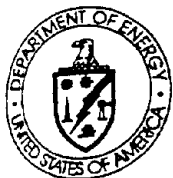


# **Appendix A**

## **Biological Assessment for the Proposed Nez Perce Tribal Hatchery**



**Department of Energy**  
Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208-3621

ENVIRONMENT, FISH AND WILDLIFE

June 12, 1997

In reply refer to: ECN-4

**Mr. Bob Hallock, Field Supervisor**  
**U.S. Fish and Wildlife Service**  
**Upper Columbia River Basin Field Office**  
**11103 E. Montgomery Drive, Suite #2**  
**Spokane, WA 99206**

**Dear Mr. Hallock:**

**In complying with its responsibilities under the Endangered Species Act of 1973, as amended, the Bonneville Power Administration (BPA) submits the enclosed biological assessment (BA) on threatened and endangered species listed in your letters (1-4-97-SP-168/Updates 1-4-95-SP-122) dated May 21, 1997, and March 8, 1995, respectively.**

**Biological Assessment - Conclusion**

**It is BPA's opinion that the proposed operation of the Nez Perce Tribal Hatchery (NPTH), is not likely to adversely affect bald eagles, gray wolves, grizzly bear, water howellia, bull trout, or their habitat.**

**We are requesting your review of the BA and concurrence with this finding within 30 days of your receipt of this letter and BA. Please contact me at (503) 230-5823, if you have any questions or require additional information.**

Sincerely,

A handwritten signature in cursive script that reads "Eric N. Powers".

**Eric N. Powers**  
**Environmental Specialist**

**Enclosure**

**BIOLOGICAL ASSESSMENT**  
**for the**  
**PROPOSED**  
**NEZ PERCE TRIBAL HATCHERY**

**I. BACKGROUND**

The Bonneville Power Administration (BPA), in cooperation with the Bureau of Indian Affairs (BIA) and the Nez Perce Tribe (NPT) proposes to fund the construction and operation of the Nez Perce Tribal Hatchery (NPTH). The Nez Perce Tribal Hatchery is a supplementation program for fall chinook salmon (*Oncorhynchus tshawytscha*) and spring chinook salmon (*O. tshawytscha*) located within the Clearwater River Subbasin in Idaho. The program provides for the Nez Perce Tribe to operate:

- A. two central incubation and rearing facilities: Cherrylane and Sweetwater Springs;
- B. six satellite facilities: Yoosa/Camp Creek, Mill Creek, Newsome Creek, Cedar Flats, Luke's Gulch and North Lapwai Valley; and
- C. eleven weir sites: Mill Creek, Johns Creek, Tenmile Creek, Newsome Creek, Meadow Creek, Lolo Creek, Eldorado Creek, Fish Creek, Boulder Creek, Warm Springs Creek, and Brushy Fork (Fig. 1).

This action responds to measure 7.4M of the Northwest Power Planning Council's (NPPC) Columbia River Basin Fish and Wildlife Program (NPPC, 1994), which calls for BPA to fund the construction, operation and maintenance of NPTH.

In accordance with Section 7 of the Endangered Species Act of 1973, as amended, BPA is submitting this Biological Assessment, which addresses the effects of the proposed NPTH operations on listed threatened and endangered species, to the U.S. Fish and Wildlife Service (USFWS). This Assessment also addresses bull trout (*Salvelinus confluentus*) which have been proposed for listing, thus formally initiating a "conference" with USFWS for this species.

The project is currently in the design and planning stage. The final design of the facilities will begin in 1997. BPA has issued a Draft Environmental Impact Statement for the project (BPA, 1996) and is currently completing the Final Environmental Impact Statement. BPA's Record of Decision (ROD) for the project is expected in July 1997. If the ROD and Biological Opinions are favorable, construction of the NPTH would begin in 1998. Construction of all facilities and satellites would occur over a multi-year time span, with initial construction focusing on the Cherrylane and Sweetwater Springs Central Incubation and Rearing Facilities (CIRF), and the Yoosa/Camp Creek and the Cedar Flats satellite facilities.

Juvenile rearing of fall and spring chinook would begin in 1997 at other facilities. Brood year returns for Rapid River stock spring chinook salmon are expected to be surplus to hatchery smolt capacity and mitigation goals in 1997. However, room is available in existing Clearwater Subbasin facilities (Clearwater Fish Hatchery, Dworshak National Fish Hatchery, and Kooskia National Fish Hatchery) and Hagerman National Fish Hatchery to rear fry for outplanting in June 1998. Therefore, parr would be reared and released from these facilities to begin seeding NPTH spring chinook "treatment" streams. Fall chinook subyearlings surplus to hatchery needs at Lyons Ferry National Fish Hatchery would also be released near Cherrylane CIRF in 1998.

Maximum production from NPTH is expected to occur within 10 years after construction and would be 768,000 spring chinook (265,000 presmolts and 503,000 fingerlings), 2,000,000 subyearling smolt fall chinook and 800,000 subyearling early run fall chinook.

## **II. LISTED THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT**

In a letter to BPA dated March 8, 1995, the U.S. Fish and Wildlife Service identified bald eagle, (*Haliaeetus leucocephalus*) and gray wolf (*Lupus canadensis*) as listed threatened or endangered species that may occur in the analysis area. In a subsequent letter to BPA dated May 21, 1997, the USFWS identified two additional species, grizzly bear (*Ursus arctos horribilis*) and water howellia (*Howellia aquatilis*) that may also occur in the analysis area. The analysis area for NPTH consists of the Clearwater River Subbasin. The Clearwater and Nez Perce National Forests provide locations for most of the satellite facilities and weir sites within the program.

The USFWS has determined that although listing is warranted for the Columbia basin population segment of bull trout, the agency has not issued a proposed rule, therefore, the species has not officially been listed as a threatened or endangered species (USFWS, 1997). Consequently, critical habitat has not been designated nor has a recovery plan been proposed.

## **III. PROPOSED PROPAGATION PROGRAM**

### **A. Production Summary**

The Nez Perce Tribal Hatchery is a supplementation program that would rear and release spring and fall chinook to reproduce in the Clearwater River Subbasin. Program managers propose techniques that would rear fish to be biologically similar to wild fish and would integrate hatchery-produced salmon into the stream and river environments needed to complete their life cycle.

The supplementation program has three phases. Phase I (1-5 years) would begin outplanting efforts to reestablish naturally-reproducing salmon in selected tributaries of the

Clearwater River Subbasin. Phase II (6-10 years) would continue the effort using those returning adults to increase and stabilize production in project streams. Phase III (11-20 years) would continue efforts to increase natural runs and create an opportunity for harvest.

During Phase I, broodstock would be obtained from selected hatchery stocks. During Phase II, adults returning as a result of the supplementation actions would provide broodstock used for egg take. The fertilized eggs would then be incubated in two central hatcheries. Fish would be reared for a short time at the central hatcheries and then moved to acclimation facilities located on various rivers and streams to condition them to the natural environment. The specific stream reaches were chosen because they have suitable chinook habitat and are consistent with aboriginal fishing areas.

Spring chinook would be reared at the Cherrylane CIRF until they are fingerling size. A portion of these fish would be outplanted as fingerlings in early summer into Meadow Creek, Boulder Creek and Warm Springs Creek. The remaining spring chinook would be moved to acclimation ponds on Yoosa/Camp Creek, Mill Creek and Newsome Creek to be reared until autumn when they would be released as presmolts. The spring chinook from both release strategies would then smolt and migrate downstream during spring of the following year.

The number of hatchery spring chinook released would be limited so that, when added to the number of wild chinook, the total would not exceed the amount of habitat available for that species. Each year, numbers for release would be recalculated, based on the results of the monitoring and evaluation program, to avoid exceeding the stream's carrying capacity. All fish released would be marked so that the hatchery fish can be distinguished from wild fish and the success of the program evaluated. Marking would also help track any fish that stray to other watersheds.

An early run fall chinook would be reared at the Sweetwater Springs CIRF until they reach fingerling size. They would then be moved to two acclimation facilities at Cedar Flats and Luke's Gulch to continue rearing for several months and to imprint on the river water. They would be released as subyearling smolts in late spring or early summer and are expected to begin their seaward migration shortly thereafter.

Normal run fall chinook would be reared at the Cherrylane CIRF until they reach fingerling size. Most of the fish would be moved to acclimation rearing ponds within the facility itself and would be released as subyearling smolts directly into the Clearwater River during late spring or early summer. Remaining fish would be moved to another acclimation site located at North Lapwai Valley. They would be reared and imprinted on that source of water prior to being released as subyearling smolts in late spring or early summer. Fall chinook are also expected to begin their seaward migration shortly after release.

Temporary weirs would be used to capture adult spring chinook salmon for broodstock. Fall chinook broodstock are expected to return to the facilities themselves. Temporary

weirs and adult traps would be placed in 11 streams that would either receive outplants of hatchery fish or would serve as experimental controls (Fig. 1). The purpose of the structures is to count and sample returning adults so that supplementation success can be evaluated and to secure enough hatchery and wild fish for broodstock purposes. Weirs would be operated from late May through mid-September.

## **B. Facility Summary**

Typical site modifications planned for the two CIRF's include building or improving existing hatchery buildings, building water treatment facilities, rearing containers, effluent ponds, operations and shop facilities, building or upgrading access roads and parking, utilities, and staff offices and housing. Site reclamation and landscape planning would be part of each site plan.

The six satellite facilities would be developed to acclimate and release young fish and to capture and hold returning adult broodstock. The basic facilities include the following components: water intake(s), water transfer pipeline, juvenile rearing ponds, adult holding ponds, water outfall line, seasonal personnel living quarters (trailers), and fish food storage. Site reclamation and landscape planning would be part of each site plan.

Eleven temporary weirs and traps would be used for collecting adults. Portable weirs are made of wood and/or metal and have angled guide fences supported by frames. Fence panels are closely spaced pickets running vertically through the frame and contact either a permanent concrete sill or the undisturbed streambed. A permanent anchoring point on either stream bank would be required at each weir site. This could range from existing boulders to concrete anchors flush with the bank surface or steel members driven into the bank.

The weirs divert upstream migrating adults into traps (live-boxes) where they are held until released or transported to the adult holding ponds. Fish not needed for broodstock would be released upstream of the weirs within 12 hours. During the trapping period, the weirs would require continual monitoring. Fisheries technicians would be stationed at the sites to operate the weirs around-the-clock, seven days a week.

Specific components for each of the proposed sites, such as exact location of water source and discharge lines, orientation and location of ponds and housing facilities, location of temporary weirs and access road locations have not been developed. They will be determined when the final engineering designs are completed.

## **C. Habitat Description**

The Clearwater River Subbasin is within two major subcontinental areas with broad similarities generally referred to as provinces. Each province is made up of smaller areas corresponding to broad vegetation regions with fairly uniform climate. Upland vegetation in the Subbasin varies considerably between the two provinces. The Semi-arid Steppe Lowlands Province includes the stream breaklands, and the Palouse and Camas prairies in

the mainstem and South Fork Clearwater drainages. The climax vegetation ranges from grasslands with some ponderosa pine and Douglas fir to forests of grand fir, Douglas fir and ponderosa pine. Agriculture, forestry and residential development have drastically altered the upland vegetation in this province (NPT and IDFG, 1990).

The Columbia Forest Highland Province, which includes the Lochsa, Selway, upper South Fork and upper half of the Middle Fork Clearwater drainages, is divided into two sections. One section includes the breaklands along the drainage mainstem up to the mountains and includes climax vegetation of hemlock, cedar, grand fir, Douglas fir, spruce, subalpine fir and ponderosa pine. The other section consists of alpine ridges, peaks, and glacial cirques. It includes climax vegetation of subalpine fir, whitebark pine with inclusions of alpine meadows and alpine larch.

Past forest fires, especially from 1910 through 1934, have set back the vegetative succession in large areas of the Lochsa and Selway drainages. Today, brush fields are dominant on the south slopes in these burned areas. Timber harvest has also changed the upland vegetative conditions. Harvest has occurred and is planned in the lower Selway, South Fork, Middle Fork, and the lower and upper Lochsa drainages (NPT and IDFG, 1990).

Riparian zones are found next to water courses such as streams, rivers, springs, ponds, lakes, or tidewaters and represent the connection between terrestrial and aquatic environments. The riparian zone has vegetation extending from the water's edge landward to the edge of the vegetative canopy (O'Connell, et al., 1993). The condition of the riparian vegetation in the Clearwater River Subbasin ranges from pristine in the Selway and Lochsa drainages to severely degraded and/or absent in parts of the mainstem and South Fork Clearwater drainages (NPT and IDFG, 1990). Both natural phenomena such as forest fires, and human activities such as road building, grazing, and mining, have degraded the riparian vegetation. The following sections describe general riparian vegetation conditions at the proposed facility sites.

## **1. Central Incubation and Rearing Facilities**

The **Cherrylane** facility is a 6 ha (14 ac) parcel on the south side of the Clearwater River 32 kilometers (20 miles) east of Lewiston, ID. The site is developed agricultural land presently used for hay production. The site is used for fall pasture after the hay crops have been harvested. Highway 12 runs along the length of the site and separates it from the Clearwater River. A narrow riparian zone exists along the banks of the Clearwater River across Highway 12 from the Cherrylane site. Riparian vegetation is dominated by black cottonwood with associated overstory species, including: box elder, black locust, white alder, Coyote willow, and Wood's rose. Weedy understory species include crab grass, reed canarygrass and horsetail. Fir Island, the largest island in the Clearwater River is located 0.4 km (0.25 mi) east of the site. The island has several active roost sites for wintering bald eagles.

The **Sweetwater Springs** site is a 1.6 ha (4 ac) parcel located 20 km (12 mi) southeast of Lewiston, ID. The site is vegetated with sparse black cottonwood, Ponderosa pine and Wood's rose. Bluebunch wheatgrass is the native understory grass though yellow starthistle has invaded the area due to disturbance by livestock grazing. Cheat grass and bulbous bluegrass also are common. The site contains an existing hatchery building and a developed spring source.

## 2. Satellite Facilities

**Luke's Gulch** is on a 1.2 ha (3 ac) flat bench above the South Fork Clearwater River upstream from Kooskia at River Mile (RM) 8, (KM 13). Vegetation is dominated by black cottonwood, Ponderosa Pine, Douglas fir, and hawthorn in the overstory growing up to the edge of the river. The understory is composed of grasses and forbs including reed canarygrass, horsetail, bluebunch wheatgrass, Kentucky bluegrass, cheatgrass and common yarrow.

The hillside and flat bench at the base of the slope display seasonal wetland characteristics resulting from apparent springs and seeps. Wood's rose and hawthorn dominate the slope overstory vegetation. The herbaceous layer on the hillside is dominated by moss and strawberry.

The **Cedar Flats** site is a 1.2 ha (3 ac) developed site on a flat bench next to the Selway River at RM 5, (KM 8). It is part of an old Job Corps facility being used by the U.S. Forest Service. The site itself is disturbed and dominated by grasses. Riparian forest vegetation surrounds the site. The forest is dominated by western red cedar with minor amounts of grand fir, Douglas fir and Engelmann spruce in the overstory. Common shrubs are huckleberry, common snowberry and twinflower. Understory species include queencup beadlily, western goldthread, ladyfern, and arrowleaf groundsel. The site is in a USFS-designated Riparian Habitat Conservation Area.

The **North Lapwai Valley** site is an alfalfa field on the west bank of Lapwai Creek about 1.6 km (1 mi) upstream from its mouth at the Clearwater River (RM 12 [KM 19]). The flat, 10 ha (25 ac) site is owned by the NPT. Riparian vegetation is absent from this reach of Lapwai Creek bordering the North Lapwai Valley site. The creek has been channelized and the banks diked and lined with riprap. The fields next to the creek are in agricultural production.

The **Yoosa/Camp Creek** site is next to U.S. Forest Service Rd. No. 103, southwest of the Musselshell Camp in the Clearwater National Forest. The site is located in a stand of cedar and pine on the western bank of Yoosa Creek about 10 m (33 ft) downstream of the confluence of Yoosa and Camp creeks. The site is an undisturbed, forested jurisdictional wetland covering an estimated 0.6 to 0.8 ha (1.5 to 2.0 ac). The dominant community type is western red cedar-ladyfern. Associated species include grand fir, Engelmann spruce, mountain ash, willow, common snowberry, dogwood, Sitka alder, Devil's club, western thimbleberry, queencup beadlily, arrowleaf groundsel, star flowered solomon



plume and pinegrass. The site is in a USFS-designated Riparian Habitat Conservation Area.

The **Mill Creek** site is next to USFS Rd. No. 309 (Hungry Ridge Rd.), between the west bank of Mill Creek and the road. The site is a forested inclined bench about 3.2 km (2 mi) upstream of its confluence with the South Fork Clearwater River. Facilities development would cover about 0.8 ha (2 ac). Forest vegetation at this site includes grand fir, Douglas fir, Engelmann spruce and western larch in the overstory; Pacific yew and fool's huckleberry in the shrub layer; and queencup beadlily, wild ginger, beargrass, and star flowered Solomon plume in the herbaceous layer. The site is in a USFS-designated Riparian Habitat Conservation Area.

The **Newsome Creek** site is along the east bank of Newsome Creek about 70 m (230 ft) upstream of the confluence of Beaver Creek. The site is next to USFS Rd. No. 1853 and is about 5 km (3 mi) upstream from the confluence of the South Fork Clearwater. The site was dredge mined in the early 1900s and has been graded into a level plateau. Mining operations have damaged the riparian zone so vegetation is limited. Forest vegetation surrounding the site includes grand fir, Douglas fir, Engelmann spruce, and western larch in the overstory; Pacific yew and fool's huckleberry in the shrub layer; and queencup beadlily, wild ginger, beargrass, and star flowered Solomon plume in the herbaceous layer. The site is in the USFS-designated Riparian Habitat Conservation Area. The project site would cover about 0.8 ha (2 ac).

### **3. Spring Chinook Direct Release Sites and Weir Sites**

Spring chinook direct release and weir sites are located in the headwater drainages of Lolo Creek, and Lochsa, Selway and South Fork Clearwater rivers. The condition of the riparian vegetation in these drainages ranges from natural in undeveloped watersheds to severely altered in drainages subjected to mining and timber harvest. Overall, riparian vegetation is in good condition at these sites.

Two weir sites are located along Lolo Creek and Eldorado Creek, a tributary of Lolo Creek. Riparian vegetation along Lolo Creek is dominated by western red cedar. Associated tree species include Douglas fir, grand fir, and Engelmann spruce. Understory species include thimbleberry, dogwood, snowberry, ladyfern, arrowleaf groundsel and pinegrass.

Lochsa River sites include the Boulder Creek and Warm Springs Creek release and weir sites and three other weir sites in Fish Creek, Lake Creek, and Brushy Creek. Lochsa River riparian forest vegetation includes western red cedar, grand fir, Douglas fir and western larch in the overstory; and ninebark and other various shrubs in the understory. The herbaceous layer includes wild ginger, arrowleaf groundsel, queencup beadlily and pinegrass.

The Warm Springs Creek and Brushy Creek weir sites are upstream on the Lochsa River, northeast of the Fish Creek and Boulder Creek sites. Riparian forest vegetation at these

sites includes grand fir, Douglas fir, and Engelmann spruce in the overstory. Shrubs include common snowberry, prickly currant and Rocky Mountain maple. Understory species include queencup beadlily, ladyfern, arrowleaf groundsel and pinegrass.

The Meadow Creek release and weir site is in the southern Selway River drainage. Riparian forest vegetation at this site includes western red cedar, grand fir, western white pine and Engelmann spruce in the overstory. The common shrub is fool's huckleberry. Understory species are queencup beadlily, western goldthread, ladyfern, and arrowleaf groundsel.

The Johns Creek and Tenmile Creek weir sites are along the South Fork Clearwater river drainage. Forest vegetation at these sites include grand fir, Douglas fir, Engelmann spruce, and western larch in the overstory; Pacific yew, and fool's huckleberry in the shrub layer; and queencup beadlily, wild ginger, beargrass, and star flowered Solomon plume in the herbaceous layer.

#### IV. SPECIES INFORMATION

**Bald Eagle (*Haliaeetus leucocephalus*).** Bald eagles occur in the project area as winter and early spring time residents. Winter habitat is found in the mainstem Clearwater River, Middle Fork, Lochsa and North Fork Clearwater (Chris Kuykendoll, 1997 and Steve Blair, 1996 USFS, personal communication). Bald eagles are commonly found along the open rivers during the day then fly to night roosts in the evenings. Eagles are common on the islands that provide large open tree forms in the lower Clearwater River. Some use does occur along the open upland ridges and prairie lands when big game and livestock carcasses are available as a food source. No known nesting sites exist in the Clearwater River Subbasin.

**Gray Wolf (*Lupus canadensis*).** The project study area for the NPTH lies completely within the Central Idaho Experimental Management Area for the recovery of the gray wolf in Idaho. Gray wolves were captured in Canada in 1995 and 1996. Fifteen wolves were released in Idaho in 1995 and 20 wolves in 1996. As of March 12, 1997, 28 wolves released under experimental rules outlined in the Fed. Register, Vol. 59, No. 224, Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of Gray Wolves in Central Idaho and Southwestern Montana, pp. 60266 - 60281, remain free roaming within the recovery area (Idaho Wolf Updates, Feb. 25, 1997). Of the 28 collared wolves in the recovery area, 8 were last known to be north of the Salmon River. One pair found in the upper North Fork drainage, has a collared wolf that joined with a non-collared wolf. One animal is found in the Oriole Creek drainage on the Idaho-Montana border, and one is in the White Sands Creek area. One pair was in the upper Selway Creek area. Locations can vary from week to week.

All project sites located in the upper drainages of the Clearwater River could fall within the home range of these free roaming wolves, however, none of the listed project sites are known to have denning or rendezvous sites located near them.

**Grizzly bear** (*Ursus arctos horribilis*). There have been no confirmed reports of grizzly bears on the Clearwater and Nez Perce National Forests since 1956 (D. Davis, 1994 and S. Blair, 1995). The Selway Bitterroot Wilderness, located in the Lochsa and Selway river watersheds, will be the likely proposed recovery area for the bear and it will be determined after release of the Final EIS for the grizzly bear recovery. The greatest potential impacts to grizzly bear resulting from the land/resource management activities would result from an increase in road density, substantial increase in human activity within a previously undisturbed habitat, reduction of forage, or directed hunting activities.

**Water howellia** (*Howellia aquatilis*). There is one documented location of a Water Howellia in Idaho which is located in Bonner County (S. Blair, 1997). The plant requires hard bottom, seasonally ponded wetlands such as sloughs and oxbows which dry out in the fall in order to germinate (B. Kibbler, USFWS, 1997). Potential impacts to this plant would result from direct removal during construction, application of herbicide or by changing the water table or flow within its habitat.

**Bull trout** (*Salvelinus confluentus*). These salmonids are members of the char family and exhibit two life forms in the project area, resident and fluvial. Resident bull trout reside close to the areas where they were spawned, whereas fluvial bull trout migrate from small streams to larger streams and rivers and back to the small streams to spawn. Resident type bull trout adults are smaller (150-300 mm long) than the fluvial adults (290-540 mm long) (Batt, 1996). Bull trout are found in cool, clean, mountain streams and rivers, often associated with some sort of cover (substrate or woody debris). Juvenile bull trout eat terrestrial and aquatic insects, while larger bull trout prey on other fish (USFWS, 1997). They evolved with salmon, steelhead, whitefish, sculpins and other trout and use all of them as food sources. Bull trout reach sexual maturity at between four and seven years of age (USFWS, 1997). Fluvial adults begin their migrations into Rapid River, a tributary to the Salmon River from May through July coincident with the declining hydrograph (Batt, 1996). They are expected to exhibit the same migration timing in Clearwater Subbasin streams. They hold in pools of the streams and spawn in the fall after temperatures drop below 9 degrees C (USFWS, 1997). They have specific spawning habitat requirements utilizing streams with abundant cold, unpolluted water, clean gravel and cobble substrate. Their eggs incubate during the winter, and fry emerge from the gravel approximately in April when they are just less than 30 mm long (Batt, 1996). They either reside in that stream their entire lives or begin their downstream migration when they are about 2-3 years old and about 100-150 mm long (Batt, 1996).

Bull trout are expected to be present in all treatment and control streams proposed for NPTH. Whether they use all the streams for spawning and rearing habitats is unknown. Because of their migratory nature, they might "dip in" to the streams from the mainstem rivers yet they may not spawn in each stream. Several interagency management efforts for protecting bull trout have been recently undertaken in the Clearwater Subbasin and they provide an indication of which streams are important bull trout habitats. The Level One Team analysis (consisting of USFS, USFWS, NMFS, IDFG, BLM and NPT participants) has identified Mill Creek, Johns Creek, Newsome Creek, and Tenmile Creek in the South

Fork Clearwater as having spawning and rearing habitat and migration and winter rearing habitat for bull trout. Clearwater National Forest internal direction (Caswell, 1994) identifies focal habitats for bull trout in lower Warm Springs Creek and lower Brushy Fork Creek. It also identifies adjunct habitats for bull trout in Fish Creek and Boulder Creek. Focal habitats are described as being critical areas supporting a mosaic of high-quality habitats that sustain a diverse or unusually productive complement of native species (i.e., likely to support bull trout spawning populations). Adjunct habitats are streams adjacent to focal habitats (i.e., they could be colonized by the fish from the focal habitats). The state of Idaho's Bull Trout Conservation Plan (Batt, 1996) describes the "key watersheds" for bull trout as including the South Fork Clearwater upstream of Meadow Creek, the Meadow Creek drainage in the Selway and the entire Lochsa River drainage. In addition, the Nez Perce Tribe has found juvenile and adult bull trout in upper Meadow Creek, indicating a spawning and rearing population and has also trapped bull trout in Lolo Creek, therefore indicating that they are present in this drainage for at least a portion of their lives (Johnson, 1997, personal communication).

## V. POTENTIAL IMPACTS

### Bald Eagle

Bald eagles select areas to winter where there is open water and/or some other food source like carrion. They also select large open tree forms as roost sites. They can be used as fishing sites or roosts. Night roosts offer protection from wind and storms. None of the facilities are located in a known roost site, however, the Cherrylane site is within 0.4 to 0.8 km (1/4 to 1/2 mi.) of Fir Island. Any construction disturbance would be mainly during the off season for eagle use and would be relatively short duration. Activities at the hatchery program site should not cause any disturbance on Fir Island. Eagles may be attracted by open ponds of fish. Netting would be used to restrict access to the ponds by avian predators. No direct mortality is expected to occur to bald eagles due to the implementation of the NPTH.

### Gray Wolf

The only land use restriction recognized in the experimental rules for wolves is focused on denning and rendezvous sites. Seasonal restrictions could be placed around these sites in order to allow the pups to be undisturbed until they can move off with the pack. This restriction would be done on a case-by-case basis. If on-going activities are not disruptive to the den site, the activity may be better off being left alone. Dens are dug in April and May, which could happen near some program facilities before the site is occupied for seasonal use (late May and June) by fisheries personnel. This would have to be evaluated on a case-by-case basis. After there are 6 breeding pairs this would not be an issue. Wolves tend to avoid human activity and would be unlikely to develop a den or rendezvous sites near program activity areas. No direct mortality is expected to occur to gray wolves due to the implementation of the NPTH.

## Grizzly Bear

There will be no construction within the Selway Bitterroot Wilderness area. Construction and operations at the CIRF's, North Lapwai Valley, Luke's Gulch satellite sites are on private lands, well away from the proposed recovery area. The proposed program will not increase road density within the proposed experimental non-essential boundaries although there will either be access roads constructed or existing access roads improved at the Yoosa/Camp, Mill and Newsome Creek, Cedar Flats satellite sites. Access road construction and/or improvements will be less than 500 meters for all sites combined. Human activity at all sites is persistent to this day consisting of recreational, logging, dredge mining and administrative uses. Thus, the existing disturbance regime will not be significantly altered. Disturbance of vegetative forage will be minor and short-lived at the satellite sites (during construction). Fish forage may be increased in the streams outplanted with salmon, which would result in a beneficial effect. The proposed action does not affect the existing harvest management of grizzly bears, and so no effect will occur for this category.

## Water Howellia

There are no oxbows, glacial ponds or sloughs which will be disturbed by the proposed action. The Yoosa/Camp satellite site is not in an oxbow or a slough, but it is characterized as an undisturbed, forested jurisdictional wetland. Water Howellia is not known to exist at the site, but the site will be surveyed mid-summer for presence of the plant prior to construction activities.

## Bull Trout

The Biological Opinion for 1995-1998 Hatchery Operations in the Columbia River Basin (NMFS, 1995) identifies eight general types of potential adverse effects of hatchery operations and production on natural fish populations (Stelle, 1996). These are:

1. Density-dependent effects of hatchery production
2. Operation of hatchery facilities
3. Disease
4. Competition
5. Predation
6. Residualism
7. Migration corridor/ocean
8. Genetic introgression.

Because there has been no similar biological opinion issued for bull trout, it is assumed that hatchery effects on the species would fall in similar type categories. Therefore, the potential for the proposed action to affect bull trout is discussed in relation to these principal categories.

## 1. Density-dependent effects of hatchery production

This relates primarily to cumulative effects of hatchery production on anadromous salmonids in the migratory corridors of the Snake and Columbia rivers and the estuary and ocean. They will not be addressed in relation to bull trout other than to say that fish released as part of the proposed action would be within the hatchery production cap ascribed for the Snake River basin.

## 2. Operation of hatchery facilities

### A. Effects to Juveniles

*1) Site Disturbances:* Construction of the CIRFs and satellite ponds would disturb the ground and add impervious surfaces to the sites which may lead to increased or re-routed runoff and sediment input. Sediment input is expected to be short-lived and is not expected to exceed the streams transport ability. It is not expected to result in a change in substrate composition. Some amount of bankside and riparian vegetation would be removed or disturbed which may affect fish cover, source of food, and shade on a very limited scale. Most of the construction activities would occur away from the channel, and would be mitigated by erosion control, removing the least amount of trees as possible, and re-vegetating the site after construction.

Site disturbances may disrupt the behavior and distribution of individual fish adjacent to and downstream of the sites, but the overall biological impact to bull trout is expected to be low. The amount of habitat and number of fish affected by these changes would be small relative to the total habitat available. No significant change in abundance or trend in bull trout populations is expected. Cumulative impacts as a result of site disturbances at all facility sites are not anticipated. Impacts are expected to be localized and short-lived.

*2) Channel Alterations:* Alterations to stream channels adjacent or proximate to Yoosa/Camp Creek, Newsome Creek and Mill Creek satellite sites would consist of channel excavation and bank riprap to establish intake structures, placement of instream boulder anchors and perhaps bank anchors to support fish weirs, and placement of the tripods and fence panels for the weirs. Alterations to stream channels in Meadow Creek, Boulder Creek, Warm Springs Creek, Johns Creek, Eldorado Creek, and Tenmile Creek consist of placement of instream boulder anchors and perhaps bank anchors to support fish weirs, and placement of the tripods and fence panels for the weirs.

During construction, fish residing within the area of activity would be displaced, and a few might be killed. Longer term impacts caused by the structures may include disrupting the behavior and distribution of individual fish adjacent to and downstream of the sites (the operation of the weirs and fish ladders and their effects on fish are discussed more fully in section B. Effects to Adults). But the actual construction and placement of the channel structures is not expected to incur significant biological impacts for bull trout. No change in abundance or trend in fish populations is expected. Cumulative impacts as a result of

channel alterations at all facility sites are not anticipated. Impacts are expected to be localized and short-lived.

3) Water Intake and Discharge Structures: Water intake, conveyance, and discharge structures would be permanent fixtures at NPTH production sites. The structures would be screened to prevent fish from entering or leaving the facilities. Construction would disturb near-channel and in-channel areas, causing sediment delivery to the stream, removal or disturbance of stream bank vegetation and disturbance of the stream substrate. Sediment input is not expected to exceed the streams transport ability and should not result in a change in substrate composition. The amount of bankside and riparian vegetation that would be removed or disturbed would be on a very limited scale.

If the screens should fail, non-hatchery fish may enter and hatchery fish may exit the facility. Unintentional releases of hatchery fish due to a lack of screening or screen failure are not anticipated. Any non-hatchery fish that enter the hatchery by screen failure in the flow distribution system would either be reared along with hatchery fish, or returned to the stream.

Site disturbances may disrupt the behavior and distribution of individual fish adjacent to and downstream of the sites, but the overall biological impact to bull trout is expected to be low. The amount of habitat and number of fish affected by these changes would be small relative to the total habitat available. No significant change in abundance nor trend in fish populations is expected. Cumulative impacts as a result of site disturbances at all facility sites are not anticipated. Impacts are expected to be localized and short-lived.

4) Instream Flow Impacts: Water requirements of the various hatchery facilities in relation to the amount of water available would have the greatest potential for adverse impacts at the Yoosa/Camp Creek, Newsome Creek and Mill Creek sites (see Table 1). These are smaller streams which could experience a reduction in flow in September of 34%, 24%, and 11%, respectively, for a distance of up to 300 m (990 feet) of stream. The amount of habitat available, passage conditions, and food production would be negatively impacted in these reaches, particularly during September, when water needs are greatest in relation to overall stream flow.

Flow alterations caused by NPTH operations would not significantly affect the viability of the bull trout population. Because of the location and the relatively small area affected, fish are expected to move either upstream or downstream, and reducing numbers within the impacted segment. Cumulative impacts as a result of water diversions at all facility sites are not expected to result in any change in status or trend of fish populations.

Table 1 - Water Availability and Water Needs

Water Available										
Facility	Total Available			Groundwater			Surface Water			
	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	
Cherrylane (1)	59,474.70	15,714,085	35011	18.9	5,000	11.4	59,455.70	157,090.85	35,000	
Sweetwater Springs	3.4	900	2.1	3.4	900	2.1	0.00	0	0	
Luke's Gulch (1)	681.2	179,982	401	1.7	450	1	679.50	179,532	400	
Cedar Flats (1)	5,096.20	1,346,493	3000	0	0	0	5,096.20	1,346,493	3,000	
N. Lapwai Valley (2)	94.3	24,907	6	2.5	670	1.5	91.70	24,237	54	
Yoose/Camp (3)	11.6	3,052	6.8	0	0	0	11.60	3,052	6.80	
Mill (3)	10.7	2,828	6.3	0	0	0	10.70	2,828	6.30	
Newsome (3)	9.5	2,513	5.6	0	0	0	9.50	2,513	5.60	

Water Needed										
Facility	Total Needed			Groundwater			Surface Water			% Surface Water Needed
	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	
Cherrylane	30.3	8,000	18	18.9	5,000	11.4	11.4	3,000	6.8	0%
Sweetwater Springs	3.4	900	2	3.4	900	2.1	0	0	0	0%
Luke's Gulch	7.9	2,100	5	1.7	450	1	6.2	1,650	3.8	1%
Cedar Flats	10.2	2,700	6	0	0	0	10.2	2,700	6.2	0%
N. Lapwai Valley	8.3	2,200	5	2.5	670	1.5	5.8	1,530	3.5	6%
Yoose/Camp	3.8	1,000	2	0	0	0	3.8	1,000	2.3	34%
Mill	1.1	300	1	0	0	0	1.1	300	0.7	11%
Newsome (3)	2.3	600	1	0	0	0	2.3	600	1.4	24%

Surface Water Available References  
 (1) - NPTH DEIS - Flow at greatest demand period for surface water by NPTH  
 (2) - USGS Data - 1974-94  
 (3) - Lowest flow measured over 5 years: 1990-95, NPT data



5) Water Quality: NPTH discharges of chemical and organic pollutants would meet or exceed federal and state water quality standards and guidelines, and would satisfy all permit requirements. Important physical properties and chemical constituents in hatchery effluent would be routinely monitored to assure compliance with water quality standards. Chemicals used to prevent or treat fish diseases would be handled, applied, and disposed of in accordance with state and federal regulations.

Hatchery practices would be conducted to minimize the amount of uneaten food and discharge of organic wastes into the natural environment. Adult fish carcasses would either be used for food, fertilizer, or disposed of at local landfills. Satellite ponds would be cleaned at the end of the rearing cycle and wastes would be disposed of at local landfills.

Any water quality changes resulting from the proposed facilities may disrupt the behavior and distribution of individual fish adjacent to and downstream of the sites, but the overall biological impact to bull trout is expected to be low. The amount of habitat and number of fish affected by these changes would be small relative to the total habitat available. No cumulative biological impacts to fisheries status or trend would result from the additive inputs of nutrients via facility discharges.

6) Fish Traps: Fish that emigrate from Lolo Creek and Meadow Creek would be collected by means of rotary screw traps and held in live boxes until sampled. Depending on the amount of flow, 5-70% of the fish passing the trap on any given day can be captured. The capture efficiency approaches 70% during the fall when water is at base flow, and is 5% or less during the spring when runoff occurs. The traps would be checked on a daily basis, unless a pulse of fish migration requires checking at more frequent intervals. The act of trapping, handling, weighing, and measuring fish would cause mortality. The Nez Perce Tribe has operated screw traps at these sites from 1994 through the present. During this time, total number of fish trapped was 50,124 and total number of mortalities was 369 (0.7%). Less than 10 bull trout were captured and none were mortalities. Because of the few number of bull trout actually captured, viability of the populations as a result of trapping are not expected to be jeopardized.

## B. Effects to Adults

1) Fish Ladders: Cherrylane, Luke's Gulch, and Cedar Flats facilities would be equipped with fish ladders so that managers may collect returning hatchery adults on an as-needed basis. No detrimental impacts are expected to occur to bull trout by the ladders themselves.

2) Fish weirs: The operation of fish weirs may block, delay, or otherwise disrupt the movements and distribution of bull trout. They can also stress, injure, or kill fish if improperly designed and operated. Bull trout are expected to travel into the streams during the weir operation.

The proposed weirs would add to effects on bull trout in the Clearwater Subbasin. Under existing conditions, weirs are operated on several streams in the Clearwater to conduct research and collect hatchery broodstock. These include Big Canyon Creek, Clear Creek, Crooked River, Red River, Walton Creek, Fish Creek, Running Creek, and historically, the upper Lochsa, and Brushy Fork Creek. The addition of at least eight weirs as proposed by this action, would cause impacts to be spread over a wider geographical range.

As mitigation, several items are required. Vigilant monitoring and cleaning of weirs would be a necessity. In addition, areas downstream of the weirs would be checked by snorkeling to determine if adults are holding up or spawning downstream. Handling protocols must be established for adults trapped. Downstream passage must be allowed using a downstream trap. Finally, corrective actions that favor the survival of naturally-spawning adults must be immediately applied should problems occur with the weirs.

### **3. Disease**

Hatcheries may introduce diseases into the natural environment either by direct contact or through contaminated wastes. Free-living fish may be exposed to increased levels of pathogens and may contract diseases when they come in contact with pathogen-bearing water. Some past releases of hatchery fish have introduced pathogens into the natural environment, leading to novel or additional health risks for wild fish (Hastein and Lindstad, 1991; Hindar, et al., 1991). However, the extent of disease transmission from hatchery to non-hatchery fish is believed to be low since the pathogens responsible are already present in both groups of fish, and environmental conditions generally do not favor outbreaks of disease in the wild.

NPTH managers would guard against the transmission of disease from hatchery to wild fish by screening broodstock for disease, by controlling the incidence of disease in the hatchery, and by ensuring that fish slated for release into the natural environment have met strict fish health quality standards. Common diseases such as bacterial kidney disease would be routinely monitored in hatchery and wild populations. Other diseases would be monitored on an ad hoc basis. Disease control and monitoring practices would conform with standards developed by the Nez Perce Tribe Fish Health Policy and the Integrated Hatchery Operations Team (IHOT, 1995). Fish rearing practices, waste removal, and prophylactic treatment of disease outbreaks within the hatchery would help maintain acceptable pathogen levels. Even if disease were to be transmitted, the overall impact would probably be negligible since wild fish are widely dispersed and tend to be disease-resistant. Consequently, the impact of transmitting diseases from hatchery to bull trout is considered low. No cumulative effects are anticipated.

### **4. Competition**

Studies on bull trout/chinook interactions found that supplementation of hatchery chinook and steelhead did not result in negative impacts to bull trout populations (Underwood, et al., 1995). The researchers found that bull trout and the supplemented species

overlapped geographically in three tributaries to the lower Snake River and thus offered the potential for competitive interactions. They found that all three species used similar habitat types, but differed in the use of microhabitats. This differential use in microhabitats suggests a partitioning of resources to minimize competitive interactions (Underwood, et al., 1995). Bull trout and supplemented chinook salmon are expected to similarly partition resources to minimize competition in NPTH treatment streams.

Furthermore, competition between chinook and bull trout would be limited by controlling stocking rates to keep densities at levels that match the existing habitat quality of the receiving stream. Habitat quality and quantity were explicitly considered in establishing production and stocking goals for spring chinook because this stock would have the longest period of freshwater cohabitation with other fish. Each targeted stream would be outplanted with a number of hatchery chinook which, when added to the wild fish chinook, would be equal to 70-100 percent of the carrying capacity for that species.

The carrying capacity was determined by the values generated as part of the Subbasin Planning efforts of the NPPC (Nez.Perce Tribe and Idaho Department of Fish and Game, 1990). Densities of salmon smolts were determined for different streams in the subbasin according to their habitat quality. Undisturbed lower gradient streams (Rosgen "C" type channels) were designated as supporting the highest numbers of chinook. Parr densities for chinook salmon were used for NPTH in place of smolt densities to estimate carrying capacity. The parr carrying capacities used empirically derived fish densities (Rich, et al., 1993) and the Subbasin Plan's habitat quality and quantity calculations for each of the NPTH treatment and control streams. The densities were not derived from lab studies which excluded other species. Because these values were empirically derived, it is assumed that the densities for the different habitat qualities reflected conditions of competition between coexisting groups of fish. By keeping stocking rates within these carrying capacities, the habitat productivity for either species would not be overwhelmed.

Nevertheless, the M & E Plan (Steward, 1996) contains specific provisions to evaluate the effects (e.g., on growth, survival, and abundance) of competition on coexisting fish species, including bull trout. This mitigation measure should be implemented and if negative impacts are detected, outplanting strategies should be revised as necessary.

## 5. Predation

1) NPTH Chinook as Predators: Chinook released by NPTH are unlikely to cause detrimental effects to bull trout by acting as predators. Hatchery chinook would be released at times that favor the development of natural diets and feeding habits. They would establish feeding stations and prey on a variety of primarily invertebrate drift species. They are not expected to eat other fish until they attain a larger size (120 mm or so). For spring chinook, the gradual transformation to a fish-eating diet begins with their seaward migration as yearling smolts, which is outside the rearing habitat of bull trout.

2) NPTH Chinook as Prey: Somewhat greater impacts are expected to derive from NPTH chinook as prey. Chinook would be released from NPTH facilities at sizes and

under conditions that initially make them susceptible to predation. Populations of predator species such as bull trout should benefit from initial outplanting and an increase in run sizes due to supplementation.

## **6. Residualism**

Chinook are not expected to residualize as do steelhead. No effects are expected on bull trout.

## **7. Migration corridor/ocean**

Potential effects in the migration corridor and ocean are addressed above in V. 1.

## **8. Genetic introgression**

No genetic effects are expected to occur to bull trout as a result of the proposed action.

# **VI. SUMMARY AND CONCLUSIONS**

Based on our qualitative analysis, BPA has concluded that the operation of the Nez Perce Tribal Hatchery is not likely to adversely affect bald eagles, gray wolves, grizzly bear, water howellia, bull trout, or their habitat. This conclusion is based on the following items.

1. No direct mortality is expected to occur to any federally listed or candidate species due to the implementation of the NPTH.
2. There are no documented nesting sites of bald eagles in the project sites at the current time.
3. Wolves tend to avoid human activity and would be unlikely to develop a den or rendezvous sites near program activity areas.
4. The proposed action does not affect the existing harvest management of grizzly bears, and so no effect will occur for this category.
5. Water Howellia is not known to exist at the site.
6. Density dependent effects are not expected to be adverse because this item is related to the cumulative effect of hatchery production on anadromous salmonids in the act of migration through the Snake and Columbia rivers and the estuary and ocean.
7. The proposed action is not likely to adversely affect bull trout as a result of hatchery operations, disease transmission, or operation of adult capture facilities.

8. Competition is not expected to be detrimental due to interspecific partitioning of resources and controlled stocking rates.
9. NPTH fish are not expected to prey on bull trout, but they are likely to offer a prey base for larger bull trout, thus resulting in a beneficial affect.
10. NPTH fish are not expected to residualize.
11. Effects due to genetic introgression are not expected.

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# **Appendix B**

## **Biological Assessment 1998-2002 Hatchery Operations of the Proposed Nez Perce Tribal Hatchery**



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

ENVIRONMENT, FISH AND WILDLIFE

June 12, 1997

In reply refer to: EWN-4

Mr. William Stelle, Jr., Regional Director  
National Marine Fisheries Service  
7600 Sand Point Way, NE  
BinC15700, Building 1  
Seattle, WA 98115

Dear Mr. Stelle:

In complying with its responsibilities under the Endangered Species Act of 1973, as amended, the Bonneville Power Administration (BPA) submits the enclosed biological assessment (BA) that addresses the effects of proposed Nez Perce Tribal Hatchery (NPTH) operation on listed anadromous fish. This biological assessment also addresses Snake River steelhead (*Oncorhynchus mykiss*) that have been proposed for listing.

BPA, in cooperation with the Nez Perce Tribe (NPT) and the Bureau of Indian Affairs (BIA) proposes to fund the construction and operation of the Nez Perce Tribal Hatchery (NPTH). The NPTH is a Supplementation program for fall chinook salmon (*Oncorhynchus tshawytscha*) and spring chinook salmon (*Oncorhynchus tshawytscha*) located within the Clearwater River Subbasin in Idaho. It would consist of two central incubating and rearing facilities, six satellite rearing facilities and three streams which would have aerial releases of fry. This action responds to measure 7.4M of the Northwest Power Planning Council's (NPPC) Columbia River Basin Fish and Wildlife Program (NPPC, 1994), which calls for BPA to fund the construction, operation and maintenance of NPTH.

Construction of all facilities and satellites would occur over a multi-year time span, with initial construction focusing on the Cherrylane and Sweetwater Springs Central Incubation and Rearing Facilities (CIRF), and the Yoosa/Camp Creek and the Cedar Flats satellite facilities. The NPTH may use room that is available in existing Clearwater Subbasin facilities (Dworshak National Fish Hatchery, and Kooskia National Fish Hatchery) to rear fry for outplanting in June 1998.

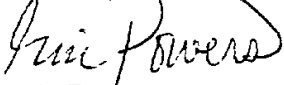


Biological Assessment - Conclusion

Based on the analysis in the enclosed BA, BPA has determined that the proposed operation of the NPTH program is not likely to adversely affect listed Snake River sockeye salmon, Snake River spring/summer chinook salmon, Snake River fall chinook salmon or their critical habitat in the Clearwater River Subbasin.

We are requesting your review of the BA and concurrence with this finding within 30 days of your receipt of this letter and BA. Please contact me at (503) 230-5823, if you have any questions or require additional information.

Sincerely,

A handwritten signature in cursive script that reads "Eric Powers". The signature is written in black ink and is positioned to the right of the word "Sincerely,".

Eric Powers  
Environmental Specialist

Enclosure

**BIOLOGICAL ASSESSMENT  
1998 - 2002 HATCHERY OPERATIONS  
OF THE  
PROPOSED  
NEZ PERCE TRIBAL HATCHERY**

**I. BACKGROUND**

The Bonneville Power Administration (BPA), in cooperation with the Bureau of Indian Affairs (BIA) and the Nez Perce Tribe (NPT) proposes to fund the construction and operation of the Nez Perce Tribal Hatchery (NPTH). The Nez Perce Tribal Hatchery is a supplementation program for fall chinook salmon (*Oncorhynchus tshawytscha*) and spring chinook salmon (*Oncorhynchus tshawytscha*) located within the Clearwater River Subbasin in Idaho. It would consist of two central incubating and rearing facilities, six satellite rearing facilities and would also include three streams which would have aerial releases of fry (Fig. 1). This action responds to measure 7.4M of the Northwest Power Planning Council's (NPPC) Columbia River Basin Fish and Wildlife Program (NPPC, 1994), which calls for BPA to fund the construction, operation and maintenance of NPTH.

In accordance with Section 7 of the Endangered Species Act of 1973, as amended, BPA is submitting this Biological Assessment, which addresses the effects of proposed NPTH operations on listed anadromous fish, to the National Marine Fisheries Service (NMFS). This Assessment also addresses Snake River steelhead (*Oncorhynchus mykiss*) that have been proposed for listing, thus formally initiating a "conference" with NMFS for this species. The proposed action represents an addition to BPA's Artificial Propagation Program as previously described in the Biological Assessment of 1995 - 1999 Umatilla Hatchery Operations (BPA, 1994), the NMFS Biological Opinion for 1995 to 1998 Hatchery Operations in the Columbia River Basin (NMFS, 1995a) and the Biological Assessment 1997 - 2001 Hatchery Operations of the Proposed Cle Elum Hatchery (BPA, 1995).

The project is currently in the design and planning stage. The final design of the facilities will begin in 1997. BPA has issued a Draft Environmental Impact Statement for the project (BPA, 1996) and is currently completing the Final Environmental Impact Statement. BPA's Record of Decision (ROD) for the project is expected in July 1997. If the ROD and NMFS Biological Opinion are favorable, construction of the NPTH would begin in 1998. Construction of all facilities and satellites would occur over a multi-year time span, with initial construction focusing on the Cherrylane and Sweetwater Springs Central Incubation and Rearing Facilities (CIRF), and the Yoosa/Camp Creek and the Cedar Flats satellite facilities.

Room is available in existing Clearwater Subbasin facilities (Dworshak National Fish

Hatchery, and Kooskia National Fish Hatchery) to rear fry for outplanting in June 1998. Therefore, parr would be reared and released from these facilities to begin seeding NPTH spring chinook "treatment" streams. It is also expected that fall chinook subyearlings surplus to hatchery needs at Lyons Ferry National Fish Hatchery would likewise be released in the vicinity of the Cherrylane CIRF in 1998.

Maximum production from NPTH is expected to occur within 10 years after construction and would be 768,000 spring chinook (265,000 presmolts and 503,000 fingerlings), 2,000,000 subyearling smolt fall chinook and 800,000 subyearling early run fall chinook.

## II. LISTED ANADROMOUS SPECIES AND CRITICAL HABITAT

The project area for NPTH consists of the Clearwater River Subbasin. No listed stocks of Snake River sockeye salmon (*Oncorhynchus nerka*) or Snake River spring/summer chinook salmon are present in the project area. Listed Snake River fall chinook are present in the project area and the Cherrylane CIRF is within the designated critical habitat for Snake River fall chinook. Chinook produced by NPTH would migrate (both upstream and downstream) through critical habitat for listed Snake River spring/summer chinook and sockeye salmon in the Snake and Columbia Rivers and through critical habitat for listed Snake River fall chinook in the Clearwater, Snake and Columbia rivers.

Snake River steelhead are present in all tributary streams proposed for either satellite facilities or for outplanting parr. They also use the Clearwater, Snake and Columbia rivers as migratory and rearing habitat.

## III. PROPOSED PROPAGATION PROGRAM

### A. Summary

The Nez Perce Tribal Hatchery is a supplementation program that would rear and release spring and fall chinook to reproduce in the Clearwater River Subbasin. Program managers propose techniques that would rear fish to be biologically similar to wild fish and would integrate hatchery-produced salmon into the stream and river environments needed to complete their life cycle.

The supplementation program has three phases. Phase I (1-5 years) would begin outplanting efforts to reestablish naturally-reproducing salmon in selected tributaries of the Clearwater River Subbasin. This Biological Assessment covers the activities of Phase I. Phase II (6-10 years) would continue the effort using those returning adults to increase and stabilize production in project streams. Phase III (11-20 years) would continue efforts to increase natural runs and create an opportunity for harvest.

During Phase I, broodstock would be obtained from selected hatchery stocks. During Phase II, adults returning as a result of the supplementation actions would provide broodstock used for egg take. The fertilized eggs would then be incubated in two central hatcheries. Fish would be reared for a short time at the central hatcheries and then moved to acclimation facilities located on various rivers and streams to condition them to the natural environment. The specific stream reaches were chosen because they have suitable chinook habitat and are consistent with aboriginal fishing areas.

Spring chinook would be reared at the Cherrylane CIRF until they are fingerling size. A portion of these fish would be outplanted as fingerlings in early summer into three different streams. The remaining spring chinook would be moved to acclimation ponds on three other streams to be reared until autumn when they would be released as presmolts. The spring chinook from both release strategies would then smolt and migrate downstream during spring of the following year.

The number of hatchery spring chinook released would be limited so that, when added to the number of wild chinook, the total would not exceed the amount of habitat available for that species. Each year, numbers for release would be recalculated, based on the results of the monitoring and evaluation program, to avoid exceeding the stream's carrying capacity. All fish released would be marked so that the hatchery fish can be distinguished from wild fish and the success of the program evaluated. Marking would also help track any fish that stray to other watersheds.

An early run fall chinook would be reared at the Sweetwater Springs CIRF until they reach fingerling size. They would then be moved to two acclimation facilities to continue rearing for several months and to imprint on the river water. They would be released as subyearling smolts in late spring or early summer and are expected to begin their seaward migration shortly thereafter.

Fall chinook would be reared at the Cherrylane CIRF until they reach fingerling size. Most of the fish would be moved to acclimation rearing ponds within the facility itself and would be released as subyearling smolts directly into the Clearwater River during late spring or early summer. Remaining fish would be moved to another acclimation site located farther downstream. They would be reared and imprinted on that source of water prior to being released as subyearling smolts in late spring or early summer. Fall chinook are also expected to begin their seaward migration shortly after release.

Temporary weirs would be used to capture adult spring chinook salmon for broodstock. Fall chinook broodstock are expected to return to the facilities themselves.

The actions proposed differ from most existing hatchery practices in the following ways:

- Spring chinook supplementation fish would be the offspring of cross-bred hatchery and wild adults in each generation.
- Spring chinook eggs would be incubated at ambient water temperatures to encourage natural rates of development.
- Fish would be reared in semi-natural ponds to increase survival in the environment. They would be conditioned by high velocity flows, exposure to natural feeds, minimal human contact and other elements of the natural environment.
- Fish would be released at different life stages to increase survival and minimize impacts to natural living fish.
- Fish would be released in several mainstem and tributary areas to establish spawning returns throughout the natural environment and optimize natural production.

Specific components for each of the proposed sites, such as exact location of water source and discharge lines, orientation and location of ponds and housing facilities, location of temporary weirs and access road locations have not been developed. They would be determined when the final engineering designs are completed.

## **B. Hatchery Operations**

1) Disease Management: NPTH managers would guard against the transmission of disease from hatchery to wild fish and from hatchery fish to hatchery fish using many measures. These include screening broodstock for disease, disinfecting water at the CIRF's, controlling water temperature to reduce infections, controlling incubation densities, controlling the incidence of disease in the hatchery, treating or disinfecting effluent, and by ensuring that fish slated for release into the natural environment have met strict fish health quality standards. Fish would be inspected before transfer to satellite facilities and again before they are released into streams. Common diseases such as bacterial kidney disease would be monitored routinely in hatchery and wild populations. Less common diseases would be monitored as necessary.

Disease control and monitoring practice would conform with standards developed by the Nez Perce Tribe Fish Health Policy (1994) and the Integrated Hatchery Operations Team (IHOT) (IHOT, 1995). The Nez Perce Tribe Fish Health Policy defines policies, goals, and performance standards for fish health management, including measures to minimize the impacts to wild fish.

2) Egg Take and Incubation: During Phase I of the program, eggs would be imported from other hatcheries. Chinook production would follow specific management protocols to ensure that healthy fish are produced for reintroduction in the Clearwater River Subbasin. Fish would be supplied either as gametes shipped to the site and held in quarantine until disease testing and screening are completed, or as eyed-eggs imported from a certified quarantine incubation facility outside of the Clearwater River Subbasin.

At the hatchery, all eggs would be disinfected. Stocks would be isolated from each other to limit the potential for transferring disease. Incubation density would be limited to one female per tray, and disease sanitation procedures would be routinely followed. Fish health inspections would be conducted at least twice, one prior to transfer to satellite facilities and again prior to release from the satellite facilities into the river.

After adults start returning (Phase II), egg take would occur at the various satellite facilities and Cherrylane. Broodstock would be screened for specific pathogens. When ready to spawn, gametes from males and females would be taken and kept separate. Care would be taken to have as antiseptic conditions as possible. Sperm and eggs would be kept on ice and transported within eight hours to the central hatcheries for fertilization. Mixing of gametes would follow the mating protocols described in 7) Broodstock Source and Management. Once at the hatchery, procedures would follow those described above.

3) Rearing Techniques: The NPTH would use innovative rearing techniques that have not been used as standard methods by other hatchery programs in the Columbia River Basin. Incubation and rearing water temperatures, rearing containers, rearing densities, release strategies, and broodstock management are different from those conventionally used in most facilities. The overall goal is to produce and release a fish that will survive to adulthood, spawn in the Clearwater River Subbasin and produce viable offspring.

Water temperatures in incubation and rearing containers would be controlled to best suit supplementation goals. Fall chinook would require an accelerated incubation and growth schedule to produce mature subyearling smolts in May and June. Naturally-produced subyearling smolts in the Clearwater River grow slowly in the cold river water and typically do not emigrate until July or August when lower Snake River flows and dam passage conditions are not as beneficial to their downstream migration. NPTH fall chinook subyearling smolts would be programmed to grow to a mature size sooner using the warmer groundwater. They would then be of a suitable size to migrate in June when flow through the Snake and Columbia River hydrosystem is currently managed to benefit chinook survival.

Spring chinook would be incubated and reared in water that approximates the temperature regime of the streams where fish would eventually be released. This stock of chinook spends more time rearing in the Clearwater River Subbasin than do the subyearling migrants, and their natural emigration dates correspond to periods when hydrosystem operation facilitates passage. Consequently, temperatures in their rearing environment would be controlled to maintain growth rates consistent with those in their receiving streams.

During rearing at the CIRFs and satellites, the fish would be kept in ponds designed and operated to simulate natural conditions. Ponds would be designed without hard, straight

lines. Artificial features such as undercut banks, logs and other structures would be placed in the ponds and fish would have a place to hide and learn to avoid other fish. Predator response would be induced by exposing the fish to birds and fish released into ponds (e.g., seagulls, mergansers, bull trout or squawfish). Maynard, et al., (1995) state that "Postrelease survival of cultured salmonids can also be increased by training them to recognize and avoid predators. Thompson (1966) first determined that salmonids can learn to avoid predators in the laboratory and then demonstrated that predator avoidance training is practical in production hatcheries." Maynard et al. (1995) further state that, "In the laboratory, it has been shown that coho salmon rapidly learn to recognize and avoid a predator after observing it attack conspecifics (Olla and Davis 1989). This approach to predator-avoidance training could be implemented by briefly exposing each lot of production fish to the main predators they will encounter after release. The loss of a few fish sacrificed in these training sessions should be outweighed by the larger number of trained fish that may survive later." (Maynard, et al., work for NMFS at their Northwest Fisheries Science Center in Seattle).

Human activity around the ponds would be discouraged, and shading and overspray would be used to obscure overhead vision. Shading would also moderate warm summer water temperatures. Underwater feeding options would be pursued to avoid conditioning young fish to be fed by humans. Water flows in ponds would be increased to exercise and build physical stamina of fish to adapt to stream or river conditions following release.

Recent literature reviews and experiments conducted by NMFS evaluate improvements in post-release survival by fish reared using these novel techniques. Maynard, et al. (1995) conducted a review of semi-natural culture strategies for enhancing the post release survival of anadromous salmonids. They discuss the difference in post release survival of fish reared in semi-natural and conventional hatchery settings. They found that fish reared in earthen ponds and in tanks with substrate, cover, and instream structure had better cryptic coloration for the stream environment into which they were released than did fish reared in barren grey tanks, similar to the surroundings in conventional raceways. Maynard, et al., (1995) reported that these semi-naturally reared fish had almost 50 percent higher post release survival than did their conventional reared counterparts (60 percent vs. 40 percent post release survival, respectively). They reported that predator avoidance strategies resulted in increased survival by hatchery fish as did some sort of exercise regime. Maynard, et al. (1996a) conducted a study that suggested that a typical hatchery diet of fish pellets supplemented with live-food could enhance the post-release forage ability and survival of cultured fish used for supplementation and stock enhancement. NMFS researchers (Maynard, et al. 1996b) also conducted experiments using a natural rearing system called NATURES which employs overhead cover, instream structure and substrate and unintrusive feed delivery systems. They found that post release survival was markedly improved for fall chinook (51 percent higher) and spring chinook (24 percent higher) than for fish reared in conventional rearing settings.

Fish would be reared at relatively low densities. The NMFS (1995) describe problems in rearing fish at high densities such as increased fingerling mortality from disease and increased smolt mortality after release. They recommend future rearing of fish in the Columbia River Basin hatcheries at a density which does not exceed  $9.6 \text{ kg/m}^3$ . The Master Plan for NPTH (Larson and Mobrand, 1992) calls for rearing fish at a density which is a third as much as those needed to meet NMFS recommendations and should impart economic efficiency to the hatchery and enhanced survival to NPTH fish. Lower rearing densities would also provide a means for reducing temperature induced stress during the warmer summer periods, particularly for those fish kept through the summer at Yoosa, Mill and Newsome creeks.

4) Release Techniques: Figure 2 displays release numbers and sites for NPTH. Hatchery fish would be released at several different life stages to optimize survival, to evaluate different strategies, and/or be consistent with natural migratory behavior. Fall chinook would be released as subyearling smolts. This migratory behavior is typical of lower elevation, larger river spawners. The fish would be released into the rivers during spring runoff in May and June when they weigh about 110 fish/kg (90 mm long). They would either join other outmigrants in the high flows or would reside in the river for awhile, and move downstream as water temperatures warm.

Most spring chinook would be released directly into stream habitats as fingerlings. Meadow, Warm Springs and Boulder creeks were selected for outplanting sites. These streams provide quality habitat. Fish would be released into these streams in June and July when they would be about 220 fish/kg (70 mm long). They would be transported to the streams by truck, and distributed by helicopters throughout the reaches of accessible spring chinook habitat. The proposed size and timing of release were selected to correspond to favorable stream conditions for growth and survival. Fish released directly into the streams are expected to sustain higher mortality during the summer than ponded fish, but survivors are expected to gain a long-term fitness advantage through their experience of living under natural conditions.

The remaining spring chinook production would be moved in May at 440 fish/kg (57 mm long) to acclimation ponds at Yoosa Creek, Mill Creek and Newsome Creek. Fish would be confined in the acclimation ponds until September, and from that point on would be allowed to exit the ponds on their own free will. At this time, the fish would average about 44 fish/kg (140 mm long). The ponds would be drained in mid-October, and the remaining fish would be forced to enter the receiving streams. The September-October timeframe corresponds to the fall migratory pulse that occurs naturally in Idaho's spring chinook populations. This migratory pulse is stimulated by decreasing day lengths and cooler water temperatures and appears to be related to chinook seeking more favorable overwinter conditions in the mainstem rivers. The migratory pulse has been found through monitoring and evaluation trapping in Lolo and Meadow creeks in 1993-96 and is known in the Imnaha, South Fork Clearwater River and South Fork Salmon River from other



smolt monitoring projects (Sprague and Johnson, 1997). The proposed release strategy would increase survival during the growing season, reduce competition among hatchery and wild fish for limited food resources, and better prepare pond-reared fish for living under natural conditions following their release.

Fish released directly into stream and pre-smolt releases would sustain higher mortality than fish reared in a conventional hatchery for the same period of time. Hatcheries offer control over environmental conditions to a great extent, allowing survival to be high. However, hatchery fish sustain considerable mortality following release into the river. This is understandable since they have had no chance to develop the "natural" behaviors that allow them to survive. The NPTH release strategy is designed to focus on producing more fit fish by subjecting them to natural environmental conditions for more of their lives. In the end, the strategy may even be more cost-effective than conventional hatcheries because the cost of raising fish for 6 months to 1 year longer in the hatchery may not be justified by increased returns.

NPTH hatchery fish would be released over a large geographic area to maximize the use of available rearing habitat in the Clearwater River Subbasin and to avoid overwhelming local anadromous and resident fish populations. Releases of fall chinook would occur in the mainstem lower Clearwater River and 48-96 km (30-60 miles) upstream in the larger tributaries, the Selway and South Fork Clearwater rivers. Spring chinook would be released in the smaller tributaries of the mainstem Clearwater, Lochsa, Selway and South Fork Clearwater rivers.

5) Adult Returns: Table 1 shows predicted annual adult salmon returns, adults available for broodstock, natural production and harvest in 20 years. A spreadsheet model was developed to predict adult returns. The model follows hatchery and naturally-produced spawners through their life cycle, calculating juveniles produced in natal streams and subtracting out mortalities accrued as the fish grow, leave the streams, travel out into the ocean and back again to the natal streams or hatchery satellite. It also incorporates the hatchery:wild spawning protocols recommended for NPTH.

For fish released from satellite ponds the model applies a post-release survival rate and an overwinter, or presmolt-to-smolt survival rate (these two are used synonymously). Post-release survival is applied whenever fish are released, by helicopter in the direct releases, or out of ponds at the satellites or CIRF. In general when fish are released by a hatchery, as smolts, parr whatever, a substantial number (60% as determined by Maynard et al. 1995) die within a couple of weeks of release. Evidently, the fish cannot swim in a current, avoid predators, eat, etc., so most die. It is this post-release survival that the NATUREs type rearing is intended to improve.

The model pond releases kills off 35% of the fish released (65% post-release survival), it then kills off 70% of the survivors to account for presmolt-to-smolt, or overwinter, survival. About 19.5% of the fish released from the ponds survive to smolt stage.

The direct release fish get an additional mortality of (28%), which is the fingerling to parr (or presmolt) survival (72%). This is the same mortality that is expected to accrue with wild fish dwelling in the stream during the summer, and is related to normal wear and tear. This leaves approximately 10% survival to smolt.

The post release survival was based on information presented in Maynard, et al. (1995) for facilities using natural-type rearing strategies. The overwinter survival rate is based on information presented in the Idaho Salmon Supplementation Studies (Bowles and Leitzinger, 1991). The survival rate for smolt-to-adult for spring chinook from satellite facilities is 0.4 percent (essentially double the current smolt-to-adult for Rapid River fish at 0.2 percent). The survival rate for smolt-to-adult for spring chinook from direct stream releases is 0.6 percent (triple the current smolt-to-adult survival rate). The survival rate for fall chinook to smolt is 50 percent, which is essentially the post release survival. The survival rate for smolt-to-adult for fall chinook is 0.8 percent (double the current smolt-to-adult survival from Lyons Ferry 1984-86 brood coded wire tag returns).

Smolt-to-adult survival rates were doubled for spring chinook satellite releases and fall chinook releases because it is assumed that the Endangered Species Act will be successful and that migratory passage conditions will be improved such that at least a 1:1 replacement rate occurs. Smolt-to-adult survival rates were tripled for spring chinook with direct releases because along with benefits accrued by the Endangered Species Act, it is assumed that these fish will have an acquired fitness advantage by their extended rearing in the natural environment.

*6) Adult Collection:* Collecting adults would provide information about the success of the program in addition to providing broodstock. The number of returning adults would be used to calculate smolt-to-adult and adult-to-smolt (or parr) survival rates. Adult salmon produced by the NPTH program are expected to be abundant enough in 5-10 years to begin collecting them for use as hatchery broodstock (Phase II). Adults would be captured near satellite facilities using various methods.

Temporary weirs and adult traps would be placed in 11 streams that would either receive outplants of hatchery fish or would serve as experimental controls (Fig. 1). The purpose of the structures is to count and sample returning adults so that supplementation success can be evaluated and to secure enough hatchery and wild fish for broodstock purposes. Depending on the species, weirs would be operated from late May through mid-September.

**Table 1 - Expected Adult Salmon Returns from Hatchery and Wild Fish**

<b>Stream</b>	<b>Total Adult Returns</b>	<b>Adults Available for Broodstock</b>	<b>Adults Available for Natural Reproduction</b>	<b>Adults Available for Harvest</b>
<b>Spring Chinook</b>				
Lolo Creek (1)	329	136	63	130
Mill Creek (1)	95	36	46	13
Newsome Creek (1)	171	69	42	60
Boulder Creek (2)	146	67	58	21
Warm Springs (2)	35	16	14	5
Meadow (Selway) (2)	676	322	248	106
<b>Number at 20 years</b>	<b>1,452</b>	<b>646</b>	<b>471</b>	<b>335</b>
<b>Fall Chinook</b>				
Luke's Gulch (3)	574	272	154	148
Cedar Flats (3)	574	272	154	148
Cherrylane	2,213	1,020	620	573
North Lapwai Valley (3)	739	340	208	191
<b>Number at 20 years</b>	<b>4,100</b>	<b>1,904</b>	<b>1,136</b>	<b>1,060</b>
<p>(1) Assumes postrelease survival is 65% and smolt-to-adult survival is double the current rate.                      (2) Assumes postrelease survival is 65% and smolt-to-adult survival is triple the current rate (because fish have acquired a fitness advantage due to extended rearing in the wild).                      (3) Assumes postrelease survival is 50% and smolt-to-adult survival is double the current rate.</p>				

The weirs divert upstream migrating adults into traps (live-boxes) where they are held until released or transported to the adult holding ponds. Fish not needed for broodstock would be released upstream of the weirs within 12 hours. During the trapping period, the weirs would require continual monitoring. Fisheries technicians would be stationed at the sites to operate the weirs around-the-clock, seven days a week.

Fall chinook broodstock would be obtained from adults ascending the fish ladders at Cherrylane, Cedar Flats and Luke's Gulch and from adults captured at the weir on Lapwai Creek. Permanent adult collection systems - fishways or fish ladders - are proposed for the Cherrylane, Cedar Flats and Luke's Gulch facilities. These would allow those adults imprinted to the water source or chemical attractants to return to the facilities directly for broodstock. The adults ascending Lapwai Creek would encounter a weir near the satellite site, be captured and transported to Cherrylane.

A portion of the fall chinook broodstock might also be captured at Lower Granite Dam. Collection of fish at Lower Granite would concentrate on unmarked, wild returning spawners. These fish would be cross-bred with fish returning to the Cherrylane CIRF or satellite facilities. The exact portion of the run that can be used for NPTH would require coordination with other agencies. Recently, fisheries managers in the U.S. vs. Oregon Production Advisory Committee have proposed that a small percentage (5 percent) of the unmarked fall chinook run crossing the dam be used to cross-breed with adults returning to Lyons Ferry Hatchery (Ed Larson, 1997, personal communication). Should production activities currently underway for fall chinook, including NPTH, and recovery actions undertaken as a result of the ESA result in a dramatic increase in unmarked returns over the dam, then it is likely that a portion would be taken into NPTH for spawning in a similar manner as are the fish for Lyons Ferry. Impacts to the naturally spawning population would be determined in the multi-agency quorums responsible for recovering the run.

7) Broodstock Source and Management: Since not enough wild chinook salmon return to the Clearwater River Subbasin today to serve as a source of broodstock, the supplementation program would use broodstock from other locations. The following sources – all hatcheries – are being considered for broodstock during Phase I:

- spring chinook – Rapid River stock, which includes Rapid River, Dworshak, and Clearwater hatcheries and the Kooskia Hatchery; and.
- fall chinook – Lyon's Ferry Hatchery stock.

Acquisition of broodstock would depend on annual coordination with NMFS, IDFG, and the U.S. vs. Oregon Production Advisory Committee of the Columbia River Management Plan.

During Phase II, when fish return as adults, they would be trucked or moved to the nearest adult holding pond for that species. Adults would be held in adequate space and water flow to alleviate stress that could occur from overcrowding and temperature. The standard rule of thumb for holding adults at hatcheries is to have a flow rate of not less than 0.004 m<sup>3</sup>/min (1 gpm) per adult and to provide space of not less than 0.283 m<sup>3</sup> (10 ft<sup>3</sup>) per adult (Senn, et al., 1984). NPTH can hold fish in flows of 0.012-0.016 m<sup>3</sup>/min (3-4 gpm) per adult and in space of at least 0.283 m<sup>3</sup> (10 ft<sup>3</sup>) per adult. These holding criteria should provide a safety measure to alleviate outbreak of stress related effects.

The NPTH is designed to ensure a balance of hatchery and wild spawners in both hatchery and streams. Some returning hatchery fish would be permitted to spawn with wild fish in the river or streams. Likewise, some returning wild fish would be spawned in the hatchery.

*Spring chinook* — The NPTH would use a sliding scale (Table 2) based on the abundance of adult chinook returning to the Clearwater River Subbasin to determine the ratio of hatchery-to-wild fish used for broodstock and mating protocols (Cramer and Neeley, 1992; Cramer, 1995). The sliding scale was developed to protect the genetic resources in the small populations of chinook salmon in the Clearwater River Subbasin yet allow for population growth. The ratios favor wild fish for natural spawning as the wild population increases. However, the proportion of hatchery fish that spawn naturally would be allowed to increase if the wild chinook population falls below 12 pair per stream. In this case, wild fish would be brought into the hatchery to spawn so that the remaining gene pool would have the advantages offered by increased survival during early rearing. Run forecasting in conjunction with baseline data on return rates to each stream would be used to predict if the runs are likely to drop below 12 pairs.

Table 2 - Hatchery (H) to Wild (W) Spawner Ratios

Natural Returns	Brood for Hatchery	Fertilization Procedure	Spawners for Wild
Greater than Broodstock Goal for Hatchery	At least 50% W	Random, H x W	At least 33% W.
Fewer than Broodstock Goal for Hatchery	At least 33% W	Random, H x W to extent possible	At least 25% W. 12 pair minimum
Between 12 to 24 Pairs	Keep all W males: Male ratio = 3H:1W H females equivalent to H + W males	Split-cross W males; each to two H females.	Release all W females. Female ratio = 3H:1W H males equivalent to H+W females.
Fewer than 12 Pairs	Keep all W fish + capacity H fish.  Spawn and rear H + W separately.  Smolt release for W + captive brood.	Matrix for W. Random for H.	100% H up to spawning habitat capacity

*Fall chinook* — For the near future, the cross-breeding of hatchery and wild spawners applies only to spring chinook. Capture methods for obtaining fall chinook in the natural environment would require further exploration before it becomes feasible to cross-breed a significant portion of the wild run with hatchery fish. The obvious method for capturing wild fall chinook would be to take fish as they cross Lower Granite Dam. However, it is unlikely that fisheries managers in the basin would permit a significant portion of the wild run to be taken into a hatchery. Consequently, interbreeding of wild and hatchery fall chinook spawners would be limited until such time that the unmarked run increases to a much higher level.

In Phase II, it is expected that most of NPTH fall chinook broodstock would come from hatchery adults returns to Cherrylane or the satellites. A gradual blending of wild fish into NPTH broodstock would occur in time. It is anticipated that a program similar to that proposed for Lyons Ferry would be adopted by NPTH. This program proposes capture and cross-breeding of a limited number of wild fall chinook at Lower Granite with Lyons Ferry hatchery fish. Exact numbers of fish and the impacts to the wild run would be considered by the fisheries managers in the Columbia Basin before such a program can occur.

*Early run fall chinook* — Fall chinook returns to the Clearwater would have to be actively manipulated to encourage an earlier spawning fish upstream of Cherrylane. Fish released

from the Cedar Flats and Luke's Gulch satellite facilities would have to return as an early fall spawner (early September to end of October) to successfully incubate and rear in the South Fork Clearwater and the Selway River. Presently, most fall chinook spawning in the Clearwater occurs from October through November. The early portion of the run returning to the satellite facilities would be bred together to encourage an earlier run timing in the progeny. Altering the run and spawn timing of these returns would increase the chances of reestablishing a naturally spawning and rearing group of fish in these upper reaches.

### **C. Harvest Management**

An important goal of the supplementation program is to produce surplus adult fish for harvest. Harvest rates would be controlled to sustain wild and hatchery production. Population growth may be slow, requiring 20 years or longer before harvest can occur.

The Nez Perce Tribe would coordinate harvest management with other fisheries agencies in the basin. The U.S. vs. Oregon Technical Advisory Committee determines harvest allocation on the Columbia River and ocean fisheries. Washington Department of Fisheries, Oregon Department of Fish and Wildlife, Idaho Department of Fish and Game, and the Nez Perce Tribe coordinate to determine harvest in the Snake River. Harvest in the Clearwater River would be a coordinated action between NMFS, Idaho Department of Fish and Game and the Nez Perce Tribe. Harvest levels would be based on adult returns, subject to spawning escapement and broodstock requirements.

Tribal ceremonial harvest may occur at a controlled level to provide for the cultural and religious needs of the Nez Perce people. Tribal subsistence and non-tribal recreational fishing would be permitted only after predicted run sizes indicate that natural spawning and broodstock collection goals would be met. Surplus hatchery fish would be targeted, allowing weaker wild stocks to rebuild to self-sustaining levels.

Fishing would be limited to designated areas and times, using techniques that avoid or minimize impacts on non-target stocks. Such techniques include run size forecasting, setting harvest rates that vary with in-season natural spawning estimates, fishing in tributaries or other areas where only one stock is available or above a weir where monitoring and broodstock collection occur, selectively harvesting externally marked hatchery fish, and imposing gear and catch and release restrictions.

### **D. Monitoring and Evaluation Plan**

The NPTH would use adaptive management to guide hatchery operations. Monitoring and evaluation is a key part of adaptive management. The concept of adaptive management has been recently discussed in the Return to the River (Independent Science Group, 1996). Their definition states "Adaptive management uses management actions as

part of an experimental design to refine understanding concerning scientific questions. As a result of these experiments, management should adapt, resulting in improved response to environmental problems.” The Fish and Wildlife Program document for the NPPC, the Yakima Fisheries Project Final Environmental Impact Statement and the Tribal Recovery Plan use the concept to promote action in the face of significant scientific uncertainties (ISG, 1996).

There are any number of scientific uncertainties in relation to hatchery supplementation that need to be assessed during operational efforts to restore natural runs of fish. For example, the best mechanism to incubate and rear fish to mimic natural production needs to be determined, as well as optimum fish size for release and release timing. Beneficial and adverse effects of supplementation to existing populations need to be monitored and the results incorporated into production strategies. Monitoring of returns, spawning success and harvest are also aspects of hatchery management that would feed back into and revise the supplementation program. These production and harvest strategies require scientific testing of hypotheses to determine which management action is most suitable for meeting program goals. Management actions can then be revised in accordance with the results. The Monitoring and Evaluation Plan provides the backbone of experimental hypotheses.

After reviewing the Nez Perce Tribal Hatchery Master Plan (Larson and Mobernd, 1992), the NPPC directed the Tribe to develop a Monitoring and Evaluation Plan that met the following criteria:

1. Employed an ecosystem approach.
2. Assessed ecological risks:
  - Identified critical uncertainties
  - Focused on genetic resources, survival, reproductive success, and ecological interactions.
  - Evaluated cumulative impacts
3. Included baseline biological and habitat surveys.
4. Identified facilities needed to conduct M & E.
5. Integrated with other research programs; in particular, the Idaho Supplementation Studies (Idaho Department of Fish and Game) and the Snake River Genetics Monitoring Program (National Marine Fisheries Service).
6. Considered the recommendations and methods developed under the Regional Assessment of Supplementation project.
7. Consulted with the NMFS and other agencies regarding:
  - Endangered species management
  - Hatchery policy
  - Hydrosystem operation and water quality
  - Other potential management actions



Each of these concerns was addressed in the development of the M & E Plan written by Steward (1996). In general, the plan uses risk assessment and prioritization techniques to define the magnitude and significance of risks associated with the program, then proposes strategies for avoiding undesirable impacts and collecting the information necessary to evaluate program success. A *Before-After, Treatment-Control* stream experimental design is proposed as the most effective approach to determining whether supplementation causes increased numbers of returning spring chinook in treated (supplemented) streams. *Before-After* refers to observations made pre- and post-supplementation. *Treatment and Control* refers to supplemented and non-supplemented streams respectively.

Five pairs of treatment and control streams have been identified for monitoring and evaluating the success of spring chinook supplementation. (See Table 3 and Fig. 1.) Temporary weirs and adult traps would be used to count and compare adult returns. In treatment streams, the number of returning adults would then be used to calculate smolt-to-adult and adult-to-smolt (or parr) survival rates. An estimate of natural production resulting from adult spawning in the streams would be used to adjust the number of fish outplanted from the hatcheries.

**Table 3 - Treatment Control Stream Pairs**

Treatment Stream	Control Stream
Lolo Creek	Eldorado Creek
Mill Creek	Johns Creek
Newsome Creek	Tenmile Creek
Boulder Creek	Fish Creek
Warm Springs Creek	Brushy Fork Creek

The treatment streams would be planted annually with juvenile spring chinook. Control streams would not be planted until some determination can be made of program success. Information gained during Phases I and II would be used to make the decision.

Overall success of the program would be evaluated by adult returns. Fish would be marked so they could be counted. With present counting and marking technology, an adipose fin clip would likely be used to distinguish hatchery from wild, and some other tag to distinguish release location or test group. Fall chinook will require a Coded Wire Tag in the short term, to trigger a response at adult collection traps on Lower Granite, to distinguish them from Umatilla fish and to test production strategies at the hatchery. They would also require an additional tag (e.g. elastomer/ visual implant tag) to distinguish them from the Corps LSRCP Add-on fish. Springs would probably require a visual tag to distinguish returns to the various release locations. PIT tags would also be used to determine juvenile survival rates and migratory information. Exact tagging colors and codes will have to be determined on an annual basis in coordination with other management entities.

Staff would count marked adult fall chinook returning over Lower Granite Dam as fish are counted there now, and spring chinook would be counted at weirs downstream of spawning areas. Fish biologists would use the counts as a measure of population status and trends. Additionally, late summer parr densities and redd counts would be used to evaluate program success. Several genetic, demographic, and life history parameters would be monitored to check if hatchery-reared chinook perform as expected and that interactions with resident fish are not detrimental.

Meadow Creek is an experimental unit separate from the treatment and control streams. Its purpose is to study short-term experiments that evaluate different release techniques in hopes that adaptive management can be more effective in implementing recovery of fish populations.

The M & E Plan offers techniques that would not only evaluate the performance of hatchery fish, but would determine their impacts on wild fish and other aquatic biota. These data and other information would be used by program managers to continuously upgrade NPTH goals, objectives, and operations.

#### IV. ASSESSMENT OF IMPACTS

The Biological Opinion for 1995-1998 Hatchery Operations in the Columbia River Basin (NMFS, 1995) identifies eight general types of potential adverse effects of hatchery operations and production on natural fish populations (Stelle, 1996). These are:

1. Density-dependent effects of hatchery production
2. Operation of hatchery facilities
3. Disease
4. Competition
5. Predation
6. Residualism

7. Migration corridor/ocean
8. Genetic introgression.

The potential for the proposed action to affect listed Snake River salmon and steelhead is discussed in relation to these principle categories.

### **1. Density-dependent effects of hatchery production**

#### *a. Snake River sockeye salmon, spring chinook salmon, fall chinook salmon and steelhead*

The National Marine Fisheries Service (1995) has argued that effects of competition between hatchery and natural fish stocks in the mainstem and estuary habitats have posed a detriment to natural populations. Because much of the free-flowing nature of the Columbia and Snake River systems has changed to a series of reservoirs, the runoff timing, food resources, numbers of predators, competitors and exotic species have been altered. NMFS (1995) believes the carrying capacity for anadromous fish in these habitats has been reduced and that competition under conditions of reduced carrying capacity has resulted in detrimental impacts to the wild anadromous stocks. The primary source for competition is the cumulative release of almost 200 million hatchery salmon and steelhead annually in the Columbia River Basin. Although NMFS also finds that there is little definitive information on carrying capacity and density dependent (competitive) effects within the mainstem, estuary, and ocean, they recommend a cap be placed on cumulative hatchery production as a safeguard. The hatchery cap limits chinook production to the numbers produced in 1994 (20.2 million in the Snake River basin) with the exception of production to support recovery of listed threatened or endangered stocks.

Proposed releases of spring and fall chinook by NPTH would be part of the cumulative release of hatchery fish and thus effect Snake River sockeye, fall chinook, spring chinook and steelhead but, the effects would not be detrimental to the recovery of the fish. Spring chinook proposed for release are within the production cap recommended by NMFS. The cap was made for hatchery production from 1994. In that year, the Nez Perce Tribe raised approximately 500,000 chinook for outplanting. An additional 500,000 chinook were secured by the Nez Perce Tribe and reared by Idaho Department of Fish and Game at Clearwater Hatchery for the tribal outplanting. It is assumed that the production cap was a necessary measure to cause no further harm to chinook species, and would allow for rebuilding of the runs. Because spring chinook releases proposed are within the cap set in 1994 (as Nez Perce Tribal production) they should not interfere with rebuilding of the runs, nor cause harm to the listed stocks.

Fall chinook releases are not expected to cause cumulative detrimental impacts. The fall chinook stock proposed for NPT, Lyons Ferry fall chinook, is considered part of the Snake River fall chinook ESU. Propagation in NPTH is intended to promote recovery of natural Snake River fall chinook salmon. Therefore this could be considered "production

to support recovery” and should be exempt from the production ceiling. Propagation of these fish would be similar to propagation of listed spring chinook or sockeye salmon in other areas of the Snake River Basin (e.g., Eagle Creek Hatchery, McCall Hatchery, or Sawtooth Hatchery). These stocks of fish are propagated for recovery purposes. They are part of the group of fish that are proposed to be protected from competition by the production cap. Consequently, no adverse impact is anticipated that can be attributed to competition by their production and release from NPTH.

## 2. Operation of hatchery facilities

### A. Effects to Juveniles

#### *a. Snake River sockeye salmon and Snake River spring chinook*

Listed sockeye salmon and spring chinook salmon do not occur in the Clearwater River, no effects are predicted.

#### *b. Snake River fall chinook salmon and Snake River steelhead*

1) Site Disturbances: Construction of the CIRF's and satellite ponds would disturb the ground and add impervious surfaces to the sites which may lead to increased or re-routed runoff and sediment input. Sediment input is expected to be short-lived and is not expected to exceed the streams transport ability. It is not expected to result in a change in substrate composition. Some amount of bankside and riparian vegetation would be removed or disturbed which may affect fish cover, source of food, and shade on a very limited scale. Most of the construction activities would occur away from the channel, and would be mitigated by erosion control, removing the least amount of trees as possible, and re-vegetating the site after construction.

Site disturbances may disrupt the behavior and distribution of individual fish adjacent to and downstream of the sites, but the overall biological impact to fall chinook and steelhead is expected to be low. The amount of habitat and number of fish affected by these changes would be small relative to the total habitat available. No significant change in abundance or trend in fish populations is expected. Cumulative impacts as a result of site disturbances at all facility sites are not anticipated. Impacts are expected to be localized and short-lived.

2) Channel Alterations: Alterations to stream channels adjacent or proximate to North Lapwai Valley, Yoosa/Camp Creek, Newsome Creek and Mill Creek satellite sites would consist of channel excavation and bank riprap to establish intake structures, placement of instream boulder anchors and perhaps bank anchors to support fish weirs, and placement of the tripods and fence panels for the weirs. Alterations to river channels adjacent or proximate to Cherrylane, Luke's Gulch and Cedar Flats would consist of channel excavation and bank riprap to establish intake structures and fish ladders. Alterations to

stream channels in Meadow Creek, Boulder Creek, Warm Springs Creek, Johns Creek, Eldorado Creek, and Ten Mile Creek consist of placement of instream boulder anchors and perhaps bank anchors to support fish weirs, and placement of the tripods and fence panels for the weirs.

During construction, fish residing within the area of activity would be displaced, and a few might be killed. Longer term impacts caused by the structures may include disrupting the behavior and distribution of individual fish adjacent to and downstream of the sites (the operation of the weirs and fish ladders and their effects on fish are discussed more fully in Section **B. Effects to Adults**). But the actual construction and placement of the channel structures is not expected to incur significant biological impacts for fall chinook, or steelhead. No change in abundance or trend in fish populations is expected. Cumulative impacts as a result of channel alterations at all facility sites are not anticipated. Impacts are expected to be localized and short-lived.

3) Water Intake and Discharge Structures: Water intake, conveyance, and discharge structures would be permanent fixtures at NPTH production sites. The structures would be screened to prevent fish from entering or leaving the facilities. Construction will disturb near-channel and in-channel areas, causing sediment delivery to the stream, removal or disturbance of stream bank vegetation and disturbance of the stream substrate. Sediment input is not expected to exceed the streams transport ability and should not result in a change in substrate composition. The amount of bankside and riparian vegetation that would be removed or disturbed would be on a very limited scale.

If the screens should fail, non-hatchery fish may enter and hatchery fish may exit the facility. Unintentional releases of hatchery fish due to a lack of screening or screen failure are not anticipated. Any non-hatchery fish that enter the hatchery by screen failure in the flow distribution system would either be reared along with hatchery fish, returned to the stream or retained for broodstock.

Site disturbances may disrupt the behavior and distribution of individual fish adjacent to and downstream of the sites, but the overall biological impact to fall chinook and steelhead is expected to be low. The amount of habitat and number of fish affected by these changes would be small relative to the total habitat available. No significant change in abundance or trend in fish populations is expected. Cumulative impacts as a result of site disturbances at all facility sites are not anticipated. Impacts are expected to be localized and short-lived.

4) Instream Flow Impacts: Water requirements of the various hatchery facilities in relation to the amount of water available would have the greatest potential for adverse impacts at the Yoosa/Camp Creek, Newsome Creek and Mill Creek sites (see Table 4). These are smaller streams which could experience a reduction in flow in September of 34%, 24%, and 11%, respectively, for a distance of up to 300 m of stream. The amount

of habitat available, passage conditions, and food production would be negatively impacted in these reaches, particularly during September, when water needs are greatest in relation to overall stream flow. Larger systems, such as Lapwai Creek, the Selway, South Fork Clearwater, and lower mainstem Clearwater, would not be affected to any great extent since the amount of water withdrawn would be a small fraction of the total stream flow. Steelhead would be the species affected by this category; fall chinook are not expected to be effected because they dwell in the larger rivers.

Flow alterations caused by NPTH operations would not significantly affect the viability of the steelhead population. Because of the location and the relatively small area affected, fish are expected to move either upstream or downstream, and exist at fewer numbers within the impacted segment. Cumulative impacts as a result of water diversions at all facility sites are not expected to result in any change in status or trend of fish populations.

5) Water Quality: NPTH discharges of chemical and organic pollutants would meet or exceed federal and state water quality standards and guidelines, and would satisfy all permit requirements. Important physical properties and chemical constituents in hatchery effluent would be routinely monitored to assure compliance with water quality standards. Chemicals used to prevent or treat fish diseases would be handled, applied, and disposed of in accordance with state and federal regulations.

Hatchery practices would be conducted to minimize the amount of uneaten food and discharge of organic wastes into the natural environment. Adult fish carcasses would either be used for food, fertilizer, or disposed of at local landfills. Satellite ponds would be cleaned at the end of the rearing cycle and wastes would be disposed of at local landfills. Effluent from the Cherrylane facility would be routed through effluent ponds to settle, treat, and remove hatchery wastes before discharge. Once treated, effluent discharged from the settling ponds would rapidly dilute and disperse in the lower Clearwater River.

Water discharged from the Cherrylane and Sweetwater Springs facilities is expected to be somewhat cooler than the receiving stream, since air-cooled chillers would be used to maintain incubation and early rearing temperatures in the hatchery at below-ambient levels. Thermal changes would be negligible because rapid mixing of hatchery and stream or river water downstream of production facilities should minimize temperature-related impacts.

Any water quality changes resulting from the proposed facilities may disrupt the behavior and distribution of individual fish adjacent to and downstream of the sites, but the overall biological impact to fall chinook and steelhead is expected to be low. The amount of habitat and number of fish affected by these changes would be small relative to the total habitat available. No cumulative biological impacts to fisheries status or trend would result from the additive inputs of nutrients via facility discharges.

**Table 4 - Water Available and Water Needed**

Water Available										
Facility	Total Available			Groundwater			Surface Water			
	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	
Cherrylane (1)	59,474.70	15,714,085	35011	18.9	5,000	11.4	59,455.70	157,090.85	35,000	
Sweetwater Springs	3.4	900	2.1	3.4	900	2.1	0.00	0	0	
Luke's Gulch (1)	681.2	179,982	401	1.7	450	1	679.50	179,532	400	
Cedar Flats (1)	5,096.20	1,346,493	3000	0	0	0	5,096.20	1,346,493	3,000	
N. Lapwai Valley (2)	94.3	24,907	6	2.5	670	1.5	91.70	24,237	54	
Yoosa/Camp (3)	11.6	3,052	6.8	0	0	0	11.60	3,052	6.80	
Mill (3)	10.7	2,828	6.3	0	0	0	10.70	2,828	6.30	
Newsome (3)	9.5	2,513	5.6	0	0	0	9.50	2,513	5.60	
Water Needed										
Facility	Total Needed			Groundwater			Surface Water			% Surface Water Needed
	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	cubic meters/min	gpm	cfs	
Cherrylane	30.3	8,000	18	18.9	5,000	11.4	11.4	3,000	6.8	0%
Sweetwater Springs	3.4	900	2	3.4	900	2.1	0	0	0	0%
Luke's Gulch	7.9	2,100	5	1.7	450	1	6.2	1,650	3.8	1%
Cedar Flats	10.2	2,700	6	0	0	0	10.2	2,700	6.2	0%
N. Lapwai Valley	8.3	2,200	5	2.5	670	1.5	5.8	1,530	3.5	6%
Yoosa/Camp	3.8	1,000	2	0	0	0	3.8	1,000	2.3	34%
Mill	1.1	300	1	0	0	0	1.1	300	0.7	11%
Newsome (3)	2.3	600	1	0	0	0	2.3	600	1.4	24%
Surface Water Available References										
(1) - NPTH DEIS - Flow at greatest demand period for surface water by NPTH										
(2) - USGS Data - 1974-94										
(3) - Lowest flow measured over 5 years; 1990-95, NPT data.										

6) Fish Traps: Fish that emigrate from Lolo Creek and Meadow Creek would be collected by means of rotary screw traps and held in live boxes until sampled. Depending on the amount of flow, 5-70 percent of the fish passing the trap on any given day can be captured. The capture efficiency approaches 70 percent during the fall when water is at base flow, and is 5 percent or less during the spring when runoff occurs. The traps would be checked on a daily basis, unless a pulse of fish migration requires checking at more frequent intervals. The act of trapping, handling, weighing, measuring, and PIT tagging these fish would cause mortality. The Nez Perce Tribe has operated screw traps at these sites from 1994 through the present. During this time, total number of fish trapped was 50,124 and total number of mortalities was 369. No estimates of mortality were made after fish were released, but information from PIT tag studies shows an additional 2 percent might be expected to die shortly after release. Individual steelhead mortalities would occur as a result of fish trapping, but the viability of the populations are not expected to be jeopardized.

The traps operated on Lolo and Meadow Creek would add to cumulative impacts to steelhead that emigrate from these drainages. Traps are operated by other management agencies further down in the Clearwater, Snake, and Columbia River systems, in addition to those operated on the fish by-pass and transport systems at the mainstem dams. Repeated trapping and sampling of the same individual fish might increase the rate of mortality.

## B. Effects to Adults

### *a. Snake River sockeye salmon and Snake River spring chinook salmon*

Listed species do not spawn in the project area; NPTH activities are not expected to pose any effect.

### *b. Snake River fall chinook and Snake River steelhead*

1) Fish Ladders: Cherrylane, Luke's Gulch, and Cedar Flats facilities would be equipped with fish ladders so that managers may collect returning hatchery adults on an as-needed basis. No detrimental impacts are expected to be caused by the ladders themselves. However, listed fall chinook may commingle with hatchery spawners and ascend the fish ladder as part of a group. Depending on the mating protocols, they may be kept in the facility to be spawned, or released to the river. If kept in the hatchery, their progeny would be returned to the rivers with fish reared at NPTH facilities. The activities would not adversely affect fall chinook. No impact is expected to occur to Snake River steelhead.

2) Fish weirs: The operation of fish weirs may block, delay, or otherwise disrupt the movements and distribution of the late run of steelhead. They can also stress, injure, or



kill fish if improperly designed and operated. Steelhead are expected to have already spawned by the time the weirs begin operation (late May). However, in some years and streams, later running fish may still be in the systems. It is these later running fish that could be affected.

The proposed weirs would add to effects on the tail end of the steelhead run in the Clearwater Subbasin. Under existing conditions, weirs are operated on several streams in the Clearwater to conduct research and collect hatchery broodstock. These include Big Canyon Creek, Clear Creek, Crooked River, Red River, Walton Creek, Fish Creek, Running Creek, and historically, the upper Lochsa, and Brushy Fork Creek. The addition of at least eight weirs as proposed by this action, would cause impacts to be spread over a wider geographical range.

As mitigation, several items are required. Vigilant monitoring and cleaning of weirs would be a necessity. In addition, areas downstream of the weirs would be checked by snorkeling to determine if adults are holding up or spawning downstream. Handling protocols must be established for adults trapped. Downstream passage must be allowed using a downstream trap. Finally, corrective actions that favors the survival of naturally-spawning adults must be immediately applied should problems occur with the weirs.

3) Adult Holding and Spawning: The act of spawning fish in the hatchery entails risks that may affect Snake River fall chinook salmon populations. No effects are predicted for Snake River steelhead. Most hatcheries experience a pre-spawning mortality rate in the range of 10-15 percent of all adult fish captured. NPTH proposes to use higher flow rates in adult holding facilities than are commonly used by hatcheries in an effort to alleviate pre-spawning stress. Nonetheless, adult mortalities would occur. Unmarked strays (fall chinook) could experience the same mortality if they find their way into the facilities.

The potential impact to fall chinook population is not expected to affect viability of the species. Although individual adults could possibly die, overall abundance of the listed fall chinook is still expected to increase by the supplementation program. Straying of listed fish into NPTH facilities is not expected to be significant.

### 3. Disease

#### *a. Snake River sockeye salmon and Snake River spring chinook*

Listed sockeye salmon and spring chinook salmon do not occur in the Clearwater River; no effects are predicted.

#### *b. Snake River fall chinook salmon and Snake River steelhead*

Hatcheries may introduce diseases into the natural environment either by direct contact or through contaminated wastes. Free-living fish may be exposed to increased levels of pathogens and may contract diseases when they come in contact with pathogen-bearing

water. Some past releases of hatchery fish have introduced pathogens into the natural environment, leading to novel or additional health risks for wild fish (Hastein and Lindstad, 1991; Hindar, et al., 1991). However, the extent of disease transmission from hatchery to non-hatchery fish is believed to be low since the pathogens responsible are already present in both groups of fish, and environmental conditions generally do not favor outbreaks of disease in the wild.

NPTH managers would guard against the transmission of disease from hatchery to wild fish by screening broodstock for disease, by controlling the incidence of disease in the hatchery, and by ensuring that fish slated for release into the natural environment have met strict fish health quality standards. Common diseases such as bacterial kidney disease would be routinely monitored in hatchery and wild populations. Other diseases would be monitored on an ad hoc basis. Disease control and monitoring practices would conform with standards developed by the Nez Perce Tribe Fish Health Policy and the Integrated Hatchery Operations Team (IHOT, 1995). Fish rearing practices, waste removal, and prophylactic treatment of disease outbreaks within the hatchery would help maintain acceptable pathogen levels. Even if disease were to be transmitted, the overall impact would probably be negligible since wild fish are widely dispersed and tend to be disease-resistant. Consequently, the impact of transmitting diseases from hatchery to fall chinook and steelhead is considered low. No cumulative effects are anticipated.

#### 4. Competition

##### *a. Snake River sockeye salmon and Snake River spring chinook*

Listed sockeye salmon and spring chinook salmon do not occur in the Clearwater River; no effects are predicted.

##### *b. Snake River fall chinook salmon*

Fall chinook releases are not expected to interact much with their wild living counterparts in the rearing habitat or the migratory corridor. Fall chinook salmon in the Clearwater River emerge from the gravel from mid-April through June and are an average 75-80 mm long by July (Arnsberg and Statler, 1995) and typically move past Lower Granite Dam in late July and August. NPTH fall chinook would be released with a demonstrated propensity to smolt in June at a size of approximately 90 mm. Because they are expected to migrate downstream upon release, and are not in the same size category as the wild fish, NPTH fall chinook are not expected to compete for the same resources as the wild fish.

An increase in competition between natural fall chinook juveniles would occur should the supplementation program prove successful. But detrimental competition, resulting from overwhelming the carrying capacity of the river, is not expected for over 20 years.

*c. Snake River steelhead*

Spring chinook parr and pre-smolt releases have the greatest potential to compete with coexisting steelhead. This is because all streams proposed for outplanting chinook currently support steelhead. Parr would interact with steelhead from time of release in June, through the summer, fall, winter and during the spring outmigration. Presmolts would interact with steelhead through the fall, winter and during the spring outmigration. Interactions would occur in the stream of release and in the mainstem river.

Competition involving chinook and young steelhead could be expected to have detrimental effects if stream resources (food and space) were limited. However, the stocking rates proposed are controlled to keep densities at levels that match the existing habitat quality of the receiving stream. Habitat quality and quantity were explicitly considered in establishing production and stocking goals for spring chinook because this stock would have the longest period of freshwater cohabitation with other salmonids. Each targeted stream would be outplanted with a number of hatchery chinook which, when added to the wild fish chinook, would be equal to 70-100 percent of the carrying capacity for that species.

The carrying capacity was determined by the values generated as part of the Subbasin Planning efforts of the NPPC (Nez Perce Tribe and Idaho Department of Fish and Game, 1990). Densities of salmon and steelhead smolts were determined for different streams in the subbasin according to their habitat quality. Undisturbed lower gradient streams (Rosgen "C" type channels) were designated as supporting the highest numbers of chinook, whereas undisturbed moderate gradient (Rosgen "B" type channels) supported the highest numbers of steelhead. Parr densities for steelhead and chinook salmon were used for NPTH in place of smolt densities to estimate carrying capacity. The parr carrying capacities used empirically derived fish densities (Rich et al., 1993) and the Subbasin Plan's habitat quality and quantity calculations for each of the NPTH treatment and control streams. The densities were not derived from lab studies which excluded other species. Because these values were empirically derived, it is assumed that the densities for the different habitat qualities reflected conditions of competition between the two coexisting groups of fish. By keeping stocking rates within these carrying capacities, the habitat productivity for either species would not be overwhelmed.

Inherent difference in size will limit competitive interactions of the two species. Everest and Chapman (1972) note that steelhead in two Idaho study streams emerge in June while chinook emerge in March. Because of the difference in emergence timing, the age 0 chinook are typically larger than the age 0 steelhead, and do not compete for the same resources. Concerted efforts would be taken in NPTH to release spring chinook at sizes that mimic those of their naturally raised counterparts.

Furthermore, research has shown that juvenile chinook and steelhead occupy areas with different depths and velocities, thus limiting their direct competition for food or space.

Everest and Chapman (1972) found that most age 0 steelhead occupied low velocity, shallow depths over rubble substrate. Age 0 chinook occupied deeper, low velocity areas with silt substrate. Older steelhead resided in the deepest, swiftest water over large rubble substrates. Segregation by habitat preference would result in limiting competitive interactions.

## 5. Predation

### *a. Snake River sockeye salmon, spring chinook salmon, fall chinook salmon and steelhead*

NPTH chinook would fill the dual role of predator and prey in freshwater and marine ecosystems. This section considers program-related impacts separately for prey and predator species.

1) NPTH Chinook as Predators: Chinook released by NPTH are unlikely to cause detrimental effects to other fish species by acting as predators. Hatchery chinook would be released at times that favor the development of natural diets and feeding habits. They would establish feeding stations and prey on a variety of primarily invertebrate drift species. They are not expected to eat other fish until they attain a larger size (120 mm or so). For spring chinook, the gradual transformation to a fish-eating diet begins with their seaward migration as yearling smolts. Fall chinook begin their emigration at a smaller size, and thus do not begin to eat other fish until they have entered the ocean.

Chinook smolts actively feed during their downstream migration through the Snake and Columbia rivers. Their diets are dominated by local invertebrate species such as cladocerans, chironomids, and amphipods (Muir and Emmett, 1988). Although larger smolts may consume smaller fish, including other salmon, recent evidence suggests that fish comprise an insignificant fraction of the food consumed by migrating chinook salmon in the Snake and Columbia rivers (Muir and Coley, 1995).

The effects of NPTH chinook on predator-prey dynamics in the Columbia River estuary and ocean cannot be accurately predicted since little is known of the role of chinook in the ecology of these systems. NPTH chinook would prey on other species of fish in these areas but a change in status or trend of other species as a result of their predation is not expected.

Overall, the potential impact of predation by NPTH fish on Snake River sockeye, fall chinook, spring chinook and steelhead are not expected to be detrimental. They are not expected to consume many fish while in the freshwater and the effects of their predation on other fish in ocean is expected to be negligible. Cumulative effects are not anticipated.

2) NPTH Chinook as Prey: Somewhat greater impacts are expected to derive from NPTH chinook as prey. Chinook would be released from NPTH facilities at sizes and

under conditions that initially make them susceptible to predation. Populations of predator species such as bull trout, larger cutthroat, and northern squawfish should benefit from initial outplanting and an increase in run sizes due to supplementation.

Further downstream, large concentrations of hatchery fish may adversely affect listed species of fish by stimulating predation by bird and fish predators at dams and river mouths. Shifts in predator type and abundance due in part to increased hatchery production have led to higher predation mortalities among wild juveniles during migration (Li, et al., 1987). The presence of hatchery fish may also affect the behavior of non-hatchery fish, increasing their vulnerability to predators in the process. If hatchery fish enable predator populations to expand in size, if they alter behavior patterns of non-hatchery fish, or if they physically displace or induce non-hatchery fish to use suboptimal habitats, then those fish populations may experience higher predation mortality.

On the other hand, hatchery fish would buffer non-hatchery fish from predation. Recently released hatchery fish often exhibit inappropriate competitive and foraging behaviors, and lack familiarity with their new surroundings, which may divert attention away from wild fish. The long-term increased forage base provided by supplemented runs could also buffer other prey populations. Therefore, the numerical abundance of hatchery fish, including those from NPTH, might stimulate and increase predator populations, but they would also be the principal prey for the predators.

## 6. Residualism

### *a. Snake River sockeye salmon, spring chinook salmon, fall chinook salmon and steelhead*

Chinook are not expected to residualize as do steelhead. No effects are expected on any listed fish.

## 7. Migration corridor/ocean

### *a. Snake River sockeye salmon, spring chinook salmon, fall chinook salmon and steelhead*

Potential effects in the migration corridor and ocean are addressed above in IV. 1.

## 8. Genetic introgression

### *a. Snake River sockeye salmon and Snake River steelhead*

No genetic effects are expected to occur to Snake River sockeye salmon or Snake River steelhead as a result of the proposed action.

### *b. Snake River fall chinook salmon*

Detrimental impacts are not anticipated as a result of broodstock maintenance. In Phase I, NPTH fall chinook eggs would come directly from Lyons Ferry. Because this hatchery is an egg bank for Snake River fall chinook, it is assumed that their practices are adequate to minimize most hatchery related genetic risks. In Phase II, it is expected that most NPTH fall chinook broodstock would come from hatchery adults returns to Cherrylane or the satellites. IHOT recommendations would be followed to safeguard unintentional genetic effects. The risks of losing genetic diversity and increasing domestication selection might be further alleviated by incorporating wild fish into the broodstock for NPTH (see section on Adult Collection in Final EIS). This would be investigated in the future.

No impacts are anticipated as a result of spawning in the wild. NPTH fish would be derived from the same ESU as those currently spawning in the Clearwater and Snake rivers.

*Early Run Fall Chinook:* Fall chinook returns to the Clearwater would have to be actively manipulated to encourage an earlier spawning fish upstream of Cherrylane. The result would be an expansion of the phenotypic characteristics and geographic distribution of the Snake River fall chinook salmon. An early spawning fish would lengthen the typical spawning period exhibited by the stock. The early run would have the same genotype as the ESU, and so interbreeding between the two groups of fish (early run and typical run) would not result in a loss of variability. Other fish (spring/summer chinook) elsewhere in the Snake River Basin also exhibit distinctions in run time and distribution, yet still maintain the same genetic structure. Therefore, predicted changes in the species as a result of the NPTH are not expected to be detrimental.

*c. Snake River spring chinook:*

NPTH fish can possibly exert impacts on listed spring chinook if they stray into their spawning streams and interbreed with the listed fish. However, NPTH operations were designed to minimize gene flow (straying) into neighboring populations by having the outplanted fish spend a greater acclimation period in their return stream than do most hatchery fish. In addition, when returns begin, the locally adapted populations would be used as a source of broodstock. This should create greater homing fidelity than would otherwise be expected (McIssac and Quinn, 1988). Viability of listed spring chinook is not expected to be jeopardized through genetic interactions with NPTH spring chinook.

## V. SUMMARY AND CONCLUSIONS

Based on our qualitative analysis, BPA has concluded that the operation of the Nez Perce Tribal Hatchery is not likely to adversely affect listed Snake River sockeye salmon, Snake River spring/summer chinook salmon, Snake River fall chinook salmon or their critical habitat. This conclusion is based on the following items.

1. Density dependent effects are not expected to be adverse because:
  - a. Spring chinook proposed for release are within the production cap recommended by NMFS. The cap was made for hatchery production from 1994. In that year, the Nez Perce Tribe raised approximately 500,000 chinook for outplanting. An additional 500,000 chinook were secured by the Nez Perce Tribe and reared by Idaho Department of Fish and Game at Clearwater Hatchery for the tribal outplanting.
  - b. Propagation fall chinook by NPTH is intended to promote recovery of natural Snake River fall chinook salmon. Therefore, this could be considered "production to support recovery" and should be exempt from the production ceiling.
2. The proposed facility is located outside of the critical habitat for Snake River sockeye salmon and Snake River spring/summer chinook salmon. Therefore, it is not likely to adversely affect these species as a result of competition, hatchery operations, disease transmission, or operation of adult capture facilities.
3. The proposed action is not likely to adversely affect listed Snake River fall chinook as a result of hatchery operations, disease transmission, or operation of adult capture facilities.
4. Competition attributed to an increase in the natural production of juveniles is expected to occur in the future, but due to the current low seeding rate, would not affect the fall chinook population for many years to come.
5. NPTH fish are not expected to prey on listed fish. Their numbers, in combination with all hatchery fish, are expected to result in a balance of effect for predation by other species on listed fish.
6. NPTH fish are not expected to residualize.
7. Potential effects on listed spring/summer chinook by straying NPTH fish would be minimized by extended acclimation, NATURE's rearing techniques, volitional release, and 100 percent marking of juveniles. No effects of genetic introgression are expected to occur by release of fall chinook because they are the same ESU as the listed fish.

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# **Appendix C**

**Guidelines for Hatchery:Natural Ratios**  
**Selway River Genetic Resource Assessment, April 1995**  
**Pages 69-74**

## **GUIDELINES FOR HATCHERY: NATURAL RATIOS**

The original NPTH Master Plan called for the ratio of hatchery to natural fish, both in the hatchery and in the wild, to not exceed 50:50. This guideline was intended to counterbalance the genetic risks of (1) losing genetic identity (adaptive fitness) through outbreeding in the natural population, (2) losing genetic diversity through inbreeding in the natural population, and (3) losing genetic diversity and identity in the hatchery population through domestication. The 50:50 guideline provides a conservative means for containing these risks; however, the guideline also limits the use of supplementation as a tool to combat the risk of extinction. Application of the 50:50 rule limits the growth in numbers of hatchery fish in both the hatchery and the natural environment.

The effect of the 50:50 rule on the rate of increase of hatchery and natural populations is determined by production capacity and survival in the hatchery and natural environments. If the production capacity of the natural habitat, in terms of returning adults, is equal to or less than the adult production capacity of the hatchery, strict adherence to the 50:50 guideline will prevent supplementation from assisting population growth. This is because the limiting factor will always be the availability of naturally produced fish, and any natural fish taken into the hatchery can only be replaced 1-for-1 with hatchery fish in the wild. However, if the natural production capacity exceeds that of the hatchery, then hatchery fish in excess of half the hatchery capacity can be allowed to spawn naturally at a greater than 1-for-1 replacement of naturally produced fish taken into the hatchery. Regardless of the relative production capacities of the hatchery and natural environments, the survival rate of naturally produced fish, expressed as recruits per spawner, will determine how quickly the supplemented population grows.

Spawner escapement of chinook salmon in the Snake River Basin decreased sharply between 1970 and 1980, and has remained at a depressed level. Thus, not only

is natural production low, but the number of recruited spawners per parent spawner has generally been one or less. Under these conditions, strict application of the 50:50 guideline to chinook supplementation in the Snake River Basin would render supplementation useless. This also means that, under the 50:50 guideline, supplementation could not be used to reduce the risk of extinction, even though supplementation may be the best tool to avert extinction. This paradox made it apparent that the 50:50 guideline, while valuable for healthy populations, was not appropriate for protecting genetic resources in a depressed population threatened with extirpation. Therefore, we developed an additional set of guidelines designed to allow for population growth while containing genetic risks, in situations where the population is depressed and natural recruitment rate is near or below the replacement level.

The effective number of breeders is less than 100 and probably less than 25 for most populations to be supplemented by NPTH. This small number of breeders will result in the eventual loss of genetic variability through inbreeding. Thus, supplementation with an adapted genetically robust stock will offer the benefit of increasing the effective population size and avoiding loss or deleterious combinations of rare alleles. Because natural spawning escapements are presently very low in the target populations, an escapement guideline is needed in the near term that will enable expansion of supplementation to the full production level as quickly as possible. I recommend a set of guidelines that is tiered to the number of returning natural spawners, such that, at lower levels of return, proportionately greater numbers of hatchery fish are allowed to spawn naturally, so as to minimize the risk of extinction.

The challenge in supplementing a depressed population is how to allocate enough naturalized fish to natural and hatchery populations to simultaneously enable recovery and avoid unwanted genetic impacts. Therefore, the guidelines we developed specify the minimum proportion of natural (N) fish, both in the hatchery and in the wild. We

recommend four tiers of guidelines, corresponding to four levels of abundance of natural spawners (Table 8). Inherent in these guidelines are the assumptions that the hatchery environment is likely to favor domestic traits among hatchery fish, but that natural selection will work to eliminate domestic traits when hatchery fish spawn naturally. Accordingly, a higher percentage of naturally produced spawners are needed among spawnings in the hatchery than in the wild.

Table 8. Summary of guidelines for natural:hatchery (N:H) ratios in the hatchery and in the wild. Guidelines change as the abundance of natural returns changes to compensate for increasing risk of extinction at low population sizes. These guidelines apply when the founding stock for the hatchery is not the indigenous stock.

Natural Returns	Brood for Hatchery	Fertilization Procedure	Spawners for Wild
>brood fish goal for hatchery	at least 50%N	random, NxH	at least 33%N
<brood fish goal for hatchery, but >25 pairs	at least 33%N	random, NxH to extent possible	at least 25%N, 12N pair minimum
Between 12 to 24 pairs	keep all N males, male ratio = 1N:3H females equivalent to H+N males	Split-cross N males each to 2 H females	release all N females, female ratio = 1N 3H H males equivalent to H+N females
<12 pairs	Keep all fish + capacity H fish Spawn and rear N and H separately Smolt release for N+ captive brood	Matrix for N Random for H	100%H up to spawning habitat capacity

At the first and most desirable level, the number of natural fish returning would exceed the total number of fish needed to achieve the egg-take goal for the hatchery. In this situation, there would be adequate returns to use natural fish for 50% of hatchery broodstock, and to allow enough escapement of naturally produced fish to maintain 33% natural returns among fish spawning naturally. In the hatchery, natural fish would be crossed with hatchery fish, in order to limit domestication selection. Consideration should

be given to increasing the 33% guideline for naturally produced fish among spawners in the wild up to 50% after the first two generations, contingent on findings from the Monitoring and Evaluation Program.

The second level would include natural returns between 25 pairs and an equivalent of the brood fish goal for the hatchery. In this situation, there would not be sufficient natural spawners to use 50% natural spawners for full hatchery production, without taking more than 33% of the natural run into the hatchery. In this case, the required proportion of natural spawners used for hatchery broodstock would decrease to a minimum of 33%, and 25% would be required in the escapement to the wild. The stipulation that natural fish compose at least 33% of spawners is subjective (as is the 50% guideline) and reflects a strategy to protect against extinction by relaxing the controls on domestication selection. Progeny of naturally spawning hatchery fish (which carry half their genes from naturalized parents) would be exposed to the full gamut of natural selection in a single life cycle. Because of this steep natural selection gradient, the risk of passing on domesticated traits is less in the wild than it is in the hatchery.

Additionally at level two, the minimum number of natural fish left to spawn in the wild would be 12 pairs. This 12 pair rule is set to minimize the rate of loss of rare alleles to inbreeding. Simulations completed by Waples (1990) indicate that less than 10% of the rare alleles in a population would be lost over a 25 year period with only 24 breeders per generation (12 pairs)(see Figure 19). Thus, the number of breeders could be constrained to 25 fish for several generations before substantial losses of genetic variability would occur. We believe this is a wise risk to accept, given the benefits that can be realized by using naturalized fish as donor stock for the hatchery program. If the hatchery program functions as expected, the number of naturalized spawners should be back to and exceed the number required for hatchery broodstock within one or two generations. It should be noted that the use of 12 pairs per year, given an average generation time of 4 years, is

equivalent to 48 pairs per generation. We expect that the number of effective breeders per generation would be less than 48, because of prespawning mortality and unequal contribution between spawners.

The third tier of guidelines applies when natural returns are between 12 and 24 pairs. In this case, even the 12 pair rule for natural spawners in the wild limits the number of natural returns available for hatchery broodstock. To overcome this shortage, we recommend that all natural males be spawned in the hatchery, while all natural females be released to spawn naturally. The ratio of N:H would be relaxed to 1N:3H in both the hatchery and the wild. Each natural male would be spawned with two hatchery females. The procedure would be to fertilize eggs using the sperm from a natural male, followed by a second exposure to the sperm of a hatchery male. This would result in two females being fertilized by each natural male. The follow-up use of sperm from a hatchery male would protect against the occurrence of a nonfertile natural male. I recognize that mitochondrial DNA is maternally inherited and so would not be passed to hatchery fish by natural males. However, I view this as a small risk to the population viability.

The final tier is triggered when less than 12 natural pairs return to the racks. In this case, the risk of extinction is high, and all natural spawners should be taken into the hatchery. In order to preserve genetic identity and variability of the natural population, natural fish would be spawned with each other in a split-cross matrix design, and the progeny would be reared to the smolt stage for release (this would maximize survival to maturity in the wild). Additionally, a random sample of the progeny should be retained in captivity and reared to maturity to assure that the population would continue. Hatchery fish would be used to complete the egg take goal for the hatchery; their progeny would be cultured as usual. Because no natural fish would be released to spawn naturally, hatchery fish would be allowed to fill the spawning capacity of the stream. Given that survival of naturally produced fish has been so low as to push them to the verge of extinction, it is



unlikely that allowing hatchery fish to fill the spawning habitat to capacity will produce returns in the next cycle that are greater than those achieved by the natural fish reared and released as smolts from the hatchery. If this final tier were applied, the procedures for setting H:N ratios upon their return would differ from those outlined here, because the returning hatchery fish would be the only source of spawners with natural parents. Such a situation should be worked out by a panel of experts, once the specific details of the situation are known.

# **Appendix D**

## **Monitoring and Evaluation Plan Executive Summary**

## EXECUTIVE SUMMARY

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The Nez Perce Tribe has proposed to build and operate the Nez Perce Tribal Hatchery (NPTH) in the Clearwater River subbasin of Idaho for the purpose of restoring self-sustaining populations of spring, summer, and fall chinook salmon to their native habitats. The project comprises a combination of incubation and rearing facilities, satellite rearing facilities, juvenile and adult collection sites, and associated production and harvest management activities. As currently conceived, the NPTH program will produce approximately 768,000 spring chinook parr, 800,000 summer chinook fry, and 2,000,000 fall chinook fry on an annual basis. Hatchery fish would be spawned, reared, and released under conditions that promote wild-type characteristics, minimize genetic changes in both hatchery and wild chinook populations, and minimize undesirable ecological interactions. The primary objective is to enable hatchery-produced fish to return to reproduce naturally in the streams in which they are released.

These and other characteristics of the project are described in further detail in the Nez Perce Tribal Hatchery Master Plan (Larson and Moberg 1992), the 1995 Supplement to the Master Plan (Johnson et al. 1995), and the Nez Perce Tribal Hatchery Program Environmental Impact Statement (Bonneville Power Administration et al. 1996). The report in hand is referred to in project literature as the NPTH Monitoring and Evaluation (M&E) Plan.

This report describes monitoring and evaluation activities that will help NPTH managers determine whether they were successful in restoring chinook salmon populations and avoiding adverse ecological impacts. Program success will be gauged primarily by changes in the abundance and distribution of supplemented chinook populations. The evaluation of project-related impacts will focus on the biological effects of constructing and operating NPTH hatchery facilities, introducing hatchery fish into the natural environment, and removing or displacing wild fish, including targeted chinook, non-targeted chinook, and resident species.

The M&E Plan is also meant to support the capability of the Tribe to detect and report on changes in the environment and non-Tribal management activities that might affect the outcome of the hatchery program. Several information-gathering strategies are proposed that will provide meaningful and cost-effective assessment of environmental events and non-project management activities that might affect project status and impacts. NPTH managers can use this information to make informed decisions and resolve potential conflicts.

Monitoring needs, procedures, and products are discussed as they relate to salmon supplementation theory, to NPTH goals and objectives, and to assumptions that are critical to the program's planning and success. The validity of many of these assumptions is uncertain or depends on factors that are beyond the control of program managers. Uncertainty implies an element of risk since making an erroneous assumption may lead to undesirable consequences. Project-related assumptions were carefully evaluated to expose any conceptual inconsistencies or weaknesses in the project, to quantify the risk inherent in project-related assumptions, and to identify ways in which undesirable consequences could be avoided or minimized. Risk was quantified by explicitly considering our level of understanding of the assumption or process in question, the probability that the assumption or predicted outcome is or will be correct, the likely consequences of being incorrect, and whether the risk may be avoided or reduced using available technologies and resources. Three individuals who are familiar with the project and associated resources participated in the risk assessment process.

Information needs identified through the risk assessment process enabled us to identify and prioritize monitoring and evaluation activities, which in turn formed the basis for the conceptual M&E Plan. Monitoring and evaluation will target information that can be used to reduce or eliminate the uncertainty associated with high risk assumptions, so that undesirable ecological or economic impacts can be avoided. If the evidence indicates an assumption is invalid or entails unacceptably high risk, either the assumption or the NPTH program will need to be revised.

Project assumptions were organized hierarchically by category, subcategory, and performance criterion. We were primarily concerned with assumptions relating to "ecological" impacts, which we grouped into three categories: Stock Status, Biological Interactions, and Natural Environment. Stock Status refers to targeted chinook populations; i.e., hatchery and wild components of the supplemented population. This category comprises genetic, life history, and population viability subcategories. Monitoring and evaluation activities associated with these subcategories would be primarily directed at detecting genetic and life history differences between wild and hatchery fish, and changes in population characteristics over time.

Many of the biological processes that can be expected to affect stock status will be investigated under the Ecological Interactions category. However, this category not only includes intraspecific interactions, which involve competition, reproduction, and disease transmission between targeted hatchery and wild chinook populations, but also interspecific interactions, which involve competition, predation, and pathogen interactions between targeted chinook and other species of fish and wildlife.

The third category of interest was the Natural Environment. Some of the assumptions grouped into this category were concerned with the effect of the

program on the overall health of the natural system, as indexed by its biological diversity and the status of threatened and endangered species. However, in addition to assumptions that address project impacts, this category comprises several assumptions regarding natural processes and human activities that might affect project success or moderate its impact on the environment. Included in this category are natural factors and human influences that could potentially limit the survival and abundance of wild and hatchery fish. We distinguish between factors affecting the production potential of the system, such as streamflow, water quality, and habitat carrying capacity, and "extrinsic factors", defined as environmental disturbances or management decisions that could potentially affect chinook stock status and project viability over the long-term. Examples include natural disturbances such as fire, the presence of federally protected species, hydrosystem operations, and other human activities.

In summary, the M&E Plan will not only facilitate assessment of the performance of hatchery fish, it will also enable NPTH managers to determine the effects of the project on wild fish and other aquatic biota, provide information on the capacity of the natural environment to assimilate and support chinook salmon, and give early warning of changes in environmental quality and management policy that may affect the project's success.

The characteristics of the environment that make good indicators of project status and impact are referred to as performance criteria. Performance criteria include biological characteristics such as population abundance and interspecific competition, as well as non-biological attributes such as streamflow and water quality. For each performance criterion, one or more performance variables were selected to provide readily measurable indices of change. For example, to measure changes in chinook population abundance, we recommended that returning adults be enumerated at stream weirs or, in the case of summer and fall chinook, that redd counts be used as an index of spawning escapement. Chinook parr densities, smolt counts, and harvest were also selected as performance variables for the population abundance criterion (Stock Status category, Population Viability subcategory). Taken together, these variables provide reliable indicators of change in the size and distribution of chinook populations expected under the NPTH program.

The actual parameters to be monitored to measure progress toward meeting program goals, to assess project impacts, and to detect background changes in the environment are called performance variables. They were selected on the basis of their scientific validity, ease and cost of measurement, and relevance to project objectives and critical uncertainties. A total of 83 performance variables were selected. For each variable, we describe why it was selected, how and when it is to be measured, the units (fish, sites, streams, etc.) to be sampled, and the analytical procedures to be applied to the data. We also indicate where opportunities may exist for integrating NPTH

monitoring and evaluation activities with ongoing federal and state monitoring programs.

Once performance variables had been identified, tasks and subtasks were defined to describe the activities and flow of information required to measure those variables during pre- and post-implementation sampling periods. Flow diagrams were used to depict the relation between tasks and subtasks and the amount of work required to fully implement the M&E program. The adequacy and prioritization of monitoring and evaluation activities should be periodically reassessed as data and new information becomes available.

Monitoring and evaluation activities may be classified as pre-operational (i.e., baseline) or post-operational depending on whether they occur before or after supplementation begins. An important goal of baseline sampling will be to identify and quantify key characteristics of the streams, habitats, and populations to be supplemented. This information will be used to refine hatchery/natural production goals. Once supplementation begins, M&E will be used to discriminate project from non-project effects and to evaluate alternative management options. Post-operational monitoring will enable managers to determine whether the abundance of naturally produced chinook salmon has increased in response to supplementation, whether ecological impacts are within acceptable limits, and whether the potential exists for additional supplementation and harvest.

A large-scale field experiment will be conducted to determine whether supplementation has led to significant increases in spring chinook populations. The experimental design requires that five pairs of treatment (supplemented) and control (unsupplemented) streams be repetitively sampled before and after the hatchery begins operation. The response variable of interest is the number of spring chinook spawners counted each year at adult collection weirs located near the mouths of the treatment and control streams. Pre-operation sampling will establish baseline conditions and the relationship between treatment and control streams prior to supplementation. Data collected on populations before project startup will be compared to relationships observed during the post-implementation period. An effect due to supplementation will be considered positive if the proportional abundance of chinook salmon in treatment and control streams increases between pre- and post-implementation periods. A time series of eight to ten years is required to allow unambiguous interpretation of the results.

Inferences regarding the success of fall and summer chinook supplementation will be more tenuous than those of spring chinook due to the lack of opportunity for spatial replication and the difficulty of obtaining accurate estimates of abundance. Rather than count returning fall and summer chinook adults, we propose to evaluate performance on the basis of trends in the peak redd counts obtained annually for these

species throughout the Clearwater drainage. A steady increase in summer and fall chinook escapement will be taken as evidence for supplementation success.

Potential effects of supplementation on wild chinook salmon and other aquatic biota will be evaluated through observational and correlational data collected under the M&E Plan. Information of this type does not always give a clear picture of cause-and-effect relationships. However, observational and correlational data can provide greater understanding of the processes and conditions that influence the observed response, and they can suggest testable hypotheses about project effects.

The final chapter of this report provides guidelines by which the Tribe can prioritize implementation of monitoring and evaluation activities. The full suite of tasks and subtasks identified through the risk assessment and performance variable selection procedures constitute the conceptual M&E Plan. By sampling all 83 performance variables, managers would obtain the scientific information and feedback necessary to fully assess the ecological benefits and costs of the NPTH program, and to measure progress toward project goals. However, the resources required to fully implement the M&E Plan will probably exceed those available to the Nez Perce Tribe. Anticipating that the Tribe will need to scale back the M&E program to include fewer performance variables and activities than are identified in the conceptual plan, an effort was made to prioritize performance variables according to their relative importance and cost. Once ranked, the variables were divided into three groups corresponding to minimal, partial, and full levels (Levels I, II, and III, respectively) of implementation.

Level I implementation would include monitoring of 27 performance variables considered essential to evaluating project effectiveness and impacts. We assigned highest priority to performance variables associated with the Population Abundance and Survival performance criteria. Also targeted are indicators that facilitate evaluation of stream carrying capacities, the status of genetic resources, impacts on resident fishes, and the potential effects of non-project management activities.

Level II implementation would include monitoring of 60 performance variables, including those identified for Level I. Monitoring at this level will provide a much stronger scientific and empirical basis for evaluating NPTH success and impacts than would Level I implementation. Level II implementation would substantially reduce the cost and effort (relative to full implementation) of monitoring and evaluation without sacrificing significant amounts of information.

Level III implementation would include the entire 83 performance variables identified in the conceptual M&E Plan. Measurement of these variables would provide the greatest assurance that high-risk critical uncertainties will be addressed within an ecosystem management framework.

The prioritization schemes and cost-reducing strategies recommended in the final chapter of this report are meant to assist NPTH managers in developing annual and multi-year M&E implementation plans. If funding levels or available information do not justify full implementation of the conceptual M&E Plan, we recommend sampling the broadest spectrum of performance variables possible to diminish the chance of overlooking or misinterpreting project effects. The challenge will be to strike a balance between intensively monitoring a few key variables so that specific objectives can be evaluated, and monitoring many variables to be able to detect unanticipated impacts.



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## ACKNOWLEDGEMENTS

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This work was completed by Cleveland R. Steward (Steward Consulting, P.O. Box 206, Bothell, WA 98041-0206) under subcontract to the Nez Perce Tribe. Funding was provided by the Bonneville Power Administration.

# **Appendix E**

## **U.S. Fish and Wildlife Letters Listing Threatened and Endangered Species**



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Idaho State Office, Ecological Services  
4696 Overland Road, Room 576  
Boise, Idaho 83705

March 8, 1995

Leslie Kelleher  
Department of Energy  
Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208-3621

Subject: Request For Species List-Funding Nez Perce Tribal  
Hatchery Salmon Supplementation Project Within  
Clearwater Subbasin  
(File #501.1100 and 913.0212)  
(Species List #1-4-95-SP-122)

Dear Ms. Kelleher:

The U.S. Fish and Wildlife Service (Service) is providing you with a list of endangered, threatened, candidate, and/or proposed species which may be present in the Clearwater Subbasin Salmon Supplement Project area. You requested this species list in a letter dated February 3, 1995, received by this office on February 8, 1995. This list fulfills requirements under Section 7(c) of the Endangered Species Act of 1973 (Act), as amended. The requirements for Federal agency compliance under the Act are outlined in Enclosure 2. If the project is not started within 180 days of this letter, regulations require that you request an updated list. Please refer to the number shown on the list (Enclosure 1) in all correspondence and reports.

Section 7 of the Act requires Federal agencies to assure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. If a listed species appears on Enclosure 1, agencies are required to prepare a Biological Assessment. It would be prudent for you to consult informally with the Service in development of any Biological Assessment. If you determine that a listed species is likely to be affected adversely by the proposed project, the Act requires that you request formal Section 7 consultation through this office. If a proposed species is likely to be jeopardized by a Federal action, regulations require a conference between the Federal agency and the Service.

Candidate species that appear on Enclosure 1 have no protection under the Act, but are included for your early planning

consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on proposed and/or candidate species that may occur in the project area. It may be necessary for you to conduct surveys of the project area to determine the presence or absence and status of candidate species. If it is likely the project will adversely affect a candidate species, we recommend you consult informally with this office.

If you have any questions regarding Federal consultation responsibilities under the Act, please contact Bob Kibler of this office at 208/334-1931. For your information on future Idaho projects, our office in Boise is your contact for any activities on watersheds which drain to the Snake River system. Thank you for your continued interest in the Endangered Species Act.

Sincerely,

*Susan B. Martin*

*for* Charles H. Lobdell  
State Supervisor - Ecological Services

Enclosures

cc: IDFG, Region II, Lewiston

LISTED AND PROPOSED ENDANGERED AND THREATENED  
SPECIES, AND CANDIDATE SPECIES, THAT MAY OCCUR  
WITHIN THE NEZ PERCE TRIBAL HATCHERY SALMON  
SUPPLEMENTAL PROJECT AREA  
FWS-1-4-95-SP-122

LISTED SPECIES

COMMENTS

Bald Eagle (LE)  
(Haliaeetus leucocephalus)

Wintering Areas

Sockeye Salmon (LE)  
(Oncorhynchus nerka)

Chinook Salmon (LE)  
(Oncorhynchus tshawytscha)

Gray Wolf (LE)  
(Canis lupus)

Many Probable  
Sightings  
Experimental/  
Nonessential  
Population

PROPOSED SPECIES

None

None

CANDIDATE SPECIES

Bull Trout (C1)  
(Salvelinus confluentus)

Jessica's Aster (C1)  
(Aster jessicae)

Broad-Fruit Mariposa (C1)  
(Calochortus nitidus)

Northern Goshawk (C2)  
(Accipiter gentilis)

Nesting Territories

Long-Legged Myotis (C2)  
(Myotis volans)

Confirmed Sightings

Wolverine (C2) ( <u>Gulo gulo luscus</u> )	Probable and Confirmed Sightings
Lynx (C2) ( <u>Lynx lynx</u> )	Probable and Confirmed Sightings Confirmed Trapped Specimen
Mission Creek Oregonian (C2) ( <u>Cryptomastix magnidentata</u> )	
Columbia Pebblesnail (C2) ( <u>Fluminicola columbiana</u> )	
Payson's Milkvetch (C2) ( <u>Astragalus paysonii</u> )	
Clustered Lady's-Slipper (C2) ( <u>Cypripedium fasciculatum</u> )	
Idaho Douglasia (C2) ( <u>Douglasia idahoensis</u> )	
Palouse Goldenweed (C2) ( <u>Haplopappus liatrifomis</u> )	
Hazel's Prickly Phlox (C2) ( <u>Leptodactylon pungens ssp. hazeliae</u> )	
Spalding's Silene (C2) ( <u>Silene spaldingii</u> )	

Candidate species and historic eyries for peregrine falcons that appear on Attachment A have no protection under the Endangered Species Act, but are included for early planning consideration.

C1 = Category 1 Taxa for which the U.S. Fish and Wildlife Service currently has substantial information on hand to support the biological appropriateness of proposing to list as endangered or threatened. Proposed rules have not been issued, but development and publication of such rules are anticipated.

C2 = Category 2 Taxa for which information now in possession of the U.S. Fish and Wildlife Service indicates that proposing to list as endangered or threatened is possibly appropriate, but for which conclusive data on biological vulnerability and threat are not currently available to support proposed rules. Further biological research and field study may be needed to ascertain the status of taxa in this category.

FEDERAL AGENCIES' RESPONSIBILITY UNDER SECTIONS 7(a) AND (c)  
OF THE ENDANGERED SPECIES ACT

SECTION 7(a) - Consultation/Conference

Requires: 1) Federal agencies to utilize their authorities to carry out programs to conserve endangered and threatened species;

2) Consultation with FWS when a Federal action may affect a listed endangered or threatened species to insure that any action authorized, funded or carried out by a Federal agency is not likely to jeopardize the continued existence of listed species; or result in destruction or adverse modification of critical habitat. The process is initiated by the Federal agency after determining the action may affect a listed species; and

3) Conference with FWS when a Federal action is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat.

SECTION 7(c) - Biological Assessment for Major Construction Activities <sup>1/</sup>

Requires Federal agencies or their designees to prepare Biological Assessment (BA) for major construction activities. The BA analyzes the effects of the action<sup>2/</sup> on listed and proposed species. The process begins with a Federal agency in requesting from FWS a list of proposed and listed threatened and endangered species (list attached). If the BA is not initiated within 90 days of receipt of the species list, the accuracy of the species list should be informally verified with our Service. The BA should be completed within 180 days after its initiation (or within such a time period as is mutually agreeable). No irreversible commitment of resources is to be made during the BA process which would foreclose reasonable and prudent alternatives to protect endangered species. Planning, design, and administrative actions may be taken; however, no construction may begin.

We recommend the following for inclusion in the BA; an onsite inspection of the area to be affected by the proposal which may include a detailed survey of the area to determine if the species are present; a review of literature and scientific data to determine species' distribution, habitat needs, and other biological requirements; interviews with experts, including those within FWS, State conservation departments, universities and others who may have data not yet published in scientific literature; an analysis of the effects of the proposal on the species in terms of individuals and populations, including consideration of cumulative effects of the proposal on the species and its habitat; an analysis of alternative actions considered. The BA should document the results, including a discussion of study methods used, any problems encountered, and other relevant information. The BA should conclude whether or not a listed or proposed species will be affected. Upon completion, the BA should be forwarded to our office.

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1' A major construction activity is a construction project (or other undertaking having similar physical impacts) which is a major action significantly affecting the quality of human environment as referred to in the NEPA (42 U.S.C. 4332 (2)(c)).

2' "Effects of the action" refers to 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.





# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Snake River Basin Office, Columbia River Basin Ecoregion  
1387 South Vinnell Way, Room 368  
Boise, Idaho 83709

May 21, 1997

Leslie Kelleher  
Department of Energy  
Bonneville Power Administration  
P.O. Box 3621  
Portland, Oregon 97208-3621

Subject: Nez Perce Tribal Hatchery Species List Update  
SP #1-4-97-SP-168/Updates SP #1-4-95-SP-122 File #501.1100

Dear Ms. Kelleher:

The U.S. Fish and Wildlife Service (Service) is writing to provide you with an updated list of threatened, endangered, candidate, and proposed species which may occur on the Nez Perce Tribal Hatchery project. You requested the update in a letter to our office on March 31, 1997. There are additions and changes to the previous list. Please note that the bald eagle has been downlisted to threatened, the grizzly bear listed as threatened was not on the previous list, the chinook salmon are listed as threatened not endangered as noted on our previous list, steelhead are proposed threatened in the Clearwater subbasin, and water howellia, a plant species; is listed as threatened. This letter officially updates species list number SP #1-4-95-SP-122 of March 8, 1995 and provides you with a new number 1-4-97-SP-168. You should refer to the new number in subsequent correspondence and documents.

Information concerning Federal agency obligations under the Endangered Species Act have been provided to you in the past. If you would like us to send you any of this information again or if you have questions, please contact Alison Beck Haas of my staff at (208) 378-5384.

Thank you for your continued interest in endangered species conservation.

Sincerely,

*Susan B. Martin*  
Acting Supervisor, Snake River Basin Office

LISTED AND PROPOSED ENDANGERED AND THREATENED  
SPECIES, AND CANDIDATE SPECIES, THAT MAY OCCUR  
WITHIN THE AREA OF THE NEZ PERCE TRIBAL HATCHERY PROJECT  
FWS-1-4-97-SP-168

LISTED SPECIESCOMMENTSMammals

Gray wolf (LE: XN)  
(*Canis lupus*)

Experimental/  
Non-essential population

Grizzly bear (LT)  
(*Ursus arctos horribilis*)

Birds

Bald eagle (LT)  
(*Haliaeetus leucocephalus*)

Wintering areas

Fish

Sockeye salmon \*\* (LE)  
(*Oncorhynchus nerka*)

Chinook salmon \*\* (LT)  
(*Oncorhynchus tshawytscha*)

Plants

Water howellia (LT)  
(*Howellia aquatilis*)

PROPOSED SPECIESFish

Steelhead \*\* (PT)  
(*Oncorhynchus mykiss*)

CANDIDATE SPECIESFish

Bull trout (C)  
(*Salvelinus confluentus*)

The Fish and Wildlife Service has concerns about the following plants and animals. Although these species have no status under the Endangered Species Act, we are concerned about their population status and threats to their long-term viability.

## Mammals

Wolverine  
(*Gulo gulo luscus*)

Lynx  
(*Lynx canadensis*)

Fisher  
(*Martes pennanti*)

Long-legged myotis (bat)  
(*Myotis volans*)

Townsend big eared bat  
(*Corynorhinus townsendii*)

Fringed myotis (bat)  
(*Myotis thysanodes*)

Long-eared myotis (bat)  
(*Myotis evotis*)

Pygmy shrew  
(*Sorex hoyi*)

## Birds

Northern goshawk  
(*Accipiter gentilis*)

Western pipistrelle  
(*Pipistrellus hesperus*)

Mountain quail  
(*Oreortyx pictus*)

Long-billed curlew  
(*Numenius americanus*)

Yellow-billed cuckoo  
(*Coccyzus americanus*)

Flammulated owl  
(*Otus flammeolus*)

Northern pygmy-owl  
(*Glaucidium gnoma*)

Great gray owl  
(*Strix nebulosa*)

Boreal owl  
(*Aegolius funereus*)

White-headed woodpecker  
(*Picoides albolarvatus*)

Three-toed woodpecker  
(*Picoides tridactylus*)

Pygmy nuthatch  
(*Sitta pygmaea*)

#### Fish

Westslope cutthroat trout  
(*Oncorhynchus clarki lewisi*)

#### Invertebrates

Mission Creek Oregonian  
(*Cryptomastix magnidentata*)

Columbia pebblesnail  
(*Flumincola columbiana*)

#### Amphibians and Reptiles

Ringneck snake  
(*Diadophis punctatus*)

Coeur d'Alene salamander  
(*Plethodon idahoensis*)

#### Plants

Jessica's aster  
(*Aster jessicae*)

Broad-fruit mariposa  
(*Calochortus nitidus*)

Palouse goldenweed  
(*Haplopappus liariformis*)

Clustered lady's slipper  
(*Cypripedium fasciculatum*)

Payson's milkvetch  
(*Astragalus paysonii*)

Idaho douglasia  
(*Douglasia idahoensis*)

Hazel's prickly phlox  
(*Leptodactylon pungens* ssp. *hazeliae*)

Spalding's silene  
(*Silene spaldingii*)

## GENERAL COMMENTS

C- *Candidate*. Taxa for which the U.S. Fish and Wildlife Service has on file sufficient information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened species. Proposed rules have not yet been issued because this action is precluded by other listing activity. Development and publication of rules for these taxa are anticipated. The Service encourages State and other Federal agencies as well as other affected parties to give consideration to these taxa in environmental planning.

\*\* Under National Marine Fisheries jurisdiction.

# **Appendix F**

## **Decision Tree from the Supplement to the Nez Perce Tribal Hatchery Master Plan**

A Decision Tree was developed to guide management response in years of varying broodstock and hatchery production. Guidelines for outplanting spring chinook are presented in a flow chart. Assuming that supplementation is in progress, hatchery production is assigned first to experimental streams, then to Meadow Creek (Selway), and finally to surplus streams. Treatment streams will be outplanted in all years, each stream will receive a constant proportion of fish. In normal and surplus production years, Meadow Creek will be supplemented after the experimental streams have been outplanted. Seeding levels will be capped at 100% of the estimated stream carrying capacity, taking natural fry or parr densities into account. One or more non-experimental streams may be outplanted in years of superabundance.

Mainstem rearing habitat for fall chinook is not believed to be limiting for a smolting fish, so surplus production will be allocated proportionally to all release sites.



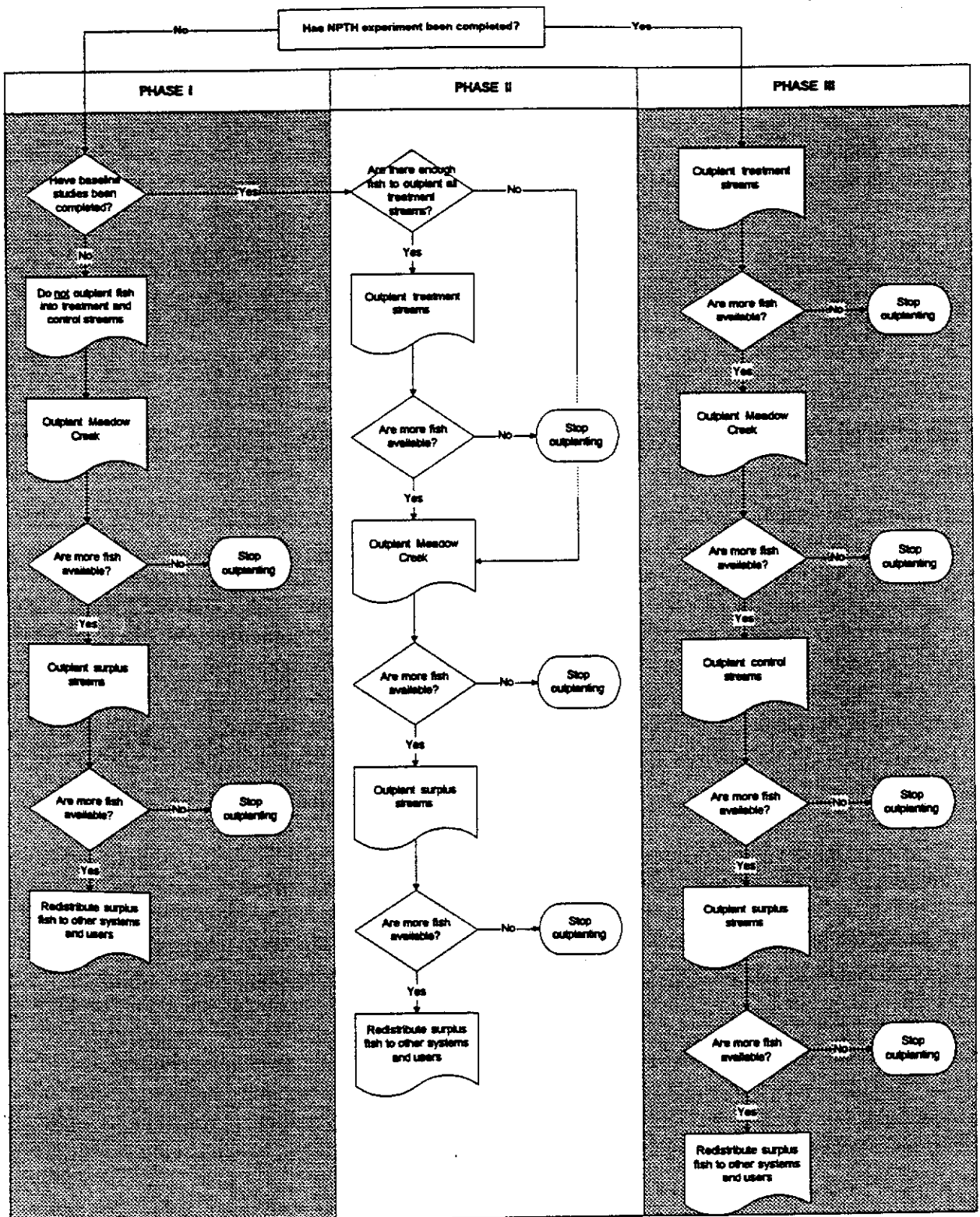


Figure 2. Decision tree for outplanting NPTH-reared spring chinook in the Clearwater River subbasin.