HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Yakima Basin Steelhead Reconditioning Project
Species or Hatchery Stock:	Steelhead (*Oncorhynchus mykiss*)
Agency/Operator:	Yakama Nation In cooperation with CRITFC And BPA as funding agency
Watershed and Region:	Yakima River Subbasin/Columbia Plateau Province
Date Submitted:	August 27, 2004; Updated July 6, 2005
Date Last Updated:	January 4, 2008

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.
Yakima Basin Steelhead Reconditioning Project

1.2) Species and population (or stock) under propagation, and ESA status.
State common and scientific names.

Steelhead (*Oncorhynchus mykiss*)
ESA Status: Threatened (part of Mid-Columbia ESU listed as threatened - Final Rule 3/25/99: 64 FR 14517-14528, reconfirmed as DPS 1/5/2006: 71 FR 834-862)

1.3) Responsible organization and individuals
Indicate lead contact and on-site operations staff lead.

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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

Co-operators	Role
Bonneville Power Administration	Funding Entity- Administrator
U.S. Bureau of Reclamation	Owner of facility land; and minor funding entity for facility upgrades and public education
National Marine Fisheries Service	Decision on Listed Species; radio telemetry support
Washington Department of Fish & Wildlife	Co-Manager
Northwest Power Planning Council	Makes Fish and Wildlife Program decisions under the Northwest Power Act.

University of Idaho	Radio Telemetry support

1.4) Funding source, staffing level, and annual hatchery program operational costs.

Funding sources: Bonneville Power Administration, Yakama Nation, and U.S. Bureau of Reclamation (Funds for facility improvements, public education, in-kind land contribution).

Staffing and annual operational costs:
Prosser Hatchery
9 scientific technicians, 2 management biologists, total of 11 full time equivalent staff. Annual operating cost (dollars): $1,141,042. These data include staff and costs for both Yakama coho and fall Chinook programs.

1.5) Location(s) of hatchery and associated facilities.

Include name of stream, river kilometer location, basin name, and state. Also include watershed code (e.g. WRIA number), regional mark processing center code, or other sufficient information for GIS entry. See "Instruction E" for guidance in responding.

Broodstock source	Program reconditions and releases Yakima Basin kelt steelhead. No spawning or rearing occurs under this program.
Kelt collection location (stream, RKm, subbasin)	Chandler Juvenile Monitoring Facility (CJMF), Yakima, RKm 75.4
Adult holding location (stream, RKm, subbasin)	Prosser Hatchery (Off river of the Yakima River ~0.75 miles downstream of Prosser Dam, RKm 75.1, Yakima Subbasin
Reconditioning location (stream, RKm, subbasin)	Prosser Hatchery (Off river of the Yakima River ~0.75 miles downstream of Prosser Dam, RKm 75.1, Yakima Subbasin
Incubation location (facility name, stream, RKm, subbasin)	Not applicable
Rearing location (facility name, stream, RKm, subbasin)	Not applicable

WRIA code for Prosser Dam and Hatchery: 37

1.6) Type of program.

Define as either: Integrated Recovery; Integrated Harvest; Isolated Recovery; or Isolated Harvest (see Attachment 1 - Definitions" section for guidance).

Integrated Recovery.

1.7) Purpose (Goal) of program.

Define as either: Augmentation, Mitigation, Restoration, Preservation/Conservation, or Research (for Columbia Basin programs, use NPPC document 99-15 for guidance in providing these definitions of "Purpose"). Provide a one sentence statement of the goal of the program, consistent with the term selected and the response to Section 1.6. Example: "The goal of this program is the restoration of spring chinook salmon in the White River using the indigenous stock".

The purpose of this program is to test the feasibility of kelt reconditioning as a method to enhance the survival and repeat spawning of steelhead and as mitigation for hydro and habitat

impacts.

1.8) Justification for the program.

Indicate how the hatchery program will enhance or benefit the survival of the listed natural population (integrated or isolated recovery programs), or how the program will be operated to provide fish for harvest while minimizing adverse effects on listed fish (integrated or isolated harvest programs).

- Yakima Basin steelhead are part of the mid-Columbia ESU listed as ESA-threatened in 1999, reconfirmed as DPS 1/5/2006: 71 FR 834-862.
- The parties to the *United States versus Oregon* Columbia River Fish Management Plan agreed to approve and implement supplementation recommendations and to evaluate the effectiveness of outplanting of steelhead.
- This project meets the definition of "Restoration" from NPPC document 99-15: "Restoration - The use of artificial propagation to hasten rebuilding or reintroduction of a fish population to harvestable levels in areas where there is low, or no natural production, but potential for increase or reintroduction exists because sufficient habitat for sustainable natural production exists or is being restored."

The program attempts to increase the abundance and diversity of steelhead in the Yakima Basin by increasing the number of iteroparous (repeat spawning) steelhead on the spawning grounds.

1.9) List of program "Performance Standards".

"Performance Standards" are designed to achieve the program goal/purpose, and are generally measurable, realistic, and time specific. The NPPC "Artificial Production Review" document attached with the instructions for completing the HGMP presents a list of draft "Performance Standards" as examples of standards that could be applied for a hatchery program. If an ESU-wide hatchery plan including your hatchery program is available, use the performance standard list already compiled.

Example: " (1) Conserve the genetic and life history diversity of Upper Columbia River spring chinook populations through a 12 year duration captive broodstock program; (2) Augment, restore and create viable naturally spawning populations using supplementation and reintroduction strategies; (3) Provide fish to satisfy legally mandated harvest in a manner which minimizes the risk of adverse effects to listed wild populations; (4)....".

In order to evaluate the feasibility of kelt reconditioning as a potential recovery and restoration strategy for wild steelhead in the Columbia River basin, this project was designed to address the following research objectives:

Objective 1: Implement and evaluate short-term kelt reconditioning, transportation and release downstream from Bonneville Dam.

Objective 2: Continue to refine and improve efficiency and success of long-term steelhead reconditioning at the Prosser Hatchery.

Objective 3: Assess homing fidelity of steelhead kelts following their release from the reconditioning program.

Key questions relating to objectives 1-3:

1. What feed types result in growth and re-maturation of gonads when rearing kelt steelhead in a captive environment?
2. Do captive kelts grow and survive?
3. Is abundance of potential repeat spawners better enhanced by a short- or long-term reconditioning program?
4. Do reconditioned kelts migrate to the spawning grounds?

Objective 4: Evaluate the reproductive success of reconditioned kelt steelhead.

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

"Performance Indicators" determine the degree that program standards have been achieved, and indicate the specific parameters to be monitored and evaluated. Adequate monitoring and evaluation must exist to detect and evaluate the success of the hatchery program and any risks to or impairment of recovery of affected, listed fish populations.

The NPPC "Artificial Production Review" document referenced above presents a list of draft "Performance Indicators" that, when linked with the appropriate performance standard, stand as examples of indicators that could be applied for the hatchery program. If an ESU-wide hatchery plan is available, use the performance indicator list already compiled. Essential 'Performance Indicators" that should be included are monitoring and evaluation of overall fishery contribution and survival rates, stray rates, and divergence of hatchery fish morphological and behavioral characteristics from natural populations.

The list of "Performance Indicators" should be separated into two categories: "benefits" that the hatchery program will provide to the listed species, or in meeting harvest objectives while protecting listed species; and "risks" to listed fish that may be posed by the hatchery program, including indicators that respond to uncertainties regarding program effects associated with a lack of data.

1.10.1) "Performance Indicators" addressing benefits.

(e.g. "*Evaluate smolt-to-adult return rates for program fish to harvest, hatchery broodstock, and natural spawning.*").

Indicator	Performance Standard	Indicator is Monitored
Annual escapements of natural populations that are affected by fisheries targeting program fish.		YN, WDFW, and USFS conduct annual redd counts of naturally spawning steelhead in the Yakima Basin
Annual number of spawners on spawning grounds, by age.	Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.	YN estimates Yakima River run size from Prosser dam count, harvest, and redd count data. Age composition can be estimated from Prosser Denil passage and Prosser/Roza steelhead and kelt sampling.
Annual number of redds in selected natural production index areas.		YN, WDFW, and USFS conduct annual redd counts of naturally spawning fall chinook in the Yakima Basin

1.10.2) "Performance Indicators" addressing risks.

(*e.g. "Evaluate predation effects on listed fish resulting from hatchery fish releases."*).

Indicator	Performance Standard	Indicator is Monitored
Marking rate by mark type for each release group.	Release groups are sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.	Yes, all released kelts are PIT-Tagged and some are radio tagged.
Temporal distribution of broodstock collection, and of naturally produced population at point of collection.	Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of the population from which broodstock is taken.	Yes, kelts are collected from throughout the duration of their return migration from the subset of kelts which migrate downstream and are diverted into the Chandler Canal and juvenile fish monitoring facility.
Age composition of broodstock collected, and of naturally produced population at point of collection.		Scale samples are taken (if not reabsorbed) from collected kelts; in addition, PIT-tagging of juvenile steelhead in Yakima Basin has occurred since the 2002 outmigration. These combined with Roza-tagged steelhead can also be used for age composition.
Number of spawners of natural origin removed for broodstock.	Broodstock collection does not significantly reduce potential juvenile production in natural rearing areas.	Not applicable.
Number and origin of spawners migrating to natural spawning areas.		The contribution of reconditioned kelts to the (fresh) natural spawning return is known and computed on an annual basis.
Number of eggs or juveniles placed in natural rearing areas.		Not applicable.
Life history characteristics	Life history characteristics of the natural population do not change as a result of this artificial production program.	The following characteristics are monitored on an annual basis: Juvenile migration timing (at Chandler), juvenile size at outmigration (tributary screw trapping and Chandler juvenile monitoring operations), adult return timing (at Prosser), adult return age and sex composition and size at return (Prosser Denil and kelt sampling), Spawn timing and distribution (comprehensive spawner surveys), fecundity and egg size (beginning to build a database from fish used in reproductive success studies)
Carrying capacity criteria for basin-wide and local habitat, including method of calculation.	Annual release numbers do not exceed estimated basin-wide and local habitat capacity, including spawning, freshwater rearing, migration corridor, and estuarine and nearshore rearing.	Yakima Basin carrying capacity determined using EDT model analysis.
Annual release numbers from all programs in basin and subbasin, including size and life-stage at release, and length of acclimation, by program.		The number of short- and long-term kelts released annually is documented as well as location of release.
Location of releases and natural rearing areas.		Short-term Kelts are trucked from Prosser Hatchery and released in the vicinity of the Hamilton Island Boat Ramp below Bonneville Dam. Long-term kelts are released in the vicinity of Mabton upstream of Prosser Dam; some are also released in the vicinity of Wallula Gap near McNary Dam to assess homing fidelity.
Timing of hatchery releases, compared to natural populations.		Short-term reconditioned kelts are released below Bonneville Dam in the spring and return on their own schedule. The majority have returned after spending 3-5 months in the estuary/ocean, but a few have returned immediately after release and a few have returned 1+ years after release. To date none have returned after more than 2 years. Long-term kelts are released in late November or early December to coincide with returning 'fresh' steelhead.

Genetic profiles of naturally produced adults, as developed at program's outset (e.g. through DNA or allozyme procedures) and compared to genetic profiles developed each generation.	Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.	DNA samples are taken from a subset of kelts that are reconditioned. DNA samples are also being taken from a subset of fish passing upstream at Roza Dam.
Total number of natural spawners reaching the collection facility.	Collection of broodstock does not adversely impact the genetic diversity of the naturally spawning population.	Hatchery, natural, and reconditioned origin returns are known (see above).
Total number of spawners estimated to pass the collection facility to spawning areas, compared to minimum effective population size (when established) required for those natural populations.		Total number of natural spawners is known (see above); minimum effective population size could be determined using EDT model analysis.
Timing of collection compared to overall run timing.		See above.
The ratio of observed and/or estimated total numbers of artificially produced fish on natural spawning grounds, to total number of naturally produced fish, for each significant spawning area.	Artificially produced origin adults in natural production areas do not exceed appropriate proportion of the total natural spawning population.	Hatchery, natural, and reconditioned origin returns are known (see above).
Observed and estimated total numbers of naturally produced and artificially produced adults passing a counting station close to natural spawning areas.		Hatchery, natural, and reconditioned origin returns are known (see above).
Location of juvenile releases.	Juveniles are released on-station, or after sufficient acclimation to maximize homing ability to intended return locations.	Not applicable.
Length of acclimation period.		Not applicable.
Release type, whether forced, volitional, or direct stream release.		Fish are released directly into the Columbia or Yakima Rivers after reconditioning, but the location and timing of their return and spawning are volitional (see above).
Level of smoltification at release, compared to a regional smoltification index (when developed). Release type, whether forced, volitional, or direct stream release.	Juveniles are released at fully smolted stage.	Not applicable.
Number of adults available for broodstock (moving geometric mean, based on number of ages at return for this species).	The number of adults returning to the hatchery that exceeds broodstock needs is declining.	Prosser dam and Chandler kelt counts should provide an index with which to make this determination.
Scientifically based experimental design, with measurable objectives and hypotheses.	The artificial production program uses standard scientific procedures to evaluate various aspects of artificial propagation.	See http://www.efw.bpa.gov/searchpublications/ for annual report detailing latest year's results.
Monitoring and evaluation framework including detailed time line.	The artificial propagation program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the experimental objective and evaluate beneficial and adverse effects on natural populations.	Monitoring and evaluation framework is being developed as part of the Master Plan for this species.
Annual and final reports.		See http://www.efw.bpa.gov/searchpublications/ for annual report detailing latest year's results.
Annual reports indicating level of compliance with applicable standards and criteria.	Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, INAD, and MDFWP.	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results
Discharge water quality compared to applicable water quality standards and guidelines, such as those described or required by NPDES, IHOT, PNFHPC, and Co-Managers of Washington Fish Health Policy tribal water quality plans, including those relating to temperature, nutrient loading, chemicals, etc.	Effluent from artificial production facility will not detrimentally affect natural populations.	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results

Water withdrawals compared to applicable passage criteria.	Water withdrawals and instream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results for all performance indicators for this standard.
Water withdrawals compared to NMFS, USFWS, and WDFW juvenile screening criteria		
Number of adult fish aggregating and/or spawning immediately below water intake point.		
Number of adult fish passing water intake point.		
Proportion of diversion of total stream flow between intake and outfall.		
Certification of juvenile fish health immediately prior to release, including pathogens present and their virulence.	Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.	USFWS fish health professionals sample and certify all releases.
Number and location(s) of carcasses or other products distributed for nutrient enrichment.	Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines.	See http://www.efw.bpa.gov/searchpublications/ Lower Yakima O&M annual report for latest year's results for all performance indicators for this standard.
Statement of compliance with applicable regulations and guidelines.		
Spatial and temporal spawning distribution of natural population above and below weir/trap, currently and compared to historic distribution.	Adult broodstock collection operation does not significantly alter spatial and temporal distribution of any naturally produced population.	Derived from spawner survey and radio telemetry work (temporal and spatial), and Prosser Dam counts (temporal).
Mortality rates in trap.	Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.	Mortality rates are documented.
Prespawning mortality rates of trapped fish in hatchery or after release.		Mortality rates are documented.
Size at, and time of, release of juvenile fish, compared to size and timing of natural fish present.	Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.	Not applicable.
Total cost of program operation.	Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population.	See 1.4 above.
Sum of ex-vessel value of commercial catch adjusted appropriately, appropriate monetary value of recreational effort, and other fishery related financial benefits.		This calculation will be difficult to do accurately since these fish are impacted in marine fisheries from Alaska possibly as far south as Northern California and inland to Prosser Dam and as expressed above, the proportion of Yakima fish in the total wild/natural steelhead harvest in these fisheries can only be roughly estimated.
Total cost of program operation.	Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.	See 1.4 above.
Average total cost of activities with similar objectives.		
Number of adult fish available for tribal ceremonial use.	Non-monetary societal benefits for which the program is designed are achieved.	YN documents this use.
Recreational fishery angler days, length of seasons, and number of licenses purchased.		See relevant *U.S. v OR* TAC and WDFW documentation.

1.11) Expected size of program.

In responding to the two elements below, take into account the potential for increased fish production that may result from increased fish survival rates affected by improvements in hatchery rearing methods, or in the productivity of fish habitat.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

The program collects kelt steelhead that naturally migrate downstream after spawning and are entrained into the Chandler irrigation diversion canal at Prosser Dam. The fish are then diverted into the Chandler Juvenile Monitoring Facility (CJMF) staffed by Yakama Nation fisheries technicians and biologists. Between 2001 and 2007, the annual handle of kelt steelhead at the CJMF ranged from 520 to 1,157 and averaged 803 over the seven years that this program has operated to date. All handled fish are biologically sampled by staff at the CJMF. Steelhead which are in very poor condition or are considered "green" pre-spawned steelhead upon examination by staff are released immediately back to the river near the Prosser hatchery. A random sample of the remaining kelts (generally every fifth fish) are biologically sampled, tagged with a Passive Integrated Transponder (PIT) tag, and placed immediately back into the river near the Prosser Hatchery (Yakima direct release group) as a control group to measure "baseline" return rates for iteroparous steelhead. After sampling, the remaining fish are placed into either: a) a "no term" program where fish are PIT tagged and hauled within 1-3 days to a release site below Bonneville Dam, b) a "short term" program where fish are PIT tagged and hauled within 4-10 weeks to a release site below Bonneville Dam, or c) a "long term" program where fish are retained in one of four circular rearing tanks at the Prosser Hatchery, held and fed for up to six months, then released to the Yakima River in the vicinity of Prosser Hatchery in late October to early November coincident with the peak of the "fresh" upstream migration of steelhead returning from the ocean to spawn. Annual release ranges, averages, and years of release for the four release groups were:

Yakima direct: from 52 to 67 (average of 57) kelts from 2005-2007
"No Term": from 38 to 96 (average of 62) kelts from 2004-2007
"Short Term": from 38 to 332 (average of 142) kelts from 2002-2007
"Long Term": from 85 to 301 (average of 176) kelts from 2001-2007

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location. (*Use standardized life stage definitions by species presented in* Attachment 2).

Life Stage	Release Location	Annual Release Level
Eyed Eggs		Not applicable – see 1.11.1
Unfed Fry		Not applicable – see 1.11.1
Fry		Not applicable – see 1.11.1
Fingerling		Not applicable – see 1.11.1
Yearling		Not applicable – see 1.11.1

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Provide estimated smolt-to-adult survival rate, total adult production number, and escapement number (to the hatchery and natural areas) data available for the most recent twelve years (roughly three fish generations), or for the number of years of available and dependable information. Indicate program goals for these parameters.

The following is the abstract of a manuscript titled, "Reconditioning Kelt Steelhead: A Novel Management Strategy for Populations in Low Abundance", which summarized results from the first five years of this program and was submitted to *Fish Management and Ecology* for peer review in late September of 2007.

> We reconditioned steelhead kelts in short- and long-term programs in a five-year study. Short-term reconditioned kelts were fed for approximately 3-11 weeks, transported around Columbia River hydroelectric facilities and released, with natural rearing and gonad rematuration occurring in the ocean. In long-term reconditioning, kelts were reared for 6-10 months then released locally. Survival to release for short-term reconditioning ranged from 69-93% and averaged 79%. Post-release survival and return of short-term kelts ranged from 1-9% with returning "ocean-reared" kelts showing an average weight gain of 46%. Survival to release for long-term reconditioning ranged from 19-62% and averaged 36% with captive-reared kelts showing an average weight gain of 38%. Short- and long-term reconditioned steelhead kelts represented 2-11% of the annual spawning escapement from 2001 to 2005 compared to a repeat spawning rate of 1.6% from the literature. Radio telemetry results demonstrated success in locating spawning grounds and constructing redds.

A study to investigate the relative reproductive success of artificially reconditioned kelt steelhead is being implemented.

1.13) Date program started (years in operation), or is expected to start.

To address recovery, the YKFP in cooperation with the University of Idaho and the Columbia River Inter-Tribal Fish Commission began capturing wild emigrating steelhead kelts from the Yakima River in 1999 to test reconditioning and the effects of several diet formulations on its success at Prosser Hatchery (Rkm 76) on the Yakima River.

The first two years of the program were primarily aimed at assessing feasibility and determining feed-types and methods that would successfully encourage kelts to begin actively feeding. The long-term reconditioning program began in earnest in 2001. Short-term reconditioning began in 2002.

1.14) Expected duration of program.

Undetermined.

1.15) Watersheds targeted by program.
Include WRIA or similar stream identification number for desired watershed of return.

Yakima River Subbasin/Columbia Plateau Province. Yakima Basin (WRIA code 37 and 39), including the Naches subbasin (WRIA code 38), middle and upper Yakima subbasins, and tributaries.

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

From 2003 HGMP provincial meetings:

Yakima Steelhead Kelt Reconditioning

1.16.1 Brief Overview of key issues
The primary goal for this program is to test the hypothesis that increasing the natural expression of historical repeat spawning rates using fish culturing means is a viable technique to assist the recovery of depressed steelhead populations. Reconditioning is the process of culturing post-spawned fish (kelts) in a captive environment until they are able to reinitiate feeding, growth, and again develop mature gonads. Key issues are:
1. Developing commercial food products that stimulate the initiation of feeding in wild adult steelhead.

1.16.2 Potential alternatives to the current program
1. Do not attempt kelt reconditioning
2. Collect kelts and transport them by truck or barge to lower Columbia for release to avoid mortality associated with passage at Hydro dams.
3. Keep kelts until mature, spawn, and rear/release resulting smolts.
4. [added by Bill Bosch, YN, 08/27/04]. Develop full-scale steelhead hatchery program for the Yakima Basin.

1.16.3 Potential reforms and investments
1. Develop Kelt reconditioning sites in upper watershed for identified stocks in each subbasin of Yakima.

Because of their diverse life history (steelhead can migrate to sea after one to three years in freshwater) and since steelhead in the Yakima Subbasin are apparently uniquely adapted to one of several specific tributaries or reaches, it is difficult to design a steelhead supplementation program for the Yakima Subbasin using traditional fish culture practices. For these reasons, the YKFP has not incorporated steelhead into its supplementation activities. However, it is anticipated that the habitat actions undertaken pursuant to the YKFP are likely to benefit steelhead populations as well. In lieu of a "traditional" supplementation program, the Yakama Nation, in cooperation with the Columbia River Inter-Tribal Fish Commission, is exploring the potential to increase the rate of repeat spawning in Yakima Subbasin steelhead populations via the steelhead kelt reconditioning program. The M&E results of this program over the next several years should lead to recommendations on future methods, plans, and strategies for facilitating recovery of steelhead in the Yakima Basin and hopefully, in other parts of the Columbia Basin as well.

SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS. (USFWS ESA-Listed Salmonid Species and Non-Salmonid Species are addressed in Addendum A)

2.1) List all ESA permits or authorizations in hand for the hatchery program.

The program has all applicable permits and/or authorizations.

See appendices:
Appendix A. 2004 Biological Assessment.
Appendix B. 2005 Permit Application
Appendix C. Coverage for Roza adult trapping operations.
Appendix D. Adult and Juvenile Take Tables for Mid-Columbia Steelhead Kelt Reconditioning Projects.
Appendix E. NOAA 2006 Determination Letter.

Contacts: Doug Hatch, CRITFC, 503-238-0667; Mark Johnston or Todd Newsome at 509-865-5121.

2.2) Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

2.2.1) Description of NMFS ESA-listed salmonid population(s) affected by the program.

Include information describing: adult age class structure, sex ratio, size range, migrational timing, spawning range, and spawn timing; and juvenile life history strategy, including smolt emigration timing. Emphasize spatial and temporal distribution relative to hatchery fish release locations and weir sites

- Identify the NMFS ESA-listed population(s) that will be directly affected by the program. *(Includes listed fish used in supplementation programs or other programs that involve integration of a listed natural population. Identify the natural population targeted for integration).*

Yakima River summer steelhead were listed as threatened in 1999 as part of the mid-Columbia Distinct Population Segment (DPS). These fish spawn in tributaries of the Yakima Basin including: Satus, Toppenish, and Ahtanum Creeks, and the Naches and Upper Yakima River systems, and there is some evidence of genetic uniqueness among these subpopulations (Small et al. 2006). The Interior Columbia Technical Recovery Team designated four populations within the Yakima River major population group: Satus, Toppenish, Naches River, and Yakima River upper mainstem (ICTRT 2003 and 2005).

- Identify the NMFS ESA-listed population(s) that may be incidentally affected by the program.
(Includes ESA-listed fish in target hatchery fish release, adult return, and broodstock collection areas).

2.2.2) Status of NMFS ESA-listed salmonid population(s) affected by the program.

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds (*see definitions in "Attachment 1").*

- Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.

- Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data. *(Include estimates of juvenile habitat seeding relative to capacity or natural fish densities, if available).*

- Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Yakima Basin Steelhead Escapement and Spawning Summary						
Run Year	Prosser Dam Count	Redd Counts by Survey Stream				Roza Dam Count
		Satus	Toppenish	Ahtanum	Naches	
1987-88	2,840	445				
1988-89	1,162	404	45			
1989-90	814	289	26			
1990-91	834	125				
1991-92	2,263					116
1992-93*	1,184	73				15
1993-94	554	114				28
1994-95**	925	85				23
1995-96	505	148				92
1996-97*	1,106	76	5			22
1997-98*	1,113	190	13			51
1998-99	1,070	130	78			14
1999-00	1,611	169	185	11		14
2000-01	3,089	102	355	8		140
2001-02**	4,525	240	111	13		238
2002-03	2,235	172	354	8		134
2003-04	2,755	93	56	12	94	213
2004-05	3,451	108	99	16	140	227
2005-06**	2,005	60	20	1	19	117
2006-07	1,537	87	42**	4**	44	58

Blank = no data available
* Partial survey.
**Survey affected by access problems, high flows, or poor redd visibility

Hatchery releases were discontinued in the early 1990s. Recent 9-year average (since 1998-99 run year) escapement over Prosser Dam has been >98% wild; since 1983-84 the annual steelhead escapement has averaged about 92% wild. Data source: YN databases (YakRSthdDB.xls, SthdReddSummary.doc).

Please see the Yakima Basin salmon recovery plan for further information. The recovery plan describes a process to remove or minimize the threats to the long-term survival of steelhead, and bull trout and reverse their decline in the Yakima subbasin. Actions proposed should also benefit other sensitive or at-risk species. Current and historical conditions of each population were described, and limiting factors that led to the decline of each population or local population in the Yakima subbasin were identified. Appropriate actions were then selected based on limiting factors analysis and analysis of metrics within preliminary guidelines for determining population viability (abundance, productivity, spatial structure, and diversity). Recovery actions were coordinated with local stakeholders and jurisdictions that determined the feasibility of the recommended actions. In addition to actions to address habitat limiting factors, the salmon recovery plan also includes discussion of steelhead kelt reconditioning and other potential production actions.

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take *(see "Attachment 1" for definition of "take")***.**

The program has all applicable permits and/or authorizations.

Please refer to the following appendices for information requested in this section:
Appendix A. 2004 Biological Assessment.
Appendix B. 2005 Permit Application
Appendix C. Coverage for Roza adult trapping operations.
Appendix D. Adult and Juvenile Take Tables for Mid-Columbia Steelhead Kelt Reconditioning Projects.
Appendix E. NOAA 2006 Determination Letter.

Contacts: Doug Hatch, CRITFC, 503-238-0667; Mark Johnston or Todd Newsome at 509-865-5121.

- Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take.
(*e.g. "Broodstock collection directed at sockeye salmon has a "high" potential to take listed spring chinook salmon, through migrational delay, capture, handling, and upstream release, during trap operation at Tumwater Falls Dam between July 1 and October 15. Trapping and handling devices and methods may lead to injury to listed fish through descaling, delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation*").

- Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

- **Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**
*Complete the appended "take table" (**Table 1**) for this purpose. Provide a range of potential take numbers to account for alternate or "worst case" scenarios.*

- Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.
(*e.g. "The number of days that steelhead are trapped at Priest Rapids Dam will be reduced if the total mortality of handled fish is projected inseason to exceed the 1988-99 maximum observed level of 100 fish."*)

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.
(e.g. "The hatchery program will be operated consistent with the ESU-wide plan, with the exception of age class at release. Fish will be released as yearlings rather than as sub-yearlings as specified in the ESU-wide plan, to maximize smolt-to-adult survival rates given extremely low run sizes the past four years.").

A Yakima Subbasin salmon recovery plan is presently being developed in cooperation with the Yakima Subbasin Fish and Wildlife Recovery Board. A draft document is available for public review at http://www.ybfwrb.org/Draft%20plan/RecPlanFinal.pdf. Yakima Basin steelhead kelt reconditioning activities will be consistent with this recovery plan. Yakima kelt reconditioning activities are also an integral part of production actions being developed in negotiations to update the *U.S. v Oregon* Columbia River Fish Management Plan and reasonable and prudent alternative actions being developed in the Biological Opinion Remand process.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates. *Indicate whether this HGMP is consistent with these plans and commitments, and explain any discrepancies.*

Document Title	Type
Treaty of 1855. Asserted the right of the Yakama Nation to "take fish at all usual and accustomed fishing areas". Federal courts have held that this right means more than the right of Indians to hang a net in an empty river (*Washington v Washington State Commercial Passenger Fishing Vessel Association, 1979*).	Supreme law of the land
United States versus Oregon Columbia River Fish Management Plan.	Federal Court Order
US v Washington	Federal Court Order

Northwest Power and Conservation Council (NPCC), Fish and Wildlife Program.	Northwest Power Act
WY-KAN-USH-MI WA-KISH-WIT	Columbia River Anadromous Fish Restoration Plan of the Columbia River Tribes
Yakama Nation and US Bureau Reclamation Prosser Hatchery Agreement	MOU
Yakama Nation and US Fish & Wildlife Service Fish Health Agreement	MOU

The four Columbia River Treaty Tribes (Nez Perce, Umatilla, Warm Springs, and Yakama) identified steelhead restoration and enhancement throughout the Columbia Basin as a priority in *Wy-Kan-Ush-Mi-Wa-Kish-Wit*, commonly referred to as the Tribal Restoration Plan (TRP) (CRITFC 1995, 2000). It is a comprehensive plan put forward by the Tribes to restore the Columbia River fisheries.

In 1996, the Northwest Power Planning Council (NPPC) recommended the tribal mid-Columbia reintroduction project for funding by BPA, which has responsibilities under the Northwest Electric Power Planning and Conservation Act of 1980 to protect, mitigate, and enhance fish and wildlife that have been affected by the construction and operation of the Federal Columbia River Power System.

Steelhead enhancement programs are also recognized in the Columbia River Fish Management Plan, a court-mandated plan under the jurisdiction of *U.S. v. Oregon*, involving Federal, state and tribal fish managers in the Columbia basin (CRITFC 1988). The U.S. District Court ruled on March 22, 1974 that the Yakama Nation and Washington Department of Fish and Wildlife co-manage fish resources in Washington State. This decision is commonly referred to as the Boldt Decision.

The YN has a Memorandum of Understanding with the BOR, which stipulates responsibilities between the two parties pertaining to the Prosser Hatchery facility.

The YN has a subcontract with the USFWS to monitor fish health at the main hatchery facility and satellite acclimation facilities.

3.3) Relationship to harvest objectives.

Explain whether artificial production and harvest management have been integrated to provide as many benefits and as few biological risks as possible to the listed species. Reference any harvest plan that describes measures applied to integrate the program with harvest management.

3.3.1) Describe fisheries benefitting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Also provide estimated future harvest rates on fish propagated by the program, and on listed fish that may be taken while harvesting program fish.

There are no specific harvest objectives for this project.

3.4) Relationship to habitat protection and recovery strategies.

Describe the major factors affecting natural production (if known). Describe any habitat protection efforts, and expected natural production benefits over the short- and long-term. For Columbia Basin programs, use NPPC document 99-15, section II.C. as guidance in indicating program linkage with assumptions regarding habitat conditions.

Limiting factors in the Yakima Subbasin and strategies to address them are well described in the Yakima Subbasin Plan (YSFWPB 2004). The following text is a summary of Yakima Basin limiting factors for aquatic habitats excerpted directly from the Subbasin Summary.

> The loss of floodplain habitat, especially side channels and springs adjacent to the mainstem Naches and Yakima rivers, were identified as a significant limiting factor for the productivity of aquatic habitat in the subbasin. Actions to reverse this habitat loss are to relocate infrastructure (where possible) to allow natural processes to operate and reconnection of side channels by removal of obstructions. Artificial channels should be constructed where current conditions allow.
>
> Riparian zone (the area adjacent to the river which is influenced by the river itself) problems include lack of shade and large woody debris (LWD), bank instability, and the inability of black cottonwood to reproduce under existing flow regimes. The Subbasin Plan calls for restoration of riparian zones and reduction of chronic bed instability through revegetation, introduction of LWD, protection of riparian areas by purchase or easement, improved riparian area management, and restoration of natural flow regime.
>
> Channel confinement by levees, bridges and roads leads to altered floodplain functions and habitat loss. Multi-jurisdictional floodplain restoration and flood hazard reduction projects are necessary to reconnect floodplain side channels and to restore "unmanaged" or natural floodplain habitats.
>
> The presence of reservoirs in the system has reduced peak flows and may have either increased or decreased energy available for sediment transport. The effect the natural glacial lakes had on flow and other attributes such as temperature is not well understood, and therefore we do not have accurate guides to pre-1850s conditions. Characterizations of the pre-1850s flow regimes are important for evaluation of how system function has changed, and how those changes have affected fish and wildlife populations. An objective is to find or create a new model to simulate the physical, chemical, thermal effects of lakes in the pre-1850s environment so that we can better understand the difference between current conditions and conditions that existed before the lakes were dammed.
>
> Altered flows of water, sediment and water temperature changes (mostly summer increases) severely reduce the quantity and quality of aquatic habitats. The Plan contains objectives to replicate basin wide temperature variability by returning the timing and quantity of river flow to a more natural state. This restoration of a normative flow regime can be accomplished by the purchase, transfer, or lease of water rights; changes in flow management, conservation; and increased natural and artificial storage.

There is a high predation risk for juvenile salmonids in the Subbasin. To reduce the effect of elevated predation it is recommended to increase the number of spawning fish in the Yakima Subbasin, reduce populations of smallmouth bass in the lower Yakima River, improve cover and off channel habitats, and implement further control on predator populations in mainstem reservoirs.

Passage barriers and unscreened diversions and pumps have significant negative effects on salmon productivity. Related objectives of the plan are to improve passage and design of irrigation diversions to allow fish and sediment to pass through diversion points. The strategies recommended are to reduce or eliminate operational spill to tributaries during migration periods, increase irrigation efficiency, relocate or consolidate existing structures, replace or rebuild existing diversion dams, move or consolidate diversions, and provide pump screens to landowners.

Kachess, Kecheelus, Cle Elum and Bumping Dams block passage for sockeye and bull trout and Tieton Dam blocks passage for bull trout. A high priority objective is to restore passage to at least one dam by 2007, possibly through various fish passage options such as ladders, trap and haul, and modification of outlets for downstream passage.

Steelhead populations have been reduced from pre-1850s abundance levels because of habitat loss and alteration and changes in the biotic community. These factors have reduced habitat suitability, which in turn has reduced productivity, abundance, and spatial distribution of the species. To increase the abundance, productivity, and genetic diversity (and therefore stability), of the species it is recommended to increase distribution of healthy steelhead populations in areas that are currently suitable but inaccessible, such as Cowiche Creek and possibly Taneum Creek, and improve habitat in those areas currently accessible but of low quality. Steelhead population should be monitored for abundance, distribution, and genetic diversity.

Steelhead abundance and productivity have also been reduced due to a severe reduction in repeat spawning. To increase the number of repeat spawning steelhead in Yakima Subbasin, collect spawned out steelhead kelts and 1) recondition these kelts for release in the subbasin for natural spawning, and/or 2) transport kelts below the Columbia River dams to increase repeat spawning.

At least three specific (NPCC/BPA-sponsored) projects are ongoing in the Yakima Basin which are aimed at addressing limiting factors in the Basin (with some sub-components of these projects aimed specifically at enhancing steelhead habitats in the Basin):
199603501 – Yakama Reservation Watersheds Project
199705100 – Yakima Basin Side Channels
199206200 – Yakama Nation – Riparian/Wetlands Restoration

3.5) Ecological interactions. [Please review Addendum A before completing this section. If it is necessary to complete Addendum A, then limit this section to NMFS jurisdictional species. Otherwise complete this section as is.]
Describe salmonid and non-salmonid fishes or other species that could (1) negatively impact program; (2) be negatively impacted by program; (3) positively impact program;

and (4) be positively impacted by program. Give most attention to interactions between listed and "candidate" salmonids and program fish.

No negative ecological interactions are anticipated as a result of this project. Ecological interactions will be assessed indirectly via other work being conducted pursuant to YKFP activities in the Yakima Basin.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

For integrated programs, identify any differences between hatchery water and source, and "natal" water used by the naturally spawning population. Also, describe any methods applied in the hatchery that affect water temperature regimes or quality. Include information on water withdrawal permits, National Pollutant Discharge Elimination System (NPDES) permits, and compliance with NMFS screening criteria.

Prosser Hatchery operates under NPDES permit WAG135017.

Prosser Hatchery has the ability to use 30 cfs Yakima River water, and has three wells that contribute 3200 gallons per minute. The river water supply is used from March through July for juvenile fish rearing and September through January for adult broodstock. The surface water is gravity flow from Chandler Canal behind the fish screens. One well is used from September through April to incubate eggs. The well is capable of pumping 800 gallons per minute. The other two wells are used all year to rear juvenile salmon and adult steelhead kelts. Each well is able to pump 1,200 gallons per minute. The well water is constant 57 degrees F, and the surface water temperature changes with the seasons. The water used meets or exceeds the recommended Integrated Hatchery Operations Team (IHOT) guidelines.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

(e.g. "Hatchery intake screens conform with NMFS screening guidelines to minimize the risk of entrainment of juvenile listed fish.").

The production from this facility falls below the minimum production requirement for an NPDES permit, but the facility operates in compliance with state or federal regulations for discharge. Chandler Canal is screened to prevent juvenile salmonids from entering the canal and the hatchery intake. See also 4.1.

SECTION 5. FACILITIES

Provide descriptions of the hatchery facilities that are to be included in this plan (see "Guidelines for Providing Responses" Item E), including dimensions of trapping, holding incubation, and rearing facilities. Indicate the fish life stage held or reared in each. Also describe any instance where operation of the hatchery facilities, or new construction, results in destruction or adverse modification of critical habitat designated for listed salmonid species.

5.1) Broodstock collection facilities (or methods).

Kelt reconditioning research is conducted at the Prosser Fish Hatchery in Prosser, Washington. Prosser Hatchery is located on the Yakima River at river kilometer, (rkm) 75.6, downstream from Prosser Dam, and adjacent to the Chandler Juvenile Monitoring Facility (CJMF). The Yakima River is approximately 344 km in length and enters the Columbia River at rkm 539. Summer steelhead populations primarily spawn upstream from Prosser Dam in Satus Creek, Toppenish Creek, Naches River, and other tributaries of the Yakima River (TRP 1995). The Yakama Nation (YN) operates Prosser Hatchery, with a primary function of rearing, acclimation, and release of fall chinook salmon *O. tshawytscha*. The facility is also used for coho salmon *O. kisutch* rearing prior to acclimation and release in the upper Yakima River Basin.

After spawning naturally in tributaries of the Yakima River, a proportion of the steelhead kelts that encounter the Prosser Dam facility during emigration are diverted into an irrigation channel that directly connects to the Chandler Juvenile Monitoring Facility. The CJMF diverts migratory fishes away from the irrigation canal to reduce mortality associated with agriculture. Once diverted into the CJMF, emigrating kelts can be manually collected from a fish separation device (a device which allows smaller juvenile salmonids to "fall through" for processing in the juvenile facility while larger fish can be dipnetted off the separator for processing or release back to the river). Yakama Nation (YN) staff monitor the Chandler bypass separator 24 hours a day from mid-March mid-July annually. All adult steelhead arriving at the CJMF separator, regardless of maturation status (kelt or pre-spawn), are dipnetted off the separator and placed into a water-lubricated PVC pipe slide that was directly connected to a temporary holding tank 20' (l) x 6' (w) x 4'(h) containing oxygenated well water (57F or 13.8C).

Out-migrating steelhead kelt specimens are transferred with a dipnet from the temporary holding tank to a nearby 190-L sampling tank containing fresh river water, and anesthetized in a buffered solution of tricaine methanesulfonate (MS-222) at 60 ppm.

All specimens visually determined to be prespawn individuals are immediately returned to the Yakima River. Following kelt identification, we collect data on weight (collected in pounds but converted to kg for reporting purposes), condition (good- lack of any wounds or descaling, fair- lack of any major wounds and/or descaling, poor- major wounds and/or descaling), coloration (bright, medium, dark), and presence or absence of physical anomalies (e.g., head burn, eye damage). Steelhead kelts in poor condition and dark in color are released back in the river, all others are retained for reconditioning. Passive Integrated Transponder (PIT) tags (if not already present) are then implanted in the fish's abdominal cavity for individual fish identification during reconditioning.

Upon admission of kelts to the reconditioning program at Prosser Hatchery, all kelts are retained in one of four 20'(diameter) x 4'(h) circular tanks. Individual tank carrying capacity was set at a maximum of 200 fish based on the aquaculture experience of YN hatchery staff, and the project goal of maximizing kelt survival in captivity. Formalin was administered five times weekly at 1:6,000 for 1 hour in all reconditioning tanks to prevent fungal outbreaks.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

See 5.1 Once kelts are reconditioned, fish are transported in either a 400 gallon tank placed on the back of a pick up truck, or a three compartment 1500 gallon tank on a flatbed for transportation to release site(s): either below Bonneville Dam, Wallula Gap, or Mabton. Both trucks are designed to safely haul fish equipped with oxygen and aeration system.

5.3) Broodstock holding and spawning facilities.

See 5.1.

5.4) Incubation facilities.

Not applicable.

5.5) Rearing facilities.

See 5.1.

5.6) Acclimation/release facilities.

See 1.11.1 and 5.1.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

Given the low natural iteroparity rates observed in the literature, natural mortality rates for steelhead kelts are assumed to be very high. Mortalities of kelts held for reconditioning are generally assumed to be related to the natural condition of these post-spawned steelhead.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.
(e.g. "The hatchery will be staffed full-time, and equipped with a low-water alarm system to help prevent catastrophic fish loss resulting from water system failure.").

The facility is sited so as to minimize the risk of catastrophic fish loss from flooding. At Prosser Hatchery, staff members are on-site 24/7 during critical phases of the program, and the facility is enclosed in chain linked fence, and periodic patrols of law enforcement (local and tribal) maintain a security envelope of facility.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

List all historical sources of broodstock for the program. Be specific (e.g., natural spawners from Bear Creek, fish returning to the Loon Creek Hatchery trap, etc.).

Steelhead kelts are collected at Prosser Dam and therefore may be one of several populations residing in the Yakima Basin (e.g., Satus, Toppenish, Ahtanum, upper Yakima, Naches, etc.). Releasing reconditioned kelts in the vicinity of Prosser in late October to early December allows the fish to decide for themselves where in the Basin they will migrate to. See also 1.11.1 and 5.1.

6.2) Supporting information.

6.2.1) History.

Provide a brief narrative history of the broodstock sources. For listed natural populations, specify its status relative to critical and viable population thresholds (use section 2.2.2 if appropriate). For existing hatchery stocks, include information on how and when they were founded, sources of broodstock since founding, and any purposeful or inadvertent selection applied that changed characteristics of the founding broodstock.

Steelhead are no longer stocked in the Yakima subbasin, but over the years steelhead from several sources were introduced, most notably the Skamania stock, which originated from the Washougal River. The co-managers agreed in the mid-1980s that a new approach was needed for Yakima steelhead enhancement, and entered into an agreement to produce fish from wild Yakima broodstock. In 1985 the YN and WDFW started a hatchery production program with wild Yakima stocks. Broodstock were trapped by YN at Prosser Dam and transported to the WDFW Yakima hatchery for spawning, egg incubation and rearing. Final rearing was at the Nelson Springs raceway by volunteers from the Yakima Chapter, Northwest Steelhead and Salmon Council of Trout Unlimited. The co-mangers agreed that wild broodstock collection should discontinue after 1989 because of a low smolt-to-adult survival rate, and because there was no way to differentiate steelhead populations at Prosser Dam. From 1990 through 1992 a small number of adult Yakima subbasin steelhead were trapped and their progeny reared by Yakima-Klickitat Fisheries Project (YKFP) researchers to evaluate species interactions in the upper Yakima River. Hatchery-produced steelhead smolts were last released in the Yakima subbasin in 1993. Since the last of these fish likely returned by 1998, any steelhead returning to the Yakima Basin with fin clips since that time are designated “hatchery” and are most probably out-of-basin strays. There have been no hatchery bull trout programs in the Yakima subbasin.

6.2.2) Annual size.

Provide estimates of the proportion of the natural population that will be collected for broodstock. Specify number of each sex, or total number and sex ratio, if known. For broodstocks originating from natural populations, explain how their use will affect their population status relative to critical and viable thresholds.

See 2.2.2 for annual steelhead returns (upstream migration) to the Yakima Basin. See 1.11.1 for annual kelt (downstream migration) collections at Chandler.

6.2.3) Past and proposed level of natural fish in broodstock.

If using an existing hatchery stock, include specific information on how many natural fish

were incorporated into the broodstock annually.

All fish used in this program are wild/natural fish.

6.2.4) Genetic or ecological differences.
Describe any known genotypic, phenotypic, or behavioral differences between current or proposed hatchery stocks and natural stocks in the target area.

Yakima River summer steelhead spawn in tributaries of the Yakima Basin including: Satus, Toppenish, and Ahtanum Creeks, and the Naches and Upper Yakima River systems, and there is some evidence of genetic uniqueness among these subpopulations (Small et al. 2006). The Interior Columbia Technical Recovery Team designated four populations within the Yakima River major population group: Satus, Toppenish, Naches River, and Yakima River upper mainstem (ICTRT 2003 and 2005).

6.2.5) Reasons for choosing.
Describe any special traits or characteristics for which broodstock was selected.

See 6.1 and other earlier responses.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.
(e.g. "*The risk of among population genetic diversity loss will be reduced by selecting the indigenous chinook salmon population for use as broodstock in the supplementation program*.").

See earlier responses and Kelt Reconditioning: A Research Project to Enhance Iteroparity in Columbia Basin Steelhead (*Oncorhynchus mykiss*), BPA Project Annual reports, DOE #00004185[-1 through -4], available on BPA website at http://www.bpa.gov/efw/pub/searchpublication.aspx

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adult (post-spawned) steelhead kelts.

7.2) Collection or sampling design.
Include information on the location, time, and method of capture (e.g. weir trap, beach seine, etc.) Describe capture efficiency and measures to reduce sources of bias that could lead to a non-representative sample of the desired broodstock source.

See 1.11.1 and 5.1.

7.3) Identity.

Describe method for identifying (a) target population if more than one population may be present; and (b) hatchery origin fish from naturally spawned fish.

Steelhead kelts are collected at Prosser Dam and therefore may be one of several populations residing in the Yakima Basin (e.g., Satus, Toppenish, Ahtanum, upper Yakima, Naches, etc.). Releasing reconditioned kelts in the vicinity of Prosser in late October to early December allows the fish to decide for themselves where in the Basin they will migrate to. See also 1.11.1 and 5.1.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

There is no program goal in terms of the number of kelts to be collected for this program. Rather, kelts which are entrained into the Chandler irrigation diversion canal on their downstream migration are considered "volunteers" to the program and handled as described in 1.11.1.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

See 1.11.1.

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.
Describe procedures for remaining within programmed broodstock collection or allowable upstream hatchery fish escapement levels, including culling.

Not applicable. As described earlier (6.2.1), very few marked (hatchery) fish return to the Yakima Basin any more, and those that do are assumed to be strays from out-of-basin that escape to the natural spawning grounds.

7.6) Fish transportation and holding methods.
Describe procedures for the transportation (if necessary) and holding of fish, especially if captured unripe or as juveniles. Include length of time in transit and care before and during transit and holding, including application of anesthetics, salves, and antibiotics.

See 5.1.

7.7) Describe fish health maintenance and sanitation procedures applied.

Integrated Hatchery Operations Team (IHOT 1995), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed at the Prosser Hatchery for all hatchery activities. The Yakama Nation maintains subcontracts with the U.S. Fish and Wildlife Service for fish health screening and consultation.

7.8) Disposition of carcasses.

Include information for spawned and unspawned carcasses, sale or other disposal methods, and use for stream reseeding.

In the past kelt mortalities were bio-sampled (sex, length, weight, etc.), PIT tags were removed, and carcasses were placed in the river each day. Beginning in 2005, kelt mortalities are being stored in the freezer to take bio samples later. The PIT tags will be removed and the carcasses will be heated to remove any chance of virus and they will be distributed in the tributaries. All surviving kelts (including immatures) are released at the end of each year's long-term reconditioning program.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.
(e.g. "The risk of fish disease amplification will be minimized by following Co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines").

See earlier responses.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.
Specify how spawners are chosen (e.g. randomly over whole run, randomly from ripe fish on a certain day, selectively chosen, or prioritized based on hatchery or natural origin).

See 1.11.1. Steelhead kelts reconditioned in this program are taken from the entire downstream kelt migration population. Kelts are randomly entered into the various reconditioning treatments. Kelts released below Bonneville Dam in the "no term" and "short term" programs re-enter the wild/natural population and surviving and returning fish from these programs obviously choose their own spawning mates, timing and location. Kelts from the "long term" program are released in the vicinity of Prosser Dam in late October to early December coincident with the peak of upstream migrating "fresh" fish returning from the ocean. Thus, these fish are also allowed to choose their own spawning mates, timing and location.

8.2) Males.
Specify expected use of backup males, precocious males (jacks), and repeat spawners.

Not applicable.

8.3) Fertilization.
Describe spawning protocols applied, including the fertilization scheme used (such as equal sex ratios and 1:1 individual matings; equal sex ratios and pooled gametes; or factorial matings). Explain any fish health and sanitation procedures used for disease prevention.

Not applicable.

8.4) Cryopreserved gametes.

If used, describe number of donors, year of collection, number of times donors were used in the past, and expected and observed viability.

In 2005, the milt from one "fresh" male destined for the Satus Creek drainage was cryo-preserved and stored at the University of Idaho. The milt from this male was tested and had 83% observed viability (compared to 90% expected). However, the female that was used in the same Gamete and Progeny study perished and Gamete and Progeny analysis was terminated due to concerns of mining the wild population from Satus Creek by both CRITFC and YN staff. The possibility of utilizing cryo-preservation in 2008-09 using wild kelts or first time spawning males was reestablished in planning meetings late in 2007 to assist in evaluation of the viability of female kelt gametes.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

(*e.g. "A factorial mating scheme will be applied to reduce the risk of loss of within population genetic diversity for the small chum salmon population that is the subject of this supplementation program"*.).

See 8.1.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

Provide data for the most recent twelve years (1988-99), or for years dependable data are available.

Not applicable.

9.1.2) Cause for, and disposition of surplus egg takes.

Describe circumstances where extra eggs may be taken (e.g. as a safeguard against potential incubation losses), and the disposition of surplus fish safely carried through to the eyed eggs or fry stage to prevent exceeding of programmed levels.

Not applicable.

9.1.3) Loading densities applied during incubation.

Provide egg size data, standard incubator flows, standard loading per Heath tray (or other incubation density parameters).

Upon admission of kelts to the reconditioning program at Prosser Hatchery, all kelts were retained in one of four 20'(diameter) x 4'(h) circular tanks. Individual tank carrying capacity was set at a maximum of 200 fish based on the aquaculture experience of YN hatchery staff, and the project goal of maximizing kelt survival in captivity. Formalin was administered five times weekly at 1:6,000 for 1 hour in all reconditioning tanks to prevent fungal outbreaks.

9.1.4) Incubation conditions.
Describe monitoring methods, temperature regimes, minimum dissolved oxygen criteria (influent/effluent), and silt management procedures (if applicable), and any other parameters monitored.

Not applicable.

9.1.5) Ponding.
Describe degree of button up, cumulative temperature units, and mean length and weight (and distribution around the mean) at ponding. State dates of ponding, and whether swim up and ponding are volitional or forced.

Not applicable.

9.1.6) Fish health maintenance and monitoring.
Describe fungus control methods, disease monitoring and treatment procedures, incidence of yolk-sac malformation, and egg mortality removal methods.

Integrated Hatchery Operations Team (IHOT 1995), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed at the Prosser Hatchery for all hatchery activities. The Yakama Nation maintains subcontracts with the U.S. Fish and Wildlife Service for fish health screening and consultation.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.
(*e.g. "Eggs will be incubated using well water only to minimize the risk of catastrophic loss due to siltation.")*

Not applicable.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Survival to release for short-term reconditioning ranged from 69-93% and averaged 79%. Post-release survival and return of short-term kelts ranged from 1-9% with returning "ocean-reared" kelts showing an average weight gain of 46%. Survival to release for long-term reconditioning ranged from 19-62% and averaged 36% with captive-reared kelts showing an average weight

gain of 38%.

9.2.2) Density and loading criteria (goals and actual levels).

Include density targets (lbs fish/gpm, lbs fish/ft3 rearing volume, etc).

See Section 1.11.1, 5.1, and 9.1.3.

9.2.3) Fish rearing conditions

(Describe monitoring methods, temperature regimes, minimum dissolved oxygen, carbon dioxide, total gas pressure criteria (influent/effluent if available), and standard pond management procedures applied to rear fish).

See Section 1.11.1, 5.1, and 9.1.3.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Based on visual observations, the overwhelming majority of kelts captured were female (93.5%). The majority of kelts collected for reconditioning during 2001-2005 were considered in good (43.0%) or fair (56.5%) overall condition. Approximately 51% of kelts classified in good and 40% of kelts in fair condition at collection survived to release. Fewer than 7 kelts per year classified in poor condition at collection were even retained, none of which survived to release. Similarly, the majority of kelts collected for reconditioning during 2001-2005 were considered bright (33.5%) or intermediate (62.6%) in color. Approximately 50% of kelts classified as bright and 42% of kelts intermediate in color at collection survived to release. Almost 140 fish (3.9%) were classified as dark in color at collection, of which 56 (41%) survived to release.

Short-term kelts were held for an average of 44 days before being trucked below Bonneville Dam for release, while long-term kelts were reconditioned for an average of 227 days prior to release. The average weight of surviving kelts captured and held for short-term reconditioning was 2.0 kg. The average weight at release of short-term reconditioned kelts was 1.9 kg representing a mean weight loss during short-term reconditioning of 5.9%. The average weight of surviving kelts captured and held for long-term reconditioning was 2.0 kg. The average weight at release of long-term reconditioned kelts was 2.7 kg representing a mean weight gain during long-term reconditioning of 37.7%. The vast majority (70-90%) of short-term program fish experienced a zero to 20% weight loss, while a substantial proportion (> 45%) of long-term program fish experienced a weight gain of 30% or more during the reconditioning process (Table 3).

Table 9.2.4.1. Holding time and weight change statistics for surviving short- and long-term kelts reconditioned at Prosser hatchery, 2001-2005.

	Days Held	Capture Weight	Release Weight	Percent Weight Change
Short-Term (n = 667)				
Mean	43.5	2.00	1.87	-5.9%

Minimum	21.0	0.90	0.90	-46.8%
Maximum	78.0	4.19	4.12	120.9%
Median	41.0	1.85	1.73	-6.4%
Long-Term (n = 883)				
Mean	227.3	1.97	2.65	37.7%
Minimum	162.0	0.58	0.77	-47.6%
Maximum	294.0	4.48	7.70	210.9%
Median	230.0	1.80	2.48	31.6%

Table 9.2.4.2. Percent of fish by weight change distribution category (percentage change from capture weight to release weight) for surviving short- and long-term kelts reconditioned at Prosser hatchery, 2001-2005.

Percent	Short-Term Releases				Long-Term Releases				
Wt. Chg.	2002	2003	2004	2005	2001	2002	2003	2004	2005
<= -20%	4.0	3.2	0.0	21.8	2.1	7.1	4.0	3.7	4.9
>-20% to 0	72.0	93.5	81.8	69.0	2.1	27.9	12.4	13.8	14.6
>0 to 30%	21.9	2.7	15.2	9.2	11.6	18.6	35.2	38.1	28.0
>30 to 70%	1.5	0.5	3.0	0.0	31.6	28.6	31.5	30.6	29.3
>70 to 100%	0.3	0.0	0.0	0.0	27.4	12.9	10.7	10.1	18.3
>100%	0.3	0.0	0.0	0.0	25.3	5.0	6.0	3.7	4.9

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

Contrast fall and spring growth rates for yearling smolt programs. If available, indicate hepatosomatic index (liver weight/body weight) and body moisture content as an estimate of body fat concentration data collected during rearing.

See 9.2.4.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

The use of krill as a starter diet was associated with higher overall survival rates while the use of maintenance feed pellets appeared to increase rates of maturation. Kelts that received krill as a starter diet had an average survival rate of 45% compared to only 21% survival for kelts not exposed to krill (Table 9.2.6.1). In the tank that received a diet of just krill, only 25% of surviving fish were classified as mature compared to an average of almost 60% for the three tanks receiving a maintenance diet of pellets. Mean percentage weight gains were highest for fish in tanks which received both a starter diet of krill and a maintenance diet of pellets, while fish which received only krill had the smallest mean weight gain. We used these results to establish a feeding regime for subsequent years. Short-term reconditioned kelts were fed a diet of krill for the duration (3-11 weeks) of their captivity. Long-term reconditioned fish were fed a combination of frozen krill for the first 2.5 months and unaltered Moore-Clarke pellets thereafter.

Table 9.2.6.1. Survival, maturity, and weight (kg) statistics for four experimental feed groups of

steelhead kelts captured and reconditioned at the Prosser Hatchery, March 12 – November 15, 2001.

Feed Description	Tank	Collection N	Survival N	Wt. at Collection Mean	Wt. at Collection Std Dev	Reconditioned Wt. Mean	Reconditioned Wt. Std Dev	Survival Percent	Maturity Percent
Early[a] krill + pellets	C1	130	58	1.99	0.49	3.15	0.99	44.6%	63.8%
Specialized[b] pellets	C2	132	28	1.87	0.51	2.45	0.78	21.2%	67.9%
Late[c] krill + pellets	C3	105	55	1.93	0.65	3.23	1.25	52.4%	47.3%
Krill only	C4	102	40	2.01	0.69	2.30	0.89	39.2%	25.0%

[a] Fish were collected from 12 March to 20 April, 2001.
[b] Fish received only variations of a Moore-Clark Trout Brood Diet, a Moore-Clark Pedigree Salmon Brood Diet, and a wet fish/krill slurry modified from a North Attleboro National Fish Hatchery (NFH) diet all fed in pellet form. The Moore-Clark Trout Brood Diet was modified so that the pellets would float and pellets were top-coated with a krill/squid mixture.
[c] Fish were collected from 23 April to 5 June, 2001.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Integrated Hatchery Operations Team (IHOT 1995), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed at the Prosser Hatchery for all hatchery activities. The Yakama Nation maintains subcontracts with the U.S. Fish and Wildlife Service for fish health screening and consultation.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Not applicable.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

See 1.11.1, 5.1, and 8.1.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation. (*e.g. "Fish will be reared to sub-yearling smolt size to mimic the natural fish emigration strategy and to minimize the risk of domestication effects that may be imparted through rearing to yearling size.")*

See 8.1.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program. *Specify any management goals (e.g. number, size or age at release, population uniformity, residualization controls) that the hatchery is operating under for the hatchery stock in the appropriate sections below.*

10.1) Proposed fish release levels. *(Use standardized life stage definitions by species presented in **Attachment 2**. "Location" is watershed planted (e.g. "Elwha River").)*

Age Class	Maximum Number	Size (fpp)	Release Date	Location

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Eggs	Not applicable – see 1.11.1			
Unfed Fry	Not applicable – see 1.11.1			
Fry	Not applicable – see 1.11.1			
Fingerling	Not applicable – see 1.11.1			
Yearling	Not applicable – see 1.11.1			

10.2) Specific location(s) of proposed release(s).
Stream, river, or watercourse: *(include name and watershed code (e.g. WRIA) number)*
Release point: (*river kilometer location, or latitude/longitude*)
Major watershed: (e.g. "Skagit River")
Basin or Region: *(e.g. "Puget Sound")*

All no-term and short-term reconditioned kelts were transported and released at the Hamilton Island Boat Ramp, below Bonneville Dam (approximate Columbia River Rkm 234) on the lower Columbia River. All long-term reconditioned kelts were transported and released at the Mabton Boat Ramp (Yakima Rkm 96.3) on the Yakima River (WRIA 37).

10.3) Actual numbers and sizes of fish released by age class through the program.
For existing programs, provide fish release number and size data for the past three fish generations, or approximately the past 12 years, if available. Use standardized life stage definitions by species presented in ***Attachment 2****. Cite the data source for this information.*

See 1.11.1 and 5.1.

10.4) Actual dates of release and description of release protocols.
Provide the recent five year release date ranges by life stage produced (mo/day/yr). Also indicate the rationale for choosing release dates, how fish are released (volitionally, forced, volitionally then forced) and any culling procedures applied for non-migrants.

Fish are trucked to the release locations described in 10.2 and released directly to the river. Release dates for the various treatments were as follows:

	2001	2002	2003	2004	2005	2006	2007
Yakima Direct					12Apr – 5May	29Mar – May	12Apr – 1May
No Term				3May	22Apr, 13May	21Apr, 12May	20Apr, 25May
Short Term		20May	4Jun	3May, 11May	13May, 30Jun	12May, 23Jun	25May

Long Term	15Nov	10Dec	8Dec	30Nov	12Dec	17Oct	11Oct

We are evaluating whether nutrition factors could lead to reduced egg development or whether missed environmental cues may lead to hardened or reabsorbed eggs in long-term reconditioned female kelts. A critical period for initiation of maturation in Pacific salmonids is the autumn one year prior to maturation, but the period may extend into late winter and early spring (Flagg and Nash 1999). As the threshold of growth or body fat levels for initiating and maintaining sexual maturation are not yet known, Flagg and Nash (1999) recommended an artificial culture strategy that mimics the patterns of growth and body fat levels of wild fish and suggested feeding high-protein, low-fat diets and reducing the feeding ration over the winter period. Since initiation of maturation in long-term reconditioned kelts may begin in the late summer or early fall, beginning in 2006 we stopped feeding and released long-term reconditioned kelts to the wild 1-2 months earlier than in prior years. This could lead to a more natural repeat spawning cycle with greater potential reproductive success for these fish. See also 1.11.1 and 5.1.

10.5) Fish transportation procedures, if applicable.
Describe fish transportation procedures for off-station release. Include length of time in transit, fish loading densities, and temperature control and oxygenation methods.

The Prosser Hatchery has two transportation trucks which are used to transport reconditioned kelts to release locations described in 10.2.

Equipment Type	Capacity (gallons)	Supplemental Oxygen (y/n)	Temperature Control (y/n)	Normal Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Adult Transfer Tanker Truck	700	Y	N	5	Light dose MS	nya
Juvenile Transfer Tanker Truck	2500	Y	N	150	nya	nya

10.6) Acclimation procedures (*methods applied and length of time***).**

Not applicable.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

If not already present, passive integrated transponder (PIT) tags were implanted in the fish's pelvic girdle (Prentice et al. 1990) upon initial collection and sampling for individual fish identification during reconditioning and post-release tracking.

Radio telemetry was used to determine if reconditioned kelts released in the Yakima River would migrate to spawning areas and construct redds. Prior to release, a subsample of fish from the long-term reconditioning program (ranged from 12-62 fish annually over the 5-year study; 16-56% of fish released) were instrumented with Lotek radio tags (MBFT series, Lotek Engineering Inc., Newmarket, Ontario, Canada). Each tag had unique bandwidth pulses that provided individual identification codes. The tags were programmed to last for at least 155 days;

however, some tags were used and may have had a lesser life. Radio tags were implanted using the gastric insertion technique (Adams et al.1998). Radio-tagged fish were released at the Mabton boat launch (Rkm 93) upstream from Prosser Hatchery. Fish were tracked using fixed and mobile tracking receivers (Lotek Inc.). Fixed receiver sites were located at Prosser Dam (Rkm 76), Slagg Ranch (Rkm 106), Sunnyside Dam (Rkm 167), Roza Dam (Rkm 206), Naches River (Cowiche Dam, Naches Rkm 6), Toppenish Creek (Rkm 71), and Simcoe Creek (Rkm 13). Mobile tracking was done by road and by raft and allowed for actual pinpoint locations and visual observations of steelhead kelt redd construction and spawning. Aerial flights were also conducted in all basins and proved to be essential in locating fish not detected by other methods. See Hatch et al. 2002, 2003, 2004a, and 2004b and Branstetter et al. 2006a and 2006b for details and results from these studies.

In addition, a total of 284 no-term release kelts and short-term reconditioned kelts received hydro-acoustic tags to assess return survival, travel time, and migratory behavior below Bonneville Dam from 2004 through 2007 (see Hatch et al. 2004b and Branstetter et al. 2006a and 2006b).

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

In the past kelt mortalities were bio-sampled (sex, length, weight, etc.), PIT tags were removed, and carcasses were placed in the river each day. Since 2005, kelt mortalities have been stored in the freezer with biological samples taken later. The PIT tags were removed and the carcasses were heated to remove any chance of virus and they were distributed in the tributaries. All surviving kelts (including immatures) are released at the end of each year's long-term reconditioning program (see 1.11.1 and 5.1).

10.9) Fish health certification procedures applied pre-release.

Integrated Hatchery Operations Team (IHOT 1995), Pacific Northwest Fish Health Protection committee (PNFHPC), state or tribal guidelines are followed at the Prosser Hatchery for all hatchery activities. The Yakama Nation maintains subcontracts with the U.S. Fish and Wildlife Service for fish health screening and consultation.

10.10) Emergency release procedures in response to flooding or water system failure.

Fish would be dipnetted from the circular rearing tanks, placed in tanks, and transported by truck or "4-wheeler" tractors to the Yakima River in the vicinity of the hatchery and released directly to the river.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

(*e.g. "All yearling coho salmon will be released in early June in the lower mainstem of the Green River to minimize the likelihood for interaction, and adverse ecological effects, to listed natural chinook salmon juveniles, which rear in up-river areas and migrate seaward as sub-yearling smolts predominately in May").*

See earlier responses.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

This section describes how "Performance Indicators" listed in Section 1.10 will be monitored. Results of "Performance Indicator" monitoring will be evaluated annually and used to adaptively manage the hatchery program, as needed, to meet "Performance Standards".

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

To date, monitoring and evaluation has consisted of measuring growth and survival parameters as well as tracking released fish using PIT and radio tags as described in earlier sections of this HGMP. Monitoring and evaluation methods and results to date are more fully described in Bosch et al. (2007 submitted) and in BPA Project Annual reports, DOE #00004185[-1 through -4], available on the BPA website at http://www.bpa.gov/efw/pub/searchpublication.aspx.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

BPA Fish & Wildlife Program funding is committed for this Project and its associated M&E activities through at least fiscal year 2009.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

(*e.g. "The Wenatchee River smolt trap will be continuously monitored, and checked every eight hours, to minimize the duration of holding and risk of harm to listed spring chinook and steelhead that may be incidentally captured during the sockeye smolt emigration period.)"*

Please refer to the following appendices for information requested in this section:

Appendix A. 2004 Biological Assessment.
Appendix B. 2005 Permit Application
Appendix C. Coverage for Roza adult trapping operations.
Appendix D. Adult and Juvenile Take Tables for Mid-Columbia Steelhead Kelt Reconditioning Projects.
Appendix E. NOAA 2006 Determination Letter.

Contacts: Doug Hatch, CRITFC, 503-238-0667; Mark Johnston or Todd Newsome at 509-865-5121.

SECTION 12. RESEARCH

Provide the following information for any research programs conducted in ***direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish****. If applicable, correlate with research indicated as needed in any ESU hatchery plan approved by the co-managers and NMFS. Attach a copy of any formal research proposal addressing activities covered in this section. Include estimated take levels for the research program with take levels provided for the associated hatchery program in* ***Table 1****.*

12.1) Objective or purpose.

Indicate why the research is needed, its benefit or effect on listed natural fish populations, and broad significance of the proposed project.

Populations of wild steelhead *Oncorhynchus mykiss* in the Columbia River Basin have declined dramatically from historical levels (Nehlsen et al. 1991; NRC 1996; Williams et al. 1999) and are now listed under the Endangered Species Act. Average abundance of wild steelhead (summer run; there are no winter run steelhead) in the Yakima River Subbasin over the last two decades is only 2% of pre-1890 abundance levels (Howell et al. 1985). Causes of these declines include a host of environmental and human-induced factors (NRC 1996; Williams et al. 1999). Some measures to restore habitats in the Yakima Subbasin have been identified and are being implemented (YSFWPB 2004). Because habitat restoration is inherently long-term in nature, efforts to sustain or increase abundance in the near-term are also being pursued. However, the substantial biological and genetic diversity inherent in Columbia Basin steelhead (Busby et al. 1996; NOAA 2003) make it difficult to design a cost-effective enhancement program using traditional fish culture practices that preserves this rich diversity.

Columbia River steelhead are iteroparous (able to spawn multiple times). Hockersmith et al. (1995) documented average incidence of natural iteroparity of about 1.6% for Yakima River steelhead from 1989-1993. However, major dams affect their survival as post-spawned steelhead (kelts) attempt to migrate downstream for a return trip to the ocean (Wertheimer and Evans 2005). Therefore, a novel approach to effectively increase abundance and productivity of steelhead populations is to capitalize on their inherent iteroparity by artificially reconditioning kelts. Reconditioning is the practice of capturing, holding, and feeding post-spawned salmon or steelhead in an artificial rearing environment for the purpose of regeneration of gonads for repeat spawning. This concept has been applied to Atlantic salmon *Salmo salar* populations in the U.S. and Canada over the last three decades by maintaining fish in freshwater (Hill 1978; Johnston et al. 1987) and seawater (Ducharme 1972; Gray et al. 1987; Pepper and Parsons 1987). Reconditioning of Atlantic salmon has also been attempted in Europe (Dumas et al. 1991) where natural rates of iteroparity are also low (1%). Artificial reconditioning of sea-run brown trout *Salmo trutta L.* has also been undertaken with some success (Poole et al. 1994; Poole et al. 2002). We could only find one published study of artificially reconditioning steelhead (Wingfield 1976).

The Yakama Nation, in cooperation with the Columbia River Inter-Tribal Fish Commission, is managing a reconditioning project aimed at increasing the survival and potential repeat spawning rates of Yakima River steelhead kelts. The questions we addressed in the initial phase of this project, conducted from 2001 through 2005, were:

1. What feed types result in growth and re-maturation of gonads when rearing kelt steelhead in a captive environment?
2. Do captive kelts grow and survive?
3. Is abundance of potential repeat spawners better enhanced by a short- or long-term reconditioning program?
4. Do reconditioned kelts migrate to the spawning grounds?

To address these questions, wild steelhead kelts from the Yakima River were captured during their emigration past Prosser Dam and through the Chandler irrigation canal (see 1.11.1). These kelts were held in circular tanks at Prosser Hatchery. The short-term program was conducted from 2002 to 2005 while the long-term program was from 2001 to 2005. Short-term program fish were held and fed for three to eleven weeks, then trucked around mainstem irrigation and hydroelectric facilities and released below Bonneville Dam to continue the reconditioning process on their own. Long-term program kelts were reconditioned for about 6-10 months at the Prosser Hatchery, and released at Mabton in late November or early December concurrent with the return of the natural spawning run. This allowed reconditioned kelts to naturally select their spawning location, timing, and mates. The key question of course, is whether reconditioned kelt steelhead were able to successfully spawn and reproduce once they were released to the natural environment. We are addressing this uncertainty more rigorously with additional ongoing research.

12.2) Cooperating and funding agencies.

The YN and CRITFC conduct studies associated with the steelhead reconditioning program. Bonneville Power Administration is the funding agency. See also 1.3.

12.3) Principle investigator or project supervisor and staff.

Joe Blodgett, YN Prosser Complex Hatchery Manager,
Dr. David Fast, YKFP Research Manager,
Douglas R. Hatch, CRITFC research biologist,
Ryan Branstetter, CRITFC research biologist,
Bill Bosch, YKFP Data Manager, and
Todd Newsome, YN Fisheries Biologist.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Same as described in Section 2.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

See earlier responses.

12.6) Dates or time period in which research activity occurs.

Collection of kelts occurs from March through June or early July. Short-term release is in May. Long-term release has occurred from mid-October to early December. Monitoring of returns occurs year-round.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

See section 9 of this HGMP.

12.8) Expected type and effects of take and potential for injury or mortality.

Please refer to the following appendices for information requested in this section:

Appendix A. 2004 Biological Assessment.
Appendix B. 2005 Permit Application
Appendix C. Coverage for Roza adult trapping operations.
Appendix D. Adult and Juvenile Take Tables for Mid-Columbia Steelhead Kelt Reconditioning Projects.
Appendix E. NOAA 2006 Determination Letter.

Contacts: Doug Hatch, CRITFC, 503-238-0667; Mark Johnston or Todd Newsome at 509-865-5121.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).

Please refer to the following appendices for information requested in this section:

Appendix A. 2004 Biological Assessment.
Appendix B. 2005 Permit Application
Appendix C. Coverage for Roza adult trapping operations.
Appendix D. Adult and Juvenile Take Tables for Mid-Columbia Steelhead Kelt Reconditioning Projects.
Appendix E. NOAA 2006 Determination Letter.

Contacts: Doug Hatch, CRITFC, 503-238-0667; Mark Johnston or Todd Newsome at 509-865-5121.

12.10) Alternative methods to achieve project objectives.

See Section 1.16 of this HGMP.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

Please refer to the following appendices for information requested in this section:

Appendix A. 2004 Biological Assessment.
Appendix B. 2005 Permit Application

Appendix C. Coverage for Roza adult trapping operations.
Appendix D. Adult and Juvenile Take Tables for Mid-Columbia Steelhead Kelt Reconditioning Projects.
Appendix E. NOAA 2006 Determination Letter.

Contacts: Doug Hatch, CRITFC, 503-238-0667; Mark Johnston or Todd Newsome at 509-865-5121.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.
(*e.g. "Listed coastal cutthroat trout sampled for the predation study will be collected in compliance with NMFS Electrofishing Guidelines to minimize the risk of injury or immediate mortality.")*.

See earlier responses in this HGMP.

SECTION 13. ATTACHMENTS AND CITATIONS

Include all references cited in the HGMP. In particular, indicate hatchery databases used to provide data for each section. Include electronic links to the hatchery databases used (if feasible), or to the staff person responsible for maintaining the hatchery database referenced (indicate email address). Attach or cite (where commonly available) relevant reports that describe the hatchery operation and impacts on the listed species or its critical habitat. Include any EISs, EAs, Biological Assessments, benefit/risk assessments, or other analysis or plans that provide pertinent background information to facilitate evaluation of the HGMP.

Adams N. S., D. W. Rondorf, S. D. Evans, and J. E. Kelly. 1998. Effects of surgically and gastrically implanted radio transmitters on growth and feeding behavior of juvenile chinook salmon. Transactions of the American Fisheries Society 127(1):128-136.

Bosch, W. J., D. E. Fast, D. R. Hatch, J. W. Blodgett, R. Branstetter, T. H. Newsome, and M. J. Johnston. 2007 (submitted). Reconditioning kelt steelhead: A novel management strategy for populations in low abundance. Fisheries Management and Ecology.

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 1. Estimated listed salmonid take levels of by hatchery activity. **See Tables in Appendices C and D.**

Listed species affected: _____ ESU/Population:_____ Activity:_____				
Location of hatchery activity:_____ Dates of activity:_____ Hatchery program operator:_____				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)				
Collect for transport b)				
Capture, handle, and release c)				
Capture, handle, tag/mark/tissue sample, and release d)				
Removal (e.g. broodstock) e)				
Intentional lethal take f)				
Unintentional lethal take g)				
Other Take (specify) h)				

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
h. Other takes not identified above as a category.

Instructions:

1. *An entry for a fish to be taken should be in the take category that describes the greatest impact.*
2. *Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).*
3. *If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.*

Attachment 1. Definition of terms referenced in the HGMP template.

Augmentation - The use of artificial production to increase harvestable numbers of fish in areas where the natural freshwater production capacity is limited, but the capacity of other salmonid habitat areas will support increased production. Also referred to as "fishery enhancement".

Critical population threshold - An abundance level for an independent Pacific salmonid population below which: depensatory processes are likely to reduce it below replacement; short-term effects of inbreeding depression or loss of rare alleles cannot be avoided; and productivity variation due to demographic stochasticity becomes a substantial source of risk.

Direct take - The intentional take of a listed species. Direct takes may be authorized under the ESA for the purpose of propagation to enhance the species or research.

Evolutionarily Significant Unit (ESU) - NMFS definition of a distinct population segment (the smallest biological unit that will be considered to be a species under the Endangered Species Act). A population will be/is considered to be an ESU if 1) it is substantially reproductively isolated from other conspecific population units, and 2) it represents an important component in the evolutionary legacy of the species.

Harvest project - Projects designed for the production of fish that are primarily intended to be caught in fisheries.

Hatchery fish - A fish that has spent some part of its life-cycle in an artificial environment and whose parents were spawned in an artificial environment.

Hatchery population - A population that depends on spawning, incubation, hatching or rearing in a hatchery or other artificial propagation facility.

Hazard - Hazards are undesirable events that a hatchery program is attempting to avoid.

Incidental take - The unintentional take of a listed species as a result of the conduct of an otherwise lawful activity.

Integrated harvest program - Project in which artificially propagated fish produced primarily for harvest are intended to spawn in the wild and are fully reproductively integrated with a particular natural population.

Integrated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), and fish produced are intended to spawn in the wild or be genetically integrated with the targeted natural population(s). Sometimes referred to as "supplementation".

Isolated harvest program - Project in which artificially propagated fish produced primarily for harvest are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Isolated recovery program - An artificial propagation project primarily designed to aid in the recovery, conservation or reintroduction of particular natural population(s), but the fish produced are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Mitigation - The use of artificial propagation to produce fish to replace or compensate for loss of fish or fish production capacity resulting from the permanent blockage or alteration of habitat by human activities.

Natural fish - A fish that has spent essentially all of its life-cycle in the wild and whose parents spawned in the wild. Synonymous with *natural origin recruit (NOR).*

Natural origin recruit (NOR) - See *natural fish* .

Natural population - A population that is sustained by natural spawning and rearing in the natural habitat.

Population - A group of historically interbreeding salmonids of the same species of hatchery, natural, or unknown parentage that have developed a unique gene pool, that breed in approximately the same place and time, and whose progeny tend to return and breed in approximately the same place and time. They often, but not always, can be separated from another population by genotypic or demographic characteristics. This term is synonymous with stock.

Preservation (Conservation) - The use of artificial propagation to conserve genetic resources of a fish population at extremely low population abundance, and potential for extinction, using methods such as captive propagation and cryopreservation.

Research - The study of critical uncertainties regarding the application and effectiveness of artificial propagation for augmentation, mitigation, conservation, and restoration purposes, and identification of how to effectively use artificial propagation to address those purposes.

Restoration - The use of artificial propagation to hasten rebuilding or reintroduction of a fish population to harvestable levels in areas where there is low, or no natural production, but potential for increase or reintroduction exists because sufficient habitat for sustainable natural production exists or is being restored.

Stock - (see “Population”).

Take - To harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Viable population threshold - An abundance level above which an independent Pacific salmonid population has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time frame.

Attachment 2. Age class designations by fish size and species for salmonids released from hatchery facilities.

(generally from Washington Department of Fish and Wildlife, November, 1999).

	SPECIES/AGE CLASS	SIZE CRITERIA Number of fish/pound	SIZE CRITERIA Grams/fish
X	Chinook Yearling	<=20	>=23
X	Chinook (Zero) Fingerling	>20 to 150	3 to <23
X	Chinook Fry	>150 to 900	0.5 to <3
X	Chinook Unfed Fry	>900	<0.5
X	Coho Yearling 1/	<20	>=23
X	Coho Fingerling	>20 to 200	2.3 to <23
X	Coho Fry	>200 to 900	0.5 to <2.3
X	Coho Unfed Fry	>900	<0.5
X	Chum Fed Fry	<=1000	>=0.45
X	Chum Unfed Fry	>1000	<0.45
X	Sockeye Yearling 2/	<=20	>=23
X	Sockeye Fingerling	>20 to 800	0.6 to <23
X	Sockeye Fall Releases	<150	>2.9
X	Sockeye Fry	> 800 to 1500	0.3 to <0.6
X	Sockeye Unfed Fry	>1500	<0.3
X	Pink Fed Fry	<=1000	>=0.45
X	Pink Unfed Fry	>1000	<0.45
X	Steelhead Smolt	<=10	>=45
X	Steelhead Yearling	<=20	>=23
X	Steelhead Fingerling	>20 to 150	3 to <23
X	Steelhead Fry	>150	<3
X	Cutthroat Trout Yearling	<=20	>=23
X	Cutthroat Trout Fingerling	>20 to 150	3 to <23
X	Cutthroat Trout Fry	>150	<3
X	Trout Legals	<=10	>=45
X	Trout Fry	>10	<45

1/ Coho yearlings defined as meeting size criteria and 1 year old at release, and released prior to June 1st.
2/ Sockeye yearlings defined as meeting size criteria and 1 year old.

Appendix A. 2004 Biological Assessment.

Biological Assessment of Incidental Impacts on Salmon Species Listed Under the Endangered Species Act in the Proposed Research Project: Kelt Reconditioning: A Research Project to Enhance Iteroparity in Columbia Basin Steelhead *(Oncorhynchus mykiss)*

2004- Dec. 31st, 2006

Prepared by the
Columbia River Inter-Tribal Fish Commission

July 14, 2004

Table of Contents

Introduction

Biological Assessment of Incidental Impacts on Salmon Species Listed Under the Endangered Species Act in the Proposed Research Project:

This biological assessment has been prepared by staff of the Columbia River Inter-Tribal Fish Commission by and through the Bureau of Indian Affairs (BIA) as trustee for the Commission's member tribes for the purpose of initiating a consultation process for proposed research on steelhead in the mid-Columbia and upper Columbia that may affect species listed for protection under the Endangered Species Act (ESA). This biological assessment describes new proposed research activities. The project will be under the direction of researchers from the Columbia River Inter-Tribal Fish Commission's Fishery Science department, in cooperation with staff from the Yakama Nation, Confederated Tribes of the Warm Springs Reservation, and the Confederated Tribes of the Colville Indian Reservation.

The described research in this biological assessment will occur between May 15, 2004, and December 31, 2005, and includes:

- Evaluating effects of directly transporting steelhead kelts around the hydro system on enhancement of iteroparity.
- Evaluating effects of long-term kelt reconditioning and subsequent release for natural spawning on enhancement of iteroparity.
- Evaluating effects of long-term kelt reconditioning and captive spawning on: a) gamete and progeny viability; and b) enhancement of iteroparity.
- Examining reproductive success in hatchery-origin, natural-origin, and reconditioned kelt steelhead in several streams

RPA Number	Description
NMFS RPA 107	Assess survival of adult salmonids migrating upstream, and factors contributing to unaccountable losses.
NMFS RPA 118	Assess and enumerate indirect prespawning mortality of upstream-migrating fish. Enhance efforts to enumerate unaccountable losses in mainstem reservoirs.
NMFS RPA 184	Develop an hatchery research, monitoring, and evaluation program to determine whether hatchery reforms reduce the risk of extinction for salmonids
RA 994	Assess adult salmon passage success in the lower Columbia and Snake rivers, evaluate specific flow and spill conditions, and evaluate measures to improve adult anadromous passage.
RM&E Topics:	General migration corridor; NMFS RPAs and RAs: 85,87,190, 193
	Adult homing/straying: Outmigration of steelhead kelts;

	NMFS RPAs and RAs: 37,109,199,1224,2000
Corps Action 109	The Corps shall initiate an adult steelhead downstream migrant (kelt) assessment program to determine the magnitude of passage, the contribution to population diversity and growth, and potential actions to provide safe passage (Draft Mainstem/Systemwide Artificial Production Program Summary, pg 24).

This biological assessment provides a description and evaluation of the effects of the proposed research project on the following listed "species" as so designated by NOAA Fisheries or the U.S. Fish and Wildlife Service for protection under the ESA: Upper Columbia river steelhead ESU, Middle Columbia River steelhead ESU, and Columbia River Bull Trout ESU.

Description of Fish Stocks

Steelhead **(***Oncorynchus mykiss***)**
Historically, summer steelhead differed in their time of entry into the Columbia River and were defined accordingly as groups A and B in the CRFMP and in the Status Review of West Coast Steelhead. These designations are based on the observation of a bimodal migration of adult steelhead at Bonneville Dam and differences in age (1-versus 2-ocean) and adult size observed among Snake River steelhead (Busby et al 1996). Typically, adult A-run steelhead enter fresh water from June to August; as defined, the A-run passes Bonneville Dam before 25 August (CBFWA 1990). Group A steelhead originate in production areas throughout the Columbia River Basin, whereas Group B steelhead are believed to originate only in portions of the Clearwater and Salmon River drainages in Idaho (TAC 1997). Upper Columbia River steelhead are designated as Group A

Bull Trout **(***Salvelinus confluentus***)**
Historically bull trout were found throughout the Columbia River Basin. At present, bull trout are found primarily in upper tributary streams and in lake and reservoir systems; they have been eliminated or have been greatly reduced in the mainstems of large rivers. Upper Columbia River bull trout can be migratory or resident (Rieman and McIntyre 1993). Resident bull trout complete their entire life cycle in or near their natal tributary. Migratory bull trout spawn in tributary streams where juvenile fish rear one to four years before migrating to either a lake (adfluvial form) or a river (fluvial form).

Descriptions of ESA Listed Populations

Since 1991, the NOAA Fisheries has identified several populations of Columbia River Basin salmon and steelhead as ESUs that require protection under the ESA. The populations potentially affected by the proposed research project are shown below as described by the NOAA Fisheries and their current listing status (NMFS 1999), currently under review. Any changes in the status of these listings or ESU boundary changes will be addressed in the

consultation process. These ESU populations are only those that are potentially present in the proposed research areas from March 2003, to December 31, 2005. The U.S. Fish and Wildlife Service (USFWS) have listed the bull trout populations as threatened since 1998. Since bull trout are widely distributed and have varying life histories and therefore different threats, the USFWS identified 22 recovery units within the Columbia River Distinct Population Segment, each with its own recovery strategy (USFWS 2002). Unless otherwise noted, the listed component only includes wild/naturally-spawning populations.

1. Upper Columbia River steelhead, endangered, August 18, 1997. This inland steelhead ESU occupies the Columbia River Basin upstream from the Yakima River, Washington, to the United States/Canada Border (Busby et al. 1996). (USFWS 2002)

2. Columbia River bull trout, threatened, June 10, 1998. (USFWS 2002). The particular unit that could be effected by our research would be the Unit 6 Deschutes River Population. (USFWS 2002)

3. Mid-Columbia River steelhead, threatened, March 25, 1999. The Mid-Columbia River Unit encompasses the geographic area from Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington. (USFWS 2002)

Project Description

Background

Populations of wild steelhead *(O. mykiss)* have declined dramatically from historical levels in the Columbia and Snake rivers (Nehlsen et al. 1991; NRC 1996; *US v. Oregon* 1997; ISRP 1999). Steelhead in the upper Columbia River have been listed as an endangered species under the Endangered Species Act (ESA) since 1997[1]. Those in the Snake River have been listed as threatened, also since 1997[1], and those in the mid-Columbia were listed as threatened in 1999[2]. Causes of the declines are numerous and well known (TRP 1995; NPPC 1986; NRC 1996; ISRP 1999), and regional plans recognize the need to protect and enhance weak upriver steelhead populations while maintaining the genetic integrity of those stocks (NPPC 1995).

Enhancing the species' natural iteroparity (i.e. its ability to spawn more than once in its life) may strengthen wild steelhead populations. Fish that have spawned in one or more previous years contribute substantially to some wild steelhead populations (e.g. as high as 79% for 1994-96 in the Utkholok River of Kamchatka; MSU undated; M. Powell UI and R. Williams, ISRP pers. comm.). However, the contribution from iteroparous steelhead in Columbia River populations is much lower. For example, recent estimates of repeat spawners in the Kalama River (tributary of the unimpounded lower Columbia River) have exceeded 17% (NMFS 1996), which is the highest published iteroparity rate we found from the Columbia River Basin. Farther upstream, 4.6% of the summer run in the Hood River (above only one mainstem dam) are repeat spawners (J. Newton, ODFW, pers. comm.). Similarly, summer steelhead in the South Fork Walla Walla River have 2%-9% rates of repeat spawning (J. Germond, ODFW, pers. comm.), whereas repeat

[1] Final Rule 8/18/97: 62 FR 43937-43954.
[2] Final Rule 3/25/99: 64 FR 14517-14528.

spawners compose only 1.6% of the Yakima River wild run (from data in Hockersmith et al. 1995) and 1.5% of the Columbia River run upstream from Priest Rapids Dam (L. Brown, WDFW, unpubl. data). In the Snake River subbasin, at least 2% of wild steelhead returning to Idaho's Clearwater River were repeat spawners when there were only two downstream dams (Lewiston Dam and Bonneville Dam; Whitt 1954). In recent years, we know of a few confirmed repeat spawners that were observed in the juvenile bypass system at Little Goose Dam in 2000 and 2001(Evans and Beaty 2001) as well as a small number that returned to the Lower Granite Dam in 2002 (Hatch et al. 2002), and we suspect that < 1% of wild Snake River steelhead survive to spawn more than once. Under present conditions, very few (< 5% overall) summer steelhead in the Columbia River – especially in the upper basin – appear capable of exhibiting iteroparity in the impounded, post-development Columbia Basin.

Iteroparity rates for *0. mykiss* were estimated to be as high as 79% for 1994-96 in the Utkholok River of Kamchatka (MSU undated; M. Powell UI and R. Williams, ISRP pers. comm.) Reported iteroparity rates for Columbia basin steelhead (*O. mykiss*) were considerably lower, due largely to high mortality of downstream migrating kelts at hydropower dams (Evans and Beaty 2001; Hatch et al. 2002; Hatch et al.b In-Review), and to inherent differences in iteroparity rate based on geography (e.g. latitudinal effect, inland distance effect; Withler 1966; Bell 1980; Fleming 1998). Chilcote (In review) reported iteroparity rates ranging from 3 to 21% for 12 different steelhead populations in Oregon. Outmigrating steelhead averaged 58% of the upstream run in the Clackamas River from 1956 to 1964 (Gunsolus and Eicher 1970). Recent estimates of repeat spawners in the Kalama River (tributary of the unimpounded lower Columbia River) have exceeded 17% (NMFS 1996), which is the highest published iteroparity rate we found from the Columbia River Basin. Farther upstream, 4.6% of the summer run in the Hood River (above only one mainstem dam) are repeat spawners (J. Newton, ODFW, pers. comm.). Iteroparity for Klickitat River steelhead was reported at 3.3% from 1979 to 1981 (Howell et al. 1985). Summer steelhead in the South Fork Walla Walla River exhibited estimated 2% to 9% iteroparity rates (J. Gourmand, ODFW, pers. comm.), whereas repeat spawners composed only 1.6% of the Yakima River wild run (from data in Hockersmith et al. 1995) and 1.5% of the Columbia River run upstream from Priest Rapids Dam (L. Brown, WDFW, unpubl. data).

Before repeat spawners can contribute to population growth and diversity, they must first successfully outmigrate to the ocean following spawning. The term "kelt" has been used to describe this unique post-spawned life history phase within salmonids. In 1999 and 2000 ultrasound and visual methods were developed – with funding from the U.S. Army Corp of Engineers – to accurately distinguish kelts from pre-spawners (mature steelhead). The ultrasound technique provided a highly accurate and non-invasive way to enumerate the abundance of kelts in the Snake and Columbia rivers basins (Evans and Beaty 2000). Using this technique, kelts were enumerated at Little Goose bypass (1999 and 2000), Lower Granite bypass (2000 and 2001), and at McNary and John Day bypass facilities (2001). In 2002, CRITFC compared visual identification and the ultrasound identification technique (Hatch et al. In Review). Identification crews, with proper identification training, were able to accurately identify steelhead kelts. Data revealed that approximately 2,780 wild kelts, equivalent to *ca.* 23% of the 1999 wild run above Lower Granite Dam, passed through the juvenile collections systems at Lower Granite and Little Goose dams in the spring of 2000 (Evans and Beaty 2001). In 2001, an estimated 4,695 wild kelts, equivalent to *ca*. 21% of the 2000 wild run, passed

through Lower Granite bypass facility alone (Evans 2002). During the spring of 2002 the number of wild kelts was approximately 3,348, equivalent to ca. 7% of the 2001 wild run (Hatch et al., In Review). The majority of kelts were considered to be in good physical condition (> 70%) and the kelt run was predominately female (> 80%). A trend toward higher post-spawn female survival, relative to males, is consistent with data from other iteroparous populations (Withler 1966, Leider et al. 1986, Jonsson et al. 1991, Fleming 1998, and Niemela et al. 2000).

Despite the thousands of kelts that arrived at Lower Granite Dam in 2002, as in 2001, very few successfully navigated the Columbia Basin hydrosystem. Radio telemetry indicated that only 17.6% (37/210) and 13.3% (8/210) of tagged kelts released from Lower Granite Dam tailrace reached the Ice Harbor Dam tailrace and Bonneville Dam tailrace, respectively. In addition to kelt mortality associated with dam passage, depleted energy stores and physical deterioration likely constituted important mortality, compounded by fasting for many months during migration and spawning (Love 1970). However, based on the above suite of empirical iteroparity estimates, steelhead kelts in impounded areas of the Columbia basin should have significantly greater likelihood of exhibiting iteroparity if they are reconditioned in captivity, relative to their current inability to exhibit iteroparity in the impounded, post-development Columbia Basin.

Kelt reconditioning promotes re-initiation of feeding, thereby enabling them to survive and rebuild energy reserves required for proper gondal development and iteroparous spawning. Kelt reconditioning techniques were initially developed for Atlantic salmon *Salmo salar* and sea-trout *S. trutta.* A review of these studies and those applicable to steelhead kelts are summarized in Evans et al. 2001. This project identifies and systematically tests several kelt reconditioning approaches.

- 2000

In the spring of 2000, the YN collected 512 wild kelts (38% of the subbasin's run that year) at the Chandler Juvenile Migrant Fish Facility (CJMFF) for reconditioning at Prosser Hatchery. The kelts – arriving in surprisingly high numbers even before this project's contract was in place – had to be initially held at undesirably high densities in temporary tanks, where they were fed using the slurry method of the previous year. During mid-June, when the four 20' diameter circular tanks were received and installed, the 354 surviving kelts were treated for parasites and transferred to the new tanks. A high proportion of the transferred fish was emaciated, clearly starving. The feeding methods had not been working satisfactorily under the exceptionally stressful conditions in the temporary tanks. During July, the YN started to feed freeze-dried krill, which elicited a strong feeding response from kelts that were already eating pelleted diet and a weaker – but still positive – response from emaciated, previously non-feeding fish. One-fourth of the kelts were lost when inflow to one of the tanks was interrupted overnight in late July, and attrition due to starvation continued in the remaining three tanks. In mid-December, when the 90 survivors (18% of those collected) were examined and released, ultrasound revealed that 51 (57%) were rematuring. Hence, first year re-spawner rate (reconditioned plus rematuring in the next year) was only 10% (51/512).

- 2001

In the spring of 2001, the YN collected 551 wild kelts ca. 18.7% of the 2000 wild run from the (CJMFF) for reconditioning at the Prosser hatchery. Steelhead kelts held for reconditioning were held in the four 20' diameter circular tanks. Captured steelhead kelts were released on two dates

November 15, 2001 and January 18, 2002 (kelts held longer to assure rematuration). Different diet formulations were fed to reconditioned kelts to ascertain an optimum reconditioning diet. The diet formulation that showed the most promise at reinitiating a feeding response was krill followed by a maintenance diet of Moore-Clark pellets. Under this diet formulation kelts also showed some weight gain with 95%(91of 95 measured) showing a weight increase. A total of 108 kelts survived the reconditioning experiment to release while an estimated number of kelts 96% showed some sign of rematuration.

- 2002

During 2002, the YN CJMFF crew collected a total of 899 wild kelts ca. 19.8% of the 2001 wild run for reconditioning. Steelhead kelts continued to be held in the four 20' diameter circular tanks. The experiment was separated into a short-term (1 and 2 month reconditioning) and long-term (6-7 months) feeding experiment with 3 different feeding combinations. Another dimension of the experiment was trucking short-term releases below Bonneville dam for release. Survival rates in all groups increased this year, with especially high survival rates being found in the short-term reconditioning groups. Long-term experiments had overall lower survival rates when compared to short-term reconditioned fish, although they had a significantly higher rematuration rate (when compared to short-term 0% rematuration vs. long-term at about 30-75%). Long-term reconditioned fish also tended to increase in weight during reconditioning, while short-term reconditioned fish lost a small amount of weight. So far, a total of 28 out of 331 Passive Integrated Transponder (PIT) tagged fish have returned to the Yakima River basin to respawn.

- 2003

In 2003, ongoing BPA funded projects that were being reviewed in the Systemwide Provincial Review Process were required to maintain work scopes from the previous year. Therefore, we repeated the experiments from 2002. We collected 811 kelt steelhead at CJMFF and retained 677 for reconditioning. The short-term reconditioning group had 97% survival to release and the current survival (as of 9/30/03) for fish in the long-term reconditioning group is approximately 73%.

Project Goals for 2004-2006

1. Develop, test, and evaluate methods and protocols for successful reconditioning of kelt steelhead.
2. Work in close cooperation with fishery managers to formulate and test critical questions about the technical and management feasibility of kelt reconditioning.
3. Apply reconditioning methods and protocols to appropriate fishery management programs within five years, when warranted by the results of reconditioning and benefit/risk analysis.
4. Directly examine reproductive success in hatchery-origin, natural-origin, and reconditioned kelt steelhead in several streams

5. Replicate and evaluate kelt reconditioning procedures and protocols at a variety of locations.

6. Track migration behavior of reconditioned steelhead kelts through the Columbia River Basin to estuaries and possibly continental shelf.

Rationale

The primary purpose of this assessment is to estimate the incidental take of ESA listed fish by ESU as a result of the proposed research at the Yakima River, Shitike Creek, Omak Creek, and Satus Creek. Available data on run size, run timing, age composition, hatchery production, and ecology of stocks were used to evaluate potential effects.

Direct Release

In an effort to determine the impact that reconditioning has on steelhead kelts, up to 200 Yakima River outmigrating kelts will be captured at the CJMFF and directly be released in a one time release below Bonneville Dam. These fish will receive no treatment except for the placement of PIT-tags in all individuals and surgical implantation of 30 radio tags and 30 acoustic tags into 60 individuals, once we receive an adequate amount of fish to compare against reconditioned fish, they will then be transported to the Hamilton boat ramp below Bonneville Dam.

Capture and Placement of Virgin Spawners

In Shitike and Omak Creek we will attempt to capture around 200 virgin spawners using a weir at each stream system to obtain genetic samples from each fish captured so that we can assign parentage to offspring. Fish captured in Shitike and Omak Creeks will be released to continue their migration to spawning grounds upstream. At Satus Creek we will obtain at most 80 (minimum 40) virgin spawners headed upstream and obtain genetic samples from them before they are transported to either 2 of the 4 streams (North and South Fork Logy, Section Corner, and/or Yatamai Creeks will be decided by end of 2004) that have suitable steelhead spawning gravels. The 4 creeks are geographically isolated by large waterfalls and will be racked to keep adult steelhead in the streams until they spawn. We will capture our released fish when they become outmigrating kelts using a V-weir. These outmigrating kelts will then be held for long-term reconditioning (6-8 months) and subsequently be reintroduced to the system the following year. These streams provide a good opportunity for us to establish parentage rates in a field laboratory setting.

Long-term Reconditioning

We made substantial progress in 2001 and 2002 regarding long-term kelt reconditioning, achieving a current long-term survival rate of 73% in 2003. However, the applicability of long-term reconditioning must be evaluated at different locations (i.e., with different source populations) in order to adequately assess long-term reconditioning's ability to augment iteroparity rates. Long-term reconditioning will be performed using fish from 4 sites: Omak Creek, Yakima River, Satus Creek, and Shitike Creek.

Gamete and Progeny Viability

Approximately 20 first-time spawners and 20 steelhead kelts from the long-term reconditioning experiment at the CJMFF will be retained to ascertain gamete and progeny viability. These fish will be air spawned, their gametes will then be refrigerated and sent to the University of Idaho where they will be fertilized and evaluated. Some of the fertilized eggs will be raised to adulthood to evaluate the gamete viability of the progeny.

Short-term reconditioning

Successful expression of iteroparity in steelhead may not simply be limited by post-spawning downstream passage through the mainstem corridor but also by starvation. Thus, short-term conditioning may augment iteroparity rates by initiating the feeding process and allowing kelts to naturally undergo gonadal recrudescence in the estuary and marine environments. Short-term reconditioning is defined as the period of time needed (6 to 8 weeks) for kelts to initiate post-spawning feeding, followed by the transportation of kelts around mainstem hydroelectric facilities for release and natural rearing and rematuration in the Pacific Ocean. Short-term reconditioning will be performed at the CJMFF on the Yakima River.

Juvenile *Oncorhynchus mykiss* Collection

There is no method to avoid sampling ESA-listed fish in a screw-trap or V-weir. The rotary screw trap or V-weir will be deployed at Omak Creek, Shitike Creek, and/or 2 of the 4 streams in the Satus watershed. We will take precautions to minimize the effect of sampling all fish including frequent monitoring, safe handling procedures, and expedient measurement. No take of ESA listed fish is expected.

Collection of Adult Rainbow Trout (*O. mykiss*)

It is possible that resident rainbow trout may be mating with returning steelhead and must be identified so that assigning parentage will be successful. There is no method to avoid sampling ESA-listed fish in a screw-trap or V-weir. The rotary screw trap or V-weir will be deployed at Omak Creek, Shitike Creek, and/or 2 of the 4 streams in the Satus watershed. Adult rainbow trout will have a genetic sample taken (caudle fin punch) that will be analyzed to isolate genetic contributors to juvenile stocks. We will take precautions to minimize the effect of sampling all fish including frequent monitoring, safe handling procedures, and expedient measurement. No take of ESA listed fish is expected.

PIT tag

All adult Steelhead kelts will receive Passive Integrated Transponder (PIT) tags inserted into the body cavity via syringe. No take of ESA listed fish is expected.

Acoustic Telemetry

A portion of the adult steelhead kelts at the Yakima River (~60 individuals), will have long-life (>300 day) acoustic transmitters surgically implanted into the body cavity below the pectoral fin for long-term tracking. No take of ESA listed fish is expected.

Radio Telemetry

A portion of adult steelhead kelts at Shitike Creek (~40 individuals), Yakima River (~100 individuals) will have long-life (>50 day) radio transmitters surgically implanted into the body

cavity below the pectoral fin for long-term tracking or use of the gastric insertion technique for short-term tracking. No take of ESA listed fish is expected.

Floy-Tagging
Adult steelhead kelts at Shitike Creek will have floy-tags attached at the base of the dorsal fin to aid in identification of experimental fish. No take of ESA listed fish is expected.

Genetic Sampling
Adult Steelhead kelts at Shitike Creek, Satus Creek and Omak Creek, will have a fin clip taken for genetic analysis. No take of ESA listed fish is expected.

Truck Transport
Given the high mortality rates of emigrating kelts observed via radio telemetry in the Snake River (Evans et al. 2001; Evans 2002; Hatch et al, in review), iteroparity may simply be augmented by transporting kelts around the hydro system, thereby increasing the number of kelts that successfully have access to the marine environment. The purpose for this objective is to evaluate the lowest cost alternative aimed at increasing steelhead iteroparity. The objective will be conducted at the CJMFF at Prosser, WA.

Project Methodology

This project focuses on research to determine the best methodology for reconditioning steelhead kelts. The start date for this project is March 2004. This project is expected to last until 2006.

Steelhead Kelt Collection
Some of the steelhead kelts will be captured at V-weir sites (Shitike Creek, Omak Creek, and Satus Creek) that will direct fish to a capture box that will hold them until they can be dip netted into a holding tank then transported via truck to a reconditioning facility. Once at the reconditioning facility kelts will be placed in 20' circular tanks that use well water and/or river water and given a diet of krill and Moore-Clark pellets for 4-5 months. The rest of the steelhead kelts will need to be captured at the Yakima River at the Chandler juvenile evaluation facility at the juvenile bypass and dip netted off of the separator and held in 4'x 6' tank until they can be transported to 20' circular tanks that use well water and/or river water and given a diet of krill and Moore-Clark pellets for reconditioning for 4-5 months and 6-8 weeks.

Steelhead Kelt Reconditioning
All steelhead kelts captured at all sites (Shitike Creek, Omak Creek, Satus Creek, and the Yakima River) will be retained in a 20'(l) x 20'(w) x 4'(h) circular tank. Individual tank carrying capacity was set at a maximum of 200 fish based on the aquaculture experience of YN hatchery staff, and the project goal of maximizing steelhead kelt survival in captivity. Formalin will be administered five times weekly at 1:6,000 for 1 hour in all reconditioning tanks to prevent fungal outbreaks. Due to the successful use in treating *Salmonicola* during the kelt reconditioning experiments in 2000 (Evans and Beaty 2000), Ivermectin™ will again be diluted with saline (1:30) and injected into the posterior end of the fish's esophagus using a small (1cc) plastic syringe. Water used for the tanks will either be ground well, river, or both depending on the site and will be of good quality for the health of the fish. Kelts will be given a diet of krill

and Moore-Clark pellets to elicit a feeding response from steelhead kelts. Short-term reconditioned fish will be held for a total of 6-8 weeks then trucked below Bonneville for release. A portion of the Yakima River short-term reconditioned fish (~60) along with the direct transport and release group (~60) will be either radio-tagged or acoustically tagged using surgical implantation into the body cavity just below the pectoral fin, so that we may ascertain outward migration behavior from below Bonneville Dam to the estuaries and continental shelf. Long-term reconditioned fish will be held for a total of 4-7 months and then released in-river to spawn. Approximately 40 Yakima River individuals from the long-term reconditioning experiment will receive radio-tags using the gastric insertion technique to monitor return spawning rates and the location of spawning grounds.

Gamete and Progeny Viability

Fish that are kept for gamete and progeny viability will be air spawned with gametes going to the University of Idaho where they will be evaluated using a number of different tests (i.e. keel counts, eye counts) to compare virgin spawners versus reconditioned fish. Some of the fertilized eggs will be raised to adulthood to evaluate the gamete viability of the progeny to determine if there are any deleterious effects on offspring from the reconditioning process.

Juvenile *O. mykiss* Collection

Downstream migrating juvenile steelhead will be trapped at a 5-foot diameter rotary-screw trap located on Omak Creek and Shitike Creek, and a V-weir on 2 of the 4 following creeks (North Fork Logy, South Fork Logy, Section Corner, and Yatamai Creeks). Collected data will be used to measure success of the parents' reproductive success. Data will also be collected on the physical characteristics of the sample sites (i.e., discharge).

When river conditions are conducive to trap operation, the migrant trap will be operated in a manner that will insure collection of a representative sample of juvenile steelhead. Operation will be noncontiguous and will span the entire outmigration period that is generally recognized as occurring from March through late August in the streams of interest.

Collection of Adult Rainbow Trout (*O. mykiss*)

Resident adult rainbow trout (*O. mykiss*) will be captured using a V-weir on Omak Creek, Shitike Creek, and on 2 of the 4 following creeks (North Fork Logy, South Fork Logy, Section Corner, and Yatamai Creeks). Genetic samples will be taken from resident adults to aid in assigning parentage. Data will also be collected on the physical characteristics of the sample sites (i.e., discharge).

Genetic sampling

Tissue samples of Adult steelhead, juvenile steelhead, and rainbow trout will consist of a non-lethal fin clips and scale samples to estimate age. Each sample will be measured and labeled accordingly.

PIT-tagging

Target species will be PIT tagged in accordance with protocols established by the Columbia Basin Fish and Wildlife Authority PIT Tag Steering Committee (CBFWA PTSC 1999). Data on tag release, tag detection, stream temperature, and fish length will be recorded. Target species

will be examined for marks, clips, injuries, and descaling, as well as scanned for previous PIT tags prior to PIT tag injections. Hand-held PIT tag injectors will be disinfected between fish to reduce the possibility of transfer of diseases (CBFWA PTSC 1999).

Floy Tagging

Colored and uniquely numbered tags will be inserted using a floy tag piercing gun held at a 45 degree angle, just below the dorsal fin.

Acoustic Tagging

Some short-term reconditioned (~30) and direct transport/release (~30) fish will receive acoustic tags (~12 grams) that will be surgically implanted into the body cavity just below the pectoral fin (FAO Fish Telemetry Web site).

Radio Tagging

An additional (~30) short-term reconditioned and (~30) direct transport/release fish that received acoustic tags will also receive radio tags (~3 grams) that will be surgically implanted into the body cavity below the pectoral fin (FAO Fish Telemetry Web site). Long-term reconditioned fish will receive radio tags (~4 grams) using the gastric insertion technique (FAO Fish Telemetry Web site).

Assessment of Potential Impacts to Listed Fish

The primary purpose of this assessment is to estimate the incidental take of ESA listed fish by ESU as a result of the proposed research at Shitike Creek, Omak Creek, Satus Creek and the Yakima River. Available data on run size, run-timing, age composition, hatchery production, and ecology of steelhead were used to evaluate potential affects to ESA-listed species.

Steelhead Kelt Collection

Adult steelhead sampling will be strictly limited to the capture of adult steelhead kelts at the Chandler juvenile evaluation facility located on the Yakima River and the Satus Creek dam. At Shitike Creek there is the possibility of capturing Bull Trout at the weir site. It is anticipated that work will begin in 2005. It is expected that there will be no to little effect on ESA-listed Bull Trout. Sites will be continuously monitored to ensure that fish are appropriately sorted and either kept for reconditioning or released back to the river to continue migration.

Steelhead Kelt Reconditioning

Steelhead kept for reconditioning will then be expedited to the reconditioning site where they will be processed and then reconditioned. It is expected that there may be some mortalities associated with handling stress after processing for reconditioning. It should be noted though that the survival rate for reconditioned steelhead held in captivity ~70%, is still much higher than would be found in the altered hydrosystem ~1%. (Hatch et al. In Review; Wertheimer et al. 2002)

Juvenile *O. mykiss* Collection

There is no method to avoid sampling ESA-listed fish in a rotary-screw trap. The rotary screw trap will be deployed on the Shitike Creek, Omak Creek, and Satus Creek but some bull trout

may be trapped incidentally at Shitike Creek. The rotary-screw trap will be used for a short period of time to avoid sampling large numbers of ESA-listed stocks. We will take precautions to minimize the effect of sampling all fish including frequent monitoring, safe handling procedures, and expedient measurement.

Fluvial bull trout from the Columbia River use Shitike Creek primarily as a migration corridor although some adults hold in the larger pools to feed. Bull trout spawning and rearing typically occurs near headwaters; there is no known spawning near the mouth of Omak Creek. The resident form is typically found in portions above passage barriers and therefore should not be affected by the proposed research. Some sub-adults may be trapped incidentally as well as some bull trout fry later in the season.

Collection of Adult Rainbow Trout (*O. mykiss)*
Adult rainbow trout (*O. mykiss*) will be collected using a rotary screw trap in Shitike and Omak Creek and a V-weir in either 2 of 4 listed creeks in the Satus Creek drainage (North Fork Logy, South Fork Logy, Section Corner, and Yatamai Creeks) for capture of resident *O. mykiss* for parentage assignment. After capture fish will be anesthetized and have a non-lethal fin clip taken for genetic analysis. No effect on ESA-listed stocks is expected.

Genetic Sampling
Adult steelhead kelts, juvenile steelhead and adult rainbow trout will be sampled. We expect no effect on ESA-listed stocks.

PIT Tagging
Only adult steelhead kelts will be PIT-tagged so no effect is expected on ESA-listed adult steelhead kelts from PIT tagging.

Floy Tagging
Only adult steelhead kelts from Shitike Creek will be Floy tagged. We expect no effect on ESA-listed adult steelhead kelt stocks.

Acoustic-Tagging
A portion of adult steelhead kelts in the short-term reconditioning and direct transport/release experiments from the Yakima River will receive acoustic tags. We expect none to little effect on ESA-listed stocks.

Radio-tagging
A portion of adult steelhead kelts from the Yakima River and Shitike Creek are expected to be radio-tagged. We expect none to little effect on ESA-listed stocks.

Description and Estimates of Harrasment/Take

Based upon the methodology described above and the anticipated low level of ‘take’ (capture, handling and/or tagging) of ESA-listed species identified below through this research project, we have determined that this project may incidentally effect, but will not jeopardize ESA-listed species.

List of Each Species and/or Population and/or ESU to be harassed/taken

Harassment

Steelhead Kelt Collection
Steelhead Captured for reconditioning, data collected:

Endangered, adult UCR steelhead- 250
Threatened, naturally produced adult Unit 6 bull trout- 55
Threatened, naturally produced adult MCR steelhead- 1,600

Steelhead Kelt Reconditioning
Kept in captivity, only handled before release for data recording and with some individuals receiving radio tag placement then trucked to release sites:

Endangered, adult UCR steelhead- 200
Threatened, naturally produced adult MCR steelhead- 1,280

Juvenile steelhead collection
Captured, anesthetized, handled (genetic samples taken), allowed to recover from the anesthetic, and released:

Endangered, juvenile UCR steelhead- 1,700
Threatened, naturally produced juvenile Unit 6 bull trout- 55
Threatened, naturally produced juvenile MCR steelhead- 1,876

Collection of adult rainbow trout (O. mykiss)
Captured, anesthetized, handled (genetic samples taken), allowed to recover from the anesthetic, and released:

Threatened, naturally produced juvenile Unit 6 bull trout that may be harassed- 55

Indirect Mortalities

Steelhead Kelt Collection
Captured for reconditioning, data collected:

Endangered, adult UCR steelhead- 10
Threatened, naturally produced adult Unit 6 bull trout- 1
Threatened, naturally produced adult MCR steelhead- 64

Steelhead Kelt Reconditioning
Kept in captivity, only handled before release for data recording and with some individuals receiving radio tag placement then trucked to release sites:

Endangered, naturally reared adult UCR steelhead- 80
Threatened, naturally produced adult MCR steelhead- 440

Juvenile steelhead collection
Captured, anesthetized, handled (genetic samples taken), allowed to recover from the anesthetic, and released:

Endangered, juvenile UCR steelhead- 17
Threatened, naturally produced juvenile Unit 6 bull trout- 1
Threatened, naturally produced juvenile MCR steelhead- 18

Collection of Adult Rainbow Trout (O. mykiss)
Captured, anesthetized, handled (genetic samples taken), allowed to recover from the anesthetic, and released:

Threatened, naturally produced juvenile Unit 6 bull trout that may suffer mortality- 1

Calculation of potential harassment/take of ESA-listed species

<u>Calculation of potential steelhead harassment/take</u>

Adult Steelhead Kelt Collection

- Upper Columbia River Adult Steelhead Harassment/Take Estimates

  We are interested in reconditioning ~200 steelhead kelts at Omak Creek. With the Yakama reconditioning effort we typically kept 80% of what was handled and released ~20%(Hatch et al. a. in review).

  200 intended for reconditioning / .8 percent kept for reconditioning = 250 total harassment

  For the incidental mortality we used Yakama reconditioning as an estimate for the amount of handling mortalities associated with adult steelhead kelt capture. Handling mortalities at the CJMFF averaged ~4% (Hatch et al. a. in review).

  250 total fish handled * .04= 10 potential mortalities

- Middle Columbia River Adult Steelhead Harassment/Take Estimates

We are interested in reconditioning ~200 steelhead kelts at Shitike Creek, and min (40)/max (80) virgin spawners from Satus Creek. We are also interested in reconditioning ~ 800 adult steelhead kelts at the facility at the CJMFF. With the Yakama reconditioning effort we typically kept 80% of what was handled and released ~20% (Hatch et al. a. in review).

CJMFF on Yakima River @ Prosser, WA

800 intended for reconditioning and 200 for direct release/ .8 percentage kept for reconditioning = 1,250 total harassment

Shitike Creek steelhead kelts + Satus Creek virgin spawners

(200 intended for reconditioning / .8 percentage kept for reconditioning) + (80 intended for transport/ .8 total kept for transport) + (maximum of 80 steelhead kelts recaptured for reconditioning) = 250 + 100 = 350 total harassment

Total MCR adult steelhead kelt harassment = 1,600

For the incidental mortality we used the Yakama reconditioning effort as an estimate for the amount of handling mortalities associated with adult steelhead kelt capture. Handling mortalities at the CJMFF averaged ~4% (Hatch et al. a. in review).

CJMFF on Yakima River @ Prosser, WA

1,250 total fish handled * .04= 50 potential mortalities

Shitike Creek and Satus Creek

(250 fish handled * .04) + (100 fish handled * .04) = 10 + 4 = 14 potential mortalities.

Adult Steelhead Kelt Reconditioning

- Upper Columbia River Adult Steelhead

Harassment rates are based on the number of steelhead that may be potentially harassed during their movement from the reconditioning tank for sampling to the truck for release. We intend to recondition up to 200 fish at Omak Creek, which results in the possible harassment of up to 200 adult steelhead kelts.
Potential take is based off of last year's mortality rates from the Yakama Nation's previous reconditioning efforts, which was ~ 40% for the low in long-term reconditioning (Hatch et al. a. in review).

200 potential reconditioned fish * .4 mortality = 80 potential mortalities

- Middle Columbia River Adult Steelhead

  Harassment rates are based on the number of steelhead that may be potentially harassed during their movement from the reconditioning tank for sampling to the truck for release. We intend to recondition up to 800 fish and 200 for direct transport/release at the Yakima River at the CJMFF, which results in the possible harassment of up to 1000 adult steelhead kelts. We also plan on reconditioning around 200 steelhead kelts at Shitike Creek and the 80 fish that will be released into the two of the four sites at the CJMFF. All together, this could result in the possible harassment of up to 1, 280 adult steelhead kelts in these locations combined.

  Potential take is based off of last year's mortality rates from the Yakama Nation's previous reconditioning efforts, which was ~ 40% for the low in long-term reconditioning (Hatch et al a. in review). Potential take for the direct release/transport is assumed to be ~4% based off of our handling take at the CJMFF (Hatch et al. a. in review).

  1000 potential long-term reconditioned fish * .4 assumed mortality rate = 400 potential mortalities

  200 potential direct transport/release *.04 assumed mortality rate = 8 potential mortalities

  80 potential capture/transport/long-term recondition/release * .4 assumed mortality rate = 32 potential mortalities

*Juvenile Steelhead (**O. mykiss**) collection*

- Upper Columbia River Juvenile Steelhead

  Harassment rates are based on the number of juvenile *O. mykiss* that may be captured by a rotary screw trap or V-weir, handled to obtain genetic data, and then released to resume migration. We based captures on yearly smolt release data at Omak Creek (WDFW 2003) then averaged the data (smolt release, ~17,000). Based on the average, we assume a 10% capture rate with a 1% mortality rate.

- Middle Columbia River Juvenile Steelhead.

  Harassment rates are based on the number of juvenile steelhead that may be captured by a rotary screw trap, handled to obtain genetic data, and then released to resume migration. The number of steelhead estimated captured by the rotary screw trap was based off of previous years capture data at Shitike Creek with a screw trap (Warm Springs Tribal Fisheries Program, personal communication). We then averaged the yearly screw trap capture data and then assumed that we would capture at nearly the same rate (1,644 juveniles). Based on the average capture rate, we assume a 1% mortality rate.

  1,644 potentially captured juvenile steelhead smolts *.01 assumed mortality rate = 16 potential mortalities

  In the 2 of the 4 following listed creeks in the Satus Creek drainage (North Fork Logy, South Fork Logy, Section Corner, and Yatamai Creeks) will have virgin spawners placed and then racked off to prevent them from descending the waterfalls. This area is geographically isolated from resident rainbow trout populations. We will then capture juvenile steelhead smolts to obtain parentage data. Based on Yuen and Sharma's smolt per spawner estimates (~ 58 smolts/spawner) and at least 40 spawners, there could possibly be 2,320 outmigrating smolts (Yuen and Sharma, 2004). We should be able to capture at least 10 % of the outmigrating smolt population, which gives us 232 smolts captured. We will assume a 1% mortality rate, which results in 2 possible mortalities.

<u>Calculation of potential Unit 6 bull trout harassment/take</u>

Little is known about the biology and abundance of the Columbia River fluvial bull trout population (USFWS 2002). The Warm Springs Fisheries Program monitors smolt production with a rotary screw trap in Shitike Creek from early spring through early fall.

Adult Steelhead Kelt Collection

Based on yearly data (Warm Springs Tribal Fisheries Program, personal communication) of adult fluvial bull trout weir trapping at Shitike Creek in 2001-2002 and then averaged, we estimate that we may potentially harass 55 bull trout during our trapping of adult steelhead kelts. Based on a 1% mortality rate we estimate that we may potentially take a single adult fluvial bull trout.

Juvenile Steelhead Collection

We estimated that we may capture 55 juvenile and sub-adult fluvial bull trout based on an average of rotary screw trap data in Shitike Creek (Warm Springs Tribal Fisheries Program, personal communication). We estimate based on a 1% mortality rate that we may have a single mortality during our trapping operation.

Collection of Resident Adult Rainbow Trout (O. mykiss)

Based on yearly data (Warm Springs Tribal Fisheries Program, personal communication) of adult fluvial bull trout weir trapping at Shitike Creek in 2001-2002 and then averaged, we estimate that we may potentially harass 55 bull trout during our trapping of adult rainbow trout. We will be using either a V-weir or rotary screw trap to capture adult rainbow trout (*O. mykiss*). We estimate based on a 1% mortality rate that we may have a single mortality during our trapping operation.

Assessment of Potential Impacts to Critical Habitat for Listed Fish

No potential impacts to critical habitat for ESA-listed steelhead and bull trout are expected from either adult steelhead capture, juvenile steelhead capture, or resident capture. Both in-stream structures, the rotary-screw trap used to sample juvenile steelhead and the weirs for adult capture are temporary structures that will not alter or otherwise affect critical habitat for listed species. Both of these structures will be located low on the Omak and Shitike Creek system below primary spawning and rearing habitat for ESA-listed species. Location of the North and South Fork Logy, Section Corner, and/or Yatamai Creek structures are located above any critical habitat to any listed species.

Conclusion

Steelhead Reconditioning has proven to be successful in the Yakima River Basin with survival rates >70%. The next step in our research is to see how successful a region wide attempt to improve listed steelhead stocks, as well as improve a life history strategy. The data provided from this proposed study would answer questions about the viability of this project on a region wide scale. The seven components of this study: long-term reconditioning, juvenile steelhead collection, electro fishing, PIT-tagging, radio telemetry, floy-tagging, and genetic sampling will provide valuable information to separately evaluate the productivity of reconditioned steelhead over a regional scale.

Since methods are limited to monitor and/or sample adult or juvenile salmonids without intercepting non-target species, this project should have little effect on ESA-listed species present in Shitike Creek, Omak Creek, Satus Creek (including it's 4 tributaries), and the Yakima River. Overlap in run-timing of juvenile emigration of steelhead and bull trout creates the potential for some incidental capture of these ESA-listed species, yet this capture represents a very low percentage of the total run (less than 1%). Based upon the project design and methodology described above, our assessment is that the proposed project, Steelhead Kelt Reconditioning, may effect but will not adversely impact ESA-listed Upper Columbia River steelhead, Columbia River bull trout stocks, Middle Columbia River steelhead.

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Appendix B. 2005 Permit Application

A. **Title:** Application for Permit for Scientific Purposes and to Enhance the Propagation or Survival of Listed Species under the Endangered Species Act of 1973.

B. **Species:** Upper Columbia River steelhead
Mid-Columbia River steelhead

C. **Date of Permit Application**: January 18, 2005

D. Applicant Identity:

1. Robert C. Lothrop, Manager, PDLSD;

2. By and through the Bureau of Indian Affairs;

3. c/o CRITFC, 729 NE Oregon Street, Suite 200, Portland, Oregon 97232; and

4. (503)238-0667; fax (503)235-4228 email lotr@critfc.org.

5. Doug Hatch, Fisheries Scientist, CRITFC, 729 NE Oregon Street, Suite 200, Portland, Oregon 97232; (503)238-0667; fax (503)235-4228, email: hatd@critfc.org.

E. **Information on Personnel, Cooperators, and Sponsors.**

1. **Douglas Hatch is the Principle Investigator** of the study. Mr. Hatch received a Masters of Science Degree in Fisheries Resources from the University of Idaho in 1991 and a Bachelor of Science Degree in Fisheries Resources from the University of Idaho in 1986. He has been employed as a Fisheries Scientist at CRITFC since 1990. Mr. Hatch has been the Project Manager on the BPA Kelt Steelhead Reconditioning Project (2000-017) and the Kelt Enumeration Study at Lower Granite Dam (COE funded) since 2001. During the fourteen years that Mr. Hatch has been with CRITFC he has led projects on developing escapement estimation techniques where he gained an extensive knowledge of weir construction, placement, and utilization. He also has managed all aspects of numerous contracts (with BPA 92-055; 2000-017; 2001-049), and subcontracts (with all CRITFC member tribes) including budgeting, contracting, and procurement. **Dr. David E. Fast** received a Ph.D. from the University of Washington in 1987. Dr. Fast is the Research Managers for Fisheries Resource Management Program, Yakama Nation. Dr. Fast is responsible for the design, development, and implementation of a major supplementation and research facility to test the concept of using artificial production to rebuild natural spawning populations of spring chinook salmon in the Yakima Basin (BPA Project 199506325). He also has developed research programs to reintroduce extirpated

coho salmon populations and to recondition ESA listed steelhead kelts for multiple spawning. Other responsibilities include writing detailed project plans, develop short- and long-term project goals and objectives, and supervise professional and technical staff.

2. Ryan Branstetter, Fisheries Biologist, CRITFC; Chris Brun, Fisheries Biologist, Bob Spatholts, Fisheries Biologist, Devin Best, Fisheries Biologist, CTWSRO; Chris Fisher, Fisheries Biologist, Jerry Marco, Fisheries Biologist, CCT; Joe Boldgett, Fisheries Biologist, YN.

3. Funding Source: Bonneville Power Administration, Division of Environment, Fish and Wildlife.

4. The proposed activities will be coordinated with and among the Warm Springs tribe, Yakama Nation, and Colville Confederated Tribes by the CRITFC, using the genetics lab at the University of Idaho. Permit conditions will be a made a part of any subcontract issued to carry out activities of this project.

5. Provide a description of the arrangements for the disposition of any tissue samples, dead specimens, or other remains, either in a museum or other institution, for the continued benefit to science. Include the list of researchers, laboratories, museums, and/or institutional collections that would receive these tissue samples or specimens. Please include name, address, contact, and phone number for each. **Shawn Narum will be the lead Geneticist** on the project. Shawn Narum received a Masters of Science Degree from the University of San Diego in 2000 and a Bachelor of Science Degree in Fishery Biology from Colorado State University in 1996. Mr. Narum has been employed by CRITFC (stationed at the Collaborative Center for Applied Fish Science Laboratory in Hagerman, ID) as Fisheries Scientist / Conservation Geneticist since 2002. Prior to coming to CRITFC, Mr. Narum was a Senior Research Associate for Chugai Biopharmeceuticals in San Diego and a Contract Geneticist for the National Marine Fisheries Service Southwest Fisheries Science Center. Mr. Narum is the lead Geneticist on several steelhead and chinook salmon projects using microsatellite DNA analyses to examine stock composition, relatedness, and defining conservation units. **Dr. Madison Powell** received his Ph.D. in the Systematics & Evolutionary Biology program at Texas Tech University in 1995 and is currently an Assistant Professor in the Department of Fish and Wildlife Resources and Department of Animal and Veterinary Sciences at the University of Idaho. Dr Powell is also the director of the Center for Salmonid & Freshwater Species at Risk at the University of Idaho. He supervises UofI molecular genetic laboratories at the Aquaculture Research Institute in Moscow, ID and at the Hagerman Fish Culture Experiment Station in Hagerman, Idaho. The laboratories' primary goals are to provide timely genetic information to applied conservation genetic questions, and provide genetic advice and consultation to state, federal, and tribal agencies regarding endangered fishes and fisheries management. Dr. Powell is currently the Principal investigator of several genetic projects examining reproductive success of hatchery and wild fish using

microsatellite DNA analyses including (sockeye BPA project, Chinook captive broodstock project). Dr. Powell will assist in the development of the research study design, supervise genetic lab work, analyze data and report results.

6. See Sections G & I for description of holding tanks and transport, respectively.

F. **Project Description, Purpose, and Significance:** Please describe the purpose of your study or project. If available, please attach a copy of the formal project proposal or contract, including the contract number, to your application. You may reference the appropriate section of the proposal/contract in response to a particular question.

1. Project justification and objective(s): The primary purpose of this assessment is to estimate the incidental take of ESA listed fish by ESU as a result of the proposed research at the Yakima River, Shitike Creek, Omak Creek, and Satus Creek. Available data on run size, run timing, age composition, hatchery production, and ecology of stocks were used to evaluate potential effects. Kelt reconditioning promotes re-initiation of feeding, thereby enabling them to survive and rebuild energy reserves required for proper gondal development and iteroparous spawning. Kelt reconditioning techniques were initially developed for Atlantic salmon *Salmo salar* and sea-trout *S. trutta.* A review of these studies and those applicable to steelhead kelts are summarized in Evans et al. 2001. This project identifies and systematically tests several kelt reconditioning approaches. Enhancing the species' natural iteroparity (i.e. its ability to spawn more than once in its life) may strengthen wild steelhead populations. Fish that have spawned in one or more previous years contribute substantially to some wild steelhead populations (e.g. as high as 79% for 1994-96 in the Utkholok River of Kamchatka; MSU undated; M. Powell UI and R. Williams, ISRP pers. comm.). However, the contribution from iteroparous steelhead in Columbia River populations is much lower. For example, recent estimates of repeat spawners in the Kalama River (tributary of the unimpounded lower Columbia River) have exceeded 17% (NMFS 1996), which is the highest published iteroparity rate we found from the Columbia River Basin. Farther upstream, 4.6% of the summer run in the Hood River (above only one mainstem dam) are repeat spawners (J. Newton, ODFW, pers. comm.). Similarly, summer steelhead in the South Fork Walla Walla River have 2%-9% rates of repeat spawning (J. Germond, ODFW, pers. comm.), whereas repeat spawners compose only 1.6% of the Yakima River wild run (from data in Hockersmith et al. 1995) and 1.5% of the Columbia River run upstream from Priest Rapids Dam (L. Brown, WDFW, unpubl. data). In the Snake River subbasin, at least 2% of wild steelhead returning to Idaho's Clearwater River were repeat spawners when there were only two downstream dams (Lewiston Dam and Bonneville Dam; Whitt 1954). In recent years, we know of a few confirmed repeat spawners that were observed in the juvenile bypass system at Little Goose Dam in 2000 and 2001(Evans and Beaty 2001) as well as a small number that returned to the Lower Granite Dam in 2002 (Hatch et al. 2002), and we suspect that < 1% of wild Snake River steelhead survive to spawn more than once. Under present conditions, very few (< 5% overall) summer steelhead in the Columbia River – especially in the upper basin – appear

capable of exhibiting iteroparity in the impounded, post-development Columbia Basin.

2. This proposed work responds directly to several reasonable and prudent alternatives identified in NOAA's biological opinion on the Federal Columbia River Power System, as listed in the box below:

RPA Number	Description
NMFS RPA 107	Assess survival of adult salmonids migrating upstream, and factors contributing to unaccountable losses.
NMFS RPA 118	Assess and enumerate indirect prespawning mortality of upstream-migrating fish. Enhance efforts to enumerate unaccountable losses in mainstem reservoirs.
NMFS RPA 184	Develop an hatchery research, monitoring, and evaluation program to determine whether hatchery reforms reduce the risk of extinction for salmonids
RA 994	Assess adult salmon passage success in the lower Columbia and Snake rivers, evaluate specific flow and spill conditions, and evaluate measures to improve adult anadromous passage.
RM&E Topics:	General migration corridor; NMFS RPAs and RAs: 85,87,190, 193
	Adult homing/straying: Outmigration of steelhead kelts; NMFS RPAs and RAs: 37,109,199,1224,2000
Corps Action 109	The Corps shall initiate an adult steelhead downstream migrant (kelt) assessment program to determine the magnitude of passage, the contribution to population diversity and growth, and potential actions to provide safe passage (Draft Mainstem/Systemwide Artificial Production Program Summary, pg 24).

3. Broader Significance: Steelhead kelts in impounded areas of the Columbia basin should have significantly greater likelihood of exhibiting iteroparity if they are reconditioned in captivity, relative to their current inability to exhibit iteroparity in the impounded, post-development Columbia Basin. Kelt reconditioning promotes re-initiation of feeding, thereby enabling them to survive and rebuild energy reserves required for proper gondal development and iteroparous spawning.

4. This project links with the Collaborative Center for Applied Fish Science (Project 2001-046-00).

5. Despite the thousands of kelts that arrived at Lower Granite Dam in 2002, as in 2001, very few successfully navigated the Columbia Basin hydrosystem. Radio telemetry indicated that only 17.6% (37/210) and 13.3% (8/210) of tagged kelts released from Lower Granite Dam tailrace reached the Ice Harbor Dam tailrace and Bonneville Dam tailrace, respectively. In addition to kelt mortality associated with dam passage, depleted energy stores and physical deterioration likely constituted important mortality, compounded by fasting for many months during migration and spawning (Love 1970). Without this project and associated efforts, return steelhead spawners will continue to be underrepresented in the Columbia River system.

G. **Project Methodology:** Please provide a detailed description of the project, or program, in which the listed species is to be used, including:

1. The described research in this biological assessment will occur between May 15, 2004, and December 31, 2005

2. A discussion of the procedures and techniques which will be used during the project. The discussion should include, at a minimum:

a. Yakima River: Up to 200 Yakima River outmigrating kelts will be captured at the CJMFF and directly be released in a one time release below Bonneville Dam. Shitike Creek: We will attempt to capture around 200 virgin spawners using a weir. Omak Creek: We will attempt to capture around 200 virgin spawners using a weir. Satus Creek: We will obtain at most 80 (minimum 40) virgin spawners headed upstream and obtain genetic samples from them before they are transported to either 2 of the 4 streams (North and South Fork Logy, Section Corner, and/or Yatamai Creeks will be decided by end of 2004) that have suitable steelhead spawning gravels. The 4 creeks are geographically isolated by large waterfalls and will be racked to keep adult steelhead in the streams until they spawn. We will capture our released fish when they become outmigrating kelts using a V-weir.

b. All adult Steelhead kelts will receive Passive Integrated Transponder (PIT) tags inserted into the body cavity via syringe. No take of ESA listed fish is expected. A portion of the Yakima River short-term reconditioned fish (~60) along with the direct transport and release group (~60) will be either radio-tagged or will have long-life (>300 day) acoustic transmitters surgically implanted into the body cavity below the pectoral fin for long-term tracking of outward migration behavior from below Bonneville Dam to the estuaries and continental shelf. Approximately 40 Yakima River individuals from the long-term reconditioning experiment will receive radio-tags using the gastric insertion technique to monitor return spawning rates and the location of spawning grounds.

A portion of adult steelhead kelts at Shitike Creek (~40 individuals), Yakima River (~100 individuals) will have long-life (>50 day) radio transmitters surgically implanted into the body cavity below the pectoral fin for long-term tracking or use of the gastric insertion technique for short-term tracking.

Adult steelhead kelts at Shitike Creek will have floy-tags attached at the base of the dorsal fin to aid in identification of experimental fish. No take of ESA listed fish is expected.

c. Formalin will be administered five times weekly at 1:6,000 for 1 hour in all reconditioning tanks to prevent fungal outbreaks.

d. We made substantial progress in 2001 and 2002 regarding long-term kelt reconditioning, achieving a current long-term survival rate of 73% in 2003. However, the applicability of long-term reconditioning must be evaluated at different locations (i.e., with different source populations) in order to adequately assess long-term reconditioning's ability to augment iteroparity rates. Long-term

reconditioning will be performed using fish from 4 sites: Omak Creek, Yakima River, Satus Creek, and Shitike Creek. Some of the steelhead kelts will be captured at V-weir sites (Shitike Creek, Omak Creek, and Satus Creek) that will direct fish to a capture box that will hold them until they can be dip netted into a holding tank then transported via truck to a reconditioning facility. Once at the reconditioning facility kelts will be placed in 20' circular tanks that use well water and/or river water and given a diet of krill and Moore-Clark pellets for 4-5 months. The rest of the steelhead kelts will need to be captured at the Yakima River at the Chandler juvenile evaluation facility at the juvenile bypass and dip netted off of the separator and held in 4'x 6' tank until they can be transported to 20' circular tanks that use well water and/or river water and given a diet of krill and Moore-Clark pellets for reconditioning for 4-5 months and 6-8 weeks.

All steelhead kelts captured at all sites (Shitike Creek, Omak Creek, Satus Creek, and the Yakima River) will be retained in a 20'(l) x 20'(w) x 4'(h) circular tank. Individual tank carrying capacity was set at a maximum of 200 fish based on the aquaculture experience of YN hatchery staff, and the project goal of maximizing steelhead kelt survival in captivity. Formalin will be administered five times weekly at 1:6,000 for 1 hour in all reconditioning tanks to prevent fungal outbreaks. Due to the successful use in treating *Salmonicola* during the kelt reconditioning experiments in 2000 (Evans and Beaty 2000), Ivermectin™ will again be diluted with saline (1:30) and injected into the posterior end of the fish's esophagus using a small (1cc) plastic syringe. Water used for the tanks will either be ground well, river, or both depending on the site and will be of good quality for the health of the fish.

Kelts will be given a diet of krill and Moore-Clark pellets to elicit a feeding response from steelhead kelts. Short-term reconditioned fish will be held for a total of 6-8 weeks then trucked below Bonneville for release. Long-term reconditioned fish will be held for a total of 4-7 months and then released in-river to spawn.

Approximately 40 Yakima River individuals from the long-term reconditioning experiment will receive radio-tags using the gastric insertion technique to monitor return spawning rates and the location of spawning grounds. Once we receive an adequate amount of fish to compare against reconditioned fish, they will then be transported to the Hamilton boat ramp below Bonneville Dam.

Fish captured in Shitike and Omak Creeks will be released to continue their migration to spawning grounds upstream.

At Satus Creek we will obtain at most 80 (minimum 40) virgin spawners headed upstream and obtain genetic samples from them before they are transported to either 2 of the 4 streams (North and South Fork Logy, Section Corner, and/or Yatamai Creeks will be decided by end of 2004) that have suitable steelhead spawning gravels. The 4 creeks are geographically isolated by large waterfalls

and will be racked to keep adult steelhead in the streams until they spawn. We will capture our released fish when they become outmigrating kelts using a V-weir. These outmigrating kelts will then be held for long-term reconditioning (6-8 months) and subsequently be reintroduced to the system the following year. These streams provide a good opportunity for us to establish parentage rates in a field laboratory setting.

Successful expression of iteroparity in steelhead may not simply be limited by post-spawning downstream passage through the mainstem corridor but also by starvation. Thus, short-term conditioning may augment iteroparity rates by initiating the feeding process and allowing kelts to naturally undergo gonadal recrudescence in the estuary and marine environments. Short-term reconditioning is defined as the period of time needed (6 to 8 weeks) for kelts to initiate post-spawning feeding, followed by the transportation of kelts around mainstem hydroelectric facilities for release and natural rearing and rematuration in the Pacific Ocean. Short-term reconditioning will be performed at the CJMFF on the Yakima River

Truck Transport: Given the high mortality rates of emigrating kelts observed via radio telemetry in the Snake River (Evans et al. 2001; Evans 2002; Hatch et al, in review), iteroparity may simply be augmented by transporting kelts around the hydro system, thereby increasing the number of kelts that successfully have access to the marine environment. The purpose for this objective is to evaluate the lowest cost alternative aimed at increasing steelhead iteroparity. The objective will be conducted at the CJMFF at Prosser, WA.

e. Approximately 20 first-time spawners and 20 steelhead kelts from the long-term reconditioning experiment at the CJMFF will be retained to ascertain gamete and progeny viability. These fish will be air spawned, their gametes will then be refrigerated and sent to the University of Idaho where they will be fertilized and evaluated. Some of the fertilized eggs will be raised to adulthood to evaluate the gamete viability of the progeny.

Adult Steelhead kelts at Shitike Creek, Satus Creek and Omak Creek, will have a fin clip taken for genetic analysis. No take of ESA listed fish is expected

3. Steelhead kelt collection While there are mortalities associated with the take of adult steelhead/kelts, these potential mortalities must be viewed in the context of the higher natural mortality that would occur for these fish without intervention.

Juvenile *Oncorhynchus mykiss* Collection There is no method to avoid sampling ESA-listed fish in a screw-trap or V-weir. The rotary screw trap or V-weir will be deployed at Omak Creek, Shitike Creek, and/or 2 of the 4 streams in the Satus watershed. We will take precautions to minimize the effect of sampling

all fish including frequent monitoring, safe handling procedures, and expedient measurement. No take of ESA listed fish is expected.

Collection of Adult Rainbow Trout (*O. mykiss*) It is possible that resident rainbow trout may be mating with returning steelhead and must be identified so that assigning parentage will be successful. There is no method to avoid sampling ESA-listed fish in a screw-trap or V-weir. The rotary screw trap or V-weir will be deployed at Omak Creek, Shitike Creek, and/or 2 of the 4 streams in the Satus watershed. Adult rainbow trout will have a genetic sample taken (caudle fin punch) that will be analyzed to isolate genetic contributors to juvenile stocks. We will take precautions to minimize the effect of sampling all fish including frequent monitoring, safe handling procedures, and expedient measurement. No take of ESA listed fish is expected.

H. Description and Estimates of Take:

The description of the listed species to be taken during the proposed activities should include the following:

1. Upper Columbia River steelhead, endangered, August 18, 1997. This inland steelhead ESU occupies the Columbia River Basin upstream from the Yakima River, Washington, to the United States/Canada Border (Busby et al. 1996). (USFWS 2002)

   Mid-Columbia River steelhead, threatened, March 25, 1999. The Mid-Columbia River Unit encompasses the geographic area from Wind River, Washington, and the Hood River, Oregon (exclusive), upstream to, and including, the Yakima River, Washington. (USFWS 2002)

2. Sampling will occur throughout the run of steelhead returning to the Omak and Satus Creeks, Yakima River and Shitike Creek sampling sites.

3. Since 1991, the NOAA Fisheries has identified several populations of Columbia River Basin salmon and steelhead as ESUs that require protection under the ESA. The populations potentially affected by the proposed research project are shown below as described by the NOAA Fisheries and their current listing status (NMFS 1999), currently under review. Any changes in the status of these listings or ESU boundary changes will be addressed in the consultation process. These ESU populations are only those that are potentially present in the proposed research areas from March 2003, to December 31, 2005. The U.S. Fish and Wildlife Service (USFWS) have listed the bull trout populations as threatened since 1998. Since bull trout are widely distributed and have varying life histories and therefore different threats, the USFWS identified 22 recovery units within the Columbia River Distinct Population Segment, each with its own recovery strategy (USFWS 2002).

   Historically, summer steelhead differed in their time of entry into the Columbia River and were defined accordingly as groups A and B in the CRFMP and in the Status Review of West Coast Steelhead. These designations are based on the observation of a bimodal migration of adult steelhead at Bonneville Dam and differences in age (1-versus 2-ocean) and adult size observed among Snake River steelhead (Busby et al 1996). Typically, adult A-run steelhead enter fresh water from June to August; as defined, the A-run passes Bonneville Dam before 25 August (CBFWA 1990). Group A steelhead originate in production areas throughout the Columbia River Basin, whereas Group B steelhead are believed to originate only in portions of the Clearwater and Salmon River drainages in Idaho (TAC 1997). Upper Columbia River steelhead are designated as Group A

4. A description of estimated take per annual period for activities at each discrete location:

Adult Steelhead Kelt Collection and Reconditioning

Upper Columbia River Adult Steelhead Harassment/Take Estimates

Capture

We are interested in reconditioning approximately 200 steelhead kelts at Omak Creek. With the Yakama reconditioning effort we typically kept 80% of what was handled and released about 20% (Hatch et al. a. in review). With 200 intended for reconditioning and with 80 percent captured kept for reconditioning, there will be 250 total harassed in capture. In order to determine incidental mortality for this phase, we used Yakama reconditioning as an estimate for the amount of handling mortalities associated with adult steelhead kelt capture. Handling mortalities at the CJMFF averaged about 4% (Hatch et al. a. in review). With a total of 250 fish handled and assuming a 4% mortality rate, we could have 10 potential mortalities for this phase.

Reconditioning

Harassment rates are based on the number of steelhead that may be potentially harassed during their movement from the reconditioning tank for sampling to the truck for release. We intend to recondition up to 200 fish at Omak Creek, which results in the possible harassment of up to 200 adult steelhead kelts. Potential take is based off of last year's mortality rates from the Yakama Nation's previous reconditioning efforts, which was ~ 40% for the low in long-term reconditioning (Hatch et al. a. in review). With 200 potential reconditioned fish at a 40% mortality rate, there is the potential for 80 mortalities.

***Totals*: 250 adults captured, handled, and released (in 2 different stages), with a total potential mortality of 90 adults.**

Middle Columbia River Adult Steelhead Harassment/Take Estimates

Capture

We are interested in reconditioning approximately 200 steelhead kelts at Shitike Creek, and min (40)/max (80) virgin spawners from Satus Creek. We are also interested in reconditioning approximately 800 adult steelhead kelts at the facility at the CJMFF. With the Yakama reconditioning effort we typically kept 80% of what was handled and released about 20% (Hatch et al. a. in review). For the CJMFF on Yakima River @ Prosser, WA, with 800 intended for reconditioning and 200 for direct release and 80 percent kept for reconditioning, there will be a total of 1,250 captured and handled initially, with 1000 kept for two different releases.

For Shitike Creek steelhead kelts and Satus Creek virgin spawners, we calculate:

(200 intended for reconditioning / 80 percent kept for reconditioning) + (80 intended for transport/ 80 percent total kept for transport) + (maximum of 80 steelhead kelts recaptured for reconditioning) = 250 + 100 = 350 total harassment

That means that the total MCR adult steelhead kelt captured and handled will be 1,600; with a total of 1,200 held for reconditioning and 80 for transport to release sites.

For the incidental mortality associated with the initial capture and handling, we used the Yakama reconditioning effort as an estimate for the amount of handling mortalities associated with adult steelhead kelt capture. Handling mortalities at the CJMFF averaged ~4% (Hatch et al. a. in review).

CJMFF on Yakima River @ Prosser, WA

1,250 total fish handled * .04= 50 potential mortalities

Shitike Creek and Satus Creek

(250 fish handled * .04) + (100 fish handled * .04) = 10 + 4 = 14 potential mortalities.

So, in the initial capture an handling phase, we estimate up to 64 mortalities.

Reconditioning

Since we intend to recondition up to 800 fish and 200 for direct transport/release at the Yakima River at the CJMFF, we will have a total of up to 1000 adult steelhead kelts in holding tanks for reconditioning. We also plan on reconditioning around 200 steelhead kelts at Shitike Creek and the 80 fish that will be released into the two of the four sites at the CJMFF. All together, this could result in up to 1, 280 adult steelhead kelts in these locations combined.

Potential take is based off of last year's mortality rates from the Yakama Nation's previous reconditioning efforts, which was about 40% for the low in long-term reconditioning (Hatch et al a. in review). Potential take for the direct release/transport is assumed to be about 4% based off of our handling take at the CJMFF (Hatch et al. a. in review). With 1000 potential long-term reconditioned fish at an assumed 40% mortality rate, there could be 400 potential mortalities. In the next group, with up to 200 potential kelts for direct transport/release at an assumed 4% mortality rate, there could be 8 potential mortalities. Finally, for the transport group of 80 potential capture/transport/long-term recondition/release at an assumed 40% mortality rate, there could be 32 potential mortalities.

Totals: 1600 adult steelhead/kelts captured and handled, of which 1,200 will be held for reconditioning, resulting in a total potential mortality of 504 adults (64 in initial phase and 440 potentially lost during reconditioning).

*Juvenile Steelhead (**O. mykiss**) collection*

Upper Columbia River Juvenile Steelhead

Harassment rates are based on the number of juvenile *O. mykiss* that may be captured by a rotary screw trap or V-weir, handled to obtain genetic data, and then released to resume migration. We based captures on yearly smolt release data at Omak Creek (WDFW 2003) then averaged the data (smolt release, ~17,000). Based on the average, we assume a 10% capture rate with a 1% mortality rate.

We will capture and handle 1,700 juveniles and may encounter a total of 17 mortalities.

Middle Columbia River Juvenile Steelhead

Harassment rates are based on the number of juvenile steelhead that may be captured by a rotary screw trap, handled to obtain genetic data, and then released to resume migration. The number of steelhead estimated captured by the rotary screw trap was based off of previous years capture data at Shitike Creek with a screw trap (Warm Springs Tribal Fisheries Program, personal communication). We then averaged the yearly screw trap capture data and then assumed that we would capture at nearly the same rate (1,644 juveniles). Based on the average capture rate, we assume a 1% mortality rate.

1,644 potentially captured juvenile steelhead smolts at an assumed 1% mortality rate could result in 16 potential mortalities

In the 2 of the 4 following listed creeks in the Satus Creek drainage (North Fork Logy, South Fork Logy, Section Corner, and Yatamai Creeks) will have virgin spawners placed and then racked off to prevent them from descending the waterfalls. This area is geographically isolated from resident rainbow trout populations. We will then capture juvenile steelhead smolts to obtain parentage data. Based on Yuen and Sharma's smolt per spawner estimates (~ 58 smolts/spawner) and at least 40 spawners, there could possibly be 2,320 outmigrating smolts (Yuen and Sharma, 2004).

We should be able to capture at least 10 % of the outmigrating smolt population, which gives us 232 smolts captured. We will assume a 1% mortality rate, which results in 3 possible mortalities.

I. **Transportation and Holding**

1. **Transportation of a Listed Species:** Provide a description of how any live individuals taken from the capture site or other facility (including rescue and relocation activities) will be transported including:

   a. All steelhead kelts captured at weir sites (Omak, Shitike, and Satus Creeks) will be truck transported from capture area to reconditioning site

by respective Tribal Fish and Wildlife Program staff. At the end of reconditioning all surviving reconditioned kelts will be truck transported from reconditioning sites to release sites by respective Tribal Fish and Wildlife Program staff. Number of transported steelhead kelts will correspond with the number of kelts captured at weir sites (Please see Upper and Middle Columba River Adult Steelhead Harassment/Take Estimates, Capture Sections for details on the amount of steelhead kelts that we anticipate transporting to reconditioning facilities from capture sites) and subsequent release of all reconditioned kelts (Please see Upper and Middle Columba River Adult Steelhead Harassment/Take Estimates, Reconditioning Sections for details on the amount of steelhead kelts that we anticipate transporting to release sites from reconditioning tanks).

b. Length of time in transit for the transfer of the individual(s) from the capture site to the holding facility or to the target location. Steelhead kelts will not exceed 8 hours in transit from capture location to reconditioning facilities.

c. Length of time in transit for any planned future move/transfer of the individual(s). Steelhead kelts will not exceed 8 hours in transit from reconditioning facilities to release site.

d. The qualifications of the common carrier or agent used for transportation of the individual(s). All drivers have prior fish hauling experience and a Commercial Driver's License.

e. A description of the pen, tank, container, cage, cradle, or other devices used, both to hold the individual(s) at the capture site and during transportation. Steelhead kelts will immediately dipnetted from picket weir or removed from a weir trap box and then immediately hand carried to 1500-gallon tank truck via fish bag.

Special care before, during and after transportation (e.g., use of oxygen, temperature control, anesthetics, antibiotics, etc.) Maximum water temperature will not exceed 63^0 F by using cool circulating river water, a chiller, or ice (non-chlorinated). Oxygenation of water will be maintained at saturation. Fish will receive a .25ml injection of oxytetracycline to boost immune system response.

2. **Holding of a Listed Species:** Describe the plan for care and maintenance of any live individuals, including a complete description of the facilities where any such individuals will be maintained including:

Long-term reconditioning will be performed using fish from 4 sites: Omak Creek, Yakima River, Satus Creek, and Shitike Creek. Some of the steelhead kelts will be captured at V-weir sites (Shitike Creek, Omak Creek, and Satus Creek) that will direct fish to a capture box that will hold them until they can be dip netted

into a holding tank then transported via truck to a reconditioning facility. Once at the reconditioning facility kelts will be placed in either a 20' or 15' circular tank that use well water and/or river water and given a diet of krill and Moore-Clark pellets for 4-5 months. The rest of the steelhead kelts will need to be captured at the Yakima River at the Chandler juvenile evaluation facility at the juvenile bypass and dip netted off of the separator and held in 4'x 6' tank until they can be transported to 20' circular tanks that use well water and/or river water and given a diet of krill and Moore-Clark pellets for reconditioning for 4-5 months and 6-8 weeks.

All steelhead kelts captured at all sites (Shitike Creek, Omak Creek, Satus Creek, and the Yakima River) will be retained in a 20'(l) x 20'(w) x 4'(h) circular tank. Individual tank carrying capacity was set at a maximum of 200 fish based on the aquaculture experience of YN hatchery staff, and the project goal of maximizing steelhead kelt survival in captivity. Formalin will be administered five times weekly at 1:6,000 for 1 hour in all reconditioning tanks to prevent fungal outbreaks. Due to the successful use in treating *Salmonicola* during the kelt reconditioning experiments in 2000 (Evans and Beaty 2000), Ivermectin™ will again be diluted with saline (1:30) and injected into the posterior end of the fish's esophagus using a small (1cc) plastic syringe. Water used for the tanks will either be ground well, river, or both depending on the site and will be of good quality for the health of the fish.

Kelts will be given a diet of krill and Moore-Clark pellets to elicit a feeding response from steelhead kelts. Short-term reconditioned fish will be held for a total of 6-8 weeks then trucked below Bonneville for release. Long-term reconditioned fish will be held for a total of 4-7 months and then released in-river to spawn.

3. **Emergency contingencies**: Identify emergency contingencies- e.g., backup life support systems, alarm systems, redundant water and oxygen supply, release or destroy decision chains, etc. All reconditioning facilities will be continuously monitored by human and remote electronic systems that will alert audibly the presence of life support failure. All tanks are outfitted with back up generators, pumps, and oxygen. The Hatchery Manager will make the decision in consultation with CRITFC to make any release or destroy decisions.

J. **Cooperative Breeding Program:** You must include a statement of willingness to participate in a cooperative breeding program and to maintain or contribute data to a breeding program, if such action is requested.

K. **Previous or Concurrent Activities Involving Listed Species**:

1. Permit holder for #TE001598-2, issued by USFWS for Bull Trout; Section 10 Permits #825 and #1134 issued by NOAA Fisheries for salmon research; Section Permit #1149 issued b NOAA Fisheries for salmon enhancement activities.

L. **Certification:**

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand this information is submitted for the purpose of obtaining a permit under the Endangered Species Act of 1973 (ESA) and regulations promulgated thereunder, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or to penalties under the ESA."

_____

Robert C. Lothrop, Manager, PDLSD, by and through the BIA Date

Appendix C. Coverage for Roza adult trapping operations.

Annual Report for ESA Section 10 Scientific Research Permit - Provide separate tables for each study.

Part I:

ESU/Species	Life Stage	Take Activity	# of Fish Authorized for Take	Actual Number of Listed Fish Taken	Authorized Unintentional Mortality	Actual Number of Unintentional Mortality	Research Location	Research Period
Mid Columbia steelhead	Adult	Capture, radio tag, DNA sample, release	120	117	0	0	Yakima river Washington	November - April

The above table mirrors the Take Table for the Permit Application except for three columns: 1) # of Fish Authorized for Take, 2) Actual Number of Listed Fish Taken and 3) Actual Number of Unintentional Mortality. This table serves to contrast the number of fish authorized for take to the actual number of fish taken.

Instructions:
Life Stage: choose between juvenile (combine fry, fingerlings, smolts), adult, or post-spawned adults.

Take Activity: Indicate the type of activity: "observe/harass," "capture, handle release," "capture, tag [or mark], release," "intentional mortality." "Intentional mortality" (equivalent to direct mortality or sacrifice) is a type of take activity and must be accounted for on a separate line (see above).

# of Fish Authorized for Take: Indicate the number of fish authorized for take in the permit.

Actual Number of Listed Fish Taken: Indicate the actual number of fish taken during the activities relevant to the annual report.

Authorized Unintentional Mortality: Indicate the number of fish authorized for unintentional mortality in the permit.

Actual Number of Unintentional Mortality: Indicate the actual number of fish unintentionally killed.

Research Period: Indicate the months during which the Type of Take Activity took place.

Part II: Briefly Provide the Following Information

M. A. Measures taken to minimize effects to listed fish

Work-up protocol consisted of fish volitionally leaving the holding tank into anesthetic tank with 40ppm stock solution. After the fish were anesthetized biological data was obtained, fork length, pohp length, weight, sex and scales. DNA fin clip and then a radio tag was inserted gastro intestinally. The fish was then placed into fresh water and allowed to recover for up to 6 hours before they were released back to the river.

B. Effectiveness of these measures

All of the fish fully recovered and swam out of the facility on their own.

N. The condition of listed fish taken and used for the research

The fish appeared to be in excellent condition.

O. General extent of research activities on fish

As stated above collected bio-data to create a data base profile and radio tracked to determine critical habitat for the adult steelhead.

P. How listed fish were injured or killed and how were they disposed of

N/A

Q. Did the research activities have any unforseen effects

none

R. How were all take estimates derived

120 fish were chosen to get a good representation of the adult population above roza dam. And also the logistics of being able to track and monitor fish on a daily basis

S. What steps have been taken to coordinate the research with other researchers

This was a co-operative effort between Yakima nation and the bureau of reclamation to radio tag and track adult steelhead in the upper Yakima river watershed to determine holding and spawning areas. DNA samples were also taken as part of WDF&W genetic profiling for the Yakima river and the YKFP project.

T. Were any problems encountered during the activities

No

U. Briefly summarize any preliminary findings

We found that 50% of the fish tagged spawned in the mainstem Yakima river and the other 50% used tributaries in the upper Yakima watershed. We also determined that a large portion of the run were females and that they actually spawned with resident rainbows.

Appendix D. Adult and Juvenile Take Tables for Mid-Columbia Steelhead Kelt Reconditioning Projects.

Number of individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category (a)	Location	Date(s)	Details
250	Upper Columbia River Steelhead	Adult, Kelt	N/A	N/A	Capture, anesthetize, measure, weigh, release	Omak Cr, WA	March-June	Capture and release 40 PIT-tagged and reconditioned 200 Capture and release mortality 10 Reconditioning mortality 80
1,250	Middle Columbia River Steelhead	Adult, Kelt	N/A	wild	Capture, anesthetize, measure, weigh, release	Prosser, WA	March-June	Capture and release 200 Direct Transport and Release 200 PIT-tagged and reconditioned 800 Capture and release mortality 50 PIT-tagged Direct Transport and Release mortality 8 Reconditioning mortality 400

Number of individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category (a)	Location	Date(s)	Details
100	Middle Columbia River Steelhead	Adult First Time Spawners	N/A	wild	Capture, anesthetize, measure, weigh, tag, release	Satus Cr, WA	December-June	Capture and release 16 PIT-tagged and reconditioned 80 Capture and release mortality 4 Reconditioning mortality 32
250	Middle Columbia River Steelhead	Adult, Kelt	N/A	wild	Capture, anesthetize, measure, weigh, tag, release	Shitike Cr, OR	March-June	Capture and release 40 PIT-tagged and reconditioned 200 Capture and release mortality 10 Reconditioning mortality 80

Number of individuals	Species and/or Population and/or ESU	Life Stage	Sex	Origin	Take Activity Category (a)	Location	Date(s)	Details
1,700	Upper Columbia River Steelhead	Juvenile	N/A	N/A	Capture, anesthetize, genetic sample, release	Omak Cr, WA	March-June	Capture and release mortality 17
232	Middle Columbia River Steelhead	Juvenile	N/A	wild	Capture, anesthetize, measure, weigh, tag, release	Satus Cr, WA	December-June	Capture and release mortality 3
1,680	Middle Columbia River Steelhead	Juvenile	N/A	wild	Capture, anesthetize, measure, weigh, tag, release	Shitike Cr, OR	March-June	Capture and release mortality 16

Appendix E. NOAA 2006 Determination Letter.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
PORTLAND OFFICE
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232-1274

F/NWR5

March 1, 2006

Robert C. Lothrop, Manager
Columbia River Inter-Tribal Fish Commission
729 NE Oregon Street, Suite 200
Portland, OR 97232

RE: Determination of Take for Research Purposes (01-06 CRITFC)

Dear Mr. Lothrop:

This letter is to inform you that the National Marine Fisheries Service (NMFS) Hydropower Division's Federal Columbia River Power System (FCRPS) Branch has determined that the take associated with the ongoing study, "Proposal to Evaluate Reproductive Success of Natural Origin, Hatchery Origin, and Kelt Steelhead in the Columbia River Basin" is permitted in 2006 under the incidental take statement in the 2004 FCRPS Biological Opinion. The take is permitted under the terms, conditions, and requirements set forth below. This study received a determination in 2005 and this determination updates the take allowance for 2006. If the study continues beyond this year, the determination must be updated annually.

The study being considered in this determination would occur at several ongoing sites, including Prosser Hatchery, Shitike Creek, Omak Creek, Ahtanum Creek, Satus Creek, and Section Corner Creek. At each location, kelts will be captured and reconditioned for outmigration.

The study implements research described in the 2004 FCRPS Biological Opinion, Appendix G-14, Section 4.18, "Return Rates of Reconditioned Kelts Encountered in the System." The 2004 FCRPS Biological Opinion anticipated that this type of near term research would be implemented through the regional processes. The study is being funded by the Bonneville Power Administration's (BPA) Fish and Wildlife Program. The Northwest Power and Conservation Council recommended, and BPA has agreed, to fund the project in 2006.

Terms, Conditions, and Requirements

General Provisions

- Endangered Species Act (ESA)-listed fish must be handled with extreme care and kept in water to the maximum extent possible during sampling and processing. Adequate circulation and replenishment of water in holding units is required. When using gear that

captures a mix of species, ESA-listed fish must be processed first to minimize the duration of handling stress. ESA-listed fish must be transferred using a sanctuary net (which holds water during transfer) whenever necessary to prevent the added stress of being out of water. Should the FCRPS Branch determine that a researcher's procedure is no longer acceptable; the researcher must immediately cease such activity until the FCRPS Branch determines an acceptable substitute procedure.

- Each ESA-listed fish handled out of water must be anesthetized to prevent injury or mortality. Anesthetized fish must be allowed to recover (e.g., in a recovery tank) before being released. Fish that are simply counted must remain in water, but do not have to be anesthetized.

- To minimize the lateral transfer of pathogens, a sterilized needle must be used for each individual injection when PIT-tagging ESA-listed fish. Sterilization techniques are required for all procedures.

- Whenever possible, unintentional or indirect mortalities of ESA-listed fish that occur during scientific research and monitoring activities shall be used in place of intentional lethal take, if applicable.

- Each researcher must ensure that the ESA-listed species are taken only by the means, in the areas, and for the purposes set forth in the research proposal, as limited by the terms and conditions.

- Each researcher, in effecting the take authorized by this determination, is considered to have accepted the terms and conditions of this determination and the incidental take statement of the 2004 FCRPS Biological Opinion, and must be prepared to comply with the provisions of these two documents, and the applicable NMFS' regulations and the ESA.

- Each researcher is responsible for the actions of any individual operating under the authority of the researcher's designated take authorization within the incidental take statement of the 2004 FCRPS Biological Opinion and this determination.

- Each researcher, staff member, or designated agent acting on the researcher's behalf must possess a copy of the incidental take statement in the 2004 FCRPS Biological Opinion and this determination when conducting the activities for which a take of ESA-listed species or other exception to ESA prohibitions is authorized herein.

- Researchers may not transfer or assign a take authorization included within this determination to any other person(s), as person is defined in Section 3(12) of the ESA. The take authorization ceases to be in force or effective if transferred or assigned to any other person without prior authorization from the FCRPS Branch.

- Each researcher must obtain any other Federal, State, and local permits or authorizations necessary to conduct the activities provided for in this incidental take statement.

- Each researcher must coordinate with other applicable co-managers and researchers to ensure that no unnecessary duplication or adverse cumulative effects occur as a result of the researcher's activities.

- Each researcher must allow any FCRPS Branch employee(s), or any other person(s) designated by the FCRPS Branch, to accompany field personnel during the activities provided for within the proposed research. Each researcher must allow such person(s) to inspect the researcher's records and facilities if such records and facilities pertain to ESA-listed species covered by this determination, the incidental take statement, or NMFS' responsibilities under the ESA.

- Under the terms of NMFS' regulations, a violation of any of the terms and conditions of the incidental take statement of the 2004 FCRPS Biological Opinion, which is also covered in this determination, will subject the offending researcher and/or any individual who is operating under the authority of the incidental take statement in the 2004 FCRPS Biological Opinion and this determination, to penalties as provided for in the ESA.

- Each researcher is responsible for biological samples collected from ESA-listed species as long as they are useful for research purposes. The terms and conditions concerning any samples collected remain in effect as long as the researcher maintains authority over and responsibility for the material taken. A researcher may not transfer biological samples to anyone not listed in the research proposal without obtaining prior written approval from the FCRPS Branch. Any such transfer will be subject to such conditions as the FCRPS Branch deems appropriate.

- The FCRPS Branch may amend a take authorization identified in this determination or adjust specific take levels after reasonable notice to the applicable researcher.

- The FCRPS Branch may revoke a take authorization identified in the incidental take statement of the 2004 FCRPS Biological Opinion and this determination if the activities it provides for are not carried out, if the activities are not carried out in accordance with the conditions of this determination and the incidental take statement in the 2004 FCRPS Biological Opinion and the purposes and requirements of the ESA, or if the FCRPS Branch otherwise determines that the continuation of activities would operate to the disadvantage of ESA-listed species.

Study Specific Methodology

- Up to 200 Yakima River outmigrating kelts are permitted to be captured at the Chandler Juvenile Monitoring Facility (CJMF) and directly released in a one-time release below Bonneville Dam. At Shitike Creek, up to 200 virgin spawners will be permitted to be

captured using a weir. At Omak Creek, 200 virgin spawners will be permitted to be captured using a weir. At Ahtanum Creek, 200 virgin spawners will be permitted to be captured using a weir. At Satus Creek, up to 20 virgin spawners will be permitted to be captured before they are transported to Section Corner Creek. This location has suitable steelhead spawning gravels. Section Corner Creek is geographically isolated by a waterfall and will be racked to keep adult steelhead in the streams until they spawn. Fish will be captured using a V-weir when they become outmigrating kelts.

- All adult steelhead kelts will receive PIT tags that will be inserted into the body cavity via syringe. A portion of the Yakima River short-term reconditioned fish (~60), along with the direct transport and release group (~60), will be either radio tagged or will have long-life (>300 day) acoustic transmitters surgically implanted into the body cavity below the pectoral fin for long-term tracking of outward migration behavior from below Bonneville Dam to the estuaries and continental shelf. Approximately 40 Yakima River individuals from the long-term reconditioning experiment will receive radio-tags using the gastric insertion technique to monitor return spawning rates and the location of spawning grounds.

- A portion of adult steelhead kelts at Shitike Creek (~40 individuals) and Yakima River (~100 individuals) will have long-life (>50 day) radio transmitters surgically implanted into the body cavity below the pectoral fin for long-term tracking or use of the gastric insertion technique for short-term tracking.

- Long-term reconditioning will be performed using fish from 5 sites. Some of the steelhead kelts will be captured at V-weir sites (Shitike Creek, Ahtanum Creek, Omak Creek, and Satus Creek) that will direct fish to a capture box that will hold them until they can be dipnetted into a holding tank and then transported via truck to a reconditioning facility. Once at the reconditioning facility, kelts will be placed in 20-ft circular tanks that use well water and/or river water and given a diet of krill and Moore-Clark pellets for 4-5 months. The rest of the steelhead kelts will need to be captured at the Yakima River at the CJMF at the juvenile bypass and dipnetted off of the separator and held in a 4 ft x 6 ft tank until they can be transported to 20-ft circular tanks that use well water and/or river water and given a diet of krill and Moore-Clark pellets for reconditioning for 4-5 months.

- All steelhead kelts captured at all sites will be retained in a 20 ft long x 20 ft wide x 4 ft high circular tank. Individual tank carrying capacity will be set at a maximum of 200 fish based on the aquaculture experience of Yakama Nation hatchery staff and the study goal of maximizing steelhead kelt survival in captivity. Formalin will be administered 5 times weekly at 1:6,000 for 1 hour in all reconditioning tanks to prevent fungal outbreaks. Due to the successful use in treating *Salmonicola* during the kelt reconditioning experiments in 2000, Ivermectin™ will again be diluted with saline (1:30) and injected into the posterior end of the fish's esophagus using a small (1cc) plastic syringe. Water used for the tanks will either be ground well, river, or both, depending on the site, and will be of good quality for the health of the fish.

- Kelts will be given a diet of krill and Moore-Clark pellets to elicit a feeding response from steelhead kelts. Short-term reconditioned fish will be held for a total of 6-8 weeks and then trucked below Bonneville for release. Long-term reconditioned fish will be held for a total of 4-7 months and then released in-river to spawn.

- Fish captured in Shitike, Ahtanum, and Omak Creeks will be released to continue their migration to spawning grounds upstream.

- At most, 20 virgin spawners headed upstream at Satus Creek will be obtained for genetic samples before they are transported to Section Corner Creek, which has suitable steelhead spawning gravels. Section Corner Creek is geographically isolated by a waterfall and will be racked to keep adult steelhead in the streams until they spawn. Released fish will be captured when they become outmigrating kelts using a V-weir. These outmigrating kelts then will be held for long-term reconditioning (6-8 months) and subsequently will be reintroduced to the system the following year.

- Successful expression of iteroparity in steelhead may not simply be limited by post-spawning downstream passage through the mainstem corridor but also by starvation. Thus, short-term conditioning may augment iteroparity rates by initiating the feeding process and allowing kelts to naturally undergo gonadal recrudescence in the estuary and marine environments. Short-term reconditioning is defined as the period of time needed (6-8 weeks) for kelts to initiate post-spawning feeding, followed by the transportation of kelts around mainstem hydroelectric facilities for release and natural rearing and rematuration in the Pacific Ocean. Short-term reconditioning will be performed at the CJMF on the Yakima River.

- No more than 30 first-time spawners will be collected at Dworshak Hatchery and retained to ascertain gamete and progeny viability. These fish will be air spawned and then their gametes will be refrigerated and sent to the University of Idaho, where they will be fertilized and evaluated. Some of the fertilized eggs will be raised to adulthood to evaluate the gamete viability of the progeny. The adults then will be held and reconditioned for a second spawning at either the Nez Perce Tribal Hatchery Complex or the Aquaculture Research Institute at the University of Idaho.

- All adult steelhead kelts at Shitike Creek, Satus Creek, Ahtanum Creek, and Omak Creek will be fin clipped for genetic analysis.

- The rotary screw trap or V-weir will be deployed at Omak Creek, Shitike Creek, Ahtanum Creek, and Section Corner Creek. Precautions will be taken to minimize the effect of sampling all fish, including frequent monitoring, safe handling procedures, and expedient measurement. Adult rainbow trout will have a genetic sample taken (caudle fin punch) that will be analyzed to isolate genetic contributors to juvenile stocks.

- Sampling will occur throughout the run of steelhead returning to the Omak Creek, Ahtanum Creek, Satus Creek, and Shitike Creek sampling sites.

- All reconditioning facilities will be continuously monitored by human and remote electronic systems that will alert audibly the presence of life support failure. All tanks are outfitted with back up generators, pumps, and oxygen. The Hatchery Manager will make the decision in consultation with CRITFC to make any release or destroy decisions.

Transportation

- CJMF may transport kelts around the hydro system, thereby potentially increasing the number of kelts that successfully have access to the marine environment, as part of an evaluation of increasing steelhead iteroparity.

- All steelhead kelts captured at weir sites (Omak, Shitike, Ahtanum, and Satus Creeks) will be truck transported from the capture area to reconditioning site by respective Tribal Fish and Wildlife Program staff. At the end of reconditioning, all surviving reconditioned kelts will be truck transported from reconditioning sites to release sites by respective Tribal Fish and Wildlife Program staff

- The length of time in transit for the transfer of the individual(s) from the capture site to the holding facility, or to the target location for kelts, will not exceed 8 hours in transit from capture location to reconditioning facilities.

- The length of time in transit for steelhead kelts will not exceed 8 hours in transit from reconditioning facilities to release site.

- Necessary qualifications of the common carrier or agent used for transportation of the fish shall include a requirement that all drivers have prior fish hauling experience and a Commercial Driver's License.

- There will be a description of the pen, tank, container, cage, cradle, or other devices used both to hold the individual at the capture site and during transportation. Steelhead kelts will be immediately dipnetted from picket weir or removed from a weir trap box and then immediately hand carried to a 1500-gallon tank truck via a fish bag.

- Special care will be taken before, during, and after transportation (e.g., use of oxygen, temperature control, anesthetics, antibiotics, etc.). Maximum water temperature will not exceed 63 F by using cool circulating river water, a chiller, or ice (non-chlorinated). Oxygenation of water will be maintained at saturation. Fish will receive a .25ml injection of oxytetracycline to boost immune system response.

- In 2006, for this study the total amount of fish (listed and unlisted) allowed to be captured, handled, tagged, and released is limited to the following numbers and other conditions as indicated below:

Number of individuals	Species and population	Life stage	Sex	Origin	Activities	Location	Dates	Allowable take
250	Upper Columbia River Steelhead	Adult, Kelt	N/A	Listed/wild	Capture, anesthetize, measure, weigh, release	Omak Cr, WA	March-June	Capture and release 40 PIT-tagged and reconditioned 200. Capture and release mortality up to 10. Reconditioning mortality up to 80.
250	Middle Columbia River Steelhead	Adult, Kelt	N/A	Listed/wild	Capture, anesthetize, measure, weigh, release	Ahtanum Cr, WA	March-June	Capture and release 40 PIT-tagged and reconditioned 200. Capture and release mortality up to 10. Reconditioning mortality up to 80.
1,250	Middle Columbia River Steelhead	Adult, Kelt	N/A	Listed/wild	Capture, anesthetize, measure, weigh, release	Prosser, WA	March-June	Capture and release 200. Direct Transport and Release 200. PIT-tagged and reconditioned 800. Capture and release mortality up to 50. PIT-tagged Direct Transport and Release mortality up to 8. Reconditioning mortality up to 400.
20	Middle Columbia River Steelhead	Adult	N/A	Listed/wild	Capture, anesthetize, measure, weigh, tag, release, recondition	Satus Cr, WA	February-June	Capture , PIT-tag and release 20. Recapture and recondition the same 20 individuals. Capture and release mortality up to 4. Reconditioning mortality up to 20.
250	Middle Columbia River Steelhead	Adult, Kelt	N/A	Listed/wild	Capture, anesthetize, measure, weigh, tag, release	Shitike Cr, OR	March-June	Capture and release 40 PIT-tagged and reconditioned 200. Capture and release mortality up to 10. Reconditioning mortality up to 80.
1,700	Upper Columbia River Steelhead	Juvenile	N/A	Listed/wild	Capture, anesthetize, measure, genetic sample, release	Omak Cr, WA	March-June	Capture and release mortality up to 17.
1,700	Middle Columbia River Steelhead	Juvenile	N/A	Listed/wild	Capture, anesthetize, measure, genetic sample, release	Ahtanum Cr, WA	March-June	Capture and release mortality up to 17.
696	Middle Columbia River Steelhead	Juvenile	N/A	Listed/wild	Capture, anesthetize, measure, weigh, tag, release	Section Corner Cr, WA	February-June	Capture and release mortality up to 6.
1,680	Middle Columbia River Steelhead	Juvenile	N/A	Listed/wild	Capture, anesthetize, measure, weigh, tag, release	Shitike Cr, OR	March-June	Capture and release mortality up to 16.

Annual Report

Annual reports are due to the FCRPS Branch by January 31 of each year. The report must include the following:

- A detailed description of scientific research and monitoring activities, including the total number of fish taken at each location, an estimate of the number of ESA-listed fish taken at each location, the manner of take, and the dates and locations of the take.

- Measures taken to minimize disturbances to ESA-listed fish and the effectiveness of these measures, the condition of ESA-listed fish taken and used for research and monitoring, a description of the effects of research and monitoring activities on the subject species, the disposition of ESA-listed fish in the event of mortality, and a brief narrative of the circumstances surrounding fish injuries or mortalities to ESA-listed fish.

- Any problems that may arise during research and monitoring activities, and a statement as to whether the activities had any unforeseen effects.

- Descriptions of how all take estimates were derived.

- Any preliminary analyses of the data.

- Steps that have been and will be taken to coordinate research and monitoring activities with those of other researchers.

Operational Reporting and Notification Requirements

- Researchers must provide plans for future undefined projects and changes in sampling locations or research and monitoring protocols, and obtain the FCRPS Branch's approval before implementation.

- Each researcher must alert the FCRPS Branch whenever the authorized level of take is exceeded, or if circumstances indicate that such an event is imminent. Notification should be made as soon as possible, but no later than 2 days after the authorized level of take is exceeded. The researcher must then submit a detailed written report to the FCRPS Branch. Pending a review of the circumstances, the FCRPS Branch may suspend the research and monitoring activities or implement reasonable measures and/or alternatives to allow research and monitoring activities to continue.

- Each researcher must alert the FCRPS Branch when a take of any ESA-listed species not included in the research proposal is killed, injured, or collected during the course of research and monitoring activities. Notification should be made as soon as possible, but no later than 2 days after the unauthorized take. The researcher must then submit a detailed written report to the FCRPS Branch. Pending a review of the circumstances, the

FCRPS Branch may suspend research and monitoring activities or implement reasonable measures and/or alternatives to allow research and monitoring activities to continue.

Determinations by the NMFS FCRPS Branch for this research during the 2006 fish passage season and beyond will be made on an annual basis. The annual determination will depend upon information submitted in the research study's annual report, other new information, the annual anticipated status of fisheries stocks, and any subsequent review through regional review processes.

Please notify Blaine Bellerud (503-231-2238) as soon as possible of any deviation from the terms and conditions in this determination. Please provide the FCRPS Branch's research reporting coordinator, Eric Ostrovsky (503-736-4741, eric.ostrovsky@noaa.gov) with the annual report for this research study.

Sincerely,

James D. Ruff

James D. Ruff, Chief
Federal Columbia River Power System Branch

cc: Nancy H. Weintraub, BPA