4(d) Rule Limit 6

Proposed Evaluation and Pending Determination

Title of RMPs:	Five Joint Hatchery and Genetic Management Plans for the Lake Washington Basin
RMPs Submitted by:	Washington Department of Fish and Wildlife Muckleshoot Indian Tribe
ESU/DPS:	Puget Sound Chinook Salmon ESU Puget Sound Steelhead DPS
4(d) Rule Limit:	Limit 6
NMFS Tracking Number:	WCRO-2021-02104
Date:	8/25/2021

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1 EVALUATION

NOAA's National Marine Fisheries Service (NMFS) issued a final Endangered Species Act (ESA) 4(d) Rule adopting regulations necessary and advisable to conserve Puget Sound Chinook salmon (50 CFR 223.203(b); 70 FR 37160, June 28, 2005). These regulations were subsequently applied to the Puget Sound Steelhead Distinct Population Segment (DPS) in a separate final rule (73 FR 55451, June 25, 2008). Under limit 6 of the 4(d) Rule, ESA section 9 take prohibitions for these listed salmonid species do not apply to hatchery activities that are undertaken in compliance with a resource management plan (RMP) developed jointly by the Tribes and the State of Washington that is consistent with the 4(d) Rule criteria.

Section 9 of the ESA prohibits the take of endangered species, and pursuant to §4 NMFS has extended that prohibition to threatened salmon and steelhead. Under the limit 6 of the 4(d) Rule (50 CFR 223.203(b)(6)), those prohibitions are rescinded for hatchery activities described in an RMP, provided that:

- (i) The Secretary has determined pursuant to 50 CFR Sec. 223.209(b)(the limit on take prohibitions for tribal resource management plans) and the government-to-government processes therein that implementing and enforcing the joint tribal/state plan will not appreciably reduce the likelihood of survival and recovery of affected threatened ESUs.
- (ii) The joint plan will be implemented and enforced within the parameters set forth in United States v. Washington or United States v. Oregon.
- (iii) In making that determination for a joint plan, the Secretary has taken comment on how any fishery management plan addresses the criteria in Sec. 223.203(b)(4), or how any hatchery and genetic management plan addresses the criteria in Sec. 223.203(b)(5).

The Muckleshoot Indian Tribe (MIT) and Washington Department of Fish and Wildlife (WDFW) have provided NMFS with five hatchery and genetic management plans (HGMPs) proposed for implementation in the Lake Washington basin and adjacent marine areas (Table 1; Fig. 1). The applicants have provided the HGMPs and supplementary information for review and determination by NMFS pursuant to limit 6 of the ESA 4(d) Rule. The co-managers in this basin under *United States v. Washington* (1974) are MIT, Suquamish Tribe (SUQ) and WDFW. Each HGMP serves as an RMP for the purpose of limit 6 consideration; for this evaluation, descriptions of the proposed activities will focus on the descriptions given in the individual HGMPs.

The proposed HGMPs contain similar provisions regarding shared salmon population recovery and harvest augmentation objectives and effects; broodstock collection locations and actions; fish rearing and release sites; monitoring and evaluation actions; and funding sources. All five HGMPs were assembled consistent with the Puget Sound Salmon Management Plan, the Federal court orders under *U.S. v. Washington* (1974) that control fisheries harvest management and hatchery salmon production.

The programs have been designed to operate adaptively in response to infrastructure changes, habitat improvements or degradation, and natural-origin population responses in the Lake Washington basin. Production of Chinook salmon at the University of Washington Aquatic Research Facility (UW ARF)

ceased in 2009, and coho salmon production ended in 2010. Evaluation of the proposed operation has been informed by data from these past releases. Initial operation of this facility will include monitoring of initial releases to assess effects of releases on listed species under the proposed operation. The Issaquah Hatchery Fall Chinook program will transition into a genetically-linked program when the population of natural origin fish in Issaquah Creek is expected to exceed 500 fish for a third straight year (Table 6). This will enable NMFS an opportunity to complete accurate analysis of the effect that production increases would have on listed species in the Lake Washington basin.

The following discussion evaluates whether the submitted HGMPs address the criteria in section 223.203(b)(5) 22.203(b)(5) of the 4(d) Rule for salmon and steelhead – the appropriate criteria for HGMPs for hatchery programs.

Table 1. Proposed salmon hatchery programs for Lake Washington watershed; ESA = Endangered Species Act, WDFW = Washington Department of Fish and Wildlife, SAFS – University of Washington School of Aquatic and Fishery Sciences, SPU = Seattle Public Utilities.

Hatchery Program	Operator	Program Purpose
University of Washington Aquatic Research Facility Hatchery – Fall Chinook Salmon	SAFS	Research
University of Washington Aquatic Research Facility Hatchery - Coho	SAFS	Research
Issaquah Fall Chinook Hatchery Program	WDFW	Harvest augmentation
Issaquah Coho Hatchery Program	WDFW	Harvest augmentation
Lake Washington Sockeye Program	SPU; WDFW	Rebuilding/Harvest augmentation

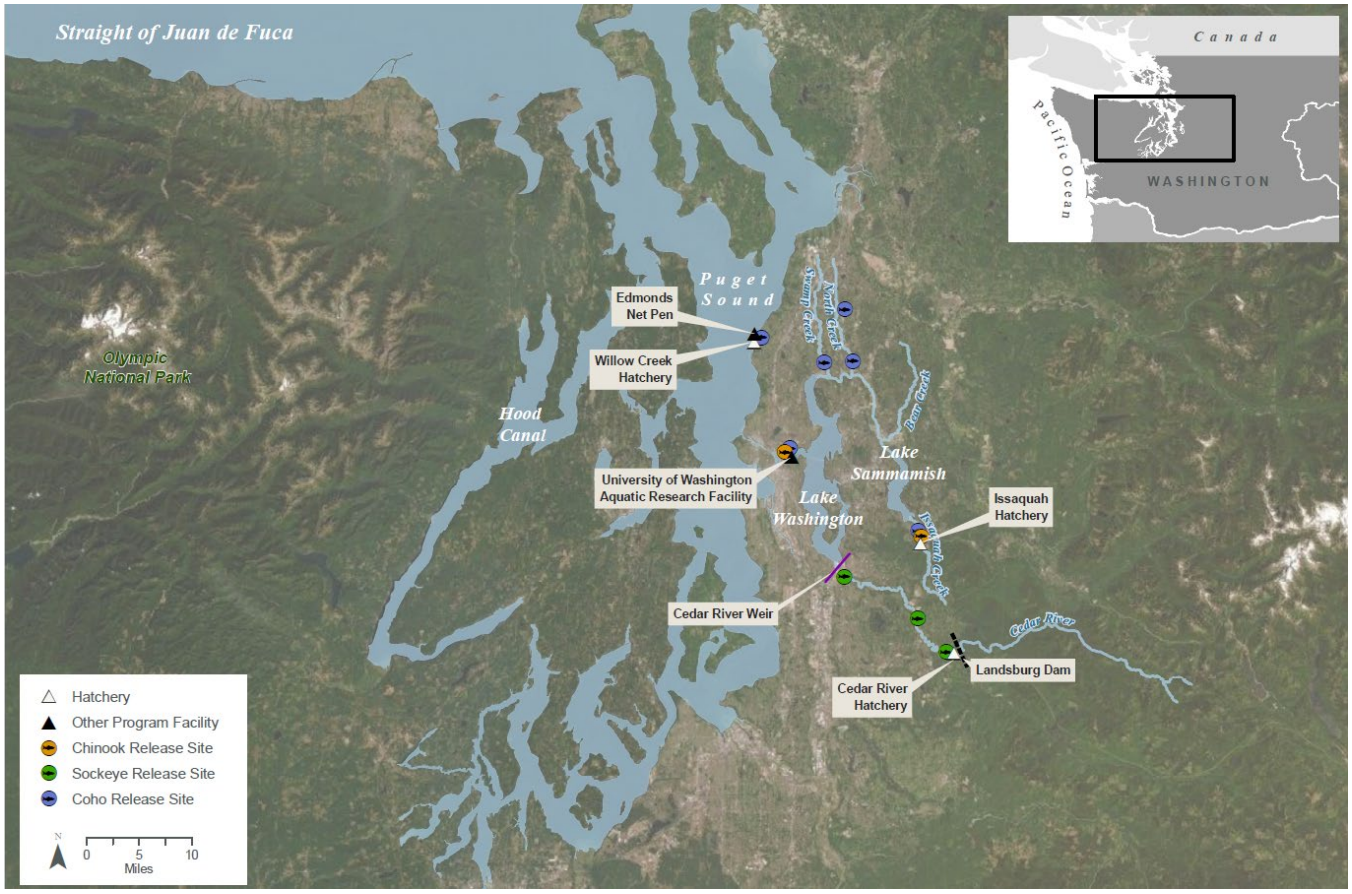

Figure 1. Lake Washington basin, adjacent marine areas, and the facilities associated with the Issaquah, University of Washington-ARF, and Cedar River salmon hatcheries.

1.1 5(i)(A) The HGMP has clearly stated goals, performance objectives, and performance indicators that indicate the purpose of the program, its intended results, and measurements of its performance in meeting those results.

Each of the HGMPs has clearly stated its goal, performance objectives, and methods for measuring the progress toward achieving those objectives. The general program goals described in section 1.7 of each HGMP for propagating hatchery fish are to contribute to:

- Producing Lake Washington fall Chinook population for sustainable fisheries and fulfill federal tribal trust responsibility and treaty rights guaranteed through treaties and affirmed in *U.S. v. Washington* (1974);
- Mitigation for decreased natural-origin production of Chinook, coho, and sockeye salmon in the Lake Washington basin.
- Does not impede recovery of ESA-listed Puget Sound Chinook salmon

- Providing for ceremonial and subsistence fishery

Performance objectives and performance indicators that would be used to gauge compliance with each objective, are described in section 1.10 of each HGMP. Evaluation and monitoring to ensure standards and indicators are met are further described in section 1.8 of this document and are summarized in Table 2.

Monitoring of HGMP implementation would generally be designed to determine:

1. Program consistency with proposed hatchery actions and intended results (e.g., juvenile fish release and adult return levels);
2. Measurement of the program's success or failure in attaining results; and
3. Effects of the program on listed natural-origin fish populations in Puget Sound freshwater and marine waters where these fish may migrate or return.

Table 2. Summary of HGMP program performance standards and indicators.

Standard	Indicator
Produce fish for harvest while minimizing excess hatchery returns	Estimate adult harvest and escapement Mass mark juvenile Chinook and Coho salmon to allow mark-selective fisheries in salt water Record return surplus to broodstock and passage needs
Proper broodstock collection and management	Collected randomly throughout the run Weir/trap checked regularly Proportion of natural-origin fish Designated mating scheme, sex ratio is followed Adheres to spawning guidelines Stray rates are as expected
Meet hatchery juvenile production goal	Egg to fry or smolt survival are as expected Number and size of juvenile fish released are as expected
Natural genetic variation of ESA-listed Chinook salmon does not change due to artificial propagation	Proportion of naturally spawning Chinook salmon of hatchery origin Spawning survey to count fin-mark and CWT or spawning ground NOR incorporated into broodstock when natural origin recruit (NOR) escapement meets trigger
Minimize interactions of hatchery releases with ESA-listed natural-origin Chinook salmon	Size, time, and condition of juvenile hatchery fish released
Life history characteristics of ESA-listed Chinook salmon does not change due to artificial propagation	Emigration-timing of juvenile natural-origin Cedar River Chinook salmon Run-timing of natural-origin Chinook salmon at the Chittenden Locks
Limit pathogen amplification and transmission	Follows co-manager fish health policy Follows USFWS fish health policy

Minimize interactions of releases with natural-origin fish	Size and time of release for listed stocks are as expected

1.2 5(i)(B) The HGMP utilizes the concepts of viable and critical salmonid population thresholds, consistent with the concepts contained in the technical document entitled "Viable Salmonid Populations."

HGMPs proposed for consideration under the 4(d) Rule must use the concepts of viable and critical thresholds as defined in the NMFS Viable Salmonid Population (VSP) document (McElhany et al. 2000). Application of these VSP concepts is needed to adequately assess and limit the take of listed salmonids for the protection of the species. Section 2.2.2 of each HGMP describes the status of the listed Chinook salmon and steelhead populations relative to "critical" and "viable" population thresholds within the Green/Duwamish watershed and references NMFS reviews' of species status.

The Lake Washington basin fall Chinook salmon population in the Puget Sound Chinook Salmon ESU remain listed as threatened (64 FR 14308, March 24,1999; 70 FR 37160, June, 28, 2005, and 79 FR 20802, April, 14, 2014). Critical habitat is designated for Puget Sound Chinook salmon within the Lake Washington basin action area (70 FR 52630). This population is not essential for recovery of the Puget Sound Chinook ESU (PRA Tier 3); the life history and Green River genetic legacy of the population are represented by other populations in the Central/South Sound Region. (NMFS 2021).

NMFS evaluation of Natural Escapement trend (1990 – 2018), published in NMFS 2021, is that Cedar River Chinook salmon population is above recovery threshold (1.04) and the Sammamish river population is below critical threshold (1.03) (NMFS 2021). Between 1999 and 2018, the geometric mean total annual naturally spawning Chinook salmon escapement in the Sammamish river was 161 natural-origin spawners compared with the recovery goal of 1,000 fish at high productivity (Table 3).

Table 3. Estimates of escapement and productivity (recruits/spawner) for Cedar and Sammamish River Fall-run Chinook Salmon. Populations at or below their critical escapement threshold are bolded (NMFS 2021).

population	1999 to 2018 Geometric mean Escapement (Spawners)		NMFS Escapement Thresholds		Recovery Planning Abundance Target in Spawners (productivity)[1]	Average % hatchery fish in escapement 1999-2018 (min-max)[2]
	Natural[3]	Natural-Origin (Productivity)[1]	*Critica*	Rebuilding		
Cedar River	924	659 (2.7)	*200*[4]	282[5]	2,000 (3.1)	28 (10-50)
Sammamish River	1,073	**161** (0.5)	*200*[4]	*1250*[5]	1,000(3.1)	80 (36-96)

[1] Source productivity is Abundance and Productivity Tables from NWFSC database; measured as the mean of observed recruits/observed spawners through brood year 2015 except: SF Nooksack through brood year 2013; and NF and SF Stillaguamish, Sammamish, Cedar, Duwamish-Green, Puyallup, White, Snoqualmie, Skykomish, through brood year 2016. Sammamish productivity estimate has not been revised to include Issaquah Creek. Source for Recovery Planning productivity target is the final supplement to the Puget Sound Salmon Recovery Plan (NMFS (2006) measured as recruits/spawner associated with the number of spawners at Maximum Sustained Yield under recovered conditions.

[2] Estimates of the fraction of hatchery fish in natural spawning escapements are from the Abundance and Productivity Tables from NWFSC database; measured as mean and range for 1999-2018. Estimates represent hatchery fraction through 2019 for: NF and SF Stillaguamish, Skykomish, Snoqualmie, Cedar, Duwamish-Green, White, Puyallup, and Elwha) (PSIT and WDFW 2013; WDFW and PSTIT 2007; WDFW and PSTIT 2008; WDFW and PSTIT 2009; WDFW and PSTIT 2010; WDFW and PSTIT 2011; WDFW and PSTIT 2012; WDFW and PSTIT 2013; WDFW and PSTIT 2014;WDFW and PSTIT (2015); WDFW and PSTIT 2016), James and Dufault 2018 (preliminary data), and the 2010-2014 Puget Sound Chinook Harvest Management Plan (PSIT and WDFW 2010).

[3] Includes naturally spawning hatchery fish Includes naturally spawning hatchery fish (estimates represent 1999-2019 geo-mean for: NF and SF Stillaguamish, Skykomish, Snoqualmie, Cedar, Duwamish-Green, White, Puyallup, and Elwha).

[4] Based on generic VSP guidance (McElhany et al. 2000)

[5] Based on spawner-recruit assessment (NMFS 2021)

1.3 5(i)(C) Taking into account health, abundances, and trends in the donor population, broodstock collection programs reflect appropriate priorities.

A prioritized purpose of a broodstock collection program using listed fish is to re-establish an indigenous salmonid population for conservation purposes, including restoration of similar at-risk populations within the same ESU, and reintroduction of at-risk populations to under-seeded habitat. Under this 4(d) Rule criterion, as described in the 4(d) rule, listed salmonids may be intentionally taken for broodstock only if:

1. The donor population is currently at or above the viable threshold and the collection will not impair its function, or
2. The donor population is not currently viable but the sole objective is to enhance the propagation or survival of the listed ESU, or
3. The donor population is shown with a high degree of confidence to be above the critical threshold although not yet functioning at viable levels, and the collection will not appreciably slow attainment of viable status for that population.

Broodstock used for non-listed programs are discussed in the following section (1.4).

The details of broodstock collection are summarized in Table 4. The Sammamish River fall Chinook salmon population is below the NMFS critical threshold (Table 3) and potential improvement in natural-origin production is limited by the existing habitat (NMFS 2021). Further this population is not essential for recovery of the Puget Sound Chinook ESU (PRA Tier 3) and the life history and Green River genetic legacy of the population are represented by other populations in the Central/South Sound Region (NMFS 2021). For these reasons, the Issaquah Fall Chinook hatchery program will operate as a segregated program unless the NOR population size meets a minimum trigger. Under this segregated program, only HORs will be spawned at the hatchery and NORs will be passed upstream to spawn naturally in upper Issaquah Creek. The Issaquah Hatchery Fall Chinook program will transition into a genetically-linked program when the minimum trigger is reached. This would occur when the population of NORs in Issaquah Creek is expected to exceed 500 fish for a third straight year. This assumes the two preceding years had more than 500 adult natural-origin returns and that the current pre-season forecast also exceeds that trigger (Table 6). Under this scenario, Issaquah Hatchery's goal will be to release 200,000 sub-yearling Chinook derived solely from natural-origin parents. These juvenile Chinook will be 100% CWT tagged. Any NORs excess to this program will be released upstream. A higher trigger occurs

when the NOR population exceeds 800 for three straight years. When this occurs, the only change is that the integrated production will be doubled to 400,000 sub-yearlings.

Initially UW ARF will be used as an acclimation and/or release site for Issaquah coho and Chinook. UW ARF will rely on juveniles from Issaquah hatchery to establish programs for coho and Chinook at the facility. Once more established, the UW ARF programs would operate as segregated programs with all broodstock anticipated to be obtained from the UW ARF volitional-entry adult collection pond at Portage Bay. In the event of a shortfall, eggs will be transferred from Issaquah Hatchery. The purpose of the programs would be to support regional research programs and staff and to support educational and outreach activities for the general public.

1.4 5(i)(D) The HGMP includes protocols to address fish health, broodstock collection and spawning, rearing and release of juveniles, disposition of hatchery adults, and catastrophic risk management.

The proposed HGMPs include protocols for fish health, broodstock collection, broodstock spawning, rearing and release of juveniles, deposition of hatchery adults, and catastrophic risk management.

Fish Health (HGMP sections 7, 9, and 10) All of the hatchery programs would be operated in compliance with the co-manager and USFWS fish health policies (USFWS 2004; WWTIT and WDFW 2006). The policies are designed to limit the spread of fish pathogens between and within watersheds by regulating the transfers of eggs and fish. The policies also outline standard fish health diagnosis, maintenance, and hatchery sanitation protocols to reduce the risk of pathogen amplification and transmission within the hatchery and to fish in the natural environment during broodstock collection and mating as well as fish incubation, rearing, and release. Fish health specialists and pathologists from WDFW, NWIFC, or the USFWS would provide fish health management support and diagnostic fish health services.

At four of the hatchery facilities (Issaquah, Willow Creek, UW ARF and Cedar River), eggs are disinfected with iodophor to reduce risk of egg-associated transmission of pathogens. Fungus is controlled by formalin drip (1,667 ppm). When eggs reach the eyed stage, they are shocked via siphoning. Non-viable eggs are removed. Coho salmon eggs from Issaquah Coho hatchery program are transported to Willow Creek Hatchery in January and February. Upon arrival at Willow Creek Hatchery, eggs are disinfected with iodophor and dead eggs are removed but eggs are not further treated with chemicals (no formalin). Eggs are monitored daily—if problems arise, they will contact the WDFW fish health specialist assigned to the Issaquah hatchery for treatment determination. The use of surface water at Willow Creek Hatchery causes silt accumulation; silt removal is accomplished by brushing the tray screens or "rodding". The control of fungus at the UW ARF hatchery is achieved by filtering the dechlorinated, cold-sterilized water source to 1 micron. Sockeye are carriers of IHNV, so strict testing, disinfection, and isolation procedures are in effect at the Cedar River Sockeye Hatchery to ensure egg lots that test positive are destroyed or other appropriate control measures implemented.

After fish are ponded, juveniles are monitored by a qualified WDFW fish health specialist. Yearlings are transferred from the Issaquah Hatchery to the net pens located at the port of Edmonds in February. Prior to transfer, juveniles are monitored and the health status is certified by a WDFW fish health specialist (WWTIT and WDFW (2006)). Net pens are checked daily and mortalities are removed.

Broodstock Collection and Spawning (HGMP sections 6, 7, and 8) Thing Issaquah Coho and Fall Chinook and Cedar River Sockeye Hatchery programs use weirs for broodstock collection. The Issaquah Hatchery program collects coho and Chinook salmon through a fish ladder and adult holding pond system. Fish are directed to the fish ladder entrance via a permanent air bladder weir located at the facility. The weir is typically operated for adult fish collection from August through the third week of November and daily. The Cedar River Sockeye hatchery collects sockeye broodstock at the Landsburg Dam fish passage facility and at a temporary (seasonally installed) floating resistance board weir located at RM 1.7. Seattle Public Utilities is in the process of designing a new weir; the construction of the weir will go through separate consultation with NMFS. For this evaluation, NMFS will analyze the effects of the operation of the current and proposed permanent weir. A seasonal weir may also be installed on Bear Creek for sockeye broodstock collection. Broodstock is also collected at Landsburg dam.

Hatchery Chinook salmon enter the UW ARF fish pond via a fish ladder. Broodstock will be collected by beach seine, from the hatchery pond.

The Lake Washington Sockeye program uses an integrated broodstock management strategy that has used local in-basin fish collected from the Cedar River Weir (RM 1.0) and Landsburg Dam (RM 27.1). Broodstock collections may occur at the Cedar River Weir (RM 1.0), Landsburg Dam (RM 27.1), Bear Creek, Issaquah Creek, Cedar River and the Ballard Locks. Recent declines in escapement might require using supplemental sources to meet broodstock targets.

Table 4: Broodstock collection details for the Lake Washington salmon hatchery programs. Proportion of natural origin fish that are used in broodstock (pNOB)

Program	Local source	Collection Location(s)	Collection Method	Collection/ Holding Target	Collection Duration	pNOB
Issaquah Fall Chinook Hatchery Program (genetically-linked)[1]	Natural and hatchery	Issaquah Creek[2]	Air-bladder weir diverts fish into volitional entry ladder and holding ponds	3,360	September - December	0
		Ballard Locks[4]	Dip net from fish ladder		July - September	
Issaquah Coho Hatchery Program (integrated)	Natural and hatchery	Issaquah Creek[2]	Air-bladder weir diverts fish into volitional entry ladder and holding ponds	1,130	October - December	up to 1
UW ARF Hatchery: Fall Chinook Salmon (segregated)	Hatchery	Portage Bay[3]	Volitional-entry ladder and holding pond; beach seine[3]	180	September – October	0
UW ARF Hatchery Coho (segregated)	Hatchery	Portage Bay[3]	Volitional-entry ladder and holding pond; beach seine[3]	180	September - December	0
Lake Washington Sockeye(Integrated)	Natural and hatchery	Landsburg Dam[4] Cedar River Weir[3]; Bear Creek[3,5]; Issaquah Creek[3], Other[3,6]	Ladder, weir and holding ponds	24,000	September - November	at least 0.5
		Ballard locks[3]	Dip net from fish ladder		June – August	
		Cedar River[3]	Gill net angling fyke nets, hoop traps[3]		September - November	

Rearing and Release of Juveniles (HGMP sections 9 and 10) All releases occur within anadromous-accessible waters of the Lake Washington basin. Prior to release, juveniles are monitored and the health status is certified by a WDFW fish health specialist. An exception is releases from Edmonds net pens, where some coho are placed in marine net pens for acclimation and direct release into Puget Sound. Release numbers, life stage, location, percentage marked, and dates for all hatchery programs are detailed in Table 5.

Table 5. Fish release details in the Duwamish/Green watershed; SCH = Soos Creek Hatchery, IC = Icy Creek Rearing Ponds, FGP = Flaming Geyser Ponds, KCC = Keta Creek Complex, MCH = Miller Creek Hatchery, MTC = Marine Technology Center; FRF = Fish Restoration Facility, TBD = to be decided.

Program	Release number, Life Stage, and Size (fp)	Marking and Tagging	Rearing, Acclimation Site?	Release Location	Volitional Release?	Release Time
Issaquah Chinook (Genetically-linked)[1]	Up to 6,000,000[2]; sub-yearling; 80-110	AD CWT[3]	Issaquah Hatchery, Sammamish Slough and tributaries, UW ARF[2], downstream sites[4]	Issaquah Creek, Lake Washington Ship Canal, Sammamish Slough and tributaries, Kenmore boat ramp, Portage Bay, downstream sites[2]	No[5]	April-June
Issaquah coho (integrated)	750,000; yearling; 17	AD, AD+CWT[3]	Issaquah hatchery, UW ARF, Sammamish Slough and tributaries, downstream sites[4]	Issaquah Creek; Lake Washington ship canal; Portage Bay, Sammamish Slough and tributaries, Kennmore boatramp, downstream sites[4]	No	March - June
	340,000; fry; 200 – 1,500	unmarked	Cooperative and School programs	Lake Washington basin	No	May-June
	25,000; yearling; 10	AD	Laebugten/Edmonds Net Pen	Puget Sound	No	May - June
	10,000; fry; 100	unmarked	Willow Creek Hatchery	North Creek	No	June
	70,000; fry; 500	unmarked		North Creek Swamp Creek	No	April-May
UW ARF- Chinook salmon (segregated)	180,000[2]; sub-yearling ;20-110	AD CWT[3]	UW ARF, Issaquah Hatchery	Portage Bay	Yes	April - June
UW ARF- Coho (segregated)	90,000; sub-yearling (0 age smolts); 30-50	AD CW[3]	UW ARF; Issaquah Hatchery	Portage Bay	Yes	April - June
Lake Washington Sockeye (Integrated)	<34,000,000[6]/*34,000,000*; fry; 2,000	Otolith	Cedar River Sockeye Hatchery, Issaquah Hatchery, UW- ARF	Cedar River, Lake Washington	No	Jan. – May
	<480,000/*1,000,000*; sub-yearling; 150-800	AD[7], Otolith	Cedar River Sockeye Hatchery, Issaquah Hatchery, net pen (s)[8], UW ARF	Cedar River , Lake Washington, Lake Washington Ship Canal, Portage Bay, net pen(s) [8]		May – June
	<300,000/*1,000,000*; sub-yearling; 80-150	AD[7, 3], Otolith				Sept. – Oct.

	< 40,000/*1,000,000*; yearling; 15-80	AD[7, 3], Otolith				April – May

[1] Issaquah Chinook hatchery program will initially begin as a segregated program and through a trigger approach that is detailed above in section 1.3 and Table 6, will switch back and forth into a genetically-linked program as determined by NOR returns

[2] The planned total Chinook salmon releases in Lake Washington watershed would not exceed 6M; i.e., if the planned UW ARF release was 0.18M, the Issaquah Fall Chinook planned release would be 5.82M.

[3] Released fish may be implanted with a coded wire tag (CWT) in the future depending on research and/or Co-manager needs.

[4] Pilot study and evaluation is in progress for releases at multiple locations in the Lake Washington Basin including: the Kenmore boat ramp, the 14th Street boat ramp in the Lake Washington ship canal, and the UW ARF Pond with releases into Portage Bay. Other sites such as the NOAA facility at Sand Point may be used in the future pending continued discussions amongst the co-managers and NMFS.

[5] Volitional releases may occur at locations other than the Issaquah Hatchery depending on the release location and acclimation site design.

[6] The planned total Sockeye salmon releases in Lake Washington watershed would not exceed 34M.

[7] Fish smaller than 250 fpp cannot be reliably adipose clipped so if the fish are released prior to this size, they will only have an otolith mark.

[8] The co-managers may consider using net pens to rear juvenile sockeye and hold adult salmon in the future. However, those options are not part of the action under consideration in this consultation.

Table 6: **Proposed annual release protocols for the genetically linked fall Chinook program at Issaquah Hatchery**

Issaquah Creek NOR 3-year Trigger[1]	Program component	Release Number[2], Life Stage, and Size (fpp)	Marking and Tagging
≥ 500	Segregated	Up to 5,800,000; sub-yearling; 80-110	AD
	Integrated	200,000; sub-yearling;80-110	AD 100% CWT
≥ 800	Segregated	Up to 5,600,000; sub-yearling;80-110	AD
	Integrated	400,000; sub-yearling;80-110	AD 100% CWT

[1] See section 1.3 for full description of decision rule for integrated program.
[2] The planned total Chinook salmon releases would not exceed 6M; i.e., if the planned UW ARF release was 0.18M, the Issaquah Fall Chinook planned release would be 5.82M.

Disposition of Hatchery Adults (HGMP sections 7.5 and 7.8) Adult fish collected in excess of annual broodstock needs are released to spawn naturally, sold to a contracted fish buyer, or distributed to the treaty tribes for subsistence use. At Issaquah Hatchery and associated programs, egg-take is carefully managed to minimize the likelihood of collecting surplus eggs or raising surplus fry. However, in years of high within-hatchery survival, juvenile production levels higher than the proposed release numbers may occur. The co-managers plan to limit production to no more than 10% above levels; an overage of 10% is anticipated to be a rare occurrence. If the running 5-year average production (beginning in the release year that NOAA makes a determination on the program) for a species-stage in the Lake Washington Drainage is more than 5% above the level described, the co-managers will notify NMFS. At UW ARF hatchery spawned and unspawned carcasses are tested for viruses and other diseases before being used to reseed stream habitat and carcass distribution is tracked for reporting. Remaining carcasses are sent to a landfill. At Cedar River Sockeye Hatchery, all collected sockeye are used for broodstock with an exception in the event of excess of males, which are released to spawn naturally in the river downstream of Landsburg Dam.

Catastrophic Risk Management (HGMP section 5.8) Issaquah Fall Chinook, Issaquah Coho, and Willow Creek Hatcheries adhere to the applicants' fish health policies (described in detail in section 10.10 of each HGMP; (USFWS 2004; WWTIT and WDFW 2006) and use best management practices to reduce the risk of catastrophic loss of fish under propagation, such as

specific rearing densities and feeding regimes and use of disinfection protocols before entering and leaving egg incubation/rearing buildings at each facility.

Table 7. Additional measures taken to reduce the likelihood of catastrophic fish loss at the hatchery facilities. NA = not applicable; net pen programs are within Puget Sound and have a ready supply of water.

Facility	Personnel	Water	Power loss
Issaquah Hatchery	On-station personnel	Low water alarm	Back-up generator
Willow Creek Hatchery	Staff on-call	Remote alarm system	Back-up generator
Edmonds Net Pen	N/A	N/A	N/A
Cedar River Sockeye Hatchery	On station at all times	Low water alarm	Back-up generator
UW ARF	Staff on-call	Remote alarm system	Back-up generator

1.5 5(i)(E) The HGMP evaluates, minimizes, and accounts for the propagation programs' genetic and ecological effects on natural populations, including disease transfer, competition, predation, and genetic introgression caused by straying of hatchery fish.

The Lake Washington watershed HGMPs provide evaluations of potential genetic and ecological effects on NMFS ESA-listed species in section 2 and risk minimization measures in sections 6-10.

Artificial fish production may result in a loss of within-population genetic diversity (the reduction in quantity, variety and combinations of alleles in a population), outbreeding depression (loss in fitness caused by changes in allele frequency or the introduction of new alleles) and/or hatchery-influenced selection. Genetic effects of fall Chinook, sockeye, and coho salmon on ESA-listed Chinook salmon and steelhead in Lake Washington watershed are unlikely because these species do not interbreed. Therefore, our consideration of their discussion of genetic effects focuses on the propagation of Chinook salmon.

The primary ecological risks to natural-origin salmon and steelhead populations posed by salmon hatchery programs are identified in the HGMPs as competition for food resources and space, and predation. Pathogen transfer and amplification are also risk factors. As noted in the HGMPs and earlier in this document, all hatchery actions would be implemented in accordance with the co-manager and USFWS fish health policies to account for and minimize the risks of pathogen transmission and amplification.

The primary genetic risks to the natural-origin salmon and steelhead populations posed by salmon hatchery programs are identified in the HGMP. The Sammamish River fall Chinook salmon population is below the NMFS critical threshold (see details in section 1.3 above). The additional contribution of hatchery fish provides some demographic benefit, but potential improvement in natural-origin production is limited by the existing habitat (NMFS 2021). Further the life history

and Green River genetic legacy of the population are represented by other populations in the Central/South Sound Region (NMFS 2021). While the program is operating as a segregated program, there would be minimal interbreeding between hatchery- and natural-origin fish. When the Issaquah Hatchery program transitions into a genetically-linked program, some interbreeding between hatchery- and natural-origin fish would occur

The HGMPs account for and minimize genetic and ecological risks through implementation of the following measures:

- Broodstock are randomly collected throughout the adult return to ensure full representation of run timing, age class, and sex ratio;
- Limit the proportion of hatchery-origin spawners (Chinook only) above the Issaquah hatchery weir to promote local adaptation;
- When the program would operate as a genetically-linked program, natural-origin fish would be incorporated into the broodstock to limit divergence from the Sammamish river population;
- Fish are marked to differentiate them from other natural-origin Chinook salmon stocks, assess out-of-basin straying, and measure proportions of hatchery- and natural-origin spawners. Released fish may be implanted with a coded wire tag (CWT) in the future depending on research and/or Co-manager needs. Chinook juveniles are acclimated at their site of release to decrease straying potential. Acclimation of hatchery juveniles before release increases the probability that hatchery adults will home back to the release location, reducing their potential to stray into natural spawning areas,
- Yearling coho produced by the net pen facilities are released directly into saltwater, with no freshwater interactions with natural-origin fish.

1.6 5(i)(F) The HGMP describes interrelationships and interdependencies with fisheries management.

The HGMPs describe the relationship of the proposed actions with fisheries management in section 3.

The HGMPs indicate that all co-managed hatchery programs in the Puget Sound region would operate consistent with the *U.S. v. Washington* (1974) fisheries management framework. This legal framework sets forth required measures for coordinating implementation of State and tribal hatchery programs, defining artificial production objectives, and maintaining treaty-fishing rights through the court-ordered Puget Sound Salmon Management Plan (PSSMP 1985). This fisheries resource co-management process requires that both the State of Washington and the Puget Sound Tribes develop salmon and steelhead hatchery program goals and objectives, and reach agreement on the function, purpose, and fish production strategies for all Puget Sound hatchery programs.

The goals of the HGMPs include providing hatchery-origin Chinook, coho, and sockeye salmon for harvest to support fisheries. State recreational and tribal fisheries for hatchery-origin species may incidentally affect NMFS ESA-listed species. However, these fisheries are not considered interrelated with or interdependent on these programs because these programs are not the sole producers of fish for the fisheries.

1.7 5(i)(G) Adequate artificial propagation facilities exist to properly rear progeny of naturally spawned broodstock, to maintain population health and diversity, and to avoid hatchery-influenced selection and domestication.

The programs that propagate ESA-listed Chinook salmon will utilize multiple facilities. This approach reduces the risk of maintaining listed fish at a single location while under propagation, lessening the potential for catastrophic loss of rearing populations in the event of water or power failure at one facility. As described in sections 4 and 5 of the HGMPs, the hatchery facilities used to implement the programs have adequate surface and groundwater sources, egg incubation and fish rearing vessels, and fish release facilities to ensure proper rearing of ESA-listed Chinook salmon and steelhead while under propagation.

Facilities that rear over 20,000 pounds of fish operate under applicable National Pollutant Discharge Elimination System (NPDES) general permits, which provide for monitoring of temperature, chlorine, and settleable and suspended solids in facility effluent. As mentioned previously, fish health is maintained throughout rearing by adhering to fish health policies and using pathogen-free water sources when possible. Minimization of catastrophic loss and genetic risks associated with these programs were addressed in Sections 1.4 and 1.5, respectively, of this document.

1.8 5(i)(H) Adequate monitoring and evaluation exist to detect and evaluate the success of the hatchery program and any risks potentially impairing the recovery of the listed ESU.

The HGMPs include implementation of adequate monitoring and evaluation actions to evaluate the performance of each program in meeting program objectives. These actions are summarized in Section 1.10, and are further described in Section 11 of each HGMP. Some of these activities may be covered using other ESA pathways (e.g., Section 10 research permits), but the information obtained may be relevant to our evaluation of the hatchery program. Monitoring and evaluation actions implemented include:

- Spawning ground/redd surveys to determine percent of naturally spawning hatchery-origin fish,
- Trapping of outmigrating juveniles to determine post-release emigration timing, emigration rate, and hatchery fish predation levels on natural fish,

- Calculating estimates of smolt-to-adult survival rates, harvest of hatchery fish, and straying of Issaquah Hatchery Chinook salmon to other Puget Sound watersheds using mark recovery programs and creel surveys,
- Collection of abundance, timing, age class, sex ratio, and fish health condition data for broodstock to assess run traits of the target populations,
- Monitoring of water withdrawal and effluent to ensure compliance with permitted levels,
- Monitoring of broodstock collection, egg take, fish survival rates in hatchery, smolt or fry release levels, and hatchery and natural fish escapement to the hatcheries to ensure compliance with program goals
- Fish health monitoring and reporting in compliance with fish health policies.

1.9 5(i)(I) The HGMP provides for evaluating monitoring data and making any revisions of assumptions, management strategies, or objectives that data show are needed.

Under the HGMPs in Section 1.10, data collected relating to hatchery program performance and effects would be evaluated by the applicants to determine whether performance standards are being met. Annual reports for the programs assembled by the applicants would be jointly reviewed by NMFS to document program results, and to determine if adjustments to the programs' assumptions and management strategies are warranted. Any changes would be incorporated into Future Brood Documents, Annual Operating Plan documents, and/or the HGMPs as necessary. These programs are enforced through the *U.S. v. Washington* Management Agreement process, upon review of annual reports and operating plans. The tribes and WDFW employ enforcement officers throughout the area, who are responsible for on the ground enforcement to prevent ESA violations.

1.10 5(i)(J) NMFS provides written concurrence [with] the HGMP, which specifies the implementation and reporting requirements.

After completion of the public review and comment period for this proposed evaluation and pending determination document, and after consulting with itself under section 7 of the ESA, NMFS will make a determination regarding the adequacy of the five Lake Washington HGMPs. If the determination is made that implementing and enforcing the plans will not appreciably reduce the likelihood of survival and recovery of the ESA-listed species, and that the plans address all the criteria specified in limit 6 of the4(d) Rule, NMFS will so notify the applicants in writing, and will specify any necessary implementation and reporting requirements.

1.11 5(i)(K) The HGMP is consistent with plans and conditions set within any Federal court proceeding with continuing jurisdiction over tribal harvest allocations.

The Lake Washington watershed salmon HGMPs were developed by the applicants pursuant to the *U.S. v. Washington* (1974) fisheries and hatchery management framework. The HGMPs are

one component of an effort to preserve and recover to a fishable status ESA-listed Chinook salmon, steelhead, and other non-listed salmonid populations in the Lake Washington watershed. The ESU recovery plan for Chinook salmon has hatchery, harvest, and habitat components, and includes monitoring, research, and restoration recommendations to complement artificial production. The hatchery actions described in the HGMPs are included within, and consistent with, this recovery plan.

2 PENDING DETERMINATION

As required by limit 6 of the4(d) Rule, the Secretary is seeking comment from the public on the pending determination as to how any hatchery and genetic management plans address the criteria in Sec. 223.203(b)(5).

NMFS has reviewed the plans and evaluated them together against the requirements of the4(d) Rule. Based on this review and evaluation, NMFS' pending determination, subject to information provided during public comment, is that activities implemented as described would meet limit 6 criteria. This pending determination does not prejudge the outcome of any additional environmental reviews that may be scheduled to be completed prior to a final determination.

3 REEVALUATION CRITERIA

NMFS will reevaluate this determination if: (1) the actions described by the plans are modified in a way that causes an effect on the listed species that was not previously considered in NMFS' evaluation; (2) new information or monitoring reveals effects that may affect listed species in a way not previously considered; or (3) a new species is listed or critical habitat is designated that may affect NMFS' evaluation of the plans.

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