**Partners:**

Nez Perce Tribe, Idaho Department of Fish and Game, and US Fish and Wildlife Service

9005500

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## Steelhead Supplementation Studies in Idaho Rivers

Subregion: Lower Snake

Subbasin: Salmon, Clearwater

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**Sponsor:** Alan Byrne, IDFG, 208-465-8404

**Target stocks:**

Not provided

**Description:**

The goal of supplementation is to use artificial propagation to increase natural fish production without a negative effect on the productivity and abundance of existing natural populations. The Northwest Power Planning Council identified supplementation to generate much of the increases to meet its goal of doubling anadromous fish runs in the Columbia River. The goal of supplementation: an increase in natural production, is a departure from previous hatchery management. Guidelines and procedures for supplementation are not established. This project was designed to investigate potential benefits and risks with small-scale experiments and to develop protocols for biologically sound steelhead supplementation. We used the Regional Assessment of Supplementation Project (RASP) guidelines to formulate the research design.

The major objectives of this research are:

1. Assess the performance of hatchery and wild brood sources to reestablish steelhead in streams where extirpated.
2. Evaluate the ability of returning adults from hatchery smolt and fingerling releases to produce progeny in natural streams.
3. Collect baseline population status, life history attributes, and genetic data from wild steelhead populations in key indicator tributaries of the Salmon and Clearwater drainages.

We minimized the risk to natural populations of steelhead and chinook salmon by choosing study streams, for Objectives 1 and 2, that are vacant of steelhead or are no longer managed as viable populations. Our manipulative experiments are small-scale, includes stocking for three or four brood years, and are not intended to produce viable populations of steelhead.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9107100

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**Snake River Sockeye Salmon Habitat and Limnological Research**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Doug Taki, SBT, 208-238-3914

**Target stocks:**  
Snake River sockeye

**Description:**

The purpose of this project is to assess habitat limitations pertaining to Snake River sockeye salmon *O. nerka* preservation and recovery, and to continue activities implemented (lake fertilization) to increase or re-establish sockeye production in historic nursery lakes of the Sawtooth Valley, Idaho. To investigate fish community dynamics in lake nursery areas, including the relationships between resident and anadromous forms of *O. nerka* in present or potential Sawtooth Valley production areas. Assist IDFG in captive broodstock activities such as sockeye net pen production and assessment of fish performance while residing in nursery lakes through smolt emigration.

Limnological conditions and fish interactions (competition/predation) are used to estimate sockeye carrying capacity. Without this data, stocking at densities greater than existing carrying capacities could result in a zooplankton crash which would reduce available rearing habitats and impede recovery.

Our limnology and lake fertilization efforts directly address 7.5A.1 and 7.6A.2 in the FWP. We also removed a passage barrier on the outlet of Pettit Lake Creek that is called for in both 7.5A.1 and 7.6A.2. The methods we use for limnological monitoring and lake fertilization are standard methods used for decades in Alaskan and Canadian sockeye rearing lakes. We consulted with Dr. John Stockner, a Canadian researcher with more than two decades of sockeye research experience, to formulate a prescription for the quantities of fertilizer to apply to each lake that will increase forage resources for juvenile sockeyes without detrimental effects on the lake's ecosystem.

We expect to increase the number of returning adult sockeyes to the Sawtooth Valley, Idaho. The time frame for this to occur is unknown but early results should be seen in adult returns during 1998.

**NPPC Measure:** 2.2A, 7.5A.1, 7.6A.2

**Partners:**

IDFG  
NMFS

9107200

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## Redfish Lake Sockeye Salmon Captive Broodstock Program

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Paul A. Kline, IDFG, 208-939-4114

**Target stocks:**

Snake River – Redfish Lake sockeye salmon

**Description:**

Precipitous declines in Snake River sockeye salmon populations lead to their Federal listing as endangered in 1991 (Redfish Lake ESU). The ultimate goal of Idaho Department of Fish and Game's (IDFG) captive broodstock development and research is to reestablish sockeye salmon runs to Stanley Basin waters and to provide for some degree of sport and treaty harvest opportunity. In the near term, our goal is to maintain Snake River sockeye salmon and prevent species extinction using captive broodstock technology. It is virtually certain that without the boost provided by this program, Redfish Lake sockeye salmon would soon be extinct. Captive broodstock efforts are consistent with the Recovery Goal presented in Chapter 7 of the National Marine Fisheries Service (NMFS) pre-decisional Snake River Salmon Recovery Plan and with the Council's Columbia River Basin Fish and Wildlife Program (7.4D, 7.4E, 7.5A.1).

Since the inception of the program in 1991, all returning anadromous adult sockeye salmon, several hundred Redfish Lake wild outmigrants, and several residual sockeye salmon adults have been captured and used to establish captive broodstocks at the IDFG Eagle Fish Hatchery and at NMFS facilities in Washington State. Adaptively managed, the program generates hatchery-produced eggs, juveniles, and adults for supplementation to Stanley Basin waters. Program captive broodstock techniques reflect the Region's best protocols for maintaining maximum genetic diversity, survival, and production success. Outmigrant evaluations and adult sonic telemetry studies provide a basis for determining whether broodstock lineage or release strategy are critical to the success of the supplementation program. Program methods and results undergo constant review and discussion through the Stanley Basin Sockeye Technical Oversight Committee (SBSTOC) process.

To date, approximately 30,000 juvenile outmigrants have emigrated from Stanley Basin nursery waters (through 1997 outmigration year). Hatchery-produced adults are expected to begin returning to the program in 1998. To balance natural escapement and hatchery production goals, a management plan is being prepared by SBSTOC participants. We anticipate the program continuing until successful natural spawning is established at sustainable levels adequate to achieve delisting criteria.

**NPPC Measure:** Not provided

**Partners:**

National Marine Fisheries Service, Shoshone-Bannock Tribes, University of Idaho

9107300

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**Idaho Natural Production Monitoring and Evaluation Program  
(INPMEP)**

Subregion: Lower Snake

Subbasin: Salmon, Clearwater

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**Sponsor:** Doug Nemeth, IDFG, 208-465-8404

**Target stocks:**

Snake River spring chinook, summer chinook, steelhead

**Description:**

The Idaho Natural Production Monitoring and Evaluation Program (INPMEP) conducts monitoring, evaluation, and analysis reflecting near-term and long-term informational needs of the region and state. The goal of the project is to effect recovery of threatened spring and summer chinook salmon and steelhead. The INPMEP contributes toward this goal by collecting, managing, analyzing and communicating data and information directly related to sp/su chinook salmon and steelhead production, productivity, structure, survival, and stock identification.

The program supplies necessary information in an adaptive management framework (FWP 3.2), addresses critical uncertainties (FWP 4.1A, 4.2A), monitors indicator populations (FWP 4.3C, 7.1C.3), supplies information to Streamnet (formerly the Coordinated Information System (CIS)) (FWP 4.3C.1), addresses mainstem survival questions (FWP 5.0A, 5.0B, 5.0E, 5.0F.7), collects life history and population status information (FWP 7.1C), and collects information for stock identification (FWP 8.4, 8.4A).

Monitoring methods are based on widely accepted techniques including redd counts and carcass recovery (Hassemer 1991), emigrant trapping (Thedinga et al. 1994), and mask and snorkel counts (Petrosky and Holubetz 1986). Analysis is conducted using accepted methodologies although some methodologies are being developed by this program (e.g. estimating the proportion of undetected smolts).

The expected outcome is to develop and maintain long-term databases needed by the Region (e.g. PATH) and to provide feedback on recovery measures. The INPMEP is intended to be in place until management feedback in an adaptive framework is no longer needed (recovery).

**NPPC Measure:** 3.2, 3.2C, 4.1A, 4.2A, 4.3C.1, 5.0A, 5.0B, 5.0E, 5

**Partners:**

The Idaho Supplementation Studies (IDFG), Salmon Supplementation Studies in Idaho Rivers (Nez Perce Tribe), Salmon Supplementation Studies in Idaho Rivers (Shoshone-Bannock Tribes), Steelhead Supplementation Studies in Idaho Rivers, (IDFG)

9202408

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**Protect Critical Salmonid Habitat and Habitat Restoration Investments**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Bret R. Haskett, SBT, 208-238-3864

**Target stocks:**

Not provided

**Description:**

Enhanced law enforcement will protect critical habitat for listed salmonid stocks along with resident fish and wildlife. Protection will also be focused on the existing habitat restoration investments (Lemhi Model Watershed, Marsh Creek, East Fork Salmon River, ect.) that restore fish habitat, passage, or adequate water flows through enforcement of water rights, fish screens, and water quality rules or laws. An evaluation will document the effectiveness of the program by analyzing statistics and documentation as it pertains to harvest (illegal or legal), habitat destruction, and fish passage issues.

**NPPC Measure:** Measure 1.6 and NPPC FY 98 AIWP Recommendations Section 5.f

**Partners:**

Not provided

9202603

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**Idaho Model Watersheds Admin./Impl. Support**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Biff Burleigh, SCC, 208-332-8652

**Target stocks:**

Chinook salmon and steelhead

**Description:**

The Model Watershed Project (MWP) was initiated by the Northwest Power Planning Council in 1992 to improve chinook salmon and steelhead habitat in the Lemhi, Pahsimeroi, and East Fork of the Salmon River watersheds. These watersheds provide habitat for approximately 75% of the upper Salmon River anadromous fish. The goal of the project is to maintain, enhance, and restore anadromous and resident fish habitat while also achieving and maintaining a balance between resource protection and resource use on a holistic watershed management basis. This project is administered through The Idaho Soil Conservation Commission and is coordinated through the Idaho Model Watershed Project Advisory and Technical Committee in conjunction with the Lemhi and Custer Soil and Water Conservation Districts and various local, state and federal agencies. Additionally, the MWP provides a foundation for other groups such as the Lemhi County Riparian Habitat Conservation Agreement, Custer County Salmon River Conservation Plan, Idaho DEQ Basin and Watershed Advisory Groups, Bureau of Reclamation Water Conservation Program, IDFG screen program and others.

The goal of the project is to maintain, enhance, and restore anadromous and resident fish habitat while also achieving and maintaining a balance between resource protection and resource use on a holistic watershed management basis. Specific habitat goals, as outlined in the Model Watershed Plan, (1995).

The coordination and administration currently funded by BPA is essential to the continuation of habitat and migration enhancement project work in the Upper Salmon River Basin along with being the glue which holds the community together with responsible resource management. This work can only happen with the cooperation of local communities, SWCD's, private landowners, NRCS, IDFG, BLM, USFWS, BoR, USFS, Tribes, NMFS, BPA and others.

**NPPC Measure:** 7.6 and 7.7

**Partners:**

Lemhi and Custer SWCDs, Lemhi Model Watershed Advisory Committee, Shoshone-Bannock Tribes, Idaho Dept. of Fish & Game, Idaho Division of Environmental Quality, Natural Resources Conservation Service, Bureau of Land Management, Bureau of Reclamation, US Forest Service, Bonneville Power Administration, National Marine Fisheries Service, US Fish and Wildlife Service, private landowners

9204000

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## Redfish Lake Sockeye Salmon Captive Broodstock Rearing and Research

Subregion: Lower Snake      Subbasin: Salmon

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**Sponsor:** Tom Flagg, NMFS, 206-942-7181

**Target stocks:**

ESA-listed Snake River sockeye salmon

**Description:**

The National Marine Fisheries Service is maintaining captive broodstocks of endangered Redfish Lake sockeye salmon. Captive broodstock programs are a form of artificial propagation where fish are cultured in captivity for most or all of their life cycle. Implementation and refinement of captive broodstocks for the recovery of Snake River sockeye salmon are identified as priorities in the NWPPC Columbia Basin Fish and Wildlife Program (7.4A.1-3) and the NMFS proposed Recovery Plan for Snake River salmon (4.1a, 4.1c--Schmitt et al. 1995; Chapter 7--Schmitt et al. 1997). The NMFS captive broodstocks are complementary to those reared by the Idaho Department of Fish and Game (IDFG) and are intended to reduce the risk of catastrophic loss of this valuable gene pool. Since 1991, only 15 sockeye salmon adults (zero to eight individuals per year) have returned to Redfish Lake. NMFS has captive broodstocks for 1991-, 1993-, 1994-, and 1996-broods (no females returned in 1992, 1995, and 1997) and has spawned Redfish Lake sockeye salmon captive broodstock yearly since 1994. The fish are reared to full term adults in fresh well water, or from smolt to adult in a pumped, filtered, and UV-sterilized seawater system. Pre-spawning adults, eyed eggs, and juveniles are returned to Idaho to aid recovery efforts. Over 600,000 viable eggs have been produced by the program for use in recovery efforts. This captive broodstock egg production translates to a direct yearly amplification of 47-250 times the endangered species gametes taken into protective culture. The relatively high juvenile survival of first and second generation captive broodstock currently being held in protective culture should result in continued production of up to 200,000 eggs yearly in upcoming years. It is virtually certain that without the boost provided by these captive broodstocks, Redfish Lake sockeye salmon would soon be extinct.

**NPPC Measure:** 7.5A (1-3)

**Partners:**

Idaho Department of Fish and Game, Shoshone-Bannock Tribes of Idaho, University of Idaho

9306200

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## Salmon River Anadromous Fish Passage Enhancement

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Jude Trapani, SWCD, 208-756-6322

**Target stocks:**

Chinook Salmon, *Oncorhynchus tshawytsch*

Steelhead, *Oncorhynchus mykiss*

**Description:**

The Model Watershed Project (MWP) was initiated by the Northwest Power Planning Council in 1992 to improve chinook salmon and steelhead habitat in the Lemhi, Pahsimeroi, and East Fork of the Salmon River watersheds. Currently, these watersheds provide habitat for approximately 75% of the upper Salmon River anadromous fish. The goal of the project is to maintain, enhance, and restore anadromous and resident fish habitat while also achieving and maintaining a balance between resource protection and resource use on a holistic watershed management basis. This project is administered through Lemhi and Custer Soil and Water Conservation Districts and is coordinated through the Idaho Model Watershed Project Advisory and Technical Committee in conjunction with the IDFG screen program and the Bureau of Reclamation Water Conservation Program.

Fish migration problems have been identified in the Model Watershed Plan (1995) and the Stream Habitat Inventory for the Lemhi, Pahsimeroi and East Fork Salmon Rivers, 1994 (unpublished). We are in the process of implementing appropriate habitat enhancement and passage restoration projects. These include fishways, irrigation diversion consolidations and structures, improved water distribution, improved secondary channel habitat, streambank stabilization, irrigation system development, portable fish screens and instream flow agreements as they relate to adult and juvenile fish migration. A portion of the identified projects in our priority areas are being constructed each year. Additionally, monitoring and evaluation is conducted by the MWP to access meeting project objectives.

**NPPC Measure:** 7.6, 7.7

**Partners:**

Private Landowners, Custer and Lemhi Soil and Water Conservation Districts, Lemhi Model Watershed Advisory Committee, Shoshone-Bannock Tribes, Natural Resources Conservation Service, Idaho Department of Fish and Game, Idaho Division of Environmental Quality, Bureau of Land Management, Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Forest Service, National Marine Fisheries Service

9401500

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**Idaho Fish Screening Improvement - O&M**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Patrick Marcuson, IDFG, 208-756-6022

**Target stocks:**

Chinook, Sockeye, Steelhead, bull trout and other indigenous resident salmonids

**Description:**

Fish screens across irrigation canals were started as a high priority ESA effort to improve existing screens, unscreened, canals, and improve fish passage in Idaho tributaries with threatened or endangered species impacts. }{167 screens have been modified to meet NMFS criteria, 11 surface irrigation canals have been eliminated. 30 canals consolidated in 14 canals. 20 pump intakes have been screened, 4 infiltration systems installed. 14 safety fences installed, 26 headgate improvements and 6 fish friendly diversions have resulted through this cooperative program.

Consolidation and/or elimination of numerous diversions is the best solution to maximizing fish survival. Reconnecting streams lost to irrigation opens up many miles of spawning and rearing habitat. Elimination or modification of gravel push-up diversions to fish friendly diversions saves fish, reduces stream instability and improves chemical, physical and biological characteristics of Idaho waterways.

Idaho is about 70% completed with the screening effort. Consistent funding could assist completing the work by 2005. Evaluations are on-going using separate funding sources

**NPPC Measure:** 7.10

**Partners:**

Soil and Water Conservation Districts in Lemhi, Custer and Blaine Counties, Lemhi Model Watershed

9401700

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## Idaho Model Watershed Habitat Projects

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Jude Trapani, SWCD, 208-756-6322

**Target stocks:**

Chinook Salmon, *Oncorhynchus tshawytsch*

Steelhead, *Oncorhynchus mykiss*

**Description:**

The Model Watershed Project was initiated by the Northwest Power Planning Council in 1992 to improve chinook salmon and steelhead habitat in the Lemhi, Pahsimeroi, and East Fork of the Salmon River watersheds. This habitat enhancement project is administered through Lemhi and Custer Soil and Water Conservation Districts and coordinated through the Model Watershed in association with the local advisory and technical committees, public entities, and various local, state and federal agencies.

The goal of the project is to maintain, enhance, and restore anadromous and resident fish habitat while also achieving and maintaining a balance between resource protection and resource use on a holistic watershed management basis. Specific habitat goals, as outlined in the Model Watershed Plan, (1995) include increasing instream flows during critical migration periods, reduce the number of physical barriers hindering migration, develop new rearing and resting pools, establish riparian vegetation along critical areas, and reduce the sediment levels within the spawning gravels. Projects have included grazing management systems, fencing projects, streambank stabilization, riparian vegetation plantings, and instream structure work. These projects include both riparian pasture and riparian exclosure systems, providing direct benefit to fish habitat by improving pool composition, stream shading, and reduction in sedimentation as outlined in the 1994 Columbia River Basin Fish and Wildlife Programs habitat objectives. Additionally, monitoring and evaluation is conducted through yearly reviews of project objectives and onsite inspection. This work can only happen with the cooperation of local communities, Soil and Water Conservation Districts, private landowners, Natural Resources Conservation Service, Idaho Department of Fish and Game, Bureau of Land Management, U.S. Fish and Wildlife Service, U.S. Forest Service, Shoshone Bannock Tribes, National Marine Fisheries Service, and Bonneville Power Administration and others.

**NPPC Measure:** 7.7B.3

**Partners:**

Private Landowners, Custer and Lemhi Soil and Water Conservation Districts, Lemhi Model Watershed Advisory Committee, Shoshone-Bannock Tribes, Natural Resources Conservation Service, Idaho Department of Fish and Game, Idaho Division of Environmental Quality, Bureau of Land Management, Bureau of Reclamation, U.S. Fish and Wildlife Service, U.S. Forest Service, National Marine Fisheries Service

9405000

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**Salmon River Habitat Enhancement**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Jeffrey L. Anderson, SBT, 208-238-3757

**Target stocks:**

Snake River spring/summer chinook salmon; Snake River summer steelhead; Bull trout

**Description:**

The Salmon River Habitat Enhancement (SRHE) project was initiated by the Shoshone-Bannock Tribes in 1984 to improve chinook salmon and steelhead runs in traditional Tribal fishing areas. The overall goal of the SRHE project is to increase adult escapement back to the Salmon River by improving egg-to-parr survival of chinook salmon and steelhead, primarily through habitat improvements. The project has sponsored major habitat enhancements in three systems: 1) Bear Valley Creek (Middle Fork Salmon River), 2) Yankee Fork Salmon River, and 3) East Fork Salmon River. While improving anadromous salmonid spawning and rearing habitat, the project enhancements also benefit resident fish and wildlife species by decreasing fine sediment inputs and enhancing riparian habitat. Feasibility studies were conducted prior to all enhancement projects and were reviewed by interagency task force teams prior to implementation to ensure that the scientific principles were sound, and the best alternative was chosen for each system. Expected outcomes of this project are increased survival during freshwater life-stages of anadromous salmonids due to improvements in spawning, incubation, rearing, and riparian habitats; increased juvenile numbers should result in an increase in adult returns if out-of-basin survival can be improved. A timeline as to when benefits will be observed or the monitoring and evaluation has been successfully completed is elusive. Benefits from this project are masked by low smolt-to-adult survival rates mainly due to low survival in the Snake River corridor. Ultimately, only the recovery of chinook salmon and steelhead will determine if all efforts have achieved their goals. Our monitoring and evaluation includes both physical and biological parameters: 1) Redd counts to estimate adult escapement, 2) Snorkel surveys to estimate juvenile production, and 3) Habitat parameter measures to determine changes in habitat quality and quantity.

**NPPC Measure:** 7.6A.1; 7.6A.2; 7.6B.1; 7.6B.3; 7.6B.4; 7.6C.5; 7.7; 7.8C.1; 7.8D.1

**Partners:**

Not provided

**9600700**

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**Irrigation Diversion Consolidations & Water Conservation, Up. Salmon  
R., ID**

Subregion: Lower Snake      Subbasin: Salmon

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**Sponsor:** Rick Philips, CS&WCD, 208-879-4428

**Target stocks:**

Sockeye, Chinook, Steelhead, Bull trout, Rainbow trout, Westslope cutthroat trout.

**Description:**

The goal of this task (IV) will reduce juvenile migration delay and improve juvenile survival by constructing a new fish screen meeting NMFS criteria on the Challis Canal (S-32).

The overall goal of this multi-year project has been to reduce the number of irrigation diversions and enhance instream flows through water conservation measures on the Salmon River. Eliminating diversions reduces opportunities for juvenile entrainment and migration delay, eliminates the need for irrigators to enter the river with heavy equipment up to twice a year to construct “push-up” gravel diversion berms, and converting some irrigators from flood to sprinkler irrigation enhances instream flows. The elimination of the Keyes, Lower McGowan, and Upper McGowan canals and conversion of several irrigators from flood to sprinkler irrigation completed in Task I (FY-96) resulted in a savings of about 9,000 acre feet annually. The elimination of the Lavery (S-29) diversion (task II & III) will result in about 10,800 acre feet less water diverted annually that will remain in the Salmon River

**NPPC Measure:** 7.7, 7.8G, 7.8H, and 7.10

**Partners:**

Idaho Department of Fish and Game, Custer SWCD, NRCS, Canal Company, USFWS, BoR, NMFS, Private Landowners.

9604300

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**Johnson Creek Artificial Propagation Enhancement - O&M and M&E**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** John S. Gebhards, NPT, 208-634-5290

**Target stocks:**

Snake River summer chinook salmon

**Description:**

Johnson Creek, a tributary of the South Fork Salmon River, is located in Central Idaho. The salmon population in Johnson Creek is one of the 39 populations listed under the Endangered Species Act. This population has experienced significant decline in population numbers over the past five decades. Escapement levels in Johnson Creek have declined from a high of 486 redds in 1960 to a low of five (5) redds observed in 1995. Since Snake River chinook salmon are listed as an endangered species we are in an emergency situation.

This project is a small-scale production initiative designed to increase survival of a weak but recoverable population of summer chinook salmon. The goal of this project is to prevent the extinction of the ESA listed Johnson Creek summer chinook population and begin it's rebuilding through supplementation. We intend to achieve this goal by rearing 300,000 chinook salmon smolts in a Nature's concept hatchery program for acclimated releases back into Johnson Creek. This program is addressed in Section 7.4 of the Columbia Basin Fish and Wildlife Program (NPPC 1995). Supplementation under this project is planned for a minimum of 5 full salmon generations or 25 years.

Overall, the project will evaluate the benefits of nature's concepts in rearing and acclimated releases which may include supplementation initiatives such as captive brood stock and cryopreservation, in conjunction with portable, low capital techniques for holding adults, acclimating juveniles, and the conversion of existing artificial production facilities to produce smolts and or other approaches as necessary to increase the population. A monitoring and evaluation plan coordinated with the ongoing Idaho Salmon Supplementation studies will be used as an adaptive management tool and to gauge the effectiveness of the program relative to its purposes.

**NPPC Measure:** 7.3B, 7.4A, 7.4A.2, 7.4C.1, 7.4O, 7.4O.1

**Partners:**

Idaho Department of Fish and Game

U.S. Fish and Wildlife Service, Lower Snake River Compensation Plan

National Marine Fisheries Service

9606700

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## Manchester Spring Chinook Broodstock Project

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Tom Flagg, NMFS, 206-942-7181

**Target stocks:**

ESA-listed Snake River spring/summer chinook salmon

**Description:**

The National Marine Fisheries Service (NMFS) is maintaining captive broodstocks of ESA-listed Snake River spring/summer chinook salmon. The relatively high fecundity of anadromous Pacific salmon, coupled with potentially high survival in protective culture, should allow captive broodstocks to produce large numbers of adults and juveniles to help "jumpstart" depleted populations. Implementation and refinement of captive broodstocks for the recovery of Snake River spring/summer chinook salmon are identified as a priorities in the NWPPC Columbia Basin Fish and Wildlife Program and the NMFS proposed Recovery Plan for Snake River. The NMFS captive broodstock program for Snake River spring/summer chinook salmon focuses on stocks from Idaho's upper Salmon River sub-basin and Oregon's Grande Ronde River sub-basin, is complementary to programs of the Idaho Department of Fish and Game (IDFG) and the Oregon Department of Fish and Game (ODFW), and together are intended to reduce the risk of catastrophic loss of these valuable gene pools. Currently, the program concentrates on 1994- and 1995-brood captured as juveniles from the wild by IDFG and ODFW and transferred as smolts to a pumped, filtered, and ultraviolet-light sterilized seawater system at the NMFS Manchester Marine Experimental Station. Over the next few years, it is anticipated that similar groups of fish from streams within the sub-basins will be transferred to Manchester on a yearly basis. Survivals of 1994-brood at Manchester range from 77-93% and survivals of 1995-brood range from 76-95%. Milt from both age-2 and age 3 male fish have been cryopreserved for use in future matings. In addition, some maturing age-3 Idaho fish have been released to their natal streams. The majority of the 1994- and 1995-broods are expected to mature in 1998 and 1999, respectively.

**NPPC Measure:** 7.4D.1

**Partners:**

Idaho Department of Fish and Game, Shoshone-Bannock Tribes of Idaho, University of Idaho, Oregon Department of Fish and Wildlife, Nez Perce Tribes

9700100

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**Captive Rearing Initiative for Salmon River Chinook Salmon**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Paul A. Kline, IDFG, 208-939-4114

**Target stocks:**

Not provided

**Description:**

To maintain Snake River chinook salmon metapopulation or stock structure, the within and among population variability, IDFG initiated a captive rearing program for populations at high risk of extinction. Captive rearing is a short term approach to species preservation. The main objective of the captive rearing approach is to avoid demographic and environmental risks of cohort extinction; maintaining the genetic identity of the breeding unit is an important but secondary objective. The strategy of captive rearing is to prevent cohort collapse of the specified target populations by providing captively reared adult spawners to the natural environment, which, in turn, maintain the continuum of generation to generation smolt production. Each generation of smolts, then, provides the opportunity for population maintenance or increase should environmental conditions prove favorable for that cohort.

The primary goal of this project is to develop the technology for captive propagation of chinook salmon that satisfy program needs. This is a demonstration project as identified in section 7.4D.2 of the Council's Fish and Wildlife program. Project 9801002 (IDFG) provides for some monitoring and evaluation during the captive rearing phase. The most important element of 9801002 is to monitor and evaluate the post-release behavior and spawning success of mature adult salmon produced through captive rearing. Success of the overall captive rearing program is dependent on the development of rearing technology and the biological performance of fish produced in the program.

The year 2005 is the expected end date for the current demonstration project. The project may continue if the demonstration process is successful and leads to a recovery program.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9703000

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**Monitor Listed Stock Adult Chinook Salmon Escapement**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Dave Faurot, NPT, 208-634-5290

**Target stocks:**

Spring/Summer chinook salmon

**Description:**

This project is designed to accurately determine the abundance and migratory timing of adult chinook salmon into the Secesh River and Lake Creek using underwater time-lapse video photography. The information gathered with this technology would be compared to redd count survey data to determine the relative accuracy and cost of each method. Underwater time-lapse video photography is a passive methodology that does not trap, hold or handle this ESA listed species. These streams have never been supplemented and the fish are considered to be wild and naturally spawning populations. The NPPC Columbia Basin Fish and Wildlife Program directs programs and management to maintain the genetic life history and morphological characteristics, and to conduct projects to determine population status, life history and other data on wild and naturally spawning populations. The Secesh River is a control population under the Idaho Salmon Supplementation study. Adult escapement information would aid this project in calculation of adult escapement to smolt production and smolt to adult escapement information. Escapement activities are coordinated with state and federal management agencies and ESA species monitoring is coordinated with NMFS. Escapement monitoring using underwater time-lapse video photography is a relatively new application of this technology. This methodology has the potential to provide more consistent and accurate information with less monetary and personnel expenditure. Accurate adult escapement information would allow managers to determine if recovery actions were recovering these unsupplemented populations.

**NPPC Measure:** 7.1.D.2, 7.1.C.3, 7.3.B.2

**Partners:**

Not provided

9703800

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**Listed Stock Chinook Salmon Gamete Preservation**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Paul Kucera, NPT, 208-843-7320 x2

**Target stocks:**

Spring and Summer Chinook Salmon and Steelhead Trout

**Description:**

Snake River spring/summer chinook salmon populations have experienced significant decline in population numbers over the past five decades and are now a listed species under the ESA. Genetic conservation through population protection and management has not been successful. With the constant threat of losing genetic diversity in specific native fish stocks, the establishment of a program for conservation of salmon germ plasm would serve as backup insurance for ongoing conservation programs. A genetic resource management approach using cryogenic techniques is recommended. The goal of the Listed Stock Gamete Preservation project seeks to apply cryogenic technology to preserve the genetic diversity of Snake River chinook salmon populations (spawning aggregate) that are at low levels of abundance and high risk of extirpation. This approach would target chinook salmon populations with ongoing conventional hatchery or captive brood stock artificial propagation programs, to preserve and use cryopreserved material to enhance genetic diversity. Secondly, this project will establish long term germ plasm repositories at the University of Idaho and Washington State University as an insurance policy in case extirpation of chinook salmon populations does occur. When used with hatchery propagation, collected sperm could enhance genetic diversity of the propagated population. When gene banked at repositories, samples preserved would allow for future management and research options.

**NPPC Measure:** 7.4E, 7.4D, 7.2D

**Partners:**

Not provided

9705700

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**Salmon River Production Program**

Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** David L. Arthaud, SBT, 208-238-3758

**Target stocks:**

Spring and Summer Chinook, Steelhead

**Description:**

The SRPP was approved for initial BPA funding in FY1998. Currently the planning phases and deliverables of this project are being contracted. Upon completion and approval of these plans, specific detail of project actions and deliverables will be identified to fulfill final numeric objectives. The overall goal of the project is to use lower cost, more effective, closer to natural production measures to reintroduce and recover anadromous fish runs in vacant and under-seeded habitats of the Snake and Salmon rivers. This goal is supported and mandated by measures 7.0A and 7.4O and the basic intent and policy of the 1994 FWP. Based upon the latest scientific principles and theory for the rapid recovery of endangered native fish species, proposed methods involve reforming and redirecting existing hatchery programs and practices in conjunction with the addition of small, relatively inexpensive (streamside or satellite) facilities to hold broodstocks and enable volitional releases of naturally acclimated fish. Expected outcomes include saving millions of dollars on existing production programs that are not conserving or recovering listed species, while redirecting production efforts to reverse declining wild populations and toward successful recoveries within 20 to 50 years. A stringent monitoring and evaluation plan will be designed in the master planning process with the critical objectives measured being increased rates and numbers of adult returns and increased numbers of natural spawners.

**NPPC Measure:** 7.0A, 7.4O

**Partners:**

Not provided

## 9801002

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### Captive Rearing Initiative for Salmon River Chinook Salmon - M & E

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Subregion: Lower Snake

Subbasin: Salmon

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**Sponsor:** Peter F. Hassemer, IDFG, 208-465-8404

**Target stocks:**

Spring/summer chinook salmon

**Description:**

To maintain Snake River chinook salmon metapopulation or stock structure, the within and among population variability, IDFG initiated a captive rearing program for stocks at high risk of extinction. Captive rearing is a short term approach to species preservation. The main objective of the captive rearing approach is to avoid demographic and environmental risks of cohort extinction; maintaining the genetic identity of the breeding unit is an important but secondary objective. The strategy of captive rearing is to prevent cohort collapse of the specified target populations by providing captively reared adult spawners to the natural environment, which, in turn, maintain the continuum of generation to generation smolt production. Each generation of smolts, then, provides the opportunity for population maintenance or increase should environmental conditions prove favorable for that cohort.

Development of the captive propagation technology is accomplished through BPA project #9700100. This is a demonstration project as identified in section 7.4D.2 of the Council's Fish and Wildlife program. The primary goal of 9700100 is to develop the technology for captive propagation of chinook salmon that satisfy program needs. This project (#9801002) provides for some monitoring and evaluation during the captive rearing phase. The most important element of this project is to monitor and evaluate the post-release behavior and spawning success of mature adult salmon produced through captive rearing. Success of the overall captive rearing program is dependent on the development of rearing technology and the biological performance of fish produced in the program. The year 2005 is the expected end date for the current demonstration project. The project may continue if the demonstration process is successful and leads to a recovery program.

**NPPC Measure:** 7.4D.2

**Partners:**

Shoshone-Bannock Tribes, Nez Perce Tribe, and U.S. Fish and Wildlife Service.

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**Characterize & Quantify Residual Steelhead in Clearwater River, Idaho**

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Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Patricia E. Bigelow, USFWS, IFRO, 208-476-7242

**Target stocks:**

Dworshak B-run summer steelhead

**Description:**

A substantial portion of hatchery steelhead released into the Clearwater basin do not successfully emigrate. Region wide there is a growing concern hatchery steelhead may be having negative impacts on wild fish. Yet, little is known about characteristics of hatchery steelhead which tend to residualize. Our project goals are to maximize efficiency of hatchery operations and minimize impacts to wild fish in the basin. Specific objectives include characterizing successful smolts, unsuccessful smolts (or residuals), and comparing the differences. Sampling will be done by snorkeling and electrofishing. By sampling areas of the mainstem Clearwater and its tributaries for coded-wire tagged residuals (approximately 10% of production), we will obtain information on hatchery rearing system and techniques, and sex, maturity, and piscivory of steelhead which fail to emigrate. By PIT tagging all unmarked steelhead and utilizing mark/recapture techniques, we will estimate numbers and growth rates of residuals in the basin below Dworshak National Fish Hatchery. Length, weight, and emigration history will be obtained from all steelhead captured and released. Differences in hatchery practices will be tested using a chi-square statistic. Growth rates of emigrants and residuals will be compared by ANOVA. Other characteristics of residuals will be descriptive. Expected results include information leading to the production of more effective hatchery smolts, maximizing our hatchery program and minimizing negative impacts to the threatened wild steelhead and fall chinook stocks in the basin. We also expect to determine if unsuccessful smolts are residing in the Clearwater River or simply expiring after their release to the wild.

**NPPC Measure:** 5.7A.4 and 5.7B.17; and indirectly, 7.2A.6, 7.2D.1, and 7.2D.3

**Partners:**

Not provided

9057

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## Evaluate Status of Pacific Lamprey in the Clearwater River Drainage, Idaho

Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Tim Cochnauer, IDFG, 208-799-5010

**Target stocks:**

Pacific Lamprey (*Lampetra tridentatus*)

**Description:**

The Pacific lamprey *Lampetra tridentatus* is an anadromous fish species facing the same migratory hazards as other anadromous fish in Idaho. Problems with habitat and the Snake River and Columbia River migratory corridors are unquestionably impacting Idaho's lamprey. Because Pacific lamprey are not recognized as a sport game fish in Idaho, little attention has been given to the species. While improvement in salmon and steelhead passage will also improve passage for Pacific lamprey, maintaining critical freshwater habitat for spawning and juvenile rearing is just as important for their survival. The Fish and Wildlife Plan Measure 7.5F addresses the declining status of Pacific lamprey within its natural range and the need to provide funding for projects that will support a restoration effort. This project will add to the knowledge of the lamprey's life history and habitat requirements. Data to be collected will describe both juvenile and adult migratory behavior and timing, and describe habitat for the multi-year juvenile rearing and the adult spawning. Measuring habitat parameters such as water depth, water velocity, and substrate at collection sites will help describe preferred juvenile rearing habitat. Collection of migratory juveniles by traps will provide information on size and age of migration and the timing of migration out of Idaho. Radio tagging of adults will help provide information of upstream migration timing, spawning periodicity, spawning location and necessary spawning habitat. The information obtained will be used to identify, preserve and enhance necessary habitat in the Clearwater River drainage.

**NPPC Measure:** 7.5 F

**Partners:**

Department of Fish and Wildlife  
College of Forestry, Wildlife and Range  
University of Idaho

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## Restore Anadromous Fish Habitat in the Little Canyon Creek Subwatershed

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Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Janet Hohle, Co-Coordinator, CFWP-ISCC, 208-882-0507

**Target stocks:**  
Steelhead Trout

**Description:**

The presence of overyearling rainbow-steelhead trout in Little Canyon Creek, a subwatershed within the Clearwater River subbasin and the exterior boundaries of the Nez Perce Indian Reservation, has been documented by Fuller, Kucera, and Johnson, (1985). The report also noted that the creek had low summer stream flow, lack of instream cover, nitrate problems in the upper section, annual stream flow variation in lower stretches, and siltation, although lower stretches had some sections of good riparian habitat. The Idaho State Section 303(d) (Clean Water Act) stream list includes Little Canyon Creek with the following parameters of concern: sediment, nutrients, dissolved oxygen, flow, and habitat alteration.

The major land use within the subwatershed is agriculture: cropland, forestland, and grazing on previously timbered, cutover forest soils. The purpose of actions presented in this proposal is to improve current agricultural practices through the implementaion of best management practices (BMPs), coordinated through efforts by private landowners/operators, the Lewis Soil and Water Conservation District (SWCD), Idaho Soil Conservation Commission (ISCC), and Natural Resources Conservation Service (NRCS) personnel. The proposed BMPs are techniques endorsed by the Bonneville Power Administration (1997), NRCS (1996), and the Idaho Agricultural Pollution Abatement Plan (1991).

Expected results from the proposed project include: decreased sediment delivery to Little Canyon Creek, improved rangeland conditions, and improved riparian habitat. The level of success will be evaluated using the NRCS predictive model for sediment delivery to streams and field inspections to evaluate compliance with conservation plans and BMP objectives.

**NPPC Measure:** 3.1, 4.1, 7.6, 7.7, 7.8

**Partners:**

Private landowners, Lewis Soil and Water Conservation District, Idaho Soil Conservation Commission, Natural Resource Conservation Service

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**Restore Anadromous Fish Habitat in the Nichols Canyon Subwatershed**

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Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Janet Hohle, Co-Coordinator, CFWP-ISCC, 208-882-0507

**Target stocks:**

Snake River summer chinook salmon

**Description:**

The presence of overyearling rainbow-steelhead trout in the Nichols Canyon Creek subwatershed of the Big Canyon Creek watershed within the Clearwater River subbasin has been documented by Murphy and Metsker, 1962, Fuller, Kucera, and Johnson, 1985, and Kucera and Johnson, 1986. The Fuller et al report also noted that the creek had low summer stream flow, lack of instream cover, nitrate problems in the upper section, annual stream flow variation in lower stretches, and siltation, although lower stretches had some sections of good riparian habitat. The Idaho State Section 303(d) (Clean Water Act) stream list includes Big Canyon Creek with the following parameters of concern: sediment, nutrients, dissolved oxygen, flow, and habitat alteration.

The Big Canyon Creek watershed is located within the exterior boundaries of the Nez Perce Indian Reservation.

The major land use within the subwatershed is agriculture occurring on timbered, cut over forest soils. The purpose of actions presented in this proposal is to improve current agricultural practices through the implementation of best management practices (BMPs), coordinated through efforts by private landowners/operators, the Nez Perce Soil and Water Conservation District (SWCD), Idaho Soil Conservation Commission (ISCC), and Natural Resources Conservation Service (NRCS) personnel. The proposed BMPs are techniques endorsed by the Bonneville Power Administration (1997), NRCS (1996), and the Idaho Agricultural Pollution Abatement Plan (1991).

Expected results from the proposed project include: decreased sediment delivery to Nichols Canyon Creek, improved rangeland conditions, and improved riparian habitat. The level of success will be evaluated using the NRCS prediction model for sediment delivery and field inspections to evaluate compliance with conservation plans and BMP objectives.

**NPPC Measure:** 3.1, 4.1, 7.6, 7.7, 7.8

**Partners:**

Private landowners, Nez Perce Soil and Water Conservation District, Idaho Soil Conservation Commission, Natural Resources Conservation Service

9120

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**Protecting and Restoring Big Canyon Creek Watershed**

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Ira Jones, NPT, 208-843-7406

**Target stocks:**

A-B run steelhead, Fall Chinook

**Description:**

Big Canyon Creek has historically supported A-run Steelhead and resident trout populations but because of commercial, agricultural, natural events and transportation activities it has become a low functioning stream. Peck road runs parallels to its channel causing the stream to be channelized for more than 4 miles. Stream reaches that are not channelized were heavily damaged in the 1996 flood event, which caused riparian vegetation to up-root, gravel's were deposited, stream banks eroded and stream was forced out of its original stream channel. Following the flood, dozers and backhoes were allowed to enter the stream channel without restriction or regard for fisheries habitat protection. The flood in combination with stream excavation, intended to abate future flood impacts, have compounded the damage done to fisheries habitat.

**NPPC Measure:** Not provided

**Partners:**

NRCS, Nez Perce Tribe Water Resource Dept.

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**Rehabilitate Lapwai Creek**Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Ira Jones, NPT, 208-843-7406

**Target stocks:**  
Coho, Steelhead

**Description:**

Lapwai Creek has historically supported A-run Steelhead and resident trout populations but because of commercial, agricultural, natural events and transportation activities it has become a low functioning stream. Highway 95 south parallels its channel causing the stream to be channelized for more than 10 miles. Stream reaches that are not channelized were heavily damaged in the 1996 flood event, which caused riparian vegetation to up-root, gravel's were deposited, stream banks eroded and stream was forced out of its original stream channel. Following the flood, dozers and backhoes were allowed to enter the stream channel without restriction or regard for fisheries habitat protection. The flood in combination with stream excavation, intended to abate future flood impacts, have compounded the damage done to fisheries habitat.

**NPPC Measure:** Section 7.6 - Habitat Goals, Policies and Objectives; Section 7.7 - Cooperative Habitat Protection and Improvement with Private Landowners; Section 7.8 - Implement State, Federal, and Tribal Habitat Improvements

**Partners:**

Department of Transportation, NRCS, Nez Perce Tribe Land Service (Geomax)

8335000

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## Nez Perce Tribal Hatchery

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** R. Ed Larson, NPT, 208-843-7320 x3

**Target stocks:**

Not provided

**Description:**

This project utilizes hatchery supplementation for restoration and recovery of Snake River Basin salmon stocks. Nez Perce Tribal Hatchery (NPTH) is intended to rear and release fall and spring chinook salmon into rivers and streams with the express purpose of increasing the numbers of fish spawning, incubating and living in the natural environment. It will use the modern technology that hatcheries offer (e.g. incubators, disease control) to overcome the mortality typically occurring in rivers and streams after eggs are laid in the gravel. Moreover, it will also utilize innovative NATUREs techniques to rear fish that are more like wild fish than those typically reared in hatcheries. Project management, direction, and overall outcome will be dependent upon implementation of the comprehensive Monitoring Evaluation Plan (Steward 1996).

Goals and objectives of NPTH, and an indication of expected outcome and time frame, are described in the NPTH Final EIS (BPA et al 1997). These are to:

1. Protect, mitigate and enhance Columbia River Basin Anadromous fish resources;
2. Develop, increase, and reintroduce natural spawning populations of salmon within the Clearwater River Subbasin;
3. Provide long-term harvest opportunities for Tribal and non-tribal anglers within four salmon generations following project completion;
4. Sustain long-term fitness and genetic integrity of targeted fish populations;
5. Keep ecological and genetic impacts to non-targeted fish populations within acceptable limits; and
6. Promote Nez Perce Tribal management of Nez Perce Tribal Hatchery facilities and production areas within Nez Perce Treaty lands.

The Northwest Power Planning Council (NPPC) recognized the opportunity to mitigate impacts to salmon runs in the Clearwater River Subbasin and developed specific measures for implementation of NPTH in its 1982, 1987, and 1994 Fish and Wildlife Programs (FWP). In addition, in 1996, NPTH was included as one of the fifteen high-priority supplementation projects for recovery of Snake River spring and fall chinook salmon.

**NPPC Measure:** Not provided

**Partners:**

Not provided

9202409

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## Enhance Law Enforcement for Fish & Wildlife and Watersheds of the Nez Perce

Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Captain Adam Villavicencio, NPTEC, 208-843-7320 x4

**Target stocks:**

(a) Tributary fisheries: Clearwater River steelhead, spring and fall chinook salmon, Snake River white sturgeon, and a variety resident fish species. (b) Mainstem fisheries: spring, summer and fall chinook salmon, coho salmon, sockeye salmon, steelhead, white sturgeon, and northern pikeminnow

**Description:**

The overall goal of the Nez Perce Tribe's law enforcement (LE) project is to increase protection of fish & wildlife on all watersheds under our jurisdiction. LE protection includes two primary components (1) reduce illegal take of Columbia Basin fish & wildlife, and (2) enforce habitat rules & regulations. Specific goals and objectives of the NPT enforcement project are consistent with the regional enhancement efforts, including: the NPT fisheries Resource Management Program; the CBFWA multi-year implementation Plan, the NPPC Fish & Wildlife Program; the anadromous fish restoration plan of the Nez Perce, Umatilla, Warm Springs and Yakama Tribes (1995), and the NMFS & USFWS ESA recovery plans. The conceptual scope of the LE program is the entire life cycle of the target fish species, i.e., "gravel to gravel". The geographical scope of Nez Perce enforcement is primarily the Nez Perce reservation and ceded lands in the tributary subbasins of the Columbia River system. The approach is threefold: (1) substantially increase the levels of harvest & habitat law enforcement on Nez Perce watersheds; (2) enhance the efficiency of this effort by promoting cooperation among all relevant entities; and (3) educate the public on the plight of depleted fish & wildlife stocks and the need to protect their critical habitats. We will adaptively manage the LE program via monitoring and evaluation --according to biologically-based performance criteria. The evaluation of desired/actual achievements are in terms of: Inputs (e.g., budget, personnel, equipment), Outputs (e.g., fishery statistics, contacts, arrests, seizures, etc.), and Outcomes (e.g., fish & wildlife saved, critical habitats protected).

**NPPC Measure:** 8.5C2

**Partners:**

All relevant tribal, federal and state law enforcement entities regarding cooperative comangement responsibilities

9303501

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## Enhance Fish, Riparian and Wildlife Habitat within the Red River Watershed

Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Denny Dawes, ISWCD, 208-875-1246

**Target stocks:**

Chinook salmon, steelhead trout, bull trout

**Description:**

The Red River has been channelized and the riparian habitat corridor eliminated. The river responded by incision resulting in steepened banks, increased sedimentation, degraded fish habitat, elevated water temperatures, depressed groundwater levels, and significantly reduced hydroperiods. The ongoing Lower Red River Meadow Restoration Project is an on-the-ground ecosystem enhancement effort that restores natural physical and biological processes to establish a sustainable diversity of habitats consistent with the 1994 Columbia Basin Fish and Wildlife Program. February 1998 will conclude the fifth year of our ten-year restoration/enhancement plan. Construction of the first two phases (over one mile of river) is complete. Plantings accelerate the native plant colonization, provide diverse habitat features, and increase channel stabilization. State-of-the-science hydrologic and geomorphic models are used to design future phases, provide decision support for adaptive management, and develop interpretative displays. Comprehensive monitoring of physical and ecological parameters is used to determine whether the success criteria have been achieved. Linkages and benefits between the local restoration site and watershed are quantified. The educational and outreach components of the project include interpretive signage, integration of students in monitoring or research activities, a manual of restoration lessons learned in the watershed, and scientific publications. A web-site describing the project, including real-time site conditions and imaging, is maintained and updated regularly. Monitoring is expected to continue beyond the project time frame for education and research.

**NPPC Measure:** 4.1 (Salmon and Steelhead Goal: Double Salmon and Steelhead Runs Without Loss of Biological Diversity), 7.6 (Habitat Goal, Policies, and Objectives), 7.7 (Cooperative Habitat Protection and Improvement with Private Land Owners).

**Partners:**

University of Idaho, Idaho Department of Fish and Game, Nez Perce Tribe, US Forest Service, Idaho Division of Water Quality, Rocky Mountain Elk Foundation, National Fish and Wildlife Foundation, Trout Unlimited, Natural Resources Conservation Service, Idaho State Soil Conservation Commission, Clearwater Focus Watershed.

9403400

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## Assessing Summer & Fall Chinook Salmon Restoration in Snake River Basin

Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Billy D. Arnsberg, NPT-DFRM, 208-476-7296

**Target stocks:**

Snake River summer chinook, Snake River fall chinook

**Description:**

The goal of this project is to identify currently accessible mainstem habitats, document wild chinook salmon spawning escapement and life history characteristics, and evaluate supplementation strategies that would be favorable for the recovery and restoration of summer and fall chinook in the upper Clearwater River and principal tributaries, lower Grande Ronde, Salmon and Imnaha Rivers.

The 1994 Columbia River Basin Fish and Wildlife Program, Section 7.3B.2, called on Fishery Managers to: "...implement the high priority supplementation projects including design, construction, operation, maintenance, monitoring and evaluation." And Section 7.5B.1 states: "...as quickly as possible and in consultation with the National Marine Fisheries Service, develop an experimental design for implementing, monitoring and evaluating supplementation of and, if appropriate, a captive broodstock program for Snake River fall chinook."

We assessed water temperatures for chinook salmon egg incubation and juvenile rearing which may be limiting factors for recovery of stocks in the upper Clearwater River and major tributaries, lower Grande Ronde, Salmon, and Imnaha Rivers. We are assessing spawning habitat quality and quantity. A summer and fall chinook broodstock management plan will be completed which includes all study streams. We are conducting fall chinook salmon aerial redd surveys to document adult escapement and hatchery contributions from supplementation efforts.

We are investigating life history characteristics of naturally produced Snake River fall chinook in the lower Clearwater and Grande Ronde and monitoring and evaluating supplementation strategies from Lyons Ferry Hatchery. Results will be completed by 2001 and will provide fishery managers with supplementation recommendations that will return the greatest number of spawning adults and contribute to ESA Snake River fall chinook salmon delisting.

**NPPC Measure:** 7.3B.2, 7.4B.1, 7.5B.1, 7.5B.3

**Partners:**

Not provided

9607702

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## Protecting and Restoring the Lolo Creek Watershed

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Ira Jones, NPT, 208-843-7406

**Target stocks:**

Spring Chinook, Lamprey, Steelhead, Coho

**Description:**

Protecting and restoring the Lolo Creek Watershed, to assist in increasing anadromous fish populations, is the overall goal of this project. We will achieve this working within an overall watershed approach, completing five objectives in many areas of the watershed, such as Mussellshell Uplands and Meadows, Browns Creek, and various portions of Lolo Creek and its tributaries. The first objective is road obliteration, which is a priority activity within the watershed, which will reduce sediment delivery to streams. Monitoring and evaluation will be completed and a report produced researching how road obliteration has decreased sediment loads into the Lolo Creek and its tributaries over time. The second objective is operation and maintenance (O&M) of existing structures to be constructed in 1998 (pending BPA approval), which will provide for their continual up keep including, two non-source watering systems and the stream and riparian protection fence. Monitoring and evaluation (M&E) of 1998 work (pending BPA approval) including, stream bank stabilization structures and riparian vegetation re-growth is objective three. Objective four, of the proposal, is to continue an analysis of the entire watershed for other problems that may need protection or restoration. Lastly, objective five will further exclude cattle from entering and destroying crucial fish and wildlife habitat by constructing eight miles of protection fence. The expected outcome of our work will decrease sediment problems, protect and enhance investments within the watershed already made, produce a list of possible future projects needing protection or restoration, and protect fish and wildlife habitat. These outcomes will increase available fish and wildlife habitat, assist in enlarging their populations, and protect Nez Perce tribal treaties and culture within this watershed.

**NPPC Measure:** Section 7.1 - Ensuring Biodiversity; Section 7.6 - Habitat Goals, Policies, and Objectives; Section 7.7 - Cooperative Habitat Protection and Improvement with Private Landowners; Section 7.8 - Implement State, Federal, and Tribal Habitat Improvements

**Partners:**

USFS, State of Idaho, Potlatch, Lease Permittees

9607703

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## Protecting and Restoring the Squaw and Papoose Creek Watersheds

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Ira Jones, NPT, 208-843-7406

**Target stocks:**

Fall Chinook, Coho, Resident Fish (Bull Trout, Cut Throat)

**Description:**

Protecting and restoring the Squaw and Papoose Creek Watersheds to assist in increasing anadromous fish populations is the overall goal of this project. We will achieve this working within an overall watershed approach, completing four objectives in many areas of the watersheds. The first objective is road obliteration, which is a priority activity within the watersheds to reduce sediment delivery into streams. Monitoring and evaluation (M&E) will be completed and a report produced researching how road obliteration has decreased sediment loads into the streams over time. The second objective is abating the potential for immediate sediment delivery into streams from identified areas of deposited sediment within riparian areas. Stabilizing landslides is the third objective to reduce potential for contributing sediment. The fourth objective in the proposal is operation & maintenance (O&M) of structures constructed in previous years in the effort to reduce sediment into streams. These structures include check dams, sediment fences, and the re-vegetation associated with them. The expected outcome of our work will decrease sediment loads into streams and tributaries within the watersheds, which will in turn increase available fish and wildlife habitat, assist in enlarging their populations, and protect Nez Perce tribal treaties and culture.

**NPPC Measure:** Section 7.1 - Ensuring Biodiversity; Section 7.6 - Habitat Goals, Policies, and Objectives; Section 7.7 - Cooperative Habitat Protection and Improvement with Private Landowners; Section 7.8 - Implement State, Federal, and Tribal Habitat Improvements

**Partners:**

USFS

9607704

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## Final Design for Fish Passage Improvements at Lower Eldorado Falls

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Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Ira Jones, NPT, 208-843-7406

**Target stocks:**

Coho, Fall Chinook, Lamprey Steelhead, Resident Fish (Bull Trout, Cut Throat)

**Description:**

Completing fish passage improvements at Lower Eldorado Falls within the Lolo Creek Watershed is the goal of this project. This project will work within an overall watershed approach for the Clearwater Sub-basin, by completing a final design for improvements at the falls to allow anadromous fish passage to prime spawning and rearing habitat. This will benefit and increase anadromous fish habitat, therefore, assist in enlarging their populations, and work towards the goal and objectives of the Columbia River Anadromous Fish Restoration Plan of the Tribes.

The design approach will be to modify the falls with as little impact to the environment, using as much native materials as possible, allowing successful fish passage. The plan will take into account anadromous fish (salmon and steelhead) capabilities, designing for required pool depth to jump height ratios, pool lengths, pool volumes, standing waves and for the streams velocities, flows, and characteristics. The design will also take into account flows at different times of the year that both fall and spring returning fish return to this area.

The outcome of the project will be a system that allows for clear passage of anadromous fish to 12 miles of prime spawning and rearing habitat. The design will be done in year 1998, with tentative construction finished by 2001.

Anadromous fish, upon completion of the project, will be observed for successful fish passage. The amount of spawning redds will be monitored and evaluated for increased populations. The monitoring observed and evaluated information will be stated in yearly reports produced by the program and distributed to all parties involved or interested.

**NPPC Measure:** Section 7.6 - Habitat Goals, Policies, and Objectives; Section 7.7 - Cooperative Habitat Protection and Improvement with Private Landowners; Section 7.8 - Implement State, Federal, and Tribal Habitat Improvements

**Partners:**

USFS

9607705

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## Restore McComas Meadows

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Ira Jones, NPT, 208-843-7406

**Target stocks:**

Fall Chinook Salmon, Steelhead, Resident Fish

**Description:**

Excessive grazing within McComas Meadows while under private ownership has completely destroyed the riparian corridor and caused excessive summer water temperatures, a change in channel morphology, and cobble embeddedness. While under private ownership the stream was altered to accommodate irrigation within the meadow. This activity degraded the wetland characteristics of the meadow which destroyed the cultural plants distributed within the meadow. The goal of this project is to protect fish and wildlife habitat and cultural resources by establishing a riparian corridor, replanting vegetation, enhancing channel morphology, preventing livestock grazing, and monitoring the meadow to determine recovery. The area is unique because of its low elevation meadow habitat which is accessible to salmon and steelhead. Anadromous fish spawning in the meadow has been non-existent due to high summer water temperatures. The monitoring will be done in conjunction with the Nez Perce National Forest, and will include an automatic data recorder to measure water temperature, air temperature and discharge. The monitoring will also include photo points, channel profiles, pool:riffle ratio, redd densities, riparian plant distribution survey, and a vegetation survey of the meadow. The expected outcome of this work will help the meadow regain some of its natural characteristics, increasing available fish & wildlife habitat. All of these benefits will contribute to the protection & enhancement of Nez Perce Tribal Culture.

**NPPC Measure:** Section 7.1 - Ensuring Biodiversity; Section 7.6 - Habitat Goals, Policies, and Objectives; Section 7.7 - Cooperative Habitat Protection and Improvement with Private Landowners; Section 7.8 - Implement State, Federal, and Tribal Habitat Improvements

**Partners:**

USFS

**9608600**

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**Clearwater Subbasin Focus Watershed Program**

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Janet Hohle, ISCC, 208-882-0507

**Target stocks:**

Anadromous and Resident Fish

**Description:**

The purpose of the Clearwater Subbasin Focus Watershed Program is to develop and implement a comprehensive system to coordinate multiple jurisdictions, multiple agencies, and multiple private landowners in their efforts to protect, restore, and enhance anadromous fisheries habitat. The system will incorporate existing subbasin requirements into the policies and goals of the Columbia Basin Fish and Wildlife Program. It is expected that increased opportunities for cooperative project design will result from the implementation of the Clearwater Focus Program (CFP) as well as increased optimization of funding sources.

Assessment criteria for this proposal is defined by the product described for each program objective. These products include: Clearwater subbasin assessment; administrative system and review protocol for project proposals designed and implemented; creation of interdisciplinary technical advisory team; compilation of potential projects; workshop presentations and assistance for focus proposal development.

**NPPC Measure:** 3.1, 4.1, 7.6, 7.7, 7.8

**Partners:**

Nez Perce Tribe, Natural Resources Conservation Service, Division of Environmental Quality, Idaho Fish and Game

**9706000**

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**Clearwater Subbasin Focus Watershed Program**

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Ira Jones, NPT, 208-843-7406

**Target stocks:**

All Anadromous, Resident Fish Stocks

**Description:**

The purpose of the Clearwater Subbasin Focus Watershed Program is to develop and implement a comprehensive system to coordinate multiple jurisdictions, multiple agencies, and multiple private landowners in their efforts to protect, restore, and enhance anadromous fisheries habitat. The system will incorporate existing subbasin requirements into the policies and goals of the Columbia Basin Fish and Wildlife Program. It is expected that increased opportunities for cooperative project design will result from the implementation of the Clearwater Focus Program (CFP) as well as increased optimization of funding sources.

Assessment criteria for this proposal is defined by the product described for each program objective. These products include: Clearwater subbasin assessment; administrative system and review protocol for project proposals designed and implemented; creation of interdisciplinary technical advisory team; compilation of potential projects; workshop presentations and assistance for focus proposal development.

**NPPC Measure:** Not provided

**Partners:**

State of Idaho, NRCS, Potlatch, Ranchers, Private Landowners, USFS, BLM, High way Department, Camas Railroad, BAG's

8709900

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## Dworshak Dam Impacts Assessment and Fisheries Investigation

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** Melo A. Maiolie, IDFG, 208-769-1414

**Target stocks:**

early spawning kokanee

**Description:**

Dworshak Reservoir was built in 1973 by the Army Corps of Engineers. This 718' high dam completely blocked the North Fork of the Clearwater River for anadromous fish and greatly changed the composition of the resident fishery. Our project goal is to improve the resident sport fisheries in the reservoir. Our objective is to minimize entrainment losses of fish into the turbine intakes and reservoir outlets so that a density of 30 to 50 adult kokanee/ ha can be maintained on an annual basis. Reducing entrainment losses of kokanee will also benefit other species by lessening entrainment of cutthroat, bull trout, and rainbow trout, providing more prey (small kokanee) for bull trout, and allowing nutrients (in the form of kokanee spawners) to move upstream into the tributaries. We also propose to monitor the kokanee population annually and relate changes to the operation of the dam. This empirical information can then be used to assist in the development of rule curves for the reservoir.

Our methods are to test behavioral avoidance devices to see if kokanee, and other fish, can be scared away from the intakes to the dam. Strobe light testing began in 1997. Kokanee avoided the strobe lights for the entire night and remained 100 to 130 feet away from them in an open lake environment. The next phase (1999) is to test the lights on-site. Lights will be installed in front of the three turbine intakes on the dam. Density of fish will be measured near the lights, in the forebay of the reservoir, and throughout the entire reservoir to determine population effects of entrainment losses. Fish densities will be determined using mobile, split-beam hydroacoustics. Fixed location hydroacoustics will be used to determine fish losses into the turbine intakes. Hydroacoustics have been used by project personnel since 1993 to monitor the fish population and have been proven to be highly precise.

**Relation to MYIP:**

This project meets the goals and vision of the Resident Fish Managers (RFM) as defined in the MYIP (pages 16 and 17) by maintaining and restoring healthy, self-sustaining, diverse resident fish populations in Dworshak Reservoir through controlling entrainment losses through the dam. It also addresses the RFM's specific goals 1, 2, 4, and 5 listed on page 17. This project addresses the objectives for Dworshak Dam listed in the MYIP (Section 6.6.5.3.B). The objectives are to keep adult kokanee densities between 30 - 50 fish/ha. With these densities, fishing effort of 140,000+ hours/yr and harvest of 200,000+ fish/yr can be maintained.

**NPPC Measure:** 10.3C.1, 10.3C.2, 10.3C.3

**Relation to NPPC:**

This research project conducts the activities specified in the above measures.

**Partners:**

The project is done in cooperation with the Nez Perce Tribe.

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**Dworshak Impacts/M&E & Biological-Integrated Rule Curves**

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Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** David P. Statler, NPT, 208-476-7417**Target stocks:**

bull trout (proposed ESA listing )  
westslope cutthroat trout  
kokanee  
smallmouth bass

**Description:**

The underlying goal for this project is to maintain the productive health of Dworshak Reservoir for resident fish while serving other multi-purpose needs, such as flood control, power production and flow augmentation for anadromous fish. This project is directly relevant to Section 10.3C.6 of the September 13, 1995, amended Columbia Basin Fish and Wildlife Program, which authorizes BPA to: "In consultation with the Nez Perce Tribe and appropriate state agencies, fund research, monitoring, and evaluation activities to determine the potential impacts of multipurpose flow operations on resident fish in Dworshak Reservoir. This information will be used to develop analytical methods, such as biological and/or integrated rule curves for reservoir operations similar to those developed by the Montana Department of Fish, Wildlife and Parks (MDFWP) for Hungry Horse and Libby reservoirs."

We are applying HRMOD modeling/rule curve approach developed by the MDFWP for Hungry Horse Reservoir. The expected outcome is to identify an operational strategy for Dworshak Dam to mimic the downstream natural hydrograph (beneficial to endangered Snake River salmon spawning, rearing and migration) and maintain a productive reservoir environment for resident fish, including native bull trout and westslope cutthroat trout. The target date for rule curve formulation and submittal to the Northwest Power Planning Council is 2001. After the proposed operational rule curve is officially adopted by the Northwest Power Planning Council, and the rule curve is applied, results will be monitored and evaluated by pre- and post-rule curve primary and secondary production indicators, and kokanee entrainment estimates. Existing knowledge is being applied to management of the Columbia River Federal Hydro-System on a real-time basis.

**Relation to MYIP:**

This project directly relates to achieving the biological objectives for Dworshak Reservoir and Tributaries identified in Section 6.6.5.3 of the Resident Fish MYIP. Biological/Integrated rule curve development and application are intended to benefit overall ecosystem productivity, thus benefiting target fish populations. Biological rule curve development will integrate downstream flow needs for anadromous fish spawning, rearing and migration. The normative river concept described by the ISG (1996) has direct applicability to rule curve development: 1) anadromous fish recovery actions incorporating normative configuration in the Lower Snake River, coupled with a normative hydrograph, engender mimicking the natural hydrograph through Dworshak Dam; 2) mimicking the natural hydrograph through Dworshak Dam affords the potential for a stable pool environment conducive to a healthy and productive reservoir ecosystem; and, 3) Dworshak Reservoir flood storage capabilities can be applied to moderate extreme spikes in the natural hydrograph, protecting human life and property.

**NPPC Measure:** 10.3C.6**Relation to NPPC:**

The project collects and analyzes data for incorporation in the development of Biological/Integrated Rule Curves for Dworshak Reservoir (Measure 10.3C.6). The project also provides for research, monitoring, and evaluation activities needed to determine potential impacts of salmon and steelhead flow operations on resident fish in and around Dworshak Reservoir (Measures 5.5A.1 & 5.5A.2)

**Partners:**

The NPPC must approve adoption of the rule curves for implementation. The Corps of Engineers and the BPA would need to follow the NPPC decision. The National Marine Fisheries Service would need to apply adaptive management principles in its recovery efforts for endangered Snake River chinook and sockeye salmon. Modifications to the original legislation authorizing Dworshak Dam and Reservoir may be needed.

9501300

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## Nez Perce Trout Ponds

Subregion: Lower Snake

Subbasin: Clearwater

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**Sponsor:** James L Mauney, NPT, 208-843-7320

**Target stocks:**

trout

**Description:**

The Nez Perce Trout Ponds project is funded by Bonneville Power Administration (BPA) pursuant to Measures 10.8D.1 and 10.8D.2 of the Northwest Power Planning Council's 1995 Resident Fish and Wildlife Amendments to the Columbia River Basin Fish and Wildlife Program (Program). The 1995 Fish and Wildlife Program recognizes that there are irretrievable losses associated with areas permanently blocked to anadromous fish. The resident fish substitution portion of the Program is intended to partially offset these losses through development of additional resident fishery opportunities. As a resident fish substitution project, the NPT goal is to develop trout ponds to substantively increase harvest. Our approach to using isolated ponds for the developing fisheries is to minimize inter- and inter-specific competition and hybridization with naturally producing native species. This approach also isolates the fishery to avoid incidental harvest and mortality on sensitive native populations. The expected outcome is to have sufficient pond habitat constructed by 2001 to support an annual harvest of 10,500 pounds of resident salmonids. To date, we have rehabilitated two existing ponds, and scoping for two new potential pond sites is ongoing. Monitoring and evaluation will be conducted via: (a) creel surveys to determine harvest rates and harvest; (b) fish sampling via gill nets, seining, and the fishery to determine fish growth and condition; (c) temperature, oxygen, and other parameters to track water quality; and, (d) echo-sounding and direct sounding to monitor sedimentation.

**Relation to MYIP:**

This project directly addresses objectives for Dworshak Reservoir and Tributaries identified in Section 6.6.5.3.B. This effort specifically seeks to: 1) pursue opportunities for sustainable trout fisheries that are compatible with the continued persistence of native resident fisheries and their restoration to near historic abundances (includes intensive fisheries within closed or isolated systems; and, 2) develops additional hatchery trout fisheries to substitute, in part, for anadromous fisheries until anadromous fisheries impacted by federally licensed and operated facilities are restored to near historic levels. The quantitative biological objective applicable to this project (pond development/management/maintenance within the NPT Reservation to support 8,750-10,500 pounds of trout annually for harvest) is also identified in Section 6.6.5.3.B.

**NPPC Measure:** 10.8D.2

**Relation to NPPC:**

Measure 10.8D.2 directs BPA to fund the Nez Perce Tribe to develop, maintain and manage trout ponds within the Nez Perce Indian Reservation including: 1) physically improve, maintain, monitor and stock two existing trout ponds; 2) identify through site inventory and analysis additional sites suitable for fish pond construction; 3) construct 6 to 12 additional fish ponds, depending on availability of suitable sites; and, 4) maintain, monitor and stock the additional fish ponds."

**Partners:**

The National Resources Conservation Service (USDA) and the US Army Corps of Engineers has and will provide valuable engineering assistance for pond development and maintenance. The US Fish and Wildlife Service coordinates fish availability with the NPT. Approval from the Nez Perce Tribe Land Commission and the Nez Perce Tribe Executive Committee will be needed to proceed with new construction on Tribal land.

9501600

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## Genetic Inventory of Westslope Cutthroat Trout, North Fork Clearwater Basin

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Subregion: Lower Snake      Subbasin: Clearwater

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**Sponsor:** Dana Weigel, NPT, 208-476-9502

**Target stocks:**  
westslope cutthroat trout

**Description:**

The goal of this project is to support resident fish mitigation in Dworshak Reservoir that will provide a consumptive trout fishery (>0.5 fish/hr) in a manner that is consistent with conservation of native fish species in the North Fork Clearwater basin. Hybridization with exotic trout has been documented as the greatest threat to the conservation of native westslope cutthroat trout in northern Idaho and western Montana. Under the current resident fish mitigation agreement among the US Army Corps of Engineers and the US Fish and Wildlife Service, rainbow trout have been released annually in Dworshak Reservoir. These fish move considerable distances upstream into the free-flowing portions of the drainage. This project will use nuclear DNA analysis to determine the extent of introgression that has occurred in westslope populations in the North Fork Clearwater basin upstream of Dworshak Reservoir. Tissue samples from 20 cutthroat, rainbow, and hybrid trout will be collected from 100 sites in the basin. If introgression is shown to pose a risk to native westslope cutthroat trout in the North Fork Clearwater Basin, a potential recommendation would be to develop a genetically pure westslope cutthroat trout broodstock derived from the North Fork Clearwater basin. Active restoration of wild westslope populations may require a directed release strategy for the native broodstock progeny. Monitoring and evaluation of implemented recommendations will require: identifying habitat use and spawning locations in the basin, evaluating habitat suitability, and comparing the survival and spawning success of the

**Relation to MYIP:**

This project directly addresses the two Resident Fish MYIP objectives for native fish identified for Dworshak Reservoir and tributaries (Section 6.6.5.3.A): 1) maintain and restore population productivity reduced by hydropower development and operations to healthy levels which provide opportunities for consumptive and nonconsumptive uses of native populations (quantitative objective of .5 fish/hr interim sustainable harvest rate); and, 2) Ensure population levels of native fish are above minimum viable population sizes which maintain adaptability and genetic diversity, and maximize probability of survival (minimum breeding populations of 150-300 individuals and >95% probability of persistence for at least 5 generations).

**NPPC Measure:** 10.3C.4, 10.3C.5

**Relation to NPPC:**

Measure 10.3C.4 specifically calls for a westslope cutthroat trout genetic inventory in the North Fork Clearwater River drainage. Measure 10.3C.4 also calls on the co-managers to make recommendations regarding further planting of rainbow trout in the North Fork Clearwater drainage. Measure 10.3C.5 authorizes BPA to fund the project.

**Partners:**

Measure 10.3C.7 includes cost-sharing from the Corps of Engineers for monitoring and evaluation of its resident fish mitigation stocking program, including impacts on native westslope cutthroat trout.

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## North Fork Malheur River Bull Trout and Redband Trout Life History Study

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Subregion: Upper Snake      Subbasin: Malheur

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**Sponsor:** Daniel Gonzalez/Dyan Straughan, BPT, 541-573-1375

**Target stocks:**

Bull trout  
redband trout

**Description:**

Past land use practices and construction of hydroelectric facilities have degraded the North Fork Malheur River to the point where survival of the remaining native salmonids are severely threatened. The goal of this project is to gain an understanding of bull trout life history and redband genetic composition in the North Fork River of the Malheur River Basin. Little information is currently available concerning native trout populations, seasonal distribution and movements throughout the Basin. What information there is on this area indicates that bull and redband populations are severely threatened. This project outlines a plan to assess salmonid population structure and dynamics through the use of radio telemetry, screw traps, habitat assessments and genetic analyses. This project will assist us in achieving the goals and objectives defined in the Northwest Power Planning Council's 1994 Columbia River Fish and Wildlife Program. This project also complements the management plans outlined in the US Forest Service North Fork Malheur Wild and Scenic River Management Plan and the Oregon Department of Fish and Wildlife's Malheur Management plan. Assessment of these surveys will be the basis of recommendations for enhancement and protection strategies that are in line with council measures. Implementation of these strategies will begin the process of restoring and enhancing suitable habitat for native fishes of the Malheur River Basin.

**Relation to MYIP:**

This project addresses the objectives and strategies for native species identified in Section 6.6.6.2.A. The objectives, goals and strategies of this project will compliment the ongoing study in the Mainstem Malheur River directed by the BPT. The resident fish populations remaining in these two watersheds are isolated from each other by way of reservoirs. The only possible connection is through entrainment during water releases to fulfill agricultural needs.

**NPPC Measure:** 10.1, 10.1A2, 10.5, 10.5A, 10.5B.1, 10.5B.2, 10.6

**Relation to NPPC:**

Not provided

**Partners:**

The Burns Paiute Tribe will be working through cost-share agreements with local agencies (Oregon Department of Fish and Wildlife, Bureau of Land Management, US Forest Service, and Bureau of Reclamation).

9701900

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## Stinkingwater Salmonid Project

Subregion: Upper Snake      Subbasin: Malheur

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**Sponsor:** Dyan Straughan/Daniel Gonzalez, BPT, 541-573-2420

**Target stocks:**

Bull trout  
redband trout

**Description:**

This life history study is designed to record the movements and seasonal patterns of bull trout and to gather genetic information on redband trout. The study will also assist our understanding of bull trout spawning cycles and preferred water temperatures during their migrational distribution. Currently we are conducting habitat surveys throughout the Middle Fork corridor to identify the condition and health of the habitat and riparian areas and their contribution to bull trout life history. The Middle Fork of the Malheur River and its tributaries are heavily populated with brook trout. Our 97 surveys indicated that the majority of the brook trout concentrations are in direct conflict with bull trout habitat. Within this system, they prefer the same habitat, spawn at the same time and compete for space and food. With the help of other agency biologists through cost-share agreements, we will develop a telemetry survey method that will allow us to compensate for the high numbers of brook trout during our surveys in the mainstem and its tributaries.

Past land use practices and construction of hydroelectric facilities have degraded the Middle Fork Malheur River to the point where survival of the remaining native salmonids are severely threatened. This project will assist us in achieving the goals and objectives defined in the Northwest Power Planning Council's 1994 Columbia River Fish and Wildlife Program. This project also complements the management plans outlined in the US Forest Service Malheur Wild and Scenic River Management Plan and the Oregon Department of Fish and Wildlife's Malheur Management Plan. Assessment of these surveys will be the basis of recommendations for enhancement and protection strategies that are in line with council measures. Implementation of these strategies will begin the process of restoring and enhancing suitable habitat and water quality for native fishes of the Malheur River Basin.

**Relation to MYIP:**

This project is identified in the current MYIP (Sections 6.6.6.2.A) and meets the plans overall goals and objectives. This project focuses on identifying the life history characteristics of (threatened) bull trout and to gather genetic information on redband trout (Category 2) in effort to identify factors needed to improve the health and population status of these species.

**NPPC Measure:** 10.1, 10.1A2, 10.5, 10.5A, 10.5B.1, 10.5B.2, 10.6

**Relation to NPPC:**

Not provided

**Partners:**

BPT is working through cost-share agreements with local agencies (Oregon Department of Fish and Wildlife, Bureau of Land Management, US Forest Service, Trout Unlimited and Bureau of Reclamation,).

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**Aquisition of Malheur Wildlife Mitigation Site**

Subregion: Upper Snake      Subbasin: Malheur

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**Sponsor:** Haace St. Martin/Daniel Gonzalez, BPT, 541-573-1533

**HUs:** 1,500 to 2000 on deeded property

**Acres:** 6,700 deeded, 26,000 leased

**Hydroproject:** To be determined

**Description:**

The Burns Paiute Tribe is proposing to acquire the Denny Jones Ranch in Juntura, Oregon. This acquisition would allow the Tribe as well as other state and federal agencies to manage 6700 acres of richly diverse property on the Malheur River. The ranch holds deed to ~ 7 miles of the Malheur River which includes 328 acres of 1888 water rights and leases 22,000 acres of BLM and 4000 acres of state land.

The project will benefit a diverse population of fish, wildlife and vegetation species. Objectives would include: removal of cattle from damaged riparian, wetlands and upland areas, fencing, riparian restoration and enhancement, increase wildlife use and reestablish historical home range for migratory species, weed control and maximize water quality.

Currently, the ranch is in very poor condition. The present land practices contributes to the degradation of land and water quality. According to federal and state officials, the Malheur River is highly impacted by the current grazing practices.

**NPPC Measure:** Section 11, 11.1, 11.2, 11.3

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**Burns Paiute Mitigation Coordinator**

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Subregion: Upper Snake

Subbasin: Malheur

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**Sponsor:** Haace St. Martin, BPT, 541-573-1533**HUs:** NA**Acres:** NA**Hydroproject:** NA**Description:**

The long-term goal of this project is full mitigation of all losses to wildlife in Oregon as a result of the development and operation of the federal Columbia Basin hydropower system. Under the Council's Fish and Wildlife Program, this means providing Habitat Units (HU's) of the highest priority habitat types for target species in a sustainable, cost-effective manner so that Bonneville receives mitigation credit.

Since 1991, Oregon's wildlife managers have been working together to coordinate the planning, selection, and implementation of BPA funded wildlife projects under the NW Power Planning Council's Fish and Wildlife Program as outlined in Sections 7 and 11, specifically measures 7.6, 11.2D, 11.3E and 11.3F.

The intent of this on-going project is twofold. First to facilitate coordination and planning between Oregon wildlife managers via individual funding of wildlife planning and coordination staff for each OWC member. This varies by need of the individual entity, and should remain stable or decline as mitigation goals are attained. The GAP Analysis, along with other federal, state and tribal wildlife mitigation plans, are used by the OWC to evaluate potential projects. Projects selected are given further scientific, policy, and economic review, and those agreed upon by the OWC are brought forth to the WWG and the Council for approval, leading to funding by Bonneville. The second component of this project is implementation of the wildlife mitigation projects that have come through the above process. This will include acquisitions, easements, enhancement and O&M.

In 1991 the Oregon Trust Agreement (OTA) Planning Project was initiated by Oregon's wildlife managers to bring Oregon wildlife managers together to develop an Oregon trust similar to what was done in Montana and Washington. This effort resulted in the "Brown Book" which identified and assessed potential wildlife mitigation opportunities throughout Oregon. Later, this effort was refined via a statewide GAP analysis, a Bonneville funded research project used to reevaluate the previously identified wildlife mitigation sites and identify new sites. The results of this project, as well as other federal, state and tribal wildlife management plans, are being used in this current phase to select, evaluate and implement wildlife mitigation opportunities in Oregon.

Oregon's wildlife managers, working within the Wildlife Working Group (WWG), have developed a budget for Bonneville dollars to implement Oregon wildlife mitigation projects through the year 2001. Initially funds were used for coordination and planning; in FY98, FY99 and beyond, the majority of funds will be used for implementation projects. Oregon's wildlife managers believe that the attached implementation projects are the result of a rigorous planning process. They have been evaluated using tested, regionally accepted scientific methods and criteria. They have been reviewed closely for consistency with the Council program, existing federal, state and tribal wildlife management plans, BPA Wildlife and Watershed Programmatic EIS's, etc. Their potential to provide the highest priority HU's in an economical and fiscally responsible manner has been assessed and reviewed. It is important to note that most of the implementation projects proposed build upon existing activities: whether by expansion or enhancement of existing wildlife areas, tying into regional programs like Metro Greenspaces, or complementing existing Bonneville funded watershed and wildlife projects.

Oregon's wildlife managers understand that while the proposed implementation projects are some of the best wildlife mitigation opportunities in Oregon, not all of them may be implemented for a variety of reasons. Additionally, new sites may be identified that are equal or better than those proposed and require immediate action to secure. In light of this, the managers will continually review and monitor the database of existing sites, but more importantly, will work with Bonneville to develop a funding arrangement that will provide Oregon's wildlife managers the flexibility to respond appropriately.

Initial HEP estimates have or will be taken on all sites identified by the planning process. Once sites are acquired or under management, a full baseline HEP analysis for current and potential HU's will be taken and agreed to by the project proponents and Bonneville. Throughout the life of this project, HEP analysis will be done regularly to ensure Bonneville and the region that contracted habitat goals are met. Additionally, Oregon's wildlife managers will work with the WWG to develop monitoring protocols for populations of target and non-target species, as called for by the ISRP.

**NPPC Measure:** Section 11, specifically measures 11.D, 11.3B and 11

8815600

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## Stocking Fish in Lakes and Streams on the Duck Valley Indian Reservation

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Subregion: Upper Snake      Subbasin: Owyhee

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**Sponsor:** Guy Dodson Sr., SPT, 208-759-3246

**Target stocks:**

rainbow trout  
wildlife

**Description:**

The Shoshone-Paiute Tribes will stock the Owyhee River and two reservoirs (Mt. View and Sheep Creek) with catchable and fingerling size certified disease free rainbow trout. This will help provide a subsistence fishery for tribal members who once lived on the wild salmon and steelhead in the Owyhee River. This is partial substitution for the loss of anadromous fish due to construction and operation of hydroelectric dams on the Columbia and Snake Rivers. This fishery provides income for the Tribes in the form of fees from non-tribal members who come to fish in these waters. Rainbow trout will be purchased from local hatcheries and only certified disease-free fish will be put into the waters of the Reservation. This project is expected to last for at least ten years until a self-sustaining fishery can be produced. Fish will be netted one-two times/year for length-weight data and signs of disease. Population estimates will also be made at this time.

This project has been successful in the past with many people coming from the western United States to fish and with Tribal members being able to provide food for their families.

**Relation to MYIP:**

This project meets the overall goals and visions of the RFM as defined in the MYIP (pages 16 and 17) by improving the health of the Upper Snake River ecosystem and by focusing on native stocks (rainbow trout). It also addresses the objectives RFM goals listed in Section 6.6.6.2.B.

**NPPC Measure:** 10.8C.1

**Relation to NPPC:**

This project provides resident fish substitution for areas that previously had salmon and steelhead but where anadromous fish are now irrevocably blocked by federally operated hydropower developments.

**Partners:**

A joint production facility with the Shoshone-Bannock Tribes (BPA Project # 9500600). Partnerships with private organizations in the State of Idaho and Nevada including IDFG, BPA, Idaho Power Company, BLM, US Forest Service, US Fish and Wildlife Service, Nevada State Fish and Game, Owyhee County Land Use Association, Western Shoshone-Paiute Livestock Association, Southwest Idaho Resource Conservation and Development, Northern Natural Resource Conservation, Owyhee Combined Schools, Youth Empowerment Council, and UNITY.

9501500

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**Billy Shaw Wetlands catch and release fishery O&M**

Subregion: Upper Snake

Subbasin: Owyhee

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**Sponsor:** Guy Dodson Sr., SPT, 208-759-3246

**Target stocks:**

rainbow trout

wildlife

**Description:**

The purpose of this Operation and maintenance (O&M) money is to enhance and develop the Billy Shaw Wetlands fishery area as a trophy catch and release fishery. The O&M will include maintaining the area as a high quality camping and fishing area in the West. Trash and litter will be picked up weekly to prevent pollution of the new lake. Interpretive signs will be updated and maintained to instruct anglers and campers of regulations. This money will be used for our initial stocking of fish in the lake and to help keep the riparian areas of the spawning streams feeding into the lake in high quality condition (planting trees, shrubs, willows). This lake will become a self supporting fishery with the trout spawning in the streams feeding the lake. Maintenance will be needed on these streams to protect them from degradation and maintain high water quality. Fish screens will also need to be maintained to prevent entrance of non-game fish into the new lake. Water quality of the lake and streams will be measured throughout the year, and habitat condition evaluated twice a year.

**Relation to MYIP:**

This project meets the overall goals and visions of the RFM as defined in the MYIP (page 16) by improving the health of the Upper Snake River ecosystem and by relieving fishing pressure on native stocks. It also addresses all the specific RFM goals listed on page 17. This project will focus on the key management issues and policies relating to substitution of resident fish species due to loss of anadromous fish caused by migration blockage from hydro operations. Relates to Section 6.6.6.2.B

**NPPC Measure:** 10.8C.4

**Relation to NPPC:**

A feasibility study (Kleinfelders, Inc. 1996) has concluded that an additional fishery would enhance tribal subsistence, economy, existing fisheries, wildlife, resident/migratory birds, big game, and raptors.

**Partners:**

A joint trout production facility with the Shoshone-Bannock Tribes (BPA Project # 9500600). Partnership with private organization in the State of Idaho, IDFG, BPA, Idaho Power Company, Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, Nevada State Fish and Game, Owyhee County Cattle and Land Use Association, and private organizations. Western Shoshone-Paiute Livestock Association, Southwest Idaho Resource Conservation and Development, Northern Natural Resource Conservation, Owyhee Combined Schools, Youth Empowerment Council, and UNITY.

9701100

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## Enhance and Protect Habitat and Riparian Areas on Duck Valley Reservation

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Subregion: Upper Snake      Subbasin: Owyhee

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**Sponsor:** Guy Dodson Sr., SPT, 208-759-3246

**Target stocks:**

rainbow trout  
native redband trout  
bull trout  
wildlife

**Description:**

The Shoshone-Paiute Tribes of the Duck Valley Indian Reservation are currently in the second year of the Habitat Enhancement Project on the Reservation. The Goals are to protect and enhance the Owyhee River and its tributaries on the Reservation, and to develop a database that can be used by other fisheries professionals which includes information on water quality and fish composition, health, abundance, and genetic makeup. This project will aid all Columbia Basin Fish and Wildlife programs in helping to identify genetically pure strains of fish (as called for in the Council's measures) and provide for clean water flowing into the Snake River and Columbia River. One habitat portion of this project will focus on protecting the numerous springs that provide clean cool water to the Owyhee River. This will be accomplished through enclosure fences at the springs and water troughs to provide wild and domestic stock access to drinking water. Part of this work also includes maintenance work on windmills and the purchase of pumps (solar powered) to ensure sufficient water for stock. The remaining portion of this project will focus on protecting and enhancing the Owyhee River and its tributaries by excluding domestic stock from critical fish spawning areas, especially those streams with suspected populations of redband trout. This project is expected to last up to five years, once all areas are protected/enhanced the remaining time and money will focus on maintenance of these areas. The desired outcome of this project is to determine the populations and species of trout in the river and streams of the Reservation as well as to increase the natural reproduction of resident trout. It is the Tribes eventual goal to have a suitable habitat for anadromous fish to once again return to the Owyhee River basin. Yearly monitoring and evaluation will occur throughout the entirety of this project to ensure that the project is achieving the desired goals. Also, new areas will be evaluated for protection and enhancement as the project continues.

**Relation to MYIP:**

This project meets the overall goals and visions of the resident fish managers (RFM) as defined in the MYIP (page 16) by improving the health of the Upper Snake River ecosystem and by focusing on native stocks (rainbow trout, redband trout, cutthroat trout, and bull trout). It also addresses all the specific RFM goals listed on page 17. This project will greatly enhance the Upper Snake River ecosystem by improving the habitat of the Owyhee River and the Duck Valley. In addition, it will enhance the water quality downstream of the Reservation, helping to achieve some of the goals of the MYIP for the Owyhee Basin and the Upper Snake River Region. Relates to Section 6.6.6.5.

**NPPC Measure:** 10.8C.5

**Relation to NPPC:**

This project provides resident fish substitution for areas that previously had salmon and steelhead but where anadromous fish are now irrevocably blocked by federally operated hydropower developments.

**Partners:**

A joint trout production facility with the Shoshone-Bannock Tribes (BPA Project # 9500600). Partnership with private organization in the State of Idaho, IDFG, BPA, Idaho Power Company, Bureau of Land Management, U.S. Forest Service, U.S. Fish & Wildlife, Nevada State Fish & Game, Owyhee County

Cattle and Land Use Association. Western Shoshone-Pauite Livestock Association, Southwest Idaho Resource Conservation and Development, Northern Natural Resource Conservation, Owyhee Combined Schools, Youth Empowerment Council, and UNITY.

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**Idaho Water Rental: Resident Fish and Wildlife Impacts Phase III**

Subregion: Upper Snake

Subbasin: Upper Snake, Boise, Payette

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**Sponsor:** Eric Leitzinger, IDFG, 208-334-4888

**Target stocks:**

bull trout, redband/rainbow trout, white sturgeon, mountain whitefish, Yellowstone cutthroat

**Description:**

Section 2.2E.7 of the FWP asks the fish managers to address the trade-offs between resident fish and wildlife affected by upriver reservoir releases and anadromous fish affected by flow augmentation releases. Section 5.5A.1 calls on the states and tribes to review, compile, and submit information on impacts of anadromous flow augmentation on resident fish and wildlife. The overall goal of the project is to quantify the impacts of the salmon flow augmentation releases on resident fish habitat (expressed in weighted usable area - WUA) in the Snake River upstream of Brownlee Reservoir and implement recommendations that result in improved resident fish habitat. The focus is on weak native stocks (white sturgeon and rainbow trout).

Evaluation of the impacts is done by using existing habitat versus flow relationships from previous IFIM studies. Changes in WUA due to increased flows from salmon flow releases are estimated. Timing of releases and WUA changes are compared to known critical time periods for fish. Also, flows with and without the salmon flow releases are compared to recommended minimum flows to determine if the salmon flow releases help meet or exceed these recommended minimums.

The expected outcomes include an accurate history of the salmon flow releases, estimates of changes in fish habitat, recommended release strategies to improve resident fish habitat, implementation of these recommendations, and a model that can simulate the salmon flow releases and can be used to evaluate the trade-offs of different release strategies.

**Relation to MYIP:**

This project meets the overall goals and vision of the resident fish managers (RFM) as defined in the MYIP (page 16) by helping to improve the health of the Upper Snake River ecosystem and by focusing on weak native stocks (e.g. sturgeon). The project evaluates the impacts of salmon flow releases on resident fish upstream of Brownlee Reservoir and formulates recommendations for release of the water to benefit resident fish. It addresses all the specific RFM goals listed on page 17 and the Upper Snake Subregional native species objectives listed in Sections 6.6.6.2.A, 6.6.6.3.A, and 6.6.6.4.A, as well as hatchery and warmwater fish objectives Sections 6.6.6.2.B, 6.6.6.3.B, 6.6.6.4.B, and 6.6.6.4.D.

**NPPC Measure:** 2.2E.7, 5.5A.1

**Relation to NPPC:**

Section 2.2E.7 asks the fish managers to address the trade-offs between resident fish and wildlife affected by upriver reservoir releases and flow augmentation. This project is attempting to quantify changes in resident fish habitat resulting from salmon flow augmentation releases from the upper Snake River Basin (upstream of Brownlee Reservoir). Section 5.5A.1 calls on the states and tribes to review, compile, and submit information on impacts of anadromous flow augmentation on resident fish and wildlife. This project is reviewing and compiling that information.

**Partners:**

Phase I and II involved the following cooperators: the BOR, IDWR, USGS, Idaho Parks and Recreation, Idaho Division of Environmental Quality, Idaho Water Users Association, University of Idaho, Idaho Power, and US Fish and Wildlife Service. Phase III has dealt primarily with habitat versus flow relationships, so the cooperators have been reduced to a technical team of biologists from IDFG, BOR, US Fish and Wildlife Service, Idaho Power, and the Idaho Water Users Association (IWUA).

9201000

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## Habitat Restoration/Enhancement Fort Hall Reservation

Subregion: Upper Snake

Subbasin: Upper Snake

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**Sponsor:** David C. Moser, SBT, 208-238-3761

**Target stocks:**

Yellowstone cutthroat trout                      Contributes to rebuilding weak but recoverable native populations.  
Rainbow trout

**Description:**

Streams on the Fort Hall Bottoms have suffered from years of unrestricted grazing and rapid flooding and drafting of American Falls Reservoir. Negative impacts from loss of bank vegetation and resultant lateral scouring and downcutting of streambanks include; siltation of spawning gravels, loss of object cover and pool depth, increasing width depth ratios of stream channels and resulting increases in water temperature. Enhancement and restoration techniques thus far have included use of instream structures to provide cover and direct flow from unstable streambanks (i.e. rock and wood wings dams and barbs), sloping of banks, revegetation with native species, and fencing of project areas and sensitive riparian areas. Monitoring has included measuring pre and post abiotic and biotic parameters, including; channel morphology, aquatic invertebrates, channel substrates, and fish populations. Since 1992 fish population densities have increased five fold from pre-project levels in Clear Creek. Stream depth has increased significantly in project areas, and new areas of clean spawning gravels have been created. Many areas of actively eroding bank have been stabilized and revegetated in Spring Creek. Restoration of riparian areas has provided for increased fish production and has benefitted other wildlife. Continued restoration/enhancement efforts combined with enclosures will address project goals, specifically, returning spring streams on the Fort Hall Bottoms to historical conditions and providing for tribal subsistence and recreational fisheries. Future plans also include supplementation of remaining native Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*) populations impacted by hybridization. Fish from the planned SBT/SPT Joint Culture Facility (Project # 9500600) will be used for supplementation. Captive brood stock will be obtained from streams on the Fort Hall Reservation after a genetic inventory of Yellowstone cutthroat trout has been completed.

**Relation to MYIP:**

This project directly addresses all objectives from section 6.6.6.4 including; 1) protect native fish in perpetuity, 2) restore and maintain the health and diversity of native resident fish populations and their habitats, 3) mitigate and compensate for anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects. 4) protect and maintain the health and diversity of watersheds, and 5) pursue opportunities for resident fisheries (consumptive and non-consumptive) compatible with or isolated from native species protection and recovery programs.

**NPPC Measure:** 10.3E.10, 10.3E.11, 10.3E.9

**Relation to NPPC:**

This project is under the resident fish mitigation section of the NPPC Fish and Wildlife Program.

**Partners:**

Opportunity for continued cost sharing with Salmon Corps. Coordinate with Idaho Fish and Game to determine harvest and fish planting management surrounding the reservation.

9500600

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**Shoshone-Bannock/Shoshone-Paiute Joint Culture Facility**

Subregion: Upper Snake

Subbasin: Upper Snake

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**Sponsor:** David C. Moser, SBT, 208-238-3761

**Target stocks:**

Yellowstone cutthroat trout

redband trout                      Contributes to rebuilding weak but recoverable native populations. Management intent to have naturally spawning fish without targeted artificial enhancement.

rainbow trout                      Pursues opportunities for resident fisheries (consumptive and non-consumptive) isolated from native species protection and recovery programs

**Description:**

Streams on the Fort Hall Reservation have suffered from years of livestock grazing and rapid flooding and drafting of American Falls Reservoir. In addition to physical habitat damage, fish stocks have been negatively affected through genetic introgression, competition with non-native salmonids, and exploitation. An effort to restore Reservation streams and riparian areas was begun in 1992 (Habitat restoration /enhancement Fort Hall Reservation; #9201000) and has been successful in stabilizing banks, reducing sediment loads, deepening stream channels, and increasing fish numbers. The restoration project addresses one limiting factor in the recovery of native Yellowstone cutthroat (*Oncorhynchus clarki bouvieri*), specifically physical habitat conditions to maintain a self-perpetuating fishery. This project was initiated to address problems stemming from hybridization with hatchery rainbow trout (*Oncorhynchus mykiss*) and competition with non-native brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and hatchery rainbow trout (*Oncorhynchus mykiss*). The goal of the joint culture facility is to produce native Yellowstone cutthroat trout, redband trout, and rainbow trout. Rainbow trout will be produced for put-and-take fisheries in enclosed reservoirs to provide recreational and subsistence opportunities and ease pressure on native fish stocks. Native fish will be used to re-establish stocks diminishing due to habitat loss, hybridization with non-native species, and exploitation. Prior to selection of broodstock a genetic inventory of Yellowstone cutthroat will be completed on the Fort Hall Reservation. Native broodstock will be replaced with wild gametes at a rate of 20-30% every year to prevent loss of genetic variation. The majority of native trout supplementation will involve outplanting eyed or green eggs to hatchboxes. Adult cutthroat and redband brood stock will be spawned in the hatchery to provide eggs, fingerlings, and catchable trout for Duck Valley and Fort Hall Reservations. Cutthroat brood stock (160) pairs will be spawned to provide 350,000 eggs for the Fort Hall Reservation and 8,000 catchables. Redband (150 - 300 pairs) will be spawned to provide Duck Valley Reservation with 350,000 eggs, 245,000 fingerlings and 94,000 catchables. Also rainbow trout eggs will be purchased to provide 550,000 rainbow fingerlings and 164,000 catchable rainbows for stocking in enclosed reservoirs.

**Relation to MYIP:**

This project directly addresses three objectives from the native species Section 6.6.6.4.A of the MYIP, including; 2) restore and maintain the health and diversity of native resident fish populations and their habitats, 3) mitigate and compensate for anadromous fish losses caused by the construction and operation of federally operated and federally regulated hydropower projects, and 5) pursue opportunities for resident fisheries (consumptive and non-consumptive) compatible with or isolated from native species protection and recovery programs. In addition, the project addresses all objectives from the hatchery reared and introduced trout section 6.6.6.4.B of the MYIP, including; 1) Mitigate and compensate for resident and anadromous fish losses caused by the construction and operation of federally regulated and federally operated hydropower projects. 2) Manage non-native resident fish stocks to insure the health and diversity of native resident fish stocks, anadromous fish stocks, and wildlife stocks, and their habitats, then maximize consumptive and non-consumptive use of non-native stocks when appropriate.

**NPPC Measure:** 10.3E.9, 10.8C.6, 10.3E.11, 10.8C.7, 10.3E.10

**Relation to NPPC:**

This project is under the resident fish mitigation and the resident fish substitution above Hells Canyon Dam sections of the NPPC Fish and Wildlife Program

**Partners:**

Partnership between Fort Hall and Duck Valley Reservations.

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**Snake River Native Salmonid Assessment**

Subregion: Upper Snake

Subbasin: Upper Snake, Boise, Payette, Weiser, Owyhee, Mid S

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**Sponsor:** Eric Leitzinger, IDFG, 208-334-4888

**Target stocks:**

bull trout (proposed ESA listing)

redband trout

Yellowstone cutthroat trout

finespots cutthroat trout

**Description:**

Native salmonid populations in the Upper Snake River Basin are depressed and declining. Section 10.5B.1 of the Fish and Wildlife Program calls for the "investigation of the life history, habitat needs and threats to persistence of native salmonids upstream of Hells Canyon Dam...". Section 10.5B.2 calls for a "comprehensive genetic sampling program for native salmonids upstream of Hells Canyon Dam in the Snake River and tributaries."

This project is a multi-phased restoration project with the overall goal of protecting and restoring native salmonid populations (redband, cutthroat, bull trout) in the Snake River Basin upstream of Hells Canyon Dam in Idaho to self-sustaining, harvestable levels. The project objectives are: 1) Assess stock status and population trends; 2) Identify life history needs, habitat needs, and threats to persistence, limiting factors, and causes for population declines; 3) Develop and implement recovery and protection plans; and, 4) Monitor effectiveness of recovery and protection actions.

The first phase is an inventory of native salmonid populations to determine present population status and trends. Streams and reservoirs will be inventoried following standard methods (Hankin and Reeves 1988; IDFG's standard survey protocols; Hamilton and Bergersen 1984; Platts et al. 1983, 1987). Multivariate techniques (e.g. direct gradient analysis, ordination, classification) will be used to relate fish populations to the habitat variables. Fin sections will be collected for genetic analysis.

The second phase of the project will be to identify life history and habitat needs, causes for population declines (limiting factors, threats to persistence), and opportunities for restoration. The third phase will be to develop, implement, and monitor protection and restoration plans. Population changes will be monitored as indicators of success.

Expected outcomes are activities that result in recovery, protection, and long-term persistence of native salmonids. These will include (but are not limited to) actions such as habitat improvement and protection, reconnecting existing populations to historic habitats (i.e., removal of human caused migration barriers), and removal/suppression of exotic competitors (especially those that can hybridize with the native species (e.g. brook trout, hatchery rainbow).

**Relation to MYIP:**

The goal of this project (stated above) is consistent with the vision statement in the MYIP (page 16), the NPPC's system wide goal for a healthy Columbia River Basin, and the resident fish goal (MYIP page 17). The project meets the native salmonid objectives for the upper Snake River Subregion listed in the MYIP Sections 6.6.6.1.B, 6.6.6.2.A, 6.6.3.A, and 6.6.6.4.A. Many of the native species strategies listed for the subregion will be used in this project.

**NPPC Measure:** 10.5B.1, 10.5B.2

**Relation to NPPC:**

This project conducts the activities specified in the above measures. It will investigate life history and habitat needs, and identify threats to persistence. Then it will develop and implement protection and

recovery plans, and monitor population responses to recovery and protection efforts. The project will also conduct a genetic inventory of native salmonids to aid management, recovery, and protection strategies by identifying unique and pure stocks, as well as introgressed stocks.

**Partners:**

This project will be closely tied to and coordinated with the Bureau of Reclamation's subregion-wide Snake River Resources Review project. Activities will be coordinated with all the fish and land management agencies in the subregion (tribes, USFS, BLM, USFWS, etc.) as well as other public and private entities (e.g. Boise Cascade, Watershed and Basin Advisory Groups, private landowners, Idaho DEQ, etc.) to maximize efficiency and avoid duplication of effort.

**9505700**

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**Southern Idaho Wildlife Mitigation**

Subregion: Upper Snake      Subbasin: Upper Snake

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**Sponsor:** H. Jerome Hansen, IDFG/SBT, 208-334-3180

**HUs:** 10,495\* (project started in FY98)

**Acres:** 3,689

**Hydroproject:** Palisades, Anderson Ranch, Minidoka, and Black Canyon

**Description:**

Protect, enhance, and maintain native riparian, wetland, and shrub-steppe habitats in southern Idaho as ongoing mitigation for Palisades, Anderson Ranch, Minidoka, and Black Canyon hydroelectric projects (NWPPC Program Measures 11.2D.1, 11.2E.1, 11.3D.4, 11.3D.5, 11.3D.7, and 11.3D.8). The overall objective is to provide 18,223 Habitat Units (HU's) by acquiring fee-title or easements and enhancing a combination of 16,216 acres of priority habitats, through the year 2003. The specific FY1999 objective is to provide 4,146 HU by the protection/enhancement of 3,689 acres.

Potential mitigation sites in southern Idaho were initially prioritized by interagency teams of biologists in the mid 1980's, who considered biological significance, applicable references (Boccard 1980), in-place/in-kind opportunities, and juxtaposition to other management areas. The original list of mitigation sites continues to guide mitigation implementation, with the addition of new information from more contemporary conservation site planning in Idaho, including wetland conservation strategies (Jankovsky-Jones, 1997a,b) and the recent Nature Conservancy/Idaho Department of Fish and Game process to identify a set of biodiversity conservation reserves in the Columbia Plateau ecoregion using GAP Analysis Program cover types as coarse filter targets (Moseley, pers. comm.). Each individual mitigation parcel is subjected to the CBFWA regional wildlife criteria by the interagency teams of biologists to ensure that it meets regional wildlife program standards.

Progress will be monitored by measuring standardized target species habitat variables from Habitat Evaluation Procedure (HEP) models (USFWS 1980). Target species population trends also will be monitored to evaluate long-term species-habitat relationships.

## FY99 Projects Sorted by Project ID

ID	Title	Subregion	Subbasin	Caucus*	Tier
9001	Monitor Water Quality and Quantity in Eastern Klickitat	Lower Mid-Columbia	Klickitat	A	2
9002	Monitor Water Quality and Quantity in L. Klickitat R. and	Lower Mid-Columbia	Klickitat	A	2
9003	Restore/Enhance Trout Creek @ Ashwood Phase II	Lower Mid-Columbia	Deschutes	A	2
9004	Restore/Enhance Trout Creek @ Ashwood Phase I	Lower Mid-Columbia	Deschutes	A	2
9005	Irrigation System Replacement Trout Cr. @ Willowdale II	Lower Mid-Columbia	Deschutes	A	1
9006	Restore/Enhance Trout Creek @ Willowdale	Lower Mid-Columbia	Deschutes	A	2
9007	Jefferson Co./Middle Deschutes Watershed	Lower Mid-Columbia	Deschutes	A	1
9008	Eval. of Fall Chinook Production & Habitat Conditions in	Lower Snake	Tucannon	A	2
9009	Restore Salmon River (Challis, ID) Area to Healthy	Lower Snake	Salmon	A	1
9010	Assess Fish Habitat & Salmonids in Walla Walla	Lower Mid-Columbia	Walla Walla	A	1
9011	Characterize & Quantify Residual Steelhead in Clearwater	Lower Snake	Clearwater	A	1
9012	Mitigate Effects of Runoff & Erosion on Salmonid	Lower Mid-Columbia	John Day	A	1
9013	Hellsgate Big Game Winter Range Continuing	Upper Columbia	Upper Columbia	W	1
9014	Restore Habitat within Dredge Tailings on the Yankee	Lower Snake	Salmon	A	2
9015	Enhance and Protect Fisheries in the Wolf Creek	Upper Mid-Columbia	Methow	A	2
9016	Research/Evaluate Restoration of NE Ore Streams and	Lower Snake	Grande Ronde, John	A	3
9017	Improve Anadromous Fish Habitat and Passage in Omak	Upper Mid-Columbia	Okanogan	A	2
9018	Assess Habitat for Anadromous Fish Upriver of Chief	Upper Columbia	Upper Columbia	A	2
9019	Monitor Reproductive Physiology of Columbia River	Lower Columbia	Lower Columbia	A	2
9020	Genetic Analysis of Native Fish on the Duck Valley	Upper Snake	Owyhee	R	2
9021	Mitigate Wildlife Losses on the Duck Valley Indian	Upper Snake	Owyhee	W	3
9022	Reintroduction of Salmon & Steelhead - Mary's Cr. &	Upper Snake	Owyhee	A	3
9023	Enforcement of ESA Laws on the Duck Valley Indian	Upper Snake	Owyhee	W	3
9024	Methow Tributaries Fish Passage	Upper Mid-Columbia	Methow	A	2
9025	Prevent Mortality in Methow Endangered and Proposed	Upper Mid-Columbia	Methow	A	2
9026	Expand Respect the River	Upper Mid-Columbia	Methow	A	2
9027	Prevent Pollution of Methow River	Upper Mid-Columbia	Methow	A	2
9028	Reduce Sediment in Frazer Creek, Beaver Creek, Methow	Upper Mid-Columbia	Methow	A	2
9029	Monitoring Water Quality With Data Collection	Lower Snake	Grande Ronde	A	3
9030	Etiology of Headburns in Returning Adult Salmonids	Lower Snake	Snake	A	3
9031	Implement Entiat Model Watershed Plan	Upper Mid-Columbia	Entiat	A	2
9032	Teach Adults to Become Holistic Master Watershed	Lower Mid-Columbia	Yakima	A	2
9033	Document Native Trout Populations	Lower Mid-Columbia	Wind, Little White	R	1
9034	Reduce Sediment Delivery From Kline Mountain Road to	Lower Snake	Salmon	A	3
9035	Evaluate Estuarine & Nearshore-ocean Migratory	Systemwide	Ocean/estuary	A	3
9036	McKenzie Watershed Habitat Assessment and Project	Lower Columbia	Willamette	A	2
9037	Acquire Fish and Wildlife Habitat in the McKenzie	Lower Columbia	Willamette	A	2
9038	Evaluate Spring Chinook Life History-habitat	Lower Columbia	Willamette	A	2
9039	Increase Stream Flow in the Methow River and Provide	Upper Mid-Columbia	Methow	A	2
9040	Central Oregon Watershed Enhancement and Outreach	Lower Mid-Columbia	Deschutes	A	3
9041	Enhance/Protect Imperiled Native Fish Species Through	Upper Columbia	Kootenai, Flathead	R	3
9042	Critical Ecosystem Reclamation, Recovery and Recharge	Upper Snake	Upper Snake	W	3
9043	Introducing Systems Science to Planning and	Lower Snake	Grande Ronde	W	3
9044	Replace Chumstick Creek Culvert	Upper Mid-Columbia	Wenatchee	A	1
9045	Eliminate Gravel Push-Up Dams on Lower North Fork	Lower Mid-Columbia	John Day	A	1
9046	Identify Res Fish & Macroinvertebrate Taxa & Function	Upper Mid-Columbia	Methow	R	3

<b>ID</b>	<b>Title</b>	<b>Subregion</b>	<b>Subbasin</b>	<b>Caucus*</b>	<b>Tier</b>
9047	Use Unsteady Flow to Aid Mainstem Passage of Juvenile	Systemwide	Mainstem	A	3
9048	Transfer Attributes From 1:100,000 to 1:24,000-Scale	Lower Snake	Snake, Salmon,	R	3
9049	Feasibility Study for a State-Wide Water Quality Data	Systemwide	Systemwide	A	2
9050	Remove 23 Migrational Barriers and Restore Riparian	Upper Mid-Columbia	Wenatchee	A	2
9051	Stabilize Blowout Creek (South Fork of Meadow Creek)	Lower Snake	Salmon	A	3
9052	Demonstrate that a Translucent Pipeline Feels Normal to	Upper Snake	Mid Snake	R	3
9053	Kirby (Atlanta) Dam Fish Ladder	Upper Snake	Mid Snake	R	3
9054	Reduce Erosion, Identify Access and Improve... at Bonn.	Upper Mid-Columbia	Wenatchee	A	3
9055	Evaluate Movement Patterns of Bull Trout in Dworshak	Lower Snake	Clearwater	R	3
9056	Evaluate Status of White Sturgeon in the Hells Canyon	Lower Snake	Snake River Drainage,	R	2
9057	Evaluate Status of Pacific Lamprey in the Clearwater	Lower Snake	Clearwater	A	1
9058	Restore Chinook Passage into Woodard Creek &	Lower Columbia	Lower Columbia	A	3
9059	Restore Anadromous Fish Habitat in the Little Canyon	Lower Snake	Clearwater	A	1
9060	Restore Anadromous Fish Habitat in the Nichols Canyon	Lower Snake	Clearwater	A	1
9061	River Wetlands Restoration and Evaluation Program	Lower Columbia	Sandy	W	1
9062	Sandy River Delta Riparian Reforestation	Lower Columbia	Sandy	W	1
9063	Ocean Survival of Salmonids Relative to Migrational	Mainstem	Ocean/estuary	A	1
9064	Analyze the Persistence and Spatial Dynamics of Snake	Lower Snake	Salmon	A	1
9065	Little Naches Streambank Restoration	Lower Mid-Columbia	Yakima	A	2
9066	Protect Klickitat River and Wind River Salmonids	Lower Mid-Columbia	Klickitat	A	3
9067	Coordinate/Facilitate Watershed Project	Lower Mid-Columbia	Yakima	A	1
9068	Improve Stream Habitat Through Reduction in Farm	Lower Mid-Columbia	Yakima	A	2
9069	Enhance Upper Yakima River Basin Fish Habitat	Lower Mid-Columbia	Yakima	A	2
9070	Improve Water Quality Through Sedimentation and	Lower Mid-Columbia	Yakima	A	2
9071	Improve Yakima River Water Quality	Lower Mid-Columbia	Yakima	A	2
9072	Improve Return Flow Water Quality	Lower Mid-Columbia	Yakima	A	2
9073	Improve Water Quality Monitoring Program	Lower Mid-Columbia	Yakima	A	2
9074	Construct Sediment Settling Basins	Lower Mid-Columbia	Yakima	A	2
9075	Construct Wetlands	Lower Mid-Columbia	Yakima	A	2
9076	Evaluate Return Flow Recovery	Lower Mid-Columbia	Yakima	A	2
9077	Evaluation of Interactions between American Shad and	Systemwide	Mainstem	A	3
9078	Water Temperature Effects on Fall Chinook Salmon in the	Systemwide	Mainstem	A	3
9079	Inventory Resident Fish Populations in Bonneville,	Lower Columbia	Lower Columbia	R	3
9080	Incidence and Effects of Gas Bubble Trauma on Salmonid	Lower Mid-Columbia	Lower Mid-Columbia	A	3
9081	Impact of Exotic Fishes and Macrophytes on Juvenile	Lower Mid-Columbia	Lower Mid-Columbia	R	3
9082	Evaluate Feed Strategies to Reduce Residualism &	Lower Snake	Clearwater	A	2
9083	Develop Tools to Evaluate the Effects of Selective	Systemwide	Systemwide	A	2
9084	Assessing Genetic Variation Among Columbia Basin	Systemwide	Systemwide	R	1
9085	Propagate Native Plant Species for Revegetation &	Lower Snake	Grande Ronde	A	3
9086	Coordinate Assessment and Prioritization of Key	Upper Mid-Columbia	Methow	A	2
9087	Acquire 1860 Fifteenmile Cr irrigation water right and	Lower Mid-Columbia	Fifteenmile	A	1
9088	Implement Best Management Practices	Lower Columbia	Cowlitz	A	3
9089	Classify Riparian and Wetland Vegetation in the	Lower Mid-Columbia	Lower Mid-Columbia	A	2
9090	Recondition Wild Steelhead Kelts For Repeat Spawning	Lower Snake	Lower Snake	A	2
9091	South Tower Fire Recovery Projects	Lower Mid-Columbia	John Day	A	3
9092	Umatilla Tribal Fish and Wildlife Enforcement	Lower Mid-Columbia	Umatilla	A	1
9093	Consumptive Sturgeon Fishery-Hells Canyon and Oxbow	Upper Snake	Snake	R	2
9094	Produce Kokanee Salmon in Net Pens for Release into	Upper Columbia	Upper Columbia	R	1
9095	Bull Trout Population Assessment in the Columbia River	Lower Mid-Columbia	Wind, Little White	R	1
9096	Northeast Oregon Wildlife Mitigation O&M Trust Fund	Lower Snake	Grande Ronde	W	2

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9097	Methow Basin Side Channel Habitat Construction	Upper Mid-Columbia	Methow	A	2
9098	Technical Support For PATH - James J. Anderson	Systemwide	Systemwide	A	3
9099	Educate Landowners and Agencies on Salmon Stream	Systemwide	Systemwide	A	2
9100	Reestablish Safe Access into Tributaries of the Yakima	Lower Mid-Columbia	Yakima	A	1
9101	Restore Upper Toppenish Creek Watershed	Lower Mid-Columbia	Yakima	A	1
9102	Ahtanum Creek Watershed Assessment	Lower Mid-Columbia	Yakima	A	1
9103	Upper Deschutes Basin Watershed Coordinator/Council	Lower Mid-Columbia	Deschutes	R	3
9104	Conduct Baseline Habitat and Pop. Dynamics Studies on	Lower Columbia	Lewis	A	1
9105	Determine if Salmon are Successfully Spawning Below	Lower Columbia	Lower Columbia	A	1
9106	Aquisition of Malheur Wildlife Mitigation Site	Upper Snake	Malheur	W	1
9107	North Fork Malheur River Bull Trout and Redband Trout	Upper Snake	Malheur	R	1
9108	Evaluate Strobe Lights as a Juvenile Salmonid Guidance	Systemwide	Mainstem	A	3
9109	Acquisition of Water and Floodplain Fisheries Habitat in	Lower Mid-Columbia	Yakima	A	2
9110	Assess Resident Fish Within Toppenish Creek and Satus	Lower Mid-Columbia	Yakima	R	3
9111	Evaluate Effects of Food Web Changes on Native Fish	Upper Columbia	Flathead	R	3
9112	Numerical Evaluation of Flow Modification on Salmonid	Systemwide	Mainstem	A	3
9113	Evaluate Effects of Hydraulic Turbulence on Survival of	Systemwide	Systemwide	A	3
9114	Stabilizing Stream Channels in the Cabin Creek	Lower Mid-Columbia	Yakima	A	2
9115	Develop TDG Abatement Plan of Action Using Wheels	Systemwide	Snake, Willamette and	A	3
9116	Razor Ranch Acquisition/Crab Creek Watershed	Upper Columbia	Upper Columbia	W	1
9117	Facilitation Services for the Regional Forum	Mainstem	Mainstem	A	1
9118	Restore West Fork Little Bear Creek For Steelhead	Lower Snake	Clearwater	A	3
9119	Public-Private Cooperative Resource Mgmt in Lower	Lower Snake	Grande Ronde	A	3
9120	Protecting and Restoring Big Canyon Creek Watershed	Lower Snake	Clearwater	A	1
9121	Assesment Salmon River Subbasin	Lower Snake	Salmon	A	2
9122	Rehabilitate Lapwai Creek	Lower Snake	Clearwater	A	1
9123	Restore Chinook Watershed	Lower Columbia	Chinook	A	3
9124	Purchase Conservation Easement from Plum Creek	Upper Columbia	Kootenai	R	3
9125	Columbia River Basin Fish Key	Systemwide	Systemwide	A	3
9126	Hood River Fish Habitat Project	Lower Mid-Columbia	Hood	A	1
9127	Development of a Cowlitz Watershed Management Plan	Lower Columbia	Cowlitz	A	3
9130	Burns Paiute Mitigation Coordinator	Upper Snake	Malheur	W	1
9131	Evaluate Fall Chinook & Chum Spawning, Production &	Systemwide	Systemwide	A	1
9132	Implement Wy-Kan-Ush-Mi Wa-Kish-Wit Watershed	Systemwide	Systemwide	A	1
9133	Bakeoven Riparian Assessment	Lower Mid-Columbia	Deschutes	A	1
9134	Effects of Catch & Release Angling and Exhaustive	Systemwide	Systemwide	R	3
9135	Assess Impacts of Hydro Operations on Mainstem	Lower Columbia	Lower Columbia	A	3
9136	Influence of Marine-Derived Nutrient Influx on CRB	Systemwide	Systemwide	A	3
9137	John Day Watershed Restoration	Lower Mid-Columbia	John Day	A	1
9138	Warm Springs Reservation 1999 Watershed	Lower Mid-Columbia	Deschutes	A	1
9139	Acquisition of Pine Creek Ranch	Lower Mid-Columbia	John Day	A	1
9140	Acquisition of Pine Creek Ranch	Lower Mid-Columbia	John Day	W	1
9141	Strategies For Riparian Recovery: Plant Succession &	Lower Mid-Columbia	Umatilla	A	3
9142	Produce Watershed Analysis Procedure for Salmon	Systemwide	Systemwide	A	2
9143	Evaluate Disease Interactions Between Wild and	Systemwide	Systemwide	A	2
9144	Monitor Natural Escapement & Productivity of John Day	Lower Mid-Columbia	John Day	A	1
9145	Evaluate the Status of Columbia River Sea-Run Cutthroat	Lower Mid-Columbia	Hood, Wind	A	2
9146	Evaluate Effects of Habitat Work Conducted in	Lower Mid-Columbia	Fifteenmile	A	1
9147	Prioritize Research and Restoration Needs for Pacific	Systemwide	Systemwide	A	2
9148	Develop Open Formula Diets to Yield Quality Smolts	Systemwide	Systemwide	A	2

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9149	Evaluate and Monitor Bacterial Cold Water Disease	Lower Columbia	Lower Columbia	A	2
9150	Captive Broodstock Artificial Propagation	Lower Snake	Grande Ronde	A	1
9151	Assess Adult Steelhead Escapement in the Secesh River	Lower Snake	Salmon	A	2
9152	Feasibility of Sockeye Reintroduction to Wallowa and	Lower Snake	Salmon	A	3
9153	Preserve Cryogenically the Gametes of selected	Lower Mid-Columbia	Deschutes	A	2
9154	Wind River Ecosystem Restoration	Lower Mid-Columbia	Wind	A	1
9155	Establish the Methow Watershed Council	Upper Mid-Columbia	Methow	A	2
9156	White Salmon River Watershed Enhancement Project	Lower Columbia	Little White Salmon	R	3
9157	Effects of Ocean Conditions on the Growth and Survival	Systemwide	Ocean/estuary	A	3
9158	Little Naches River Riparian and In-Channel Habitat	Lower Mid-Columbia	Yakima	A	2
9159	Rock Creek Watershed Assessment and Restoration	Lower Mid-Columbia	Rock Creek	A	2
9160	Construct Sediment Settling Basin	Lower Mid-Columbia	Yakima	A	2
9161	Improve Return Flow Water Quality From Farms	Lower Mid-Columbia	Yakima	A	2
9162	Improve Water Quality Monitoring Program	Lower Mid-Columbia	Yakima	A	2
9163	West Fork Squaw Creek Fish Passage Project	Lower Snake	Clearwater	A	2
9164	Analyze Ahtanum Creek Storage Project	Lower Mid-Columbia	Yakima	A	3
8201300	Coded-Wire Tag Recovery Program	Systemwide	Systemwide	A	1
8331900	New Fish-Tagging System	Systemwide	Systemwide	A	1
8332300	Monitor Smolts at the Head of Lower Granite Reservoir	Mainstem	Mainstem	A	1
8335000	Nez Perce Tribal Hatchery	Lower Snake	Clearwater	A	1
8343500	Operate and Maintain Umatilla Hatchery Satellite	Lower Mid-Columbia	Walla Walla	A	1
8343600	Umatilla Passage O&M	Lower Mid-Columbia	Umatilla	A	1
8346500	Libby and Hungry Horse Modeling Technical Analysis	Upper Columbia	Kootenai, Flathead	R	1
8346700	Mitigation for the Construction and Operation of Libby	Upper Columbia	Kootenai	R	1
8400800	North Fork John Day Habitat Improvement	Lower Mid-Columbia	John Day	A	3
8401400	Smolt Monitoring at Federal Dams	Mainstem	Mainstem	A	1
8402100	Protect and Enhance John Day River Fish Habitat	Lower Mid-Columbia	John Day	A	1
8402500	Protect and Enhance Fish Habitat in Grande Ronde Basin	Lower Snake	Grande Ronde	A	1
8503800	Colville Hatchery	Upper Columbia	Upper Columbia	R	1
8506200	Evaluate the Effectiveness of Fish Screens	Lower Mid-Columbia	Yakima	A	1
8605000	White Sturgeon Mitigation and Restoration in the	Lower Mid-Columbia	Lower Mid-Columbia	R	1
8612400	Inspection Service For Little Fall Creek Passage	Lower Columbia	Willamette	A	1
8709900	Dworshak Dam Impacts Assessment and Fisheries	Lower Snake	Clearwater	R	1
8710001	Enhance Umatilla River Basin Anadromous Fish Habitat	Lower Mid-Columbia	Umatilla	A	1
8710002	Protect & Enhance Coldwater Fish Habitat in the Umatilla	Lower Mid-Columbia	Umatilla	A	1
8712700	Smolt Monitoring By Non-Federal Agencies	Mainstem	Mainstem	A	1
8712702	Comparative Survival Rate Study (CSS) of Hatchery Pit	Mainstem	Mainstem	A	1
8712703	Imnaha River Smolt Monitoring Program Project	Lower Snake	Imnaha	A	1
8740100	Assess Smolt Condition for Travel Time Analysis:	Mainstem	Mainstem	A	1
8740700	Dworshak Impacts/M&E & Biological-Integrated Rule	Lower Snake	Clearwater	R	1
8802200	Trap and Haul in the Umatilla and Walla Walla Basins	Lower Mid-Columbia	Umatilla	A	1
8805301	Northeast Oregon Hatchery Master Plan	Lower Snake	Grande Ronde	A	1
8805302	Plan, Site, Design & Construct NEOH	Lower Mid-Columbia	Walla Walla	A	1
8805303	Hood River Production Program (HRPP)	Lower Mid-Columbia	Hood	A	1
8805304	Monitor Actions Implemented Under the Hood River	Lower Mid-Columbia	Hood	A	1
8805305	NE Oregon Hatchery Master Plan and Facilities - ODFW	Lower Snake	Grande Ronde	A	1
8806400	Kootenai River White Sturgeon Studies and	Upper Columbia	Kootenai	R	1
8806500	Kootenai River Fisheries Investigations	Upper Columbia	Kootenai	R	1
8810804	Streamnet: The Northwest Aquatic Information Network	Systemwide	Systemwide	A	1
8811500	Yakima Hatchery Construction	Lower Mid-Columbia	Yakima	A	1

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8812001	Yakima/Klickitat Fisheries Project Management	Lower Mid-Columbia	Yakima	A	1
8812005	Video Fish Monitoring Project	Lower Mid-Columbia	Yakima	A	1
8812008	Fisheries Technician Field Activities	Lower Mid-Columbia	Yakima	A	1
8815600	Stocking Fish in Lakes and Streams on the Duck Valley	Upper Snake	Owyhee	R	1
8816000	Willamette Hatchery Oxygen Supplementation	Lower Columbia	Willamette	A	1
8902401	Evaluate Juvenile Salmonid Outmigration and Survival in	Lower Mid-Columbia	Umatilla	A	1
8902700	Power/Repay O&M For USBR CPR Pumping Project	Lower Mid-Columbia	Umatilla	A	1
8902900	Hood River Production Program - Pelton Ladder -	Lower Mid-Columbia	Hood	A	1
8903500	Umatilla Hatchery Operation and Maintenance	Lower Mid-Columbia	Umatilla	A	1
8906200	Prepare Draft Annual Implementation Work Plan	Systemwide	Systemwide	A	1
8906500	Annual Fish Marking - Missing Hatchery Production	Systemwide	Systemwide	A	1
8906600	Annual Coded Wire Tag Program-Missing Production	Systemwide	Systemwide	A	1
8906900	Annual Coded Wire Tag Program - Missing Production	Systemwide	Systemwide	A	1
8907201	Independent Scientific Advisory Board Support	Systemwide	Systemwide	A	3
8909600	Monitor, Evaluate Genetic Characteristics of	Lower Snake	Grande Ronde	A	1
8909800	Salmon Supplementation Studies in Idaho Rivers	Lower Snake	Salmon, Clearwater	A	1
8909801	Salmon Supplementation Studies in Idaho Rivers	Lower Snake	Salmon, Clearwater	A	1
8909802	Salmon Supplementation Studies in Idaho Rivers	Lower Snake	Salmon, Clearwater	A	1
8909803	Salmon Supplementation Studies in Idaho Rivers	Lower Snake	Salmon, Clearwater	A	1
8910700	Statistical Support for Salmonid Survival Studies	Mainstem	Mainstem	A	1
8910800	Monitor and Evaluate Modeling Support	Systemwide	Mainstem	A	3
9000500	Umatilla Hatchery Monitoring and Evaluation	Lower Mid-Columbia	Umatilla	A	1
9000501	Umatilla and Walla Walla Basin Natural Production M&E	Lower Mid-Columbia	Umatilla	A	1
9001800	Evaluate Rainbow Trout Habitat/Passage Improvements	Upper Columbia	Upper Columbia	R	1
9004400	Implement Fisheries Enhancement Opportunities :Coeur	Upper Columbia	Coeur d'Alene	R	1
9004401	Lake Creek Land Acquisition and Enhancement	Upper Columbia	Coeur d'Alene	W	1
9005200	Performance/Stock Productivity Impacts of Hatchery	Systemwide	Systemwide	A	1
9005500	Steelhead Supplementation Studies in Idaho Rivers	Lower Snake	Salmon, Clearwater	A	1
9007700	Northern Squawfish Management Program	Mainstem	Mainstem	A	1
9007800	Evaluate Predator Control and Provide Technical Support	Systemwide	Systemwide	A	1
9008000	Columbia Basin Pit-Tag Information System	Mainstem	Mainstem	A	1
9009200	Wanaket Wildlife Mitigation Project	Lower Mid-Columbia	Lower Mid-Columbia	W	1
9009300	Life History and Genetic Analysis of Oncorhynchus	Mainstem	Mainstem	A	1
9101901	Hungry Horse Fisheries Mitigation Plan Flathead Lake	Upper Columbia	Flathead	R	1
9101903	Hungry Horse Dam Mitigation - Watershed Restoration	Upper Columbia	Flathead	R	1
9101904	Hungry Horse Mitigation - Hatchery-Based Impl. of	Upper Columbia	Flathead	R	1
9102800	Monitoring Smolt Migration of Wild Snake River	Lower Snake	Lower Snake	A	1
9102900	Life History and Survival of Fall Chinook Salmon in	Mainstem	Mainstem	A	1
9104600	Spokane Tribal (Galbraith Springs) Hatchery O&M	Upper Columbia	Upper Columbia	R	1
9104700	Sherman Creek Hatchery O&M	Upper Columbia	Upper Columbia	R	1
9105100	Monitoring and Evaluation Statistical Support	Systemwide	Mainstem	A	3
9105500	Supplementation Fish Quality (Yakima)	Lower Mid-Columbia	Yakima	A	1
9105700	Yakima Phase 2 Screen Fabrication	Lower Mid-Columbia	Yakima	A	1
9106000	Kalispel Pend Oreille Wetlands Wildlife Mitigation	Upper Columbia	Pend Oreille	W	1
9106100	WDFW Projects	Lower Mid-Columbia	Yakima	W	1
9106700	Idaho Water Rental: Resident Fish and Wildlife Impacts	Upper Snake	Upper Snake, Boise,	R	1
9107100	Snake River Sockeye Salmon Habitat and Limnological	Lower Snake	Salmon	A	1
9107200	Redfish Lake Sockeye Salmon Captive Broodstock	Lower Snake	Salmon	A	1
9107300	Idaho Natural Production Monitoring and Evaluation	Lower Snake	Salmon, Clearwater	A	1
9107500	Yakima Phase II Screens - Construction	Lower Mid-Columbia	Yakima	A	1

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9107800	Burlington Bottoms Wildlife Mitigation Project	Lower Columbia	Willamette	W	1
9200900	Yakima Screens - Phase II - O & M	Lower Mid-Columbia	Yakima	A	1
9201000	Habitat Restoration/Enhancement Fort Hall Reservation	Upper Snake	Upper Snake	R	1
9202200	Physiological Assessment of Wild and Hatchery Juvenile	Lower Mid-Columbia	Lower Mid-Columbia	A	1
9202401	Enhanced Harvest & Habitat Law Enforcement for	Mainstem	Mainstem	A	1
9202406	Public Fisheries Education/Enhanced Protection of	Upper Columbia	Flathead, Kootenai	R	3
9202408	Protect Critical Salmonid Habitat and Habitat Restoration	Lower Snake	Salmon	A	1
9202409	Enhance Law Enforcement for Fish & Wildlife and	Lower Snake	Clearwater	A	1
9202601	Grande Ronde Model Watershed - Project Planning	Lower Snake	Grande Ronde	A	1
9202602	Implement Eastern Washington Model Watershed Plans	Lower Snake	Tucannon	A	1
9202603	Idaho Model Watersheds Admin./Impl. Support	Lower Snake	Salmon	A	1
9202604	Spring Chinook Salmon Early Life History	Systemwide	Systemwide	A	1
9203200	Life-Cycle Model Development and Application to	Systemwide	Systemwide	A	1
9204000	Redfish Lake Sockeye Salmon Captive Broodstock	Lower Snake	Salmon	A	1
9204101	Evaluate Adult Migration in Lwr Col. River and	Mainstem	Mainstem	A	1
9204800	Hellsgate Big Game Winter Range	Upper Columbia	Upper Columbia	W	1
9205900	Amazon Basin/Eugene Wetlands Phase II	Lower Columbia	Willamette	W	1
9206100	Albeni Falls Wildlife Mitigation Project	Upper Columbia	Upper Columbia	W	1
9206200	Yakama Nation - Riparian/Wetlands Restoration	Lower Mid-Columbia	Yakima	W	1
9206800	Implementation of Willamette Basin Mitigation	Lower Columbia	Willamette	W	1
9206801	Implementation of Willamette Basin Mitigation	Lower Columbia	Willamette	W	3
9300802	Symptoms of GBT Induced in Salmon by TDGS of the	Mainstem	Mainstem	A	1
9301900	Hood River Production Program - Oak Springs,	Lower Mid-Columbia	Hood	A	1
9302900	Survival Estimates for Passage of Juvenile Salmonids	Mainstem	Mainstem	A	1
9303000	Buck Hollow Watershed Enhancement	Lower Mid-Columbia	Deschutes	A	3
9303501	Enhance Fish, Riparian and Wildlife Habitat within the	Lower Snake	Clearwater	A	1
9303701	Technical Assitance With Life Cycle Modeling	Systemwide	Systemwide	A	1
9303800	North Fork John Day Area Riparian Fencing	Lower Mid-Columbia	John Day	A	1
9304000	Fifteenmile Creek Habitat Restoration Project	Lower Mid-Columbia	Fifteenmile	A	1
9305600	Assessment of Captive Broodstock Technology	Systemwide	Systemwide	A	1
9306000	Evaluate Columbia River Select Area Fisheries	Lower Columbia	Lower Columbia	A	1
9306200	Salmon River Anadromous Fish Passage Enhancement	Lower Snake	Salmon	A	1
9306600	Oregon Fish Screening Project FY99 Proposal	Lower Mid-Columbia	John Day	A	1
9401001	Mitigation for Excessive Drawdowns at Hungry Horse &	Upper Columbia	Kootenai	R	1
9401002	Mitigation for Excessive Drawdowns: Hungry Horse	Upper Columbia	Flathead	R	1
9401200	Kootenai River Fisheries Investigation M&E	Upper Columbia	Kootenai	R	1
9401500	Idaho Fish Screening Improvement - O&M	Lower Snake	Salmon	A	1
9401700	Idaho Model Watershed Habitat Projects	Lower Snake	Salmon	A	1
9401805	Enhance Habitat For Spring Chinook, Summer Steelhead,	Lower Snake	Asotin	A	1
9401806	Enhance Habitat For Spring & Fall Chinook, Summer	Lower Snake	Tucannon	A	1
9401807	Enhance Habitat For Fall Chinook, Steelhead and	Lower Snake	Tucannon	A	1
9402600	Pacific Lamprey Research and Restoration	Systemwide	Systemwide	A	1
9402700	Grande Ronde Model Watershed Habitat Projects	Lower Snake	Grande Ronde	A	1
9403300	The Fish Passage Center	Systemwide	Systemwide	A	1
9403400	Assessing Summer & Fall Chinook Salmon Restoration in	Lower Snake	Clearwater	A	1
9403900	Wallowa Basin Project Planning	Lower Snake	Grande Ronde	A	1
9404200	Trout Creek Habitat Restoration Project	Lower Mid-Columbia	Deschutes	A	1
9404300	Monitor, Evaluate, and Research the Lake Roosevelt	Upper Columbia	Upper Columbia	R	1
9404700	Lake Pend Oreille Fishery Recovery Project	Upper Columbia	Pend Oreille	R	1
9404900	Improve the Kootenai River Ecosytem	Upper Columbia	Kootenai	R	1

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9405000	Salmon River Habitat Enhancement	Lower Snake	Salmon	A	1
9405300	Bull Trout Assessment - Willamette/Mckenzie	Lower Columbia	Willamette	R	1
9405400	Bull Trout Genetics, Habitat Needs, L.H. Etc. in Central	Lower Mid-Columbia	Deschutes, John Day,	R	1
9405900	Yakima Basin Environmental Education	Lower Mid-Columbia	Yakima	A	1
9406900	A Spawning Habitat Model to Aid Recovery Plans for	Lower Mid-Columbia	Lower Mid-Columbia	A	1
9500100	Kalispel Tribe Resident Fish	Upper Columbia	Pend Oreille	R	1
9500600	Shoshone-Bannock/Shoshone-Paiute Joint Culture	Upper Snake	Upper Snake	R	1
9500700	Hood River Production Program - PGE: O&M	Lower Mid-Columbia	Hood	A	1
9500900	Volunteers Rear 500,000 Net Pen Rainbow Trout Above	Upper Columbia	Upper Columbia	R	1
9501100	Chief Joseph Kokanee Enhancement Project	Upper Columbia	Upper Columbia	R	1
9501300	Nez Perce Trout Ponds	Lower Snake	Clearwater	R	1
9501500	Billy Shaw Wetlands catch and release fishery O&M	Upper Snake	Owyhee	R	1
9501600	Genetic Inventory of Westslope Cutthroat Trout, North	Lower Snake	Clearwater	R	1
9502500	Flathead River Instream Flow Project	Upper Columbia	Flathead	R	1
9502700	Assess Limiting Factors of the Lake Roosevelt White	Upper Columbia	Upper Columbia	R	2
9502800	Restore Moses Lake Recreational Fishery	Upper Mid-Columbia	Crab	R	1
9503300	O&M of Yakima Fish Protection, Mitigation &	Lower Mid-Columbia	Yakima	A	1
9505700	Southern Idaho Wildlife Mitigation	Upper Snake	Upper Snake	W	1
9506001	Enhance Squaw Creek Watershed for Anadromous Fish	Lower Mid-Columbia	Umatilla	W	1
9506300	Yakima/Klickitat Monitoring and Evaluation Program	Lower Mid-Columbia	Yakima	A	1
9506402	Upper Yakima Species Interactions Studies	Lower Mid-Columbia	Yakima	A	1
9506404	Policy/Technical Involvement & Planning for YKFP	Lower Mid-Columbia	Yakima	A	1
9506406	Monitor Supplementation Response Variable For the	Lower Mid-Columbia	Yakima	A	1
9506700	Coville Confederated Tribes Performance Contract	Upper Columbia	Upper Columbia	W	1
9506800	Klickitat Passage/Habitat Improvement M&E	Lower Mid-Columbia	Klickitat	A	1
9600500	Operate Independent Scientific Advisory Board	Systemwide	Systemwide	A	1
9600600	Path-Facilitation, Technical Assistance, and Peer Review	Systemwide	Systemwide	A	1
9600700	Irrigation Diversion Consolidations & Water	Lower Snake	Salmon	A	1
9600800	PATH-Participation by State and Tribal Agencies	Systemwide	Systemwide	A	1
9600801	Provide Scientific Input to the PATH Process	Systemwide	Systemwide	A	1
9601100	Screens and Traps on the Walla Walla and Touchet	Lower Mid-Columbia	Walla Walla	A	1
9601200	Adult Fish Passage Improvement - Walla Walla River	Lower Mid-Columbia	Walla Walla	A	1
9601700	Provide Technical Support in the Plan For Analyzing and	Systemwide	Systemwide	A	1
9601900	Second-Tier Database For Ecosystem Focus	Systemwide	Systemwide	A	3
9602100	Gas Bubble Disease Research & Monitoring of Juvenile	Mainstem	Mainstem	A	1
9603201	Begin Implementation of Year 1 of the K Pool Master Plan	Lower Mid-Columbia	Lower Mid-Columbia	A	1
9603301	Supplement and Enhance the Two Existing Stocks of	Lower Mid-Columbia	Yakima	A	1
9603302	Evaluate the Feasibility and Potential Risks of Restoring	Lower Mid-Columbia	Yakima	A	1
9603501	Satus Watershed Restoration	Lower Mid-Columbia	Yakima	A	1
9604000	Evaluate the Feasibility and Risks of Coho	Upper Mid-Columbia	Methow	A	1
9604200	Restore and Enhance Anadromous Fisheries and Habitat	Upper Mid-Columbia	Okanogan	A	1
9604300	Johnson Creek Artificial Propagation Enhancement -	Lower Snake	Salmon	A	1
9604601	Walla Walla Basin Fish Habitat Enhancement	Lower Mid-Columbia	Walla Walla	A	1
9605300	North Fork John Day River Dredge Tailings Restoration	Lower Mid-Columbia	John Day	A	1
9606700	Manchester Spring Chinook Broodstock Project	Lower Snake	Salmon	A	1
9607000	McKenzie River Focus Watershed Coordination	Lower Columbia	Willamette	A	1
9607702	Protecting and Restoring the Lolo Creek Watershed	Lower Snake	Clearwater	A	1
9607703	Protecting and Restoring the Squaw and Papoose Creek	Lower Snake	Clearwater	A	1
9607704	Final Design for Fish Passage Improvements at Lower	Lower Snake	Clearwater	A	1
9607705	Restore McComas Meadows	Lower Snake	Clearwater	A	1

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9607706	Restore Lolo Watershed	Lower Snake	Clearwater	A	2
9607707	Restore Squaw and Papoose Watersheds	Lower Snake	Clearwater	A	2
9608000	Northeast Oregon Wildlife Mitigation Project	Lower Snake	Grande Ronde	W	1
9608300	Upper Grande Ronde Habitat Enhancement	Lower Snake	Grande Ronde	A	1
9608600	Clearwater Subbasin Focus Watershed Program	Lower Snake	Clearwater	A	1
9608701	Focus Watershed Coordination-Flathead River	Upper Columbia	Flathead	R	1
9608720	Focus Watershed Coordination-Kootenai River	Upper Columbia	Kootenai	R	1
9609400	Washington Department of Fish & Wildlife Habitat Units	Systemwide	Systemwide	W	1
9700100	Captive Rearing Initiative for Salmon River Chinook	Lower Snake	Salmon	A	1
9700200	PATH-UW Technical Support	Systemwide	Systemwide	A	1
9700300	Box Canyon Watershed Project	Upper Columbia	Pend Oreille	R	1
9700400	Resident Fish Stock Status Above Chief Joseph and	Upper Columbia	Pend Oreille,	R	1
9700900	Evaluate Means of Rebuilding White Sturgeon	Lower Snake	Lower Snake	R	1
9701000	PIT Tag System Transition	Mainstem	Mainstem	A	1
9701100	Enhance and Protect Habitat and Riparian Areas on Duck	Upper Snake	Owyhee	R	1
9701300	Operation & Maintenance For Upper Yakima River	Lower Mid-Columbia	Yakima	A	1
9701400	Evaluation of Juvenile Fall Chinook Stranding on the	Mainstem	Mainstem	A	1
9701900	Stinkingwater Salmonid Project	Upper Snake	Malheur	R	1
9702400	Avian Predation on Juvenile Salmonids in the Lower	Mainstem	Mainstem	A	1
9702500	Implement the Wallowa County/Nez Perce Tribe Salmon	Lower Snake	Grande Ronde	A	1
9702600	Identify Marine Fish Predators of Salmon and Estimate	Mainstem	Ocean/estuary	A	1
9703000	Monitor Listed Stock Adult Chinook Salmon Escapement	Lower Snake	Salmon	A	1
9703400	Monitor Fine Sediment and Overwinter Sedimentation in	Lower Mid-Columbia	John Day	A	1
9703800	Listed Stock Chinook Salmon Gamete Preservation	Lower Snake	Salmon	A	1
9704900	Teanaway River Instream Flow Restoration	Lower Mid-Columbia	Yakima	A	1
9705100	Yakima Basin Side Channels	Lower Mid-Columbia	Yakima	A	1
9705200	Enhancement Between Selah and Union Gaps	Lower Mid-Columbia	Yakima	A	2
9705300	Toppenish-Simcoe Instream Flow Restoration	Lower Mid-Columbia	Yakima	A	2
9705600	Lower Klickitat River Riparian & In-Channel Habitat	Lower Mid-Columbia	Klickitat	A	1
9705700	Salmon River Production Program	Lower Snake	Salmon	A	1
9705900	Securing Wildlife Mitigation Sites - Oregon	Systemwide	Systemwide	W	1
9705904	Securing Wildlife Mitigation Sites-Oregon, Horn Butte	Lower Columbia	Lower Columbia	W	1
9705905	Securing Wildlife Mitigation Sites-Oregon, Ladd Marsh	Lower Snake	Grande Ronde	W	1
9705906	Securing Wildlife Mitigation Sites-Oregon, McKenzie	Lower Columbia	Willamette	W	1
9705907	Securing Wildlife Mitigation Sites-Oregon, E.E. Wilson	Lower Columbia	Willamette	W	1
9705908	Securing Wildlife Mitigation Sites-Oregon, Multnomah	Lower Columbia	Willamette	W	1
9705909	Securing Wildlife Mitigation Sites-Oregon, Mitchell Point	Lower Columbia	Lower Columbia	W	1
9705910	Securing Wildlife Mitigation Sites-Oregon, Trout Creek	Lower Mid-Columbia	Deschutes	W	1
9705911	Securing Wildlife Mitigation Sites-Oregon, Irrigon WMA	Upper Columbia	Upper Columbia	W	1
9705912	Securing Wildlife Mitigation Sites-Oregon, Wenaha	Lower Snake	Grande Ronde	W	1
9705913	Securing Wildlife Mitigation Sites-Oregon, South Fork	Lower Mid-Columbia	Deschutes	W	1
9705915	Juniper Canyon and Columbia Gorge Wildlife Mitigation	Lower Mid-Columbia	Lower Mid-Columbia	W	1
9705916	Tualatin River National Wildlife Refuge Additions	Lower Columbia	Willamette	W	1
9706000	Clearwater Subbasin Focus Watershed Program	Lower Snake	Clearwater	A	1
9706200	Development /Refinement of Natural Production	Lower Mid-Columbia	Yakima	A	1
9800100	Analytical Support-PATH and ESA Biological	Systemwide	Systemwide	A	1
9800200	Snake River Native Salmonid Assessment	Upper Snake	Upper Snake, Boise,	R	1
9800300	O & M Funding of Wildlife Habitat on STOI Reservation	Upper Columbia	Upper Columbia	W	1
9800702	Grande Ronde Supplementation - O&M/M&E - Nez Perce	Lower Snake	Grande Ronde	A	1
9800703	Conduct Satellite Facility O&M and Program M&E for	Lower Snake	Grande Ronde	A	1

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9801001	Grande Ronde Basin Spring Chinook Captive Broodstock	Lower Snake	Grande Ronde	A	1
9801002	Captive Rearing Initiative for Salmon River Chinook	Lower Snake	Salmon	A	1
9801003	Monitor and Evaluate the Spawning Distribution of	Lower Snake	Lower Snake	A	1
9801004	Monitor and Evaluate Yearling Snake R Fall Chinook	Lower Snake	Lower Snake	A	1
9801005	Pittsburg Landing, Capt. John Rapids, Big Canyon Fall	Lower Snake	Lower Snake	A	1
9801006	Captive Broodstock Artificial Propagation	Lower Snake	Grande Ronde	A	1
9808001	PIT Tag Purchase and Distribution	Systemwide	Systemwide	A	1