

Lewis Steelhead -Hatchery Transition Plan

Program(s): Lewis River Winter and Summer-run steelhead

Affected Recovery Population and Recovery Designation:

Population Name	Population Recovery Designation
Lewis River Winter-run Steelhead	Contributing

Overview

This document provides a synopsis of the current and alternative hatchery programs for North Fork (NF) Lewis winter- and summer-run steelhead. The overall goal of this document is to identify a program or suite of programs that maximizes the probability of achieving the Anadromous Fish Reintroduction Outcome Goal (Reintroduction Outcome Goal) as outlined in Section 3.1 of the Lewis River Hydroelectric Project Settlement Agreement (SA): to achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations and advance population(s) to the next Recovery Phase.

Currently, hatchery steelhead production in the NF Lewis River consists of three separate programs. Two of the programs (one summer, one winter) are operated as segregated programs and have the objective of augmenting harvest opportunity. The summer-run hatchery program uses Skamania-derived broodstock and aims to release 175,000 smolts annually directly from Merwin hatchery, plus another 60,000 smolts that are released from an in-river cooperative net pen in the lower NF Lewis. The segregated winter-run steelhead program uses Chambers Creek derived broodstock and aims to release 100,000 adipose-clipped smolts annually. Chambers Creek hatchery steelhead originally came from Puget Sound and thus, is an out-of-ESU stock. The second winter-run steelhead program in the NF Lewis is operated as an integrated hatchery program and primarily uses natural-origin adults for broodstock to produce the annual planting goal of 50,000 unclipped (Adipose fin intact) Blank Wire Tagged (BWT) smolts. The objective of the integrated program is to help conserve the natural-origin population by generating adults that can be used for reintroduction into the upper NF Lewis River above Merwin Dam (currently above Swift Dam only).

In preparation for consultation with NOAA Fisheries on the forthcoming NF Lewis River Hatchery Genetic Management Plans (HGMPs), the Washington Department of Fish and Wildlife (WDFW) completed an evaluation of alternative hatchery strategies for NF Lewis steelhead using a structured decision-making approach. The objective of the evaluation was to identify an alternative hatchery strategy that could replace the existing harvest-focused, segregated winter-run steelhead program. The preferred alternative would be one that maximizes conservation and harvest benefits while minimizing hatchery risks to the natural-origin population. Three main, alternative hatchery strategies were identified all of which involved maintaining a harvest-focused, segregated summer-run steelhead program (but potentially at a different smolt plant size) and discontinuing the existing harvest-focused, segregated winter-run steelhead program. The first two strategies maintained the current conservation-based, integrated winter steelhead program and created either a new, locally-derived segregated program or a “stepping stone” program (see next paragraph for further description). The third strategy proposed an expansion of the existing integrated winter steelhead program thereby creating a single winter-run hatchery

program with a dual objective of both conservation and harvest. With the alternative hatchery strategies identified, each one was modeled alongside the natural-origin population at a sub-basin scale using a deterministic life-cycle model. The life-cycle model was constructed by linking parameters (aka assumptions) that can generally be categorized as either demographic- (e.g., survival rates, relative survival, straying, productivity & capacity, and relative reproductive success) and management-based (e.g., harvest rates, broodstock collection, transport rates) parameters. The parameters used were based on the best-available information from in-basin data and estimates from published or gray literature. Sets of parameters were combined to create several scenarios of interest, which primarily focused on smolt-to-adult ratios (SAR; 1%, 3%), juvenile collection efficiency at the Swift Fish Collection Facility (30%, 95%), and in-basin harvest rates (30%, 65%). The three alternative hatchery strategies were evaluated and compared when populations were at equilibrium using a suite of standardized metrics that were separated into conservation- (abundance, genetics) and harvest-based (amount, timing) categories. Additional details and results on the alternative hatchery strategy evaluation can be found in Appendix A. Overall, based on the results of the alternative hatchery strategy evaluation, WDFW recommended updating the NF Lewis steelhead hatchery programs using a phased approach.

During the first phase of the transition, the existing conservation-focused, integrated winter-run program (50,000 smolt plant) will be maintained while both existing harvest-focused programs will be updated. The first, and largest, programmatic change will be to eliminate the segregated Chambers Creek winter-run program, and replace it with a “stepping stone” program (HSRG 2014). In short, the stepping stone program was selected as the preferred alternative in the near-term because it results in similar genetic risks to the fully integrated program while resulting in higher natural-origin and effective natural-origin spawner abundance (primarily because it requires fewer natural-origin adults for broodstock). The stepping-stone program also ameliorates the risk of either over-mining the natural-origin population or failing to meet broodstock goals in years where both SARs and juvenile collection efficiency are low relative to the fully integrated population. A new, locally-derived segregated program was the least favorable option as it would result in the highest genetic risks (PNI <0.5 across all scenarios) and overtime resembling the characteristics of the Chambers program has produce extraordinarily low harvest rates in recent years (<10%). The new winter-run, harvest mitigation stepping stone hatchery program will be derived using adult returns from the winter-run conservation program. Unlike the Chambers Creek program, which is a fully segregated and domesticated stock derived from outside the lower Columbia River ESU, this new stepping stone program will use returning in-basin, first generation (F1) adults to maintain genetic continuity between the localized hatchery and natural-origin population thereby reducing genetic risks. This program is a slight variation from a traditional “stepping stone” program in that rather than slowly increasing the size of the integrated portion of the program as natural origin abundance/availability increases, this program will maintain consistent production goals for the integrated and stepping stone components until a second phase evaluation (described below) is completed. Also, this “stepping stone variant” program will aim to only use BWT positive, adipose intact adults (aka F1s) for broodstock to propagate this program. Therefore, unlike a standard segregated program, the broodstock will always be only one or two generations removed from natural origin parents. The second change proposed during the first phase of the transition will be to transfer 25,000 smolts from the winter-run harvest program to the summer-run harvest program. This change will result in the stepping-stone variant winter-run program aiming to produce 75,000 Adipose fin (Ad) clipped smolts annually and the summer-run program aiming to produce 200,000 (plus the current 60,000 net

pen) Ad clipped smolts. Based on WDFW's evaluation, this reallocation of smolts will provide conservation and harvest benefits.

The second phase of the program will include evaluation of the updated program's performance to ensure that the integrated program is meeting conservation objectives of returning enough fish for broodstock and reintroduction needs, and to ensure the "stepping stone variant" program is meeting harvest objectives. This phase will also include an assessment/refinement of recovery phases and phase triggers. Additionally, planning for fish passage into Yale and Merwin reservoirs is underway, which will include development of transport targets and strategies for steelhead into those reservoirs for reintroduction purposes.

The third phase of the program will use evaluation results, hatchery reform phases and phase triggers and additional hatchery fish transport goals for Yale and Merwin recolonization phases to adaptively manage production size and the split between harvest and conservation programs to ensure the Reintroduction Outcome Goal and harvest objectives will be met.

Ultimately, these programmatic changes are designed to ensure adult abundance of hatchery fish available for reintroduction and harvest and improve integration of fish used for reintroduction to better represent the historical natural-origin steelhead populations in the North Fork Lewis River.

List of Acronyms Lewis Steelhead Transition plan

Ad	Adipose-fin clip
ACC	Aquatic Coordination Committee
AHN	Above Hatchery Need
AMEP	Aquatic Monitoring and Evaluation Plan
AOP	Annual Operating Plan
BWT	Blank Wire Tag (snout)
CBP	Columbia Basin Partnership
Fpp	Fish Per Pound
H&S	Hatchery and Supplementation Plan
HOR	Hatchery Origin Returns
HSRG	Hatchery Scientific Review Group
NOAA	National Oceanographic Atmospheric Association
NOR	Natural Origin Returns
pHOB	Proportion of Hatchery Origin Broodstock
pHOS	Proportion of Hatchery Origin Spawners
PNI	Proportionate Natural Influence
pNOB	Proportion of Natural Origin Broodstock
QET	Quasi-Extinction Threshold
Rmax	Maximum recruitment under average environmental conditions
VSP	Viable Salmonid Population
WDFW	Washington Department of Fish and Wildlife

Recovery Phases and Goals

The goals included in this section are derived from the Lewis River Settlement Agreement and the Healthy and Harvestable concept outlined by the Columbia Basin Partnership Task Force. Recovery phases are defined by the HSRG (2020).

Settlement Agreement Section 3: Anadromous Fish Reintroduction Outcome Goals

“The reintroduction outcome goal of the comprehensive aquatics program contained in Sections 4 through 9 of the Lewis River Settlement Agreement is to achieve genetically viable, self-sustaining, naturally reproducing, harvestable populations above Merwin Dam greater than minimum viable populations (“Reintroduction Outcome Goal”).”

Healthy and Harvestable Defined:

As stated in *A Vision for Salmon and Steelhead Goals to Restore Thriving Salmon and Steelhead to the Columbia River Basin. Phase 2 Report of the Columbia Basin Partnership (CBP) Task Force of the Marine Fisheries Advisory Committee- October 2020.*

https://s3.amazonaws.com/media.fisheries.noaa.gov/2020-10/MAFAC_CRB_Phase2ReportFinal_508.pdf?null

“The intent of this plan is to achieve Healthy and Harvestable abundance levels that would sustain very high levels of species viability, significant fishery opportunities and harvest as well as recover upper basin steelhead populations with the near-term goal of preventing population declines and the long-term goal of achieving ESA delisting through expanded diversity and resiliency.”

Goal of current integrated and proposed stepping stone variant winter-run program by recovery phase (i.e., conservation/harvest):

Population Recovery Phase	Goal of Hatchery Program	Thresholds/Triggers/Decision Rules required to transition from one phase to next
Preservation	Conservation (promote recovery) and harvest	<p>Natural origin population at risk of extirpation</p> <p><i>Not applicable – as population is already past this phase.</i></p> <ul style="list-style-type: none"> • 5 yr. geomean total abundance (when counting NOR adults, plus HOR adults up to the number which would cause pHOS to equal the pHOS goal for Local Adaptation) is LESS than the quasi-extinction threshold (QET to be determined during Population Phase Assessment). • Vast majority/all historical habitat is unusable/heavily impacted/inaccessible currently (e.g., blocked by dams with no passage)

<p>Recolonization</p>	<p>Conservation (promote recovery) and harvest</p>	<p>Natural origin population at low abundance; habitat underutilized.</p> <p>Lewis winter steelhead (considered one population) is assumed to be in this phase.</p> <ul style="list-style-type: none"> • 5 yr. geomean total abundance (when counting NOR adults, plus HOR adults up to the number which would cause pHOS to equal the pHOS goal for Local Adaptation) is MORE than quasi-extinction threshold but LESS than the number needed to meet the interim viability goal (NOAA VSP criteria or alternative). • Interim viability goal can be expressed as seeding a percentage (e.g., 50%) of the freshwater habitat, and can be estimated by stock recruit analysis (e.g., estimate spawner abundance required to produce 50% of R_{max}). • Enough historical habitat is currently accessible (including by trap and haul) for maintenance of an equilibrium population size greater than QET (to be determined during Population Phase Assessment).
<p>Local Adaptation</p>	<p>Conservation (promote recovery) and harvest</p>	<p>Natural origin population nearing full seeding of currently available habitat.</p> <p>Assuming current population is not yet in this phase.</p> <ul style="list-style-type: none"> • Develop/Confirm assessment criteria for trigger(s) <ul style="list-style-type: none"> ○ Escapement ○ R_{max} ○ Adult to adult productivity ○ Number needed to meet the interim viability goal (NOAA VSP criteria or alternative). • Early within the duration of the revised H&S Plan, the ATS will develop these criteria, incorporating biological, logistical, and management considerations. <ul style="list-style-type: none"> ○ Such as integrating R_{max}, SAR and/or adult to adult productivity into phase triggers.
<p>Full Recovery</p>	<p>Maintain Recovery and provide Harvest</p>	<p>Natural origin population is both above full-seeding of available habitat AND is meeting the Reintroduction Outcome Goal (harvestable recovery goals).</p> <p>Assuming current population is not yet in this phase. Revisit criteria if population assessment confirms populations are currently in Local Adaptation phase.</p> <ul style="list-style-type: none"> • 5 yr. geomean of spawner NOR abundance (not counting HORs) is MORE than minimum interim viability objective when only counting NOR spawners and is also At or MORE than healthy/harvestable recovery goal. • CBP Task Force Healthy Harvestable Goal: 3,000

Current Lewis Hatchery Steelhead Program(s)

This section provides a description of the current hatchery programs affecting the North Fork Lewis steelhead population.

Current Program #1: Early segregated winters (aka Chambers)

Population Recovery Phase: NA

Goal of Program: Harvest augmentation/mitigation

Population Recovery Phase: NA

Adult Broodstock Collection	
Broodstock Type	Lewis Segregated HOR adults
Broodstock Source	F1s from early segregated winter program (in-basin)
Broodstock Collection location(s)	Lewis River Hatchery Merwin Upstream Collection Facility
Integration Rate	0% (segregated; hatchery-origin brood only)

Collection timing:

Broodstock Collection

Week Ending	Brood Adults	Males	Females
4-Dec	5	2	3
11-Dec	6	3	3
18-Dec	6	3	3
25-Dec	12	6	6
1-Jan	11	5	6
8-Jan	12	6	6
15-Jan	16	8	8
Total	68	33	35

Secondary sources/plans for lack of adults; HORs collected the Cedar Creek trap.

Adult Transportation & Disposition – Early Segregated winters (aka Chambers)

Target	Rank	Quantity (range)	Location	Dates
Broodstock	1	65-70	Lewis Hatchery & Merwin Upstream Facility	Dec-Jan
Surplus -Food Quality	2	Above hatchery needs	Food Bank	Sept-Oct

Juvenile Release(s)

Release Strategy	1 group volitional followed by force out
Quantity	100,000
Release Age/size	1+/ Released at 5.5fpp
Release Location/Timing	Merwin Hatchery – April-May
Marking/Tagging strategy	<ul style="list-style-type: none"> • 100,000 Ad Only
Fish Management needs	<ul style="list-style-type: none"> • Ad clip required to allow harvest in mark-selective fisheries.
Evaluation Needs	<ul style="list-style-type: none"> • Adipose clip allows for evaluation of pHOS

Summary of Hatchery Configuration/Infrastructure:

- Adult collection for this program occurs at the Lewis River Hatchery and Merwin Upstream Fish Collection Facility.
- Broodstock is held at the Merwin Hatchery.
- Spawning and incubation occur at the Merwin Hatchery.
- Juvenile rearing occurs at the Merwin Hatchery in raceways.

Program Performance Metrics

pHOS level	Target: TBD (currently in recolonization phase) Recent Performance: unknown
pNOB levels	Target: NA Recent Performance: NA
Broodstock mining rate	Target: NA

Current Monitoring Program:

- Protocols for population monitoring are described in the Lewis River AOP (ATS 2022) associated with the H&S plan (PacifiCorp 2020).

Current Program #2: Late integrated winters (aka BWT Ad intact)

Program Type: Integrated late winter

Program: Conservation (Reintroduction Outcome Goal)

Population Recovery Phase: Recolonization

Adult Broodstock Collection	
Broodstock Type	Integrated
Broodstock Source	In-basin natural-origin adults; F1s from late integrated winter program (BWT Ad intact)
Broodstock Collection Location/Methods	Lewis River Hatchery and Merwin Upstream Collection Facility
pNOB target	100% but variable depending on mining rate

Collection timing:

Broodstock Collection (2023)

Week Ending	Brood Adults	Males	Females
18-Dec	1	1	0
25-Dec	1	0	1
1-Jan	0	0	0
8-Jan	1	1	0
15-Jan	1	0	1
22-Jan	0	0	0
29-Jan	1	1	0
5-Feb	0	0	0
12-Feb	1	0	1
19-Feb	2	1	1
26-Feb	1	1	0
5-Mar	2	1	1
12-Mar	2	1	1
19-Mar	2	1	1
26-Mar	2	1	1
2-Apr	3	2	1
9-Apr	4	2	2
16-Apr	7	4	3
23-Apr	6	3	3
30-Apr	6	3	3
7-May	4	2	2
14-May	3	2	1
21-May	3	2	1
28-May	2	1	1
Total	55	30	25

Secondary sources/plans for lack of adults; HOR (BWT) steelhead from the Cedar Creek trap.

**Hatchery Adult Transportation & Disposition - Late integrated winter (aka BWT Ad intact)
Steelhead**

Target	Rank	Quantity (range)	Location	Dates
Upper Lewis River	1	1239 - 1700*	Eagle Cliffs/Swift Forrest Camp	Jan-June
Broodstock	2	Backfill for NORs (up to 55)	Lewis River Hatchery & Merwin Upstream Facility	Jan-June

*The H&S Plan (PacifiCorp 2020) identifies a 1700 fish transport target; however updated EDT analysis was used to identify the transport target of 1239, which is the current management target in use.

Juvenile Release(s)

Release Strategy	1 group volitional followed by force out.
Quantity (range)	50,000
Release Age/size	1+/Released at 6-8fpp
Release Location/Timing	Lewis River Hatchery – May/June
Marking/Tagging strategy	<ul style="list-style-type: none"> • 50,000 BWT Ad intact
Fish Management needs	<ul style="list-style-type: none"> • BWT identifies conservation program returns from NOR steelhead • Unclipped adipose restricts harvest
Evaluation Needs	<ul style="list-style-type: none"> • BWT identifies program fish

Summary of Hatchery Configuration/Infrastructure:

- Adult collection for this program occurs at the Lewis River Hatchery and Merwin Upstream Fish Facility.
- Broodstock is held at the Merwin Hatchery.
- Spawning and incubation occur at the Merwin Hatchery.
- Juvenile rearing occurs at the Merwin Hatchery in raceways.

Program Performance Metrics

pHOS	<p>Target: TBD (currently in recolonization phase)</p> <p>Recent Performance:</p> <ul style="list-style-type: none"> - Lower mainstem NF Lewis (via M-R tangle net surveys) <ul style="list-style-type: none"> • 2016: 51% [90% CI: 41.3%, 60.4%] • 2018: 27.2% [90% CI: 21.1%, 33.9%] • Estimates were not generated for any other year. - Upper basin (transported from Merwin FCF to Swift); prelim. <ul style="list-style-type: none"> • 2022: 78% • 2023 (as of May 23rd): 81% • Data exist for other years but have not been summarized.
pNOB	<p>Target: 100%; actual will be variable based on mining rate & collection schedule</p> <p>Recent Performance:</p> <ul style="list-style-type: none"> • Pre-2022: 100% • 2022: ~90% • 2023: ~60% <p>NOTE: Beginning in 2022, the broodstock collection strategy was updated. In short, achieving a mining rate of 30% or less and demographic replacement of 2:1 became the primary targets instead of prioritizing a pNOB target of 100% (which was the sole target in all previous years). Also, an updated collection schedule was generated. Here, when insufficient natural-origin adults are</p>

	available to meet the collection schedule, hatchery-origin adults could be collected if demographic replacement has been met.
PNI	Target: TBD (currently in recolonization phase) Recent Performance: has not been estimated
Broodstock mining rate*	Target: less than 30%

*Broodstock mining rate = percentage of natural-origin escapement from a specific return year that are used for broodstock.

Current Monitoring Program:

- Protocols for population monitoring are described in the Lewis River AOP (ATS 2022) associated with the H&S plan (PacifiCorp 2020).

Current Program #3: Segregated summers

Program Type: Segregated summer

Goal of Program: Harvest augmentation/mitigation

Population Recovery Phase: Natural population considered functionally extirpated

Adult Broodstock Collection	
Broodstock Type	Lewis segregated HOR fish
Broodstock Source	F1s from segregated summer program (in-basin)
Broodstock Collection location/methods	Lewis River Hatchery Merwin Upstream Collection Facility
Integration Rate	pNOB goal of 0.0%

Collection timing:

Broodstock Collection Curve (2023)

Week Ending	Brood Adults	Males	Females
25-Jun	15	7	8
2-Jul	18	9	9
9-Jul	17	8	9
16-Jul	19	9	10
23-Jul	24	12	12
30-Jul	22	11	11
6-Aug	19	9	10
13-Aug	19	9	10
20-Aug	18	9	9
27-Aug	19	9	10
3-Sep	18	9	9
10-Sep	16	8	8
17-Sep	15	7	8
Total	239	116	123

Secondary sources/plans for lack of adults; HORs collected at the Cedar Creek trap.

Additional brood above program need are collected to mitigate for extended hold time before spawn.

Adult Transportation & Disposition – Summer Steelhead

Target	Rank	Quantity (range)	Location	Dates
Broodstock	1	224-260	Merwin Upstream Collection Facility & Lewis River Hatchery	June-Sept.
Surplus -Food Quality	2	Above recycling and hatchery needs	Food Bank	June-Nov

Juvenile Release(s)

Release Strategy	1 group volitional followed by force out
Quantity	235,000 (175,000 Merwin Hatchery+60,000 Echo net pens)
Release Age/size	1+/ Released at 5.5fpp
Release Location/Timing	Merwin Hatchery and Echo Park net pens – April-May
Marking/Tagging strategy	<ul style="list-style-type: none"> • 235,000 Ad Only
Fish Management needs	<ul style="list-style-type: none"> • Adipose clip required to allow harvest in mark-selective fisheries.
Evaluation Needs	<ul style="list-style-type: none"> • Adipose clip allows for evaluation of pHOS

Summary of Hatchery Configuration/Infrastructure:

- Adult collection for this program occurs at the Lewis River Hatchery and Merwin Upstream Fish Facility.
- Broodstock is held at the Merwin Hatchery.
- Spawning and incubation occur at the Merwin Hatchery.
- Juvenile rearing occurs at the Merwin Hatchery in raceways.

Program Performance Metrics

pHOS level	Target: NA Population considered extirpated Recent Performance: NA
pNOB levels	Target: NA Recent Performance: NA
Broodstock mining rate	Target: NA

Current Monitoring Program:

- Protocols for population monitoring are described in the Lewis River AOP (ATS 2022) associated with the H&S plan (PacifiCorp 2020).

Current Lewis Steelhead Harvest Management Strategy

- Lewis River steelhead harvest strategies are the similar for both segregated winter [Current Program #1] and summer steelhead [Current Program #1] programs, except that summer steelhead AHN can be recycled to the lower Lewis for additional angler opportunity.
- No harvest opportunity for the late integrated winter steelhead program (used exclusively for conservation objectives)
- No harvest opportunity for natural-origin adults (until we have management targets for NOR populations)

Area	Abundance		
	Low	Normal	Above Normal
Lower Lewis	Currently, pre-season management based on overall hatchery program needs	Currently, pre-season management based on overall hatchery program needs.	Currently, pre-season management based on overall hatchery program needs.
	Excess summer HORs ABOVE those needed for Lewis hatchery program recycled to lower Lewis	Excess summer HORs ABOVE those needed for Lewis hatchery program recycled to lower Lewis	Excess summer HORs ABOVE those needed for Lewis hatchery program recycled to lower Lewis.
	Restricted Mark-Selective fishery (reduced bag limit or full closure); (generally 3 hatchery adults > 20 inches).	Full Season Mark-Selective fishery (generally 3 hatchery adults >20 inches).	Full Season Mark-Selective fishery (generally 3 adults >20 inches). Potential for increased bag limits.
	In-season management based on actual hatchery/Merwin FF returns of HOR.	In-season management based on actual hatchery/Merwin FF returns of HOR.	In-season management based on actual hatchery/Merwin FF returns of HOR.
Ocean/Columbia River	Currently, pre-season management based on combined Lower Columbia forecast strength.	Currently, pre-season management based on combined Lower Columbia forecast strength.	Currently, pre-season management based on combined Lower Columbia forecast strength.
	Mark-Selective fishery (reduced bag limit or full closure); Seasons set via North of Falcon; Lewis stock part of CR steelhead aggregate.	Mark-Selective fishery (reduced bag limit or full closure); Seasons set via North of Falcon; Lewis stock part of CR steelhead aggregate.	Mark-Selective fishery (increased bag limit duration); Seasons set via North of Falcon; Lewis stock part of CR steelhead aggregate.
	In-season management based on hatchery returns.	In-season management based on hatchery returns.	In-season management based on hatchery returns.

Proposed Lewis Hatchery Steelhead Programs

Proposed Program #1: “Stepping Stone Variant” winters

During the first phase of the transition, the existing integrated conservation winter-run program (50,000 smolt plant) will be maintained and the largest programmatic change will be to eliminate the segregated Chambers Creek winter-run program, and replace it using a “stepping stone” approach (HSRG 2014). This new winter-run, harvest mitigation hatchery program will be derived using adult returns from the winter-run conservation program. Unlike the Chambers Creek program, which is a fully segregated and domesticated stock derived from outside the lower Columbia River ESU, this new stepping stone program will use returning in-basin, first generation (F1) adults to maintain genetic continuity between the localized hatchery and natural-origin population thereby reducing genetic risks. This program is a slight variation from a traditional “stepping stone” program in that rather than slowly increasing the size of the integrated portion of the program as natural origin abundance/availability increases, this program will maintain consistent production goals for the integrated and stepping stone components until a second phase evaluation (described below) is completed. Also, this “stepping stone variant” program will only select BWT-positive adults (F1s) for broodstock to propagate this program, meaning the broodstock will always be only one or two generations removed from natural origin parents, unlike a standard segregated program.

Program Type: “Stepping Stone Variant”

Population Recovery Phase: Recolonization

Goal of Program(s): Harvest

Timing for Transition: 2024

Adult Broodstock Collection	
Broodstock Source	Lewis integrated HOR F1 adults (BWT Ad intact)
Broodstock Collection Location/Methods	Lewis Hatchery Merwin Upstream Fish Facility
Integration Rate	Segregated: 0.0

Priority	Collection Strategy	pNOB Target	Brood Source	Spawning Strategy
1	Normal HOR/NOR return, no shortage Collect at Lewis Hatchery and Merwin Upstream Fish Facility	Conservation Program: 100%; actual will be variable.	Conservation Prog. Lewis Basin NORs and F1s from integrated program (BWT/ Ad intact), if needed.	Conservation Prog. a. NOR x NOR when possible. b. NOR x HOR when necessary to backfill. c. Re-use NOR males once, if needed.

				Retain up to 30% Lewis Basin NORs.	
			Stepping Stone Var. 0%	Stepping Stone Var. F1s from integrated program (BWT/ Ad intact).	Stepping Stone Var. HOR x HOR
2	Low NOR, Normal HOR	Collect at Lewis Hatchery and Merwin Upstream Fish Facility	Conservation Program: 100%; actual will be variable and likely <100%	Conservation Prog. Lewis Basin NORs and F1s from integrated program (BWT/ Ad intact). Retain up to 30% Lewis Basin NORs.	Conservation Prog. a. NOR x NOR when possible, b. NOR x HOR when necessary to backfill. c. Re-use NOR males (potentially more than once) d. Accept a lower pNOB/integration rate
			Stepping Stone Var. 0%	Stepping Stone Var. F1s from integrated program (BWT/ Ad intact).	Stepping Stone Var. a. HOR x HOR
3	Low HOR return, Normal NOR	Collect at Lewis Hatchery, Merwin Upstream Fish Facility and potentially Cedar Creek trap	Conservation Program: 100%; actual will be variable	Conservation Prog. Lewis Basin NORs and F1s from integrated program (BWT/ Ad intact). Retain up to 30% Lewis Basin NORs.	Conservation Prog. a. NOR x NOR when possible, b. NOR x HOR when necessary to backfill. c. Re-use NOR males (potentially more than once)
			Stepping Stone Var. 0%	Stepping Stone Var. F1s from integrated program (BWT/ Ad intact). Consider using F2s (returns from stepping-stone variant program) as backfill with ACC approval.	Stepping Stone Var. a. HOR x HOR b. Re-use HOR males (potentially more than once) c. Accept we may be below program goal
4	Shortages across board	Collect at Lewis	Conservation Program:	Conservation Prog.	Conservation Prog. a. HOR x NOR when possible

	Hatchery, Merwin Upstream Fish Facility and potentially Cedar Creek trap	100%; actual will be variable and likely <100%	Lewis Basin NORs and F1s from integrated program (BWT/ Ad intact). Retain up to 30% Lewis Basin NORs Retain all HORs above demographic replacement needs, if needed.	<ul style="list-style-type: none"> b. Re-use NOR males (potentially more than once) c. Accept we may be below program goal d. Accept a lower pNOB/integration rate e. May consider single year exception to demographic replacement to achieve broodstock goals, depending on seeding levels.
		Stepping Stone Var. 0%	Stepping Stone Var. F1s from integrated program (BWT/ Ad intact). Consider using F2s (returns from stepping-stone variant program) as backfill with ACC approval.	Stepping Stone Var. <ul style="list-style-type: none"> a. HOR x HOR b. Re-use HOR males (potentially more than once) c. Accept we may be below program goal

Note: ATS to develop definitions of: Low NOR, Low HOR, Normal NOR, Normal HOR

Broodstock Collection and Timing:

- Collect 50 Males and 60 Females (F1s from integrated program; BWT/ Ad intact.)
 - The broodstock collection goal for this program will be proportionally higher than the integrated conservation program.
 - This relatively higher goal will help ensure ripe fish are available when spawning events need to occur and allow for additional egg take/grading of production.
- Number and timing of spawning events will be determined during the implementation phase of the project via the AOP with the following goals:
 - Condensing the number of spawning events to:
 - maximize the ability to rear juveniles to an optimal smolt-release size that maximizes post-release survival and minimizes residualism. Spawning fish later in the spring (generally after June 1st) decreases the ability to rear juveniles to appropriate release sizes.
 - Operate the program using the current hatchery infrastructure which is currently limited by early-rearing vessels.
 - Minimize impact on the relative return timing of hatchery fish transported upstream of Merwin Dam.
- Prioritization of use for F1s from integrated program (upstream transport vs. broodstock) will be determined during the implementation phase of the project via the AOP
- Broodstock collection will start February 1st.

- Collection rate will be determined during the implementation phase of the project via the AOP to achieve adequate collection of broodstock by the time of spawning events.
- Program performance will drive adaptive management of the program through annual review during AOP development.

Adult Transportation & Disposition

Lewis HORs - Winter Steelhead Stepping Stone Variant (Ad Only)

Target Area	Rank	Quantity (range)	Location	Dates
Surplus	1	All fish above hatchery needs and after harvest.	Food grade – Food bank/tribal donation Non-food grade -Disposal (i.e., landfill)	Dec-June
Broodstock	2	In shortage years, consider using F2s (returns from stepping-stone variant program) as backfill with ACC approval.	Merwin Upstream Fish Facility and Merwin Hatchery Cedar Creek trap (potentially)	Feb-May

Lewis HORs - Winter Steelhead Conservation Program (BWT Ad intact)

Target	Rank	Quantity (range)	Location	Dates
Upper Lewis River	1	1239 - 1700*	Eagle Cliffs/Swift Forrest Camp	Jan-June
Broodstock	2	100-110	Lewis Hatchery & Merwin Upstream Facility	Jan-June

*The H&S Plan (PacifiCorp 2020) identifies a 1700 fish transport target above Swift Dam; however updated EDT analysis was used to identify the transport target of 1239, which is the current management target in use.

Juvenile Release(s)

Release Strategy	1 group - volitional followed by force out.
Quantity (range)	75,000
Release Age/size	1+ / Released at 5.5fpp
Release Location/Timing	Merwin Hatchery – April-May
Marking/Tagging strategy	<ul style="list-style-type: none"> • 75,000 Adipose fin-clipped
Fish Management needs	<ul style="list-style-type: none"> • Differential mark needed to identify stepping -stone variant program returns from integrated conservation program. The current marking strategy is an Adipose fin clip only for the harvest program and BWT with Adipose intact for the conservation program. • Adipose clip required to allow harvest in mark-selective fisheries

Evaluation Needs	<ul style="list-style-type: none">• Differential marking from integrated program allows for independent evaluation of these two programs.• Adipose clip allows for evaluation of pHOS
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Summary of Hatchery Configuration/Infrastructure:

- Adult collection for this program would occur at the Lewis River Hatchery and Merwin Upstream Fish Facility.
- Broodstock is held at the Merwin Hatchery.
- Spawning and incubation occur at the Merwin Hatchery.
- Juvenile rearing occurs at the Merwin Hatchery in raceways.

Proposed Monitoring Program:

- Protocols for population monitoring will be described in the Lewis River AOP associated with the H&S plan (PacifiCorp 2020).

Proposed Program #2: Late integrated winters (aka BWT Ad intact)

Program Type: Integrated late winter

Recovery Phase: Recolonization

Goal of Program(s): Conservation

This program will remain the same as the current late integrated winter steelhead program described earlier in this document. To avoid confusion, program information was not repeated here. A description of broodstock collection, adult transportation and disposition for the integrated late winter conservation program as it relates to the stepping stone variant program is described in the previous section (Proposed Program #1: Late Winter “Stepping Stone Variant”).

Proposed Program #3: Segregated summers

Program Type: Segregated summer

Recovery Phase:

Goal of Program(s): Harvest

Adult Broodstock Collection	
Broodstock Source	Lewis segregated HOR fish
Broodstock Collection location/methods	Lewis Hatchery Merwin Upstream Fish Facility
Integration Rate	Segregated: 0.0

Collection Timing:

Estimated Broodstock Collection Curve

Week Ending	Brood Adults	Males	Females
25-Jun	16	8	8
2-Jul	19	9	10
9-Jul	19	9	10
16-Jul	21	10	11
23-Jul	27	13	14

30-Jul	24	12	12
6-Aug	20	10	10
13-Aug	21	10	11
20-Aug	20	10	10
27-Aug	21	10	11
3-Sep	20	10	10
10-Sep	17	8	9
17-Sep	16	8	8
Total	261	127	134

Secondary sources/plans for lack of adults; HORs collected the Cedar Creek trap.

Adult Transportation & Disposition

Target	Rank	Quantity (range)	Location	Dates
Broodstock	1	250-300	Merwin Upstream Fish Facility and Merwin Hatchery	June-Sept
Surplus -Food Quality	2	Above recycle and hatchery needs	Food Bank	Sept-Oct

Juvenile Release(s)

Release Strategy	1 group volitional followed by force out
Quantity	260,000 (200,000 Merwin Hatchery+60,000 Echo net pens)
Release Age/size	1+ / Released at 5.5fpp
Release Location/Timing	Merwin Hatchery – April-May
Marking/Tagging strategy	<ul style="list-style-type: none"> 260,000 Ad Only
Fish Management needs	<ul style="list-style-type: none"> Adipose clip required to allow harvest in mark-selective fisheries.
Evaluation Needs	<ul style="list-style-type: none"> Adipose clip allows for evaluation of pHOS

Summary of Hatchery Configuration/Infrastructure:

- Adult collection for this program occurs at the Lewis River Hatchery and Merwin Upstream Collection Facility.
- Broodstock is held at the Merwin Hatchery.
- Spawning and incubation occur at the Merwin Hatchery.
- Juvenile rearing occurs at the Merwin Hatchery in raceways.

Program Performance Metrics

pHOS level	Target: NA Population considered extirpated Recent Performance: NA
pNOB levels	Target: NA Recent Performance: NA
Broodstock mining rate	Target: NA

Proposed Monitoring Program:

- Protocols for population monitoring will be described in the Lewis River AOP associated with the H&S plan (PacifiCorp 2020).

Lewis Winter and Summer Steelhead Fishery Management Strategy

Currently, directed angling and harvest opportunity for hatchery steelhead in the NF Lewis River is limited to areas below Merwin dam while implementation of fish passage and reintroduction efforts above Merwin Dam continue. Future changes to steelhead fishery management in the Upper Lewis (i.e., areas above Merwin Dam) will require both technical and policy level discussion. These discussions are contingent on development of improved modeling identified in the Aquatic Monitoring and Evaluation Plan for the Lewis River (AMEP) to better quantify key biological reference points needed for setting management targets and evaluating thresholds established in the Settlement Agreement (e.g., recovery phase triggers, transport goals, ocean recruits, etc.). The role of hatchery fish in future harvest opportunities also has not been discussed nor established.

The following fishery management strategies are divided into two tables. The first describes the proposed strategy in the interim period while modeling efforts are completed and technical/policy discussions are carried out. The second provides a conceptual strategy that includes both hatchery and natural-origin fish fishery options. This “long-term” conceptual strategy will be adjusted to reflect decisions made in future technical/policy discussions.

Proposed fishery management framework (until biological reference points and management targets for NOR populations are updated)

Interim/Recolonization Phase

Area	Abundance		
	Low	Normal	Above Normal
Lower Lewis	Currently, pre-season management based on overall hatchery program needs	Currently, pre-season management based on overall hatchery program needs.	Currently, pre-season management based on overall hatchery program needs.
	Excess summer HORs AHN recycled to lower Lewis	Excess summer HORs AHN recycled to lower Lewis	Excess summer HORs AHN recycled to lower Lewis
	Restricted Mark-Selective fishery (reduced bag limit or full closure)	Full Season Mark-Selective fishery (generally 3 hatchery adults >20 inches).	Full Season Mark-Selective fishery (generally 3 adults >20 inches). Potential for increased bag limits.
	In-season management based on actual hatchery/Merwin FCF returns of HOR.	In-season management based on actual hatchery/Merwin FCF returns of HOR.	In-season management based on actual hatchery/Merwin FCF returns of HOR.
Ocean/Columbia River	Currently, pre-season management based on combined Lower Columbia forecast strength.	Currently, pre-season management based on combined Lower Columbia forecast strength.	Currently, pre-season management based on combined Lower Columbia forecast strength.
	Mark-Selective fishery (reduced bag limit or full closure); Seasons considered via North of Falcon; Lewis	Mark-Selective fishery (reduced bag limit or full closure); Seasons considered via North of Falcon; Lewis	Mark-Selective fishery (increased bag limit duration); Seasons considered via North of

	stock part of CR steelhead aggregate.	stock part of CR steelhead aggregate.	Falcon; Lewis stock part of CR steelhead aggregate.
	In-season management based on hatchery returns.	In-season management based on hatchery returns.	In-season management based on hatchery returns.

Conceptual fishery management framework – modification will occur to reflect future technical/policy discussions and decisions. This framework is intended for discussion about potential fishery implementation during the local adaptation phase of recovery, but may be phased out when full recovery is achieved. This framework does not imply endorsement of specific harvest management strategies in the future.

Long Term /Local Adaptation Phase

Area	Abundance		
	Low	Normal	Above Normal
Lower Lewis	Utilize Lewis specific forecasts (once developed) for pre-season management. Restricted Mark-Selective fishery (reduced bag limit or full closure). In season management based on actual hatchery /Merwin FCF returns of HOR.	Utilize Lewis specific forecasts (once developed) for pre-season management. Once seeding/escapement goals are established and met: Full Non Mark Selective fishery (HOR/NOR) Bag limits TBD. In season management based on actual hatchery/Merwin FCF returns of HOR/NOR.	Utilize Lewis specific forecasts (once developed) for pre-season management. Once seeding/escapement goals are established and met: Full Non Mark Selective fishery (HOR/NOR); Potential increased Bag limits. In season management based on actual Hatchery/Merwin FCF returns of HOR/NOR.
	Excess summer HORs AHN for Lewis hatchery program recycled to lower Lewis	Excess summer HORs AHN for Lewis hatchery program recycled to lower Lewis	Excess summer HORs AHN for Lewis hatchery program recycled to lower Lewis
	Restricted Mark-Selective fishery (reduced bag limit or full closure).	Full Season Mark-Selective fishery (generally 3 hatchery adults >20 inches).	Full Season Mark-Selective fishery (generally 3 adults >20 inches). Potential for increased bag limits.
	In-season management based on actual hatchery/Merwin FCF returns of HOR.	In-season management based on actual hatchery/Merwin FF returns of HOR.	In-season management based on actual hatchery/Merwin FF returns of HOR.
Upper Lewis	Utilize Lewis specific forecasts (once developed) for pre-season management. Fishery on excess HORs transported to upper Lewis AHN to replace NORs used for broodstock (hatchery equivalents).	Utilize Lewis specific forecasts (once developed) for pre-season management. Fishery on excess HORs transported to upper Lewis AHN to replace NORs used for broodstock (hatchery equivalents). Potential NOR harvest if above escapement goals	Utilize Lewis specific forecasts (once developed) for pre-season management. Fishery on excess HORs transported to upper Lewis AHN to replace NORs used for broodstock (hatchery equivalents). Potential NOR harvest if above escapement goals
	Once seeding/escapement goals are established:	Once seeding/escapement	Once seeding/escapement

	Restricted Mark-Selective fishery (reduced bag limit or full closure); In-season management based on actual hatchery/Merwin FCF returns of HOR/NOR.	goals are established and met: Full Season Non Mark-Selective fishery (HOR/NOR bag limits TBD). In-season management based on actual hatchery/Merwin FCF returns of HOR/NOR.	goals are established and met: Full Season Non Mark-Selective fishery (HOR/NOR bag limits TBD). In-season management based on actual hatchery/Merwin FCF returns of HOR/NOR
Ocean/Columbia River	Mark-Selective fishery Ocean fishery is negligible Lewis stocks part of LCR steelhead aggregate for Columbia River Fishery Management. Seasons considered via North of Falcon	Mark-Selective fishery Ocean fishery is negligible Lewis stocks part of LCR steelhead aggregate for Columbia River Fishery Management. Seasons considered via North of Falcon	Mark-Selective fishery Ocean fishery is negligible Lewis stocks part of LCR steelhead aggregate for Columbia River Fishery Management. Seasons considered via North of Falcon

Harvest Management Notes:

Steps needed to achieve long-term management targets:

- Establish Rmax and return targets
- Achieve juvenile collection efficiency goals at all downstream collection points for every identified transport species
- Determine hatchery equivalent value used for NOR demographic replacement and establish general management guideline for NOR replacement
- WDFW - update FMEP to include above strategy and consult with NMFS. Verify ESA permitting needs with NMFS.
- Forecasts by Lewis basin specific HOR/NOR instead of aggregate
- Develop earlier in-season predictors of total return for management purposes.

Monitoring and Analysis needs associated with Adaptive Management trigger points

- Monitor SARs for program.
- Evaluate fishery contributions and harvest rates.
- Complete analysis of SARs for current programs (“stepping stone variant” and the late integrated winter (aka BWTs) steelhead) to determine what impacts transitioning to one integrated program will have on adult returns and how this transition would affect recovery.
- Following construction of juvenile and adult passage facilities, evaluation of each facility will be necessary to determine if assumptions for basin productivity and survival are correct.

Bio-programming considerations for all programs (capacity, water, how it fits with other programs):

- Broodstock will be held at the Merwin Hatchery.

- Eggs will be incubated at Merwin Hatchery
- Juvenile rearing and release will occur from the Merwin Hatchery in raceways and the Echo Park net pens.

List of Reference Materials

A vision for Salmon and Steelhead Goals to Restore Thriving Salmon and Steelhead to the Columbia River Basin. Phase 2 Report of the Columbia Basin Partnership (CBP) Task Force of the Marine Fisheries Advisory Committee- October 2020. https://s3.amazonaws.com/media.fisheries.noaa.gov/2020-10/MAFAC_CRB_Phase2ReportFinal_508.pdf?null

Aquatic Monitoring and Evaluation Plan for the Lewis River-Second Revision (Version3). PacifiCorp. April 2022. Available online: [2022-LR-Mon-Eval-Plan.pdf \(pacificorp.com\)](2022-LR-Mon-Eval-Plan.pdf)

ATS (North fork Lewis River Aquatic Technical Subgroup). 2022. Annual Operating Plan (AOP). Hatchery and Supplementation Program; North Fork Lewis River. North fork Lewis River Aquatic Technical Subgroup. December 2022.

HSRG (Hatchery Scientific Review Group). 2020. Developing recovery objectives and phase triggers for salmonid populations. Available online: [HSRG 2020 White Paper Final Draft.pdf \(streamnet.org\)](HSRG_2020_White_Paper_Final_Draft.pdf)

HSRG (Hatchery Scientific Review Group). 2014. On the Science of Hatcheries: An updated perspective on the role of hatcheries in salmon and steelhead management in the Pacific Northwest. A. Appleby, H.L. Blankenship, D. Campton, K. Currens, T. Evelyn, D. Fast, T. Flagg, J. Gislason, P. Kline, C. Mahnken, B. Missildine, L. Moberand, G. Nandor, P. Paquet, S. Patterson, L. Seeb, S. Smith, and K. Warheit. June 2014; revised October 2014. Available online: <http://hatcheryreform.us>

PacifiCorp and Cowlitz County PUD. 2020. Lewis River Hatchery and Supplementation Plan- FINAL (FERC Project Nos. 935, 2071, 2111, 2213). December 2020 Available online: [Microsoft Word - HS PLAN FINAL 2020.docx \(pacificorp.com\)](Microsoft Word - HS PLAN FINAL 2020.docx)

Appendix A

Please see attached as separate document.

Strategy evaluation of future NF Lewis winter steelhead hatchery programs (short Version for ATS).pdf

This slide deck was presented by Kale Bentley (WDFW) to the Lewis River Aquatic Technical Committee (ATS) on April 27, 2023. This presentation was intended to provide information and context of the decision process and conclusions to initiate the winter steelhead “stepping stone variant” program.

Lewis Steelhead Transition Plan Review- ATS Question and Response Matrix

Distributed To ACC June 1, 2023;
Updated on 7/12/2023

Org.	Page	Text/Section Reference	Comment/Question	WDFW Response
NMFS	9	Current Program #2 Late Winter (BWT steelhead)	Flagging this as potentially something we might discuss through the consultation process, though it's hard for me to speak with any concreteness without specific numbers. You may want to think about PNI as a metric because it will give you flexibility between managing for pNOB vs. pHOS depending on what the fish are doing that year. We will be looking at PNI in the BiOp (so we <i>might</i> ask for a higher pNOB than 30 if NO returns support that), though I'm not sure what level of PNI we would ask for at this point without looking at all the data. Happy to discuss further offline if need be.	Agree that we need to develop more specific metrics for evaluating performance as we move into implementation of this transition. PNI will be a key metric. Also- we found an error in the document – the target pNOB for the integrated winter steelhead program (conservation program) is 100% (dependent on NOR availability), not 30%. This has been corrected in the latest draft.
NMFS	13	Proposed Program #1 Late Winter Stepping Stone Variant	Would it be 100% returns from the integrated program? Or would it be mix of integrated and segregated returns?	The objective would be to use 100% returns from the integrated program return (i.e., BWT positive) fish, which are the progeny of NOR x NOR crosses. However, in the event of an extreme shortfall segregated returns from the stepping-stone program could be considered for broodstock with approval by ACC/ATS.
NMFS	13	Proposed Program #1 Late Winter Stepping Stone Variant	As opposed to collecting throughout the run? Wouldn't this skew which hatchery returns you would use, or does selecting the 1 out of 2 account for that?	In the Stepping stone program, broodstock will come from the F1 returns of the Conservation program (i.e. BWT positive fish). Therefore, returning progeny (F2s) will not be spawned. Their purpose will be to provide harvest opportunities. An expansion of the section on broodstock collection for the stepping-stone program has been added to provide additional clarity.

Org.	Page	Text/Section Reference	Comment/Question	WDFW Response
PacifiCorp	2	Overview	<p>The program proposes to increase production using F1 brood. Seems that increasing production would also increase genetic risks (from current), especially to diversity and Ne.</p>	<p>To clarify, the plan does not increase winter steelhead production (it actually proposes a 25K reduction).</p> <p>Overall, the plan is focused on modifying the winter steelhead hatchery program that is centered on harvest mitigation. We have proposed eliminating the early-timed, fully segregated program (Chamber's Creek stock derivative) and transitioning to a broad-timed, stepping-stone program. This modification has trade-offs as it pertains to genetic risks on the natural-origin population. Although this change will increase the temporal overlap of harvest mitigation and natural-origin spawners thereby increasing the risk of introgression, the stepping-stone program adults will have much higher genetic fitness given that spawners will only be 1-2 generations removed from the wild thereby reducing domestication risks. Our analysis of these tradeoffs indicates this is a net conservation gain that will also provide more harvest opportunity.</p> <p>Also, the NF Lewis winter steelhead population is recognized as a single population (above and below Merwin Dam excluding EF Lewis). The majority of spawning habitat is above Merwin Dam. As reintroduction efforts continue, additional passage is implemented, and collection efficiencies are improved to meet SA requirements, opportunities to further manage for genetic fitness improvement and population productivity will be gained.</p>

PacifiCorp	2	Overview	I would like to discuss further for my own clarity on this. Adding a segregated program isn't typically a recommendation for conservation (for late winter steelhead). This may have benefits, so I would like to understand those benefits better.	To clarify, the plan outlined does not add a segregated program. It transitions the existing segregated early-timed program (Chamber's creek stock derivative) to a later timed stepping-stone program. The stepping-stone program will use only HOR x HOR crosses, so it is technically "segregated", but it will use F1s from the Conservation program (which has a goal of 100% pNOB), so it will essentially always be only 1-2 generation removed from the natural-origin population. Also, see response above.
PacifiCorp	5	Table: Goal of current integrated and proposed stepping stone variant winter-run program by recovery phase (i.e., conservation/harvest): <u>Recolonization</u>	the interim viability goal will likely define the length of time that the integrated population stays in the recolonization phase. Also, it seems that the segregated program will put added pHOS pressure on the integrated population delaying local adaption phase	As previously mentioned, the NF Lewis winter steelhead population is recognized as a single population. The majority of spawning habitat is above Merwin Dam. As reintroduction efforts continue, additional passage is implemented, and collection efficiencies are improved to meet SA requirements, there will be opportunities to adaptatively manage the hatchery programs and transport strategies to ensure recovery goals are being met (e.g., pHOS, PNI targets). Based on our analysis of various hatchery strategies, converting the early-timed segregated program to a broad-time, stepping stone program will improve the overall genetic impacts of the hatchery populations as measured using NOAA's multi-population PNI model. Currently, the Upper Lewis is being managed solely for reintroduction and recovery, with steelhead harvest mitigation focused in the Lower Lewis. The largest potential gains and biggest drivers for population advancement towards local adaptation will come through achieving recovery objectives in the Upper Basin.

PacifiCorp	5	Table: Goal of current integrated and proposed stepping stone variant winter-run program by recovery phase (i.e., conservation/harvest): <u>Local Adaptation</u>	There will always be some hatchery production so PNI, pHOS and Ne would be important metrics to assess whether local adaptation is moving in the expected direction or trigger for moving back to recolonization.	Agree – these will be important performance metrics.
PacifiCorp	5	Table: Goal of current integrated and proposed stepping stone variant winter-run program by recovery phase (i.e., conservation/harvest): <u>Full Recovery CBP H&H goal:400-3000</u>	Very broad and not particularly useful. Ultimately determined by the Services. Agreed. Lewis River EDT (NOAA 2019) provides a much more refined estimate of abundance based on site-specific parameters of habitat within the Upper LR Basin. CBP EDT is based on meta-data.	We should discuss at ATS who makes the determination on when healthy/harvestable (i.e., full recovery) is achieved. The CBP H&H goal is the top end of the range, which equates to 3000. We made this edit for clarity. This is included in the table as a potential reference point, but we are open to adding more language to clarify need for verification of this target through a life-cycle modeling approach.
PacifiCorp	6	Adult Transportation & Disposition:	No transport targets for Chambers.	Agreed - will delete transport
PacifiCorp	8	Current Program #2 Late Winter (BWT steelhead) Table: Hatchery Adult Transportation and Disposition	There doesn't seem to be a consensus on the transport target number. The current H&S plan calls for adult capacity of 1,700 (NOR + BWT) upstream of Swift for 100% seeding. This was from an older EDT run. Chris indicates that NOAA (2019) modeling estimates of adult capacity for steelhead upstream of Swift are 1,239. And here the target is 500. Where did this number come from? Suggest using the NOAA value of 1,239 adults. Will need to update H&S plan in the future.	We have updated this to 1700 to match the current H&S Plan (and AOP) target.
PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant	A diagram might be helpful in comparing this program to the integrated. It is more complex than coho or other species.	Copied narrative from the Overview section down to this section for additional clarity, per Chris' suggestion. We are open to working with the ATS on development of a diagram to further clarify this program change if time allows or during implementation of the program and description of the program in the AOP.

PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant	Similar to Erik’s comment above, would be helpful to include a brief summary of what this Program Alternative is. What “Stepping Stone” means, etc. Subsequent alternatives below should also have a summary provided that includes how they differ from each other at a high level.	We copied narrative from the Overview section down to this section for additional clarity.
PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant Table: Adult Broodstock Collection Integration Rate: 0.0	The segregated program will increase pHOS for the integrated program. Reduced pHOS will really only come from NOR returns from natural production and high ODS. This will probably delay moving the integrated program to the adaptation phase.	We agree with the assessment that reduced pHOS will come with increased NOR returns and high ODS. We disagree with the assessment that this program will increase pHOS and delay progress towards moving to the local adaptation. In the current phase of recolonization, the recovery approach is to utilize hatchery fish (from the conservation program) to seed the upper watershed while ODS improvements are made and NOR abundance grows. This approach purposefully maintains a high pHOS in the recolonization phase. We are proposing to transition to a program that has improved genetic fitness (compared to early winter, chambers creek stock). So, while it is true that “effective” pHOS (overlap) may increase in the lower river, genetic impact of that pHOS is not expected to delay recovery. Phase triggers will be developed to determine when it is appropriate to shift into the local adaptation phase.
PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant Table: Adult Broodstock Collection Timing:	This doesn’t match the brood for 50K integrated program – should be less than 70 total brood for 75K production – not 110.	Additional language was added to this section to better clarify broodstock numbers needed, collection protocol and timing. We can review this during ATS meeting on the 25 th .
PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant Table: Adult Broodstock Collection Timing:	This rate (50%) is also too high given brood needs	Additional language was added to this section to better clarify broodstock numbers needed, collection protocol and timing. We can review this during ATS meeting on the 25 th .

PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant Table: Adult Transportation and Disposition (100-120 needed)	Revise	Additional language was added to this section to better clarify broodstock numbers needed, collection protocol and timing. We can review this during ATS meeting on the 25 th .
PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant Table: Adult Transportation and Disposition (Yale and Merwin Basin)	Not sure I follow why segregated fish would be used here?	Good catch – we inadvertently left transport into Merwin/Yale in the table. This was a carry-over from the Coho transition plan. We have corrected the table to reflect the two options for this program – broodstock or surplus. This is the same as the current early winter steelhead program.
PacifiCorp	13	Proposed Program#1 Late Winter Stepping Stone Variant Table: Adult Transportation and Disposition (surplus)	It is not clear what do we do with segregated returns at the trap? Segregated program is using BWT's as brood. Not sure if we would transport any of the segregated fish either. All surplus? Needs further discussion.	Good catch – we inadvertently left transport into Merwin/Yale in the table. This was a carry-over from the Coho transition plan. We have corrected the table to reflect the two options for this program – broodstock or surplus. This is the same as the current early winter steelhead program.
PacifiCorp	14	Proposed Program#1 Late Winter Stepping Stone Variant Table: Juvenile Release(s)	BWT + AD would be a differential mark, but this may be a confusing problem	The F1s from this program would be AD clipped only. The integrated conservation program would remain BWT/Adipose intact. This would identify the two returns and inform the transport and disposition of the two programs.
PacifiCorp	14	Proposed Program#1 Late Winter Stepping Stone Variant Table: Juvenile Release(s)	Need to discuss what the evaluation needs are. These two programs will spawn naturally together in the lower river (despite efforts to reduce with harvest). It's not clear how to keep the segregated program separate from integrated. Probably needs further discussion.	Agree – we suggest this discussion will come during the implementation phase of these programs via development of the AOP.

PacifiCorp	18	Lewis Winter and Summer Steelhead Fishery Management Strategy Table: Long Term/Local Adaptation Phase: Upper Lewis	Similar to comments regarding coho. If the population is in the local adaptation phase, then this assumes that the natural component is self-sustaining. PacifiCorp does not support harvest until the self-sustaining component of the Reintroduction Outcome Goal is met, or rather the population is in the local adaptation phase.	We included the same language that was added to the Coho Transition plan regarding the conceptual nature of the long-term strategy and the need for future technical/policy discussions. <i>"The second provides a conceptual strategy that includes both hatchery and natural-origin fish fishery options. This "long-term" conceptual strategy will be adjusted to reflect decisions made in future technical/policy discussions."</i>
PacifiCorp	18	Lewis Winter and Summer Steelhead Fishery Management Strategy Table: Long Term/Local Adaptation Phase: Upper Lewis	Not just escapement goals, but self-sustaining	See comment above.

The following comments were received during the 30-day ACC review period & responses were generated by WDFW on July 12th, 2023

PacifiCorp	1	Overview	Should provide more rationale or justification of why the stepping stone program was selected. Also include what other alternatives were considered such as one larger integrated program. This rationale needs to show how the stepping stone program benefits the reintroduction/conservation (e.g., provides more NOR for upstream transport) to be consistent with the Settlement Agreement. I can help draft this relative to the SA.	The Overview section has been updated (see paragraphs #3 and #4) to provide more detail on the evaluation and rationale for the stepping stone program being the recommended, near-term alternative.
PacifiCorp	9	Program Performance Metrics	[PNI] needs to be included [in the table] as identified [as a monitoring metric] in Objective 8 of the H&S Plan	The table has been updated to include PNI
PacifiCorp	12	Current Lewis Steelhead Harvest Management Strategy	Added an additional bullet that states "Currently no harvest opportunity for the integrated steelhead program." Added comment "Not sure what this means" to existing bullet point that states "Current (until we have management targets for NOR populations)"	The bulleted list has been updated to reflect harvest opportunities for all NF Lewis steelhead populations

PacifiCorp	13	Proposed Program #1: Late Winter "Stepping Stone Variant"	Relative to what? The temporal overlap of this new program will have genetic risks due to the release of F2 juveniles that will spawn with NOR. So, relative to the current integrated program, the stepping stone program increases risks due to more hatchery releases interacting with natural spawners (i.e., increased pHOS and potential reduction if fitness) in lower river. This may reduce fitness of NOR's transported upstream.	<p>See our response to the previous comment at the top of page 2 that stated "The program proposes to increase production using F1 brood. Seems that increasing production would also increase genetic risks (from current), especially to diversity and Ne."</p> <p>Based on our modeling evaluation, the new stepping stone program decreases the genetic risks of the harvest-focused winter steelhead program on the natural-origin population. In comparison with the alternative of a single, fully integrated program, the stepping stone program (paired with the existing conservation program) has similar genetic risks (e.g., multi-population PNI estimates are extremely similar across all modeled scenarios). This result makes sense based on the characteristics of the programs. In short, the integrated program requires more natural-origin brood (higher pNOB) but this results in fewer natural-origin spawners (higher pHOS) while the stepping stone program doesn't directly use natural-origin spawners but it needs F1s from the integrated program (low pNOB) which results in more natural-origin recruits being left on the spawning grounds (lower pHOS).</p>
PacifiCorp	13	Proposed Program #1: Late Winter "Stepping Stone Variant"	Table includes both integrated and stepping stone programs under the stepping stone heading. Suggest separate tables for each program to reduce confusion. Formatting issue.	The "Proposed Lewis Hatchery Steelhead Programs" section contains separate sub-sections for each proposed program. Thus, the (new) stepping stone program [Proposed Program #1] and the (existing) integrated program [Proposed Program #2] are separated into two different sub-sections and have their own summary tables. The integrated program is listed in several places in the stepping stone tables because the stepping stone programs requires recruits (i.e., F1s) from the integrated program.

PacifiCorp	14/15	Proposed Program #1: Late Winter “Stepping Stone Variant”	<p>If the program is at the point of considering the use of F2 returns, then the reintroduction program is essentially non-existent and more substantial changes are needed. Recommend removing this contingency.</p>	<p>This likely isn't the case re: “if the program is at the point of considering the use of F2 returns, then the reintroduction program is essentially non-existent...”</p> <p>The purpose of the Transition Plan is to outline how hatchery programs would be generally operated, which included a table of broodstock sources for both the conservation and harvest programs under varying conditions.</p> <p>The specific table referenced here table does describe the prioritization of returning conservation hatchery program fish (aka F1s), which can be used as broodstock for both programs as well as transported to the upper basin for reintroduction. These details will be developed by the ATS and described in the Annual Operating Plan and Transport Plan.</p> <p>Based on these existing criteria for the conservation program, we (WDFW) anticipate the starting point for the prioritization of F1s with a new harvest-focused, stepping-stone program would be:</p> <ol style="list-style-type: none"> 1. Upstream transport first to ensure demographic replacement (and maybe some minimum demographic boost) 2. Excess goes to harvest hatchery program and conservation program. <p>All said, we don't anticipate this topic being a major issue. F1s aren't subject to fisheries (as they are adipose intact) and have had relatively large returns in recent years. While there will certainly be a reduction in the absolute number of F1s transported for reintroduction with the new broodstock needs for the stepping stone hatchery program, the largest benefit to reintroduction will come with increased juvenile capture efficiencies at the Swift FSC.</p>
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PacifiCorp	15	Proposed Program #1: Late Winter "Stepping Stone Variant": Broodstock Collection and Timing	Spawning window should be defined here	Sentence has been updated to clarify that steelhead will generally not be spawned after June 1 st
PacifiCorp	15	Proposed Program #1: Late Winter "Stepping Stone Variant": Broodstock Collection and Timing	Yes, and required by the SA	Noted. No changes have been made but word-smith additions would be considered if specific language is provided.
PacifiCorp	15	Proposed Program #1: Late Winter "Stepping Stone Variant": Broodstock Collection and Timing	This will have to be an accepted impact to reintroduction program. A statement at the beginning or end of this plan identifying that over the long-term this stepping stone program will have benefits to reintroduction program is needed for the Utilities to accept this impact.	The statement that this comment was in reference to has been updated.
PacifiCorp	15/16	Proposed Program #1: Late Winter "Stepping Stone Variant": Broodstock Collection and Timing	Suggested adding sentence that states "It is expected that collection will follow a generalize run-timing curve to ensure brood stock are selected across the run."	While we acknowledge that this suggested edit is likely to be largely true, we did not add it because more evaluation and discussion is needed (as the leading sentence indicates).
PacifiCorp	16	Proposed Program #1: Late Winter "Stepping Stone Variant": Adult Transportation & Disposition	These returns are not available for upstream, but it that absolute? A portion of these F2 returns will be spawning naturally downstream and will return with AD intact and transported upstream (identified as NOR's). Thus, the composition of the population will change with this stepping stone program and will result in some NOR's from F2 parents being transported upstream in the coming years.	While this new stepping stone program will be more genetically fit than the existing, segregated winter steelhead program (aka Chambers), the purpose of the program is still to solely generate recruits (returning adults) for harvest and not for conservation (i.e., transported to the upper basin). Certainly, a portion of F1s from the stepping stone program could stray and successfully spawn in the lower river and those recruits (F2) could return and be transported upriver. But this is no different than what may be happening now with the Chambers program except, again, that the resulting recruits would be less genetically fit.
PacifiCorp	16	Proposed Program #1: Late Winter "Stepping Stone Variant": Juvenile Release(s)	Yes, and a requirement of SA	Noted. No changes have been made but word-smith additions would be considered if specific language is provided.

PacifiCorp	21	Lewis Winter and Summer Steelhead Fishery Management Strategy: Interim/Recolonization Phase	Suggested adding the following language “Conceptual fishery management framework – modification will occur to reflect future technical/policy discussions and decisions. This framework is intended for discussion about potential fishery implementation during the local adaptation phase of recovery, but may be phased out when full recovery is achieved. This framework does not imply endorsement of specific harvest management strategies in the future.	The language has been accepted.
PacifiCorp	21	Lewis Winter and Summer Steelhead Fishery Management Strategy: Long Term /Local Adaptation Phase	It is not clear why summer steelhead are included here as a segregated harvest program. Is there a long term conservation goal for summer steelhead?	Lewis River hatchery summer steelhead are included [in this table] because they are one of the existing and proposed steelhead hatchery programs.
PacifiCorp	22	Lewis Winter and Summer Steelhead Fishery Management Strategy: Harvest Management Notes	Does this apply to both summer and winter steelhead? Confusing.	Currently, no. Add “...for every identified transport species” to the end of the sentence to improve clarity.
PacifiCorp	22	Lewis Winter and Summer Steelhead Fishery Management Strategy: Harvest Management Notes	Why is this the only performance goal listed as necessary for achieving long term management goals? Especially if pertaining to summer steelhead	In short, the recovery of NF Lewis salmon and steelhead populations will not occur, and thus “long term” management strategies cannot be implemented, until juvenile collection efficiencies are improved. The Settlement Agreement stipulates what collection efficiencies must be met. Therefore, the identified step of “Achieve juvenile collection efficiency goals at all downstream collection points” is both accurate and a high priority. If there are other performance goals that PacifiCorp would like to be listed here, please provide specific language.
Trout Unlimited	2	Overview	Overall, we support transitioning away from the current Chambers Creek winter-run program to a “stepping stone” program, which will be derived from the integrated conservation program and used for future winter steelhead harvest in the basin.	Thank you – agreed.

Trout Unlimited	2	Overview	“...in order to assess the effectiveness of the program and make the necessary changes associated with this plan into the future, we support the planned monitoring and adaptive approaches within the plan.”	Monitoring and evaluation of these programs will be developed by the ATS and included in the H&S Plan (and corresponding Annual Operating Plan) and the AMEP, as necessary.
Trout Unlimited	1	Overview	We support the use of both the Lower Columbia Conservation and Sustainable Fisheries Plan (LCCSFP) and the Statewide Steelhead Management Plan (SSMP) as the guiding documents for risk tolerance of this plan and programs. While we understand that these are PacifiCorp hatchery programs, we strongly believe WDFW’s management plan should provide the overarching guidance for the hatchery strategies and policies	We agree and we believe this Transition Plan is in alignment with the overall goals/objectives of the LCCSFP and SSMP. References to these specific plans were not made directly in the Transition plan, as we view the Transition Plan as an extension of PacifiCorp’s H&S plan, which has the Utilities License and Settlement Agreement as the primary guidance documents.
Trout Unlimited	4	Recovery Phases and Goals	We’re pleased and supportive of the hatchery strategy evaluation separating the lower (below Merwin) and upper (above Swift) components of the population and the calculation of metrics at both the sub-population and total population scale. We acknowledge that winter steelhead in the Lewis are considered one recovery population, but we’d support the development of “soft metrics” for the sub-population in the lower basin, to prevent the lower basin from becoming a dumping ground for hatchery fish, while concurrently attempting to recover the upper basin. At least until downstream fish passage and collection through the entire hydro system is improved and to allow the upper river sub-population to begin to functionally recover.	Thank you – We agree that monitoring of the sub-populations and a roll-up to an evaluation at a total population scale is appropriate. We are supportive of developing “soft metrics” for the sub-populations. On-going discussions with the ATS for the development of the AOP along with the proposed Phase 2 evaluation and development of key management objectives are two places where “soft metrics” and monitoring needs can and should be discussed.

Trout Unlimited	4	Recovery Phases and Goals	<p>We support the upstream subpopulations being designated in a recolonization phase. We strongly support the effort to develop and complete the life-cycle modeling, which will inform when the population enters local adaptation or full recovery phase. However, we do not support the summer steelhead hatchery program being included in the recolonization phase designation, as it does not contribute to recovery and has the potential to cause harm to the natural-origin population. Instead, this population needs to be held to standards presented in the SSMP and LCCSFP.</p>	<p>Thank you for your support of the life-cycle modeling approach, we agree that this is important work that will be of great benefit to our understanding of the populations and in establishment of key biological reference points and management triggers.</p> <p>Our interpretation of the recovery phase designations and intention of their use is that they are applied to the natural population being recovered, rather than to specific hatchery programs for those species. The summer-run steelhead population in the NF Lewis is designated as Stabilizing in the NOAA Recovery plan and considered to be at very low abundance or potentially extirpated. Currently, the Lewis SA agreement does not identify the summer-steelhead run type as a formal “transport species”.</p> <p>With that said and as reintroduction progresses with passage provided for all NOR steelhead, it is conceivable that the summer-run steelhead population may gain a foothold in the upper basin. We are supportive of continued discussion with the ACC on how to best monitor and manage potential recovery of the NF Lewis summer steelhead population moving forward.</p>
Trout Unlimited	22	Monitoring and Analysis needs associated with Adaptive Management trigger points	<p>Genetic and ecological monitoring of hatchery impacts should be prioritized in the Lewis and its tributaries (except the EF Lewis River). In addition to general monitoring, there needs to be a prioritization for monitoring the impacts of the segregated Skamania summer-run hatchery program on the natural origin winter steelhead populations with future genetic monitoring possibly planning for the reemergence of natural origin summer steelhead in the basin. It is important in this phase of the project to assess the rainbow trout populations upstream of the reservoirs and identify whether they harbor summer steelhead genetics, especially with the efforts toward full implementation of downstream fish passage. In addition to completing the Genetic Monitoring Plan, as directed by the 2020 Lewis H&S Plan, this genetic data is necessary for PacifiCorp to adaptively manage during the implementation efforts.</p>	<p>Agreed.</p> <p>There is currently an effort by the ATS to develop and implement a steelhead genetic monitoring program in the lower and upper Lewis basins.</p>

Trout Unlimited	22	Bio-programming considerations for all programs	Any remaining non-migrant hatchery steelhead smolts should be transported to non-anadromous lakes to ensure they do not residualize in the Lewis River watershed and present ecological risks to the natural-origin population, either as precocious parr or through competition and predation. We also recommend a transition from Blank Wire Tags to Coded Wire Tags as another way to further improve data collection, such as age structure, survival, etc.	<p>Agreed that there needs to be agreement on the evaluation and disposition of non-migratory HOR steelhead juveniles. This should be a future topic of the ATS in development of the AOP.</p> <p>As long as the BWT are not adipose clipped, these fish would not show up in creel surveys, and very few steelhead carcasses are recovered in spawning ground surveys, so the cost may not be warranted, unless these fish are fatally spawned. CWTs in all harvest groups would be informative if a Lewis creel program is established. WDFW is open to utilization of CWTs and having discussion about the cost/benefit of doing so. This would be another good topic for discussion with the ATS in development of the AOP.</p>
Trout Unlimited	22	Harvest Management Notes: Steps needed to achieve long term management	Ongoing, PacifiCorp must improve their collection efficiencies, so fish are able to effectively utilize the high-quality habitat upstream of the hydro systems. Additionally, PacifiCorp must proceed, in earnest, to ensure the next round of fish collectors are built on time and as scheduled.	Agreed that CE as well as design, construction and operational timeliness of all passage facilities are crucial components in the recovery of all Lewis anadromous populations.