ESA Section 7 Consultation Number 2002/000981

National Marine Fisheries Service Endangered Species Act (ESA) Section 7 Consultation Biological Opinion and Magnuson-Stevens Act Essential Fish Habitat Consultation

Action Agencies: National Marine Fisheries Service (NMFS)
U.S. Fish and Wildlife Service (USFWS)
U.S. Bureau of Reclamation (BOR)

Species/Evolutionarily Significant Units (ESUs) Affected: Upper Columbia River (UCR) Steelhead (*Oncorhynchus mykiss*)
UCR Spring Chinook Salmon (*O. tshawytscha*)

Essential Fish Habitat Affected: Chinook Salmon

Activities Considered:

1. Issuance of Permit 1395 jointly to the Washington Department of Fish and Wildlife (WDFW), the Public Utility District No. 1 of Chelan County (Chelan PUD), and the Public Utility District No. 1 of Douglas County (Douglas PUD)
2. Issuance of Permit 1396 to the USFWS
3. Issuance of Permit 1412 to the Confederated Tribes of the Colville Reservation (Colville Tribes)

Consultation Conducted By: Salmon Recovery Division (SRD), Northwest Region
Consultation Number 2002/000981

This Biological Opinion (Opinion) constitutes NMFS' review of three section 10(a)(1)(A) permit actions that may affect UCR steelhead and UCR spring chinook salmon. It has been prepared in accordance with section 7 of the ESA of 1973, as amended (16 U.S.C. 1531 et seq.). It is based on information provided in the applications for the proposed permits, published and unpublished scientific information on the biology and ecology of endangered steelhead in the action area, and other sources of information. A complete administrative record of this consultation is on file with the SRD in Portland, Oregon.

Approved by: D. Robert Lohn
D. Robert Lohn, Regional Administrator

Date Issued: 11/2/03
(Expires ten years from signing)

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1. CONSULTATION HISTORY

This Biological Opinion (Opinion) constitutes the review of NOAA's National Marine Fisheries Service (NMFS) proposed approval of three Endangered Species Act (ESA) section 10(a)(1)(A) permits for artificial propagation programs for the enhancement of upper Columbia River (UCR) steelhead.

On June 12, 2002, NMFS received an application for a new ESA section 10(a)(1)(A) permit from the Washington Department of Fish and Wildlife (WDFW) (WDFW 2002). This application requested authorization for annual take of endangered UCR steelhead and UCR spring chinook salmon associated with artificial propagation research and enhancement programs of steelhead in the UCR basin. Notice of the receipt of this permit application was published in the Federal Register on August 1, 2002 (67 FR 49906), and a public informational meeting was held on August 28, 2002, in Wenatchee, Washington to inform the public of the receipt of this permit application. This new permit 1395 is to replace the expired permit 1094.

Permit 1094 was issued to the WDFW on February 4, 1998 to carry out artificial propagation programs intended to enhance and conduct research on listed UCR steelhead (63 FR 8435). Following issuance, three modifications to permit 1094 were considered and enacted. Modification 1 includes authorization of incidental take of spring chinook salmon, additional measures to enhance WDFW's ability to manage adult returns, and a one-time-only increase in authorized hatchery releases effective in 1999 (March 25, 1999; 64 FR 14431). The WDFW requested modification 2 for take of ESA-listed species associated with a radiotelemetry study – this modification was addressed as Modification 3 of research permit 1114 (July 25, 2001; 66 FR 38641). The WDFW requested modification 3 for an increase in take of listed steelhead as part of a study of potential hatchery-origin fish survival benefits at Wells Hatchery (May 13, 1999; 64 FR 25873). Permit 1094 expired on May 31, 2003. The proposed permit 1395 would replace permit 1094.

In April 2002, negotiations on three Habitat Conservation Plans (HCPs) were concluded; *Anadromous Fish Agreement and Habitat Conservation Plan Wells Hydroelectric Project FERC*[1] *License No. 2149* with the Public Utility District No. 1 of Douglas County (Douglas PUD) for the operation of Wells Dam (DPUD 2002), and *Anadromous Fish Agreement and Habitat Conservation Plan Rocky Reach Hydroelectric Project FERC License No. 2145* (CPUD 2002a) with the Public Utility District No. 1 of Chelan County (Chelan PUD) for the operation of Rocky Reach Dam, and *Anadromous Fish Agreement and Habitat Conservation Plan Rock Island Hydroelectric Project FERC License No. 943* with Chelan PUD for the operation of Rock Island Dam (CPUD 2002b). These HCPs[2] are long term agreements that at the time of this

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[1] *Federal Energy Regulatory Commission*

[2] *Each HCP agreement is subject to a separate Biological Opinion. This Opinion addresses the artificial propagation of UCR steelhead required in each HCP. Separate Biological Opinions also address artificial*

Opinion, have as signatories to each agreement NMFS, the PUDs, the WDFW, the U.S. Fish and Wildlife Service (USFWS), and the Confederated Tribes of the Colville Reservation (Colville Tribes). They provide the PUDs with some degree of certainty for the long-term operation of these projects and require the PUDs to provide mitigation in the form of a tributary fund for habitat improvement projects, and artificial propagation programs to mitigate for unavoidable loss of natural fish production due to habitat inundation and passage mortality at the projects. The HCPs were developed to protect five species of anadromous salmonids, including endangered UCR steelhead. The HCP related UCR steelhead programs would be intended as a conservation measure to ensure the persistence of the species. The HCP agreements restrict the PUDs and NMFS from changing the artificial propagation production levels during the period of this permit. The HCPs require Hatchery Committees[3] that may adjust the operation or implementation strategy of the programs based on new scientific data, changes in NMFS hatchery policy, or recommendations of the HCP Hatchery Committees.

Additionally, on June 11, 2002, NMFS received an application for a ESA section 10(a)(1)(A) permit from the USFWS (USFWS 2002), requesting multi-year authorization for annual take of UCR summer steelhead and UCR spring chinook salmon associated with UCR steelhead artificial propagation research and enhancement program. Notice of the receipt of this permit application was published in the Federal Register on August 1, 2002 (67 FR 49906), and a public informational meeting was held on August 28, 2002, in Wenatchee, Washington to inform the public of the receipt of this permit application. The USFWS was previously authorized to carry out an UCR steelhead enhancement program under permit 1118 which expired on May 31, 2003. The proposed permit 1396 would replace the expired permit 1118.

Thirdly, on October 29, 2002, NMFS received an application for ESA a section 10(a)(1)(A) permit from the Colville Tribes (CCT 2002), requesting multi-year authorization for annual take of UCR summer steelhead and UCR spring chinook salmon associated with UCR steelhead artificial propagation research and enhancement program. Notice of the receipt of this permit application was published in the Federal Register on January 14, 2003 (68 FR 1826). The Colville Tribes permit 1412 UCR steelhead artificial propagation program is a newly proposed research and enhancement program and has not been considered under previous ESA permitting actions.

NMFS has proposed and evaluated the action of issuing incidental take statements (ITSs) in relation to the National Environmental Policy Act (NEPA) for the three HCPs as its preferred alternative in the *Anadromous Fish Agreements and Habitat Conservation Plans Final Environmental Impact Statement for the Wells, Rocky Reach, and Rock Island Hydroelectric Projects* (FEIS) (NOAA Fisheries 2002). An Environmental Assessment (EA) was prepared and

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propagation programs of other anadromous fish species.

[3] *Each HCP agreement specifies the formation of a Hatchery Committee which consists of one representative of each signatory entity to the specific HCP. In general the HCP Hatchery Committee representation is likely to be similar for all three HCPs.*

opened for public comment on April 17, 2003 (68 FR 18952) which assessed the potential impacts of the issuing permits 1395, 1396, and 1412 on the environment. A finding of no significant impact (FONSI) was signed on July 10, 2003, following consideration and incorporation of public comments received on the EA (NMFS 2003).

NMFS is initiating a new consultation with itself on approval of these three section 10(a)(1)(A) permits for research and enhancement programs in the UCR summer steelhead evolutionarily significant unit (ESU). The Salmon Recovery Division decided to group these action together in a single consultation pursuant to 50 CFR §402.14(c) because they are similar in nature and will affect the same listed species. This Opinion will consider the impacts of these UCR steelhead artificial propagation enhancement programs in the Methow, Okanogan, and Wenatchee basins on anadromous salmonid species listed under the ESA.

An early product of HCP negotiations was the *Biological Assessment and Management Plan* (BAMP) (1998) developed by technical representatives from the co-managers[4] and signatory entities of the HCPs. The BAMP included review and recommendation for all artificial propagation programs in the UCR basin, HCP related and otherwise. Although the BAMP does not create legal obligations as a stand-alone document, it does provide guidance for program management and monitoring and evaluation of UCR artificial propagation programs. The HCPs define the commitment by the PUDs for implementation of hatchery propagation programs for steelhead, summer/fall chinook salmon, spring chinook salmon and sockeye salmon for the middle and UCR region. The proposed actions addressed in this Opinion are derived from the HCP agreements, the WDFW permit application, the USFWS permit application, and the Colville Tribes permit application, which together constitute a comprehensive plan for steelhead artificial propagation in the UCR basin.

In developing this Opinion, NMFS considered the information presented in the documents mentioned above, including the three HCPs; the Biological Opinion on 1995 to 1998 Hatchery Operations in the Columbia River Basin (NMFS 1995); information in the NMFS report, *Pacific Salmon and Artificial Propagation Under the Endangered Species Act* (Hard *et al.* 1992); the *Biological Opinion on Effects on Upper Columbia River Spring Chinook Salmon Supplementation Program and Associated Scientific Research and Monitoring Conducted by the Washington Department of Fish and Wildlife and the U.S. Fish and Wildlife Service* (NMFS 2002a), information provided in reports requires by previous permits; and information from the best scientific and commercial data available.

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[4] *Anadromous fisheries resource co-managers in the UCR basin include the WDFW, the USFWS, NMFS, the Colville Tribes, and the Yakama Nation.*

1.1 Analysis Framework

Over the course of the last decade and hundreds of ESA section 7 consultations, NMFS developed the following approach for applying the ESA Section 7(a)(2) standards as defined by 50 CRF §402.02 when determining what effect a proposed action is likely to have on a given listed species. In conducting analyses of the actions under Section 7 of the ESA, NMFS uses the following steps:

1. Define the biological requirements and current status of each listed species and the relevance of the environmental baseline to the species' current status in the action area (Section 3).

2. Determine the effects of the proposed or continuing action on listed species and their habitat and evaluate any cumulative effects within the action area (Section 4).

3. Evaluate whether the effects of the proposed action, taken together with any cumulative effects and added to the environmental baseline, can be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the affected species or is likely to destroy or adversely modify their designated critical habitat (Section 5).

2. PROPOSED ACTIONS

NMFS proposes to issue three section 10(a)(1)(A) enhancement permits: Permit 1395 jointly to the WDFW, the Chelan PUD, and the Douglas PUD for artificial propagation programs required under the HCP agreements; permit 1396 to the USFWS; and permit 1412 to the Colville Tribes. These permits would authorize direct take of endangered, naturally-produced and artificially propagated UCR steelhead and incidental take of UCR spring chinook salmon.

This Opinion considers artificial propagation activities which include the (1) biological sampling and release of adult UCR steelhead for annual run evaluation, (2) management of adult returns of UCR steelhead from artificial propagation programs, (3) collection, holding, and artificial spawning of adult UCR steelhead, (4) transfers of UCR steelhead eggs and/or juveniles to appropriate locations, (5) incubation and rearing of UCR steelhead fertilized eggs through the smolt stage, (6) release of propagated UCR steelhead juveniles into the UCR basin, and (7) monitoring and evaluation of the UCR steelhead artificial propagation program. Artificial propagation programs of UCR steelhead have been ongoing since the 1960's. Improvements, hatchery reform measures, and a focus on recovery of natural environment populations have occurred since the UCR steelhead ESU was listed under the ESA in August 1997. The location of the UCR steelhead ESU, the artificial propagation facilities, and the dam locations pertinent to this Opinion are presented in Figure 1. Terms and conditions that NMFS would include in each permit to ameliorate potential negative effects are listed below and additional permit specific terms and conditions follow the specific operating agency activities. These terms and conditions and proposed activities by each agency together constitute the proposed actions.

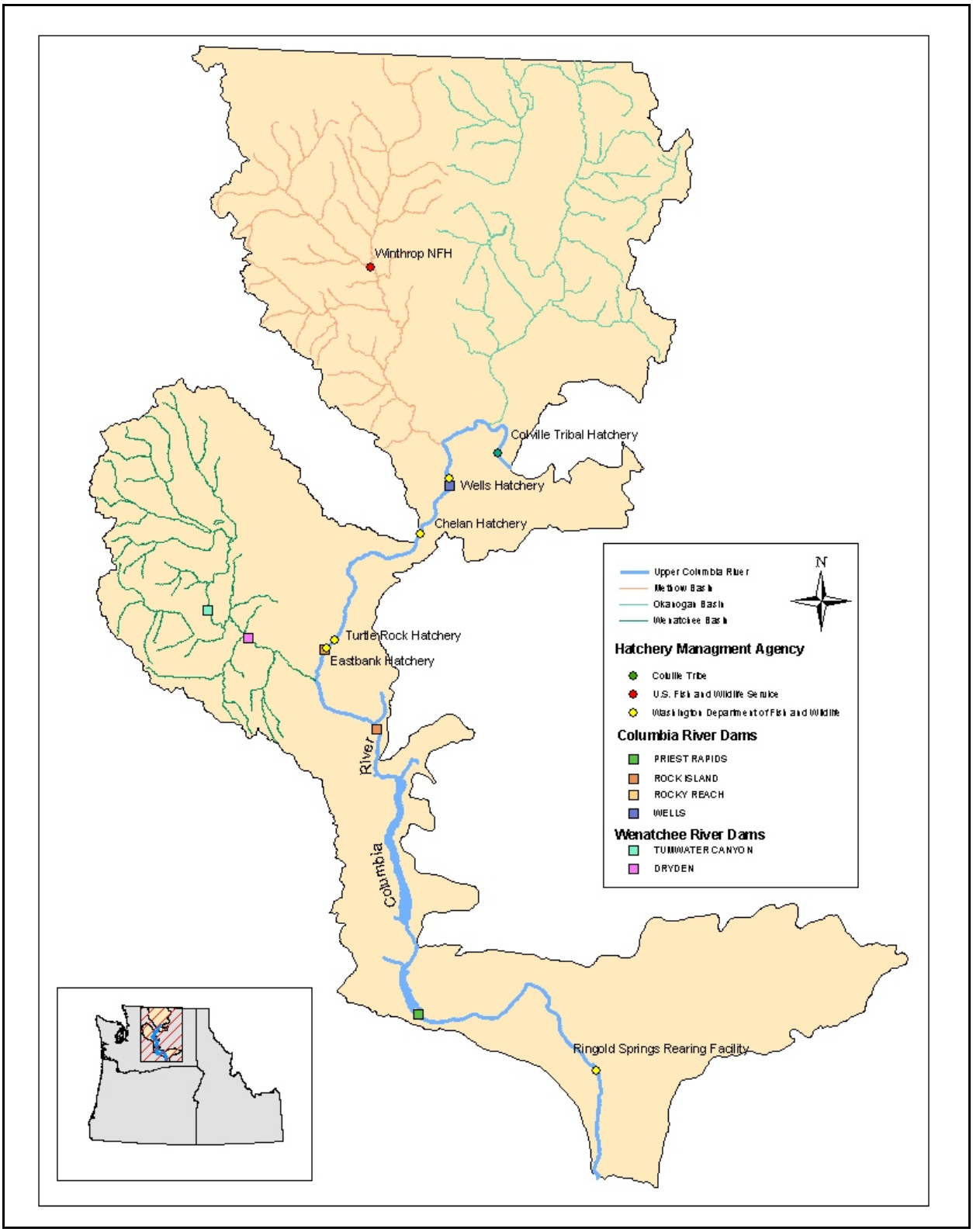

Figure 2. Map of the upper Columbia River steelhead ESU with hatchery facilities and dams relevant to the proposed artificial propagation programs identified.

2.1 General Conditions

The following conditions would be common to all three permits consulted upon in the Opinion. In all cases, the permit holder(s) must:

1. The permit holder(s) are responsible for the actions of any individual operating under the authority of this permit. Such actions include capturing, handling, releasing, transporting, maintaining, and caring for any ESA-listed species authorized to be taken by this permit.

2. The permit holder(s) must ensure that all ESA-listed species are handled carefully. Should NMFS determine that a procedure provided for under this permit is no longer acceptable, the Permit Holders must immediately cease such activity until an acceptable substitute procedure is identified and approved by NMFS.

3. Measures shall be applied to ensure that artificially propagated UCR steelhead juveniles released will be ready to actively migrate to the ocean. To meet this condition, fish must be released at a uniform size and state of smoltification that ensures that the fish will migrate seaward without delay after release. Variance from this smolts-only release requirement shall only be allowed in the event of an emergency, such as flooding, water loss to raceways, or vandalism, that necessitates early release of ESA-listed steelhead to prevent catastrophic mortality. Any emergency steelhead releases made by the action agencies shall be reported immediately to the NMFS Salmon Recovery Division in Portland.

4. The permit holder(s) must allow any NMFS employee or representative to accompany field personnel while they conduct authorized activities.

5. The permit holder(s) are responsible for obtaining all other federal, state, and local permits/authorizations needed for the proposed activities.

6. Each ESA-listed fish handled out-of-water for the purpose of recording biological information must be anesthetized. 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 need to be anesthetized.

7. ESA-listed fish must be handled with extreme care and kept in water to the maximum extent possible during sampling and processing procedures. Adequate circulation and replenishment of water in holding units is required. When using methods that capture a mix of species, ESA-listed fish must be processed first. The transfer of ESA-listed fish must be conducted using equipment that holds water during transfer.

8. The permit holder(s) shall ensure that water intakes into artificial propagation facilities be properly screened in compliance with 1995 NMFS screening criteria and as per the 1996

addendum to those criteria (NMFS 1996). As an alternative, they shall comply with transitional criteria set forth by NMFS in 1999 for juvenile fish screens constructed prior to the establishment of the 1995 criteria (NMFS 1996), to minimize risks to listed salmon and steelhead. The permit holder(s) shall inspect and monitor the water intake screen structures at their hatchery facilities to determine if listed salmon and steelhead are being drawn into the facility; the results of this monitoring shall be included in annual reports.

9. The permit holder(s) shall implement the "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State" (NWIFC and WDFW 1998) and Pacific Northwest Fish Health Protection Committee (PNFHPC 1989) guidelines to minimize the risk of fish disease amplification and transfer, and to ensure that artificially propagated fish would be released in good health.

10. The permit holder(s) shall conduct hatchery operations and monitor hatchery effluent in compliance with applicable National Pollutant Discharge Elimination System (NPDES) (EPA 1999) permit limitations.

11. In the event that circumstances, such as unanticipated, higher-than-expected fecundity, or high egg-to-fry survival rates, lead to the inadvertent possession of steelhead substantially in excess (>110 %) of program production levels specified above, then surplus eggs or fish shall be culled from the population in a manner consistent with achieving program goals.

12. Visual observation protocols must be used instead of intrusive sampling methods whenever possible. This is especially appropriate when merely ascertaining the presence of anadromous fish.

13. The permit holder(s) are responsible for any biological samples collected from listed species, which shall only occur if they are valuable for research purposes. The permit holder(s) may not transfer biological samples to anyone not listed in the application without prior written approval from NMFS.

14. The permit holder(s) must coordinate with other co-managers and researchers to ensure that no unnecessary duplication and/or adverse cumulative effects occur as a result of the permit holder's activities.

15. All artificially propagated UCR steelhead juveniles shall be externally marked (i.e., visual implant elastomer tag or adipose fin clipped) prior to release.

Reports and Annual Authorization

NMFS contact for all reports: NMFS - Salmon Recovery Division
525 NE Oregon Street, Suite 510
Portland, Oregon 97232
Phone: (503) 230-5407
Fax: (503) 872-2737

16. The permit holder(s) must notify NMFS as soon as possible, but no later than two days after, any authorized level of take is exceeded or if such an event is likely. The permit holder(s) must submit a written report detailing why the authorized take level was exceeded or is likely to be exceeded.

17. The permit holder(s) shall update and provide to NMFS by December 15th of each year, the projected hatchery releases by age class and location for the coming year.

18. The permit holder(s) shall provide annual reports that summarize numbers, pounds, dates, tag/mark information, locations of artificially propagated fish releases, and monitoring and evaluation activities that occur within the hatchery environment, and adult return numbers to the UCR basin for each program. The permit holder(s) shall ensure collection and reporting of the coefficient of variation around the average (target) steelhead release size immediately prior to their liberation from the acclimation sites as an indicator of population size uniformity and smoltification status. Reports shall also include any preliminary analyses of scientific research data, any problems that may have arisen during conduct of the authorized activities, a statement as to whether or not the activities had any unforeseen effects, and steps that have been and will be taken to coordinate the research or monitoring with that of other researchers. Unless otherwise noted in the specific terms and conditions, the reports shall be submitted by January 31st, of the year following release (i.e., brood year 2002, release year 2003, report due January 2004) to NMFS.

19. The permit holder(s) must provide plans for future projects and/or changes in sampling locations or enhancement/research protocols and obtain approval from NMFS prior to implementation of such changes.

Penalties and Sanctions

20. The persons actually doing the activity must have a copy of this permit while conducting the authorized activities.

21. The permit holder(s) may not transfer or assign this permit to any other person as defined in Section 3(12) of the ESA. This permit ceases to be in effect if transferred or assigned to any other person without NMFS' authorization.

22. If a permit holder violates any permit term or condition, they will be subject to any and all penalties provided by the ESA.

23. The permit holder(s), in effectuating the take authorized by this Permit, are considered to have accepted the terms and conditions of this permit and must be prepared to comply with the provisions of this permit, the applicable regulations, and the ESA.

24. The Salmon Recovery Division, NMFS, may amend the provisions of this permit after reasonable notice to the permit holder.

25. 50 CFR Section 222.23(d)(8) allows NMFS to charge a reasonable fee to cover the costs of issuing permits under the ESA. The fee for this permit has been waived.

26. Any falsification of annual reports or records pertaining to this permit is a violation of this permit.

27. Under the terms of the regulations, a violation of any of the terms and conditions of this permit will subject the permit holder(s), and/or any individual who is operating under the authority of this permit, to penalties as provided for in the ESA.

2.2 Permit 1395

NMFS proposes to issue permit 1395 jointly to the WDFW, the Chelan PUD, and the Douglas PUD. The activities undertaken by each of these entities varies based on their permit applications, program operational roles, and resource management responsibilities. The WDFW is generally the lead co-manager of the fisheries resources of the state of Washington and is also the operator of the hatchery facilities at which the proposed activities would occur. The activities proposed by WDFW include adult return monitoring, management of returning hatchery-origin steelhead adults, general hatchery operations associated with the UCR steelhead enhancement programs. Responsibility for research, and monitoring and evaluation of the UCR steelhead artificial propagation program activities overlap between the WDFW and the PUDs. At this time, monitoring and evaluation, and research activities are proposed to be conducted by the WDFW, however, in the future, some monitoring and research activities may be funded by the PUDs and conducted by other entities as described in the three HCP agreements. The PUDs propose to provide funding and implementation support for the WDFW managed programs. A description of activities proposed by each applicant is provided below, followed by the additional terms and conditions that would be included in the permit. Permit 1395 would replace permit 1094 which expired in May 2003.

2.2.1 WDFW Proposed Activities

The WDFW proposes to collect annual run composition data, manage the resultant artificial propagation adult UCR steelhead returning to the middle and UCR basin, operate UCR steelhead artificial propagation programs in hatchery facilities, and conduct research, monitoring, and evaluations relating to artificially propagated steelhead in the UCR basin. Reports will be submitted to NMFS annually to summarize all activities associated with each element described below.

2.2.1.1 Adult Steelhead Stock Assessment

The WDFW proposes to collect, anesthetize, biologically sample, and return to the river adult listed UCR steelhead in the east ladder of the Priest Rapids Dam on the Columbia River at river mile (rm) 397. Sampling would occur 16 to 32 hours per week during the migration period in order to achieve a minimum sample rate equal to 10 percent of the run. The purpose of this sampling is to (1) determine upriver population size, (2) estimate hatchery to natural (wild) fish ratios, (3) determine age class contribution, and (4) evaluate the need for managing returning hatchery steelhead consistent with ESA recovery objectives which include fully seeding spawning habitat with naturally produced UCR steelhead supplemented with artificially propagated enhancement steelhead. The WDFW also proposes to externally tag adipose fin-clipped sampled steelhead at Priest Rapids Dam after September 9th as a means to exclude them from harvest in years when fisheries would be allowed in areas above the dam. In some years, up to 400 of the steelhead sampled at Priest Rapids Dam would be radio-tagged or tagged with some other active-transmitting tag to investigate dam passage, migration, and spawning characteristics.

To minimize potential adverse effects on listed UCR steelhead, the following measures will be used and defined in the permit as terms and conditions by NMFS:

- No more than six fish will be in the trap box at one time;
- Fish will be removed from the trap as quickly as possible;
- Steelhead will be processed first;
- Nets will be 1-inch soft nylon mesh;
- Stock solution of 500 grams tricaine methanesulfonate (MS-222) powder to 2.5 gallons of water will be used to achieve proper anesthesia;
- Temperature and dissolved oxygen in the anesthetic bath will be monitored continuously;
- Anesthetic bath will be changed when the bath warms 2°C above river water temperature.
- Trap operations will cease if river water temperature exceeds 21°C (69.8°F).

2.2.1.2 Management of Returning Adult Hatchery Steelhead

These programs would be intended to enhance the naturally reproducing UCR steelhead populations in the UCR region. The number of natural origin and artificially propagated UCR steelhead that return to the UCR region is influenced by a variety of factors including the number of artificially propagated UCR steelhead released and the environmental conditions they experience after release, such as during their downstream migration out of tributaries and the Columbia River and conditions in the ocean environment. The uncertainty of those conditions can result in years of low returns of UCR steelhead, both naturally and artificially propagated or in high returns. The WDFW has identified several tools for managing returning adult UCR steelhead particularly in high return years. These tools include harvest fisheries directed on externally identifiable artificially propagated UCR steelhead and removal of artificially propagated UCR steelhead at dam ladders and other fish trap sites. The WDFW identifies harvest fisheries as the preferred tool to manage artificially propagated adult UCR steelhead. Furthermore, the WDFW separates harvest activities into reaches below Priest Rapids Dam and reaches above Priest Rapids Dam.

Below Priest Rapids Dam: The WDFW proposes to open a recreational harvest fishery below Priest Rapids Dam (in the vicinity of Ringold Springs Rearing Facility) for hatchery steelhead when the run size above Priest Rapid Dam is sufficient to meet interim abundance targets, which based on current information requires at least 8,300 steelhead at Priest Rapids Dam (WDFW 2002). The area encompasses waters below Priest Rapids Dam in the downstream portion of the Hanford Reach from the Highway 395 bridge at Pasco to the old Hanford town site power line towers, a distance of 32 miles. In the proposed fishery, anglers may retain adipose fin-clipped and/or adipose fin-clipped plus ventral fin-clipped steelhead. All unmarked steelhead must be released. The dates for the proposed fishery vary according to fishing method. Anglers may fish from the bank in addition to floating devices from September 16th through March 31st. From April 1st through June 15th anglers may only fish from the bank at the Ringold Springs site and all floatation devices would be prohibited. Bait would be allowed throughout the fishing period. The starting date for the fishery may be postponed until October 15th if pre-season or in-season evaluation of the steelhead run indicates that the migration over Priest Rapids Dam is delayed or below levels needed to meet recovery objectives. Additionally, the WDFW proposes to remove hatchery steelhead captured in the Ringold Springs ladder that would be in excess of broodstock and recovery needs. These fish would be transported and released in landlocked ponds and lakes to provide additional harvest opportunities on the excess hatchery steelhead.

Above Priest Rapids Dam: The WDFW propose to manage the number of artificially propagated adult steelhead on the spawning grounds in the Wenatchee, Methow, and Okanogan basins. On an annual basis, the run composition information gathered through sampling conducted at Priest Rapids Dam (described above in Section 2.2.1.1) will be assessed on or shortly after September 15th. The components of the run (naturally produced steelhead, adipose fin-clipped hatchery steelhead, and adipose fin-present hatchery steelhead) will be considered in decided whether or not removal of adipose fin-clipped steelhead is warranted.

If the natural component of the run is predicted to be below 1,300 steelhead, no steelhead fishery would be proposed, regardless of total run size. If the natural component is expected to exceed 1,300 steelhead and the total run size is predicted to exceed 9,550, then the WDFW proposes to open a recreational fishery. The fishery would be open from about October 1st through about March 31st, by emergency rules. Excess adipose fin-clipped steelhead may also be removed at the Wells Dam and Wells Hatchery for placement in local lakes or ponds for recreational angling opportunity.

The specific locations and retention limits of recreational harvest opportunity would be determined based on the results of a fishery model designed to estimate the effects of removing adipose fin-clipped steelhead from the population. The model considers the following elements; total steelhead run size, percentage of natural origin steelhead, percentage of adipose present artificially propagated steelhead, the percentage of adipose fin-clipped steelhead, and the effects of hooking mortality. Mark and tag identification at Priest Rapids Dam combined with known artificially propagated juvenile release group information would result in estimates of the number of steelhead returning to each tributary basin. The model would then be run using the calculated run estimates for each tributary basin (Okanogan, Methow, and Wenatchee).

If a fishery directed on surplus hatchery produced steelhead is authorized, the gear regulations would allow the use of bait in the mainstem Columbia River above Priest Rapids Dam. Any proposed tributary basin (Methow, Okanogan, and Wenatchee) fisheries would open under "selective gear rules," which are defined as follows: Only unscented artificial flies or lures with one barbless single hook, bait is prohibited; fish may be released until the daily limit is retained; If any fish has swallowed the hook or is hooked in the gill, eye, or tongue, it should be kept if legal to do so. Regulations requiring the release of adipose-present steelhead would be in place on all waters. Regulations may also limit the retention of steelhead with any external tags that may be associated with the Priest Rapids sampling project or other studies in the basin.

2.2.1.3 Artificial Propagation Program

The WDFW proposes to enhance the UCR steelhead ESU using artificial propagation techniques that include the collection of broodstock, spawning of adults, incubation of eggs, rearing, acclimation, and release of juvenile steelhead. A general description of the programs is provided here; for additional detail, please see the permit application (WDFW 2002). The WDFW proposes to collect, hold, and spawn adult steelhead broodstock and incubate, rear, and release the progeny of the broodstock in various hatchery facilities. The current yearling steelhead smolt release goals, general release area, and stock are provided in Table 1.

Table 1. Yearling smolt release targets for WDFW operated artificial propagation programs of UCR steelhead by general release area and broodstock collection location.

Release Area	Smolt Production Target	Broodstock Collection
Above Wells Dam (Methow and Okanogan River basins)	349,000	Wells Dam
Wenatchee River basin	400,000	Wenatchee River
Below Priest Rapids Dam (Ringold Springs area of Columbia River)	180,000	Wells Dam

Broodstock collection is proposed at: (1) Wells Dam (rm 516) and Wells Hatchery on the Columbia River, and (2) Dryden (rm 16) and Tumwater (rm 33) Dams on the Wenatchee River. Future broodstock collections would be proposed for the Methow and Okanogan Rivers, however no locations or facilities have been identified yet. The WDFW proposes to develop annual broodstock collection and spawning protocols in coordination with NMFS, and the HCP Hatchery Committees to allow for consideration of annual variation in run sizes, ages, and origins (natural and hatchery). Further details for each collection facility are provided in the WDFW application.

Broodstock collection protocols will include limits on the number of days and hours of trap operation. Specific handling procedures and reporting requirements will also be defined. In general, broodstock collection activities would occur with the following sideboards:

- Broodstock would be collected throughout the duration of the run;
- Traps would be checked and all fish removed at least daily;
- Trapping at Wells Dam would occur no more that 3 days a week, if both east and west ladder traps are utilized they would operate concurrently not to exceed 16 hours per day;
- Up to 373 steelhead would be collected at Wells Dam;
- Up to 123 or 33 percent, whichever is lower, of the broodstock could be natural origin steelhead;
- Passive trapping in the Wenatchee River at Dryden Dam would occur 24 hours a day at both the left and right bank traps;
- Trapping at Tumwater Dam would generally be limited to three days per week and 16 hours per day if actively operated;
- Hook and line collection of steelhead broodstock would be utilized as a last resort and only if traps were not effective;
- Up to 208 steelhead would be collected from the Wenatchee River;
- Up to 50 percent of the broodstock would be natural origin steelhead.

Following collection, the WDFW proposes to hold, humanely kill, and manually spawn steelhead at Wells and Eastbank Hatcheries. The Wells program will maximize matings of hatchery to natural origin steelhead. The Wenatchee program at Eastbank Hatchery will initially maximize the contribution of natural origin (wild) steelhead in creating rearing crosses of hatchery to natural (H × W) and natural to natural (W × W) matings for comparison and evaluation to hatchery to hatchery (H × H) mating progeny. Based on mating studies results, adjustments in spawning protocols may be made to improve program efficacy.

The WDFW proposes to initially incubate steelhead eggs at Wells and Eastbank Hatcheries. Up to 125,000 eyed eggs may be transferred from Wells Hatchery to Winthrop National Fish Hatchery (NFH) for continued incubation, rearing and eventual release (see Section 2.3 below). Wells Hatchery proposes to transfer up to 240,000 eyed eggs for the Ringold Springs program to other WDFW facilities for incubation and early rearing. These eggs will be from the earliest spawn dates. Eastbank Hatchery may transfer eyed eggs to Chelan Hatchery for incubation and early rearing to achieve specific rearing strategy goals of producing the highest quality smolts.

Juvenile rearing would occur at Wells Hatchery for fish destined for release in the Methow and Okanogan basins. Juvenile rearing would occur at Eastbank, Turtle Rock, and Chelan Hatcheries for fish destined for release in the Wenatchee River basin. Juvenile steelhead will be externally marked (e.g., adipose fin clipped) or tagged (e.g., visual elastomer tag) prior to release and at least a portion of the annual release will be internally tagged with a coded-wire tag (CWT) or passive integrated transponder (PIT) tagged prior to release.

Wells Hatchery proposes to release 349,000 smolts per year as specified in the HCP agreement with Douglas PUD, of which, 300,000 would be production to compensate for habitat loss due to inundation from Wells Dam pool. Smolts that volitionally migrate to a collection raceway downstream of the rearing ponds will be collected and directly scatter planted into the Methow and Okanogan basins. Juveniles that do not voluntarily exit the pond will be forced into the collection area for direct stream release in lower river areas because these fish may have a higher tendency to residualize. Final rearing and acclimation may occur in the Methow or Okanogan basin for some release groups, in some years, if appropriate sites are identified and available. No sites have been identified for acclimation at the time the application was received. The annual allocation of smolts released into the Methow and Okanogan Rivers would be determined by the HCP Hatchery Committees.

Releases into the Wenatchee River basin are proposed at 400,000 smolts as specified in the two HCP agreements with Chelan PUD. Releases would occur as direct stream plants, volitional release from Chiwawa Ponds, or potentially other acclimation sites in the Wenatchee basin which have not yet been developed. Release from Ringold Springs proposed at 180,000 smolts annually into the Columbia River as funded by the Mitchell Act.

The WDFW proposes to implement the following measures into the artificial propagation program operation to minimize potential negative impacts on ESA-listed species:

- Conduct routine water monitoring to ensure that the levels of total suspended solids, settleable solids, and water temperature at each facility to remain compliant with NPDES permits issued by Washington Department of Ecology;
- Follow fish disease control guidelines developed by IHOT (1995) and the PNFHPC (1989) to reduce the incidence of fish diseases;
- Conduct routine, generally monthly, fish growth monitoring during rearing at each facility;
- Dispose of juvenile and adult carcasses via the local solid waste management system, on-station burial, or distributing carcasses into the river system of origin for nutrient enhancement after appropriate fish health certification.

2.2.1.4 Research, Monitoring, and Evaluation Activities

Research, monitoring, and evaluation plans will be developed by the HCP Hatchery Committees as described in Section 2.2.2 (Chelan PUD and Douglas PUD Proposed Activities). Additional details of the monitoring and evaluation plan development time lines and responsibilities are provided in the three HCP agreements. Tasks proposed for consideration at this time, which will be included in the plans developed by the HCP Hatchery Committees, include monitoring within the hatchery facilities and monitoring of artificially propagated steelhead in the natural environment.

2.2.1.4.1 Within-Hatchery Environment Monitoring

Monitoring and evaluation activities will be conducted on all of the steelhead life stages that occur within the hatchery facility environment. The HCP Hatchery Committees are expected to fine-tune the evaluation activities through time to improve the knowledge base and success of the artificial propagation programs. The following tasks would be required as part of the monitoring plans:

Juvenile Steelhead

- Growth rate and general health will be monitored monthly.
- Green egg-to-eyed egg, eyed egg-to-fry, and fry-to-smolt survival rates will be determined.
- Numbers, size, and health condition of all steelhead juveniles will be determined prior to or at the time of any transfers among facilities, and prior to release.

Adult Steelhead

- Broodstock (and mortalities at trap locations) would be sampled for stock composition analysis including determination of sex, age, and stray rates.
- Biological sampling may include meristic, morphometric, tissue samples (for genetic stock identification or DNA (deoxyribonucleic acid) analysis), and scale sampling.
- Snouts of CWT steelhead would be collected.
- Annual determination of average fecundity will be conducted for a representative sample of spawned females in each program using an electronic egg counter.

2.2.1.4.2 Natural Environment Monitoring

Natural environment monitoring of juvenile artificially propagated steelhead is proposed to be conducted using a variety of standard techniques such as angling, trapping, snorkeling. In general, these population sampling techniques would be used to identify both external marks and tags and internal tags. Residualism of hatchery reared steelhead in the Wenatchee and Methow rivers will be evaluated by sampling of the resident river population during August using standard angling techniques. Migration characteristics and tributary productivity would be monitored using juvenile fish traps. Traps are proposed to be operated in the Chiwawa River, the upper and lower Wenatchee River, the Twisp River, and the Methow River. These traps would form a comprehensive juvenile monitoring program investigating the productivity of artificially propagated and natural origin UCR steelhead in the tributary environment. The trapping efficiency would be expected to vary from below four percent up to 30 percent depending on tributary conditions such as discharge and debris load. The capture of artificially propagated UCR steelhead in the juvenile traps would also vary based on release location in relation to trap site and method of release. For example UCR steelhead smolts released volitionally over a period of four to six weeks may be captured at a higher rate overall compared to a direct stream release at a single point in time. In the case of the latter release, the traps would not be operated as the large pulse of artificially propagated UCR steelhead migrate past the trap site. In the former situation, a relatively small number of released fish could be captured daily throughout the volitional release period.

Monitoring of adults in the natural environment that is additional to the Priest Rapids Dam sampling previously described in Section 2.2.1.1 (Adult Steelhead Stock Assessment), will include collection of biological data, such as scale samples and CWT recoveries, in fisheries, at trap sites, spawning ground surveys, and in carcass surveys. Spawning and carcass surveys are proposed to be conducted by WDFW staff in coordination with PUD, Tribal, USFWS, and U.S. Forest Service personnel. Surveys would be done on foot, from an airplane, or from a boat, depending on survey area.

The WDFW proposes to develop a study to assess the relative reproductive success between hatchery-reared and naturally produced steelhead using DNA micro-satellite technology. This study will provide valuable information concerning the effectiveness of the artificial propagation programs in contributing to the recovery of UCR steelhead. The study design will be subject to approval by the HCP Hatchery Committee as described in the Chelan PUD HCPs (CPUD 2002a, 2002b). The preliminary study design proposes to allow up to 120 adult steelhead, of which no more than 60 would be of natural origin, to spawn in a controlled waterway, potentially the Wells Hatchery spawning channel. Progeny of these steelhead would be sampled for DNA analysis and a portion would be PIT tagged and subsequently released into their parental origin river. Migrating smolts would be identified by the PIT tag code at downstream locations. As study fish return to the region and would be identified (via the PIT tags), comparison to the previous sample groups would be conducted.

2.2.2 Chelan PUD and Douglas PUD Proposed Activities

The Chelan PUD and the Douglas PUD propose to provide the funding and implementation support for UCR steelhead as provided by the HCPs (CPUD 2002a, 2002b; DPUD 2002). Please see the three HCP agreements for additional details of their proposed actions and obligations which would be incorporated by reference into permit 1395.

The PUDs propose to implement the specific elements of the steelhead programs consistent with overall objectives of rebuilding natural populations and compensating for unavoidable inundation and project mortality that results from the operation of Rock Island, Rocky Reach, and Wells Dams. Implementation includes fully funding the hatchery facilities, operations and evaluations of the artificial propagation programs. Program objectives will be developed by the Joint Fisheries Parties[5] (JFP) and include contributing to the rebuilding and recovery of naturally reproducing populations of UCR steelhead in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest. Specific actions needed to implement the artificial propagation programs may be altered and modifications to program implementation may be made through the HCP Hatchery Committees as described in the HCPs (CPUD 2002a; 2002b; DPUD 2002).

The PUDs or their designated agents propose to operate the hatchery facilities according to the terms of Section 8 "Hatchery Compensation Plan" of the HCPs, the ESA section 7 and 10 permit(s), and in consultation with the HCP Hatchery Committees. The total number of artificially propagated steelhead that Chelan PUD and Douglas PUD would provide funding is initially set at 400,000 smolts for Chelan PUD and 349,000 for Douglas PUD. An annual increase of up 150,000 steelhead smolts could be proposed in some years if needed to conduct survival studies at Rock Island, Rocky Reach or Wells dams. This production level increase

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[5] *For the purposes of this Opinion the Joint Fisheries Parties are the co-manager agencies who have signed the three HCP agreements. At the time of developing this Opinion they include NMFS, the WDFW, the USFWS and the Colville Tribes.*

would require the collection of about 55 adult steelhead broodstock. The production increase and the survival study design must be recommended and approved by the HCP Hatchery Committees and the HCP Coordinating Committees prior to retention of UCR steelhead. Outside of this potential annual adjustment for a few years, the production level of steelhead smolts supported by the two PUDs in the UCR basin will not increase during the duration of this Opinion. Reduction of production level could occur following survival studies and consensus of the HCP Coordinating Committee. The PUDs propose to potentially use some of the artificially propagated steelhead juveniles for dam passage survival studies pending recommendation and approval by the HCP Committees.

The PUDs propose to utilize agreements with other entities to implement hatchery obligations for the rearing, release, monitoring and evaluation, and research. The HCP Hatchery Committees must approve any proposed agreements or trades of production. However, it is the PUDs' responsibility to ensure that their obligations under Section 8 of the HCPs (Hatchery Compensation Plan) are satisfied.

The HCP Hatchery Committees will develop five-year monitoring and evaluation plans for the hatchery programs and update them every five years. The PUDs will fund the implementation of the monitoring and evaluation plans. The first monitoring and evaluation plan shall be developed by the HCP Hatchery Committees within one year of the issuance of the FERC order incorporating the HCPs into the PUDs' licenses. The monitoring plans will include data collection and analysis of all life stages of steelhead within the hatchery environment as well as data collection activities outside the hatchery facilities such as spawning ground surveys, juvenile fish traps, and adult traps and monitoring sites. Programs specific monitoring activities necessary to evaluate the programs will be determined by the HCP Hatchery Committees.

At this time, the ability to hold adult UCR steelhead in river water or water of appropriate temperature for maturation has been identified and the ability to rear juveniles on river water to produce the highest quality smolt has been identified as measures that the Chelan PUD need to address in the near term as program improvements in the two HCP agreements with Chelan PUD.

In the HCP agreements, the PUDs acknowledge that over the duration of the HCPs, new information and technologies that are developed will be considered and utilized in the monitoring and evaluation of the hatchery programs, where appropriate. The PUDs shall implement monitoring and evaluation of the hatchery programs consistent with the HCPs, the general objectives and guidelines listed for each Plan Species in the BAMP (1998), as determined by the HCP Hatchery Committees, and as analyzed in this Opinion. Monitoring and evaluation or research activities not considered here may require re-initiation of consultation depending on the potential effects of the activities.

2.2.3 Additional Terms and Conditions

The following additional terms and conditions will be incorporated into permit 1395 in order to minimize the potential adverse impacts associated with the proposed artificial propagation programs and are therefore part of the proposed action:

1. The Chelan PUD and Douglas PUD shall provide artificially propagated compensation of 400,000 and 349,000 yearling UCR steelhead smolts, respectively, as described in the three HCP agreements (CPUD 2002a; 2002b; DPUD 2002).

2. The Chelan PUD and Douglas PUD shall fund the specific elements of the artificial propagation programs objectives developed by the HCP Hatchery Committee, which may include contributing to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest.

3. The Chelan PUD and Douglas PUD, in coordination with the HCP Hatchery Committees, shall develop five-year monitoring and evaluation plans for the hatchery programs that are updated every five years. The first monitoring and evaluation plans shall be completed within one year of the issuance of the FERC order incorporating the HCPs into the hydroproject operation licenses. Existing monitoring and evaluation programs shall continue until replaced by the HCP Hatchery Committees.

4. The Chelan PUD and Douglas PUD shall be responsive to new information and technologies that are developed, and approved by the HCP Hatchery Committees, which may be considered and utilized in the monitoring and evaluation of the artificial propagation programs, where appropriate.

5. The Chelan PUD and Douglas PUD shall fund artificial propagation program monitoring and evaluation consistent with the HCPs, the general objectives and guidelines listed for each Plan Species in the BAMP, this Opinion, and as determined by the HCP Hatchery Committees.

6. The Chelan PUD and Douglas PUD shall assume the lead, and work in coordination with the HCP Hatchery Committees, in developing the ten-year hatchery program reviews and directing the development of annual summary reports. The program reviews will determine if egg-to-fry, adult-to-smolt and smolt-to adult survival rates, and other appropriate hatchery program goals and objectives of the HCPs and the ESA section 10 permits have been met or sufficient progress is being made towards their achievement. This review shall include a determination of whether artificially propagated production objectives are being achieved.

7. The WDFW shall limit annual production of Wenatchee summer steelhead for release into the Wenatchee River to not exceed 400,000 juveniles at approximately 6 fish per pound released in April or May.

8. The WDFW shall limit annual production of steelhead for release into the Methow or Okanogan Rivers to not exceed 349,000 juvenile at approximately 6 fish per pound released in April or May.

9. The WDFW shall limit annual production of steelhead for release into the Columbia River from Ringold Springs Rearing Facility to 180,000 juveniles at approximately 6 fish per pound.

10. The WDFW may collect and retain 125,000 eggs for transfer to the U.S. Fish and Wildlife Service for eventual release into the Methow River as authorized in permit 1396.

11. The WDFW may retain eggs to meet a 150,000 steelhead juvenile production level in addition to the production levels identified above, following approval and recommendation of the production for use as dam passage survival study fish by the HCP Hatchery Committees.

12. The WDFW shall operate and manage the UCR steelhead artificial propagation programs including following impact minimization measures as proposed in section 2.1 of this Opinion.

13. To the extent possible without imposing increased risk to listed species, Chelan PUD, Douglas PUD, and WDFW shall enumerate and identify marks and tags on all anadromous species encountered at adult and juvenile trapping sites. This information should be included in either an annual brood program report or a monitoring and evaluation report submitted to NMFS.

14. In trapping operations directed at the collection of broodstock, the Permit Holders shall apply measures that minimize the risk of harm to listed salmon and steelhead. These measures include, but are not limited to: limitations on the duration (hourly, daily, weekly) of trapping in mainstem river areas to minimize capture and handling effects on listed fish; limits on trap holding duration of listed fish prior to release; application of procedures to allow safe holding, and careful handling and release of listed fish; and allowance for free passage of migrating listed fish through trapping sites in mainstem and tributary river locations when those sites are not being actively operated.

15. All artificially propagated UCR steelhead smolts shall be externally marked (i.e., visual implant elastomer tag or adipose fin clipped) prior to release.

16. At least a representative portion of the artificially propagated UCR steelhead smolts shall be internally tagged (e.g., CWT, PIT tag) prior to release to allow monitoring and evaluation of fish performance and contribution rates, including straying levels to natural spawning areas and to other hatcheries. The appropriate level of tagging shall be based in the investigational or management objectives and shall be reviewed by a trained statistician or biometrician.

17. ESA-listed juvenile fish must not be handled if the water temperature exceeds 21°C (69.8°F) at the capture site. Under these conditions, ESA-listed fish may only be identified and counted.

18. If water temperature at adult trapping sites exceeds 21°C (69.8°F), the trap the trap operation shall cease pending further consultation with NMFS to determine if continued trap operation poses substantial risk to ESA-listed species.

19. When radio or active tags or Petersen disk tags are applied, recreational harvest regulations will clearly and specifically identify these fish as not available for retention. Information concerning the application, tracking, and final disposition of fish with these tags shall be included in annual reports.

20. In years when harvest activities are implemented, the WDFW shall conduct regular enforcement patrols and include a summary of enforcement actions, including regulation compliance statistics, in the annual report described below.

21. The Permit Holders may conduct spawning ground and carcass surveys to assess the distribution and impact of artificially propagated UCR steelhead on the natural-origin steelhead populations.

22. The Permit Holders may capture, handle, and release up to 20 percent of the natural-origin steelhead juveniles in a tributary basin using standard juvenile fish trapping techniques such as rotary screw traps. Lethal take may not exceed two percent of the fish captured.

23. The WDFW shall develop annual broodstock collection and spawning protocols for the UCR Region ESA-listed steelhead artificial propagation programs. Protocols should be coordinated with the co-managers and HCP Hatchery Committee which must be submitted to NMFS Salmon Recovery Division by June 15th of the collection year.

24. The WDFW shall monitor the incidence of, and minimize capture, holding, and handling effects on, listed salmon and steelhead encountered during trapping. The WDFW shall carefully handle and immediately release upstream incidentally captured listed UCR spring chinook salmon adults that are not intended for use as broodstock in concurrently operated and previously authorized listed stock recovery programs.

25. If enabled by identification of artificially propagated fish through external marking, measures should be applied to cull surplus hatchery-origin fish returning to a watershed in excess of program objectives.

26. The WDFW shall limit operation of Wells Dam east and west ladder traps to no more than three days per week from July through November. If both traps are operated, they shall be operated concurrently, operating on the same three days each week. When operating, active trapping may occur up to 16 hours per day. The ladder shall be open to passage at night to allow passage to listed steelhead.

27. Prior to opening any fishery targeting surplus artificially propagated UCR steelhead, the WDFW shall provide the proposed regulations to NMFS. The proposed regulations should include definition of the fishing areas, steelhead retention limits, anticipated encounter rate of natural-origin steelhead, estimated mortality impacts on natural-origin steelhead, monitoring plan, enforcement plans, and potential fisheries adjustments that would be made if impacts exceed authorized levels.

28. In years when harvest activities are implemented, the WDFW shall provide monthly reports by the 10th working day of the following month to NMFS. The report shall summarize the fishery activities, including angler effort, number of steelhead harvested, number of encounters with natural-origin UCR steelhead by tributary fishery area, and estimated UCR steelhead mortality impact; these reports shall include low enforcement information, particularly an estimate of illegal harvest and degree of regulation compliance. A final report detailing the fishery impacts by month and fishery area as described above shall be submitted to NMFS by August 31st of the year the fishery was concluded.

29. The WDFW shall manage artificially propagated steelhead returning to the Wenatchee River, Methow River, and Okanogan River basin tributary spawning areas in a manner consistent with recovery goals to enhance natural-origin populations. To reduce the number of artificially propagated UCR steelhead in the spawning areas in excess of full habitat seeding levels and to increase the proportion of the natural-origin steelhead in the tributary spawning populations, the WDFW may employ two methods. They may remove artificially propagated steelhead at dams or other trapping sites and they may use recreational fisheries to reduce the number of adipose fin-clipped hatchery-reared steelhead that may spawn naturally if the conditions described below are met:

i. Tier 1: When the natural origin UCR steelhead run is predicted to exceed 1,300 fish at Priest Rapids Dam and the total UCR steelhead run is predicted to exceed 9,550 steelhead, then a harvest fishery may be considered as an option to remove excess adipose fin clipped hatchery reared steelhead. For a fishery to be authorized in the tributary areas, the tributary escapements must be predicted to meet the minimum targets listed in Table 2, Tier 1. The mortality impact on natural origin UCR steelhead must not exceed the limits specified for Tier 1 in each tributary area.

ii. Tier 2: When the natural origin UCR steelhead run is predicted to exceed 2,500 fish at Priest Rapids Dam, the total UCR steelhead run is predicted to exceed 10,035 steelhead, and the tributary escapements meet the minimum targets listed in Table 2, Tier 2, then the natural origin UCR steelhead mortality impacts must not exceed the limits specified for Tier 2 for each tributary area.

iii. Tier 3: When the natural origin UCR steelhead run is predicted to exceed 3,500 fish at Priest Rapids Dam, and the total UCR steelhead run is predicted to exceed 20,000 steelhead, and the tributary escapements meet the minimum targets listed in Table 2, Tier 3, then the natural origin UCR steelhead mortality impacts must not exceed the limits specified for Tier 3 in each tributary area.

iv. The WDFW may remove artificially propagated steelhead at dams or other trapping sites to reduce the number of artificially propagated UCR steelhead in the spawning areas in excess of full habitat seeding levels to increase the proportion of the natural origin steelhead in the spawning population.

Table 2. Natural origin UCR steelhead run size criteria for recreational harvest fisheries in the Wenatchee River, Methow River, and Okanogan basin tributary spawning areas and mortality take limit of natural origin UCR steelhead. Catch and release mortality is estimated at 5 percent.

Tributary Area	Priest Rapids Dam Count	**Estimated Escapement to Tributary Area**	Mortality Impact
Wenatchee River and Columbia River above Rock Island Dam to below Rocky Reach Dam			
	<837	<599	0%
Tier 1	838	600	2%
Tier 2	2,146	1,700	4%
Tier 3	3,098	2,500	6%
Methow River and Columbia River above Wells Dam			
	<803	<499	0%
Tier 1	804	500	2%
Tier 2	2,224	1,600	4%
Tier 3	3,386	2,500	6%
Okanogan basin upstream of the Highway 97 Bridge			
	<175	<119	0%
Tier 1	176	120	5%
Tier 2	180	120	7%
Tier 3	795	600	10%

30. Adult return information shall include the most recent annual estimates of the number and proportion of artificially propagated fish on the spawning grounds, and the number and location of artificially propagated adults that were recovered outside the release areas. Adult return information and results from monitoring and evaluation activities outside the hatchery environment should be included in the annual report or a separate report. If a separate report on monitoring and evaluation activities conducted outside the hatchery environment is prepared, it shall be submitted by August 31st, of the year following the monitoring and evaluation activities (i.e., surveys conducted in 2003, report due August 2004) to NMFS Salmon Recovery Division, Portland, Oregon.

31. In years when harvest fisheries are implemented, the WDFW shall provide monthly reports by the 10th working day of the following month to NMFS Salmon Recovery Division in Portland, Oregon. The report shall summarize the fishery activities including angler effort, harvest, encounters with natural origin UCR steelhead by tributary fishery area, and estimated UCR steelhead mortality impact. A final report detailing the fishery

impacts by month and fishery area shall be submitted to NMFS Salmon Recovery Division in Portland Oregon by August 31st of the year the fishery was concluded.

32. In years when harvest fisheries are implemented, the WDFW shall conduct regular enforcement patrols and include a summary of enforcement actions, including regulation compliance statistics in the annual report described above.

2.3 Permit 1396 - U.S. Fish and Wildlife Service

NMFS proposes to issue permit 1396 to the USFWS to carry out a program artificially propagating endangered UCR steelhead in the Methow River. Program details were provided in a permit application (USFWS 2002) and are summarized below, followed by additional terms and conditions to be included in permit 1396.

2.3.1 Proposed Activities

The USFWS at Winthrop NFH proposes to obtain 125,000 eyed-eggs or fry from the WDFW Wells Hatchery for rearing and release into the Methow River annually. Two transfer options are proposed: (1) Eyed eggs taken from throughout the run would be transferred to Winthrop NFH in egg transport containers loaded in a covered truck in March, or (2) fry from eggs taken from throughout the run would be transported to Winthrop NFH in July at a size of 180 to 300 fish per pound. Fish would be transported from Wells Hatchery using fish transportation trucks equipped with aeration devices, oxygen tanks, air stones, and recirculating pumps.

At the beginning of September of each year, under both of the above scenarios, the fish will be reared to maintain a density index at or below established criteria. Water source is screened Methow River water, pumped ground water, or a combination of both. The fish remain in the six ponds until their April release into the Methow River when they average 5 to 8 fish per pound. The USFWS proposes to externally mark all smolts with an adipose fin-clipped to identify them as hatchery origin. The proposed release of 100,000 smolts would occur as a volitional release from the raceways, from which smolts would migrate into a channel fed by a spring and overflow hatchery water and enter the Methow River about 1/4 mile downstream from the hatchery facility.

2.3.2 Additional Terms and Conditions

The following additional terms and conditions will be incorporated into permit 1396 in order to minimize the potential adverse impacts associated with the proposed artificial propagation program:

1. The USFWS may receive up to 125,000 eggs from the WDFW as authorized in permit 1395

2. The USFWS shall limit annual production of steelhead for release into the Methow River to not exceed a total of 100,000 juveniles at approximately 6 fish per pound release in April or May.

3. The USFWS shall externally mark artificially propagated steelhead groups released into the Methow River with an adipose fin clip. All marking programs shall be coordinated with other fish production agencies within the Columbia River Region.

4. The USFWS shall internally tag (e.g., CWT, PIT tag) at least a representative sample of artificially propagated steelhead groups released into the Methow River to allow monitoring and evaluation of fish performance and contribution rates, including straying levels to natural spawning areas and to other hatcheries. All tagging programs shall be coordinated with other fish production agencies within the Columbia River Region.

2.4 Permit 1412 - Confederated Tribes of the Colville Reservation

NMFS proposes to issue permit 1412 to the Colville Tribes to carry out an artificial propagation research and enhancement program to enhance the natural origin UCR steelhead in the Okanogan River basin. Program details were provided in the permit application (CCT 2002) and are summarized below, followed by additional conditions that will be included in the permit.

2.4.1 Proposed Activities

The Colville Tribes propose to install a temporary picket weir in Omak Creek in mid-March through April 30th annually at approximately rm 0.5 to collect about 16 adult steelhead for broodstock. The Colville Tribes further proposed to install a permanent trap in Omak Creek in the future pending additional funding and submittal of a Biological Assessment. The permanent trap will not be analyzed at this time. If the picket weir is not successful, then trap nets or angling would be used to collect broodstock. The broodstock would be transported approximately 35 miles in a tank truck to the Colville Tribal Trout Hatchery, near Bridgeport, Washington.

Adult steelhead would be spawned and biologically sampled according to standardized fish health practices following fish disease control guidelines developed by IHOT (1995) and the PNFHPC (1989). Fin tissue and other biological data would be collected from the broodstock to monitor the program impacts.

Eggs would be incubated and juvenile fish reared at the tribal facility until the yearling smolt stage. Fish health would be monitored routinely, generally on a monthly schedule, and the rearing facility would be operated to be in compliance with "Salmonid Disease Control Policy of the Fisheries Co-managers of Washington State" standards (NWIFC and WDFW 1998).

Juvenile fish would be biologically sampled in the hatchery facility including collection of fin tissue for genetic monitoring, and growth monitoring.

Juvenile steelhead would be externally marked with visual implant elastomer tags for identification purposed but not adipose fin-clipped. Juveniles may also be PIT tagged for identification purposes. Steelhead smolts with a demonstrated preparedness for downstream migration would be released into Omak Creek from a Natural Rearing Enhancement System (NATURES)-type acclimation pond, which is in development with a completion target date of spring 2004, or scatter-planted from a tank truck in April or May.

2.4.2 Additional Terms and Conditions

The following additional terms and conditions will be incorporated into permit 1412 in order to minimize the potential adverse impacts of the proposed artificial propagation programs:

1. The Colville Tribes shall limit annual production of steelhead for release into the Okanogan River basin to not exceed 40,000 yearlings to be released in April or May.

2. In the event that circumstances, such as unanticipated, higher-than-expected fecundity, and high egg to fry survival rates, lead to the inadvertent possession of steelhead substantially in excess (>110 %) of program goal levels, surplus eggs or fish shall be culled from the population in a random manner.

3. To the extent possible without imposing increased risk to listed species, the Colville Tribes shall enumerate, and identify marks and tags on, all anadromous species encountered at adult trapping sites. This information should be included in the either an annual brood program report or a monitoring and evaluation report submitted to NMFS, Salmon Recovery Division, Portland, Oregon.

4. The Colville Tribes shall apply measures in trapping operations directed at the collection of broodstock that minimize the risk of harm to listed salmon and steelhead. These measures include, but are not limited to: limitations on the duration (hourly, daily, weekly) of trapping in mainstem river areas to minimize capture and handling effects on listed fish; limits on trap holding duration of listed fish prior to release; application of procedures to allow safe holding and careful handling and release of listed fish; and allowance for free passage of migrating listed fish through trapping sites in mainstem and tributary river locations when those sites are not being actively operated.

5. Traps to collect or monitor UCR steelhead must be checked, and all fish removed at least daily.

6. The Colville Tribes shall externally mark artificially propagated steelhead groups released into Omak Creek. All marking programs shall be coordinated with other fish production agencies within the Columbia River Region.

7. The Colville Tribes shall, if funding can be secured, periodically internally tag (e.g., CWT, PIT tag) at least a representative sample of artificially propagated steelhead groups released into the UCR basin to allow monitoring and evaluation of fish performance and contribution rates, including straying levels to natural spawning areas and to other hatcheries. All tagging programs shall be coordinated with other fish production agencies within the Columbia River Region.

8. If water temperature at adult trapping sites exceeds 21°C (69.8°F), the trap operating entity shall notify NMFS to determine if continued trap operation poses substantial risk to ESA-listed species.

9. The Colville Tribes shall provide an annual report that summarizes numbers, pounds, dates, tag/mark information, locations of artificially propagated fish releases, monitoring and evaluation activities that occur within the hatchery environment, and adult return to the UCR basin for each program. The Colville Tribes shall collect and report the coefficient of variation around the average (target) steelhead release size immediately prior to their liberation from the acclimation sites as an indicator of population size uniformity and smoltification status. Unless otherwise noted in the specific terms and conditions, the reports shall be submitted by January 31st of the year following release (i.e., brood year 2001, release year 2002, report due January 2003) to NMFS Salmon Recovery Division, Portland, Oregon.

10. Adult return information should include the most recent annual estimates of the number and proportion of artificially propagated fish on the spawning grounds, and the number and location of artificially propagated adults that were recovered outside the release areas. Adult return information and results from monitoring and evaluation activities outside the hatchery environment should be included in the annual report or a separate report. Unless otherwise noted in the specific terms and conditions, if a separate report on monitoring and evaluation activities conducted outside the hatchery environment is prepared, it shall be submitted by August 31st, of the year following the monitoring and evaluation activities (i.e., surveys conducted in 2003, report due August 2004) to NMFS.

2.5 Action Area

The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR §402.02).

Direct effects of the proposed action of the issuance of all three permits would occur within the UCR basin and includes areas primarily in Chelan, Douglas, and, Okanogan counties; more specifically, the Columbia River at and above Priest Rapids Dam, the Wenatchee River, Methow River, and Okanogan River basins and artificial propagation facilities along the mainstem Columbia River (Figure 1).

The effected area in the Wenatchee River basin includes the Chiwawa River, Nason Creek, Dryden and Tumwater Dams, and all tributaries accessible to anadromous steelhead. The effected area in the Methow River basin includes the Methow River, Twisp River, Chewuch River, the Methow Hatchery, the Winthrop NFH, and various smaller tributaries that are accessible to steelhead. The effected area in the Okanogan River basin includes the Okanogan River, Similkameen River, Omak Creek, and Salmon Creek, and other small tributaries that are accessible to steelhead. The effected area in the Columbia River basin includes the Wells, Ringold, Eastbank and Chelan hatcheries and the ladder traps at Wells and Priest Rapids dams.

Critical habitat was designated for UCR steelhead in 2000 when NMFS published a final rule in the Federal Register (65 FR 7764). However, the critical habitat designation for UCR steelhead was vacated and remanded to NMFS for new rulemaking pursuant to a court order in April 2002. The designation of critical habitat for the UCR steelhead ESU will trigger a reinitiation of ESA consultation.

3. STATUS OF SPECIES UNDER THE ENVIRONMENTAL BASELINE

In order to describe a species' status, it is first necessary to define precisely what "species" means in this context. Traditionally, one thinks of the ESA listing process as pertaining to entire taxonomic species of animals or plants. While this is generally true, the ESA also recognizes that there are times when the listing unit must necessarily be a subset of the species as a whole. In these instances, the ESA allows a "distinct population segment" (DPS) of a species to be listed as threatened or endangered. UCR steelhead and spring chinook salmon are just such DPSs and, as such, are for all intents and purposes considered "species" under the ESA.

NMFS developed the approach for defining salmonid DPSs in 1991 (Waples 1991). It states that a population or group of populations is considered distinct if they are "substantially reproductively isolated from conspecific populations," and if they are considered "an important component of the evolutionary legacy of the species." A distinct population or group populations is referred to as an evolutionarily significant unit (ESU) of the species. Hence, UCR steelhead constitute an ESU of the species *O. mykiss,* and UCR spring chinook salmon are an ESU of *O. tshawytscha*.

On March 24, 1999, NMFS listed UCR spring chinook salmon as an endangered species under the ESA (64 FR 14308). In its final listing determination, NMFS concluded that the UCR spring chinook salmon ESU is in danger of extinction throughout all or a significant portion of its range. NMFS also determined that six hatchery stocks in the UCR Basin (Chiwawa, Methow, Twisp, Chewuch, and White Rivers and Nason Creek) should be considered part of the ESU because they are currently essential for the recovery of the ESU. The WDFW operates most of the artificial propagation programs for listed UCR spring chinook salmon.

On August 18, 1997, NMFS listed UCR steelhead as an endangered species under the ESA (62 FR 43937). NMFS concluded that the UCR steelhead ESU is in danger of extinction throughout all or a significant portion of its range. NMFS also determined that one hatchery stock in the UCR basin, the Wells Hatchery stock, should be considered part of the ESU because it is currently essential for the recovery of the ESU. All artificial propagation programs rearing steelhead in the UCR were derived from the Wells Hatchery stock and natural origin UCR steelhead and are considered part of the ESU.

The UCR spring chinook salmon and steelhead were listed because NMFS determined that a number of factors—both environmental and demographic—had caused them to decline to the point where they were likely to become extinct within the foreseeable future. These factors for decline affect UCR chinook salmon and steelhead biological requirements at every life stage and they arise from a number of different sources. This section of the Opinion explores those effects and defines the context within which they take place.

To determine a species' status under extant conditions (usually termed "the environmental baseline"), it is necessary to ascertain the degree to which the species' biological requirements are being met at that time and in that action area. For the purposes of this consultation, UCR spring chinook salmon and steelhead biological requirements are expressed in two ways: Population parameters such as fish numbers, distribution, and trends throughout the action area; and the condition of various essential habitat features such as water quality, stream substrates, and food availability. Clearly, these two types of information are interrelated. That is, the condition of a given habitat has a large impact on the number of fish it can support. Nonetheless, it is useful to separate the species' biological requirements into these parameters because doing so provides a more complete picture of all the factors affecting UCR spring chinook salmon and UCR steelhead survival. Therefore, the discussion to follow will be divided into two parts: Species Distribution and Trends; and Factors Affecting the Environmental Baseline.

3.1 Species Distribution and Trends

3.1.1 Chinook Salmon

Chinook salmon are the largest of the Pacific salmon. The species' North American distribution historically ranged from the Ventura River in California to Point Hope, Alaska. In northeastern Asia, the species range from Hokkaido, Japan, to the Anadyr River in Russia (Healey 1991).

Additionally, chinook salmon have been reported in the Mackenzie River area of northern Canada (McPhail and Lindsey 1970). Of the Pacific salmon, chinook salmon exhibit the most diverse and complex life-history strategies. Healey (1986) described 16 age categories for chinook salmon, seven total ages at maturity with three possible freshwater ages. Gilbert (1912) initially described two general freshwater life-history types: "stream-type" chinook salmon reside in fresh water for a year or more following emergence; "ocean-type" chinook salmon migrate to the ocean within their first year. Healey (1983, 1991) has promoted the use of broader definitions for "ocean-type" and "stream-type" to describe two distinct races of chinook salmon. This racial approach incorporates life history traits, geographic distribution, and genetic differentiation and provides a valuable frame of reference for comparisons of chinook salmon populations. The generalized life history of Pacific salmon includes freshwater phases of incubation, hatching, emergence, migration to the ocean, rearing in marine waters, and subsequent initiation of maturation and return to fresh water for completion of maturation and spawning. Juvenile rearing in fresh water can be minimal or extended. Additionally, some male chinook salmon mature in fresh water, thereby foregoing emigration to the ocean. The timing and duration of each of these stages is related to varying degrees of genetic and environmental determinants and interactions thereof. Chinook salmon may spend one to six years in the ocean before returning to their natal streams to spawn.

Ocean distribution differs between ocean- and stream-type chinook salmon (Healey 1983, 1991). Ocean-type chinook salmon tend to migrate along the coast, and stream-type chinook salmon migrate far from the coast in the central North Pacific. Chinook salmon populations can be characterized by their time of freshwater entry as spring, summer, or fall runs. Spring chinook salmon tend to enter freshwater and migrate far upriver, where they hold and become sexually mature before spawning in the late summer and early autumn. Fall chinook salmon enter freshwater in a more advanced stage of sexual maturity, move rapidly to their spawning areas on the mainstem or lower tributaries of their natal rivers and spawn within a few days or weeks of freshwater entry (Fulton 1968, Healey 1991). Summer chinook salmon are intermediate between spring and fall runs, spawning in large and medium-sized tributaries, and not showing the extensive delay in maturation exhibited by spring chinook salmon (Fulton 1968).

3.1.1.1 UCR Spring Chinook Salmon

The UCR spring chinook salmon ESU, listed as endangered on March 24, 1999 (64 FR 14308), includes all natural-origin stream-type chinook salmon from river reaches above Rock Island Dam and downstream of Chief Joseph Dam, including the Wenatchee, Entiat, and Methow River basins (Myers *et al.* 1998). All chinook salmon in the Okanogan River are apparently ocean-type and are considered part of the UCR summer/fall run ESU. Nine stocks have been identified within the UCR spring chinook salmon ESU (WDF *et al.* 1993). All stocks, with the exception of the Methow stock, were considered by WDF *et al.* (1993) to be of native origin, of natural production type, and as depressed in status. The WDFW considers the Methow spring chinook salmon stock to be a composite in production type, but of native origin, and depressed in status.

When listing the UCR spring chinook salmon as endangered NMFS included six hatchery populations as part of the ESU: Chewuch River, Methow River, Twisp River, Chiwawa River, White River and Nason Creek. These six hatchery populations were considered to be essential for recovery and were therefore listed as part of the ESU. Hatchery populations at Winthrop NFH, Entiat NFH, and Leavenworth NFH were not included as part of the ESU because they were derived from Carson NFH spring chinook salmon.

The UCR spring chinook salmon have a stream-type life history. Adults return to the Wenatchee River during late March through early May, and to the Entiat and Methow Rivers during late March through June. Most adults return after spending 2 years in the ocean, although 20 to 40 percent return after three years at sea. The UCR spring chinook salmon experience very little ocean harvest. Peak spawning for all three populations occurs from August to September. Smolts typically spend one year in freshwater before migrating downstream. There are slight genetic differences between this ESU and others containing stream-type fish, but more importantly, the ESU boundary was defined using ecological differences in spawning and rearing habitat (Myers *et al.* 1998). The Grand Coulee Fish Maintenance Project (1939 through 1943) may have had a major influence on this ESU because fish from multiple populations were mixed into one relatively homogenous group and redistributed into streams throughout the UCR region. A more detailed discussion of UCR spring chinook salmon is provided in the Biological Opinion concerning spring chinook salmon artificial propagation programs (NMFS 2000a).

NMFS recently proposed Interim Recovery Abundance Levels and Cautionary Levels (Ford *et al*. 2001). *Cautionary Levels* were characterized as abundance levels that the population fell below only about 10 percent of the time during a historical period when it was considered to be relatively healthy. The three independent populations of spring chinook salmon identified for the ESU include those that spawn in the Wenatchee, Entiat, and Methow basins (Ford *et al.* 2001).

All three of the existing UCR spring chinook salmon populations have exhibited similar trends and patterns in abundance over the past 40 years. The 1998 status review (Myers et al. 1998) reported that long-term trends in abundance were generally negative, ranging from -5 to +1 percent. Analyses of the data series, updated to include 1996-2001 returns, indicate that those trends have continued. Based on redd count data series, spawning escapements for the Wenatchee, Entiat, and Methow rivers have declined an average of 5.6, 4.8, and 6.3 percent per year, respectively, since 1958. In the most recent five year geometric mean (1997-2001), spawning escapements were 273 for the Wenatchee population, 65 for the Entiat population, and 282 for the Methow population, only 8 to 15 percent of the interim abundance recovery targets, although escapement increased substantially in 2000 and 2001 in all three river systems. Based on 1980-2000 returns, the average annual growth rate for this ESU is estimated as 0.85. Assuming that population growth rates were to continue at 1980-2000 levels, UCR spring chinook salmon populations are projected to have very high probabilities of 90 percent decline within 50 years (87 to 100 percent).

Summary
While some improvement can be seen in recent years, the ESU is still at critically low levels compared to both historic production and the desired escapement levels—particularly for natural fish. Therefore, while there is some cause for very guarded optimism, NMFS finds that there has been no genuine change in the species' status since they were listed as endangered, and the biological requirements are not being met with respect to abundance, distribution, or overall trend.

3.1.2 Steelhead

Steelhead can be divided into two basic run types based on their level of sexual maturity at the time they enter fresh water and the duration of the spawning migration (Burgner *et al*. 1992). The stream-maturing type, or summer steelhead, enters fresh water in a sexually immature condition and requires several months in fresh water to mature and spawn. The ocean-maturing type, or winter steelhead, enters fresh water with well-developed gonads and spawns relatively shortly after river entry (Barnhart 1986). Variations in migration timing exist between populations. Some river basins have both summer and winter steelhead, others only have one run type. Unlike Pacific salmon, steelhead are iteroparous, or capable of spawning more than once before death. However, it is rare for steelhead to spawn more than twice before dying, and most that do so are females (Nickelson *et al.* 1992). Iteroparity is more common among southern steelhead populations than northern populations (Busby *et al.* 1996). Multiple spawnings for steelhead range from three percent to 20 percent of runs in Oregon coastal streams. Steelhead spawn in cool, clear streams with suitable gravel size, depth, and current velocity. Intermittent streams may also be used for spawning (Barnhart 1986, Everest 1973).

Based on catch data, juvenile steelhead tend to migrate directly offshore during their first summer, rather than migrating nearer to the coast as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986). Available fin-mark and coded-wire tag data suggests that winter steelhead tend to migrate farther offshore but not as far north into the Gulf of Alaska as summer steelhead (Burgner *et al.* 1992). Maturing Columbia River steelhead are found off the coast of Northern British Columbia and west into the North Pacific Ocean (Busby *et al.* 1996). At the time adults are entering freshwater, tagging data indicate that immature Columbia River steelhead are out in the mid-North Pacific Ocean.

3.1.2.1 UCR Steelhead

The UCR steelhead ESU, listed as endangered on August 18, 1997 (62 FR 43937), includes all natural-origin populations of steelhead in the Columbia River basin upstream from the Yakima River, Washington, to the U.S./Canada border. The Wells Hatchery steelhead stock is considered essential for recovery, and is included in the listing.

The Wells hatchery stock is considered part of the UCR ESU because it was founded from a mixture of native populations and retains genetic resources of steelhead populations above Grand

Coulee Dam that are now extinct. Since 1997, the WDFW has been developing a Wenatchee River stock for the juvenile released into the Wenatchee basin. Currently, there is probably a close resemblance between the natural and hatchery populations in this ESU because of the incorporation of naturally-spawning adults into the hatchery program and the large number of hatchery fish that have been spawning in the natural environment (65-80 percent of the spawning population in the Methow basin; Busby *et al.* 1996). Since natural replacement rates of UCR steelhead are low (0.3:1), the hatchery supplementation programs were determined to be essential for recovery and included in the endangered listing under the ESA. These hatchery fish could be used to reduce the short-term risk of extinction and aid in the recovery of the UCR steelhead ESU.

Although the life history of this ESU is similar to that of other inland steelhead, smolt ages are some of the oldest on the west coast (up to 7 years old), probably due to the ubiquitous cold water temperatures (Mullan *et al.* 1992). Adult steelhead from this ESU enter the lower Columbia between May and September with fish arriving at Wells Pool in early July. Fish enter the Wenatchee and Methow Rivers in mid-July and peak between mid-September and October. During winter, adult steelhead generally return to the warmer Columbia River and re-enter the Methow to begin spawning in mid-March after the ice has thawed. Spawning continues through May and many fish seek out higher reaches in the tributaries. Fry emergence occurs that summer and juveniles rear for two to four years prior to spring downstream migration.

On April 4, 2002, NOAA Fisheries defined interim abundance recovery targets for each spawning population in this ESU (Lohn 2002). These targets are intended to represent the number and productivity of naturally produced spawners that may be needed for recovery, in the context of whatever take or mortality is occurring. They should not be considered in isolation, as they represent the numbers that, taken together, may be needed for the population to be self-sustaining in its natural ecosystem. For UCR steelhead, the interim recovery levels are 2,500 spawners in the Wenatchee River, 500 spawners in the Entiat River, and 2,500 spawners in the Methow River (Lohn 2002).

Returns of both hatchery and naturally produced steelhead to the UCR basin have increased in recent years. The average 1997-2001 return counted through the Priest Rapids Dam fish ladder was approximately 12,900 fish. The average for the previous five years (1992-1996) was 7,800 fish. Abundance estimates of returning naturally produced UCR steelhead have been based on extrapolations from mainstem dam counts and associated sampling information (e.g., hatchery/natural fraction, age composition). The natural component of the annual steelhead run over Priest Rapids Dam increased from an average of 1,040 (1992-1996), representing about 15 percent of the total adult count, to 2,200 (1997-2001), representing about 17 percent of the adult count during this period of time (BRT 2003).

In terms of natural production, recent population abundances for both the Wenatchee/Entiat river aggregate population and the Methow population remain well below the interim recovery levels developed for these populations (BRT 2003). A 5-year geometric mean (1997-2001) of

approximately 900 naturally produced steelhead returned to the Wenatchee and Entiat rivers (combined) compared to a combined abundance target of 3,000 fish. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 3.4 percent per year). However, the average percentage of natural fish for the recent 5-year period dropped from 35 to 29 percent, compared to the previous status review. For the Methow population, the 5-year geometric mean of natural returns over Wells Dam was 358. Although this is well below the interim recovery target, it represents an improvement over the past (an increasing trend of 5.9 percent per year). In addition, the estimated 2001 return (1,380 naturally produced spawners) was the highest single annual return in the 25-year data series. However, the average percentage of natural origin spawners dropped from 19 percent for the period prior to the 1998 status review to 9 percent for the 1997 to 2001 returns.

Naturally produced steelhead made up an average of 17.8 percent of the steelhead run at Priest Rapids Dam during the 18-year period from 1986 to 2001 (Table 3). These natural origin steelhead are not equally distributed among the UCR tributary basins. Mullen *et al*. (1994) reported annual escapement to the Methow basin at only 10 percent natural origin steelhead; however, in recent years the WDFW (2002) report natural origin steelhead composition of 5 to 11 percent in 1998 through 2000 at Wells Dam (Table 4). The escapement to the Wenatchee basin from 1998 to 2000 averages 430 natural origin steelhead.

Table 3. Upper Columbia River steelhead run at Priest Rapids Dam from 1986 to 2002.

	Artificially Propagated		Naturally Produced		
Year	Total	Percent	Number	Percent	Total Run
1986	20,022	90%	2,342	10%	22,364
1987	9,955	71%	4,058	29%	14,013
1988	7,530	74%	2,670	26%	10,200
1989	8,033	75%	2,685	25%	10,718
1990	6,252	80%	1,585	20%	7,837
1991	11,169	80%	2,799	20%	13,968
1992	12,102	88%	1,618	12%	13,720
1993	4,538	84%	890	16%	5,428
1994	5,880	87%	855	13%	6,735
1995	3,377	77%	993	23%	4,370
1996	7,757	90%	843	10%	8,600
1997	8,157	91%	785	9%	8,942
1998	4,919	84%	928	16%	5,847
1999	6,903	83%	1,374	17%	8,277
2000	9,023	79%	2,341	21%	11,364
2001	24,174	81%	5,670	19%	29,844
Average	**9,362**	**82.2%**	**2,027**	**17.8%**	**11,389**

Table 4. Upper Columbia River steelhead run composition at Wells Dam (Methow and Okanogan basins) (Letter from Kirk Truscott, WDFW, July 9, 2003).

	Artificially Propagated		Naturally Produced		
Year	Number	Percent	Number	Percent	Total Run
1998	2,849	92%	234	8%	3,083
1999	3,511	89%	447	11%	3,958
2000	6,142	92%	541	8%	6,683
2001	18,034	95%	889	5%	18,923
2002	9,098	93%	706	7%	9,804

Artificially propagated steelhead have been released into tributary areas with good quality habitat to encourage their return and eventual spawning in the natural environment. In recent years artificial propagation has focused on incorporating natural origin fish into the broodstock populations.

Upper Columbia River steelhead migration and dam passage characteristics were evaluated using radio tags implanted at Priest Rapids Dam in 1999 and 2001 (English *et al*. 2001, 2003). Radio tagged fish were subsequently released 7.9 rm downstream of the dam. Of the steelhead tagged in 1999 and 2001, 75 and 81 percent were identified by marks and tags and originating from artificial propagation programs, respectively.

The distribution of radio tagged steelhead provides insight into the migration characteristics and spawning site selection. Based on marks and tags identified on and in steelhead at the time of tagging, 201 steelhead that were expected to return to the Methow or Okanogan basins remained in the system to spawn naturally. Of these, 72 percent actually went to the Methow or Okanogan, 5 percent strayed to rivers below Wells Dam, and 22 percent were last tracked in the Columbia River. A total of 32 radio-tagged steelhead were expected to return to the Wenatchee River basin, based on marks and tags. Of these, 66 percent (21 fish) went to the Wenatchee, 19 percent (6 fish) went to the Methow or Okanogan, and 16 percent (5 fish) were last tracked in the Columbia River (English *et al*. 2001, 2003).

The radio telemetry study also indicated that 56 to 73 percent of the steelhead that spawned attempted to return to the ocean in 2002 (tagged in 2001) as kelts. Of the 170 tributary spawners that were subsequently tracked as kelts, 18 percent (30 fish) were detected at or below Coyote Rapids in the Hanford Reach area below Priest Rapids Dam.

Radio tagged steelhead, both hatchery origin and natural origin, were tracked through the spawning season into the Wenatchee, Methow, Okanogan river basins as well as the Entiat,

Yakima, Snake river basins. In 2001-2002, a total of 77 and 61 percent of the hatchery and natural origin steelhead tagged were tracked through spawning, respectively. Both hatchery and natural origin steelhead were located in each of the major basins of the UCR. Distribution of hatchery and natural origin steelhead was similar. Natural origin fish returns were most frequently observed in the Wenatchee basin (37 percent) and Methow basin (35 percent).

Summary

While some improvement can be seen in recent years, the ESU is still at critically low levels compared to both historic production and the desired escapement levels of natural origin UCR steelhead. Therefore, while there is some cause for very guarded optimism, there has been no genuine change in the species' status since they were listed as endangered, and based on the best available science, NMFS finds that the biological requirements are not being met with respect to abundance, distribution, or overall trend.

3.2 Factors Affecting the Environmental Baseline in the Action Area

Environmental baselines for biological opinions are defined by regulation at 50 CFR §402.02, which states that an environmental baseline is the physical result of all past and present state, Federal, and private activities in the action area along with the anticipated impacts of all proposed Federal projects in the action area (that have already undergone formal or early section 7 consultation). The environmental baseline for this biological opinion is therefore the result of the impacts a great many activities (summarized below) have had on UCR steelhead and spring chinook salmon survival and recovery. Put another way, the baseline is the culmination of the effects that multiple activities have had on the species' biological requirements and, by examining those individual effects, it is possible to derive the species' status in the action area.

The best scientific information presently available demonstrates that a multitude of factors, past and present, have contributed to the decline of west coast salmonids by adversely affecting these essential habitat features. These factors are well known and documented in dozens—if not hundreds—of scientific papers, policy documents, news articles, books, and other media. It is therefore unnecessary to detail in this opinion the many ways in which human activities and natural factors have affected the UCR steelhead's and chinook salmon's habitat-related biological requirements; thus the following paragraphs constitute a brief summary of what the most recent accepted science has to say about how human action and natural processes have degraded essential steelhead habitat features in the UCR subbasin.

Some factors in the action area (e.g., hydropower and agricultural development—particularly irrigation diversions) have had adverse effects on the habitat-related biological requirements of UCR spring chinook salmon and UCR steelhead, while other factors have only affected some of those essential habitat features. For example, road building in the UCR subbasin has had a sizeable effect on stream substrates and water quality (through siltation), and road culverts have blocked fish passage, but such activities have not had much of an effect on water velocity. In another instance, timber harvest and grazing activities have affected—to greater or lesser

degrees—all the factors except space. And urban development has affected them all, but generally to a small degree in the largely rural UCR subbasin. In short, nearly every widespread human activity in the basin has adversely affected some or all of the habitat features. And by disrupting those habitat features, these activities—coupled with past hatchery and fishery effects and occasional natural disturbances such as drought and fire—have had detrimental impacts on UCR steelhead and spring chinook salmon health, physiology, numbers, and distribution in virtually every subpopulation and at every life stage. For detailed information on how various factors have degraded essential habitat features in the UCR subbasin, please see any of the following: NMFS (1991), NMFS (1997), NMFS (1998), NMFS (2000a), and, in particular, NMFS (2000b).

Summary

In conclusion, the picture of whether UCR steelhead and spring chinook salmon biological requirements are being met is more clear-cut for habitat-related parameters than it is for population factors: given all the factors for decline, it is clear that the UCR steelhead and spring chinook salmon biological requirements are currently not being met under the environmental baseline. Thus their status is such that a substantial improvement in the environmental conditions of their habitat is needed (over those currently available under the environmental baseline). Any further degradation of the environmental conditions could have a large impact because the species is already at risk of going extinct. In addition, there must be efforts to minimize impacts caused by dams, harvest, hatchery operations, habitat degradation, and unfavorable natural conditions.

4. ANALYSIS OF THE EFFECTS

NMFS analyzes the direct and indirect effects on an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action that will be added to the environmental baseline. Indirect effects are those that are caused by the proposed action and are later in time, but still are reasonably certain to occur. Interrelated action are those that are part of a larger action and depend on the larger action for the justification. Inter dependent actions are those that have no independent utility apart from the action under consideration (50 CFR §402.02).

The proposed actions can be divided into four categories, with specific activities in each category summarized in Table 5. Each of these activity categories has potential to effect ESA-listed UCR spring chinook salmon and UCR steelhead. The ESA section 10(a)(1)(A) process includes applicant proposed measures, and terms and conditions proposed by NMFS which function together to be protective of listed species. This section considers the potential effects of the proposed actions in the four activity categories above on the two ESA-listed ESUs that occur in the action area.

Table 5. Summary of activities that would be conducted if Permits 1395, 1396, and 1412 are issued.

Type of Activity	Permit 1395	Permit 1396	Permit 1412	Potential Effects
Adult Return Monitoring	Intercept and collect biological data (length, scales, marks, tags, etc.) on 10 percent of run Externally tag sampled steelhead Summarize, assess, and report data collected	Not applicable	Not applicable	Mortality due to stress from capture, handling, release Injury or mortality from tagging
Adult Return Management	Ensure the run can fully seed the habitat in each basin Develop broodstock collection protocols Determine if excess hatchery steelhead should be removed from spawning populations in each basin	Not applicable	Not applicable	Swamping impacts on natural origin UCR steelhead Mortality from capture and release in fisheries
Artificial Propagation	Collect up to 373 broodstock fish at Wells Dam on the Columbia River for Methow and Okanogan basin releases Collect up to 208 broodstock fish at Dryden and Tumwater Dams for Wenatchee basin releases Collect up to 55 broodstock fish for PUD survival studies is some years Holding and artificial spawning of broodstock at Wells and Eastbank Hatcheries Transfer of 125,000 eyed-eggs or fry from Wells Hatchery to Winthrop National Fish Hatchery annually	Receive up to 125,000 eggs or fry from WDFW annually	Collect up to 16 adult steelhead for broodstock from Omak Creek or Okanogan River Holding and artificial spawning of broodstock at Colville Trout Hatchery	Numeric reduction of natural origin UCR steelhead spawners because they are collected for broodstock

Type of Activity	Permit 1395	Permit 1396	Permit 1412	Potential Effects
	Transfer up to 225,000 eyed-eggs from Wells Hatchery to WDFW facilities for release from Ringold Springs Rearing Facility annually			
	Incubation and rearing to smolt	Incubation and rearing to smolt	Incubation and rearing to smolt	
	Rear juveniles following routine fish culture methods to an average size of 5 to 8 fish per pound	Rear juveniles using routine fish culture methods to an average size of 5 to 8 fish per pound	Rear juveniles using routine fish culture methods to an average size of 5 to 8 fish per pound	
	Externally mark or tag all fish prior to release	Adipose fin clip all fish prior to release	Externally mark or tag all fish prior to release	
	Internally tag some smolts prior to release			Competition for food and space with natural origin UCR spring chinook salmon and UCR steelhead juveniles
	Release up to 180,000 smolts into the Columbia River from Ringold Springs Rearing Facility			
	Release of 350,000 smolts into the Methow and/or Okanogan basins annually and release of 400,000 smolts into the Wenatchee basin annually	Release of up to 100,000 smolts in the Methow River annually	Release of up to 40,000 smolts into the Okanogan basin annually	
	Release of up to 150,000 smolts into the Columbia River for dam passage survival studies in a few years			
Research, Monitoring and Evaluation	Investigate the factors that affect and the extent of residualism of juveniles from release groups		Investigate the efficacy of hatchery programs in rebuilding self-sustaining populations	Visual observation, harassment of UCR steelhead and spring chinook salmon

Type of Activity	Permit 1395	Permit 1396	Permit 1412	Potential Effects
	Determine the relative success of program steelhead in the natural environment Investigate the efficacy of hatchery programs in rebuilding self-sustaining populations Monitor the affect of artificial propagation on the genetic profile of the stocks		Cap a portion of the redds deposited in Omak Creek to determine spawning success of artificially propagated fish in the natural environment Monitor the affect of artificial propagation on the genetic profile of the stocks	Numeric reduction of natural origin UCR steelhead spawners Mortality of juvenile UCR steelhead

4.1 Effects of Proposed Action on UCR Spring Chinook Salmon

The potential effects in the form of incidental take of the proposed action on UCR spring chinook salmon is evaluated in this section. Organized by the four categories listed above. Where appropriate, the applicants propose minimization techniques to reduce incidental impacts on UCR spring chinook salmon.

4.1.1 Adult Return Monitoring

Monitoring of adult steelhead returns to the UCR basin at Priest Rapids Dam (rm 397), which is below the four steelhead production tributaries of the UCR basin will impact the target UCR steelhead, and potentially impact ESA-listed UCR spring chinook salmon. The migration timing of steelhead at Priest Rapids begins in late June and continues through November 15th when adult counting at the facility is terminated for the season (http://www.fpc.org/). Spring chinook salmon migration at Priest Rapids Dam occurs between about April 15th and June 15th. Adult steelhead return monitoring activities at Priest Rapids Dam generally begin the second week of July and ends about November 15th, which encompasses 95% of the run (Figure 2). The temporal separation between the two ESA-listed species run timing results in no anticipated effects on spring chinook salmon from steelhead adult monitoring at this location.

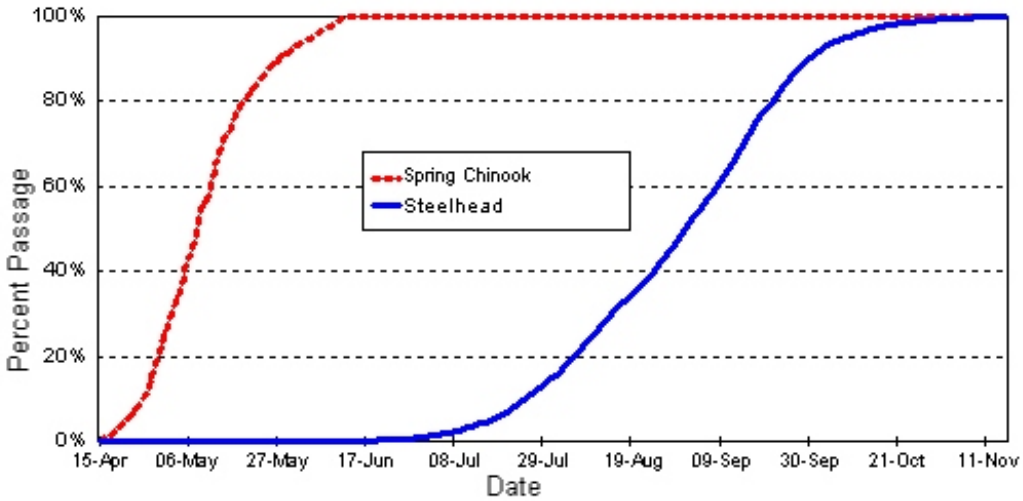

Figure 3. Ten year average cumulative passage of spring chinook salmon and steelhead at Priest Rapids Dam.

4.1.2 Adult Return Management

Management activities such as removal of excess artificially produced adult steelhead at trap sites or via recreational harvest fisheries could occur from October through March. Spring chinook salmon adults return to the UCR beginning in late March and complete spawning by the

end of September. The temporal separation in life history strategies result in no anticipated impacts of adult steelhead management or broodstock collection activities. Additionally, fishing gear used to target adult steelhead would be too large to catch juvenile spring chinook salmon, leading NMFS to determine that potential management actions and broodstock collection activities associated with the artificial propagation programs are not likely to adversely effect UCR spring chinook salmon.

4.1.3 Artificial Propagation Activities

The WDFW, the Chelan PUD, the Douglas PUD, the USFWS, and the Colville Tribes propose to operate artificial propagation enhancement programs for ESA-listed UCR steelhead. The *Biological Opinion on Artificial Propagation in the Columbia River* (NMFS 1999a) and the *Biological Opinion for 1995-1998 Hatchery Operations in the Columbia River Basin* (NMFS 1995) identify nine general types of potential adverse effects of hatchery operations and production on natural fish populations. These are: (1) operation of hatchery facilities, (2) broodstock collection, (3) genetic introgression, (4) density-dependent effects of hatchery production, (5) disease, (6) competition, (7) predation, (8) residualism, and (9) migration corridor/ocean. Adverse impacts on UCR spring chinook salmon resulting from UCR steelhead artificial propagation programs could only result from a few of the nine general types because of differences between the two species.

Physical operation of hatchery facilities impacts could occur from water withdrawal, release of hatchery effluent and facilities failure (NMFS 1999a). Water withdrawal for hatcheries located within the spawning and/or rearing areas can diminish stream flow from points of intake to outflow and, if great enough, can impede migration and affect spawning behavior. Effluent from the hatchery may change water temperature, pH, suspended solids, ammonia, organic nitrogen, total phosphorus, and chemical oxygen demand in the receiving stream's mixing zone (Kendra 1991).

Hatchery facilities operating to carry out the proposed programs rely largely on ground water withdrawal, although an important aspect of the two HCP agreements with Chelan PUD require the ability to hold steelhead adults and rear/acclimated juvenile steelhead on river water. Hatchery operators are required to comply with water right permits administered by Washington Department of Ecology established for each hatchery or acclimation site. This is intended to prevent over-appropriation of surface water needed for natural fish production and migration. Hatcheries facilities are also required to maintain all screens associated with water intakes in surface water areas to NMFS screening criteria (NMFS 1996). All hatcheries associated with the proposed action operate under NPDES permits that regulate water quality impacts. Reporting of hatchery effluent and water quality monitoring activities are part of the annual report to NMFS. Potential impacts of hatchery facility operation for the proposed programs were evaluated in an Environmental Assessment and determined to not be significant (NMFS 2003) . NMFS finds that adherence to water right limits, water quality NPDES permits, and NMFS screening criteria (NMFS 1996) are sufficient measures to protect the UCR spring chinook salmon ESU.

The release of steelhead smolts may cause displacement of rearing natural UCR spring chinook salmon from occupied stream areas, leading to abandonment of advantageous feeding areas or premature out-migration (Pearsons *et al*. 1994). The presence of large numbers of hatchery produced steelhead may also alter natural fish behavior patterns, which may increase their vulnerability to predation (NMFS 1995).

The release of only volitionally migrating smolts into the upper tributary reaches will contribute to a decrease in density-dependent effects on natural fish, by limiting interactions between natural and hatchery fish. Releases of hatchery smolts coincident with managed releases of water (flow augmentation) will also help accelerate downstream migration of artificially propagated steelhead, further reducing spatial and temporal overlaps with listed fish and potential adverse behavioral effects. When possible, release of juveniles which may residualize will occur into the lower tributary areas to minimize the potential adverse impacts on the naturally produced populations.

Artificially propagated steelhead smolts may prey upon other fish. Due to their location, size, and time of emergence, newly emerged chinook salmon fry are likely to be most vulnerable to predation by hatchery released fish. Their vulnerability is believed to be greatest as they emerge and decreases somewhat as they move into shallow, shoreline areas (USFWS 1994). Emigration out of release areas and foraging inefficiency of newly released smolts may minimize the degree of predation on chinook salmon fry (USFWS 1994).

Predation by artificially produced steelhead smolts on natural origin smolts is less likely to occur than predation on fry. The USFWS (1994) presented information indicating salmonid predators are generally thought to prey on fish approximately 1/3 or less their own length (see also Witty *et al.* (1995) citing Parkinson *et al.* (1989)). Consequently, predation by hatchery fish on listed salmon smolts in the migration corridor is believed to be low.

Large numbers of artificially propagated steelhead may attract predators (birds, fish, pinnipeds) and, consequently, contribute indirectly to predation of naturally produced fish. On the other hand, a mass of hatchery fish moving through an area may confuse or distract predators and may provide a beneficial effect to naturally produced fish. Both effects may be occurring to some extent. The presence of large numbers of hatchery fish may also alter the listed species' behavioral patterns, which may influence vulnerability and prey susceptibility (USFWS 1994). Considering the measures to protect UCR steelhead, the impacts of predation will not be substantial.

4.1.4 Research, Monitoring, and Evaluation

Research that may be conducted on artificially propagated UCR steelhead under the proposed permits will be evaluated by regional scientific and technical committees that have the responsibility to identify activities important for advancing the survival and recovery of ESA-listed anadromous fish populations. The three HCPs previously described require both HCP

Hatchery Committee and a HCP Coordinating Committee to address issues relating to programs funded by Chelan and Douglas PUDs. A representative of NMFS is on each committee. Federal and State agencies have the additional responsibility pursuant to their agencies mandates to protect and conserve the natural resources to coordinate research and monitoring actions with other co-managers that may or may not be represented on the HCP committees. This technical and scientific scrutiny is expected to ensure that research and monitoring activities that occur in the natural environment minimize adverse impacts on ESA-listed species while maximizing the survival and recovery of anadromous fish populations. Additionally, newly initiated research projects not considered in this Opinion will have to be evaluated for potential impacts to listed species pursuant to the ESA. The UCR steelhead program monitoring will likely over lap or be combined with UCR spring chinook salmon monitoring and provide a benefit to the UCR spring chinook salmon ESU.

The monitoring elements that are identified in this Opinion that may impact UCR spring chinook salmon are restricted to natural environment monitoring (Section 2.1.1.4.2). Natural environment monitoring of adult UCR steelhead includes redd and carcass surveys activities. Adult UCR spring chinook salmon spawn in August and September, while UCR steelhead spawn from January through May. This separation in spawn timing results in no impact on adult UCR spring chinook salmon. Juvenile UCR spring chinook salmon could be present in redds or occupying rearing habitat. Any impacts would be minor, transitory, and temporary.

Monitoring of juvenile UCR steelhead in the natural environment will be done using standard angling techniques and juvenile fish traps (i.e., rotary screw traps). These activities could encounter UCR spring chinook salmon. In previous years, no UCR spring chinook salmon have been encountered during sampling using standard angling techniques for residual UCR steelhead (Andrew Murdoch, WDFW personal communication, August 27, 2003).

The WDFW juvenile fish traps are generally operated to achieve a sample efficiency of four to 20 percent of the total brood production of the target species, depending on the river size. In the Wenatchee River basin, two juvenile fish traps are currently authorized under ESA permit 1203 to monitor natural production of UCR spring chinook salmon. In general, these traps result in mortality of less than two percent on target species and less than one percent on non-target species. In the Biological Opinion for permit 1203 (NMFS 1999b), the WDFW assumed mortality of listed UCR spring chinook salmon would not exceed three percent. Based on experience since that time, the WDFW has revised the mortality impact to be less than two percent on target species. The incidental mortality of UCR spring chinook salmon would not exceed one percent of the UCR spring chinook salmon captured. Using the larger of the two estimates of UCR basin natural production capacity for UCR spring chinook salmon of 753,168 smolts (Ford *et al.* 2001) and assuming trap efficiency of 20 percent and incidental mortality of one percent equals an impact of 1,506 smolts. Converting this to adult equivalents (1.3 percent survival smolt-to-adult, Ford *et al.* 2001) results in a maximum loss of up to 20 adult UCR spring chinook salmon. Considering that juvenile fish traps will likely not be operated in all tributary basins and not all traps will achieve an efficiency of 20 percent (for example the lower

Wenatchee River trap has previously achieved only about a two percent efficiency), the numeric impact will likely be much less and the impact to the ESU as whole is not substantial.

4.2 Effects on UCR Steelhead

Quantitative impacts estimated for the program on the natural population of UCR steelhead are provided below (Table 6 and Table 7), followed by a discussion of the relative effects of the numerical impacts. To address the potential impacts, the applicants propose minimization techniques and research, monitoring, and evaluation activities to assess the affects of the proposed programs, and a mechanism to adjust the programs consistent with the adaptive management approach adopted within the three HCPs. NMFS will place additional limits in the section 10(a)(1)(A) permits which will include facility operational sideboards, limits to the number of natural origin steelhead collected, and reporting requirements in order to reduce and monitor the direct take of UCR steelhead. Overall, the artificial propagation programs provide a benefit to the endangered UCR steelhead ESU by boosting the population abundance, while maintaining or increasing the genetic diversity, and spatial distribution.

Table 6. Estimated numerical or proportional non-lethal and lethal take of naturally produced and artificially propagated ESA-listed Upper Columbia River (UCR) steelhead adults.

Permit - Holder	Non-lethal	Lethal	Non-lethal	Lethal	Lethal Total
Proposed Activity	Naturally produced adult		Artificially propagated adult		
Permit 1395 - WDFW, Chelan PUD and Douglas PUD					
Adult Monitoring at Priest Rapids Dam [a]					
Proportional Take	10% of run	1% of sample	10% of run	1% of sample	1% of sample
1978-2002 Average	226	2[a]	1,104	11 [a]	13 [a]
Radio/Active Tag Study	80 [b]	4	320 [b]	16	20 [b]
Disk Tag Application					
Proportional Take	not applied	not applied	3.8% of run	5% of tagged	5% of tagged
9 Years Triggers Met	0	0	485	24	24 [c]
Recreational Harvest			See Table 9 below		
Artificial Propagation		216	500 [d]	525 [e]	581
Dam Survival Studies				55	55
Research and Monitoring	95	3	230	10	13
Permit 1396 - USFWS					
Artificial Propagation	No broodstock collection, eggs received from WDFW and is included in permit 1395				
Permit 1412 - Colville Tribes					
Artificial Propagation		16	50 [d]	16 [f]	16

[a] *Priest Rapids Dam 1978-2002 average count equals 13,306 steelhead., of which 17 percent were of natural origin (2,262 fish).*

[b] *Assumes 1 percent mortality of steelhead captured, handled, and released when water temperature exceeds optimal maximum of 58°C, which on average is 58 percent of the sampling days. The WDFW has not observed a mortality in the previous 16 years.*

[c] *Total radio/active tag application would not exceed 400 fish, natural and hatchery origin component would depend on run composition, would only occur in years of high returns of both natural and artificially propagated steelhead.*

[d] *Capture, handle, release of non-target adult steelhead during broodstock collection activities.*

[e] *If natural origin steelhead are not available artificially produced steelhead would be collected up to the 581 total limit.*

[f] *If natural origin steelhead are not available artificially produced steelhead could be collected up to the 16 total limit.*

Table 7. Estimated numerical or proportional non-lethal and lethal take of naturally produced and artificially propagated ESA-listed Upper Columbia River (UCR) steelhead juveniles.

Permit - Holder	Non-lethal	Lethal	Non-lethal	Lethal	Lethal Total
Proposed Activity	Naturally produced juvenile		Artificially propagated juvenile		
Permit 1395 - WDFW, Chelan PUD and Douglas PUD					
Adult Monitoring at PRD	0	0	0	0	0
Steelhead Management	0	0	0	0	0
Artificial Propagation	0	0	0	0	0
Research and Monitoring [a]	25%	2%	15%	2%	2%
Permit 1396 - USFWS					
Artificial Propagation	0	0	0	0	0
Permit 1412 - Colville Tribes					
Artificial Propagation	0	0	0	0	0
Research and Monitoring [b]	30%	5%	0	0	5%

[a] *Wenatchee and Methow Basin populations.*

[b] *Omak Creek population.*

4.2.1 Adult Return Monitoring

The WDFW requests authorization to capture 10 percent of the annual steelhead run at Priest Rapids Dam for sampling. Biological sampling would include length measurements, collection of scales, visual examination for external marks and tags, and scanning with a coded-wire tag detector for presence of internal tags. The 10-year average run (1992-2001) is 10,383 steelhead, of which an average of 17.7 percent were naturally produced. Based on this average, about 1,038 steelhead total and about 184 naturally produced steelhead could be sampled annually. The range of natural-origin steelhead at Priest Rapids Dam is large (8.8 to 29.0 percent) and in some years could result in handling a higher proportion of natural-origin steelhead compared to the average. Previous sampling at Priest Rapids Dam has intercepted approximately 8-10 percent of the passing adult steelhead population (246 to735 adults; WDFW 1997). The potential benefit of this activity is the information which will allow for the active management of artificially produced steelhead on the spawning grounds, improved knowledge of the timing and distribution of natural and artificially propagated steelhead throughout the UCR basin which, combined with other data such as redd counts may be used to estimate the productivity of UCR steelhead. In the WDFW's and NMFS' judgement these benefits outweigh the potential adverse effects of collecting, handling, sampling, and releasing 10 percent of the run.

Radiotelemetry studies in 1999 and 2001 indicate a delay at Priest Rapids Dam of approximately 2.5 and 5.4 hours, respectively, when the trap is operated (English *et al*. 2001, 2003). Considering that the median travel time from Priest Rapids Dam tailrace to Wells Dam exit was 20.1 days in 1999 and 9.5 days in 2001, the few hours of delay for a small portion of the run is not substantial.

The WDFW indicates that no direct mortalities have been observed during the previous 16 years of sampling. The time from capture to release of steelhead at Priest Rapids Dam is generally less than five minutes, and after release above the trap into the fish ladder it is unlikely that delayed mortality steelhead would be observed. Groot *et al*. (1995) concede that the mechanisms connecting stress with disease induction in fishes are not fully understood. It is however, generally accepted that elevated plasma cortisol concentration caused by stress, is a key factor in increasing the susceptibility to disease. Water temperatures above the optimal range add an additional stressor. Optimal temperature range for steelhead is 45 to 58°F (7.2 to 14.4°C) (FPDEP 1991). In August through October, average daily Columbia River water temperatures at Priest Rapids Dam range between 52.8 and 69.2°F (11.6-20.7°C) (10-year average scroll case temperature from http://www.cqs.washington.edu/dart/dart.html, March 20, 2003) and 58 percent of the average daily temperatures are above the optimal range for steelhead (Figure 3). The experience level of samplers and the measures to reduce stress lead NMFS to assume that delayed mortality would not exceed one percent of the fish sampled during the warm water period. In an average run year, this would total 10 steelhead, 2 of which would be expected to be of natural origin.

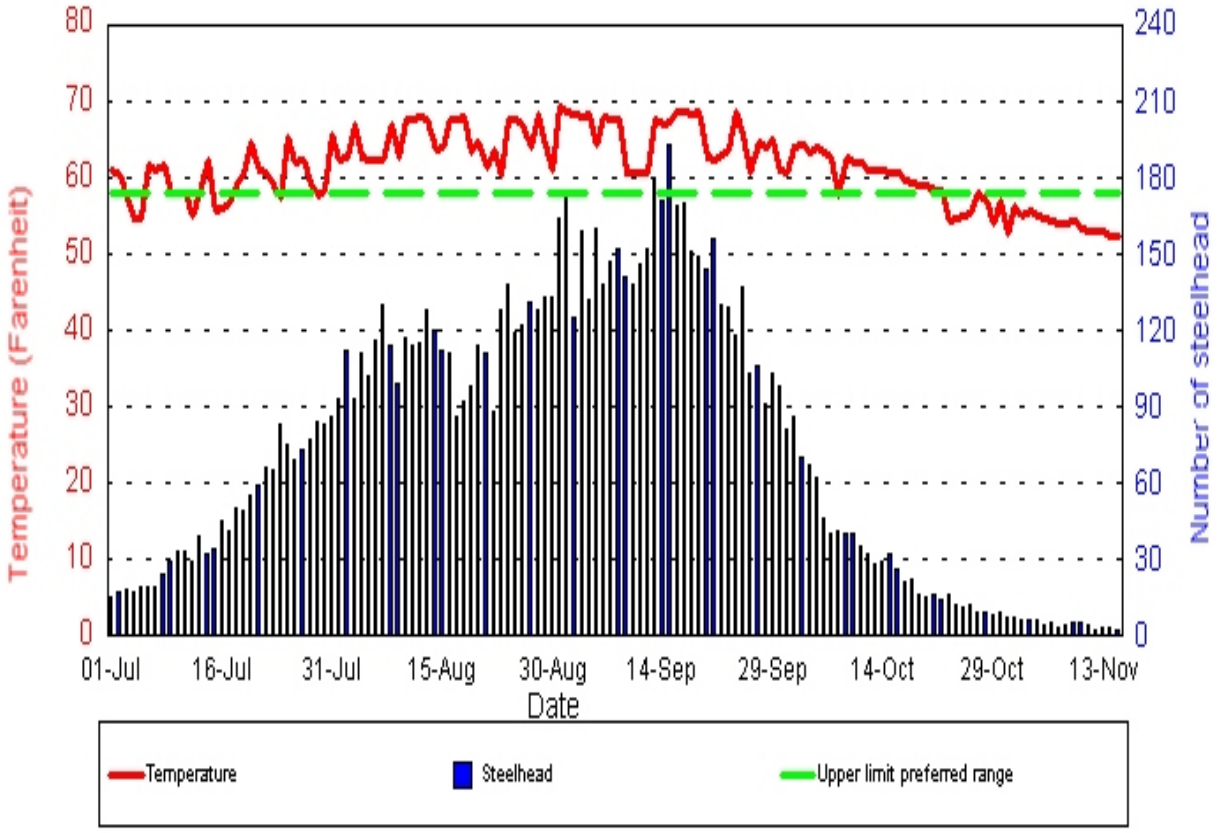

Figure 4. Ten year average upper optimal water temperature and daily passage of steelhead at Priest Rapids Dam.

The WDFW proposes to apply Petersen-type disk tags to the dorsal fin of adipose fin-clipped hatchery origin steelhead after September 9th in years where the run size is likely to exceed 1,300 natural origin steelhead and the total run is likely to exceed 9,550 steelhead. These run sizes are the initial triggers identified for considering additional actions such as recreational fisheries to manage returning hatchery origin steelhead. They reflect a minimum run that exceeds the 10-year average return of natural origin steelhead (years 1991 to 2000) and a starting point for recovery of the natural populations. The September 9th date is 21 days prior to October 1st, which is the earliest a recreational fishery would be opened. The anesthetic, tricaine methanesulfonate (sold under the brand names of Finquel or Tricane-S), commonly know as MS-222, used during sampling has a required 21-day withdrawal period set by the Food and Drug Administration, during which time the fish should not be available for human consumption.

The WDFW believes the application of this tag is necessary to identify steelhead that have been subjected to anesthetic to exclude them from harvest in a recreational fishery (see Section 4.2.2 below). The application of a Petersen disk tag involves the insertion of a wire that holds a 22mm diameter bright orange disk on both sides of the fish through the base of the dorsal fin. As

described above, the environmental conditions at Priest Rapids Dam are outside the optimal range for maintaining optimal steelhead health. The additional stress and injury of applying this type of tag could be expected to increase delayed mortality. Empirical data is lacking concerning the impacts of this specific activity on survival to spawning. The WDFW reports that steelhead with disk tags have been captured in recreational fisheries and that the tag and fish were both in good condition. No information on direct or delayed mortality resulting from application of this type of disk tag was found during a literature search. McFarlane *et al.* (1990) in their review of the development of external tags and marks summarized that this type of tag was first used in 1895 and continues to be a popular tag.

NMFS, based on the data cited above, concludes that the type of injury inflicted during the application of a disk tag is no greater than the injury sustained during hooking and releases steelhead in a recreational fishery under warm water conditions. Therefore, the delayed mortality would be expected to be no greater than 10 percent of the fish receiving a Petersen-disk tag. Run sizes exceeded the above triggers in nine of the last 17 (1978-2002) return years. Utilizing run sizes for those nine years and assuming that all artificially propagated steelhead smolts were adipose fin clipped NMFS calculated the following impact. Tag application would be limited to hatchery origin, adipose fin clipped steelhead, trapped after September 9th when, on average 62 percent of the run has passed Priest Rapids Dam (Figure 4), and only applied during relatively high run size years, on a portion of the fish sampled, the number of steelhead that would receive a disk tag would be about 485 and an estimated 49 steelhead would die. Currently, not all releases are adipose fin clipped and the number of tagged steelhead would be smaller than in this estimate. Since no adipose present natural-origin steelhead would be tagged, no impact to this component of the population would occur.

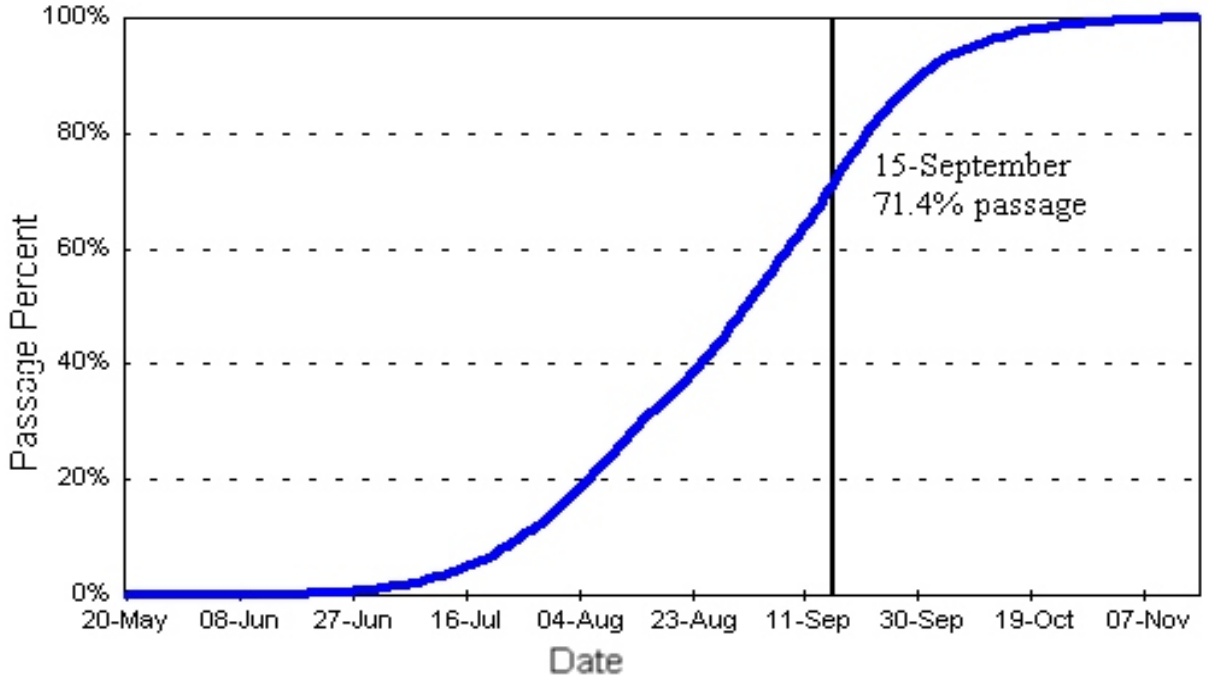

Figure 5. Ten year average cumulative run timing of steelhead at Priest Rapids Dam and the proposed September 15th date for adult steelhead management option assessment.

Additionally, the WDFW proposes to radio/active tag or up to 400 steelhead at Priest Rapids Dam in some years. Radio/active tags would be used to assess migration timing, route, survival, as well as tributary migration and spawning distribution. Radio tag studies conducted by the PUDs have indicated that stray rates of artificially propagated steelhead are higher than expected (English *et al*. 2001, 2003). Considering the current uniformity of the Wenatchee and Wells steelhead stocks in terms of both genetic identity and hatchery program management the stray rates are not entirely surprising. Radio tagged steelhead have been captured and retained during broodstock collection activities. In NMFS' judgement, in years when radio/active tracking is conducted in tributary areas that it would be beneficial to leave radio/active tagged steelhead in the natural environment to collect information on spawning distribution, timing and kelting. Additionally, some radio/active tagged steelhead have been harvested during recreational fisheries; again; potential spawning information is lost when radio/active tagged steelhead are removed from the river. As the tributary oriented programs continue to develop, radio/active tag studies will likely be a very useful measurement tool to determine if tributary oriented artificial propagation strategies are effective. Prior to initiating a radio/active tag study for a given year, the HCP Hatchery Committees will review and approve the study design. Delayed mortality that result of radio/active tagging is assumed to occur at a rate of about 5 percent. Therefore, the ten-year average run size mortality from the telemetry study would be about 20 steelhead, of which only about 20 percent would be of natural origin, resulting in a mortality estimate of four natural origin steelhead.

The cumulative effects of the basic stock assessment activities, and the additional application of a disk tag, and/or a radio/active tag would be expected to result in some occurrence of delayed mortality. A steelhead run consistent with the 1978-2002 average run and all activities occurring would result in a capture, handling, tagging and release mortality impact range of about six natural origin and 48 artificially propagated steelhead. Take in the form of capture, handle, release will not exceed 10 percent of the total run, with mortality from the take not expected to exceed one percent. Take from these monitoring and evaluation activities is not expected to exceed 3.8 percent of the total run and mortality is not expected to exceed 0.2 percent of the total run. This mortality would be limited to years of high returns of both natural and artificially propagated steelhead. In an average run, the take is equal to about 20 steelhead, of which 4 fish (20 percent) would be of natural origin. Given that the average run size is 13,306 (1978 to 2002), the total potential loss of 20 steelhead, predominately artificially propagated steelhead is not a substantial impact considering the potential benefit of the data collection. The data collected is potentially very valuable for future recovery and management actions in the UCR basin as well as other salmon and steelhead populations.

In order to minimize the potential impacts on UCR steelhead from the monitoring activities, the WDFW proposes specific trap operation and fish handling measures adherence to which will be a condition of the permit (see Section 2.2.1.1). NMFS finds these measures are adequate to minimize the adverse impacts on ESA-listed UCR steelhead and that these activities provide a net benefit to the recovery of ESA-listed steelhead in the UCR basin.

4.2.2 Adult Return Management

The ESA intends to ensure the protection and restoration of species in their native habitats. In some years the return of adult UCR steelhead is higher than what is needed to fully seed the habitat which is not surprising since much of the artificial propagation program is produced as mitigation for inundation of habitat. Priority in conservation is afforded to naturally produced steelhead to ensure the highest potential for successful natural production. NMFS in the ESU determination has recognized that the artificially produced steelhead in the UCR are an important component of the recovery effort. However, in years of high survival and return of naturally produced steelhead, the individuals that were the products of the natural environment should be given priority to spawn naturally to perpetuate the species. In years of large returns of artificially produced steelhead to the UCR, the WDFW seeks to reduce the potential negative effects of excess artificially propagated escapement by several methods.

The WDFW proposes to purposefully manage artificially propagated UCR steelhead adults returning to the UCR basin to provide adequate escapement to fully seed the spawning habitat. Artificially produced steelhead have been an important component of the spawning escapements to the Wenatchee and Methow basins. Recent hatchery reforms and recovery strategies include the development of a Wenatchee basin steelhead stock and incorporation of naturally produced adults into the hatchery programs in both basins. Please see the WDFW application for a full

discussion of hatchery program strategies (WDFW 2002). Below are brief descriptions of the different strategies that WDFW will use to manage UCR adult hatchery steelhead.

The Ringold Springs steelhead program serves several purposes. First it provides a genetic reserve for the UCR steelhead ESU in case of catastrophic crash of the upper basin population. Second, it allows managers to remove the earliest spawning component of the Wells Hatchery stock which historically was artificially selected for by well intentioned hatchery managers. This action is one hatchery reform measure intended to help reverse previous adverse impacts of hatchery program management. It provides these benefits to the recovery of the population and an additional benefit of recreational angling in an area that has minimal adverse impacts on the natural steelhead populations. The WDFW proposal to open recreational harvest fisheries in the area adjacent to Ringold Springs would be expected to remove excess artificially propagated steelhead and result in the hook and release of few natural origin steelhead.

In areas above Priest Rapids Dam, several methods have been used to estimate the number of steelhead spawners and juveniles that the available habitat may be capable of supporting. These estimates for the UCR basin range from 1,603 to 8,281 depending on the estimation method (Ford *et al*. 2001). The Interior Columbia Basin Technical Recovery Team (TRT) is reviewing the available data and is expected to provide escapement recommendations for recovery of all ESA-listed UCR species. The WDFW proposes to manage artificially propagated steelhead at levels above the interim abundance targets developed by NMFS (Lohn 2002) until the TRT recommendations are available. NMFS has not developed abundance targets for the Okanogan basin or other smaller tributaries. The WDFW proposes abundance levels for these tributaries for management purposes as well (Table 8).

Table 8. Interim abundance targets of naturally produced steelhead by basin and approximate natural origin broodstock collection goal.

Basin	Interim Abundance Target	Broodstock Goal
Wenatchee	2,500	at least 104 [a]
Entiat	500	- -
Methow	2,500	maximum 123 [b]
Okanogan	600	16
Small Tributaries	200	- -
Total	**6,300**	**243**

[a] *Proportional to run-at-large in years when run is composition is 50% or greater natural origin steelhead, otherwise goal is 50% naturally produced steelhead. Total broodstock collection goal is generally about 208 steelhead..*

[b] *Combined WDFW Methow/Okanogan programs will not exceed 30% natural origin steelhead in the broodstock. Up to 373 steelhead may be collected for broodstock total.*

Artificially produced steelhead released into the UCR basin have three potential parental backgrounds: two natural origin parents, two hatchery origin parents, or one parent of each.

Currently artificially propagated steelhead are externally marked either with a uniquely colored visual implant elastomer (VIE) tag behind the eye or by removing the adipose fin. Artificially propagated steelhead may also receive internal tags such as coded-wire tags or passive integrated transponder (PIT) tags. Based on these marks and tags observed during adult monitoring at Priest Rapids Dam, the WDFW proposes to estimate the composition of the run, including the proportion of natural origin steelhead, and the proportions of artificially propagated steelhead by release location, release group, and parental background. This information will be used to determine if actions to manipulate the proportion of hatchery steelhead in each of the populations in the Wenatchee, Methow, and Okanogan river basins to improve the potential for successful reproduction of naturally produced steelhead are appropriate for a given year.

Utilizing several methods, the WDFW proposes to manage adult steelhead returns to increase the proportion of natural origin steelhead in the spawning populations in each tributary basin. One method is to remove steelhead at trap sites such as the Wells Dam ladders, Ringold Springs ladder, hatchery traps and fishways. Collected hatchery steelhead can then be transported to landlocked lakes for subsequent recreational harvest opportunities. The WDFW believe the stress to individual steelhead being removed will be no more than what currently occurs when steelhead are captured, examined, and released during the currently-authorized activities (WDFW 2002).

Artificially propagated steelhead surplus to program objective can also be removed through recreational harvest, and the WDFW includes this in their proposal. The WDFW summarize that the literature concerning mortality of adult steelhead following release by trout anglers occurs at a rate of less than 5 percent. The WDFW reports (WDFW 2002) that hooking mortality on natural steelhead adults caught during winter conditions (in cool [<50°F] water), including those caught with bait, sustain a hooking mortality of 1.1 percent, while year-round fisheries sustained a hooking mortality of 3.7 percent. The WDFW assumes a 5 percent mortality for adult steelhead caught in UCR fisheries from September through March. Columbia River temperature at Wells Dam in September exceeds 58°F until November 2nd (10-year average, http://www.fpc.org/). Most angling is expected to occur in the tributary areas and after water temperature begins to decrease.

NMFS proposes take limits, specifically mortality limits, based on the natural origin UCR steelhead tributary population escapement to spawning. These limits are defined in Table 10 and assume a catch and release mortality rate of 5 percent. The potential adverse impact in the form of dead natural origin UCR steelhead ranges from 2 to 10 percent of the natural origin steelhead in each tributary spawning area (Table 9) depending on the natural origin UCR steelhead run size and total (natural plus hatchery) run size.

Table 9. Proportional natural-origin UCR steelhead mortality take limit for recreational harvest fisheries in the Wenatchee River, Methow River, and Okanogan River basin tributary areas by run size. Catch and release mortality is assumed to be five percent.

Tributary Area	Priest Rapids Dam Count	Escapement to Tributary Area	Mortality Impact	
			Proportion	Count
Wenatchee River and Columbia River above Rock Island Dam to below Rocky Reach Dam				
	<837	<599	0%	0
Tier 1	838	600	2%	12
Tier 2	2,146	1,700	4%	68
Tier 3	3,098	2,500	6%	150
Methow River and Columbia River above Wells Dam				
	<803	<499	0%	0
Tier 1	804	500	2%	10
Tier 2	2,224	1,600	4%	68
Tier 3	3,386	2,500	6%	150
Okanogan Basin upstream of the Highway 97 Bridge				
	<175	<119	0%	0
Tier 1	176	120	5%	6
Tier 2	180	120	7%	8
Tier 3	795	600	10%	60

The constraints on the impact are designed such that the highest risk is taken in the Okanogan River basin which has been identified as having the least suitable spawning and rearing habitat for steelhead and less risk in the Methow and Wenatchee River basins. Also, no interim abundance target has been define by NMFS for this basin. When the minimum natural origin run size at Priest Rapids Dam of 1,300 steelhead is met, and the tributary run size criteria are met in a particular basin, recreational fisheries could occur in each basin which meets the criteria. For example at the minimum Priest Rapids Dam run size of 1,300, it is not possible to meet the 176 Okanogan basin level and both minimum criteria in the Methow and Wenatchee river basins because the secondary tributary criteria could not be met (838+804+176=1,818). Take limits increase as progress toward recovery is made in the form of increasing natural origin UCR steelhead run sizes. At the minimum Tier 1 criteria, the proportional mortality limit is two percent in the Wenatchee River area or Methow River area and could result in the loss of up to ten or 12 natural origin steelhead from the spawning population in the Methow or Wenatchee basin and up to six natural origin UCR steelhead from the Okanogan River basin. At the maximum end of Tier 1 impacts - 1,699 natural origin steelhead returning to the Wenatchee River and 1,599 returning to the Methow River basin for spawning, which would require at total

natural origin steelhead run of 4,415, fisheries could occur in both basins and a two percent impact would result in up to 34 and 32 natural origin steelhead adults being killed in the Wenatchee and Methow River basins, respectively. At Tier 3 criteria levels the tributary populations have met the currently identified interim abundance targets and the risks associated with the loss of relatively few natural origin steelhead is not substantial. Under this two criteria strategy (Priest Rapids Dam run size and tributary escapement size), if recovery in the Wenatchee and Methow River basins is disproportionate, that is one basin approaches recovery levels of natural origin steelhead and a much greater rate than the other, recreational fisheries could occur in each basin at different impact levels.

Additionally, the WDFW proposes to employ the following measures to minimize the potential adverse impacts of these activities on natural origin UCR steelhead. These will be included as additional conditions in the permit:

- The mandatory release of all adipose fin-present steelhead;
- Fishery openings are established to protect important spawning and outmigration periods;
- Fisheries are selective for adipose fin-clipped or otherwise externally marked hatchery origin steelhead;
- Selective gear regulations will be in effect for fisheries authorized in the tributaries;
- Sanctuary areas in the tributary basins will be established and maintained to protect important production areas;
- Provide information on natural origin fish release requirements and selective gear regulations in the annual Washington Sport Fishing Rules pamphlet, in periodic media news releases, and with signs posted in the fishing areas;
- The WDFW Enforcement Program will enforce these regulations by conducting periodic random and special emphasis patrols;
- Managers must have assurance that the abundance of returning adult UCR steelhead is sufficiently high to meet escapement objectives and achieve hatchery broodstock goals before fisheries will occur.

Benefits to removing excess artificially produces UCR steelhead include increasing the proportion of natural origin steelhead on the spawning grounds. This also reduces the genetic risks to natural populations such as swamping, masking, and density dependant effects created when the habitat is fully seeded and an over abundance of hatchery reared steelhead are on the spawning grounds. NMFS finds that once the minimum UCR steelhead abundance criteria are met, that the benefits of removing surplus artificially propagated UCR steelhead outweigh the small numeric reduction of natural origin UCR steelhead of the recreational fisheries.

4.2.3 Artificial Propagation Activities

The WDFW, Chelan PUD, Douglas PUD, USFWS, and Colville Tribes propose to operate artificial propagation enhancement programs for ESA-listed UCR steelhead. The *Biological Opinion on Artificial Propagation in the Columbia River* (NMFS 1999a) and the *Biological Opinion for 1995-1998 Hatchery Operations in the Columbia River Basin* (NMFS 1995) identify nine general types of potential adverse effects of hatchery operations and production on natural fish populations. These are: (1) operation of hatchery facilities, (2) broodstock collection, (3) genetic introgression, (4) density-dependent effects of hatchery production, (5) disease, (6) competition, (7) predation, (8) residualism, and (9) migration corridor/ocean.

The take of endangered UCR steelhead requested by the applicants will result from proposed artificial propagation enhancement programs designed to benefit ESA-listed UCR steelhead. The primary objectives of these efforts are to preserve extant steelhead populations in the region, and to boost the abundance of remaining stocks. There are risks of ecological and genetic impacts on the ESA-listed juvenile and adult steelhead resulting from the proposed programs. However, the risk of extinction to natural populations is high enough that aggressive intervention is proposed. Strategies are proposed to minimize potential impacts on endangered steelhead that may be associated with these programs.

4.2.3.1 Operation of Hatchery Facilities

Potential adverse impacts identified with the physical operation of hatchery facilities include impacts from water withdrawal, release of hatchery effluent and facilities failure (NMFS 1999a). Hatchery effluent may transport pathogens (disease) out of the hatchery and infect natural-origin fish. Aside from the potential impacts on water flow and quality, operational failures due to power/water loss, flooding, freezing, vandalism, predation and disease may result in catastrophic losses to rearing adults and juveniles.

Flow reductions, flooding and poor fish culture practices may all cause hatchery facility failure or the catastrophic loss of listed fish under propagation. To protect endangered steelhead, all efforts should be made to ensure that the survival of adult steelhead held for broodstock at the hatchery facility be maximized. The applicants propose a variety of measures to address risks associated with operational failures, including:

- Protection of fish from vandalism and predation is provided by fencing, locks, and security lights at all hatchery facilities;
- Rapid response in the event of power and water loss or freezing is provided by a combination of staffing and automated alarm paging systems;
- Equipping hatchery facilities to ensure reliable power to provide water to rearing fish during power outages;

- Rearing juveniles at lower pond loading densities to minimize the risk of loss due to disease; and
- Ensuring staff are adequately trained in proper fish handling, rearing, and biological sampling techniques, and that all activities will be conducted in accordance with the WDFW Fish Health Manual (WDFW 1996) and/or Pacific Northwest Fish Health Protection Committee (PNFHPC 1989) disease prevention and control standards.

NMFS finds operational measures proposed which will be included as additional terms and conditions in the permit will adequately protect ESA-listed UCR chinook salmon and UCR steelhead. The proposed measures are in accordance with standard scientific protocols for operating hatchery facilities (IHOT 1995). Further, staff implementing these programs will be sufficiently trained and will be qualified to exercise professional judgement should unforeseen circumstances arise.

4.2.3.2 Broodstock Collection

Broodstock collection typically involves a weir or barrier that forces migrating adults to enter a ladder and trap. This effectively blocks their upstream migration and the trapped steelhead are counted and either retained for use in the hatchery or released upstream of the collection facility to continue their migration and spawn naturally. Potential adverse effects to adults include delaying upstream migration, rejection of the weir or fishway structure resulting spawning downstream of the trap, falling back downstream after passing upstream of the collection facility, being injured or killed as adults attempt to jump the barrier, and inducing stress by handling. These impacts are due to the physical presence and operation of the trap, other potential impacts of broodstock collection including the numerical reduction of the donor population (mining), and selection effects.

Collection of steelhead for broodstock will occur at various dams, hatchery ladders, or using temporary weirs. Hook and line capture of broodstock may be used in some years if other methods are not successful in collecting steelhead. When in operation, trap facilities will be checked and emptied daily with adults to be used as broodstock transported to a hatchery facility for holding and spawning, and all other fish released upstream of the trap. Direct mortality from broodstock collection activities has been low (WDFW 1997). Hook and line collection of broodstock is the least preferred technique that would be employed when other collection options had been thoroughly considered. Handling stress of adult steelhead captured by hook and line will be minimized.

The proposed actions include the development of annual site-based broodstock collection protocols by the Hatchery Committee as described in the three HCPs. A representative from NMFS is on each of the HCP Hatchery Committees to ensure the collection protocols employed will not be detrimental to the persistence and recovery of ESA-listed species. The objectives and protocols may be adjusted in season to meet changes in the abundance and location of adult

returns, and minimizing impacts on non-target fish. The total broodstock collection will not exceed 208 steelhead in the Wenatchee basin and 389 for areas above Wells Dam.

Historically, the trapping of adult steelhead for broodstock in the Wenatchee River generally occurs from July to November at Dryden and Tumwater Dams. Both of these facilities may be operated for concurrent broodstock collections of non-ESA-listed species (summer chinook salmon, sockeye salmon, or coho salmon) consistent with ESA permit 1347 and section 7 consultation with BOR. Dryden Dam was specifically engineered to intercept less that 100% of the migrating adult salmonids. In years of very low run sizes broodstock collection of steelhead can be problematic. Therefore, hook and line collection of steelhead adults may be necessary in those years of low returns. Utilization of these trapping locations is for the purpose of developing a locally-adapted broodstock for the Wenatchee River basin. Historically, all steelhead releases into the Wenatchee River were offspring of steelhead collected at Wells Dam and Wells Hatchery. However, since 1996 steelhead broodstock for the Wenatchee basin have been collected from these facilities.

The WDFW and Colville Tribes will employ the following procedures to minimize potential adverse impacts on salmon and steelhead associated with broodstock collection activities:

- All species will be held for a minimal duration in the traps – less than 24 hours;
- Traps and holding areas will be locked or secured against tampering or vandalism;
- All species including steelhead in excess of broodstock goals will be released upstream immediately without harm;
- Steelhead transfers will be done using water-to-water techniques;
- Hook and line technique will be last collection option employed.

The removal of adults from the naturally spawning population has potential adverse impacts. These include numerical reduction of the natural population (mining) and selection effects. Selection is the intentional and unintentional collection of adults for broodstock based on one or more of the life history characteristics such as run timing, age, morphology and sex ratio, that do not fully represent the natural (or target) population. The effects of selection or selection effects can change the characteristics of the natural population as well as cause the hatchery-produced fish to diverge genetically or demographically from the naturally produced population.

The proposed supplementation program is designed to preserve and rebuild naturally producing steelhead populations in the UCR Region. Natural steelhead in the UCR ESU are not replacing themselves and extinction appears likely without the proposed program. Risks to the donor natural populations, including numerical reduction and selection effects, are therefore viewed by the permit applicants and NMFS as subordinate to the need to expeditiously implement the supplementation program that will prevent extinction of the ESU (BAMP 1998). To preserve the

remaining natural populations and to address the numerical reduction and selection effects the following measures will be implemented and included in the permit additional conditions:

- Broodstock removals will be limited to a maximum of 104 natural origin steelhead from the Wenatchee basin and 289 for areas above Wells Dam; and
- Removal of adult broodstock at traps for the enhancement programs shall be consider the composition of the run-at-large with respect to migration timing, age class, and morphology, collection decisions made to maximize the natural population recovery efforts.

NMFS finds that the proposed broodstock collection strategies and that the numerical collection limits will protect naturally produced ESA-listed UCR steelhead.

4.2.3.3 Genetic Introgression

Hatchery fish straying into UCR steelhead natural production areas can potentially lead to long-term deleterious effects on natural steelhead populations. The genetic risks to natural populations from hatchery propagation include loss of fitness, reduction in genetic variability within and between populations, genetic drift, selection and domestication (Hard *et al.* 1992; Cuenco *et al.* 1993; NRC 1996; and Waples 1996). Because of these risks, it is recommended that straying of hatchery fish be minimized to reduce the effects of genetic introgression on natural populations (Hard *et al.* 1994). Campton (1995) provides a discussion of what is known about the genetic effects of hatchery reared fish on natural populations and concludes that most of the observed or suspected effects are due to management decisions rather than biological factors intrinsic to hatcheries or hatchery fish.

It is likely that UCR steelhead have been adversely impacted by previous management actions concerning artificial propagation programs. Substantial genetic mixing of populations within this ESU has occurred from fish being stocked into non-local sub-basins as a result of the Grand Coulee Fish Maintenance Project and from the Wells Hatchery steelhead program. The proposed actions may continue to adversely affect natural steelhead in the future if the number of hatchery fish straying into natural steelhead production areas is in excess of the desired number and/or development of locally-adapted broodstock is not accomplished in the tributary basins.

Historically, steelhead broodstock have been held on pathogen free well water which is warmer than river water. This combined with historic selection of the earliest maturing component of the run has resulted in the acceleration of sexual maturation. Due to this developmental acceleration, hatchery fish spawn from January through March whereas natural fish spawn in April and May. During the previous few years hormone treatment of natural-origin steelhead broodstock and experiments with artificial light have been used in attempts to align the maturation schedules of both hatchery and natural origin steelhead. In addition, the eggs from the earliest spawning hatchery origin steelhead have been utilized in the Ringold Springs program. This action is intended to be one step toward correcting previous hatchery management actions that likely had

an adverse impact on the natural population. Radio telemetry data in 2001-2002 indicate that some of the steelhead released into the Columbia River from the Ringold Springs program migrate back to the UCR area. In order to limit this straying, the Ringold Springs program should be maintained at the 200,000 smolt release level until monitoring indicate that the fish are no longer straying upstream and posing an increased risk to the recovery efforts.

In the two HCP agreements with Chelan PUD there is a requirement that the hatcheries have the ability to hold Wenatchee steelhead broodstock on river water. This measure is one step toward creating the best environment for holding maturing adult UCR steelhead.

Additionally, the long term strategy for steelhead artificial propagation programs in the UCR includes limiting the percentage of hatchery reared steelhead on the spawning grounds following achievement of recovery goals. NMFS expects the resource managers to take steps to reduce the potential adverse impacts on the natural reproducing population such as altering release locations to modify adult return behavior and modifying external marking strategies of juveniles released to increase management options for removal of excess adult steelhead. NMFS at this time includes a long term target of no more than 20 percent of the spawners being of hatchery origin in the Wenatchee River and Methow River basins and no more than 50 percent in the Okanogan River basin once recovery goals are achieved (Figure 5 and Figure 6).

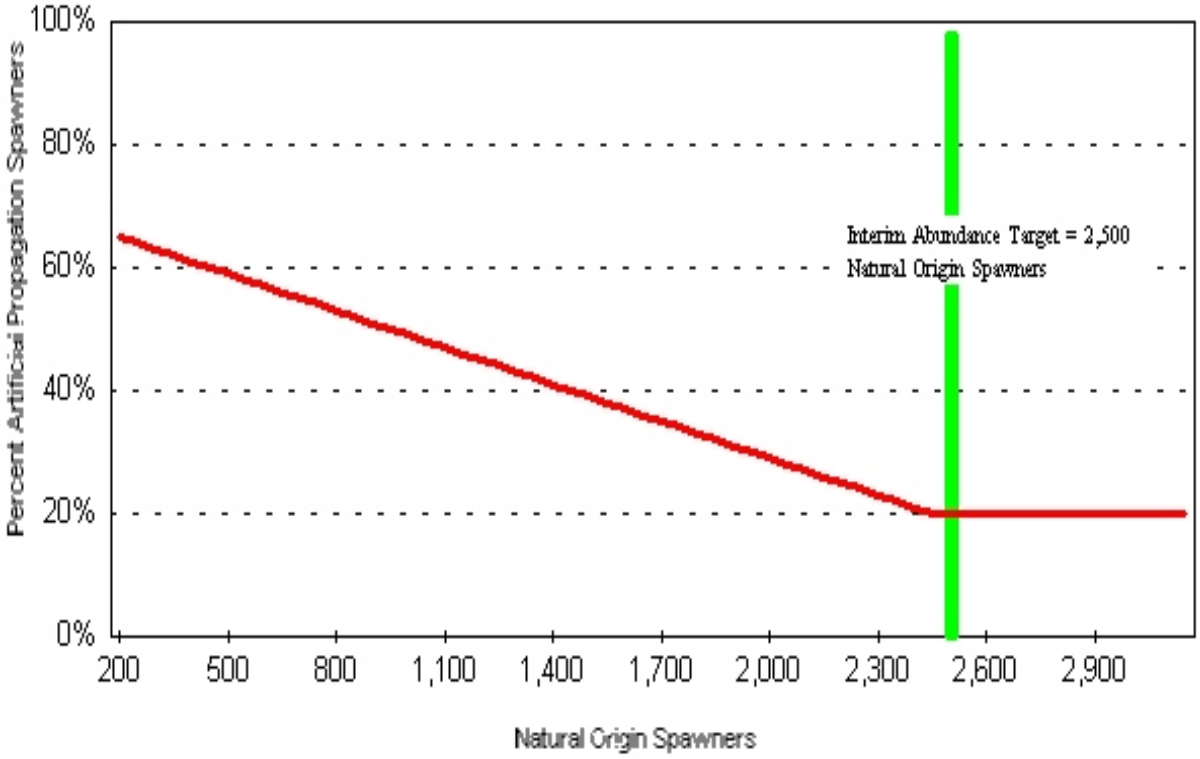

Figure 6. Wenatchee and Methow River Basin management objective for limiting artificially propagated steelhead on spawning grounds as natural origin steelhead population increases.

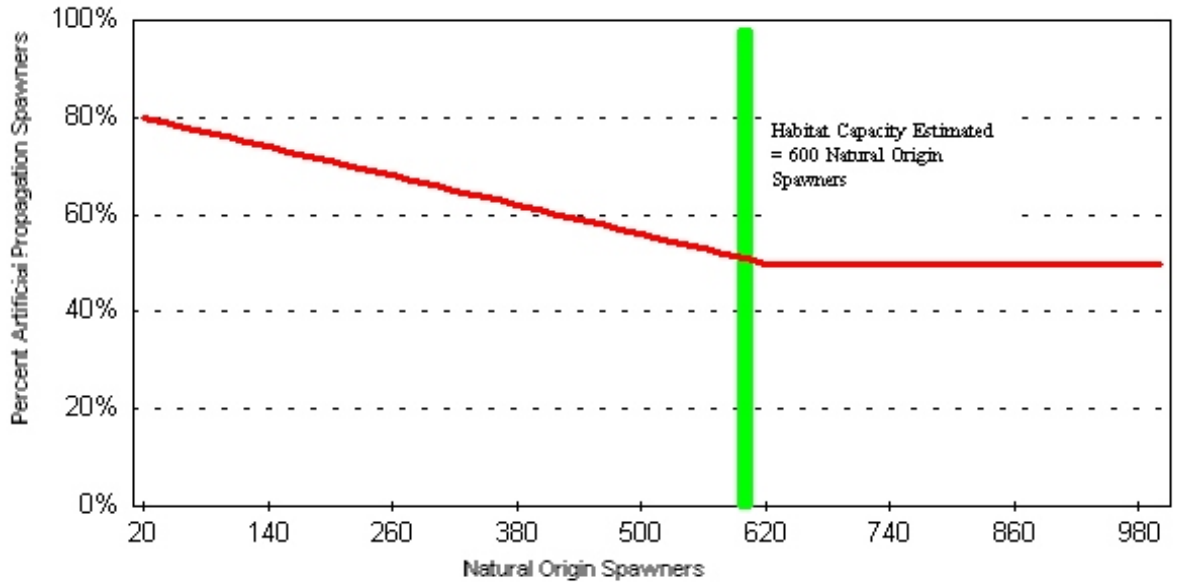

Figure 7. Okanogan Basin management objective for limiting artificially produced steelhead on spawning grounds as natural origin steelhead populations increase.

4.2.3.4 Density-Dependent Effects

Steelhead smolt releases may cause displacement of rearing natural steelhead juveniles from occupied stream areas, leading to abandonment of advantageous feeding areas or premature out-migration (Pearsons *et al*. 1994). The presence of large numbers of newly released steelhead may also alter natural fish behavior patterns, which may increase their vulnerability to predation (NMFS 1995).

The release of only volitionally migrating smolts into the upper tributary reaches will contribute to a decrease in density-dependent effects on natural fish, by limiting interactions between natural and hatchery fish. Releases of smolts coincident with managed releases of water (flow augmentation) will also help accelerate downstream migration of artificially propagated steelhead, further reducing spatial and temporal overlaps with listed fish and potential adverse behavioral effects. Release of juveniles that have an increased tendency to residualize into the lower tributary areas, when possible, will minimize the potential adverse impacts on the naturally produced populations.

4.2.3.5 Disease

Interactions between hatchery fish and listed fish in the natural environment may be a source of pathogen transmission. This impact is probably occurring in headwater spawning and/or rearing areas and throughout the entire migration corridor. Because the pathogens responsible for diseases are present in both hatchery and natural-origin populations, there is some uncertainty associated with determining the extent of disease transmission from hatchery fish (Williams and Amend 1976; Håstein and Lindstad 1991). However, hatchery populations are potential reservoirs of disease pathogens because of the high rearing densities and resultant stress. Under natural conditions, which usually involve rearing at low density, most pathogens are held in check. When an epizootic event occurs, it is often triggered by increased population density and unusual changes in the environment (Saunders 1991). Consequently, it may be possible that release of large numbers of smolts may be responsible for some loss of natural steelhead from disease.

Although hatchery populations can be reservoirs for disease pathogens because of their elevated exposure to high rearing densities and stress, there is little evidence to suggest that diseases are routinely transmitted from hatchery to natural fish (Steward and Bjornn 1990). Chapman et al. (1994) concluded that disease transmittal from hatchery to natural populations is likely not a major factor negatively affecting natural steelhead in the Columbia basin.

To address concerns of potential disease transmission from hatchery to natural fish, the Pacific Northwest Fish Health Protection Committee (PNFHPC) has established guidelines to ensure hatchery fish are released in good condition, thus minimizing impacts on natural fish (PNFHPC 1989). Also, the IHOT (1995) developed detailed hatchery practices and operations designed to prevent the introduction and/or spread of any fish diseases with the Columbia River basin. Hatchery facility operators in the UCR basin follow fish health protocols in accordance with PNFHPC and IHOT recommended guidelines.

The WDFW, USFWS, and Colville Tribes will implement both disease prevention and disease control techniques to maximize production of healthy fish. Spawned adults are evaluated for the presence of viral and bacterial pathogens following accepted standard procedures set forth by the Salmonid Disease Control Policy of the Fisheries Co-managers of Washing State (NWIFC and WDFW 1998 and the Pacific Northwest Fish Health Protection Committee (PNFHPC 1989). NMFS finds that following these practices in the hatchery environment will adequately protect listed naturally produced UCR steelhead from impacts from the transmission of disease.

4.2.3.6 Competition

Direct competition for food and space between artificially propagated and naturally produced fish may occur in spawning and/or rearing areas, the migration corridor, and ocean habitat. These impacts are assumed to be greatest in the spawning and nursery areas and at points of highest fish density (release areas) and to diminish as hatchery smolts disperse (USFWS 1994). Competition

continues to occur at some unknown, but probably lower, level as smolts move downstream through the migration corridor. Release of large numbers of pre-smolts in a small area is believed to have greater potential for competitive effects because of the extended period of interaction between hatchery fish and listed species. Release of smolts that are physiologically ready to migrate is expected to minimize competitive interactions because they are more likely to quickly migrate out of the spawning and nursery areas.

When artificially propagated steelhead smolts are released into the UCR basin, a potential exists for inter-specific competition with naturally produced steelhead. These effects are likely to be greatest near the point of release and decrease as the smolts disperse and migrate seaward. Release of artificially propagated steelhead may adversely impact natural steelhead especially if hatchery fish are larger and food and space are limited. However, competition should be minimized because only smolts demonstrating migratory behavior and/or smolting characteristics will be released. In most years, releases will be scatter planted to reduce instantaneous densities of hatchery fish in natural production areas (WDFW 1997). Monitoring of residualization is provided for in Section 2.2.1.3 (Research, Monitoring, and Evaluation).

Competition for prime spawning habitat could occur in years of high survival to adult of both natural and artificially produced steelhead. As recovery plans are implemented, the number of natural origin steelhead should increase. The utilization of artificially propagated steelhead to supplement natural spawning should be reduced as natural populations rebound. NMFS has identified an approximate long-term management sliding scale to assist hatchery managers to make appropriate decisions concerning release strategies of artificially propagated steelhead smolts. As the number of natural origin spawners increases the number of hatchery reared smolts released high in tributary systems should decrease to reduce the potential for competition and genetic swamping of the natural population. Artificially propagated steelhead could then maintain recreational harvest opportunities particularly in lower tributary areas without posing substantial risk to the UCR steelhead ESU.

4.2.3.7 Predation

Predation by hatchery fish on natural-origin smolts is less likely to occur than predation on fry. The USFWS (1994) presented information indicating salmonid predators are generally thought to prey on fish approximately 1/3 or less their own length (see also Witty *et al.* (1995) citing Parkinson *et al.* (1989)). Consequently, predation by hatchery fish on listed salmon smolts in the migration corridor is believed to be low.

Large numbers of artificially propagated steelhead may attract predators (birds, fish, pinnipeds) and, consequently, contribute indirectly to predation of naturally produced fish. On the other hand, a mass of hatchery fish moving through an area may confuse or distract predators and may provide a beneficial effect to naturally produced fish. Both effects may be occurring to some extent. The presence of large numbers of hatchery fish may also alter the listed species' behavioral patterns, which may influence vulnerability and prey susceptibility (USFWS 1994).

Impacts from predation by hatchery-produced steelhead released into the UCR are not likely to be a substantial risk to ESA-listed naturally produced UCR steelhead because of their size at release and because they tend to migrate out of the basin quickly.

4.2.3.8 Residualism

Artificially propagated steelhead have the potential to residualize after release in the freshwater environment. The degree of residualism can vary greatly, but is thought to typically average between 5 and 10 percent of the number of fish released (USFWS 1994). Hatchery steelhead residuals can compete for food and space, prey upon, and/or transfer disease to other salmonids.

Volitional or scatter planted release strategies will be used to reduce the residualization of hatchery fish. In addition, acclimation sites are currently being researched and developed. These techniques help promote rapid downstream migration of released smolts and reduce interactions of hatchery and natural fish. The WDFW is proposing to release only juvenile steelhead with demonstrated readiness for seaward migration into the upper tributary areas where feasible. Smolt releases will also be timed with water budget releases from upstream dams to further accelerate rapid downstream movement (WDFW 1997). Investigations of the propensity and the causes of residualism of artificially propagated steelhead will be part of the research, monitoring, and evaluation program developed by the HCP Hatcheries Committees (see Section 4.2.4). When monitoring indicates that a hatchery population may have a tendency to residualize at a higher than expected rate, the group will be released into lower tributary areas or hatchery management changes will be implemented.

4.2.3.9 Migration Corridor/Ocean

Considerable speculation, but little scientific information, is available concerning the overall effects to listed salmon and steelhead from the combined number of hatchery fish in the Snake/Columbia River migration corridor. In a review of the literature, Steward and Bjornn (1990) indicated that some biologists consider density-dependent mortality during freshwater migration to be negligible; however, they also cited a steelhead study that indicated there may have been a density-dependent effect (Royal 1972, cited in Steward and Bjornn 1990). Hatchery and natural populations have similar ecological requirements and can potentially be competitors where critical resources are in short supply (LGMSC 1993).

A total of about 1.1 million steelhead smolts will be released into the Wenatchee, Methow and Okanogan River basins. The artificial propagation programs will be managed to produce only juvenile steelhead ready for seaward migration. Proposed maximum production for these facilities is the same as when the Columbia basin annual production ceiling was established in 1995 (NMFS 1995; WDFW 1997).

The Columbia basin annual production ceiling was based on the information on the effects of hatchery fish on listed fish in the migration corridor and ocean. Reviews of the potential effects

of hatchery fish in the migration corridor and ocean are provided by Hard (1994), NMFS (1995) and CBFWA (1996). Currently, the only way to address potential ecological interactions between hatchery and natural fish in the Columbia River basin is through the production ceiling (NMFS 1995), which limits the number of hatchery fish released into the basin. A total of about 72 million anadromous salmonid smolts are released from artificial propagation programs annually. The effects of the 1.1 million steelhead smolts cannot be separated from all other smolt releases, nor can the effects of the entire release be determined at this time. NMFS concludes that the production ceiling protects ESA listed species and finds that based on the best available information of adverse impacts in the migration corridor and ocean that the proposed programs have only minor transitory effects.

4.2.4 Research, Monitoring, and Evaluation

Research, monitoring, and evaluation are a critical component of the three HCP agreements. The adaptive management strategy relies on three hatchery committees (one for each HCP agreement) to provide oversight and recommendations for the artificial propagation programs specified in the HCPs. The enhancement programs will be monitored and evaluated within the hatchery environment and in the natural environment, and will involve both adult and juvenile UCR steelhead components.

4.2.4.1 Hatchery Environment Monitoring

Monitoring activities that occur within the hatchery environment will include biological sampling of both adult and juveniles steelhead. Sampling will be conducted in a manner to extract as much information from as small a sample size as possible to meet the research or investigative needs. No impact to the naturally produced component of the species would occur as a result of the within-hatchery facility research and monitoring activities.

4.2.4.1.1 Juvenile Monitoring

Juvenile monitoring will include routine growth and health sampling on about a monthly basis. This activity will likely result in handling stress, but is not expected to alter the long-term survival of the population. Occasional lethal sampling will occur for health monitoring and to collect tissue samples. This type of sampling will be conducted in a manner to maximize the information collected from each individual killed. For example, juveniles killed for organosomatic index health monitoring, and tissue samples can be used for DNA analysis, thus only one sample group would be collected for both activities. NMFS finds that such sampling provides a net benefit to the ESA-listed artificially propagated population.

4.2.4.1.2 Adult Monitoring

Adult sampling will be coordinated with spawning activities where fish are humanly killed as part of the spawning process. Morphometric samples, sex, mark, tag data, and biological samples such as scales, kidney, spleen and other tissues may be collected. The sampling of adult steelhead after spawning will not increase the level of take or adverse impacts on the species because the steelhead are already dead.

4.2.4.2 Natural Environment Monitoring

The enhancement program will also be monitored outside of the hatchery environment. The monitoring and evaluation program will help identify problems or deviations from the criteria established to measure the expected performance of the supplementation program. The monitoring and evaluation programs will also provide invaluable data on the use of supplementation to conserve and recover ESA-listed salmon species. The proposed action includes the intent to modify the production implementation protocols based on input from these research, monitoring, and evaluation activities.

4.2.4.2.1 Juvenile Monitoring

Monitoring of artificially propagated juvenile steelhead after release will be done using a variety of techniques depending on the investigative objective. Extent and impact of residualizism would be assessed using standard angling and non-lethal sampling techniques and migration rate and tributary productivity would be monitored using juvenile fish traps.

The capture and handling process is likely to cause some stress on ESA-listed fish. Typically, fish recovery rapidly from handling procedures. The primary factors that contribute to stress and mortality from handling are excessive doses of anesthetic, differences in water temperature, dissolved oxygen conditions, the amount of time that fish are held out of water, and physical trauma. Stress on salmonids increases rapidly from handling of the water temperature exceeds 18°C (64.4°F) or dissolved oxygen is below saturation. Also, stress can occur if there are more than a few degrees difference in water temperature between the stream/river and the holding tank. The potential for unexpected injuries or mortalities to ESA-listed fish will be mitigated in a number of ways. Wet hands and keeping fish submerged while measuring will minimize scale and slime removal. Study protocols would include only handling fish during appropriate water temperatures to avoid adding any additional stress and ensuring revival prior to release. The use of sanctuary nets when transferring fish to holding containers will avoid potential injuries. Appropriate anesthetics will be used to calm fish subjected to collection of biological data, captured fish will be allowed to fully recover before being released back into the stream and will be released only in slow water areas. Tagging, such as PIT tagging, of natural origin UCR steelhead juveniles would be used to determine trap efficiency and to assess juvenile seaward migration rate and survival to adult would be determined based on tag detections at dam or recoveries on spawning grounds or in broodstock. The information gained is expected to be very

valuable in increasing our understanding to UCR steelhead populations and life strategies. NMFS finds the measures above to minimize the impacts of the proposed activities adequate to protect the UCR steelhead ESU.

As discussed above in the effects on UCR spring chinook salmon, the WDFW juvenile fish traps are generally operated to achieve a sample efficiency of four to 20 percent of the total run, depending on the river size and the mortality impact would be expected to be less than two percent on target species. Using the largest of the estimates of UCR basin natural production capacity for UCR steelhead of 276,048 (Ford *et al.* 2001) and assuming trap efficiency of 20 percent and mortality of two percent equals an impact of 1,104 smolts. Converting this to adult equivalents (three percent survival smolt-to-adult, Ford *et al.* 2001) results in a maximum loss of up to 33 adult UCR steelhead. Considering that juvenile fish traps will likely not be operated in all tributary basins and will not all achieve an efficiency of 20 percent (for example the lower Wenatchee River trap has previously achieved only about a two percent efficiency), the numeric impact will likely be much less. Based on the highest adult capacity estimate of 8,281 (Ford *et al.* 2001), or the interim abundance target of 5,000 (Lohn 2002), the loss of 33 adult steelhead is not likely to substantially impact the ESU as whole. Again, it is likely mortality from juvenile fish trapping would be much less than this estimate.

4.2.4.2.2 Adult Monitoring

Monitoring of artificially propagated adult steelhead on the spawning grounds will be conducted by air, foot, or float surveys is expected to result in minimal take of UCR steelhead in the form of harassment and collection of tissues from dead steelhead. Potential research or monitoring activities also includes in-water observation of steelhead (i.e., snorkeling). Direct observation is the least disruptive and simplest method of determining presences/absence of the species and can be used to estimate the relative abundance. During some activities redds may be visually inspected, but no redds would be walked on. Potentially, UCR steelhead could experience take in the form of harassment as defined above. However, most activities would not disrupt or injure UCR steelhead. These primarily observational activities will not result in additional mortality of UCR steelhead because carcasses are already dead. The proposed observation, collection of biological data, and tissue samples from carcasses of ESA-listed fish will benefit the species as a whole because of the information gained through these activities will be used in the future to protect, recover, and manage UCR and other steelhead ESUs.

4.3 Cumulative Effects

Cumulative effects are defined in 50 CFR §402.02 as "those effects of future State, tribal, local or private actions, not involving Federal activities, that are reasonably certain to occur in the action area considered in this biological opinion." Future Federal actions, including the ongoing operation of hatcheries, fisheries, and land management activities, are not considered within the category of cumulative effects for ESA purposes because they require separate consultations pursuant to Section 7 of the ESA after which they are considered part of the environmental

baseline. Future State, tribal, local, or private actions within the action area are described for NEPA purposes in the EIS (NMFS 2003) regarding the implementation of the three HCP agreements. NMFS evaluated these actions to determine whether or not they would meet the requirements of its implementing regulations. Those actions which are most notable include Washington State TMDL (total maximum daily load) development and implementation, Washington State legislation to enhance salmon recovery through tributary enhancement programs, and recent human population trends in the action area. However, after considerable review, NMFS has determined that these actions cannot be deemed reasonably likely to occur based on its ESA implementing regulations.

The Endangered Species Consultation Handbook describes this standard as follows:

> "Indicators of actions 'reasonably certain to occur' may include, but are not limited to: approval of the action by State, tribal or local agencies or governments (e.g., permits, grants); indications by State, tribal or local agencies or governments that granting authority for the action is imminent; project sponsors' assurance the action will proceed; obligation of venture capital; or initiation of contracts. The more State, tribal or local administrative discretion remaining to be exercised before a proposed non-Federal action can proceed, the less there is a reasonable certainty the project will be authorized."

There are, of course, numerous non-Federal activities that have occurred in the action area in the past, which have contributed to both the adverse and positive effects of the environmental baseline. This step of the analysis for application of the ESA Section 7(a)(2) standards requires the consideration of what of those past activities are "reasonably certain to occur" in the future within the action area.

First of all, any of these actions that involve Federal approval, funding, or other involvement are not considered "cumulative effects" for this analysis (see ESA definition, above). This Federal involvement will trigger ESA Section 7(a)(2) consultation in the future. Once the consultation on those actions is completed the effects may be considered part of the environmental baseline, consistent with the ESA regulatory definition of "effects of the action" (50 CFR §402.02). Thus, for example, state efforts to improve water quality in compliance with the Federal Clean Water Act would not be considered because of the involvement of the EPA, until separate ESA consultations are completed. Others examples include irrigation water withdrawals involving the

USFS (right-of-way permits for irrigation canals) or agricultural practices that receive Federal funding through the U.S. Department of Agriculture.

Next, actions that do not involve Federal activities must meet the "reasonably certain to occur" test for NMFS to consider their effects in this Opinion. Recognizing that this is a narrower standard than used for NEPA purposes, not all of the actions identified in the EA may be considered as "cumulative effects" for this ESA Section 7(a)(2) consultation. In reviewing the

actions identified in cumulative effects analysis of the EA, after eliminating from consideration those with Federal involvement, NMFS finds that currently few, if any, of the future adverse or beneficial State, tribal or private actions qualify for consideration in this analysis as "cumulative effects."

Therefore, when evaluating the status of the listed species, including their likelihood of survival and recovery, NMFS concludes that most of the factors for the decline of these species are not eligible for consideration in determining whether the authorization of incidental take under this HCP is likely to jeopardize their continued existence. Thus the future abundance and productivity of the listed UCR steelhead and UCR spring-run chinook salmon, against which the effects of this action are considered, are likely to be improved, although to an unknown or possibly minor extent, over those reflected by the historical trends under the environmental baseline.

4.4 Integration and Synthesis

The proposed UCR steelhead artificial propagation programs pose minimal risk to the UCR spring chinook salmon ESU. Operation of the hatchery facilities in which UCR steelhead are reared is not likely to substantially affect the water quality characteristics or water quantity, because of minimization measures in place and NPDES permit requirements and water right restrictions. Adult UCR spring chinook salmon and UCR steelhead return and spawn at different times of the year and therefore UCR spring chinook salmon adults are not expected to be affected by returning adult artificially propagated UCR steelhead. Juvenile UCR spring chinook salmon could be minimally impacted by the release of artificially propagated UCR steelhead smolts. The proposed actions include measures to minimize impacts which include releasing only migration ready steelhead smolts. Capture, handling, and release of UCR spring chinook juveniles could occur during some monitoring and evaluation activities. The mortality impacts to the ESU would be small in comparison to the total UCR spring chinook smolt production capacity of the UCR basin. Furthermore, juvenile fish traps used to monitor UCR steelhead are likely to be used to monitor UCR spring chinook salmon as authorized in permit 1203.

The proposed actions of the enhancement programs involve the direct taking of up to 581 UCR steelhead, of which only up to 216 would be natural origin UCR steelhead. The collection of five percent of the average UCR steelhead run for the production of up to 889,000 smolts released in the UCR basin and 180,000 smolts released from Ringold Springs Rearing Facility is intended to facilitate recovery of the ESU by enhancing natural reproduction of UCR steelhead in the Wenatchee, Methow and Okanogan basins.

The permit applicants identified specific artificial propagation program impact minimization measures which NMFS further defines through section 10 permit terms and conditions, which together provide substantial protection to the UCR steelhead ESU. The monitoring and evaluation, and research projects will provide more information on the reproductive success of artificially propagated steelhead and program implementation changes to ensure the programs

achieve the enhancement objective. Juvenile monitoring could result in a maximum, but likely substantially less than, a lethal take of two percent of the UCR steelhead smolts. This translates into a numeric reduction of about 33 adult steelhead for the entire ESU. Annual reporting requirements for each permit holder provides NMFS with a mechanism to ensure that the assumptions of the analysis and the impact limits are not violated.

NMFS must weigh the potential benefits with the potential adverse effects when deciding whether the contemplated actions will appreciably reduce the likelihood of the UCR spring chinook ans steelhead survival and recovery - the critical determination in issuing any biological opinion.

5. CONCLUSION

NMFS has determined, after reviewing the current status of UCR steelhead, the environmental baseline for the action area, the effects of the proposed section 10(a)(1)(A) actions, and the cumulative effects, that the issuance of the multi-year section 10(a)(1)(A) permits to the WDFW, the Chelan PUD, and the Douglas PUD (permit 1395), the USFWS (permit 1396), and the Colville Tribes (permit 1412) for an annual take of endangered UCR steelhead for scientific research and enhancement of UCR steelhead is not likely to jeopardize the continued existence of UCR steelhead and UCR spring chinook salmon. Furthermore, the supplementation programs covered by the permits are expected to provide a survival benefit to UCR steelhead by increasing the natural production of Wenatchee, Methow and Okanogan basins.

6. INCIDENTAL TAKE STATEMENT

Section 9 and rules promulgated under subsection 4(d) of the ESA prohibit the take (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct) of listed species without a specific permit or exemption. Harm is defined as "an act that may include significant habitat modification or degradation where it actually kills or injures fish by impairing breeding, spawning, rearing, migration, feeding or sheltering." Harass is defined as " actions that create the likelihood of injuring listed species to such an extent as to significantly alter normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is take of listed species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such taking is in compliance with the terms and conditions of this ITS. [50 CFR §402.14(I)(3)]

An ITS specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize the effect of incidental

take and sets forth terms and conditions with which the action agency must comply in order to implement the reasonable and prudent measures.

6.1 Amount or Extent of Take Anticipated

The measures described in this section are non-discretionary and must be included in the ITS issued by NMFS. NMFS' proposed action of issuing a section 10(a)(1)(A) permit is designed to minimize incidental take of listed species. The proposed UCR steelhead artificial propagation programs are reasonably certain to result in incidental take of UCR spring chinook salmon because juvenile UCR spring chinook salmon are known to occur in the action area.

Adult UCR spring chinook salmon are not expected to be impacted during any of the activities associated with the proposed programs because they are generally not in the action area at the same time as adult steelhead, nor are they present during the spring months when juvenile steelhead would be released from hatchery facilities.

No incidental takes of ESA-listed species are expected to occur as a result of within-hatchery monitoring and evaluation associated with the proposed programs. Incidental takes of listed species associated with monitoring and evaluation outside of the hatchery environment may occur depending on the monitoring activity.

Visual Observation techniques employed in the natural environment such as redd counts and snorkeling do not involve collection or physical contact with UCR spring chinook salmon or other species. These activities may result in temporary displacement of juvenile UCR spring chinook salmon from local habitats for brief periods of time. The impacts of this type of activities are currently unquantifiable but are expected to be small.

Monitoring of juvenile steelhead released from hatchery facilities or that are progeny of hatchery origin steelhead that spawned in the natural environment using techniques such as juvenile fish traps may result in the capture, handling, and release of juvenile UCR spring chinook salmon. It is expected that such monitoring activities would be conducted to minimize potential adverse impacts on UCR spring chinook salmon and likely included spring chinook salmon monitoring as a study objective. If a monitoring activity such as juvenile fish trapping does not included collection of UCR spring chinook salmon as an objective authorized under a separate ESA consultation the mortality impact on UCR spring chinook salmon juveniles should not exceed one percent of the UCR spring chinook salmon encountered in the trap.

6.2 Effects of the Take

In the accompanying biological opinion, NMFS determined that the level of anticipated take described above is not likely to result in jeopardy to the listed species.

6.3 Reasonable and Prudent Measures

Reasonable and Prudent Measures (RPMs) are non-discretionary measures to minimize take, that may or may not already be part of the description of the proposed action. They must be implemented as binding conditions for the exemption in section 7(o)(2) to apply. NMFS has the continuing duty to regulate the activities covered by this ITS. If NMFS fails to require the applicants to adhere to the terms and conditions of this ITS through enforceable terms that are added to the permits or grant documents, or fails to retain the oversight to ensure compliance with these terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the WDFW, the Chelan PUD, and the Douglas PUD, the USFWS, and the Colville Tribes must report the progress of their actions and the respective impacts on the species to NMFS as specified in this ITS. NMFS believes that activities carried out in a manner consistent with these reasonable and prudent measures, except those otherwise identified, will not necessitate further site-specific consultation. Activities which do not comply with al relevant reasonable and prudent measures will require further consultation.

In order to issue the multi-year section 10(a)(1)(A) permits for the proposed actions, NMFS believes that the following reasonable and prudent measures are necessary and appropriate to minimize the incidental take of ESA-listed species associated with the UCR steelhead artificial propagation programs and the monitoring and evaluation efforts:

1. The applicants should minimize the incidental take of ESA-listed species associated with the artificial propagation programs by using observational techniques whenever possible to meet monitoring and evaluation objectives.

2. The applicants should have as a long-term management target no more than 20 percent of the spawners being of hatchery origin in the Wenatchee and Methow basins and no more than 50 percent in the Okanogan basin once recovery goals are achieved.

6.4 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the program operating entities must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are not discretionary and are valid for the duration of the respective permits:

1. The WDFW, the USFWS and the Colville Tribes shall monitor the incidental take of ESA-listed species, including endangered, naturally produced, UCR spring chinook salmon and UCR steelhead, as a result of juvenile fish releases from the artificial propagation program. As part of the monitoring effort, the program operating entities shall attempt to determine the extent to which artificially propagated juvenile steelhead released from the program interact positively or negatively with the UCR spring chinook salmon's natural production in the region.

2. Annual reports shall be provided to the Salmon Recovery Division, NMFS, documenting the incidental take of ESA-listed species associated with the endangered UCR steelhead artificial propagation programs by January 31st of each year the permit is in effect.

7. REINITIATION OF CONSULTATION

This concludes formal consultation of the actions outlined in the applications for section 10(a)(1)(A) permits. As provided in 50 CFR §402.16, reinitiation of formal consultation is required if: (1) the amount or extent of annual take, either intentional take or incidental take, is exceeded or is expected to be exceeded; (2) new information reveals effects of the agency action that may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect to listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the operation that resulted in exceeding take must cease, and consultation must be reinitiated.

8. MAGNUSON-STEVENS ACT ESSENTIAL FISH HABITAT CONSULTATION

8.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance Essential Fish Habitat (EFH) for those species regulated under a Federal fisheries management plan. Pursuant to the MSA:

- Federal agencies must consult with NMFS on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));
- NMFS must provide conservation recommendations for any Federal or State action that would adversely affect EFH (§305(b)(4)(A));
- Federal agencies must provide a detailed response in writing to NMFS within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with NMFS EFH conservation recommendations, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH:

Waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR §600.10). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR §600.810).

Consultation with NMFS is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

8.2 Identification of Essential Fish Habitat

Pursuant to the MSA, the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of federally-managed Pacific salmon: chinook; and coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*)(PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally-impassable barriers (i.e., natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

8.3 Proposed Action and Action Area

For this EFH consultation, the proposed actions and action area are as described in this Opinion above. The actions are the issuance of scientific research/enhancement permits pursuant to section 10(a)(1)(A) of the ESA for the implementation of artificial propagation programs rearing ESA-listed UCR steelhead. The proposed action area is the UCR basin, including all river reaches accessible to salmon in the Wenatchee, Methow, and Okanogan River basins in Washington and is part of the EFH for chinook salmon and coho salmon. The proposed actions may also affect EFH in the lower Columbia River and near ocean areas; however, NMFS does not believe it is possible to meaningfully measure, detect or evaluate the effects of those actions in these areas, and, consequently, NMFS will not include EFH subject to these effects in the

action area. Assessment of the impacts on these species' EFH from the above proposed action is based on this information.

8.4 Effects of the Proposed Action

As described in detail above of this Opinion, the proposed action may result in adverse effects to EFH. These adverse effects are:

- Water quality impacts from water withdrawal and hatchery effluent.
- Adult passage impediments due operation of weirs used for broodstock collection.
- Predation of natural juvenile salmonids by artificially propagated fish.
- Competition for resources between artificially propagated and natural salmonids.
- Exchange of disease pathogens between artificially propagated and natural salmonids.

8.5 Conclusion

NMFS concludes that the proposed action would adversely affect designated EFH for chinook salmon.

8.6 EFH Conservation Recommendation

Pursuant to Section 305(b)(4)(A) of the MSA, NMFS is required to provide EFH conservation recommendations to Federal agencies regarding actions which may adversely affect EFH. NMFS understands that the conservation measures described in the Permit Applications, this Opinion are applicable to designated salmon EFH and address the adverse effects. Therefore, NMFS recommends that those same Conservation Measures and Terms and Conditions be adopted as the EFH Conservation Recommendations for this consultation.

8.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR §600.920(j), Federal agencies are required to provide a detailed written response to NMFS' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

8.8 Consultation Renewal

The NMFS must reinitiate EFH consultation if the proposed actions are substantially revised in a way that may adversely affect EFH, or if new information becomes available that affects the basis for NMFS' EFH conservation recommendations (50 CFR §600.920(k)).

9. REFERENCES

Section 7(a)(2) of the ESA requires biological opinions to be based on "the best scientific and commercial data available." This section identifies the information sources in developing this Opinion.

9.1 Federal Register Notices

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63 FR 8435. February 19, 1998. Receipt of applications for scientific research permits (1120, 1123, 1124, 1126, and 1127) and modification 1 to permit 998. Issuance of scientific research permits (1094, 1106, 1107) and amendments to permits 822, 847, and 848. Federal Register 63(33):8435-8437.

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