

# **Klickitat Complex - Fall Chinook**

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**HATCHERY AND GENETIC MANAGEMENT PLAN**  
**(HGMP)**

***Final DRAFT***

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Hatchery Program	Klickitat Complex - Fall Chinook
Species or Hatchery Stock	Chinook Salmon ( <i>Oncorhynchus tshawytscha</i> )
Agency/Operator	Yakama Nation
Watershed and Region	Klickitat Subbasin/Columbia Gorge Province
Date Submitted	May 2011
Date Last Updated	May 2011

## Section 1: General Program Description

### 1.1 Name of hatchery or program.

Klickitat Fall Chinook – Mid-Columbia Bright

### 1.2 Species and population (or stock) under propagation, and ESA status.

Mid-Columbia Bright Fall Chinook Salmon (*Oncorhynchus tshawytscha*)

ESA Status: Not listed and not a candidate for listing

### 1.3 Responsible organization and individuals.

Name (and title):	Jason Rau (Complex Manager)
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
Washington Dept. Fish & Wildlife (WDFW)	Fish Hatchery Specialist 1
United States Fish and Wildlife Service (USFWS)	Health Technician and Pathologist

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

Funding Sources
Currently Mitchell Act. Other funding sources may include John Day Mitigation or BPA

Operational Information	Number
Full time equivalent staff	1 FTE, 4-5 seasonal
Annual operating cost (dollars)	\$275,000 (NPCC Step-1 estimate)

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

<i>Broodstock source</i>	Klickitat River Fall Chinook
<i>Broodstock collection location (stream, Rkm, subbasin)</i>	Lyle Falls (Klickitat River Rkm 3.5), Klickitat River Hatchery (Rkm 68), Wahkiacus (Rkm 27)
<i>Adult holding location (stream, Rkm, subbasin)</i>	Klickitat River Hatchery (Rkm 68), Wahkiacus (Rkm 27)
<i>Spawning location (stream, Rkm, subbasin)</i>	Klickitat River Hatchery (Rkm 68), Wahkiacus (Rkm 27)
<i>Incubation location (facility name, stream, Rkm, subbasin)</i>	Klickitat River Hatchery (Rkm 68), Wahkiacus (Rkm 27)
<i>Rearing location (facility name, stream, Rkm, subbasin)</i>	Klickitat River Hatchery/Rkm 68. and Wahkiacus Hatchery (Rkm 27)

### 1.6 Type of program.

Segregated Harvest

No conservation goal has been established for Klickitat fall Chinook because this race of Chinook is not native to the Subbasin. There are no plans to establish a viable, naturally reproducing population of fall Chinook in the Subbasin in the foreseeable future. The goal is to establish a locally adapted, segregated hatchery population designed to provide fish for harvest. The program will support Tribal and non-tribal fisheries mandated by federal court orders and treaties. The objective is production of 18,000 fall Chinook for harvest in all fisheries, with the majority occurring in Tribal fisheries in Zone 6 and the Klickitat River.

The YN considered five options for managing Klickitat River fall Chinook.

1. Maintain existing program
2. Transition to fully integrated hatchery program
3. Eliminate hatchery production
4. Restore the natural fall Chinook spawning habitat eliminated by the construction of The Dalles and John Day dams
5. Convert existing program to local broodstock

Option 5, which relies on local broodstock, best meets the goals identified by YN and WDFW, the co-managers, for fall Chinook. This option may pose risks to native spring Chinook; therefore, the primary objective is to select habitat, hatchery, and harvest measures that reduce these risks while still allowing the Yakima/Klickitat Fisheries Project (YKFP) to meet the fall Chinook harvest objective.

The hatchery strategy involves implementation of a segregated harvest program

that uses fall Chinook returning to the Klickitat River as its broodstock. This will be accomplished through: 1) elimination of eyed-egg transfers from Little White Salmon NFH , 2) development of locally adapted broodstock, 3) construction of the Wahkiacus Hatchery, 4) marking all juvenile fall Chinook, and 5) releasing 4 million fall Chinook subyearlings at 50 to 80 fish per pound annually.

### **1.7 Purpose (Goal) of program.**

The goal is to establish a locally adapted, segregated hatchery population designed to provide fish for harvest. The harvest will support Tribal and non-tribal fisheries mandated by federal court orders and treaties. The objective is production of 18,000 fall Chinook for harvest in all fisheries, with the majority occurring in Tribal fisheries in Zone 6 and the Klickitat River.

### **1.8 Justification for the program.**

The program will be operated to provide fish for tribal and sport harvest while minimizing adverse affects on listed fish (steelhead and bull trout). Fall Chinook releases in the Klickitat River have long been a part of *U.S. v. Oregon* management agreements (see 2008-2017 *U.S. v. Oregon* Management Agreement) and are part of efforts to move Mitchell Act production to upriver areas where production losses occurred.

### **1.9 List of program "Performance Standards".**

See section 1.10 below.

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

### 1.10.1 Benefits:

Performance Standard	Benefits	
	Performance Indicator	Monitoring & Evaluation
Provide Fish to Meet Columbia River fish Mgt. Plan ( <i>US v Oregon</i> ), production and harvest objectives.	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Objective is to provide 18,000 adult fish for harvest.	Contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock needs
Smolt-to-adult survival (SAR)	SAR Value of 1%	SAR will be determined by counting tagged fish recovered at traps, broodstock collection facilities, sport and tribal fisheries and on the spawning grounds.
Straying of Klickitat River origin fish to other subbasins	Stray rate of less than 5%	Regional M&E efforts will be used to track the number and capture location of Klickitat River origin fish
Use of local origin fall Chinook for broodstock	Broodstock consists of 95% Klickitat origin fall Chinook.	Real-time DNA samples will be collected from all Chinook captured for this program.
Maintain outreach to enhance public understanding, participation and support of YKFP hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off- station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program.  Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments.	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity	2,500 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return	Annual run timing, age and sex composition and return timing data are collected.
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery-origin fish	16.5% of all fish released will be ad-clipped and coded-wire-tagged (cwt). Blank coded-wire tags may be used to identify fish for broodstock. 100% will be adipose-clipped.	Returning fish are sampled throughout their return for length, sex, and mark
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (WDFW and NWIFC 1998).	a. Necropsies of fish to assess health, nutritional status, and culture conditions	USFWS Fish Health Pathologist inspect adult broodstock yearly for pathogens at <b>Little White Salmon NFH</b> and Klickitat Hatcheries and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, USFWS Fish Health Pathologist recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as necessary  A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	b. Release and/or transfer exams for pathogens and parasites.	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers' Fish Health Policy

	c. Inspection of adult broodstock for pathogens and parasites.	At spawning, lots of 60 adult broodstock are examined for pathogens
	d. Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy (WDFW and NWIFC 1998)

**1.10.2 Risks:**

Risks		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (50-80 fish/lb) and released volitionally from the hatchery at a time that fosters rapid migration downstream. Also, 16.5 % of all fish released will be marked and CWT tagged to identify them from naturally produced fish and monitor straying. All fish will be adipose-clipped.	Monitor size, number, date of release and CWT mark quality.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers' Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from USFWS Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance  YN water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and in-stream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	YN completes an HGMP and is issued a federal and state permit when applicable.	
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

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

The program will collect 2,500 adults returning to the Klickitat River (1:1 Male to Female).

**1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.**

Age Class	Max. No. (Million)	Size (fpp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Fingerling	2.0	50.0 - 80.0	June/July	Klickitat	RKm 27	Klickitat	Columbia Gorge



Fingerling	2.0	50.0 - 80.0	June/July	Klickitat	RKm 68	Klickitat	Columbia Gorge
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**1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.**

Recent conversion from Priest Rapids Hatchery to Little White Salmon NFH (2007) do not present enough years of information so the following information from historic Priest Rapids egg source is presented. This information will be updated for this section in the future.

Smolt-to-adult survival rates for URB from Priest Rapids Hatchery fall Chinook have been estimated to range from 0.29 % to 2.44 % (smolt-to-adult overall survival estimates for brood years 1983-87 from IHOT 1995). In comparison, from 1995 – 1999, SARs for Klickitat URB have averaged 0.34% and ranged from a low of .009% in 1995 to a high 0.73% in 1999 (RMIS Database).

Converting to local broodstock is expected to result in an average SAR of 1% which is closer to that observed for Priest Rapids Hatchery. This hatchery uses local origin fall Chinook as its brood source.

Priest Rapids Hatchery survival data can be found at:

(<http://www.cbr.washington.edu/cgi-bin/cwtSAR/cwtSAR.pl?action= default&hatch=PRIEST%20RAPIDS%20HATCHERY&species=1&run=3> )

The average annual harvest of fall Chinook from Klickitat River releases in combined ocean, Columbia River, and Klickitat River fisheries is estimated to exceed 19,000 fish. Sport and Tribal fall Chinook fisheries in the Klickitat River take, on average, about 3,600 fish each year.

Harvest rates on aggregate Upper River Bright fall Chinook stocks (including Klickitat River fall Chinook) in ocean and lower Columbia River fisheries range from 40% to 60% (NOAA 2000). Klickitat River terminal harvest rates of URB fall Chinook averaged 35 to 40% from 1986 to 2005.

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

The Klickitat Hatchery was completed in 1951 and fall Chinook production efforts have been on-going since that time. Beginning in 1986, Klickitat Hatchery production switched from the earlier tule stock to an upriver bright (URB) fall Chinook from Priest Rapids. In 2007, converted URB egg source from Priest Rapids Hatchery to Little White Salmon NFH.

**1.14 Expected duration of program.**

On-going program. A Memorandum of Understanding (MOU) was signed on December 30, 2005 detailing the transfer of ownership and operational

responsibility of the Klickitat Hatchery and the Lyle Falls and Castile Falls fishways from the WDFW to the YN. Overall goal is to maintain the Klickitat fall Chinook program at current levels for harvest augmentation for the future

### **1.15 Watersheds targeted by program.**

The Klickitat River Subbasin and the mainstem Columbia River (harvest)

### **1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being addressed.**

A list of the alternative approaches considered for the program is presented below. More detailed discussions to why each alternative was rejected can be found in the revised Klickitat River Anadromous Fisheries Master Plan (Yakama Nation 2008 *in draft*).

**Alternative 1- Maintain Existing Program:** Eliminated due to: 1) imports fish from outside of the basin which increases disease risk, and 2) competition effects on spring Chinook.

**Alternative 2- Transition to Fully Integrated Hatchery Program:** Program requires the establishment of naturally reproducing population above Lyle Falls. Since fall Chinook were not historically present in this area, their presence may result in negative impacts to native spring Chinook.

**Alternative 3- Eliminate Hatchery Production:** Alternative did not meet the harvest goals identified in the *U.S. v. Oregon* 2008-17 Columbia River Fishery Management Plan. .

**Alternative 4- Restore the Natural Fall Chinook Spawning Habitat** Eliminated by the Construction of The Dalles and John Day Dams: Primarily eliminated due to political infeasibility.

#### **1.16.3) Potential Reforms and Investments**

**Reform/Investment 1:** Upgrade of adult collection facilities at Lyle Falls.

**Reform/Investment 2:** Construction of the Wahkiacus Hatchery and Acclimation Facility.

**Reform/Investment 3:** Addition of staff, equipment, and supplies needed to implement program.

**Reform/Investment 4:** Release of fall Chinook lower in the Subbasin to reduce competition with listed fish species.

**Reform/Investment 5:** Use Klickitat River-origin adult returns as broodstock.

## **Section 2: Program Effects on ESA-Listed Salmonid Populations**

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

Program is described in the Biological Assessment For The Operation Of Hatcheries Funded by The National Marine Fisheries Service (March 1999), Statewide Section 6 consultation with USFWS for interactions with Bull Trout, and concurrent with this HGMP, to satisfy Section 7 consultations the YN is writing HGMPs to cover all stock/programs in the Klickitat River including fall Chinook, spring Chinook, steelhead, and coho released from Klickitat Hatchery.

This document is intended to be consistent with NOAA (2008) which states (RPA 39):

The FCRPS Action Agencies will continue funding hatcheries in accordance with existing programs... Consultation under the ESA on the operation of hatchery programs funded by the FCRPS Action Agencies [will] include the submittal of updated and complete HGMPs. Updated and complete HGMPs are to be submitted to NOAA Fisheries and ESA consultation should be initiated by ... July 2009 for hatchery programs in the Middle Columbia ... ESA consultations should be completed by January 2010 for hatchery programs in the Middle Columbia ...

Project sponsors are also aware of direction in NOAA (2009) calling “for consultations on hatchery programs within the MCR Steelhead DPS to be completed by January 2010”. Project sponsors remind NOAA of its statement in this document that “mitigation obligations will not be diminished under this process”. The Yakama Nation considers this project essential to meeting federal commitments to honor the Treaty of 1855, and to “protect, rebuild, and enhance” anadromous salmon populations throughout tribal usual and accustomed fishing areas as described in the 2008-2017 United States v. Oregon Management Agreement and in the Columbia River Fish Accords. As such, any changes to program parameters which would diminish the number of adult salmon returning to tribal usual and accustomed fishing areas that result from this HGMP development and consultation process will not be implemented unless and until they are considered and approved in appropriate policy fora.

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NOAA. 2008. Consultation Title: Remand of 2004 Biological Opinion on the Federal Columbia River Power System (FCRPS) including 19 Bureau of Reclamation Projects in the Columbia Basin (Revised pursuant to court order, NWF v. NMFS, Civ. No. CV 01-640-RE (D. Oregon). Tracking Number: 2005/05883. [https://pcts.nmfs.noaa.gov/pls/pcts-pub/pcts\\_upload.summary\\_list\\_biop?p\\_id=27149](https://pcts.nmfs.noaa.gov/pls/pcts-pub/pcts_upload.summary_list_biop?p_id=27149)

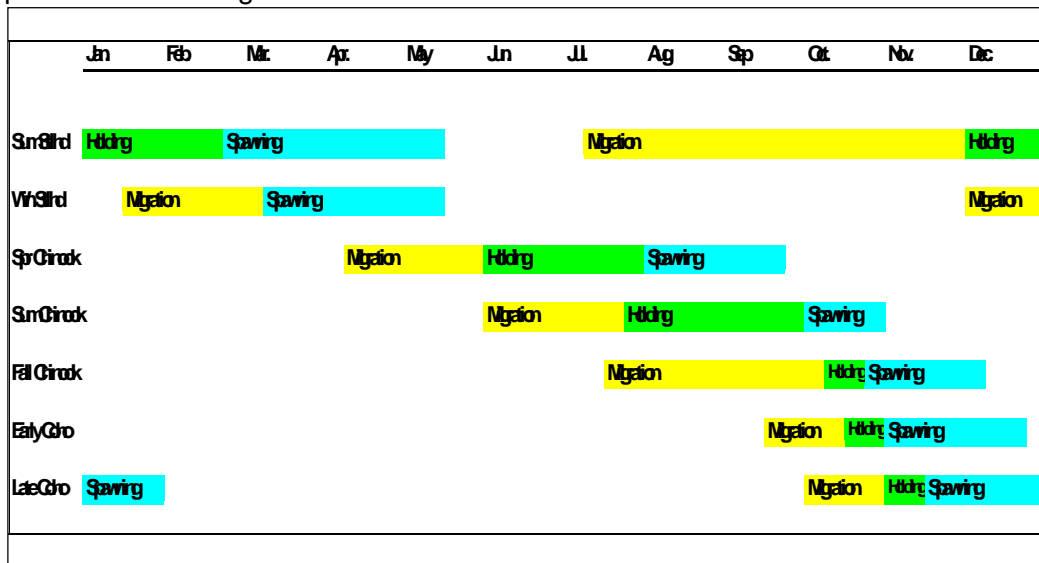
NOAA. 2009. Letter from Rob Jones, Chief, Salmon Recovery Division, National Marine Fisheries Service, Portland Oregon to “Interested Parties”, dated March 5, 2009. NMFS, Portland Office, 1201 NE Lloyd Blvd, Suite 100, Portland, Oregon.

## 2.2 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

ESA listed stock	Status	Take Level	Action
Summer Steelhead-Natural	Threatened	Minor	Broodstock collection/trapping at Lyle Falls
Winter Steelhead-Natural	Threatened	Minor	Broodstock collection/trapping at Lyle Falls
Bull Trout – Natural	Threatened	Minor	Broodstock collection/trapping at Lyle Falls

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

Adult and juvenile run-timing for listed steelhead and other fish species are presented in the figure below.



The majority of the steelhead population is found from the mouth of the Klickitat River to Castile Falls. Steelhead access to areas above Castile Falls has been limited due to poor natural migration conditions at the falls. Passage has been improved at Castile Falls and steelhead abundance above this point is expected to increase. Currently, steelhead spawning is concentrated between Rkm 8 and 80. Tributary spawning occurs in Swale, Swift, Summit and White Creeks, the lower Little Klickitat River and other small tributaries.

Juvenile rearing occurs in the mainstem and major tributaries. Peak smolt migration occurs in April and May; however, juvenile steelhead have been captured in traps located at Lyle Falls in all months.

Based on limited data, it is thought that an adfluvial population of bull trout may be present in the lower Klickitat River below Lyle Falls. Work is on-going to determine bull trout abundance and distribution in the lower river. No bull trout have been captured in any juvenile or adult trapping facility.

Maps depicting steelhead and bull trout distribution in the Klickitat River are presented in Appendix A.

**Identify the ESA-listed population(s) that will be directly affected by the program**

No NMFS ESA listed fish populations will be directly affected by this program. This broodstock was not considered part of the ESU by WDFW and USFWS and was not essential for recovery. This stock originates from populations not considered to be part of the Lower Columbia River Chinook salmon ESU.

**Identify the ESA-listed population(s) that may be incidentally affected by the program**

Middle Columbia River Steelhead March 19, 1998; 64 FR 14508; updated January 5, 2006, 71 FR 834. Threatened  
Columbia Basin DPS Bull Trout June 10, 1998 (63 FR 31647), Threatened.

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

**Middle Columbia River Steelhead (*Oncorhynchus mykiss*) March 19, 1998; 64 FR 14508; updated January 5, 2006, 71 FR 834 Threatened.**

The ICTRT (2007) has identified Klickitat River steelhead as an independent population belonging to the Mid-Columbia ESU. The Middle Columbia steelhead ESU was listed as threatened under the ESA on March 25, 1999 (64 FR 14517) and reaffirmed January 5, 2006; (71 FR 834). The Klickitat steelhead population includes both summer-run and winter-run steelhead (Yakima Nation 2008).

Temporal and spatial spawning segregation between the Klickitat steelhead summer and winter runs has not been clearly defined. Genetic analysis of juveniles and adults is expected to provide additional information about the spatial and temporal distribution of both steelhead races.

Past genetic analysis on steelhead have shown some degree of genetic differentiation between tributaries to the Klickitat River; genetic samples from the upper Klickitat, White Creek, and Trout Creek seem to diverge most widely from the Skamania Hatchery stock (Marshall unpubl.). Recent genetic analysis indicates there may be six to seven genetically distinct populations of naturally reproducing steelhead in this river system. The results also suggest the genetic integrity and variation of native Klickitat River steelhead have been maintained despite repeated hatchery introduction and that the potential is high for restoring the population's viability (Narum et al. 2006).

No solid historical data exist on the size and productivity of the Klickitat summer steelhead run. Based on NOAA Fisheries historical intrinsic potential analysis, the ICTRT considers the Klickitat River population to be an "intermediate" sized

population that can support a minimum of 1,000 spawners (ICTRT 2007).

The escapement of naturally spawning (summer and winter, hatchery and wild combined) steelhead in the Klickitat River from 1987 to present has been estimated at approximately 700 fish (see below). However, this estimate is based on redd count data which is believed to be an underestimate because of difficulties associated with conducting accurate counts during spring flow conditions (NPCC 2004). YN biologists hypothesize that the actual mean escapement is closer to 900-1000 spawners annually.

Additionally, from the early 1960s to 2005, Castile Falls likely blocked all steelhead from stream habitat located upstream of the falls. By 2005, upstream fish passage conditions at Castile Falls were improved to allow steelhead access to this portion of the Subbasin. Habitat modeling work indicates that adult steelhead production potential above the falls may be as high as 750 adults (Yakima Nation 2008, Appendix C). If the production potential estimate is accurate, total steelhead production in the Klickitat River Subbasin could increase to over 2,000 fish in the near future.

Based on population parameters developed for the area mainly below Castile Falls, the ICTRT rated Klickitat steelhead as having only a moderate risk in regards to the key population parameters of abundance/productivity and spatial structure/diversity. Thus, the population does not meet ICTRT criteria for a viable population, although it does meet criteria for a "Maintained" population (ICTRT 2007).

Recent mark-recapture evaluations using hatchery and natural origin summer steelhead trapped and tagged at Lyle Falls estimates natural origin returns to the lower Klickitat River to average about 1500 fish from 2005-2009 (Gray 2007 and Zendt 2010).

**Columbia Basin DPS Bull Trout (*Salvelinus confluentus*) June 10, 1998 (63 FR 31647), Threatened.**

The Fish and Wildlife Service issued a final rule listing the Columbia River and Klamath River populations of bull trout (*Salvelinus confluentus*) as a threatened species under the Endangered Species Act on June 10, 1998 (63 FR 31647). The Columbia River Distinct Population Segment is threatened by habitat degradation and fragmentation, blockage of migratory corridors, poor water quality, and past fisheries management practices such as the introduction of non-native species.

The Lower Columbia Recovery Unit Team identified two core areas (Lewis and Klickitat rivers) within the recovery unit. The Klickitat Core Area includes all tributaries downstream to the confluence with the Columbia River. Recent evidence indicates both resident and adfluvial bull trout are present in the Subbasin. There are numerous confirmed and anecdotal reports of bull trout in the mainstem Klickitat River from the mouth up to the area below Castile Falls. Sizes reported are indicative of an adfluvial life history. Presence of resident populations has also been documented in the West Fork Klickitat River, Fish Lake Stream, Little Muddy Creek, Trappers Creek, Clearwater Creek, Two Lakes Stream, and an unnamed tributary to Fish Lake Stream (all within the

West Fork Klickitat watershed).

The abundance of the stock in the Klickitat River is poorly known and there are insufficient data to make an assessment. However, it appears that there are very few bull trout in the lower- to mid-Klickitat drainage. Bull trout appear to be more abundant in the upper drainage where habitat conditions are more favorable.

Preliminary results of recent genetic analysis indicate that resident bull trout in the Klickitat Subbasin are genetically distinct from other Columbia tributary populations, but that fish in two West Fork Klickitat tributaries (Trappers and Clearwater creeks) do not differ significantly from each other.

The impacts of hatchery salmon and steelhead in the main Klickitat River on bull trout are unknown. Generally, in drainages colonized by anadromous salmon and steelhead, char successfully co-exist by occupying a different ecological niche. However, negative interactions such as predation may occur when hatchery fish are released near char spawning and rearing areas.

### **2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.**

The following activities may lead to a take of listed species.

*Broodstock Collection:* Broodstock will be collected for this program at Lyle Falls, Klickitat Hatchery and Wahkiacus Hatchery from July through November. No ESA-listed fish mortalities (steelhead or bull trout) have been observed at the Klickitat River Hatchery for the past nine years. The operation of the new adult collection facilities at Lyle Falls and Wahkiacus Hatchery may result in some ESA- listed steelhead being handled because the collection facilities will be operated during time of the year when steelhead may be migrating to spawning grounds. However, as noted, the data collected at the Klickitat River Hatchery have shown that mortality is unlikely. Also, the facilities will be designed to meet NMFS passage and handling criteria which should minimize stress and associated mortality rates on fish. It is assumed that no more than 25 ESA-listed steelhead will be handled at broodstock collection facilities.

*Water diversion:* Water is diverted at times from the Klickitat River for Klickitat Hatchery operations. This diversion affects approximately 0.25 miles of stream habitat. The loss in habitat may result in a decrease in steelhead and bull trout abundance, although this has not been quantified, it is expected to be negligible. In addition, NOAA (2008) ([http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish\\_passage\\_design.pdf](http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish_passage_design.pdf)) has identified design and alternatives needed to bring existing structures in compliance with NOAA fish screening standards. YN has requested funding for future scoping, design, and construction work of a new intake system.

The new Wahkiacus Hatchery will divert approximately 24 cfs of water from the Klickitat River for rearing both fall Chinook and coho. The diversion structure will be screened to meet NMFS standards. The 24 cfs equates to approximately 1%

of total river flow in May, the peak usage month. The diverted water will decrease streamflow in less than 0.25 miles of riverine habitat.

*Water Quality:* Both the Klickitat and Wahkiacus hatcheries will operate under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Discharges from the cleaning treatment system are monitored as follows:

*Total Suspended Solids (TSS):* Collected 1 to 2 times per month on composite effluent, maximum effluent, and influent samples.

*Settleable Solids (SS):* Collected 1 to 2 times per week on effluent and influent samples.

*In-hatchery Water Temperature* - Daily maximum and minimum readings. Water quality monitoring is not expected to result in the take of listed species.

*Genetic introgression:* Straying of fall Chinook from this program to other subbasins could result in genetic introgression with listed Chinook stocks, e.g. Snake River fall Chinook. Indirect take from straying is unknown.

*Disease:* Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, advances in rearing densities, disease prevention, and fish health monitoring have greatly improved the health of the programs at Klickitat River Hatchery. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995) have been instrumental in reducing disease outbreaks. Fish are planted and transferred after a fish health specialist has determined population health. Indirect take from disease is unknown.

### **Release Program**

*Competition and Predation:* According to the HSRG (2005) and Flagg et al. (2000) the potential for predation of wild salmonids by hatchery-reared smolts will depend on the size, number, and spatial distribution of both predators and prey, the functional and numerical responses of the predators, and the amount of time that predators and prey are in proximity. Busack et al. (2005) reviewed published rates of predation by juvenile hatchery fall Chinook on wild juvenile Chinook and found predation rates were generally low (<2% of natural population consumed). In contrast, data collected on hatchery coho predation rates on wild fall Chinook juveniles in the Lewis River were quite high (>11%) (Hawkins and Tipping 1999). The variability in study results is one reason the HSRG (2005) suggests that hatcheries monitor predation impacts resulting from hatchery releases.

In general, hatchery fish can consume fish that are 50% of their body length, however studies reviewed by Busack et al. (2005) indicated that the range may extend from approximately 38% (steelhead) to 75% (coho). NOAA Fisheries and



the USFWS in a number of biological assessments and opinions were of the opinion that juvenile salmonids can consume prey up to 33% of their body length (USFWS 1994; NMFS 1999). Predation by hatchery fish on wild fish can occur anywhere the two stocks exist in space and time. Therefore, predation may not only be a concern in the stream environment, but also in the estuary and marine environments.

The site-specific nature of predation and the limited number of empirical studies that have been conducted make it difficult to predict the predation effects of this specific hatchery release. The YN is unaware of any studies that have empirically estimated the predation risks to listed fish posed by the Klickitat Hatchery programs. In the absence of site-specific empirical information, the identification of risk factors can be a useful tool for reviewing hatchery programs while monitoring and research programs are developed and implemented in the region.

**Risk Factors:**

Date of Release: The release date can influence the likelihood that listed species are encountered. Fall Chinook will be released in June, which is within the window when steelhead fry will be present in the mainstem Klickitat River.

Fish Size at Release: Based on the 33% of body length predation assumption and a fall Chinook size of release range of 80-100 mm, hatchery Chinook may consume listed steelhead up to 26-33 mm in length. During the time fall Chinook are expected to be in the mainstem Klickitat River (June-July), steelhead fry (26-40 mm) will be present in the system and will be vulnerable to predation. However, steelhead fry will be occupying shallow water habitat that is not likely accessible to the larger hatchery fall Chinook; thereby reducing the chance of predation. The level of fall Chinook predation on steelhead is unknown.

Release Location and Release Type: The likelihood of predation may also be affected by the location and the type of release. Other factors being equal, the risk of predation may increase with the length of time that fish co-mingle. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate. Fall Chinook will be released volitionally from rearing sites located at Rkm 27 (Wahkiacus Hatchery). The remaining Fall Chinook production (2,000,000) from the Klickitat Hatchery will be transported to the recently vacated fall Chinook acclimation ponds/raceways at the Wahkiacus Hatchery to “backfill” the vacant rearing space. This “backfill” production will remain at WHAF for a short duration (1-2 weeks) prior to volitional release. The purpose of this “backfill” transfer is to eliminate potential negative species interactions within the 26 miles of highly productive natural habitat between the Klickitat Hatchery and Wahkiacus Hatchery.

The minimal amount of time they spend in the river system should reduce predation and competition effects to listed fish species. Additionally, as fall Chinook will not be released in tributaries, they will not affect steelhead juveniles rearing in these streams.

Residualism: For the fall Chinook subyearling program the following actions are taken to reduce residualism:

1. Fish Condition factors, standard deviation and co-efficient of variation (CV) on lengths of fish are measured throughout the rearing cycle and at release.
2. Feeding rates and regimes throughout the rearing cycle are programmed to satiation feeding to minimize size variations and reprogrammed as needed to achieve goals for smolt size at time of release.
3. Based on past history, fish have reached a size and condition that indicates a smolted condition at release.
4. Releases occur within known time periods of wild fish migration.
5. Releases from acclimation ponds are volitional with large proportions of the populations moving out initially with the remainder of the population vacating within a couple of days.

Straying: As noted by the HSRG (2009), straying to the Snake River of fall Chinook released in the Klickitat has been a major concern in the past. However, past releases in the Klickitat used Priest Rapids (and in some years even Lyons Ferry Hatchery) as brood sources. Beginning in brood year 2007, the URB brood source is from the Little White Salmon River and approximately 650,000 fish or 16.25% of the Klickitat release is coded-wire tagged (per US v. Oregon). This will help to better determine present rates that Klickitat releases of fall Chinook return upstream to Ice Harbor Dam on the Snake River. The Master Plan further attempts to address this issue by developing a locally adapted broodstock and releasing 50% of the fish (~2.0 million) from an acclimation site at Wahkiacus. Marking methods will allow continued monitoring of this issue. The remaining Fall Chinook production (2,000,000) from the Klickitat Hatchery will be transported to the recently vacated fall Chinook acclimation ponds/raceways at the Wahkiacus Hatchery to “backfill” the vacant rearing space. This “backfill” production will remain at WHAF for a short duration (1-2 weeks) prior to volitional release. The purpose of this “backfill” transfer is to eliminate potential negative species interactions within the 26 miles of highly productive natural habitat between the Klickitat Hatchery and Wahkiacus Hatchery.

#### Migration Corridor/Ocean:

The Columbia River hatchery production ceiling, called for in the Proposed Recovery Plan for Snake River Salmon of approximately 197.4 million fish (1994 release levels), has been incorporated by NOAA-Fisheries into their recent hatchery biological opinions to address potential mainstem corridor and ocean effects, as well as other potential ecological effects from hatchery fish. Recent releases have been in the 140 to 145 million range for the entire Columbia River basin. Although hatchery releases occur throughout the year, approximately 80% occur from April to June and Columbia River mainstem out-migration occurs primarily from April through August ([www.fpc.org](http://www.fpc.org)). It is unknown to what extent listed fish are available both behaviorally and spatially on the migration corridor.

Once in the main stem Columbia River, Witty et al. (1995) has concluded that predation by hatchery fish on wild salmonids does not significantly impact naturally produced fish survival in the Columbia River migration corridor. In a study designed to define the migrational characteristics of Chinook salmon, coho salmon, and steelhead trout in the Columbia River estuary, Dawley et al (1984), found the average migration rates for subyearling Chinook, yearling Chinook, and coho salmon and steelhead, were 22, 18, 17, and 35 Rkm/d respectively. There appear to be no studies demonstrating that large numbers of Columbia system smolts emigrating to the ocean affect the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean and an inability to measure.

**Monitoring:**

1. Smolt Monitoring- Smolt traps above Castile Falls, near the Klickitat Hatchery and lower Klickitat River will be used to monitor hatchery fish migration timing and abundance.
2. Adult trapping at Lyle Falls, Castile Falls and Klickitat River Hatchery will be monitored for impacts to listed adults.

These activities have the potential to harass, kill, or injured handled fish as evidenced by the data presented in the following table:

**The number of juvenile steelhead handled and resultant mortality at the Lyle Falls rotary screw trap (2003-2006).**

Year	Workups		Tallies		Grand Totals		% mortality
	Morts	Total Handled	Morts	Total Handled	Morts	Total Handled	
2003	8	764	64	515	72	1279	5.6%
2004	1	486	110	2054	111	2540	4.4%
2005	1	379	8	817	9	1196	0.8%
2006	0	81	0	35	0	116	0%
Totals					192	5131	3.7%

See Klickitat spring Chinook HGMP table.

**Research:**

None proposed.

**Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).**

Estimated listed salmonid take levels by hatchery activity.

**Steelhead**

<i>ESU/Population</i>	Middle Columbia River Steelhead
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<i>Activity</i>	Klickitat Hatchery Spring Chinook Program
<i>Location of hatchery activity</i>	Klickitat R. Hatchery
<i>Dates of activity</i>	May – September
<i>Hatchery Program Operator</i>	YN & WDFW through co-managed YKFP

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile /Smolt	Adult	Carcass
Observe or harass (a)				
Collect for transport (b)				
Capture, handle, and release (c)		5,000*	25**	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal (e.g., broodstock) (e)			40	
Intentional lethal take (f)				
Unintentional lethal take (g)				
Other take (indirect, unintentional) (h)				

\* Past juvenile trapping operations have captured ~5,000 steelhead parr and smolts.

\*\*Although steelhead have not been taken during past hatchery practices, it is anticipated that adult steelhead will be collected and handled at the new facilities at Lyle Falls and Wahkiacus Hatchery. No mortality is expected from these operations.

- a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
- b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
- c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
- d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
- e. Listed fish removed from the wild and collected for use as broodstock.
- f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
- g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

**Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

Any mortality from this operation or other Klickitat River Hatchery operations will be communicated to Fish program staff for additional guidance. For other listed species, if significant numbers of wild salmonids are observed to be negatively impacted by this operation, staff will inform the YN lead biologist who will communicate concerns to NOAA staff. Mitigation recommendations made by NOAA and the co-managers will then be implemented.

### **Section 3: Relationship of Program to Other Management Objectives**

#### **3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review Report and Recommendations - NPPC document 99-15*). Explain any proposed deviations from the plan or policies.**

For ESU-wide hatchery plans, the plant of fall Chinook to the Klickitat River is consistent with:

- 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999)
- Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1995)
- The 2008-2017 *U.S. v. Oregon* Management Agreement
- Columbia River Basin Fish and Wildlife Program (<http://www.nwcouncil.org/library/2000/2000-19/Default.htm> )
- NPPC Annual Production Review
- Principles and Recommendations of the HSRG (HSRG 2005 and 2009)
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- Klickitat River Anadromous Fisheries Master Plan (2008, in draft)
- Draft Klickitat Subbasin Recovery Plan for Middle Columbia River Steelhead ESU. (NOAA-Portland 2007)
- 2008 Columbia Basin Fish Accords Memorandum of Agreement between the Three Treaty Tribes and FCRPS Action Agencies

The current program has been made consistent with and aligned with the following plans and policies to the extent possible:

*Yakima/Klickitat Fisheries Project (YKFP or Project)* - Encompasses both the Yakima and Klickitat subbasins. It is the only major project in the Northwest Power and Planning Council's (NPPC) Fish and Wildlife Program that covers two major subbasins, each within a separate province. Since inception, the Yakama Nation has managed Project operations in both subbasins as one undertaking. By consolidating management for both subbasins into a single management unit, the YN has ensured Project efficiency at all levels. As necessitated by the NPPC's provincial proposal format, this proposal "unbundles" Project operation and maintenance activities. It covers the Klickitat Subbasin only. The YKFP is a supplementation project designated by the Northwest Power Planning Council's as the principal means of protecting, mitigating, and enhancing the anadromous fish populations in the Yakima and Klickitat subbasins (<http://www.ykfp.org/> ).

*Klickitat Master Plan* -Prepared by Yakama Nation and reviewed by WDFW, this master plan addresses proposed facilities, production protocols, monitoring and

evaluation, and habitat improvements needed to manage spring and fall Chinook salmon, coho, steelhead, bull trout, and Pacific Lamprey in the Klickitat Subbasin.

NMFS recently adopted a recovery plan for the Mid-Columbia Steelhead Distinct Population Segment (DPS). The NMFS *Mid-Columbia Steelhead Recovery Plan (NMFS 2009)* summarizes information from four regional management unit plans covering the range of tributary habitats associated with the DPS in Washington and Oregon. Each of the management unit plans are incorporated as appendices to the recovery plan, along with modules for the mainstem Columbia hydropower system and the estuary, where conditions affect the survival of steelhead production from all of the tributary populations comprising the DPS. The recovery objectives defined in the plan are based on the biological viability criteria developed by the ICTRT. The plan also incorporates information on current status developed through the ICTRT (Ford *et al.* 2010).

*U.S. v Oregon* and the Columbia River Fish Management Plan (CRFMP)

*Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington*. These guidelines define practices that promote maintenance of genetic variability in propagated salmon (Hershberger and Iwamoto 1981). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

*Spawning Guidelines for Washington Department of Fisheries Hatcheries*. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be used to maintain genetic variability within the hatchery populations (Seidel 1983). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

*Stock Transfer Guidelines*. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

*Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin.

*National Pollutant Discharge Elimination System Permit Requirements (NPDES)*. This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

### **3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.**

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan
- Klickitat Master Plan

- Yakima/Klickitat Fisheries Project (YKFP or Project)
- U.S. vs. Oregon court decision and 2008-2017 Management Agreement
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC) (<http://www.fws.gov/pnfhpc/>)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plan (<http://www.nwcouncil.org/fw/subbasinplanning/klickitat/plan/>)
- Memorandum of Understanding Joint Operating Agreement for the Klickitat Hatchery (WDFW and YIN)
- 2008 Columbia Basin Fish Accords Memorandum of Agreement between the Three Treaty Tribes and FCRPS Action Agencies

### **3.3 Relationship to harvest objectives.**

The *U.S. v. Oregon* Columbia River Fish Management Plan recognized the importance of tribal harvest in the Klickitat River by mandating releases of 4.0 million fall Chinook (<http://www.critfc.org/legal/crfmp88.html>). The YN has an overall objective of providing 18,000 adults for harvest. The fall Chinook program has provided a steady contribution to tribal commercial fisheries. A summary of fall Chinook escapement and harvest estimates are provided below in Section 3.3.1 for marine, Columbia River and Klickitat River. The data indicate that the fall Chinook program has provided, on average, approximately 19,500 fish for harvest.

#### **3.3.1. Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years, if available.**

The largest harvest of Klickitat Hatchery fall Chinook is in the Canadian Troll fishery, but they are also harvested in the Canadian sport and net fisheries, the Washington/Oregon coastal sport and troll fisheries, Alaskan fisheries, Columbia River tribal fisheries, and freshwater sport fisheries. Harvest rates have not been estimated for Klickitat Hatchery fall Chinook. They were originally the product of Up-River Bright (URB) fall Chinook and it is likely that their harvest profiles are similar. The total ocean and freshwater adult equivalent harvest rates for URB fall Chinook for return years 1989-1996 ranged from 33% to 73%. The 1989-1993 average was 62% and the 1991-1996 average was 48%. Terminal harvest rates are expected to increase as the program will be designed to eliminate, to the extent possible, fall Chinook spawning above Lyle Falls.

#### **Estimated harvest and run size information for Klickitat River fall Chinook (adults and jacks, early-fall/tule and URB stocks combined)(1986-2005).**



Year	Marine <sup>1</sup> Harvest	Columbia R. Mouth Return	Col. R. Harvest <sup>2</sup>		Bonn. Passage Loss <sup>3</sup>	Klickitat R. Mouth Return <sup>4</sup>	Klickitat Harvest <sup>4</sup>	Total Harvest
			Zones 1-5	Zone 6				
1986		25,693	9,017	7,449	461	8,766	8,104	24,570
1987		5,489	2,209	1,344	97	1,839	1,132	4,685
1988		3,693	1,689	875	56	1,073	1,073	3,637
1989	9,295	14,174	6,738	2,861	229	4,346	1,754	20,648
1990	15,270	12,817	4,109	2,952	288	5,468	1,574	23,906
1991	3,553	10,349	2,763	1,547	302	5,737	2,791	10,654
1992		7,687	1,694	1,169	241	4,583	1,148	4,011
1993	23,267	6,520	1,339	1,407	189	3,586	1,118	27,130
1994	1,051	6,686	296	731	283	5,377	1,249	3,326
1995	3,446	5,282	308	539	222	4,213	1,470	5,763
1996	4,562	13,924	1,680	1,541	535	10,168	3,811	11,594
1997	4,196	16,664	2,257	1,839	628	11,940	3,612	11,904
1998	3,735	18,070	2,332	1,458	714	13,566	3,504	11,029
1999	5,525	23,240	2,807	1,585	942	17,906	3,335	13,252
2000	4,303	21,372	3,205	2,980	759	14,428	4,939	15,427
2001	3,761	12,653	2,304	2,637	386	7,327	2,897	11,598
2002	15,065	33,609	5,901	7,219	1,024	19,465	7,730	35,915
2003	22,260	48,145	9,497	8,229	1,521	28,899	3,852	43,837
2004	25,775	22,676	3,235	3,580	793	15,068	8,885	41,475
2005	50,702	19,977	2,878	3,533	678	12,887	8,109	65,222
Avg	12,235	16,436	3,313	2,774	517	9,832	3,604	19,479

1. Derived from Regional Mark Information System (RMIS) recovery year data for marine and freshwater coded-wire tag (CWT) recoveries of fall Chinook released in the Klickitat River.

2. Derived from *U.S. v. Oregon* Technical Advisory Committee reports.

3. Assume 5% passage attrition ascending Bonneville Dam and through the reservoir.

4. YN and WDFW database estimates.

### 3.4 Relationship to habitat protection and recovery strategies.

The program described in this HGMP is consistent with the following habitat and protection strategies:

*Klickitat Subbasin Recovery Plan for the Mid Columbia ESU-* This plan provides habitat strategies to be used to recover ESA listed steelhead in the Klickitat Subbasin. The hatchery program has considered current and future habitat conditions in sizing program and defining release locations

*Yakama Nation Fisheries Program (YNFP):*

The Klickitat Watershed Enhancement Project is a BPA-funded watershed restoration project implemented by the Yakama Nation Fisheries Program (YNFP). The YNFP is working in coordination with WDFW, Natural Resources Conservation Service (NRCS), and the Central Klickitat Conservation District. The project was proposed under the Northwest Power Planning Council's Fish and Wildlife Program and funded by BPA in 1997. Initial project restoration projects were located within the Swale Creek and Little Klickitat River watersheds. Included in the project scope of work are in-stream structural modifications, re-vegetation of the riparian corridor, construction of sediment

retention ponds to provide late-season flow to the creek and enclosure fencing to prevent channel degradation from livestock. A monitoring program has been initiated to document project success and guide future restoration activities. The second phase of the project will use EDT modeling output to guide and prioritize restoration activities.

*Klickitat River Anadromous Fisheries Master Plan:*

The Master Plan is currently in preparation by the Yakama Nation in cooperation with WDFW. It addresses proposed goals and objectives, facilities, production, monitoring and evaluation, and habitat improvements needed to manage spring and fall Chinook salmon, coho salmon, steelhead, and Pacific Lamprey in the Klickitat Subbasin (Yakama Nation 2008 *in draft*).

*Subbasin Planning and Salmon Recovery:*

*Habitat Treatment and Protection:*

WDFW, in partnership with YN, has conducted or is conducting habitat inventories within the Klickitat Subbasin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the Subbasin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP) which documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

*Limiting Factors Analysis*

A WRIA 30 (Klickitat Basin) habitat limiting factors report (LFA) has been completed by the Washington State Conservation Commission. This limiting habitat factors analysis was conducted pursuant to RCW 75.46 (Salmon Recovery). The purpose of this analysis was "to identify the limiting factors for salmonids" where limiting factors are defined as "conditions that limit the ability of habitat to fully sustain populations of salmon." It was intended that a locally based habitat project selection committee use the findings of this analysis to prioritize appropriate projects for funding under the state salmon recovery program. This analysis may also be used by local organizations and individuals interested in habitat restoration to identify such projects (Washington State Conservation Commission 1999).

*The Strategic Plan For Salmon Recovery (HB 2496):* Klickitat County functions as the lead entity for this plan which includes Klickitat major creeks, Big White Salmon and Little White Salmon. This document provides the prioritized actions addressing limiting factors from which the Salmon Recovery Funding Board projects are ranked for consistency and effectiveness.

### **3.5 Ecological interactions.**

Below are discussions on both negative and positive interactions relative to the fall Chinook program.

(1) *Salmonid and non-salmonid fishes or species that could negatively impact the program:*

Klickitat fall Chinook smolts are subject to predation after release throughout the entire migration corridor from the Subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays as well as a variety of bird species including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons are among those preying on fall Chinook smolts. River otters can take a heavy toll on migrating smolts while returning adults are preyed upon by harbor seals, sea lions, and Orcas. Large numbers of northern pikeminnows congregate at the mouth of the Klickitat River. Predation on the juvenile Chinook outmigrants by the northern pikeminnow may have a negative impact on this stock. Avian predation by common mergansers, double crested cormorants, and (especially) Caspian terns also pose a large threat.

*(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program:*

Natural salmon and steelhead populations that co-exist in local tributary areas and the Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA-listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short- and long-term processes and over multiple time periods which makes evaluation of the net effect difficult. See previous discussion on potential ecological interactions in Section 2.2.3.

*3) Salmonid and non-salmonid fishes or other species that could positively impact the program.*

Other wild and hatchery salmonids may provide nutrients to the Klickitat River upon their return as adults. These carcasses may increase stream productivity, which in turn may increase food abundance for Chinook.

*4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program.*

Aquatic and terrestrial species that consume salmonids will benefit from the continued release of fish from this program. Common species that may benefit include northern pikeminnow, smallmouth and largemouth bass, gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons, harbor seals, sea lions, river otters, bear, and killer whales (Orcas). Additionally, salmon carcasses act as a source of fertilizer that benefits riparian plants which, in turn, provide nutrients back to the stream.

## Section 4. Water Source

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

#### Klickitat Hatchery

The Klickitat River is the homing water source for the target population. The water flowing into Klickitat Hatchery Pond 24 is re-used rearing water from the hatchery and is made up primarily of spring water from Indian Ford A Springs originating across the river from the hatchery. This is the same spring water, which is used for the incubation and early rearing of all juveniles. In the spring, river water is introduced for acclimation for this pond. The remaining population is reared in Pond 26 which is supplied with spring water from Wonder Springs which is approximately one-half mile downstream and across the river from the main hatchery. These water sources flow naturally into the Klickitat River and make up a part of its total volume; however, they were not historically available as separate spawning/rearing waters.

#### Wahkiacus Hatchery

This facility will use up to 24 cfs of river water from the Klickitat River. Water quality in the area is acceptable for spring and early summer acclimation. High turbidity during storm events may cause short-term problems in juvenile fish rearing and feeding.

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

Hatchery water withdrawal	<p><i>Klickitat Hatchery:</i> Water rights total 6000 – 8000 gpm from the gravity intake with another 4,000 pumped from the river. Water rights will be formalized through trust water rights from the Department of Ecology (DOE). Monitoring and measurement of water usage is reported in monthly NPDES reports.</p> <p><i>Wahkiacus Hatchery:</i> A new Klickitat River water right permit has been obtained for this site from DOE.</p>
Intake/Screening Compliance	<p>Intake structures will be designed and constructed to NMFS specifications at Wahkiacus Hatchery. The Mitchell Act Intake and Screening Assessment (2002) identified the design and alternatives needed to get existing structures at Klickitat Hatchery in compliance with NMFS fish screening standards. From the assessment, YN has been requesting funding for</p>

	future scoping, design, and construction work of a new intake system.
Hatchery effluent discharges. (Clean Water Act)	<p>Both facilities will operate under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-5002. Monthly and annual reports on water quality sampling, use of chemicals, and compliance records will be available from the Washington DOE.</p> <p>Discharges from the cleaning treatment system are monitored as follows:</p> <p><i>Total Suspended Solids (TSS):</i> Collected 1 to 2 times per month on composite effluent, maximum effluent, and influent samples.</p> <p><i>Settleable Solids (SS):</i> Collected 1 to 2 times per week on effluent and influent samples.</p> <p><i>In-hatchery Water Temperature</i> - Daily maximum and minimum readings.</p> <p>Acclimation ponds will be designed to handle and process effluent during cleaning operations.</p>

## **Section 5. Facilities**

### **5.1 Broodstock collection facilities (or methods).**

Broodstock to be collected at Lyle Falls, Wahkiacus Hatchery and Klickitat River Hatchery. Adults will be collected randomly throughout the entire run. Real-time DNA samples will be collected on adults collected in the Klickitat River to ensure that spring Chinook and out-of-basin origin fish are not used as broodstock.

Adults will be transported by truck to holding facilities located at Klickitat or Wahkiacus hatcheries using protocols defined in Hager and Costello (1999). Time in transport will be less than 1 hour.

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

Adults and juveniles are trucked to holding and acclimation sites.

### **5.3 Broodstock holding and spawning facilities.**

Adult holding ponds at Klickitat and Wahkiacus hatcheries are/will be fed with a combination of river, well and spring water.

See Little White Salmon NFH HGMP for data on adult holding at this facility.

#### 5.4 Incubation facilities.

Incubation facilities at Wahkiacus and Klickitat hatcheries use well or spring water for incubation. Klickitat Hatchery has 72 stacks of FAL Heath incubators for incubation and hatching. Stack incubators are loaded at 6000-8000 eggs/per tray for hatching. Removal of dead eggs, accurate enumeration, and loadings are adjusted during this time.

See Little White Salmon NFH HGMP for data on incubation facilities at this hatchery.

#### 5.5 Rearing facilities.

Fall Chinook will be reared at both Wahkiacus and Klickitat hatcheries. All releases will occur from the Wahkiacus Hatchery.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)
11	concrete	3500	100	10	3.5	250
26	Hypalon Pond	29925	190	45	3.5	55
24	earthen pond	24500	175	40	3.5	6000

Fall Chinook fry are ponded in raceways. In mid-March the fingerlings are transferred to release ponds 24 & 26 at the Klickitat Hatchery until transfer at approximately 80 fpp. for eventual release at Wahkiacus Hatchery. The hypalon pond (26) is gravel bottomed and vinyl sided, while Pond 24 is an earthen/gravel pond.

At Wahkiacus, eggs will be incubated, fry will be “first fed” and fingerlings will be reared to release size. Fish will be moved from smaller to larger rearing units as they grow.

#### 5.6 Acclimation/release facilities.

Initially, the majority of the fall Chinook will be transferred as eyed-eggs from Little White Salmon NFH to either Klickitat or Wahkiacus hatcheries in December and January. The fish will be reared on a combination of well and river water. Partial rearing on parent river water, or acclimation for several weeks, is done to ensure strong homing to the hatchery, thus reducing the stray

rate to natural populations. Fish will be allowed to migrate volitionally from rearing ponds at Wahkiacus hatchery.

As the program is shifted to local broodstock, eyed-egg transfers from Little White Salmon NFH will be eliminated.

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

Currently, the 4.0 million target release strains facility operations, making best rearing practices difficult to implement. The new Wahkiacus Hatchery will alleviate this problem by increasing rearing capacity. However, there has been no instance of large-scale fish loss for the current program.

### **5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.**

<b>Potential Hazard</b>	<b>Risk Aversion Measure</b>
Equipment failure/Water loss	Both facilities will have multiple water sources available. At Klickitat Hatchery, there is a main river gravity water feed system, three torpedo type river pumps, and several springs available. Backup generator system is automatic in case of power loss. Wahkiacus Hatchery will have both river intake and well water sources.
Flooding/Water Loss	Both facilities are sited to minimize the risk of catastrophic fish loss from flooding and equipped with low water alarm probes in strategic locations to prevent fish loss due to loss of water. Alarm systems are monitored 24/7 with staff available on-station to respond to problems.  At Wahkiacus, under 100-year flood conditions, pond berms may be overtopped. Fish could be washed out of the system during these events. Debris entering the ponds will need to be removed and ponds cleaned and repaired.
Disease Transmission	USFWS fish health guidelines are followed. USFWS fish health pathologists conduct inspections monthly and problems are managed promptly to limit mortality and reduce possible

	disease transmission.
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## **Section 6. Broodstock Origin and Identity**

### **6.1 Source.**

Source is Little White Salmon NFH and the Klickitat River. Broodstock used in the program will be collected at random throughout the run-at-large at Lyle Falls, Klickitat Hatchery, Wahkiacus Hatchery, and Little White Salmon NFH.

As the project progresses, only adult fall Chinook returning to the Klickitat River will be used for broodstock.

### **6.2.1 History.**

Introductions of fall-run Chinook salmon into the Klickitat River began in 1946 (Marshall et al. 1995), and although a hatchery broodstock was established, tule stocks from various facilities continued until 1986. Beginning in 1986, Klickitat Hatchery production switched from the tule stock to an upriver bright (URB) fall Chinook. Since 2007, 4 million hatchery URB smolts are released on-station annually, primarily for harvest augmentation. Eyed eggs currently are transferred from Little White NFH to the Klickitat Hatchery for final rearing. There is no capture of fall-run Chinook salmon adults at Klickitat Hatchery and eggs are imported yearly from Little White Salmon, or Bonneville hatcheries. A naturally spawning population of fall-run Chinook salmon exists in the Klickitat River; it appears to be a hybrid of tule and upriver bright stocks. Genetic analysis of naturally spawning Klickitat fall Chinook sampled from 1991 to 1994 showed them to be very similar genetically to URB Chinook at Priest Rapids Hatchery and in Hanford Reach and they were closely associated with URB populations at Bonneville and Little White Salmon hatcheries and in the Yakima River (Marshall 2000).

See Little White Salmon Nation Fish Hatchery URB Chinook HGMP for additional egg transfer information.

### **6.2.2 Annual size.**

A total of 4.5 million eyed eggs have been historically transferred to Klickitat Hatchery for this program. The 4.5 million egg-take will continue; however, the program now calls for collecting as large a proportion as possible from adults returning to the Klickitat River with the goal of completely eliminating egg-transfers from Little White Salmon NFH. Adult and jack fall Chinook returning to the Klickitat River will be used as the broodstock source for the program. The broodstock will be collected at the Lyle Falls, Wahkiacus, and Klickitat Hatchery facilities. Approximately 2,500 adults will be needed to produce a release of 4.0 million subyearling fall Chinook. Broodstock will be collected throughout the entire adult migration period to increase the diversity of life histories being reared at the hatchery. This action will reduce disease risks associated with the importation of eggs from outside of the Subbasin.

### **6.2.3 Past and proposed level of natural fish in the broodstock.**

Estimates of the proportion of wild fish used as broodstock are not known. However, because broodstock were collected at historically from Priest Rapids Hatchery and now Little White Salmon NFH, Klickitat River origin fish have never been used as broodstock.

The new program will use adult fall Chinook that return to the Subbasin as broodstock. Both marked and unmarked fish may be incorporated into the hatchery program. However, because a native run of fall Chinook does not exist above Lyle Falls, the number of natural-origin fish available to the program is limited. Therefore, the program does not establish a goal for the number or proportion of natural-origin fish used as broodstock.

Adult and jack fall Chinook returning to the Klickitat River will be used as the broodstock source for the program. The broodstock will be collected at the Lyle Falls, Wahkiacus, and Klickitat Hatchery facilities. Approximately 2,500 adults will be needed to produce a release of 4.0 million subyearling fall Chinook. Broodstock will be collected throughout the entire adult migration period to increase the diversity of life histories being reared at the hatchery.

#### **6.2.4 Genetic or ecological differences.**

Tule fall Chinook are not indigenous to the Klickitat Subbasin. Hatchery plants (tule) from outside the Subbasin first occurred in 1946. Releases from the Klickitat Hatchery began in 1952 and continued until 1986. Releases have included stocks from Cowlitz, Toutle, Kalama, Washougal, Bonneville, Cascade, and Ringold hatcheries. The Klickitat fall Chinook program was originally developed to rear tule fall Chinook from the Spring Creek Hatchery. When the Spring Creek program failed to provide the necessary eggs, the program was changed to URB Chinook. The URB Chinook program was intended to provide a better quality fish for the tribal terminal fishery in the lower Klickitat River.

#### **6.2.5 Reasons for choosing.**

Using Klickitat River origin fish is expected to increase survival rates, reduce disease transfer risks, and reduce genetic risks to the natural population (HSRG 2005).

### **6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.**

Using native Klickitat River adults for broodstock is expected to minimize straying into adjacent subbasins, thereby reducing genetic risks to ESA -listed Chinook populations in the Columbia and Snake rivers.

## **Section 7. Broodstock Collection**

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

Adults

### **7.2 Collection or sampling design**

Adults will be collected at random throughout the entire upstream migration period. Fish will be collected at Lyle Falls, Klickitat Hatchery, Wahkiacus Hatchery, and at Little White Salmon NFH.

Broodstock collection at Little White Salmon NFH will be phased out over time as the program is converted to local broodstock.

### **7.3 Identity.**

Klickitat River and URB at Little White Salmon NFH. Program goal to eventually collect all broodstock from the Klickitat River.

### **7.4 Proposed number to be collected:**

A maximum of 2,500 adults will be collected for broodstock.

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

A maximum of 2,500 adults will be collected for broodstock.

#### **7.4.2 Broodstock collection levels for the last twelve years, or for most recent years available.**

See Little White Salmon Nation Fish Hatchery URB Chinook HGMP for broodstock use and egg transfer information.

### **7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.**

Surplus adults will be distributed to tribal members for ceremonial and subsistence purposes.

### **7.6 Fish transportation and holding methods.**

Fall Chinook captured at Lyle Falls will be transported by truck to either Wahkiacus or Klickitat hatcheries following protocols identified in Hager and Costello (1999). Fall Chinook that swim in to either hatchery will be diverted to adult holding ponds. Adult holding ponds are supplied with a combination of river, well, and spring water.

Fall Chinook are collected at the LWS NFH adult ladder. It is generally not required to transport adult fall Chinook. The holding period for upriver bright fall Chinook salmon is very short (about one month as a maximum amount of time). The goal for all species is to achieve a 2.5% or less pre-spawning mortality rate during the holding period.

**7.7 Describe fish health maintenance and sanitation procedures applied.**

USFWS fish health protocols will be followed for adult holding.

**7.8 Disposition of carcasses.**

Carcasses of fall Chinook spawned through the programs will be buried at a local landfill. If they receive certification by USFWS, they may be planted as part of a nutrient enhancement project in the Klickitat River Subbasin.

**7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.**

All listed species collected in traps will released immediately back to the stream. Adult trapping facilities are designed to meet NMFS standards to minimize impacts to anadromous salmonids.

Converting to local broodstock is expected to reduce adult straying rates to other subbasins, thereby decreasing genetic risks to other Chinook populations.

## **Section 8. Mating**

### **8.1 Selection method.**

The spawning protocol mandates the use of a spawning population of at least 500 adults. Spawners are selected and mated randomly from the population maintained in the hatchery holding pond. Fish are spawned throughout the entire run to help ensure that the run timing for the stock is maintained.

### **8.2 Males.**

Jacks will be used in proportion to that observed in the natural run.

### **8.3 Fertilization.**

A 1:1 male to female ratio will be used for fertilization.

### **8.4 Cryo-preserved gametes.**

Cryo-preserved gametes are not used.

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

DNA samples will be collected on all adult fish collected for broodstock. We will attempt to use only fish which type similar to mid-Columbia Bright (MCB) fall Chinook populations for brood stock. Over time we expect the local (Klickitat) brood source may develop a unique DNA profile and these fish would be incorporated into brood stock to the maximum extent possible.

No listed fish will be spawned or mated as part of this program.

## **Section 9. Incubation and Rearing.**

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

Eggs are taken from fish spawned at Little White NFH. Data below is from the [Klickitat URB Fall Chinook HGMP](#), January 18, 2005. Once “eyed”, 4.5 million eggs will be transferred to Klickitat Hatchery.

Year	Egg Take	Eyed-Ponding Survival (%)
1995	17,345,900	98.10
1996	14,533,500	99.13
1997	17,007,000	99.24
1998	13,981,300	98.09
1999	16,089,600	98.72
2000	15,349,500	97.89
2001	13,389,500	94.28
2002	13,732,550	99.54
2003	13,820,500	98.90
2004	12,753,500	92.30
2005	13,500,100	92.33
2006	14,412,102	91.38
2007	11,338,617	91.46
2008	9,158,431	89.13
2009	7,462,632	85.49
2010	8,901,550	87.84

At Klickitat Hatchery, eyed egg to ponding survival is approximately 98.2%. A similar rate is expected for the new Wahkiacus Hatchery.

Some green eyed shipping loss was experienced with 2 early takes of URB eggs from LWS, BY 2010.

### **9.1.2 Cause for, and disposition of surplus egg takes.**

Variability in fecundity and egg survival may result in surplus eggs being collected at the Wahkiacus Hatchery. Surplus eggs may be released or destroyed dependent on the results of consultations with the co-managers.

### **9.1.3 Loading densities applied during incubation.**

Klickitat Hatchery has 72 stacks of FAL Heath incubators for incubation and hatching. Stack incubators are loaded at 6000-8000 eggs/per tray for hatching. Removal of dead eggs, accurate enumeration and loadings are adjusted during this time. See section 5.4 for load and hatching criteria. Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations are followed for water quality, flows, temperature, substrate and incubator capacities. Wahkiacus will have similar facilities.

#### **9.1.4 Incubation conditions.**

Integrated Hatchery Operations Team (IHOT) species-specific incubation recommendations will be followed for water quality, flows, temperature, substrate, and incubator capacities at both the Wahkiacus and Klickitat hatcheries.

Harmful silt and sediment is cleaned from incubation systems regularly while eggs are monitored to determine fertilization and mortality. Incubation water is from Indian Ford A Springs located across the river from the hatchery. Temperature is monitored by thermograph and recorded; temperature units (TU) are tracked for embryonic development. Dissolved oxygen content is monitored and has been at acceptable levels of saturation with a minimum criteria of 8 parts per million (ppm). When using artificial substrate, vexar, or bio-rings, egg densities within incubation units are reduced by 10%.

#### **9.1.5 Ponding.**

Fall Chinook fry are transferred from Heath trays for ponding upon button-up and swim-up. Fry are ponded when: a visual inspection of the amount of yolk sac remaining with the yolk slit closed to approximately 1 millimeter wide (approximately 1,600 – 1,800 temperature units) or based on (95% yolk absorption) KD factor. The mean weight for fry ponded is 700-800 fpp. At this time, fry are transferred to raceways for rearing.

#### **9.1.6 Fish health maintenance and monitoring.**

USFWS fish health guidelines are followed. Hatchery staff conducts daily inspection, visual monitoring and sampling from eye, fry fingerling and sub-yearling stages. Potential problems are immediately communicated to the USFWS fish health specialist. In addition, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. At spawning, eggs are water-hardened in iodophor as a disinfectant. Formalin (37% formaldehyde) is periodically dispensed into water supplied to the incubators and raceways to control fungus growth on eggs. Formalin may also be used on parasite loads on juvenile salmon, if recommended by a fish health specialist. Treatment dosage and duration varies by life-stage and condition being treated. All fish disease control procedures are conducted consistent with USFWS Policy for fish reared in the Klickitat and Little White Salmon National Fish Hatchery.

**9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.**

Listed fish are not incubated for this program.



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

Year	Fry-fingerling Survival (%)
1995	96.50
1996	98.86
1997	98.78
1998	99.19
1999	99.40
2000	96.13
2001	98.69
2002	97.72
2003	98.43
2004	94.21
2005	99.15
2006	89.16
2007	98.04
2008	98.32
2009	97.08
2010	99.89

Data above are from the [Klickitat URB Fall Chinook HGMP](#), June 2011. At Klickitat Hatchery, eyed egg to smolt release survival for the last nine years has averaged 91%.

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

The pond loading densities maintained at the Klickitat Hatchery are consistent with those recommended by Piper et al. (1982; 6 lb/gpm and 0.75 lb/ft<sup>3</sup>) and Banks (1994; 0.125 lb/ft<sup>3</sup>/in) (BAMP 1998).

Fry are transferred from the Heath incubation trays to vinyl raceways for start feeding and continued rearing. The raceways have flow through water circulation.

**9.2.3 Fish rearing conditions.**

Fish are to be reared on a combination of river, spring and well water at Klickitat and the new Wahkiacus hatcheries. Information provided below is for

the Klickitat Hatchery, but will apply to the Wahkiacus Hatchery as well once this facility is constructed.

Temperature, dissolved oxygen and pond turn over rate are monitored. IHOT standards are followed for: water quality, alarm systems, predator control measures (netting) to provide the necessary security for the cultured stock, fish loadings and densities. Settleable solids, unused feed, and feces are removed regularly to ensure proper cleanliness of rearing containers. All ponds are broom-cleaned as needed and pressure-washed between broods. Temperature and dissolved oxygen are monitored and recorded daily during fish-rearing. Temperatures during the rearing cycle range from a high of 65 to a low of 33 degrees F. Raceway vessels are cleaned on an as-needed basis. Netting covers are placed over acclimation rearing ponds to minimize predation.

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

Table 9.2.4.1. Growth data for Little White Salmon National Fish Hatchery fall Chinook during final rearing at the Klickitat Hatchery, 2010.			
Rearing Period	Length (mm)	Weight (fpp)	Condition Factor
02/10	Na	Na	Na
03/10	Na	890	Na
04/10	Na	359	Na
05/10	Na	159	Na
06/10	82	73	1.114

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

Table 9.2.5.1. Growth data for Little White Salmon National Fish Hatchery fall Chinook during final rearing at the Klickitat Hatchery, 2010.			
Rearing Period	Length (mm)	Weight (fpp)	Condition Factor
02/10	Na	Na	Na
03/10	Na	890	Na
04/10	Na	359	Na
05/10	Na	159	Na
06/10	82	73	1.114

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

Table 9.2.6.1. Feed data for Little White Salmon National Fish Hatchery fall Chinook during rearing at the Klickitat Hatchery, 2010.

Rearing Period	Food Type	Application Schedule (# feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed per gpm of Inflow	Food Conversion During Period
3/15/10 – 4/30/2010	Ewos Micro#1 & 2	4-8	1.50-2.00	0.023	0.48
4/30/2010 – 6/14/2010	Ewos Pacific 1.2mm	2-4	1.5	0.026	0.55
6/14/2010 – 6/28/2010	Ewos Vita 1.5 mm	2	1.5	0.051	0.54

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

Fish Health Monitoring	A fish health specialist inspects fish monthly and checks both healthy and if present symptomatic fish. Based visual detection of pathological problems, age of fish, and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills, and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	Appropriate therapeutic treatment will be prescribed to control and prevent further outbreaks. Dead fish are collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.
Sanitation	All eggs brought to the facility are surface-disinfected with iodophor (per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Foot baths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

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

Fall Chinook are released in May-June as sub-yearling smolts. Program goal

has been to release fish when they reach 80 fpp. Along with size, appearance, and release time are used to indicate the readiness of the population for emigration.

ATPase data will be collected on fish released at and the Wahkiacus Hatchery to determine smoltification status.

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

None.

**9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.**

Listed fish are not under propagation.

## ***Section 10. Release***

**10.1 Proposed fish release levels.**

4.0 million fingerlings at 50-80 fish per pound (FPP).

**10.2 Specific location(s) of proposed release(s).**

Releases will be made from from the Wahkiacus Hatchery at RKm 27. Approximately 4 million fish will be released from this site. The fall Chinook production (2,000,000) from the Klickitat Hatchery will be transported to the recently vacated fall Chinook acclimation ponds/raceways at the Wahkiacus Hatchery to "backfill" the vacant rearing space. This "backfill" production will remain in at WHAF for a very short duration (1-2 weeks) prior to volitional release. The purpose of this "backfill" transfer is to eliminate potential negative species interactions within the 26 miles of highly productive natural habitat between the Klickitat Hatchery downriver to the Wahkiacus Hatchery.

### 10.3 Actual numbers and sizes of fish released by age class through the program.

Release Year	Fingerling Release		
	No.	Date (MM/DD)	Avg Size (fpp)
1996	4,380,000	05/16-06/08	64.0
1997	3,625,870	May	65.0
1998	4,387,480	05/21-05/31	71.0
1999	4,289,100	06/02-06/07	71.0
2000	3,972,500	05/15-05/22	55.0
2001	3,850,300	05/22-05/25	66.0
2002	3,968,900	06/03-06/07	65.0
2003	3,664,100/	6/03-6/19/	73.0
	520,000	7/16-7/20	79.0
2004	2,590,650/	6/14-18/	62.2
	1,635,000	7/6-13/	69.0
2005	2,150,500/	6/12-16/	77.0
	2,397,800	6/19-21/	69.6
2006	4,548,270	6/12-6/16	71.8
2007	2,158,500	6/25-29/	83.1
	2,198,000	6/11-15/	82.8
2008	1,539,477	6/16-20/	75
	2,012,960	6/26-30/	69
2009	2,018,200	6/12-14/	85
	2,357,900	6/9-11/	74
2010	2,073,311	7/7-10/	75
	2,079,425	6/28-7/2	67.9

### 10.4 Actual dates of release and description of release protocols.

Fish will be allowed to migrate volitionally from the rearing ponds. Fish that do not migrate volitionally from the ponds will be seined and destroyed. Carcasses will be buried in an upland landfill.

#### **10.5 Fish transportation procedures, if applicable.**

Fingerlings are not transported.

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

Chinook for this program will be reared on a combination of Klickitat River, adjacent spring water or well water for prior to release. Rearing on parent river water, or acclimation for several weeks to parent river water, is done to ensure strong homing to the release site, thus reducing the stray rate to natural populations.

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

1) 16.5% of all fish released will be adipose-clipped and coded-wire-tagged (CWT).

2) with infrastructure improvements to allow for safe marking, it is intended that 100% of all Little White Salmon NFH origin fish (or fish from eggs) will be adipose-clipped until these fish/egg transfers are eliminated.

3) Klickitat River origin juveniles will be tagged with a blank cwt but not adipose-clipped. This strategy will allow identification of Klickitat-origin fish as out-of-basin fish should they be detected as “strays” at other Columbia Basin facilities. The strategy will also allow Klickitat-origin fish to be easily distinguished from Little White Salmon -origin fish so that only Klickitat-origin fish can be used in development of a local brood stock. At a point in the future when local brood is sufficient to meet Klickitat Basin production needs, Little White Salmon brood will no longer be needed, and all Klickitat fall Chinook hatchery production will be adipose-clipped to allow maximum harvest of this segregated, harvest augmentation program in mark-selective fisheries.

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

N/A.

#### **10.9 Fish health certification procedures applied pre-release.**

Prior to release from Wahkiacus Hatchery and prior to transport from Klickitat Hatchery to Wahkiacus Hatchery (backfill proportion), the population health and condition is established by the USFWS Fish Health Pathologist. This is commonly done 1-3 weeks pre-transfer and up to 6 weeks on systems with pathogen-free water and little or no history of disease. Prior to this examination, whenever abnormal behavior or mortality is observed, staff contacts the USFWS Fish Health Pathologist. The pathologist examines affected fish and recommends appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers’ Fish Disease Control Policy and USFWS guidelines.

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

Emergency procedures and disposition of fish will adhere to the protocols and procedures set forth in approved operation plans. If the program is threatened by ecological or mechanical events, the Complex Manager will contact YN fish management. If an on-station emergency release is authorized, personnel will pull screens and sumps and fish will be force- released into the Klickitat River.

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

- Fish are reared to sufficient size (80 fpp) so that smoltification occurs simultaneously within almost the entire population. This will reduce retention in the streams after release.
- Rearing on natal river water or acclimation for several weeks to this river water is done to ensure strong homing to the hatchery, thus reducing adult stray rate to streams outside of the Klickitat River basin.
- The Yakama Nation transition plan calls for moving the program to a lower Klickitat River acclimation site, assuming funding for construction and O&M of the Wahkiacus Hatchery and Acclimation Facility (WHAF) is secured. . This will reduce interactions with listed steelhead in the Klickitat River Subbasin.

**Section 11. Monitoring and Evaluation of Performance Indicators**

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

*Harvest:* Fisheries will be monitored by the co-managers to determine harvest rates and numbers in Columbia River and Klickitat River Subbasin fisheries. Ocean fisheries will be monitored by the WDFW and other entities by sampling fishing boats and fishers when they return to ports or to fish processing stations.

*Smolt-to-adult Survival Rate:* A portion of all releases will be marked with CWT and adipose fin-clipped. These tags will be recovered from fish caught in all fisheries, spawning ground surveys, hatchery returns, and from tags voluntarily submitted by the public.

*Adult Straying:* Regional M&E efforts will be used to track the number and capture location of fish originating from the Klickitat River.. Klickitat River fish will be tagged with a wire-tag so that they can be identified in fisheries, in spawning ground surveys, and at hatcheries.

*DNA (Broodstock composition):* A portion of the fin collected from adult fall

Chinook at broodstock collection facilities will be taken and the DNA analyzed. The adults will be given a unique numeric mark and then released to adult holding facilities. Only those adults identified as originating from the Klickitat River Subbasin will be used as broodstock.

*Juvenile Health Monitoring.* Juvenile fish at Klickitat Hatchery are monitored on a routine basis by the hatchery staff to determine the condition of fry, fingerlings, and smolts. Samples will be taken by the USWS Fish Health pathologist to determine the health of fry, fingerling, and smolts prior to release. Sampling of fingerlings for tag retention and fin mark quality, prior to release, is conducted by YN marking program.

*Environmental Monitoring.* Environmental monitoring is conducted at hatchery facilities to ensure that the facilities meet the requirements of the National Pollution Discharge Elimination System (NPDES) permit and is also used in managing fish health. On a short-term basis, environmental monitoring helps identify when changes to hatchery practices are required. The following parameters are currently monitored -

- Total Suspended Solids (TSS)
- Settleable Solids (SS)
- Water Temperature

## **Survival**

Three survival indices will be used to determine the success of the hatchery programs:

- Catch plus Escapement (C+E): Total catch of all ages plus total escapement of all ages. This method targets the outcome of the harvest management activities affecting the species.
- Adult Equivalent Run (AER): The total number of fish that would have returned to the spawning grounds at all ages in the absence of fisheries. AER is the best estimate of adult run-size without human harvest.
- Age 2 Recruits (A2R): Number of fish alive at the time of first recruitment into a fishery (typically at age 2). A2R represents the maximum number of fish recruited to fisheries.

All three survival metrics will be calculated for spring Chinook, fall Chinook, and coho populations. Because few steelhead are caught in ocean fisheries, only C+E will be calculated for this species.

To calculate each parameter requires that a portion of the hatchery production be tagged with a CWT or another distinguishing mark. Sampling performed by state, federal, and Tribal entities in fisheries, at hatcheries, and on the spawning grounds will be used to recover Klickitat River-origin tags. All tagged data will be reported to the Regional Mark Processing Center (<http://www.psmfc.org/regional-mark-processing-center-rmpc.html>). Results of



survival analysis will be presented in the Master Plan's annual M&E report.

### **Predation Index**

The YN biologists are concerned that hatchery releases of coho, spring Chinook, and steelhead could result in high rates of predation on native juvenile anadromous fish, i.e. steelhead and spring Chinook. To address this concern, a study will be undertaken to develop a predation index for hatchery fish.

The predation index study will have two components:

1. Radio Tagging: used to determine the amount of time hatchery fish spend in the Klickitat River after their release from facilities.
2. Stomach analysis: used for estimating the number, size, and species of juvenile fish consumed by the hatchery juveniles.

### **Migration Timing and Travel Time**

Approximately 50 juveniles of each test species (coho, spring Chinook, and steelhead) will be tagged with radio tags and released from associated hatchery and acclimation facilities (Table 7-3). These fish will be tracked using antennae arrays located at the following sites in the Subbasin:

- McCreedy Creek Acclimation Facility
- Castile Falls
- Klickitat River Hatchery
- Wahkiacus Facility
- Lyle Falls
- Mouth of Klickitat River.

Detection histories on each antenna will be used to determine: 1) migration timing and travel time from point of release to the mouth of the Klickitat River and 2) relative survival rate from point of release to mouth of Klickitat River.

### **Stomach Sampling**

Migrating hatchery spring Chinook, coho, and steelhead will be collected at a screw trap located just upstream of Lyle Falls. The screw trap will be operated from April through late June in order to sample the expected hatchery fish out-migration period. During each week of screw trap operations, a random sample of 10 fish of each hatchery stock of interest will be collected and their stomachs removed for analysis. Given a 10-week migration window, a total of 100 fish per hatchery stock will be collected and sampled. The stomach samples will be sent to a lab for examination and enumeration of the number, size, and species of salmonids present. This data will be combined with information gathered from the radio-tag analysis to develop the predation index.

The PI value will be compared with estimates of natural juvenile spring Chinook and steelhead production taken from M&E activities associated with the steelhead ESU draft recovery plan (NOAA-Fisheries 2007). If the PI exceeds 10% of estimated total wild juvenile fish production for either

steelhead or spring Chinook, the YN proposes to implement one or both of the following actions:

1. Implement a more rigorous predation study to develop more quantitative estimates of predation.
2. Alter hatchery release locations, size at release, or numbers released to reduce predation impacts to wild fish.

If the second action is selected, the predation index study will be repeated before proceeding to a more robust predation analysis.

### **Juvenile Migratory Status**

Smolt development of hatchery juveniles will be determined by measuring gill Na<sup>+</sup>, K<sup>+</sup>-ATPase activity over time. Tracking enzyme levels will help determine the migratory status of hatchery juveniles released from hatchery facilities and acclimation sites.

Gill Na<sup>+</sup>, K<sup>+</sup>-ATPase samples will be collected from the gill tissue of hatchery fish using the techniques described in Schrock et al. 1994 (Appendix E). A total of 25 gill samples for each species will be collected weekly for coho, fall Chinook, steelhead, and hatchery spring Chinook released in the Subbasin annually. Sampling will begin approximately 8 weeks prior to the expected release date for each species.

Gill Na<sup>+</sup>, K<sup>+</sup>-ATPase samples (25 per week per species) will also be collected for naturally produced smolts captured in traps located in stream reaches above and below Lyle Falls. Because the procedure does not require killing the sample fish, fish losses are expected to be small.

Results obtained from the hatchery and natural fish populations will be tracked over time and compared. Hatchery managers will use this information to better refine the hatchery release schedule based on the physiological condition of the fish. Fish rearing practices would be adjusted so that timing and migratory status (as indicated by gill Na<sup>+</sup>, K<sup>+</sup>-ATPase levels) of the two groups match to the extent possible. It is assumed that the more hatchery fish reflect the wild fish template, the more likely they are to survive in the natural environment.

### **Adult Composition**

Adult return information and age composition including mini-jack and jack information will be collected at both the Lyle Falls Fishway Monitoring Facility and the Klickitat Hatchery.

### **Demographic Analysis of Upper Subbasin Resident Trout Populations**

Prior to implementation of the conservation hatchery program, YN biologists will conduct surveys for the purpose of estimating population abundance and distribution of the upper mainstem rainbow trout populations. These are the preferred resident populations for use in the conservation program because previous genetic work suggests that the populations have experienced

contemporary gene flow from other populations (likely anadromous) in the Klickitat River Subbasin.

Other critical demographic data that will be collected as part of the study are:

- Length and age at maturity
- Spawn timing and distribution
- Age structure
- Fecundity

Study data collected will be summarized in annual reports.

### ***Harvest Monitoring and Evaluation***

Harvest monitoring of Klickitat River-origin salmonids will be performed by WDFW and The Yakama Nation. The WDFW is responsible for monitoring non-tribal sport and commercial fisheries in the Columbia River, Klickitat River, and ocean. The fisheries monitoring methodologies used by WDFW and other state and federal agencies are outside the scope of this document.

The Tribal harvest monitoring program is designed to achieve project goals through:

- sampling subsistence fisheries at Cascade Locks, The Dalles Dam, and John Day Dam on the mainstem Columbia River
- sampling all Tribal fisheries in the Klickitat River

### **Subsistence Fisheries**

In order to monitor subsistence fisheries in the Columbia River, the following methods will be employed.

1. Tribal fisheries at Cascade Locks, The Dalles and John Day dams will be monitored daily whenever fisheries are conducted.
2. Each fishing day will be divided into three 8-hour periods. A different observer will be used to monitor each 8-hour period.
3. Every 2 hours, the observer will record the number of active gear, the number of fish captured per gear type, and the length of the observation period.
4. Catch estimates will be calculated by expanding the counts for both time and gear.
5. Caught fish will be randomly sub-sampled for marks. Fish species and (if possible) sex will be identified for each fish and each fish will be examined for marks. Length measurements will be taken for each fish caught. Scale samples will be collected on each fish for aging. DNA samples will also be collected on a sub-sample of fish if required as

part of genetic studies being undertaken by YN or other research groups.

6. Recovered CWTs will be sent to WDFW for processing. WDFW will report tag recoveries and information to the appropriate regional databases.
7. YN will be responsible for reporting PIT-tag recoveries to PITAGIS (the PIT-Tag Information System) and other regional databases.

### **Klickitat River Fisheries**

The majority of Tribal fishing activities in the Klickitat River occur at Lyle Falls. This fishery will be monitored in a manner similar to that described in Section 7.2.1. In addition, Additional harvest monitoring that will occur in the Klickitat is as follows:

1. Fishery monitors will record the species and number of fish released voluntarily by Tribal fishers. This information will be used to determine the success of the volunteer effort to release wild steelhead back to the stream to increase spawning escapement for this ESA-listed species.
2. YN staff will also conduct interviews with Tribal fishers conducting fisheries in areas upstream of Lyle Falls. Their catch will be subsampled as described in the subsistence section above.

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

BPA and Mitchell Act funding are expected to be sufficient to implement program and associated monitoring.

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

- For fall Chinook, spawning/carcass surveys occur at a time when adult steelhead are not spawning.
- Any disturbance of adult or juvenile steelhead during spawning and carcass surveys is expected to be minimal because surveys are performed only once a week.
- Steelhead collected in broodstock collection facilities will be immediately returned with minimal handling to the river or stream..

## **Section 12. Research**

### **12.1 Objective or purpose.**

No research is proposed.

**12.2 Cooperating and funding agencies.**

NA

**12.3 Principle investigator or project supervisor and staff.**

NA

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

NA

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

NA

**12.6 Dates or time periods in which research activity occurs.**

NA

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

NA

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

NA

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

NA

**12.10 Alternative methods to achieve project objects.**

NA

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

NA

**12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities.**

NA

## ***Section 13. Attachments and Citations***

### **13.1 Attachments and Citations**

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**Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY**

14.1 Certification Language and Signature of Responsible Party

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

**Name, Title, and Signature of Applicant:**

Certified by \_\_\_\_\_ Date: \_\_\_\_\_

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## **ADDENDUM A. PROGRAM EFFECTS ON OTHER (AQUATIC OR TERRESTRIAL) ESA-LISTED POPULATIONS**

### **15.1) List all ESA permits or authorizations for USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species associated with the hatchery program.**

No permits in place for this new program. They will be developed through consultation with appropriate agencies as facilities and programs are developed.

### **15.2) Describe USFWS ESA-listed, proposed, and candidate salmonid and non-salmonid species and habitat that may be affected by hatchery program.**

Hatchery operations may impact USFWS listed Klickitat River bull Trout (*Salvelinus confluentus*). Bull trout are listed as Threatened by the USFWS. The USFWS has designated the West Fork Klickitat River and Klickitat River reaches adjacent to the Yakama Indian Reservation as Critical Habitat (Federal Register 2005). Stream habitat in the Klickitat River Basin has been impacted by human activities associated with agriculture, logging, recreation, and urban development.

Hatchery facilities are located both within and near the Klickitat River. Water for rearing anadromous fish at the Klickitat River hatchery is diverted from the river. New juvenile acclimation sites are being developed at Wahkiacus Hatchery that will disturb upland and riparian habitat near the stream channel. A diversion structure will also be built at this facility to provide water for acclimating hatchery smolts.

Other listed or candidate species that may be impacted by the construction and operation of the Wahkiacus Hatchery include:

Oregon Spotted Frog ( <i>Rana pretiosa</i> )	Candidate
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	Threatened
Northern Spotted Owl ( <i>Strix occidentalis</i> )	Threatened

Possible impacts to these species from construction or operation of new facilities have not been quantified.

### **15.3) Analyze effects.**

Bull Trout

Possible hatchery operational effects to listed bull trout in the Klickitat River are described below. The effects are expected to be on-going while the hatchery program remains in place.

*Water diversion:* Water is diverted from the Klickitat River for hatchery operations. This results in a decrease in the amount (0.25 miles) and quality of stream habitat at both the Wahkiacus and Klickitat River. The loss in habitat could result in a decrease in bull trout abundance. However, because bull trout are primarily found in the West Fork Klickitat River and tributaries higher in the Subbasin than the hatchery locations, impacts to bull trout are assumed minor.

*Diversion Screens:*

Klickitat River Hatchery: The Mitchell Act Intake and Screening Assessment (2002) identified design and alternatives needed to get existing diversion and screening structures in compliance with NOAA fish screening standards. From the assessment, YN has requested funding for future scoping, design, and construction work of a new intake system. Staff has not reported any bull trout entrained into hatchery facilities or impinged on screen surfaces.

Wahkiacus Hatchery: This facility will be equipped with screens that meet NMFS fry screening criteria.

*Waste and Pollutants:* Both facilities will operate under the “Upland Fin-Fish Hatching and Rearing” National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). The limitations listed in the permit are assumed to be protective of water quality and therefore the hatchery waste water is likely to have little impact on bull trout.

*Disease:* Outbreaks in the hatcheries may cause significant adult, egg, or juvenile mortality. Over the years, advances in rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Klickitat Hatchery. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) Chapter 5 have been instrumental in reducing disease outbreaks. Fish are planted and transferred after a fish health specialist has determined the populations' health. The level of indirect take of bull trout from disease is unknown.

*Broodstock Collection:* hatchery broodstock will be collected at traps located at Lyle Falls, Klickitat River Hatchery and Wahkiacus Hatchery. Although no bull trout have been collected in the past, the addition of new trapping facilities at Lyle falls and Wahkiacus Hatchery could result in the capture and handling of both bull trout juveniles and adults. Because the facilities will be designed to NMFS criteria, impacts to bull trout are expected to be minor. Any bull trout captured will be released unharmed to the stream.

*Acclimation Facilities:* New acclimation facilities are to be constructed at Wahkiacus Hatchery located at Rkm 27. The diversion structure will be screened to meet NMFS criteria for fry. Impacts to bull trout from the diversion structure are expected to be minimal.

*Release of Juveniles:* The program will release 4.0 million fall Chinook smolts, at a size range of 80-100 mm, into the Klickitat River each year.. If it assumed that Chinook can consume fish that are up to 33% of their body length, there is the possibility that bull trout less than 36 mm may be susceptible to predation (See section 2). Because fall Chinook smolts will not be released in the primary bull trout spawning stream (West Fork Klickitat River) it is unlikely that the hatchery smolts will prey on, or compete with, listed bull trout.

*Food:* The carcasses of returning hatchery fall Chinook adults will increase stream productivity which should result in an increase in food abundance for bull trout. Additionally, fall Chinook juveniles (both hatchery and wild) could provide a food source for adult bull trout.

*Monitoring and Evaluation:* Smolt trapping may be used to determine if hatchery fall Chinook migrate quickly through the system after release. Some bull trout may be captured and handled at the trapping facilities; these fish will be released unharmed to the stream.

#### Oregon Spotted Frog

Neither hatchery operations nor proposed new facilities are likely to adversely impact this species. The only known population of Oregon Spotted Frog in the Klickitat River Subbasin is located in the Conboy Lake National Wildlife Refuge (NWR) managed by USFWS (Klickitat Subbasin Plan 2002). The refuge is located approximately 10 miles east of Trout Lake and 7 miles southwest of Glenwood in the Glenwood Valley/Camas Prairie area.

#### Bald Eagle

Bald eagles can be found throughout the year in the Klickitat River Subbasin. Because this species feeds on salmon, increased hatchery production should result in an increase in food for this species as a result of more adult fish returning to the Subbasin. Bald eagle surveys will be conducted prior to constructing any new facilities in the Subbasin.

#### Northern Spotted Owl

No impacts are expected to spotted owls because the existing facilities and the proposed facilities are not located in spotted owl habitat.

### **15.4) Actions taken to minimize potential effects.**

#### Bull trout

*Diversion Screens:* All intake screens will be updated to meet NMFS screen criteria for fry.

*Waste and Pollutants:* All terms associated with the NPDES Permit will be implemented and followed.

*Broodstock Collection:* Any juvenile or adult bull trout captured during broodstock collection activities will be returned safely to the stream channel. Trapping facilities will be designed to meet NMFS standards.

*Acclimation Facilities:* These facilities will be sited to reduce impacts to riparian and stream habitats to the extent possible. The YN will coordinate the location and construction of this facility with USFWS staff to minimize or avoid impacts to all listed species.

*Monitoring and Evaluation:* Bull trout collected during juvenile trapping operations will be released unharmed to the stream.

#### Oregon Spotted Frog

Prior to constructing any facility, stream and riparian areas near proposed sites will be surveyed for the presence Oregon Spotted Frogs. If this species is found, the YN will coordinate with USFWS staff to develop mitigation and protection measures. This activity will be further in the EIS required for a Step 2 project.

#### Bald Eagle

Acclimation facilities will not be located near bald eagle nests.

#### Northern Spotted Owl

No activities are proposed that will impact this species because no facilities or activities are planned for areas inhabited by spotted owls or which are suitable spotted owl habitat.

### **15.5) References**

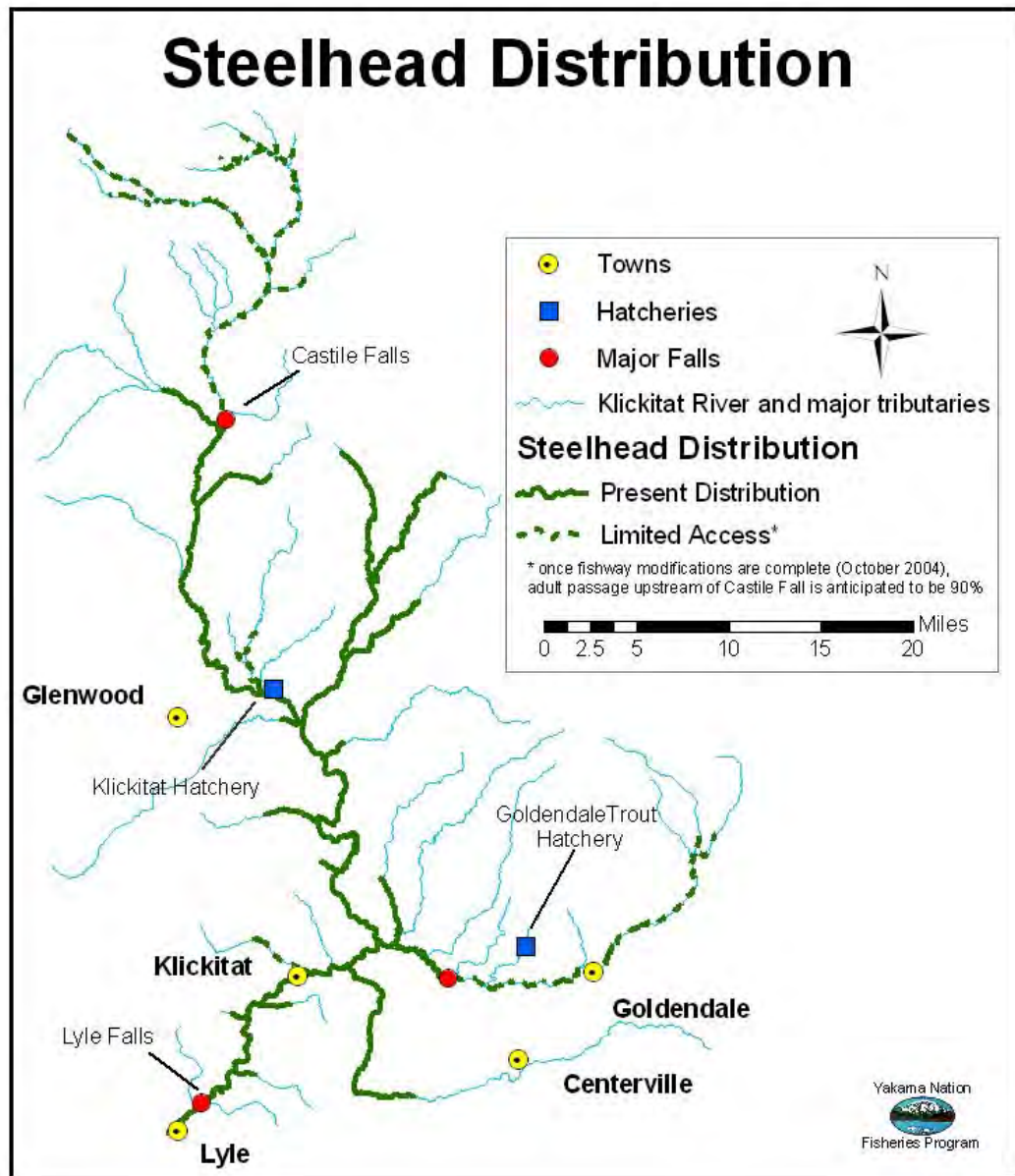
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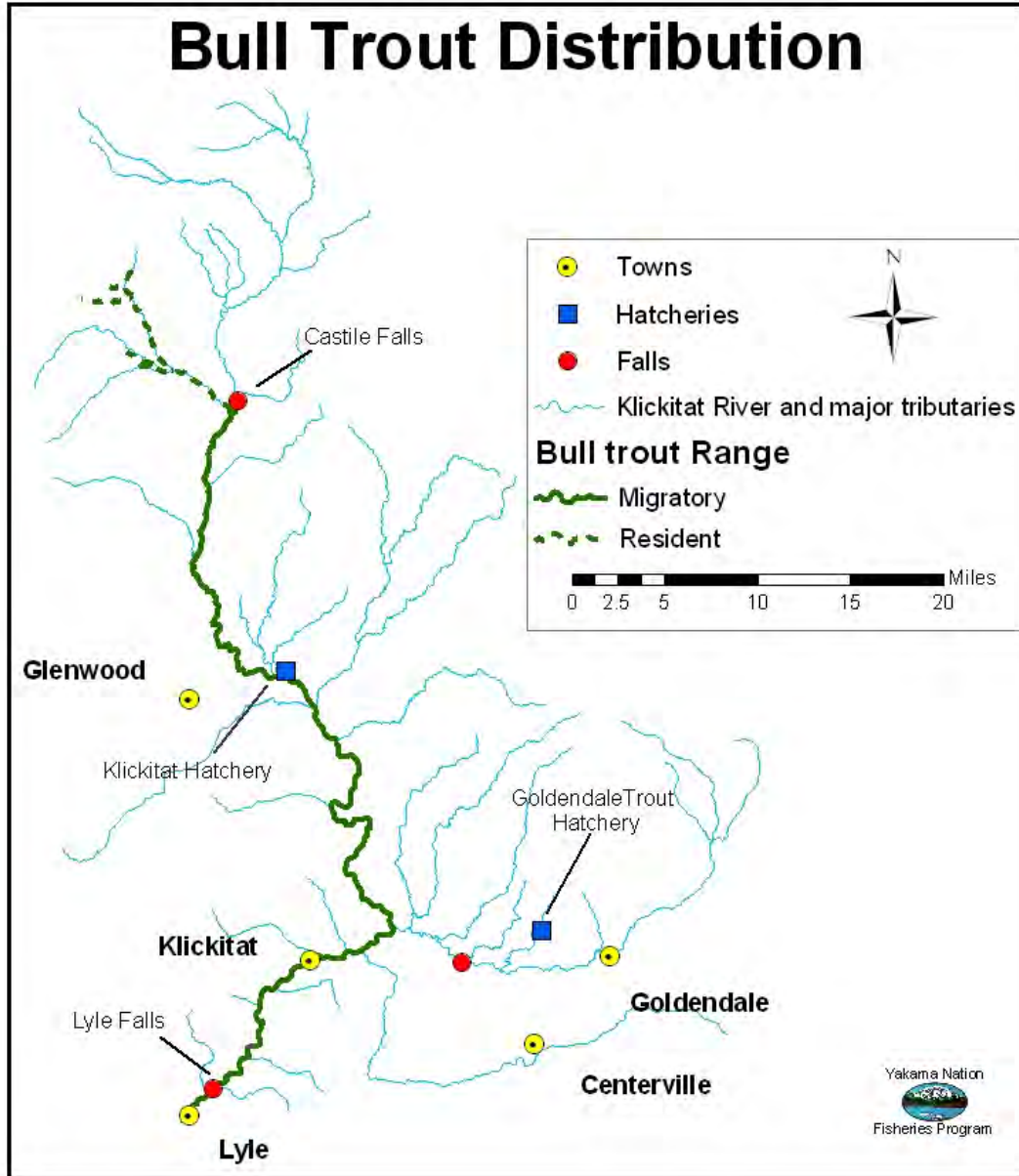
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## Appendix A- Steelhead and Bull Trout Distribution

### Steelhead Distribution



## Bull Trout





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