

# **Klickitat Hatchery Complex - Coho**

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

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Hatchery Program	<i>Klickitat Hatchery Complex - Coho</i>
Species or Hatchery Stock	<i>Oncorhynchus kisutch "Type N" Coho Salmon</i>
Agency/Operator	<i>Yakama Nation</i>
Watershed and Region	<i>Klickitat Subbasin/Columbia Gorge Province</i>
Date Submitted	<i>August 2011</i>
Date Last Updated	<i>August 2011</i>

## Section 1: General Program Description

### 1.1 Name of hatchery or program.

Wahkiacus Hatchery (Klickitat River) Type N Coho

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

Type N Coho (*Oncorhynchus kisutch*)

ESA Status: Not listed

### 1.3 Responsible organization and individuals.

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

Co-operators	Role
National Marine Fisheries Service (NMFS)	Manager of Mitchell Act Funds
United States Fish and Wildlife Service (USFWS)	Fish Health

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

Funding Sources	
Mitchell Act	
Operational Information	Contract Number NA06NMF4360230
Full time equivalent staff	5 existing employees (1-2 new seasonal)
Annual operating cost (dollars)	\$87,000 (NPCC Step-1 estimate)

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

Broodstock source	Klickitat River
Broodstock collection location (stream, Rkm, subbasin)	Klickitat Hatchery (Rkm 68) Wahkiacus Hatchery Acclimation Facility (Rkm 27), Lyle Falls (Rkm 3.5)
Adult holding location (stream, Rkm, subbasin)	Wahkiacus Hatchery Acclimation Facility (Rkm 27)
Spawning location (stream, Rkm, subbasin)	Wahkiacus Hatchery Acclimation Facility (Rkm 27)
Incubation location (facility name, stream, Rkm, subbasin)	Washougal River Hatchery
Rearing location (facility name, stream, Rkm, subbasin)	Washougal River Hatchery Wahkiacus Hatchery Acclimation Facility (Rkm 27)

**1.6 Type of program.**

Segregated Harvest (Convert to Local Broodstock)

Coho never successfully exploited the Klickitat River Subbasin to a great degree, but were introduced in 1952 to achieve harvest obligations. Current coho returns are from smolts produced by lower Columbia River hatcheries and released in the Klickitat River Subbasin. Since 1987, the YN estimates that the number of coho returning to the Subbasin has averaged 5,500 fish annually. The combined annual harvest of Klickitat River coho in all fisheries is estimated to average 15,700 fish between 1987 and 2005. The harvest rate has been 95% due primarily to terminal fisheries within the Subbasin that account for 84% of the harvest.

There is no natural production goal for Klickitat River coho because this species is not native to the Subbasin. There are no plans to establish a viable naturally spawning population. The goal is, however, to establish a locally adapted, segregated hatchery population while minimizing potential negative impacts to native fish species.

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

The primary objective of the coho program is to provide fish necessary to support Tribal fisheries mandated by federal court orders and treaties. The objective is to produce a total of 14,000 coho for harvest in all fisheries, with the majority of the harvest to occur in Tribal fisheries in Zone 6 and the Klickitat River.

- To produce coho salmon to help mitigate for fish losses due to activities, such as federal dam construction, within the Columbia River Basin that have decreased salmonid populations. Coho smolts released into the

Klickitat Subbasin are solely for harvest opportunity.

- To benefit sport and tribal fisheries at the mouth of the Klickitat River, in-river sport fisheries, and mixed stock ocean fisheries.

The hatchery strategy calls for the implementation of a segregated harvest program that uses coho returning to the Klickitat River as broodstock. The actions proposed to achieve the conservation and harvest goals for coho are:

- Reduce hatchery production from 3.7 to 1.0 million juveniles
- Eliminate all out-of-Subbasin coho transfers over time
- Convert to the use of locally adapted broodstock
- Eliminate the direct planting of Washougal River origin coho to the mainstem Klickitat River (necessary to increase SAR and reduce hatchery production)
- Develop the Wahkiacus Hatchery and Acclimation Facility (WHAF) to allow for the implementation of acclimation and volitional release strategies that are necessary to be able to reduce production by 2.7 million juveniles.

The plan will be implemented in 3 phases. Reduction of hatchery production will constitute Phase 1, while conversion to locally adapted broodstock will occur in Phase 2. Construction and operation of WHAF is a necessary to implement Phase 1. Phase 3 will comprise all broodstock collection, incubation, and rearing within the Klickitat River Subbasin. Reduction of out-of-Subbasin fish transfer should occur over time and should decrease negative impacts of the coho program on other fish species.

The harvest strategy will be tailored to each phase:

Phase 1: No change in harvest regulations or seasons is proposed. In-basin Klickitat River selective fisheries for coho will not be implemented as the program does not call for establishment of a self-sustaining run of coho in the Subbasin.

Phase 2: Fisheries will be operated in a manner that ensures that the 750 hatchery adult escapement target is met each year. To reduce effects on fisheries, the escapement target may also be achieved through the manipulation of river flow passing through the updated Lyle Falls Fishway. By controlling the amount of flow passing through this fishway, managers may be able to attract and capture more adults for use as broodstock.

Phase 3: Fishing regulations will be developed that best fit the implementation strategy.

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

- The coho production program is funded through the Mitchell Act via NMFS "To provide for the conservation of the fisheries resources of the Columbia River, establishment, operation, and maintenance of one or more stations in

Oregon, Washington, and Idaho, and for the conduct of necessary investigations, surveys, stream improvements, and stocking operations for these purposes." The "Mitchell Act" (Act) (Public Law 75-502) was passed in 1938 concurrent with legislation enabling the construction of the Federal Columbia River Hydropower System.

- Federal Court Decisions (US vs. Oregon and US vs. Washington) ruled that Indian Tribes who signed treaties with the federal government in the 1850s have treaty rights to harvest a share (50%) of surplus fish resources.
- Yakima/Klickitat Fisheries Project (YKFP or Project)
- Pacific Northwest Electric Power Planning and Conservation Act.
- Columbia River Fisheries Development Program
- Columbia River Fish Management Plan

In order to minimize impact on listed fish by YN facilities operation and the Klickitat N (north-migrating) coho program, the following Risk Aversion Measures are included in this HGMP:

**Summary of risk aversion measures for the Klickitat N Coho program.**

<b>Potential Hazard</b>	<b>Risk Aversion Measures</b>
Water Withdrawal	Water rights will be formalized through a trust water right with the Department of Ecology. Monitoring and measurement of water usage will be reported in monthly NPDES reports.
Intake Screening	YN has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (per guidelines in <a href="http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish%20Passage%20Design.pdf">http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish Passage Design.pdf</a> ).
Effluent Discharge	Both the Klickitat Hatchery and WHAF facilities will be operated under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-5002.
Broodstock Collection & Adult Passage	Broodstock will be collected at Wahkiacus, Lyle Falls, and Klickitat Hatchery.
Disease Transmission	<i>Fish Health Policy in the Columbia Basin.</i> Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, <i>Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries</i> (Genetic Policy Chapter 5, IHOT 1995).

Competition & Predation	Coho will be released relatively low in the Klickitat Subbasin at Rkm 27. Fish will be released volitionally to foster rapid migration out of the Subbasin.  Gill ATP-ase samples will be collected on the juveniles to document smoltification levels.
Harvest	All coho will be adipose-clipped so that selective fisheries practices will be effective.

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

See HGMP Section 1.10

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

**1.10.1 Benefits:** Note: Some sections apply to the broodstock program at Washougal Hatchery.

Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
Assure that hatchery operations support 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.  Maintain a combined average annual harvest (ocean, Columbia River, and Klickitat basin) of approximately 14,000 coho.	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Smolt-to-Adult Survival (SAR)	Achieve an SAR of 2% to the Klickitat River Subbasin.	SAR will be determined by counting tagged fish recovered at traps, broodstock collection facilities, sport and tribal fisheries and on the spawning grounds.
Adult Straying	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
Maintain outreach to enhance public understanding, participation and support of YN 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.  Maintain effective population size.	Attempt to collect 750 adults from 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.  Adhere to WDFW spawning guidelines. (Seidel 1983)  Adhere to WDFW stock transfer guidelines during Phase 1. (WDFW 1991)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (100% adipose-fin clip) for targeted fisheries with additional groups Ad+CWT (100,000 cwt) for evaluation purposes	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 (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	USFWS Fish Health Section inspect adult broodstock yearly for pathogens at Washougal Hatchery and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed 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.



Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
	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
	Inspection of adult broodstock for pathogens and parasites.	At spawning, adult broodstock in lots of 60 fish are to be examined for pathogens
	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 (15.0 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark fish for targeted fisheries.	Monitor size, number, date of release and mass 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 USF&WS Lower Columbia River Fish Health Center 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 will meet state and federal guidelines when 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.	Identified in HGMP and Biological Opinion for hatchery operations.
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).**

Broodstock collection currently occurs at Washougal Hatchery. The program will require about 750 adults to produce 1,000,000 smolts. (1:1 Male to Female ratio). Broodstock collection activities will occur in the future at Wahkiacus and Klickitat hatcheries and possibly Lyle Falls.

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

Age Class	Max. No.	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Current Yearling	1,000,000	15.0	May	Klickitat	RKm 68	Klickitat	Columbia Gorge
Yearling	2,700,000				< RKm 3.5		
Phase 1-2 Yearling	1,000,000	15.0	May	Klickitat	RKm 68	Klickitat	Columbia Gorge
Phase 3 Yearling	1,000,000	15.0	May	Klickitat	RKm 27	Klickitat	Columbia Gorge

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

Table 1.12.1. Washougal Releases from Klickitat Hatchery.

Brood Year	SAR (%)	Total Catch*
1988	1.69	16,562
1989	0.55	5,300
1990	0.13	1,200
1991	0.13	1,200
1992	0.10	980
1993	Na*	Na*
1994	0.07	680
1995	0.01	98
1996	0.01	98
1997	0.06	580
1998	0.47	4,600
1999	0.74	7,200
2000	Na*	Na*
2001	Na*	Na*
2002	Na*	Na*
2003	Na*	Na*
Avg.	.30%	2,900

Data Source:

[http://wdfw.wa.gov/hat/hgmp/pdf/lower\\_columbia/coho/klickitatcohonwonstation.pdf](http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/coho/klickitatcohonwonstation.pdf)

Brood Year	SAR (%)	Total Catch*
1988	Na*	Na*
1989	Na*	Na*
1990	Na*	Na*
1991	Na*	Na*
1992	Na*	Na*
1993	Na*	Na*
1994	0.05	1,200
1995	0.05	1,200
1996	0.20	4,900
1997	Na*	Na*
1998	Na*	Na*
1999	0.22	5,300
2000	0.15	3,600
2001	Na*	Na*
2002	Na*	Na*
2003	Na*	Na*
Avg.	.13%	3,240

Data Source:

[http://wdfw.wa.gov/hat/hgmp/pdf/lower\\_columbia/coho/klickitatcohonwoffstation.pdf](http://wdfw.wa.gov/hat/hgmp/pdf/lower_columbia/coho/klickitatcohonwoffstation.pdf)

\* data not available

Historically, coho escapement estimates have not been developed.

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

The first year of operation for this hatchery was 1951. The *U.S. v. Oregon* Columbia River Fish Management Plan has mandated releases of up to 4.0 million coho in the river annually since 1988. Current production levels are consistent with production tables in the 2008-2017 *U.S. v. Oregon* Management Agreement.

The conversion to local broodstock is expected to begin in 2009. The actual conversion rate will depend on run-size back to the Subbasin.

### 1.14 Expected duration of program.

The program is on-going with no planned termination at this time. However, the YN will explore opportunities to eliminate the program if harvest goals can be achieved outside of the Subbasin.

### 1.15 Watersheds targeted by program.

Klickitat Subbasin/Columbia Gorge Province

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

#### 1.16.1 Potential Alternatives:

The alternatives considered for implementation, but rejected, are presented

below. More detailed rationale for rejecting the alternatives can be found in the revised Klickitat River Anadromous Fisheries Master Plan (Yakama Nation 2008, *in draft*).

**Alternative 1-** Maintain Existing Program: Risks to ESA-listed steelhead and bull trout were not acceptable and can be avoided; therefore this alternative was not selected for implementation.

**Alternative 2-** Eliminate Program: This alternative does not meet tribal harvest goals and *U.S. v Oregon* agreements and was therefore was not considered for implementation.

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

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

This program is included in the Klickitat River Anadromous Fisheries Master Plan (Yakama Nation 2008 *in draft*). An EIS will be prepared for the Master Plan in 2008. At that time, all hatchery actions will be reviewed and approved by the regulatory agencies.

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.

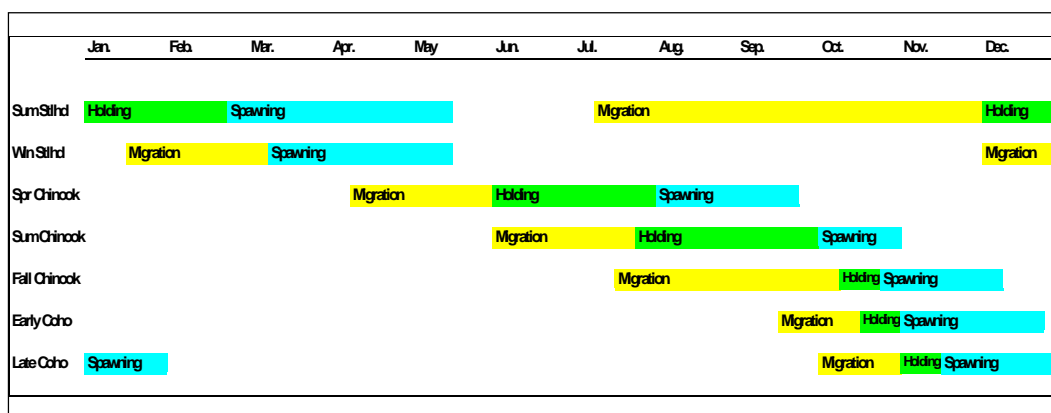
### **2.2 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.**

The following ESA-listed natural salmonid populations occur in the Subbasin where the program fish are released:

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. Steelhead spawning is concentrated between Rkm 8 and 80. Tributary spawning occurs in Swale, Snyder, Dead Canyon, Summit and White Creeks, the lower Little Klickitat River, and other small tributaries.

Klickitat River bull trout life-history characteristics are not well understood. Research is on-going to collect more data on this species. Bull trout are found in the West Fork and many of its tributaries. Electro-fishing work has shown that bull trout in the West Fork are likely resident, based on the size of fish collected

(~ 10 inches). Falls on the West Fork likely isolate most of the resident bull trout population from the mainstem Klickitat River.

Based on limited data, it appears that an adfluvial population of bull trout may be present in the lower Klickitat River below Lyle Falls. Additional work is ongoing to determine bull trout abundance and distribution in the lower river.

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 populations will be directly affected by this program.

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

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

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

**Describe the status of the listed natural population (s) relative to “critical” and “viable” population thresholds.**

**Middle Columbia River Steelhead (*Oncorhynchus mykiss*) 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. Numerous confirmed and anecdotal reports of bull trout exist 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. 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 (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.**

No direct take of listed fish populations occurs for this program. Program risks are described below:

#### ***Broodstock Program***

*Broodstock Collection:* To be performed at Wahkiacus, Lyle Falls, and Klickitat Hatchery. Risks to listed steelhead or bull trout from broodstock collection are expected to be minimal as neither species is present when coho adults return to hatchery facilities.

*Genetic introgression:* Coho are not believed to be native to the Klickitat watershed because Lyle Falls (Rkm 3.5) was impassable to coho at the time the adults arrived in the late summer and early fall. This stock is of non-native origin and is sustained by hatchery production. Since 1988, Type N coho smolts from Washougal Hatchery and Klickitat Hatchery have been released. These releases have resulted in a small population of naturally spawning fish.

#### ***Rearing Program***

*Operation of Hatchery Facilities:* Water rights are formalized through trust water rights from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports. Intake structures were designed

and constructed to specifications current at the time the Klickitat facility was constructed. NOAA ([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 get existing structures including intake screens and velocity sweeps into compliance with NOAA fish-screening standards. From the assessment, WDFW has been requesting funding for future scoping, design, and construction work of a new intake system. All Subbasin facilities 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 for the Klickitat Hatchery facility are available from DOE.

*Water diversion:*

Wahkiacus Hatchery Acclimation Facility: This new facility will divert a maximum of 24 cfs from the mainstem Klickitat River (maximum occurs in May). The diversion will reduce river flow in 0.25 miles of the stream by about 1%.

*Water Diversion Screening:*

Wahkiacus Hatchery Acclimation Facility: The water diversion at this site will be screened according to NMFS criteria for fry; therefore injury or mortality to listed species is expected to be negligible.

*Disease:* Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, 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 1995) Chapter 5 have been instrumental in reducing disease outbreaks. Fish are planted and transferred after a fish health specialist has determined the 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 salmonids 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 size; 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, are of the opinion that juvenile salmonids can consume prey up to approximately one-third 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 environment.

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.

Risk Factors:

Date of Release: The release date can influence the likelihood that listed species are encountered. Coho will be released in early May, which is near the start of steelhead emergence from the gravel. Because coho smolts are unlikely to use the shallow low velocity habitat preferred by steelhead fry, impacts due to predation and competition should be minor.

Fish Size at Release: Based on the 'up to 33%' of body length predation assumption put forward by NMFS and USFWS, and a coho size of release range of 130-150 mm, hatchery coho may consume listed steelhead that are up to 43-50 mm in length. During release period (May), the majority of steelhead juveniles present in the system are expected to be 1+ smolts that are generally larger than 80 mm. These fish are considered to be too large to be consumed by hatchery juvenile coho.

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. By Phase 3, coho will be released voluntarily from rearing sites located at Rkm 27. Based on data collected in the Cowlitz River (Harza 1998), coho smolts are likely to migrate approximately 25 kilometers per day. At this migration rate, coho should take from 1 to 7 days to migrate out of the Subbasin. The small amount of time the hatchery fish are present in the Klickitat River should reduce possible competition and predation effects to listed fish species.

**Residualism:** To maximize smolting characteristics and minimize residualism, a combination of acclimation, volitional release strategies, size, and time guidelines will be applied to coho released in the Klickitat River. The following actions will be taken reduce residualism:

- Fish Condition factors, standard deviation and co-efficient of variation (CV) on lengths of fish will be measured throughout the rearing cycle and at release.
- Feeding rates and regimes throughout the rearing cycle will be programmed to satiation feeding to minimize size variations and re-programmed as needed to achieve goals for smolt size at time of release.
- Releases will occur within the typical migration period for wild coho in the Columbia River Basin (May).
- Fish will be released volitionally from acclimation ponds to ensure good smoltification and quick migration from the system. ATP-ase data will be collected to confirm the onset and pace of smoltification.

**Migration Corridor/Ocean:** The Columbia River hatchery production ceiling of approximately 197.4 million fish (1994 release levels) called for in the Proposed Recovery Plan for Snake River Salmon 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 hatchery 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. 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 production 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. The lack of studies appears to be due, in part, to the dynamic nature of fish rearing conditions in the ocean and an inability to measure.

**Monitoring:**

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.

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 for updated tables.

[http://ykfp.org/klickitat/Library/Klickitat%20Spring%20Chinook\\_HGMP\\_YFKP\\_updated\\_May2011.pdf](http://ykfp.org/klickitat/Library/Klickitat%20Spring%20Chinook_HGMP_YFKP_updated_May2011.pdf)

**Research:**

No research program is associated with the coho hatchery program.

**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).**

Data on the take of listed species are presented in the following table. It is anticipated that up to 50 steelhead adults may be handled at upstream trapping facilities. It must be noted that natural-origin steelhead will also be collected for the Klickitat River Hatchery Steelhead Program. As long as both hatchery programs are operational, impacts to adult steelhead will be shared. If the steelhead program were to be discontinued, then the 50 adult take would apply only to the spring Chinook program.

**Estimated listed salmonid take levels by hatchery activity.**

**Steelhead**

<i>ESU/Population</i>	Middle Columbia River Steelhead
<i>Activity</i>	Klickitat Hatchery Coho Program
<i>Location of hatchery activity</i>	Klickitat R. Hatchery
<i>Dates of activity</i>	Yearly
<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*	50**	
Capture, handle, tag/mark/tissue sample, and release (d)				
Removal, e.g. broodstock (e)				
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 collection facilities at Lyle Falls and Castile Falls. 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 or handling of listed steelhead that exceeds the values shown above will be communicated to Fish Program staff for additional guidance. The YN Senior Fisheries Biologist, along with the Hatchery Complex Manager, will determine an appropriate plan of action through consultation with NOAA. With the exception of unusual events that could not be forecasted, take limits will not be exceeded without prior approval from NOAA.

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

Because few steelhead or bull trout are expected to be migrating when coho adults are being collected, broodstock collection activities impacts to either species should be minor to negligible.

### **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 coho 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 Report
- 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).
- Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan. Corrected Version November 30, 2009 (NMFS 2009).
- 2008 Columbia Basin Fish Accords Memorandum of Agreement between the Three Treaty Tribes and FCRPS Action Agencies

For statewide hatchery plan and policies, hatchery programs in the Columbia system adhere to a number of guidelines, policies, and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies, and permit requirements that govern Columbia hatchery operations for the production of coho in the Klickitat River:

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

*Hatchery Reform: Principles and Recommendations of the Hatchery Scientific Review Group (HSRG):* Provides guidance on hatchery operations and their impacts to native salmon populations. The program is using HSRG recommendations for broodstock management.

*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).

*Spawning Guidelines*: provides guidance on the mating and spawning protocols followed at WDFW hatcheries (Seidel 1983).

*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. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Fish Policy Chapter 5, IHOT 1995).

*National Pollutant Discharge Elimination System Permit Requirements* 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. v. 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)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Subbasin 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 release of 3.85-million coho in the river annually since 1988. With these releases, sales of coho have provided a steady contribution to tribal commercial fall season fisheries.

The Klickitat River coho program provides fish for harvest in marine and freshwater areas as documented in the 2008-2017 *U.S. v Oregon* Management Agreement and related biological opinion (NMFS 2008). A summary of harvest

by area is shown below (See Appendix B for yearly data).

**Average Yearly Harvest Numbers For Klickitat River Origin Hatchery Coho (1987-2005)**

Fishery Location	Number of Fish Caught
Marine	8,460 (mark-selective sport fishery for adipose-clipped hatchery fish)
Lower Columbia River	2,465 (mark-selective sport fishery for adipose-clipped hatchery fish)
Klickitat River	4,576 (all terminal fisheries non-selective)

The reduction in program size from approximately 3.7 million to 1.0 million is likely to reduce harvest benefits over the short-term. It is anticipated that by producing higher quality smolts, and using acclimation techniques proven effective in the Yakima River, survival rates of released fish will increase to make up for this possible loss. However, if harvest goals are not met, direct plant releases into the lower Klickitat River of pre-smolts from Washougal stock may resume. The actual number of additional releases will be determined by the performance (adult return numbers) of the new program and the estimated number of additional juveniles needed to meet the harvest goals of the program.

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

For coho, natural production is not an objective because it was unlikely that coho spawned above Lyle Falls in the past.

Coho production and harvest objectives have been considered in the following documents.

*Klickitat Sub basin 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

*Klickitat River Anadromous Fisheries Master Plan (2008 in draft):* This document describes actions needed to protect and restore stream habitat in the Klickitat River as well as the basis for hatchery operations.

*Yakama Nation Fisheries Program (YNFP):*

The Lower Klickitat Riparian and In-Channel Habitat 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 exclusion 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 prioritization restoration activities.

*Subbasin Planning and Salmon Recovery:*

A regional sub-basin planning process is a broad-scale initiative that will provide building blocks of recovery plans for listed fish. The spring Chinook hatchery program is designed to be consistent with the goals identified in this plan (NPPC 2004).

*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). Habitat and hatchery actions will be coordinated as part of Subbasin planning.

*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.**

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

Klickitat coho smolts can be preyed upon through the entire migration corridor from the Subbasin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays along the Columbia mainstem sloughs can prey on coho smolts. Avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons, and night herons can also prey on coho smolts. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters, and Orcas.

*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: including 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 this effect difficult. YN is unaware of studies directly evaluating adverse ecological effects to listed salmon. Ecological interactions were discussed further in 2.2.3.

*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 coho.

*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, night herons, harbor seals, sea lions, river otters, beaver, and killer whales (Orcas). Additionally, salmon carcasses act as a source of fertilizer that can benefit plants that 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.

A Klickitat River surface water right permit for the Wahkiacus Hatchery and Acclimation Facility has been obtained (S4-34554P) from the Washington DOE. Water for rearing may also include a combination of shallow wells and this non-consumptive river water.

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>New water permits will be obtained from the DOE for the Wahkiacus Hatchery Facility and Acclimation Ponds. The maximum amount of river water to be diverted in any month will be 24 cfs, or ~ 1% of total stream flow. The water right will be for non-consumptive use.</p> <p>Monitoring and measurement of water usage is reported in monthly NPDES reports.</p>
Intake/Screening Compliance	Intake structures at the WHAF facility will be designed and constructed to NMFS specifications.
Hatchery effluent discharges. (Clean Water Act)	<p>All hatchery 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 at this facility, and compliance records will be available from DOE.</p> <p>Discharges from the cleaning treatment system will be 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>
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## **Section 5. Facilities**

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

Broodstock will be collected at Wahkiacus, Lyle Falls, or the Klickitat Hatchery. Fish will be collected randomly throughout the entire coho adult migration period.

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

1 million pre-smolts will be transported by truck to Wahkiacus for acclimation/release from the Washougal Hatchery using protocols identified in Hager and Costello (1999). These fish transfers will continue through Phase 1 as coho will be reared at Washougal Hatchery and brought back for acclimation and release. The transport of out-of-basin coho will be eliminated in Phases 2 and 3 of project implementation.

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

New broodstock holding and spawning facilities will be incorporated into the Wahkiacus Hatchery (See *draft* Klickitat River Anadromous Fisheries Master Plan for detailed description [Yakima Nation 2008])

### **5.4 Incubation facilities.**

Washougal Hatchery's incubation facilities (see Washougal River Type N coho HGMP) would be used for Phases 1 and 2 of project implementation. New facilities would be developed in the basin at Wahkiacus under Phase 3 of project implementation (See Klickitat River Anadromous Fisheries Master Plan [Yakama Nation 2008])

### **5.5 Rearing facilities.**

Washougal Hatchery's rearing facilities (see Washougal River Type N coho HGMP) would be used for Phases 1 and 2 of project implementation with final rearing and release at Klickitat Wahkiacus Hatchery. In Phase 3, coho pre-smolts will be reared at acclimation facilities located at the new Wahkiacus facility.

Wahkiacus Facility Description:

30% conceptual plans call for fish ladder and adult collection (7' 6" wide, 41' long, 10' high with 3-5 feet water depth), eight concrete jumbo raceways for acclimation (20' 8" wide, 90' long, 8' high, 4-6', water depth). Raceways will

have over structure to provide cover and shading. Outlet structures will be equipped with dam boards to control water levels and screens that prevent fish escape

## 5.6 Acclimation/release facilities.

See 5.5.

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

This site does not yet exist; data are not available.

## 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.

Potential Hazard	Risk Aversion Measure
Equipment failure/Water loss	See below
Flooding/Water Loss	<p>The facility is sited to minimize the risk of catastrophic fish loss from flooding and equipped with low water alarm probes in strategic locations to prevent fish mortality due to loss of water. Alarm systems will be monitored 24/7 with staff available on-station to respond to problems.</p> <p>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, ponds cleaned, and repaired.</p>
Disease Transmission	<p>USFWS fish health guidelines will be followed. USFWS fish health pathologist will conduct inspections monthly and problems are managed promptly to limit mortality and reduce possible disease transmission.</p>

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

### **6.1 Source.**

Washougal Hatchery will be the brood source for Phase 1. In Phases 2 and 3, the program will use local-origin coho adults returning to the Klickitat River.

### **6.2.1 History.**

The Hatchery program began with local stocks and some imported Toutle "Early" stock coho in 1958-59. In 1985, late stock coho were introduced from the Cowlitz Salmon Hatchery. Since that time, in most years, production has been a composite of late run Washougal and Lewis River Type N Coho.

Please WDFW's Washougal Type "N" Coho HGMP for additional information.

### **6.2.2 Annual size.**

Approximately 750 adults will be needed for broodstock. The number of adults collected will depend on female fecundity and pre-spawn mortality rates.

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

The program will be managed as a segregated hatchery program. The local brood program will be managed neither to include nor exclude natural-origin fish from brood stock.

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

No indigenous stock of coho exists in the Klickitat River.

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

Local broodstock are expected to possess the life-history traits and behavior necessary to better survive and return to the Klickitat River Subbasin.

### **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.**

Adult trapping is monitored daily for incidental capture of listed steelhead and bull trout; ESA-listed fish are identified and quickly returned to the river.

The new Lyle Falls fish ladder and trapping facility will be designed to meet NMFS fish handling criteria. Following these guidelines should reduce impacts to listed fish.

No genetic effects are expected because as coho are not native to the Subbasin.

## **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 randomly throughout the entire run. Initially, adults will be collected at the Washougal Hatchery, then at Wahkiacus, Lyle Falls and (possibly) the Klickitat Hatchery as the program is converted to local broodstock in phases 2 and 3 of project implementation.

## **7.3 Identity.**

Washougal- (Phase 1) and Klickitat- (Phases 2 and 3) origin coho. The long-term goal is to maintain a run of hatchery adults returning to the Klickitat River.

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

750 adults

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

Surplus hatchery fish will be given to tribal members or used as part of a stream nutrient enhancement program for the Subbasin.

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

The transport protocols defined in Hager and Costello (1999) will be followed. Transport time from trapping facilities to the adult holding ponds will be less than 1 hour.

In the future, adult coho will be held on river water at the Wahkiacus Hatchery. Adults will be injected with Erythromycin-200 at a dosage of 20-30 mg/kg of body weight upon capture and may receive additional treatments during holding depending on disease presence.

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

Transported adults will be injected with Erythromycin-200 at a dosage of 20-30 mg/kg of body weight upon capture (Hager and Costello 1999).

## **7.8 Disposition of carcasses.**

Carcasses will either be frozen and used for nutrient supplementation activities or buried in an upland landfill.

## **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.**

No genetic effects are expected to natural coho stocks because coho are not native to the Subbasin. Ecological risks to listed steelhead and bull trout are expected to be minimal because these species are generally not present at collection facilities during the adult coho migration period. Until the Wahkiacus facility is constructed, it is not known whether adult steelhead or bull trout will be impacted by WHAF operations.

## ***Section 8. Mating***

### **8.1 Selection method.**

Cohorts will be taken from the entire run cycle. Mating will be done randomly with the males and females available on a given day.

### **8.2 Males.**

Males will be utilized at a 1:1 spawning ratio whenever possible. No mini-jacks will be used as broodstock for the program.

### **8.3 Fertilization.**

Eggs will be mixed with milt and water hardened with iodophor at a 1:600 concentration.

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

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.**

See Washougal or Lewis River Type N coho HGMP for current risks.

As coho are not listed in the Klickitat River, no genetic or ecological risks are expected from the future program.

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

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

Currently (through Phase 1 of implementation), eggs for this program are taken at the Washougal Hatchery (see Washougal River Type N coho HGMP).

Future program (phases 2 and 3) will collect eggs from adults returning to the Klickitat Subbasin. The number of eggs collected will be sufficient to produce 1.0 million smolts. Actual egg-take will be based on resulting survival rates for adult holding, collection, fecundity, egg transport, incubation, and rearing.

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

For the Wahkiacus Hatchery, surplus eggs may result from unexpected variability in female fecundity or pre-spawn survival rates. Surplus eggs from HOR-origin fish will be destroyed and buried in the upland landfill.

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

See Washougal Type N Coho HGMP for initial program.

Will be developed for the Wahkiacus Hatchery if a decision is made to move forward with conducting incubation activities within the Subbasin.

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

See Washougal Type N Coho HGMP for initial program.

Will be developed for the Wahkiacus Hatchery if a decision is made to move forward with conducting incubation activities within the Subbasin. These are expected to be similar to those used at the Washougal River Hatchery.

#### **9.1.5 Ponding.**

See Washougal Type N Coho HGMP for initial program.

Will be developed for the Wahkiacus Hatchery if a decision is made to move forward with conducting incubation activities within the Subbasin.

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

See Washougal Type N Coho HGMP.

Will be developed for the Wahkiacus Hatchery if a decision is made to move forward with conducting incubation activities within the Subbasin.

#### **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.**

See Washougal Type N Coho HGMP

Will be developed for the Wahkiacus Hatchery if a decision is made to move forward with conducting incubation activities within the Subbasin.

#### **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 (1990-2001), or for years dependable data are available.**

See Washougal Type N Coho HGMP

Will be developed for the Wahkiacus Hatchery if a decision is made to move forward with conducting incubation activities within the Subbasin.

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

See Washougal Type N Coho HGMP

Will be developed for the Wahkiacus Hatchery if a decision is made to move forward with conducting incubation activities within the Subbasin.

#### **9.2.3 Fish rearing conditions.**

Currently fish are transferred from Washougal Hatchery and ...

In Phase 3 fish will be transferred from Washougal Hatchery to the Wahkiacus Hatchery in March and reared on primarily river water for approximately 8 weeks. The fish will then be released volitionally from the ponds. Pond water temperatures will mimic river temperatures, which vary seasonally.

Half of the ponds are expected to be vacuumed each week, and all ponds just

prior to fish release. Wastes will be sent to a settling pond. The ponds have been sized to easily hold pond effluent and cleaning wastes. The volume of effluent handled will be approximately 62,000 gallons per cleaning.

Fish will be fed to satiation daily and checked for signs of disease as well as behavior indicative of smoltification. ATP-ase samples will be collected from a random sample of fish starting in April each year.

**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.**

Please see WDFW's Washougal Type "N" Coho HGMP.

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

Please see WDFW's Washougal Type "N" Coho HGMP.

**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).**

Please see WDFW's Washougal Type "N" Coho HGMP.

**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 on visual detection of pathological signs, 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. Mortality is 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 (as 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. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.
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**9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.**

ATPase data will be collected to determine fish condition and release dates at the new Wahkiacus Hatchery.

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

Cover and substrate will be incorporated into the acclimation ponds.

**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.

Age Class	Max. No.	Size (fpp)	Release Date	Location			
				Stream	Release Point (Rkm)	Major Water-shed	Eco-province
Yearling	1,000,000	15	May	Klickitat River	27	Klickitat	Columbia Gorge

See also 1.11.2.

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

In phases 1 and 2,) and phase 3, fish are to be released from a new acclimation site located at Rkm 27 (Wahkiacus Hatchery). However, if harvest goals are not met, scaled direct plant releases into the lower Klickitat River of pre-smolts from Washougal stock may resume.

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

A total of 1.0 million coho will be released at 15 fpp.

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

Fish will be allowed to migrate volitionally from the acclimation sites starting in May. Fish that do not leave the ponds volitionally will be collected, destroyed, and buried in upland landfill area.

### 10.5 Fish transportation procedures, if applicable.

Fish will not be transported to release sites once the program has been converted to local broodstock and incubation facilities constructed in the basin. Before these two actions occur, fish will be transported following protocols identified in Hager and Costello (1999).

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

Coho for this program will be acclimated for 8 weeks prior to the target release date.

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

10% (100,000) smolts will be CWT and adipose fin-clipped. The remaining 900,000 will be adipose clipped only. In Phase 2 of the program approximately 500,000 may be adipose fin-clipped, 100,000 ad+CWT, and the remainder unmarked pending co-managers formal decision. This action is designed to increase returns for locally adapted broodstock. Marking strategies will be revisited periodically and revised as necessary to ensure compatibility with overall program goals.

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

During phases 1 and 2, few surplus juvenile fish are expected as they will be counted prior to transfer from the Washougal Hatchery.

In phase 3, initial operations at Wahkiacus Hatchery may result in surplus juveniles until staff becomes familiar with the operation of this facility. If surplus fish are produced, NMFS and other agencies will be informed and asked for a decision as to whether the fish should be released or destroyed.

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

Prior to release from Wahkiacus Hatchery, fish population health and condition will be 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 will contact the USFWS Fish Health Pathologist. The Pathologist will examine affected fish and will recommend appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers' Fish Disease Control Policy and IHOT 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 events or mechanical failure, the Hatchery manager will inform regional management of the situation. Based on a determination of a partial or complete emergency release of program fish, 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.**

- In phases 1 and 2, the number of fish released will be substantially reduced predicated on Wahkiacus operation; otherwise direct releases of additional Washougal fish into the lower river, up to the existing 2.7M smolts, will be scaled to maintain the target 14K adult harvest goal for all fisheries combined.
- In phase 3, smolts will be released volitionally from the Wahkiacus Hatchery (Rkm 27). This release site is lower in the Subbasin than past release sites under this program. This action should reduce competition with and predation on listed fish species.
- Smolts plants have averaged 16.5 fpp (132 mm fl), a size which should reduce predation impacts on juvenile (fry and parr) steelhead.

Because Klickitat River coho are not listed (nor native to the Subbasin) the hatchery program will have no genetic effects on wild coho.

## **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 Contribution:* Coho contribution to harvest will be estimated for each brood year by sampling ocean and freshwater fisheries for tagged fish. YN staff will sample tribal and sport fisheries in the Columbia River and Klickitat River Subbasin. WDFW and other fisheries agencies will monitor and record harvest rates in the ocean.

*Smolt-to-Adult Survival (SAR):* The data collected for harvest contribution will be combined with information gathered during spawning and carcass surveys to estimate SAR for coho. Spawning surveys will be conducted weekly throughout the spawning season.

*Adult Straying:* The Regional Mark Information System (RMIS) will be queried to determine the number of tagged Klickitat origin coho recovered at hatcheries and streams located outside of the Klickitat River basin. These data will be used to determine if the 5% stray rate criterion is being achieved.

*Fish Health:* The USFWS Fish Pathologist will monitor fish health at all facilities following standard reporting protocols and implement corrective measures as needed.

#### **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.

### **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.**

Funding requested under the Klickitat River Anadromous Fisheries Master Plan is expected to be sufficient to implement M&E activities (Yakama Nation 2008).

#### **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.**

Spawning and carcass surveys will be performed weekly to minimize interactions with adult and juvenile listed steelhead inhabiting basin streams. Surveying sport and tribal fishers will have no impact to listed species.

## **Section 12. Research**

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

No research is conducted for this program.

### **12.2 Cooperating and funding agencies.**

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

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

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

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

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

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

### **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).**

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

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

### **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.**

## **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: \_\_\_\_\_

## **Section 15**

### **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 federally 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 Subbasin 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 the Wahkiacus Hatchery (Rkm 27). Construction of these facilities 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 and Acclimation Facility Creek include:

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

The possible impacts of facilities construction and operation may have on these species has 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 continue while the hatchery program is in place.

*Water diversion:* Water is diverted from the Klickitat River to operate the Wahkiacus Hatchery and Acclimation Facility. This action may result in a slight decrease in the amount (0.25 miles) and quality of stream habitat affected by stream de-watering. The habitat loss may 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 location, impacts to bull trout are expected to be minor.

*Diversion Screens:* The Wahkiacus Hatchery and Acclimation Facility water intakes will be screened to meet NMFS criteria for fry. Impacts to juvenile bull trout are expected to be negligible.

*Waste and Pollutants:* The facility will 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). Water meeting these standards is not expected to have adverse impacts on bull trout.

*Disease:* Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, 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:* Broodstock will be collected at Wahkiacus Hatchery. Although few, if any, bull trout are likely to be captured at this facility, fish entering the facility could be injured by the equipment used to capture and process returning broodstock.

*Acclimation Facilities:* New acclimation facilities are to be constructed on the mainstem Klickitat River at Rkm 27 (Wahkiacus Hatchery Acclimation Facility). Migratory adult and juvenile bull trout may be affected by facility operations.

*Release of Juveniles:* The program will release 1,000,000 coho into the Klickitat River each year of Phase 3 operation or in Phase 1 or 2 if WHAF is operational sooner. These fish may compete with and prey on juvenile bull trout. Smolt length at release will range from 130 to 150 mm. If it assumed that coho can consume fish that are up to 33% of their body length, there is the possibility that bull trout less than 46 mm may be susceptible to predation. However, because coho will not be released in the primary bull trout 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 naturally spawning coho adults returning to the Subbasin may increase stream productivity through the addition of ocean-derived nutrients. Increased productivity may result in an increase in food availability to both juvenile and adult bull trout. Offspring of naturally spawning coho may also provide a food source for bull trout.

*Monitoring and Evaluation:* Smolt trapping may be used to determine that hatchery coho juveniles migrate quickly through the system after release. Some bull trout may be captured and handled at the trapping facilities.

#### Oregon Spotted Frog

Neither hatchery operations nor proposed new facilities are likely to 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 (NPPC 2004). 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 basin.

#### Northern Spotted Owl

No facilities will be located in, nor activities conducted in, areas inhabited by the Northern Spotted Owl or in suitable owl habitat.

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

#### Bull trout

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

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

*Broodstock Collection:* Broodstock collection facilities will be designed to meet USFWS and NMFS criteria.

*Acclimation Facilities:* These facilities will be sited to reduce impacts to riparian and stream habitats. 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 returned unharmed to the stream.

#### Oregon Spotted Frog

Prior to constructing new facilities, the stream and riparian area near proposed sites will be surveyed for the presence of the Oregon Spotted Frog. If these frogs

are found, the YN will coordinate with USFWS staff to develop mitigation and protection measures.

Bald Eagle

New facilities will not be located near bald eagle nests.

Northern Spotted Owl

The Wahkiacus Hatchery will not be located in Northern Spotted Owl habitat and, therefore, no adverse impacts are expected.

## **15.5 References**

IHOT (Integrated Hatchery Operations Team). 1995. Operation plans for anadromous fish production facilities in the Columbia River basin. Volume III-Washington. Annual Report 1995. Bonneville Power Administration, Portland Or. Project Number 92-043. 536 pp.

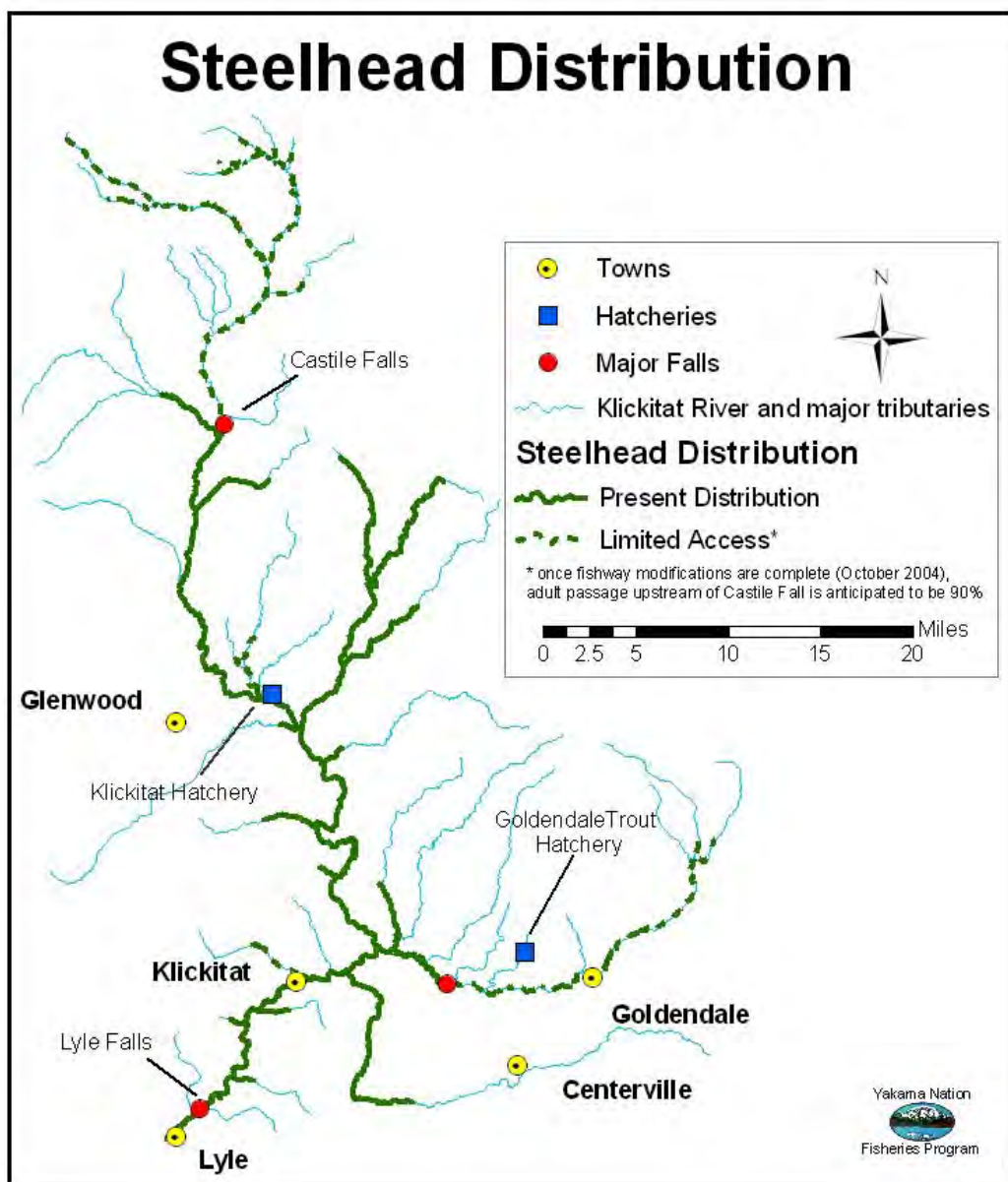
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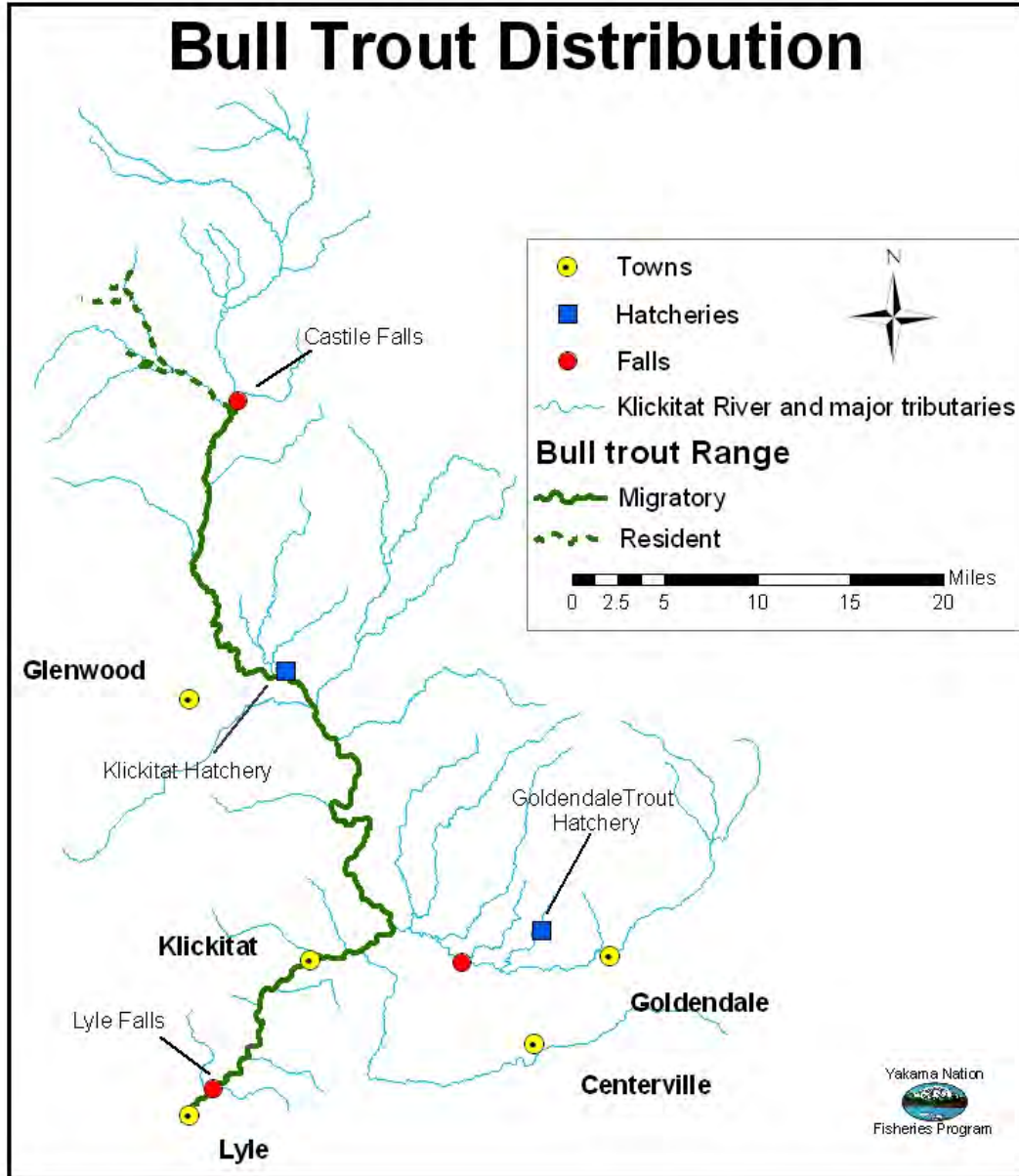


## Appendix A- Steelhead and Bull Trout Distribution

### Steelhead Distribution



## Bull Trout



**Appendix B- Coho Harvest**

Year	Klickitat River <sup>1</sup>			L. Col. R. Harvest <sup>3</sup>	Marine <sup>4</sup> Harvest	Total Harvest
	Run	Harvest	Escape <sup>2</sup>			
1987	316	256	60	178	630	1,064
1988	12,386	9,619	2,767	8,666	20,292	38,577
1989	8,857	7,185	1,672	5,552		12,737
1990	3,055	2,478	577	1,131		3,609
1991	9,702	7,870	1,832	7,021	15,630	30,521
1992	534	433	101	232	1,505	2,170
1993	549	446	104	268	1,235	1,949
1994	3,882	3,149	733	1,451		4,600
1995	2,012	1,632	380	631		2,263
1996	896	698	198	231	3,254	4,183
1997	1,470	1,010	460	402	4,451	5,863
1998	3,379	2,846	533	546	5,578	8,970
1999	3,930	3,435	495	1,176	2,986	7,598
2000	5,808	4,871	938	1,855	3,211	9,937
2001	14,078	10,450	3,628	4,896	9,058	24,404
2002	9,901	8,701	1,200	3,340	7,220	19,262
2003	8,640	8,360	280	3,944	18,574	30,878
2004	5,959	5,817	143	1,816	13,695	21,328
2005	8,276	7,678	598	2,403	19,576	29,657
Avg <sup>5</sup> :	5,454	4,576	879	2,465	8,460	15,757

1. YN and WDFW database estimates.
2. Derived from redd count data assuming 2.5 fish per redd. For years when redd counts were unavailable, assumes average escapement-to-total-harvest ratio from years when redd counts were available. These data are likely underestimates, as water conditions often preclude accurate redd count estimates.
3. Derived from *U.S. v. Oregon* Technical Advisory Committee reports.
4. Derived from Regional Mark Information System (RMIS) recovery year data for marine and freshwater coded-wire tag (CWT) recoveries of coho released in the Klickitat River.
5. Klickitat River data are 1987-2005 averages. Averages for all other data are also for the period 1987-2005 and are exclusive of years when available CWT recovery data preclude an accurate estimate of marine harvest.

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