Project Name	Article 5: Satellite Rearing
Date Proposal Summited	11/4/2025
Date of Requested Decision	12/2/2025
Requested By	Matt Bleich
Date of Decision[1]	12/2/2025

[1] Decision will become final if committee members who were not present at this meeting do not oppose this proposed decision within 7 days.

FTC Decision and Justification

The Cowlitz Fisheries Technical Committee (FTC) supports the proposed decision.

FTC members present included: WDFW (Bryce Glaser), Ecology (Andrew Luymes), Trout Unlimited (Jonathan Stumpf), Yakama Nation (Bill Sharp), Tacoma Power (Melora Shelton) and USFWS (Jeff Garnett); USFWS abstained from voting.

Proposed Decision for Consideration

Support the implementation of a new Satellite Rearing proposal as outlined in the Satellite Rearing Program Details (attached) and briefly summarized here. This proposal supersedes and replaces prior Satellite Rearing Decision Documents including DD 2016-06, DD 2021-07, DD 2022-07, DD 2022-07(a).

The proposal consists of implementing the following three actions:

1.) Cowlitz Falls Fish Facility Extended Operations - Extend the operating window (collection season) of the Cowlitz Falls Fish Facility to March 8th thru December 23rd and then adaptively manage the operational period in coordination with the FTC to improve Fish Passage Survival (FPS).

2.) Cowlitz Falls Rearing - Utilize raceways at Cowlitz Falls to raise up to 50,000 segregated spring Chinook yearlings to 5fpp and pilot the facility for the integrated spring Chinook program. Fish will be transferred in early December and released at the Cowlitz Salmon Hatchery (CSH) boat launch during their normal release window. All segregated spring Chinook will be marked with an adipose fin clip and a subset will receive CWT.

3.) Mayfield Net Pens - Utilize the existing Mayfield Net Pen array to raise approximately 250,000 coho juveniles to 15fpp making room for additional spring Chinook poundage at the CSH (approximately 55k @ 5fpp). Coho will be transferred in early December and released at the CSH boat launch during their normal release window. All coho will be marked with an adipose fin clip and a subset will receive CWT.

Tacoma will invest the Capital, Operations, and Maintenance funds and efforts to facilitate the Satellite Rearing actions for the duration of the License (2037). If the FTC determines a satellite

rearing action is not achieving expected outcomes, the FTC will discuss adaptive management options as described in the Satellite Rearing Program Details document (attached). Pending approval by the FTC, Tacoma will begin implementing actions following the timelines outlined in this DD and the attached Satellite Rearing Program Details document.

Pending FERC's approval this proposal would fulfill the Satellite Rearing requirement in Article 5 of the Settlement Agreement as incorporated into the FERC License. See the Satellite Rearing Program Details document and information below for additional context and details.

Background

Article 5 of the Settlement Agreement (SA) and FERC License calls for operation and maintenance of three satellite rearing facilities for the duration of the License, alongside the Cowlitz Hatchery Complex. Article 5 further clarifies that, for the hatchery program and satellite rearing facilities, "production shall emphasize the recovery of indigenous stocks, and production and management of all stocks shall be consistent with that goal." The License and Settlement Agreement provide that these requirements will be implemented with an adaptive management approach:

An adaptive management approach to implementing the Agreement is a central concept. In particular, decisions on fish passage and hatchery production are tied to various measures of progress toward salmon recovery. Under various conditions of the Agreement, Tacoma would consult with a Fisheries Technical Committee for the purpose of assisting the licensee in the design of monitoring plans and studies, reviewing and evaluating resulting data, and decisions on adaptive management measures associated with the fisheries measures.
Cowlitz License Order (2002).

As such, the satellite rearing facilities were intended to be built to help promote restoration and recovery of wild, indigenous salmonid runs, including ESA-listed and unlisted stocks, to harvestable levels. The implementation of the facilities was to be developed in consultation with the FTC following adaptive management principles.

I. Changing Conditions

Early conversations within the FTC focused on the proposed construction of three satellite ponds in the Upper Cowlitz Basin, including one per major watershed (i.e., Tilton, Upper Cowlitz, and Cispus). However, as more information has become available, programmatic goals for the satellite facilities have focused on supporting recovery of natural origin salmonid populations, creating rearing space for additional flexibility and capacity within the Cowlitz Hatchery Complex, and increasing harvest opportunity in the Upper Cowlitz Basin.

The recovery landscape has changed significantly compared to when the SA was signed over 25 years ago. At the time of the SA development, satellite rearing facilities were thought to offer conservation benefits in the form of helping to improve the spatial structure of recolonizing populations by helping them utilize the productive capacity of habitat contained above the dams. However, in the intervening years, recolonization has proceeded without these facilities,

and natural origin populations have become established, including numerically large coho populations and spatially well-dispersed steelhead populations.

In addition, improvements in juvenile collection efficiency at the Cowlitz Falls Fish Facility (CFFF) have begun to move in a positive and meaningful direction, which will promote rapid additional population growth for all species in the near-term. Based on higher recent collection efficiency and management actions prioritizing increased adult transport to the Upper Basin, natural origin coho, spring Chinook and steelhead abundances are also likely to be high enough to distribute well and better seed the upper watershed in the near-term. From a recovery perspective, once full seeding is consistently occurring by well-distributed natural origin spawners, there will be a reduced conservation benefit of releasing additional hatchery origin fish in the upper basin. Hatchery origin releases would then primarily be released to support harvest opportunity as populations continue progressing towards full recovery. As long as collection efficiency remains high or increases and spatial distribution is improved, there is considerable likelihood that these satellite rearing facilities, as originally envisioned, would soon be obsolete from a recovery perspective.

Reflecting this shift, the 2011 Fisheries and Hatcheries Management Plan (FHMP) reintroduction strategies focused on adult transport to a greater extent than juvenile releases in the upper basin. The 2011 FHMP was approved by FERC in 2014 (149 FERC ¶ 62,032). In the 2014 Order, FERC requested a status update on the satellite rearing facilities. In the 2014 FHMP Annual Report and Status Evaluation, Tacoma responded that it was scheduling meetings with the FTC to determine a path forward. In 2020, Tacoma filed an updated FHMP, which called for the development of the satellite rearing strategy during the current FHMP period. Because the License indicates the primary purpose of the satellite rearing is to facilitate recovery of wild stocks, and the recovery needs of wild stocks have changed since the issuance of the new License in 2002, Tacoma proposes the following adaptive management strategy.

II. Satellite Rearing Adaptive Management Proposal

Rather than concentrating on traditional Satellite Rearing Sites that may offer limited value upon completion, the focus will shift to Satellite Rearing actions that actively contribute to ongoing conservation and recovery efforts. These actions primarily target the recovery of spring Chinook and will also support the restoration of other ESA-listed salmonids in the Upper Cowlitz Basin. Additionally, two of the actions will further enhance Hatchery Complex capacity and flexibility, enabling managers to effectively adapt to future recovery objectives. By implementing the three proposed actions, we ensure that the conservation and recovery value of Satellite Rearing sites remains significant now and into the future and will support recovery of wild stocks and harvest opportunities consistent with the License.

Additional details of the proposed actions are described in the attached Satellite Rearing Program Details document and are summarized here:

1.) <u>Cowlitz Falls Fish Facility Extended Operations</u>

Synopsis: Extend the operational period of the CFFF to maximize operations within existing environmental and facility constraints and then adaptively manage the operational period in

coordination with the FTC. Typically, operations will commence on March 8th and continue through December 23rd, subject to operational feasibility. The facility will typically undergo annual maintenance during January and February, in addition to any unplanned outages required for repairs. Within the framework of the Downstream Adaptive Management Plan, the Technical Working Group (TWG) may recommend modifications to the operational window to the FTC. Scheduling decisions will be made in advance of the upcoming season to ensure operational continuity.

The collector is a highly specialized facility functioning within a dynamic and often unpredictable environment. Fall and winter months present significant challenges due to drawdowns, freezing conditions, debris, turbidity, and elevated flow events, which pose a substantial risk of damage that could compromise system integrity and readiness for the spring migration season. Given the presumed minimal migratory activity during the winter months, this period offers a window for conducting annual maintenance and necessary repairs. This approach ensures the collector is fully operational and prepared to support peak migration activity in the spring.

Expected Recovery Benefits: Maximizes optimal operation of the Cowlitz Falls Fish Facility to improve FPS to benefit recovery across varying life history strategies for all ESA listed species.

Increasing the operational period of the CFFF is expected to increase outmigrant collection of all ESA listed salmonid species (coho, steelhead, Chinook) and native anadromous cutthroat trout. Additional outmigrant collection is expected to increase productivity and abundance of Natural Origin adults. Fish collected during this expanded timeframe may also represent diverse life history strategies ultimately increasing population diversity, a key component of the Viable Salmonid Population parameters. Population diversity strengthens resilience and viability, both of which are essential for adapting to and withstanding environmental challenges.

Timeline: Due to the compressed schedule, implementation will occur in 2026 with an initial operational period of March 15th through December 23rd.

2.) <u>Cowlitz Falls Rearing</u>.

Synopsis: Utilize raceways at Cowlitz Falls to raise up to 50,000 segregated spring Chinook yearlings to 5fpp and pilot the facility for the integrated spring Chinook program. Fish will be transferred in early December and released at the CSH boat launch during their normal release window. All segregated spring Chinook will be marked with an adipose fin clip and a subset will receive a CWT.

The initial intent of this program is to utilize additional raceway capacity at Cowlitz Falls to increase spring Chinook program poundage, while also piloting use of the facility for potential implementation of an integrated spring Chinook program.

Expected Recovery Benefits: Increases abundance of returning adult spring Chinook for supplementation without requiring additional broodstock by increasing survival of smolts released. Advances progress towards implementation of an integrated spring Chinook Program as called for in the 2020 FHMP. Increases Hatchery Complex capacity, flexibility, and productivity.

Based on the previous analysis by the FTC's M&E subgroup, rearing spring Chinook to yearling size rather than sub-yearling size has been shown to increase their Smolt to Adult Return rate (SAR). Utilizing fish from the existing sub-yearling program is expected to increase adult abundance without requiring additional adults for broodstock. Abundance building is a key action in the initial phase of reintroduction. In addition, this facility could be utilized to rear a future integrated spring Chinook program as called for in the 2020 FHMP. Regardless of the final program, the site will provide additional Hatchery Complex capacity, better acclimation to the upper watershed, and more natural rearing temperature profiles that have been shown to also increase SARs.

Timeline: Pending timely FTC approval, infrastructure modifications, and regulatory approval, implementation could occur starting December 1st of 2026. If the near-term timeline cannot be reached implementation would occur starting December 1st of 2027.

3.) <u>Mayfield Net Pens.</u>

Synopsis: Utilize the existing Mayfield Net Pen array to raise approximately 250,000 coho juveniles to 15fpp making room for additional spring Chinook poundage at the CSH (approximately 55k @ 5fpp). Coho will be transferred in early December and released at the CSH boat launch during their normal release window. All coho will be marked with an adipose fin clip and a subset will receive a CWT.

The initial intent of this program is to increase spring Chinook program poundage at the CSH by shifting a portion of the coho production to the Mayfield Net Pens allowing approximately 55,000 additional spring Chinook to be raised to 5 fish per pound prior to release.

Expected Recovery Benefits: Increases abundance of returning adult spring Chinook for supplementation without requiring additional broodstock by increasing survival of smolts released. Maintains full production of the existing integrated coho program. Increases Hatchery Complex capacity, flexibility, and productivity.

Based on the previous analysis of the FTC's M&E subgroup, rearing spring Chinook to yearling size rather than sub-yearling size has been shown to increase their SAR. Abundance building is a key action in the initial phase of reintroduction. Based on the results of the Mayfield Net Pen Pilot project (attached), continuing the program as proposed in the pilot project not only benefits spring Chinook but also preserves the production of 250,000 Upper Cowlitz integrated coho. Regardless of the final program, the site will provide additional Hatchery Complex capacity for future programs.

Timeline: The current Mayfield Net Pen Pilot Project (attached) terminates after the fall 2025 transfer of coho to the net pens and subsequent release in the spring of 2026. For this action, Tacoma will continue on-going implementation of the Mayfield Net Pen program with the transfer of coho to the Net Pens in December of 2026.

Coordination Need

Proposal Options:

1.) Cowlitz Falls Fish Facility Extended Operations - Annual review by TWG as part of Downstream Adaptative Management Plan framework.
2.) Cowlitz Falls Rearing – Review of this program will occur through the Annual Program Review (APR) process conducted by Tacoma and the FTC, with implementation recommendations (i.e. final program size, size at release, marking, tagging, etc.) coming from the FTC's Monitoring and Evaluation (M&E) and Hatchery Operations Management (HOM) sub-groups. FTC to finalize approach to implementing integrated spring Chinook program.
3.) Mayfield Net Pens- Review of this program will occur through the APR process conducted by Tacoma and the FTC, with implementation recommendations (i.e. final program size, size at release, marking, tagging, etc.) coming from the FTC's M&E and HOM sub-groups.

Summary of Potential Changes

Supporting this proposal will create the adoption of three Satellite Rearing actions. This suite of actions once fully adopted by FERC will fulfill the Satellite Rearing portion of the Settlement Agreement and create lasting benefits for the conservation and recovery of ESA listed Upper Cowlitz salmonid populations.

See attached: Satellite Rearing Program Details, Mayfield Net Pen Plan (coauthored by TPU and WDFW), Mayfield Net Pen Pilot Program Results Summary.

Satellite Rearing Program Details

Tacoma will invest the Capital, Operations, and Maintenance funds and efforts to facilitate the Satellite Rearing actions below for the duration of the License. If the FTC determines a satellite rearing action is not achieving expected outcomes, the FTC will discuss adaptive management options as described in this document.

Cowlitz Falls Fish Facility Extended Operations

Action: Extend the operating window (collection season) of the Cowlitz Falls Fish Facility to March 8th thru December 23rd and then adaptively manage the operational period in coordination with the FTC to improve Fish Passage Survival (FPS).

Purpose / Intent: To maximize the Cowlitz Falls Fish Facility's operational window, recognizing that environmental and facility constraints will require non-operational periods.

Recovery Benefit: Maximizes optimal operation of the Cowlitz Falls Fish Facility to improve FPS to benefit recovery across varying life history strategies for all ESA listed species.

Adaptive Management: The operation window shall be adaptively managed by the FTC to maximize fish collection within operational constraints. Typically, the facility will undergo annual maintenance during January and February. Within the framework of the Downstream Adaptive Management Plan, the Technical Working Group (TWG) will use the best available science to recommend and implement assessment of CFFF operations as part of implementing their Annual Work Plan. The TWG will evaluate collection and assessment data and may recommend modifications to the operational window to the FTC.

When considering changes managers should prioritize operational readiness during peak migration timing. The collector is a highly specialized facility functioning within a dynamic and often unpredictable environment. Fall and winter months present significant challenges which pose a substantial risk of damage that could compromise system integrity and readiness for the spring migration season. Given the presumed minimal migratory activity during this period, the winter months offer a window for conducting annual maintenance and necessary repairs. This approach ensures the collector is fully operational and prepared to support peak migration activity in the spring.

Constraints / Caveats: The operating season for each subsequent year will be determined annually no later than July 1st or will default to the most recently agreed to operational period. The facility requires a collective maintenance window of up to 60 days annually. Maintenance blocks may be intermittent with enough lead time as determined by operational staff. Other constraints and potential for operational interruptions include unforeseen repairs, extraordinary maintenance, unanticipated LCPUD operations, drawdowns, freezing conditions, debris challenges, or other extreme environmental conditions.

Timeline: Due to the compressed schedule, implementation will occur in 2026 with an initial operational period of March 15th through December 23rd.

Expected Outcomes: Measurable increase in FPS as part of the TWG evaluation attributable to additional operational time.

Cowlitz Falls Rearing

Action: Utilize raceways at Cowlitz Falls to raise up to 50,000 segregated spring Chinook yearlings to 5fpp and pilot the facility for the integrated spring Chinook program. Fish will be transferred in early December and released at the Cowlitz Salmon Hatchery (CSH) boat launch during their normal release window. All segregated spring Chinook will be marked with an adipose fin clip and a subset will receive a CWT.

Purpose / Intent: The initial intent of this program is to utilize additional raceway capacity at Cowlitz Falls to increase spring Chinook program poundage, while also piloting use of the facility for potential implementation of an integrated spring Chinook program.

Recovery Benefit: Increases abundance of returning adult spring Chinook for supplementation without requiring additional broodstock by increasing survival of smolts released. Advances progress towards implementation of an integrated spring Chinook Program as called for in the 2020 FHMP. Increases Hatchery Complex capacity, flexibility, and productivity.

Adaptive Management: Programs to be adaptively managed. Therefore, this facility is to be used however best serves the Cowlitz fish production programs as determined by the FTC and in alignment with the current License, FHMP, HGMPs, and other guiding documents. Review of this program will occur through the Annual Program Review (APR) process conducted by Tacoma and the FTC, with implementation recommendations (i.e., final program size, size at release, marking, tagging, etc.) coming from the FTC's Monitoring and Evaluation (M&E) and Hatchery Operations Management (HOM) sub-groups.

Constraints / Caveats: Maximum fish poundage produced in this facility is up to 5,800 pounds annually. This figure is based upon 50,000 spring Chinook transferred in at 12fpp and planted at 5fpp (rounded). This poundage is in addition to the 650,000 pound "limit" described in Article 5 of the Settlement Agreement. Final program size will be determined by the M&E and HOM group consistent with standard hatchery loadings. Other constraints include avoiding seasons of high-water temperature, fish health constraints, and operational drawdowns.

Timeline: Pending timely FTC approval, infrastructure modifications, and regulatory approval, implementation could occur starting December 1st of 2026. If the near-term timeline cannot be reached implementation would occur starting December 1st of 2027.

Expected Outcomes: An increase in the adult spring Chinook returns attributable to this poundage proportional to Cowlitz Salmon Hatchery production of this size at release. Potential implementation of an integrated spring Chinook program from this facility.

Mayfield Net Pens

Action: Utilize the existing Mayfield Net Pen array to raise approximately 250,000 coho juveniles to 15fpp making room for additional spring Chinook poundage at the CSH (approximately 55k @ 5fpp). Coho will be transferred in early December and released at the CSH boat launch during their normal release window. All coho will be marked with an adipose fin clip and a subset will receive a CWT.

Purpose / Intent: The initial intent of this program is to increase spring Chinook program poundage at the CSH by shifting a portion of the coho production to the Mayfield Net Pens allowing approximately 55,000 additional spring Chinook to be raised to 5fpp prior to release.

Recovery Benefit: Increases abundance of returning adult spring Chinook for supplementation without requiring additional broodstock by increasing survival of smolts released. Maintains full production of the existing integrated coho program. Increases Hatchery Complex capacity, flexibility, and productivity.

Adaptive Management: Programs to be adaptively managed. Therefore, this facility is to be used however best serves the Cowlitz fish production programs as determined by the FTC and in alignment with the current License, FHMP, HGMPs, and other guiding documents. Review of this program will occur through the Annual Program Review (APR) process conducted by Tacoma and the FTC, with implementation recommendations (i.e. final program size, size at release, marking, tagging, etc.) coming from the FTC's Monitoring and Evaluation (M&E) and Hatchery Operations Management (HOM) sub-groups.

Constraints / Caveats: Maximum fish poundage produced in this Satellite Rearing facility is up to 9,500 pounds annually. This figure is based upon 250,000 coho transferred in at 35fpp and planted at 15fpp (rounded). This poundage is in addition to the 650,000 pound "limit" described in Article 5 of the Settlement Agreement. Other constraints include avoiding seasons of high-water temperature, fish health constraints, and operational drawdowns.

Timeline: The current Mayfield Net Pen Pilot Project (attached) terminates after the fall 2025 transfer of coho to the net pens and subsequent release in the spring of 2026. For this action, Tacoma will continue on-going implementation of the Mayfield Net Pen program with the transfer of coho to the Net Pens in December of 2026.

Expected Outcomes: An increase in the adult spring Chinook returns attributable to this poundage proportional to Cowlitz Salmon Hatchery production of this size at release. SAR for coho released from the Mayfield Net Pen that is comparable to those released from CSH.

Mayfield Net Pen Coho Pilot Project: Phases I and II Update

Monitoring and Evaluation Subcommittee &
Hatchery Operations & Management Group
November 6, 2025

In the 2022 Annual Program Review process (APR), the Fisheries Technical Committee (FTC) decided to officially increase the poundage of Spring Chinook by creating additional rearing space at Cowlitz Salmon Hatchery through the reallocation of coho production to net pens in Mayfield Lake (DD 2022-04). To assess the feasibility of this directive, Tacoma Power (Tacoma) has committed to funding a two phased pilot project with testing of a small population of approximately 100k Coho in Mayfield net pens in the first-year pre-pilot project (Phase I) and if proven successful, a full-scale pilot project of 250k Coho in the net pens (equivalent to one raceway of Coho) initiated the following year (Phase II). Guidance for the collaborative implementation of this project by Tacoma and the Washington Department of Fish & Wildlife (WDFW) was outlined in the document "Development of the Mayfield Net Pen Coho Pilot Project" (May 2024).

The purpose of Phase I was to compare rearing survival performance of Coho in net pens and the hatchery under two different densities. Phase I was initiated on December 4, 2024, with the transfer of ~98,000 hatchery coho from the CSH to the Mayfield net pens. Four net pens were used under two densities: two pens were programmed to a final density of 0.3 lbs./ft^3 (~18,400 per pen), and the other two pens were programmed to a final density of 0.5 lbs./ft^3 (~30,600 per pen). Both groups had an additional 2% added to account for mortality that is typical under hatchery conditions (Table 1). Fish were moved to the net pens and monitored weekly for mortality, growth, condition (K-factor and coefficient of variation), fish health, predation, or other events of concern. Final net pen release numbers were calculated by subtracting observed mortalities from the initial population size, allowing for calculation of net pen densities prior to release (Table 1). Mean percent loss was calculated across all net pens as a 0.52% ± 0.31% via observed mortality, which was similar to the lowest mortality rate reported within the hatchery raceways in the past three years (Table 2).

Table 1. Phase 1 initial loadings, final loadings, and release totals, calculated as a reduction of observed mortalities over the rearing period (12/4/2024 – 4/28/2025).

Unit	Initial population	Total released	Initial density (lbs/ft^3)	Final density (lbs/ft^3)
Net Pen 1	18,353	18,308	0.139	0.305
Net Pen 2	18,361	18,183	0.139	0.303
Net Pen 3	30,507	30,364	0.231	0.506
Net Pen 4	30,550	30,428	0.231	0.507

Table 2. Resulting observed mortality (mean % loss) from three brood years (2021, 2022, and 2023) in the standard hatchery program (raceway) compared to the Coho in the Mayfield net pens in 2023.

Brood Year	Program	Mean % Loss	SD
2021	Raceway	0.96	0.35
2022	Raceway	1.99	0.49
2023	Raceway	2.84	1.75
2023	Net Pen	0.52	0.31

Upon completion of Phase I, fish were pumped into Tacoma transport trucks by WDFW staff and released at the CSH Barrier Dam boat launch (early May 2025). The Hatchery Operations and Management (HOM) group then convened to assess the performance of Phase I. During the first year of operations, 15 fish were recovered at the Mayfield Bypass Trap, indicating a limited degree of escapement from the net pens. A subsequent investigation determined that the escapement resulted from a minor breach due to a retaining loop failure in one pen. Given the prompt response by staff and the low number of fish recovered, program managers concluded that the escapement was minimal and would not impact the integrity of the study. The HOM group recognizes that this incident, along with the potential for unobserved mortality, suggests that the overall mortality rate may be underestimated. However, based on the low observed mortality rate (0.52% ± 0.31%), the positive assessment from Fish Health Staff, and no significant difference in fish condition, the HOM group recommended proceeding to Phase II of the study. This recommendation was approved by the FTC in June 2025 (DD 2025-04).

Phase II aims to better quantify potential differential survival in the Mayfield net pens via a mark-recapture study that will begin in December 2025. Eight net pens with Coho equally distributed at approximately 0.5 lbs./ft^3 (~32.5k fish/pen) will be used to assess survival and condition factor. This phase will account for mortality by PIT tagging 4,060 fish by Tacoma staff (proposed December 2-3, 2025). Of these, 60 fish will be assessed for tag retention, unfed in hoop nets located in the trough room for 48 hours post-tagging. The other 4,000 PIT tagged Coho will be loaded in fish hauling trucks by WDFW, 500 fish at a time (500/pen). Approximately 32,000 fish will be pumped from the hatchery raceways into the truck. The 500 tagged fish will be placed into the truck by hand for a total delivery load of approximately 1,000 lbs of fish, or 32,500 total juvenile coho per pen. WDFW will implement standard rearing practices, track mortality using an HPR-Lite to detect PIT tags and monitor Coho monthly for fish quality. Post-season, independent survival estimates will be calculated via a Cormack-Jolly-Seber model and observed mortality summation, as well as a jointly developed report summarizing findings and a recommendation for the FTC for future utilization of the Mayfield net pen site.

Development of the Mayfield Net Pen Coho Pilot Project

A Guiding Document Authored in Collaboration with Tacoma Power and the Washington State Department of Fish and Wildlife

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Date: May 2024

Purpose:

The purpose of this program is to identify the feasibility of shifting a portion of hatchery coho production from the Cowlitz Salmon Hatchery (CSH) into the Mayfield Net Pens (net pens) to create space within the hatchery for additional Spring Chinook rearing capacity.

The objective of this document is to furnish explicit information regarding program intent, population sizes, performance evaluation, decision points, timelines, and operational details. These details were still pending determination during the creation of the 2023 Fisheries Technical Committee (FTC) Decision Document.

Background:

During the 2020 FHMP update and through the subsequent APR process the Spring Chinook program was evaluated for options to increase adult returns. Adjustments to the size of release groups were agreed upon that created the need to shift bio-programming of the Coho program.

In the 2022 Annual Program Review (APR) process, the FTC decided (DD 2022-04) to officially increase the poundage of Spring Chinook which required reallocating one pond of coho production to the Mayfield net pens to create additional rearing space for spring Chinook. The proposal was to purchase nets, establish the project and evaluate the approach for one year only. After the first-year, new funding would be required to continue the program as the shift in production would exceed Tacoma's 650k pound cap.

In a subsequent FTC meeting in 2023, Tacoma committed to funding a two-year phased pilot project with a small population of approximately 100k in the first year. If proven successful, a full-scale pilot project (250k, or one raceway of Coho) would be initiated the following year. Once the two-year project is completed, the project will need to find outside funding to continue. The APR meeting provided several options if funding wasn't identified, including, but not limited to, discontinuing 250k coho from the program. However, a preferred course of action in the absence of funding was not established, leaving room for future decisions. Additionally, discussions of transitioning this program into a Satellite Rearing Program occurred although no decisions were reached.

Phase 1

Program details:

Tacoma will fund all operations during phase one. WDFW will operate the net pens under mutually agreed to task orders. Further details will be captured as needed in a jointly developed summary sheet.

During this phase, managers will be comparing the rearing survival performance of Coho in net pens vs. the hatchery at two different densities within the net pens. In late November or early December of 2024, WDFW will transfer ~98,000 hatchery coho from the CSH to the net pens. The initial program will require 4 pens. Two pens will be programmed to a final density of 0.3 Lbs/Cuft, the other two pens will be programmed to a final density of 0.5 Lbs/Cuft. Both groups will have an additional 2% added to account for mortality that is typically seen in the hatchery.

Size at stocking of NP: ~35fpp (December)		**Size at release**: 15fpp (May1st)	
Starting Population:	2 pens at 18,400		
	2 pens at 30,600		
	98,000		
Ending Pop. w/ 2% mortality:	2 pens at 18,000	Density:	0.3 lbs/cuft
	2 pens at 30,000	Density:	0.5 lbs/cuft
	96,000		

WDFW staff will pump these fish into Tacoma transport trucks for release at the CSH Barrier Dam boat launch in early May 2025. Both the hatchery population and two net pen strategies will be monitored by WDFW in the same manner. Typical in-hatchery metrics will be tracked to include, picked mortality, growth rate, CV, and monthly Fish Health inspections (as determined by WDFW Fish Health Staff).

All fish will receive an adipose clip to identify them as hatchery origin. As a relatively small pilot project with varying densities, the primary intent of this project is to compare two net pen densities vs. hatchery survival performance during their respective juvenile rearing duration. Using standard hatchery practices, coded wire tags (CWTs) or other distinguishing marks are not required to evaluate "in-hatchery" rearing survival.

However, to support future SAR analysis, 50k CWTs comprised of two different tag codes will be used to differentiate the two net pen density strategies from the standard in-hatchery program to evaluate relative performance over time. These 50k tags will be a subset of the existing 200k CWTs that are available for the Coho program to achieve an index group in all three rearing strategies. This will result in a 150K CWT group in the Coho reared and released at CSH as part of the standard Coho program, a 25K CWT group in the 0.3 Lbs/Cuft net pen group and a 25K CWT group in the 0.5 Lbs/Cuft net pen group.

Predator netting will be installed by TPU and WDFW staff and maintained by WDFW staff to minimize risk of both piscivorous and avian predation for each of the pilot programs. After release, WDFW staff will remove, clean, and store the net pens and predator netting.

Evaluation:

Once fish are moved to the net pens, WDFW will monitor operations and provide a weekly status report to Tacoma. These short updates will be summarized and shared with the FTC monthly by Tacoma in the "Facilities Update" to help inform real time evaluation of the program. The report will include at a minimum, mortality tracking, population growth rates, CV's, any fish health issues, predation, or other events of concern.

To inform the decision on program continuation for the next year, a comparison between in-pen survival and in-hatchery survival performance will occur. If survival in the net pens in either density group is equal to or greater than the five-year average of in-hatchery survival for that period than the project should move to the next phase utilizing the optimal density (if there is one). If both density groups perform identically Tacoma and WDFW will make a mutually agreed to recommendation for the subsequent year.

It will be important to retain as accurately as possible volumetric readings of the tanker trucks during both stocking and release to identify any loss from the net pens that could not be captured through routine mortality picking. The accuracy of volumetric measurements is not typically high, therefore data from this method must only be used if necessary.

Prior to transfer to the net pens, a tertiary estimate- likely a mark-recapture approach, will be developed by WDFW to give greater accuracy to the release estimates.

Tacoma owns and operates the Mayfield Juvenile Bypass System located immediately downstream of the net pen array. Tacoma staff will be on alert to provide immediate feedback should they begin to encounter ad-clipped coho in their collections.

If the net pen mortality is less than 5% for both density groups and fish health does not have concerns for the remaining fish (i.e., lingering disease or persistent environmental concerns) then the program will be cleared to continue to Phase 2. The adjustment to stocking of the net pen in Phase 2 could be made up to the 5% threshold as identified in table 1.0.

If mortality exceeds the 5% threshold it will be a policy call by the FTC on whether the loss of Coho production above this point is adequately compensated for with the increase in Spring Chinook production.

During evaluation, it's also essential to consider whether performance can be enhanced through infrastructure or management changes. For example, if growth is subpar but fish health and survival match or surpass those of the hatchery, it might be prudent to advance to the next phase, focusing on improved feeds or alternative feeding approaches. Additionally, factors like natural events, vandalism, staff learning curves, and issues with fish food should be carefully assessed. If the Hatchery Operation Managers agree that adjustments can mitigate or significantly reduce the risk of recurrence, the program should proceed to the next phase.

Table 1.0				
		Additional		Females
Mortality	Fish	Fish	Lbs at 35fpp	Required
2%	**255,000**	**0**	**0**	**0**
3%	257,500	2,500	71	2
4%	260,000	5,000	143	3
5%	262,500	7,500	214	4
6%	265,000	10,000	286	6
7%	267,500	12,500	357	7
8%	270,000	15,000	429	8
9%	272,500	17,500	500	10
10%	275,000	20,000	571	11
11%	277,500	22,500	643	12
12%	280,000	25,000	714	14
13%	282,500	27,500	786	15
14%	285,000	30,000	857	16
15%	287,500	32,500	929	18
In-Hatchery survival from 35fpp to release is about 2%				

Note: Budget managers will need to assume the net pen program will continue into phase 2 prior to releasing and final evaluation of the fish from phase 1. WDFW and Tacoma task order budgets will need to account for the labor, tagging, and feed for Phase 2 in both the net pen program and the increased amount of spring chinook feed. Additional net pen purchases for Phase 2 will also need to occur prior to the release and final evaluation of Phase 1. Due to these early decision points, the net pen program will be evaluated monthly by the HOM team to look for fatal flaws that may indicate the need for an earlier FTC decision prior to final evaluation.

Review and Recommendation:

After the fish are released in May of 2025, a short memo and data summary will be jointly compiled by WDFW staff, Fish Health staff and Tacoma staff based on the evaluation above. The findings and resulting recommendation on program continuation will be presented to the FTC in the form of a Decision Document by June 3rd, 2025, to allow for budgeting and planning for the next phase.

Phase 2

Program details:

Tacoma will fund all operations during phase two. WDFW will operate the net pens under mutually agreed to task orders. Further details will be captured as needed in a jointly developed summary sheet.

If deemed appropriate to move forward, the phase 2 net pen loading strategy (i.e., preferred density) will be finalized based on the evaluation in phase 1 by the HOM team. The actual number of fish will be based on the survival witnessed in Phase 1 and fish will be distributed based on the selected density with any necessary adjustments made mutually by operation managers. Below is an example of the two scenarios utilizing a 5% buffer for mortality.

At **0.3** Lbs/Cuft:

In late November/early December of 2025, transfer 262,500 hatchery coho from the CSH to the net pens. This program will require 14 pens at 18,750 coho per pen. These fish would be pumped into transport trucks and released at the CSH Barrier Dam boat launch in May.

At **0.5** Lbs/Cuft:

In late November/early December of 2025, transfer 262,500 hatchery coho from the CSH to the net pens. This program will require 9 pens at 29,167 coho per pen. These fish would be pumped into transport trucks and released at the CSH Barrier Dam boat launch in May.

All fish will receive an adipose clip to identify them as hatchery origin and approximately 45k would receive CWTs based on WDFW's regional standard for Coho programs. The CWTs could be reprogrammed from the existing tag group or potentially funded in addition.

Evaluation:

Once fish are moved to the net pens, WDFW will monitor operations and provide a weekly status report to Tacoma. These short updates will be summarized and shared with the FTC monthly by Tacoma in the "Facilities Update" to help inform real time evaluation of the program. The report will include at a minimum, mortality tracking, population growth rates, CV's, any fish health issues, predation, or other events of concern.

The evaluation for phase two will follow the same format as phase one (excluding the density evaluation) with any mutually agreed to modifications.

Review and Recommendation:

After the fish are released in May of 2026, a short memo and data summary will be jointly compiled by WDFW staff, Fish Health staff and Tacoma staff. The findings and resulting recommendation on program continuation will be presented to the FTC in the form of a Decision Document by June 2nd, 2026, to allow for budgeting and planning for the final phase.

Phase 3

If the FTC considers phase 2 a success and outside funding has been identified, Coho production will occur in the Mayfield Net Pens and the additional pounds of Spring Chinook production will continue, contingent on APR and FTC approval. If phase 2 is unsuccessful and or outside funding cannot be identified, the FTC will need to re-evaluate alternatives for distributing production within the 650K poundage cap. One alternative would be to reduce BY2025 Coho production to accommodate the increase in Spring Chinook poundage.

Decision Point Deadlines

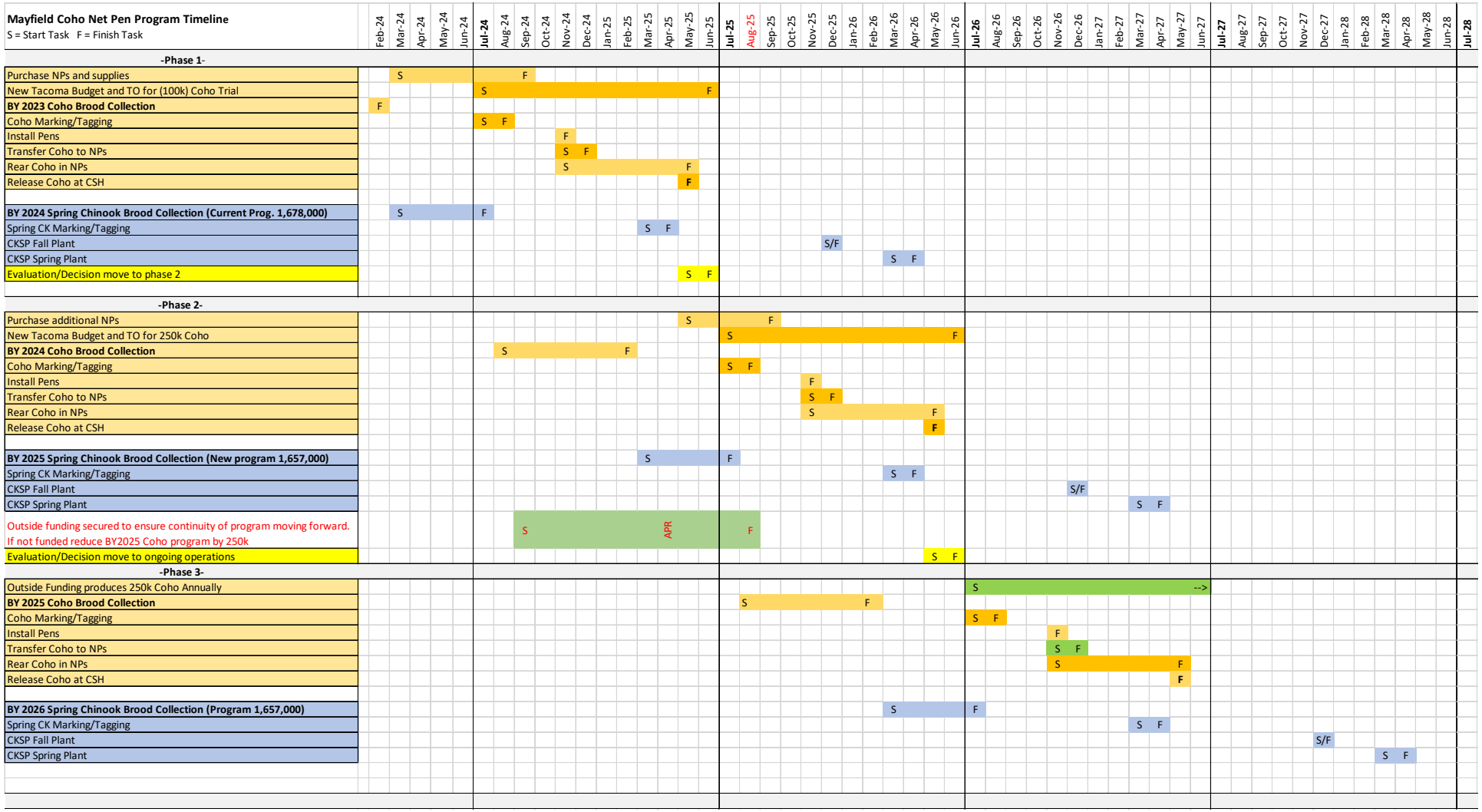
- ***March 1, 2025*** *– Programmatic Change No Decision Needed* - Start Brood Collection on new CKSP BY2025 Program of 1.657M as described in previous APR.

- **April 1, 2025** - Decide on CWT group for Mayfield NP BY2024 Coho
    - Tagging occurs in July of 2025 and tags need to be ordered 90 days ahead of time to avoid additional fees.

- **May 23, 2025** – Complete phase 1 evaluation and recommendation of Coho Mayfield NP project. Send out ahead of the meeting for a DD and decision at June FTC Meeting.
- **June 3, 2025** – FTC to approve program moving to phase 2.
    - If not approved reduce BY2025 Coho.
- **August 15, 2025** – Outside funding needs to be secured to support ongoing production of 250k BY2025 Coho in the Mayfield NPs.
    - If there is no funding*, plan to sunset the program after phase 2 (May 2026) and reduce BY2025 Coho brood stock commensurately (to achieve 250k reduction).*

- **April 1, 2026** - Order CWT group for Mayfield NP BY2025 Coho (**Needs to be outside funded**)
    - Tagging occurs in July of 2026 and tags need to be ordered 90 days ahead of time to avoid additional fees.
- **May 21, 2026** – Complete phase 2 evaluation and recommendation of Coho Mayfield NP project. Send out ahead of the meeting for a DD and decision at June FTC Meeting.
- **June 2, 2026** – FTC to approve program moving to phase 3
    - If not approved reduce BY2025 Coho program to accommodate Spring Chinook Production.

Timeline


Mayfield Coho Net Pen Program Timeline
S = Start Task F = Finish Task
Feb-24 Mar-24 Apr-24 May-24 Jun-24 Jul-24 Aug-24 Sep-24 Oct-24 Nov-24 Dec-24 Jan-25 Feb-25 Mar-25 Apr-25 May-25 Jun-25 Jul-25 Aug-25 Sep-25 Oct-25 Nov-25 Dec-25 Jan-26 Feb-26 Mar-26 Apr-26 May-26 Jun-26 Jul-26 Aug-26 Sep-26 Oct-26 Nov-26 Dec-26 Jan-27 Feb-27 Mar-27 Apr-27 May-27 Jun-27 Jul-27 Aug-27 Sep-27 Oct-27 Nov-27 Dec-27 Jan-28 Feb-28 Mar-28 Apr-28 May-28 Jun-28 Jul-28
-Phase 1-
Purchase NPs and supplies
New Tacoma Budget and TO for (100k) Coho Trial
BY 2023 Coho Brood Collection
Coho Marking/Tagging
Install Pens
Transfer Coho to NPs
Rear Coho in NPs
Release Coho at CSH
BY 2024 Spring Chinook Brood Collection (Current Prog. 1,678,000)
Spring CK Marking/Tagging
CKSP Fall Plant
CKSP Spring Plant
Evaluation/Decision move to phase 2
-Phase 2-
Purchase additional NPs
New Tacoma Budget and TO for 250k Coho
BY 2024 Coho Brood Collection
Coho Marking/Tagging
Install Pens
Transfer Coho to NPs
Rear Coho in NPs
Release Coho at CSH
BY 2025 Spring Chinook Brood Collection (New program 1,657,000)
Spring CK Marking/Tagging
CKSP Fall Plant
CKSP Spring Plant
Outside funding secured to ensure continuity of program moving forward.
If not funded reduce BY2025 Coho program by 250k
APR
Evaluation/Decision move to ongoing operations
-Phase 3-
Outside Funding produces 250k Coho Annually
BY 2025 Coho Brood Collection
Coho Marking/Tagging
Install Pens
Transfer Coho to NPs
Rear Coho in NPs
Release Coho at CSH
BY 2026 Spring Chinook Brood Collection (Program 1,657,000)
Spring CK Marking/Tagging
CKSP Fall Plant
CKSP Spring Plant