Klickitat Hatchery Complex - Coho

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Final Draft

Hatchery Program	*Klickitat Hatchery Complex - Coho*
Species or Hatchery Stock	*Oncorhynchus kisutch "Type N" Coho Salmon*
Agency/Operator	*Yakama Nation*
Watershed and Region	*Klickitat Subbasin/Columbia Gorge Province*
Date Submitted	*November 8, 2013*
Date Last Updated	*August 2013*

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.

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

Washington Dept. of Fish & Wildlife	Co-managers
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	3 employees
Annual operating cost (dollars)	~$87,000

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Washougal[1] River Hatchery
Broodstock collection location (stream, RKm, subbasin)	Washougal River Hatchery
Adult holding location (stream, RKm, subbasin)	Washougal River Hatchery
Spawning location (stream, RKm, subbasin)	Washougal River Hatchery
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

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 15,600 fish between 1987 and 2008. The harvest rate for terminal fisheries within the Subbasin have averaged about 84% over that same time period.

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.

1.7 Purpose (Goal) of program.

The primary objective of this coho program in combination with a 1,500,000 Klickitat River direct river release of Washougal pre-smolts 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

[1] Operation of the Washougal Hatchery is not included in this HGMP and the impacts from the operation of this facility will be covered in a separate consultation with NMFS submitted by WDFW.

Klickitat Subbasin are solely for harvest opportunity.
- To benefit tribal and sport 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 Washougal River Hatchery coho as broodstock. The actions proposed to achieve the conservation and harvest goals for coho are:

- Reduce hatchery production from 3.5 to 2.5 million juveniles. The 1.0 million smolt release from Wahkiacus Acclimation Facility (described here) and the 1.5 million smolt direct release into the lower Klickitat River from Washougal River Hatchery.

- Develop the Wahkiacus Acclimation Facility (WAF) to allow for the full implementation of acclimation and volitional release strategies that are necessary to be able to reduce overall production.

Due to funding and WAF buildout constraints an incremental approach will be used to move towards the goal described above. The following identifies elements of that phased approach:

Construct WAF to accommodate 500,000 Washougal coho pre-smolts for acclimation and release. This would require a total of seven 30-ft. circular tanks. This quantity of production is desirable during this initial phase because the total biomass gain during the 6-8 week acclimation timeframe is under the level requiring a pollution abatement facility.

These same seven circulars provide the needed rearing space to accommodate the 2M fall Chinook subyearling pre-smolts delivered from LWNFH after the coho are released (see Klickitat Fall Chinook HGMP 2013). Again the quantity of total fall Chinook biomass gain during their 6 week acclimation timeframe is under the level requiring a pollution abatement facility.

The remaining coho production of 500,000 would be reared at the Klickitat Hatchery. This production affords YKFP managers the opportunity to evaluate release strategies that may maximize harvest and minimize potential species interactions. Evaluation would be conducted using marked PIT tag or CWT groups to compare with the 500,000 WAF release group. YKFP managers would work with WDFW and NOAA researchers to implement release strategies for these remaining 500,000 coho that may include one of the following:

- Transfer 500,000 pre-smolts from Washougal Hatchery to Klickitat Hatchery for the same rearing timeframe as the WAF group to test smolt to adult survival rates between Klickitat Hatchery spring water reared and WAF river water reared releases.

- Transfer sufficient amount of eyed eggs from Washougal Hatchery for a 500,000 yearling smolts from the Klickitat Hatchery to test smolt to adult survival rates between the two release groups.

- Collect local broodstock (~750 adults) from the Lyle Falls Adult Trap for a 500,000 yearling release from the Klickitat Hatchery to test smolt to adult survival rates between the two release groups.

- Collect local broodstock (~750 adults) from the Lyle Falls Adult Trap for a 500,000 yearling reared at the Klickitat Hatchery and transported as pre-smolts for a direct river release into the lower Klickitat River to test smolt to adult survival rates between the two release groups.

YKFP managers would develop a supplement to this HGMP that provides the preferred interim strategy for the 500,000 coho smolt production listed above. This supplement would detail production measures and projected operating costs. Each of the options listed above can be implemented using existing infrastructure (Klickitat Hatchery incubation through release ponds, Lyle Adult Trap, and YKFP hatchery for brood/juvenile transport truck). Modifications would be needed to the adult holding ponds at the Klickitat Hatchery to segregate fall Chinook (see Klickitat Fall Chinook HGMP 2013) from coho broodstock.

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.

Potential Hazard	Risk Aversion Measures
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. *Wahkiacus Acclimation Facility*: A new Klickitat River

	water right permit has been obtained for this site from DOE. S4-34554P
Intake Screening	For development of the Wahkiacus Acclimation Facility (WAF) YN has requested funding for future scoping, design, to construct either a permanent river intake or use of mobile pumping and intake system. The selected option will meet NOAA compliance (per guidelines in http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish Passage Design.pdf).
Effluent Discharge	The WAF will be operated under the "*Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country within the Boundaries of the State of Washington*" National Pollution Discharge Elimination System (NPDES) general permit (WAG-130021) administered by the U.S. Environmental Protection Agency (EPA).
Broodstock Collection & Adult Passage	Washougal River Hatchery
Disease Transmission	*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* (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	Coho released from the WAF will be lower 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. Noted here but covered in the *WDFW - Washougal HGMP*, the 1.5M directed release coho will be maintained at the two release points Wahkiacus Bridge (Rkm 27) and Pitt Bridge (Rkm 15.1)
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 *(US v Oregon)*, 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% of the recipient population Klickitat coho salmon	Regional M&E efforts will be used to track the number and capture location of Klickitat River released 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.	WDFW through the Washougal HGMP will collect sufficient number of adults to support the 1,000,000 pre-smolt transfer to WAF.	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 (across all fisheries, Lyle Falls Adult Trap and on spawner surveys) 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	WDFW to 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. The US Fish & Wildlife Service pathologist through their ongoing *Klickitat Hatchery Complex Fish Health Services Agreement* with the Yakama Nation will assume responsibility for sampling at WAF prior to release.

Benefits		
Performance Standard	Performance Indicator	Monitoring & Evaluation
		A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	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.	See WDFW Washougal Coho HGMP
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites.	See Washougal Coho HGMP

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 WAF 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 WAF program monthly. Exams performed at pre-smolt and smolt life stage which will 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	The WAF will be operated under the "*Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country within the Boundaries of the State of Washington*" National Pollution Discharge Elimination System (NPDES) general permit (WAG-130021) administered by the U.S. Environmental Protection Agency (EPA). 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. *Wahkiacus Acclimation Facility*: A new Klickitat River water right permit has been obtained for this site from DOE. S4-34554P.	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.	WAF intake structures will meet state and federal guidelines when located in fish-bearing streams.	Daily monitoring to ensure in-stream intakes are functioning properly and within compliance.
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 will occur at Washougal Hatchery. The program will require about 750 adults to produce 1,000,000 smolts. (1:1 Male to Female ratio). If needed in low return years, broodstock collection activities may occur in the future at Lyle Falls Fishway & Research Facility, WAF and Klickitat Hatchery.

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 Yearling	1,000,000 2,700,000	15.0	May	Klickitat	RKm 68 < RKm 27	Klickitat	Columbia Gorge
Future Yearling	1,000,000 1,500,000	15.0	May	Klickitat	RKm 27 < 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.

Estimated juvenile releases, natural juvenile coho production, total adult returns to the Klickitat River mouth, and SAR for coho released directly into the river and from the hatchery for release years 1987-2009

Release Year	Number Released[1]		Natural Prod.[2]	Total Release	Total Return[3]	SAR
	Direct Stream Plants	Klickitat Hatchery				
1987	2,487,600	1,383,600		3,871,200	12,386	0.32%
1988	2,478,200	1,320,900	49,177	3,848,277	8,857	0.23%
1989	2,405,000	1,209,700	380	3,615,080	3,055	0.08%
1990	2,500,000	1,563,200	14,271	4,077,471	9,702	0.24%
1991	2,433,700	1,354,000	10,660	3,798,360	534	0.01%
1992	2,500,000	1,250,000	3,676	3,753,676	549	0.01%
1993	2,500,100	1,360,000	11,676	3,871,776	3,882	0.10%
1994	2,232,600	1,052,900	642	3,286,142	2,012	0.06%

1995	2,573,500	966,000	661	3,540,161	896	0.03%
1996	2,620,827	1,568,800	4,672	4,194,299	1,470	0.04%
1997	1,949,949	1,358,869	2,421	3,311,239	3,379	0.10%
1998	2,719,988	1,130,000	1,259	3,851,247	3,930	0.10%
1999	2,514,927	1,100,000	2,933	3,617,860	5,808	0.16%
2000	2,138,220	1,420,000	3,395	3,561,615	14,078	0.40%
2001	2,802,100	1,296,000	3,156	4,101,256	9,901	0.24%
2002	2,453,166	1,025,000	5,977	3,484,143	8,640	0.25%
2003	2,554,300	998,900	23,125	3,576,325	5,959	0.17%
2004	2,543,138	942,600	7,650	3,493,388	8,276	0.24%
2005	2,499,530	1,000,175	1,785	3,501,490	8,166	0.23%
2006	2,424,276	922,520	908	3,347,704	3,339	0.10%
2007	2,403,690	1,071,000	3,812	3,478,502	22,292	0.64%
2008	2,625,000	1,092,550	3,812	3,721,362	40,826	1.10%
2009	2,503,299	1,158,000	3,028	3,664,327	14,957	0.41%
Average	2,472,309	1,197,596	7,231	3,676,822	8,387	0.23%

[1] Data from TAC ASR (1987-1995) and Fish Passage Center (1996-2011).
[2] Assumes 85% pre-spawn survival, 50% females, 50% reproductive success rate, 3000 eggs per female, and 1% egg-to-yearling-smolt survival.
[3] Assumes all fish return as age-3 adults one year after release.

See Section 3.3 for harvest, return, and escapement information.

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.

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 2012,).

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 as amended in this HGMP will include in the final STEP III submittal of the Klickitat River Anadromous Fisheries Master Plan (Yakama Nation DRAFT 2012). This program as amended in this HGMP is identified the Final Klickitat Hatchery Complex EIS prepared by BPA (June 2013). 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.

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

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.

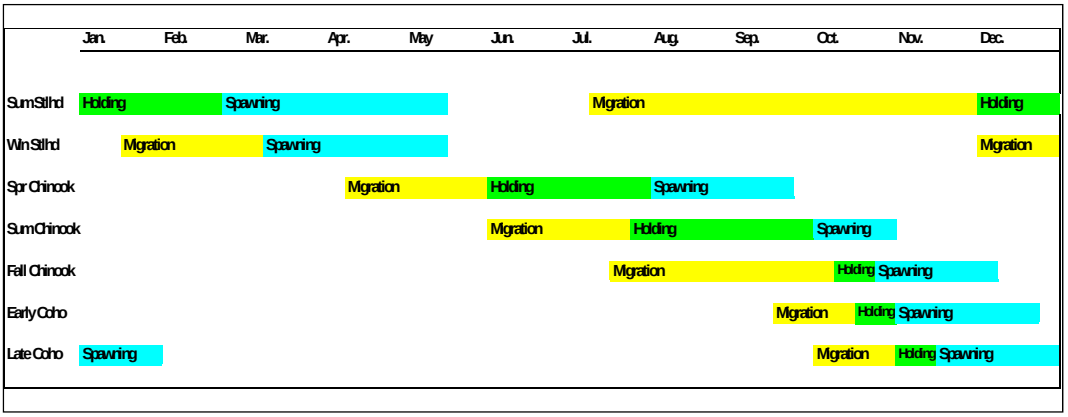
2.2 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

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 if needed to augment Washougal broodstock
Winter Steelhead-Natural	Threatened	Minor	Broodstock collection/trapping at Lyle Falls if needed to augment Washougal broodstock
Bull Trout – Natural	Threatened	Minor	Broodstock collection/trapping at Lyle Falls if needed to augment Washougal broodstock

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. Until improvements in 2005, steelhead access to areas above Castile falls had been limited due to poor migration conditions at the Castile Falls fishway tunnels. Steelhead spawning is concentrated between RKm 8 and 80. Tributary spawning occurs in White Creek watershed (including Brush and Tepee Creeks), Summit Creek, Dead Canyon Creek, the lower Little Klickitat watershed (including Bowman and Canyon Creeks), Swale Creek,

Snyder Creek, and occasional use of tributaries below the town of Klickitat.

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

Klickitat River bull trout life history characteristics are not very well understood, but bull trout are present in the middle and lower mainstem Klickitat and are concentrated in the West Fork Klickitat watershed and several of its tributaries. The population in the West Fork Klickitat watershed is likely resident and while the fish found in the mainstem Klickitat are likely adfluvial or migratory. Falls on the West Fork likely isolate most of the resident bull trout population from the mainstem Klickitat River.

Maps depicting steelhead and bull trout distribution in the Klickitat River are presented in Appendix 2.

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 2012).

Temporal and spatial spawning segregation between the Klickitat steelhead summer and winter runs has not yet been clearly defined. Ongoing genetic analysis and radio telemetry monitoring 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 2000). 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.

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 1600 fish from 2005-2011 (Gray 2007 and Zendt et al. 2013).

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 (Yakama Nation 2012). 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).

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) (Byrne et al. 2001, Thiesfeld et al. 2002, Gray 2007).

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

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

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

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

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

Broodstock Program

Broodstock Collection: To be performed at Washougal River Hatchery. Please see the WDFW HGMP for that facility.

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. For the current on-station program 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) has identified design will be needed for the WAF for structures including intake screens and velocity sweeps to ensure compliance with NOAA fish-screening standards. From the assessment, YN 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 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 0.10 miles of the stream by about 1%.

Water Diversion Screening:

Wahkiacus 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 volitionally beginning in early May, which is near the start of steelhead emergence from the gravel. Because coho smolts are unlikely to be 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 volitionally 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). 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:

Monitoring and evaluation activities have the potential to harass, kill or injured handled fish; these activities are summarized below and described in more detail in Appendix 1.

Monitoring and evaluation activities include: spawning ground surveys; adult salmonid monitoring at Lyle Falls and Castile Falls fishways; juvenile outmigration monitoring (using floating rotary screw traps); juvenile and resident salmonid population surveys (via stream electrofishing); scale analysis; sediment monitoring; temperature and water quality monitoring; habitat surveys; and genetic data collection and analysis.

Research:

No research program is associated with the coho hatchery program, other than the monitoring and evaluation activities described above and in Appendix 1.

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.
Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Middle Columbia River Steelhead
Activity	Klickitat Hatchery Coho Program
Location of hatchery activity	Klickitat R. Hatchery
Dates of activity	Year-round
Hatchery Program Operator	YN & WDFW through co-managed YKFP

	Annual Take of Listed Fish by life Stage (number of fish)			
Type of Take	Egg/Fry	Juvenile /Smolt	Adult	Carcass
Observe or harass (a)		50-150	100	

Collect for transport (b)				
Capture, handle, and release (c)		500-2000 wild; 2000-3000 hatchery*	650-950 wild; 800-1000 hatchery**	
Capture, handle, tag/mark/tissue sample, and release (d)		3000-10,000 wild***		
Removal, e.g. broodstock (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)		190 wild; 150 hatchery	25 wild; 30 hatchery	
Other take (indirect, unintentional) (h)				

* Smolt trapping operations for monitoring purposes
** 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. Mortality occurs only on rare occasions during these operations.
***Stream fish (juvenile steelhead and resident trout) sampling 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 for biological sampling, 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 (2012 in STEP II 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 as appropriate.

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 2012 STEP II draft
- 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 data is shown below.

Annual Run, Harvest, and Escapement Estimates For Klickitat River Hatchery Coho (1987-2010)

	Klickitat River[1]			L. Col. R.	Marine	Total
Year	Run	Harvest	Escape[2]	Harvest[3]	Harvest[4]	Harvest
1986	41,645	33,147	8,498	29,258	96,212	158,617
1987	316	256	60	178	629	1,063
1988	12,385	9,619	2,766	8,666	20,038	38,323
1989	8,857	7,185	1,672	5,551		12,736
1990	3,055	2,478	577	1,130		3,608
1991	9,701	7,870	1,831	7,021	15,632	30,523
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	3,221	4,150
1997	1,470	1,010	460	402	5,227	6,639
1998	3,379	2,846	533	546	6,550	9,943
1999	3,930	3,435	495	1,176	5,366	9,978
2000	5,808	4,871	938	1,855	1,350	8,076
2001	14,078	10,450	3,628	4,904	12,821	28,176
2002	9,910	8,710	1,200	3,368	7,162	19,241
2003	8,626	8,346	280	3,933	18,476	30,756
2004	6,025	5,883	143	1,832	13,224	20,939
2005	8,283	7,685	598	2,445	9,238	19,369
2006	8,166	7,568	598	1,415	14,883	22,138
2007	3,339	2,864	475	485	9,854	8,369
2008	22,292	20,904	1,388	3,144	22,216	58,640
2009	40,826	40,291	535	9,732	137,399	115,974
2010	14,957	14,492	465	3,879	31,984	42,082
Avg[5]:	5,486	4,640	846	2,272	8,613	13,572

[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] Averages exclude 2008-2010 due to preliminary CWT estimates subject to change.

The reduction in program size from approximately 3.7 million to 2.5 million (1.0 million acclimated at WAF, and 1.5 million direct river release from Washougal) 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, full 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 (2012 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 Klickitat Watershed Enhancement Project is a BPA-funded watershed restoration project implemented by the Yakama Nation Fisheries Program (YNFP). The YNFP is working in coordination with WDFW, Natural Resources Conservation Service (NRCS), local Conservation Districts, local land trusts, and Regional Fisheries Enhancement Groups. The project was proposed under the Northwest Power Planning Council's Fish and Wildlife Program and funded by BPA in 1997. The project also solicits and receives significant funding from the Washington Salmon Recovery Funding Board. Initial project restoration projects were located within the Swale Creek and Little Klickitat River watersheds; ongoing projects focus on floodplain and riparian restoration in the mainstem Klickitat and the White Creek watershed. Included in the project scope of work are in-stream structural modifications, re-vegetation of the riparian corridor, floodplain reconnection, and exclusion fencing to prevent channel degradation from livestock. A monitoring program has been initiated to document project success and guide future restoration activities. Future phases of the project will use physical habitat survey and 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 coho hatchery program is designed to be consistent with the goals identified in this plan (NPPC 2004).

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, bald eagles, harbor seals, sea lions, river otters, bear, 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 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	New water permits (DOE. S4-34554P) has been obtained from the DOE for the Wahkiacus Acclimation Facility. 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. Monitoring and measurement of water usage is reported in monthly per DOE specifications.
Intake/Screening Compliance	Intake structures at the WHAF facility will be designed and constructed to NMFS specifications.
Hatchery effluent discharges. (Clean Water Act)	All hatchery facilities will operate under the "*Federal Aquaculture Facilities and Aquaculture Facilities Located in Indian Country within the Boundaries of the State of Washington*" National Pollution Discharge Elimination System (NPDES) general permit (WAG-130021) which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the EPA. Monthly and annual reports on water quality sampling, use of chemicals at this facility, and compliance records will be available from EPA. Discharges from the cleaning treatment system will be monitored as follows: *Total Suspended Solids (TSS):* Collected 1 to 2 times per month on composite effluent, maximum effluent and influent samples.

	Settleable Solids (SS): Collected 1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - Daily maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

See Washougal River Type N coho HGMP

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).

5.3 Broodstock holding and spawning facilities.

See Washougal River Type N coho HGMP

5.4 Incubation facilities.

Washougal Hatchery's incubation facilities (see Washougal River Type N coho HGMP) would be used for project implementation.

5.5 Rearing facilities.

Washougal Hatchery's rearing facilities (see Washougal River Type N coho HGMP) would be used for project implementation with final rearing and release at WAF.

Wahkiacus Facility Description:
Approximately 14 above ground circular ponds ~30 ft in diameter with outlet structures, pollution abatement, river pump station with back up diesel power generation capabilities.

5.6 Acclimation/release facilities.

See 5.5.

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

The Wahkiacus Acclimation Facility 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	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. Under 100-year flood conditions, tank berms may be overtopped. Fish could be washed out of the system during these events. Debris entering the tanks will need to be removed, ponds cleaned, and repaired.
Disease Transmission	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.

Section 6. Broodstock Origin and Identity

6.1 Source.

Washougal River Hatchery will be the brood source.

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.

None.

6.2.4 Genetic or ecological differences.

No indigenous stock of coho exists in the Klickitat River.

6.2.5 Reasons for choosing.

Existing brood source

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.

See Washougal River Hatchery HGMP

Section 7. Broodstock Collection

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

Adults

7.2 Collection or sampling design

See Washougal River Type N coho HGMP

7.3 Identity.

See Washougal River Type N coho HGMP

7.4 Proposed number to be collected:

750 adults

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

N/A

7.6 Fish transportation and holding methods.

The transport protocols defined in Hager and Costello (1999) will be followed.

Washougal hatchery to WAF is 73.1 miles (1 hour and 41 minutes driving time).

7.7 Describe fish health maintenance and sanitation procedures applied.

See Washougal River Type N coho HGMP

7.8 Disposition of carcasses.

See Washougal River Type N coho HGMP

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 WAF operations.

Section 8. Mating

8.1 Selection method.

See Washougal River Type N coho HGMP

8.2 Males.

See Washougal River Type N coho HGMP

8.3 Fertilization.

See Washougal River Type N coho HGMP

8.4 Cryo-preserved gametes.

See Washougal River Type N coho HGMP.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to <u>listed</u> 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.

Eggs for this program eggs are taken at the Washougal Hatchery (see

Washougal River Type N coho HGMP).

9.1.2 Cause for, and disposition of surplus egg takes.

For the WAF, 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.

9.1.4 Incubation conditions.

See Washougal Type N Coho HGMP for initial program.

9.1.5 Ponding.

N/A

9.1.6 Fish health maintenance and monitoring.

See Washougal Type N Coho HGMP.

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

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

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

See Washougal Type N Coho HGMP

9.2.3 Fish rearing conditions.

Fish are transferred from Washougal Hatchery to the Wahkiacus Acclimation Facility in early March and reared on primarily river water for approximately 8 weeks. The fish will then be released volitionally from the rearing tanks. Water temperatures from river intakes will mirror river temperatures, which vary seasonally.

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. See Washougal River Type N coho HGMP for additional detail.

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 WAF.

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

Cover and substrate may be incorporated into the acclimation tanks.

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).

RKm 27 at Wahkiacus Acclimation Facility.

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 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 or more 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 100% adipose fin-clipped.

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

Juvenile fish are not expected as they will be counted prior to transfer from the Washougal Hatchery.

However, during initial operations at WAF 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 WAF, 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 tanks stand pipes 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.

- The overall US v Or production numbers of fish released will be reduced from 3.7 million to 2.5 million overall into the Klickitat Subbasin (I million pre-smolts acclimated and released from WAF and 1.5 million direct release from Washougal River Hatchery), 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.
- Smolts will be released volitionally from the WAF (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 biweekly throughout the spawning season. Additionally, a portion of all releases will be marked with CWT and adipose fin-clipped. These tags will be recovered from fish caught in all fisheries, spawning ground surveys, hatchery returns, and from tags voluntarily submitted by the public.

Adult Straying: 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.

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

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

Water Diversion Screens: Facility water intakes will be designed in accordance with NMFS standards. Velocity measurements will be taken at each screening system each year to ensure the criteria are being met. Screens will also be inspected each year for any problems (missing panels, debris, etc.) and corrective actions taken.

Hatchery Operations: An annual report will be written documenting program operations, disease problems, treatment, broodstock collection, number of fish released, fish size, and release date.

Predation Index: To address possible concerns regarding predation by hatchery coho juveniles, a study may be undertaken to develop a predation index for hatchery fish.

The predation index study may have two components:

1. Radio and/or Acoustic Tagging: used to determine the amount of time hatchery fish spend in the Klickitat River after their release from facilities. Approximately 50-100 fish will be tagged and monitored at various sites to determine migration timing and travel time from point of release to the mouth of the Klickitat River.

2. Stomach analysis: used for estimating the number, size, and species of juvenile fish consumed by the hatchery juveniles. Migrating hatchery coho juveniles 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:

   a. Implement a more rigorous predation study to develop more quantitative estimates of predation.

   b. 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.

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 2012).

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

Spawning and carcass surveys will performed biweekly 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 activities are proposed for coho that will affect listed fish populations in the Klickitat River, other than monitoring and evaluation activities described above and in Appendix 1.

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

Busack, C., K. Currens, T. Pearsons, and L. Mobrand. 2005. "Tools for Evaluating Ecological and Genetic Risks in Hatchery Programs", 2004 Final Report, Project No. 200305800, 91 electronic pages, (BPA Report DOE/BP-00016399-1).

Byrne, J., R. McPeak, B. McNamara - Washington Department of Fish and Wildlife. 2001. Bull Trout Assessments in the Columbia River Gorge, FY-2000 Annual Report, Report to Bonneville Power Administration, Contract No. 00000651, Project No. 199802600, 85 electronic pages (BPA Report DOE/BP-00000651-1).

Dawley, E. M., R.D. Ledgerwood, T.H Blahm, R.A. Kirn, and A.E. Rankis. 1984. Migrational Characteristics And Survival Of Juvenile Salmonids entering the Columbia River estuary During 1983. Annual Report to the Bonneville Power Administration, Portland, OR.

Flagg, T.A., B.A. Berejikian, J.E. Colt, W.W. Dickhoff, L.W. Harrell, D.J. Maynard, C.E. Nash, M.S. Strom, R.N. Iwamoto, and C.V.W. Mahnken. 2000. Ecological and behavioral impacts of artificial production strategies on the abundance of wild salmon populations. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-41: 92p.

Gray,S.W. 2007. Determine the Origin, Movements, and Relative Abundance of Bull Trout in Bonneville Reservoir. Available at: https://pisces.bpa.gov/release/documents/documentviewer.aspx?doc=P103326

Hager, R.C. and R.J. Costello. 1999. Optimal Conventional and Semi-natural Treatments for the Upper Yakima Spring Chinook Salmon Supplementation Project: Treatment Definitions and Descriptions and Biological Specifications for Facility Design. Proj. No. 95-06404, Prepared for Bonneville Power Administration. Portland, OR.

Hawkins, S.W., Tipping, J. M. 1999. Predation By Juvenile Hatchery Salmonids on Wild Fall Chinook Salmon Fry in the Lewis River, Washington. California Fish and Game 85(3):124-129.

Hatchery Scientific Review Group (HSRG). 2005. Hatchery Reform in Washington State: Principles and Emerging Issues. Fisheries. Volume 30, Number 6. June 2005.

Hatchery Scientific Review Group (HSRG). 2009. System-Wide Report on Columbia River Basin Hatchery Reform. Available at: http://hatcheryreform.us/hrp/reports/system/welcome_show.action

Harza. 1998. The 1997 and 1998 technical study reports, Cowlitz River

Hydroelectric Project. Vol. 2, 35-42.

Howell, P., K. Jones, D. Scarnecchia, L. LaVoy, W. Knedra and D. Orrman. 1985. Stock assessment of Columbia River anadromous salmonids. Vol: I. U.S. Dep. Energy, Bonneville Power Administration. Project No. 83-335, 558 pp.

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.

Interior Columbia Basin Technical Review Team (ICTRT). 2007. Viability Criteria for Application to Interior Columbia Basin Salmonid ESUs (Review Draft March 2007). Prepared by the Interior Columbia Basin Technical Recovery Team. Portland, OR, and Seattle, WA.

Klickitat Subbasin Recovery Plan for Middle Columbia River Steelhead ESU. Working Draft NOAA-Portland 2007.

Marshall, A.R. 2000. Genetic analysis of Chinook populations in the Klickitat River. Unpublished draft report to Yakima Klickitat Fisheries Project, WDFW Genetics Unit. Olympia, WA.

Narum S. R., M. Powell, R. Evenson, B. Sharpe and A. Talbot. 2006. Microsatellites Reveal Population Substructure of Klickitat River Native Steelhead and Genetic Divergence from an Introduced Stock. North American Journal of Fisheries Management **26**:147-155.

NMFS (National Marine Fisheries Service). 1999. Biological opinion on artificial propagation in the Columbia River Basin.

NMFS (National Marine Fisheries Service). 2008. Anadromous Fish Passage Facility Design. Available at: http://www.nwr.noaa.gov/Salmon-Hydropower/FERC/upload/Fish_Passage_Design.pdf

NMFS. 2008. Endangered Species Act-Section 7 (a) (2) consultation biological opinion. Consultation on treaty and non-treaty fisheries in the Columbia River basin subject to 2008-2017 U.S. v. Oregon management agreement. NOAA Fisheries. NW Region, Portland, Oregon.

NOAA 2005. Updated Status of Federally Listed ESU's of West Coast Salmon and Steelhead. NOAA Technical Memorandum NMFS-NWFSC-66.

NOAA 2007. Environmental Assessment of NOAA's National Marine Fisheries Service's (NMFS) approval of Five Fisheries Management and Evaluation Plans For Tributaries of the middle Columbia River Submitted by the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish And Wildlife (WDFW), and of NMFS' Determination that the Plans Adequately Address Section 4(d) Limit 4 Criteria and Do Not

Appreciably Reduce the Likelihood of Survival and Recovery of Salmon and Steelhead Listed Under the Endangered Species Act

NMFS. 2009. Middle Columbia River Steelhead Distinct Population Segment ESA Recovery Plan. Corrected Version November 30, 2009. Available at *http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Interior-Columbia/Mid-Columbia/Mid-Col-Plan.cfm* (accessed December 16, 2010).

NPPC 2004. Klickitat Subbasin Plan. Prepared for the Northwest Power and Conservation Council. Prepared by the Yakama Nation, Klickitat County, and Washington Department of Fish and Wildlife.

Seidel, Paul. 1983. Spawning Guidelines for Washington Department of Fish and Wildlife Hatcheries. Washington Department of Fish and Wildlife. Olympia, Wa.

Thiesfeld, S.L., R.H. McPeak, B.S. McNamara, and I. Honanie. 2002. Bull trout population assessment in the White Salmon and Klickitat Rivers, Columbia River Gorge, Washington. Fiscal Year 2001 Annual Report. BPA Contract # 00004474-00001, Project # 1999-024-00.

USFWS (U.S. Fish and Wildlife Service). 1994. Biological assessment for operation of U.S. Fush and Wildlife Service operated or funded hatcheries in the Columbia River Basin in 1995-1998. Submitted to National Marine Fisheries Service (NMFS) under cover letter, dated August 2, 1994, from William F. Shake, Acting USFWS Regional Director, to Brian Brown, NMFS.

United States Fish and Wildlife Service 1998. Biological Opinion for the Effects to Bull Trout from Continued Implementation of Land and Resource Management Plans and Resource Management Plans as Amended by the Interim Strategy for Managing Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, Western Montana, and Portions of Nevada (INFISH) and the Interim Strategy for Managing Anadromous Fish-Producing Watersheds in Eastern Oregon and Washington, Idaho, and Portions of California (PACFISH). Region 1, Portland, Oregon.

Washington Department of Fisheries. 1991. Stock Transfer Guidelines. Hatcheries Program, Washington Department of Fisheries. Olympia, Wa.

Washington Department of Fish and Wildlife. Fisheries Management and Evaluation Plan WDFW, 2003. Lower Columbia River. Submitted to NMFS. Portland, Oregon.

WDFW and NWIFC 1998. Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State.

Washington State Conservation Commission. 1999. Salmonid habitat limiting factors water resource inventory area 30 - Klickitat watershed. Final Report.

Wahkiacus Hatchery Conceptual Design Study 2010. Yakima/Klickitat Fisheries Program. Toppenish, WA

Witty, K., C. Willis and S. Cramer. 1995. A review of potential impacts of hatchery fish on naturally produced salmonids in the migration corridor of the Snake and Columbia Rivers. S.P. Cramer and Associates, Inc., 600 NW Fariss, Gresham, Oregon.

Yakama Nation 2012. STEP II Draft Klickitat River Anadromous Fisheries Master Plan, Yakima/Klickitat Fisheries Program. Toppenish, WA.

Zendt, J., N. Romero, S. Keep, and M. Babcock. 2013. Klickitat Subbasin Monitoring and Evaluation - Yakima/Klickitat Fisheries Project, 2010-2012 Annual Report. BPA Document ID # P132813.
https://pisces.bpa.gov/release/documents/documentviewer.aspx?doc=P132813

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 Acclimation Facility (RKm 27). Construction of this facility 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 Acclimation Facility Creek include:

Oregon Spotted Frog (*Rana pretiosa)*	Candidate
Bald Eagle (*Haliaeetus leucocephalus)*	Threatened
Northern Spotted Owl (*Strix occidentalis)*	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 Acclimation Facility. This action may result in a slight decrease in the amount (0.1 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 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. These techinuqes will be employed at the Wahkiacus Acclimation Facility. 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: Wahkiacus Acclimation Facility. See Washougal Type N Coho HGMP.

Acclimation Facilities: A new acclimation facility is to be constructed on the mainstem Klickitat River at RKm 27 (Wahkiacus 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. 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: See Washougal River Type N coho HGMP

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 Acclimation Facility 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.

NPPC 2004. Klickitat Subbasin Plan. Prepared for the Northwest Power and Conservation Council. Prepared by the Yakama Nation, Klickitat County, and Washington Department of Fish and Wildlife.

Yakama Nation 2012. *Draft* Klickitat River Anadromous Fisheries Master Plan, Yakima/Klickitat Fisheries Program. Toppenish,WA.

Appendix 1- Take Tables

Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Middle Columbia River Steelhead
Activity	Klickitat Hatchery Spring Chinook Program
Location of hatchery activity	Klickitat R. Hatchery
Dates of activity	Year-round
Hatchery Program Operator	YN & WDFW under 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)		50-150	100	
Collect for transport (b)				
Capture, handle, and release (c)		500-2000 wild; 2000-3000 hatchery*	650-950 wild; 800-1000 hatchery**	
Capture, handle, tag/mark/tissue sample, and release (d)		3000-10,000 wild***		
Removal (e.g., broodstock) (e)				
Intentional lethal take (f)				
Unintentional lethal take (g)		190 wild; 150 hatchery	25 wild; 30 hatchery	
Other take (indirect, unintentional) (h)				

* Smolt trapping operations for monitoring purposes
** 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. Mortality occurs only on rare occasions during these operations.
***Stream fish (juvenile steelhead and resident trout) sampling 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

Take Table 2. Estimated listed salmonid take levels by hatchery activity.

Bull Trout

ESU/Population	Columbia River Basin DPS Bull Trout
Activity	Klickitat Hatchery Spring Chinook Program
Location of hatchery activity	Klickitat R. Hatchery
Dates of activity	Year-round
Hatchery Program Operator	YN & WDFW under 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)		65*	15*	
Collect for transport (b)				
Capture, handle, and release (c)		5**	5**	
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)				

* Spawner surveys or habitat surveys
**Juvenile and adult trapping 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

YAKIMA/KLICKITAT FISHERIES PROJECT - KLICKITAT MONITORING AND EVALUATION PROJECT DESCRIPTION

Action	Overview of Action/Purpose	Description	Location	Anticipated Take (per year)				
				General ESA Approach/Notes	Bull Trout adults	Bull Trout juveniles	Steelhead adults	Steelhead juveniles
Spawning ground surveys	Document the abundance and temporal and spatial distribution of spawners and redds in the Klickitat basin for spring Chinook, fall Chinook, coho, and steelhead.	Conduct spawner surveys via wading and/or rafting within the known geographic range in the Klickitat subbasin. Count individual redds and record location using handheld GPS units. Record counts of live fish and carcasses. Collect biological information from carcasses (length, sex, scale sample, and tag/mark data). Examine carcasses for sex determination, egg/milt retention (percent spawned), and presence of decimal coded wire tags (CWT) tags or external experimental marks. Make attempts to cover the entire known spawning range of each species. Survey each stream reach multiple times (preferably at least 3 survey passes) during the spawning periods.	Throughout Klickitat subbasin (Klickitat River and anadromous-accessible tributaries); approximately 150 river miles of survey reaches	"Take" for this action may include scaring/stressing fish, temporary displacement of fish, and temporary interruption of spawning. Survey timing is as follows: spring Chinook - mid August through early October; fall Chinook - late October through early to mid December; coho - mid October through mid February; steelhead - late January through early June. No mortalities anticipated.	< 5	< 5	< 100	< 50
Adult salmonid monitoring at Lyle Falls Fishway	Collect data on adult salmonids in the Klickitat River to determine fish use, run timing, and estimate abundance.	Operate adult trap in the Lyle Falls fishway. Trap will be operated as flows and debris levels allow. Trap will be checked every 24 hours. Biological data will be collected including fish length, tag inspection, scale sample, and DNA samples. Marks (opercle punches and floy tags) will be administered to assist in subsequent resight/recapture and development of population estimates. Fish are crowded, then lifted and transported (via water-to-water transfer) to handling tanks for biological sampling. Fish are handled and sampled in small tanks using soft mesh knotless netting. Depending on funding, fish may also be PIT-tagged and/or radio-tagged to assist in determination of migration/holding patterns, spawning areas, passage issues, and fishway use. Appropriate anesthesia (generally electronarcosis) will be used; no chemical anesthetic is used due to harvest availability of fish after leaving trap.	RM 2.3 on the Klickitat River; T03N, R12E, Sec. 25 NWSW	"Take" for this action includes fish trapping and handling, collection of biological data and marking/tagging. Mortality only occurs on very rare occasions. Trap is operated year round as flows and debris/bedload levels allow.	< 5	0	600-800 Klickitat wild; 50 Snake R. wild; 800-1000 Klickitat hatchery; 50 Snake R. hatchery; < 3% mortality (Radio tagging: up to 100 wild, 100 hatchery of this total)	0
Adult salmonid monitoring at Castile Falls fishway	Collect data on adult salmonids in the Klickitat River to determine fish use, run timing, and estimate abundance	Operate enumeration facility in the Castile Falls fishway. Facility will be operated as flows and debris levels allow. Facility will be checked on a weekly or biweekly basis. Video and PIT tag detection equipment installed in fishway will be primary means of monitoring fish. Occasional trapping and handling of fish will occur for	RM 64.6 on the Klickitat River; T09N R13E, Sec. 18 SWSW	"Take" for this action includes occasional fish trapping and handling, collection of biological data and marking/tagging. Mortality will likely occur only on very rare occasions. Facility will be operated year round as flows and	0	0	50-100 Klickitat wild; < 2% mortality	0

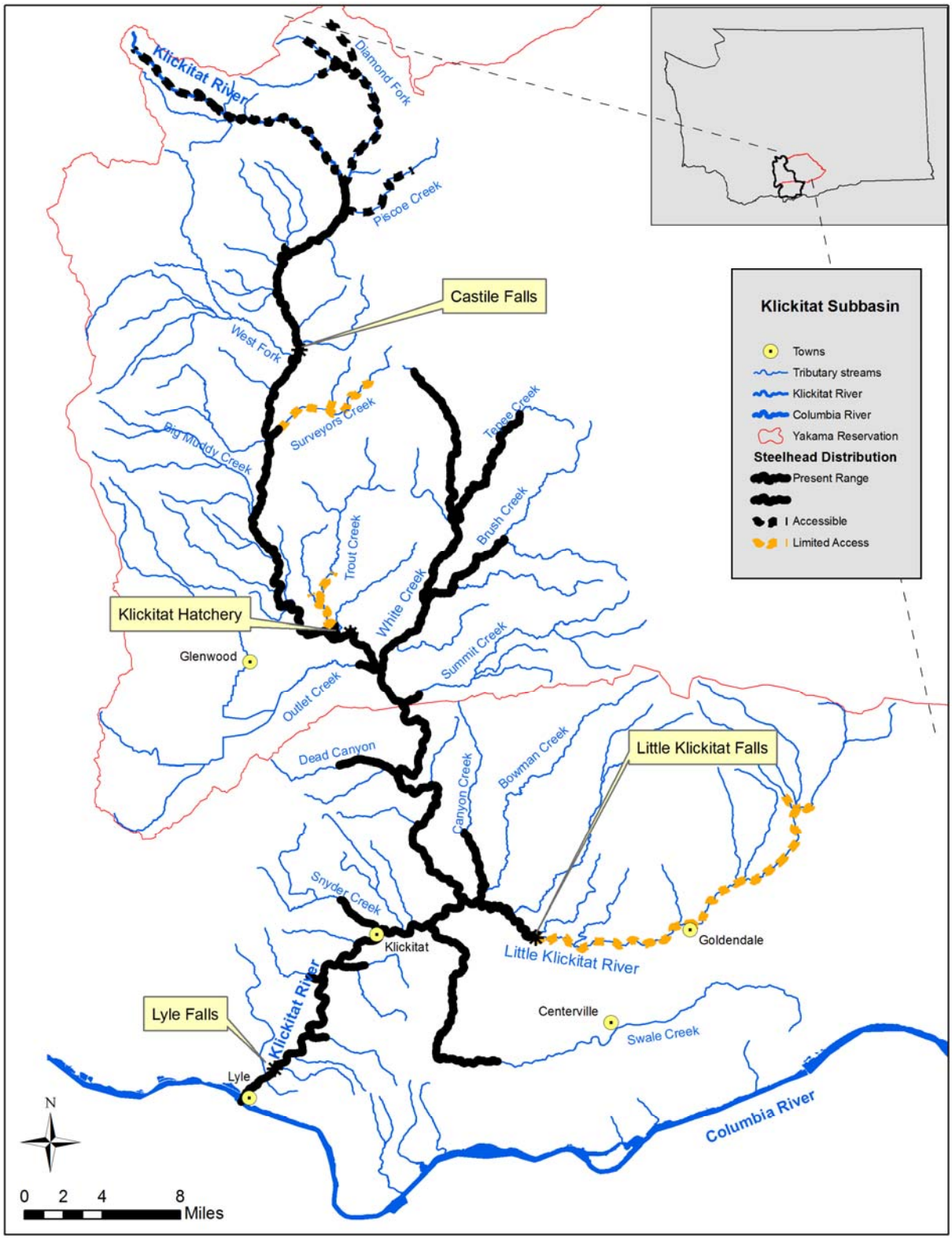
		biological sampling purposes (fish length, tag inspection, scale sample, and DNA samples). When operated as a trap, facility will be checked every 24 hours. Handled fish will be placed in water-filled blackout tubes (PVC tubes with cutout sections) or soft mesh knotless netting; appropriate anesthesia (e.g., electronarcosis or MS-222) will be used.		debris/bedload levels allow.				
Juvenile outmigration monitoring	Continuous monitoring of juvenile outmigration in the upper and lower Klickitat River utilizing rotary screw traps. Information to provide an index of number of smolts, parr, and fry leaving the Klickitat system.	Operate floating rotary screw traps to monitor juvenile (smolt, parr, and fry) outmigration in the upper and lower Klickitat River. Traps will be fished year round (as flows, debris levels, and hatchery releases allow) at the: 1. Lyle Falls trap, 2. Klickitat Hatchery trap, and 3. seasonally (between May and November) at the Castile Falls trap. Calibration studies (mark-recapture trials) will be conducted to estimate trap efficiency and assist in development of smolt production estimates. Environmental and trap data will be recorded along with bio-data on 10 to 30 of each salmonid species represented. Fish will be anesthetized and sampled for length, weight, scales, and DNA. Additional tags or marks may also be administered (fin clips for mark-recapture efficiency testing and PIT tags). The excess and non-salmonid fish will be tallied by species. Depending on funding, 1 or 2 additional smolt traps or instream PIT tag antennas may temporarily be deployed in selected key tributaries (e.g. White Creek).	Lyle Falls (RM 2.3 on the Klickitat River; T03N,R12E, Sec. 25 NWSW) Klickitat Hatchery (RM 42 on the Klickitat River; T06N R13E, Sec. 4 SWNE) Castile Falls (RM 64 on the Klickitat River; T09N,R13E, Sec.19 NENE	"Take" for this action includes fish trapping and handling, collection of biological data and marking/tagging. Mortality only occurs on rare occasions. Lyle Falls and Klickitat Hatchery traps are operated year round (as flows, debris levels, and hatchery releases allow); Castile Falls trap is operated seasonally (generally May to November)	< 5	< 5	< 5 (kelts)	500-2000 wild; 2000-3000 hatchery; < 5% mortality (PIT tagging: up to 1500 wild of this total; PIT tagging may also include an additional 10,000 hatchery smolts tagged at Skamania Hatchery)
Juvenile and resident salmonid population surveys	Determine the spatial distribution, abundance, survival, and migration patterns of salmonids throughout the basin to provide baseline information and evaluate hatchery and habitat actions.	Electrofishing surveys will be conducted in selected key tributary and mainstream reaches. Standard depletion or mark-recapture estimates to determine abundance will be utilized. Snorkel surveys will also be used in selected reaches. Population surveys may be completed in selected reaches pre and post-habitat improvement actions. The number of sites sampled will be determined by time allotted to other field season activities (e.g., habitat surveys). Fish captured will be anesthetized and sampled for length, weight, scales, and DNA. Depending on funding, additional tags or marks may also be administered (e.g., fin clips and PIT tags for survival estimation and juvenile outmigration monitoring).	Throughout Klickitat subbasin; includes White Cr. watershed, other specific locations to be determined	"Take" for this action includes fish capture (via electrofishing), scaring/stressing fish or temporary displacement of fish (during snorkel surveys), handling, tagging, and collection of biological data. Mortality only occurs on very rare occasions. Sampling would generally occur in the summer and early fall.	< 5	< 5	< 5	3000-10000 wild; <3% mortality (PIT tagging: up to 5000 wild of this total)
Scale analysis	Scales are taken at traps and from carcasses encountered on spawner surveys as part of a	Fish scales are taken at screw traps, at the Lyle and Castile adult traps, and from carcasses encountered on spawning surveys. The majority of the scale reading is done by YKFP M&E staff; some scales may be read by WDFW staff.	Same location as screw traps, adult traps, and spawner surveys (above)	No effect – action is scale reading and analysis;	No effect – action is scale reading and analysis	No effect – action is scale reading and analysis	No effect – action is scale reading and analysis	No effect – action is scale reading and analysis

	continuous and ongoing sampling routine to determine age and stock composition of juvenile and adult salmonid stocks in the Klickitat basin.							
Sediment monitoring	Monitor stream sediment loads associated with natural and anthropogenic factors (e.g., logging, agriculture, and road building) which can increase sediment loads in streams utilized by all salmonids in the Klickitat basin.	Gravel samples will be collected and analyzed using Washington State DNR Timber, Fish and Wildlife (TFW) monitoring methodology. McNeil gravel core samples will be collected at 10-12 sites and will be sieved to estimate percentage composition of various substrate particle sizes.	Klickitat River between RM 16 and 88; Diamond Fork Cr. between RM 0 and 12; White Cr. RM 9; Tepee Cr. RM 5	"Take" for this action may include scaring/stressing fish, temporary displacement of fish, and minor localized turbidity increases during gravel sampling. Sampling would occur in the fall (October – November). No anticipated mortalities.	0	0	<5	<10
Water quality monitoring	Continue ongoing water quality monitoring at established and selected new sites.	Record water quality measurements on selected tributaries and within selected habitat survey reaches on a seasonal and as-possible basis. Portable field meters will be used to measure and record the following parameters: temperature, dissolved oxygen, pH, conductivity, and turbidity. Data will be recorded at 36-38 locations, approximately 5-8 times per year at each location. Temperature is also continuously monitored via data loggers placed in streams at these locations.	Approximately 38 locations throughout Klickitat subbasin (Klickitat R. and tributaries)	No effect is anticipated.				
Habitat Surveys	Complete habitat surveys at selected sites and reaches. Quantitative habitat data will provide the foundation for decision-making relative to habitat restoration, as well as refining related attributes of the EDT model. Survey data will also assist in effectiveness monitoring of	Collect baseline data on existing habitat conditions throughout the basin. The habitat inventories will be conducted using YKFP Rapid Habitat Assessment protocols and the Washington State DNR Timber, Fish and Wildlife (TFW) monitoring methodology (modules: Stream Segment Identification, Reference Point Survey, Habitat Unit Survey, and Large Woody Debris Survey). Sites may include previously surveyed sites and/or new sites.	Throughout Klickitat subbasin; specific locations to be determined	"Take" for this action may include scaring/stressing fish or temporary displacement of fish during habitat survey. Surveys generally occur in late spring and summer. No anticipated mortalities.	0	< 50	0	< 100

	habitat restoration projects and in other land management planning.							
Genetic data collection, analysis, and synthesis	Provide information on subpopulation structure, geographic variation, and production in order to minimize any effects from hatchery actions.	Genetic samples will be collected from adult salmonids at the Lyle and Castile adult traps, and from juveniles at rotary screw traps. Additional samples may also be collected via stream electrofishing. Samples will be sent to Columbia River Intertribal Fish commission (CRITFC) genetics lab or other genetics labs for analysis. YKFP biologists, in collaboration with CRITFC geneticists, will compile existing data and analyze genetics information. May also include research on phenotypic expression of biologically functional genes (e.g. thermal tolerance and smoltification).	Same location as screw traps, adult traps, and spawner surveys (above) Other locations to be determined throughout Klickitat subbasin.	Take for this action includes fish capture and handling (with non-lethal fin clip, fin punch, or opercle punch sampling) during stream electrofishing and adult trap and screw trap operation. May include some lethal sampling (up to 100 juvenile steelhead per year) for research on phenotypic expression of biologically functional genes; otherwise no mortalities expected.	0	0	0	500-1000 (most of this total included as part of other sampling described above)

Appendix 2 - Steelhead and Bull Trout Distribution

Steelhead Distribution



Bull Trout Distribution