

Lewis Coho -Hatchery Transition Plan

Program(s): Lewis River Coho Salmon

Affected Recovery Population(s) and Recovery Designation(s):

Population Name	Population Recovery Designation
North Fork Lewis Coho	Contributing

Overview

This document provides a synopsis of the current and alternative hatchery programs for North Fork Lewis River coho salmon. The overall goal of this document is to identify a program 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.*

Currently, hatchery coho salmon production in the North Fork Lewis River consists of two separate programs. The first program is an early (Type S) segregated program that aims to release 1.1 million smolts. The second program is a late (Type N) integrated program that aims to use at least 30% natural-origin adults in its broodstock and release 900,000 smolts. Returning hatchery-origin adults from both programs have been used for reintroduction purposes in the Upper Lewis Basin above Merwin Dam (currently above Swift Dam only). Moving forward, we are proposing several changes to the current coho hatchery programs that will be implemented using a phased approach.

The first phase of the transition will be to maintain the status quo production targets for each program. Specifically, maintain a 1.1M early (Type S) segregated program while transitioning the 900K integrated program from a “late” program to one integrated across the full breadth of the natural origin coho return, including both the early and late time periods (approximately late-August through January). Once adults from the newly integrated program begin to return, only integrated coho will be used for reintroduction purposes. This action provides an advancement towards recovery by improving the genetic composition of the integrated program used for reintroduction, while maintaining contribution to fisheries from both the early segregated (harvest only) and integrated (conservation/harvest) programs. The early segregated coho program could still be used for Habitat Preparation in Yale and Merwin and could be used as a backfill for reintroduction purposes in years of forecasted extremely poor coho abundance, if deemed appropriate and approved by the Lewis River Aquatic Coordination Committee (ACC).

The second phase of the program will include evaluation of program performance to ensure the integrated program is meeting conservation objectives of returning enough fish for broodstock and reintroduction needs, and to ensure both the integrated and segregated programs are meeting harvest objectives. This phase will also include development of recovery phase transition targets that can be used to further assess recovery progress and the role of hatchery programs in achieving recovery. Additionally, planning for fish passage into Yale and Merwin reservoirs is underway, which will include development of transport targets for hatchery coho into those reservoirs for reintroduction purposes.

The third phase of the program will use evaluation results, recovery phase transition targets and additional hatchery fish transport goals for Yale and Merwin to adaptively manage production size and the split between early segregated and integrated 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 coho population for the North Fork Lewis River.

List of Acronyms in Lewis Coho Transition plan

Ad.....	Adipose clip
ACC.....	Aquatic Coordination Committee
AHN.....	Above Hatchery Need
AMEP.....	Aquatic Monitoring and Evaluation Plan
AOP.....	Annual Operating Plan
CWT.....	Coded Wire Tag
CBP.....	Columbia Basin Partnership
DIT.....	Double Index Tag
Fpp.....	Fish Per Pound
H&S.....	Hatchery and Supplementation Plan
HOR.....	Hatchery Origin Returns
HSRG.....	Hatchery Scientific Review Group
HPP.....	Habitat Preparation Plan
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
RRS.....	Relative Reproductive Success
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 coho 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 new program(s) by recovery phase (i.e., conservation/harvest, etc.):

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 coho (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 Rmax). • 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. (healthy and 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: 21,000

Current Program(s)

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

Lower North Fork Lewis Coho Salmon

Program Type: Segregated early fall (Type S) – current program

Population Recovery Phase: Recolonization

Goal of Program(s): Conservation (Reintroduction Outcome Goal)/Harvest

Adult Broodstock Collection	
Broodstock Source	Lewis segregated HOR fish
Broodstock Collection location/methods	Lewis River Hatchery and Merwin Upstream Collection Facility (Merwin FF)
Integration Rate	pNOB goal of 0.0

Collection timing curves:

Estimated Broodstock Collection Curve (2020)

Week Of	Males	Females	Jacks	
6-Sep	50	55	5	8%
13-Sep	63	68	6	10%
20-Sep	94	102	6	15%
27-Sep	125	136	7	20%
4-Oct	138	150	7	22%
11-Oct	94	102	6	15%
18-Oct	63	68	5	10%
TOTAL	626	682	42	

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

Adult Transportation & Disposition

Target	Rank	Quantity (range)	Release Location	Dates
Upper Lewis	1	Up to 9500 AHN (in combination with Type-N Late-Coho)	Eagle Cliffs & Swift Forrest Camp	Sept-Oct
Yale Reservoir	2	1800 AHN (per Yale HPP)	Yale Park and Saddle Dam	Sept-Oct until 2024 - per HPP plan
Merwin Reservoir	NA	NA	NA	Sept-Oct
Surplus -Food Quality	3	Above transport and hatchery needs	Food Bank	Sept-Oct
Nutrient Enhancement	4	Spawned carcasses, non-food grade fish above transport and hatchery needs	Lewis River Basin - Various	Sept-Oct

Juvenile Release(s)

Release Strategy	1 group volitional followed by force out
Quantity	1,100,000
Release Age/size	1+ / Released at 16fpp
Release Location/Timing	Lewis Salmon Hatchery – April-May
Marking/Tagging strategy	<ul style="list-style-type: none"> • 950,000 Ad Only • 75,000 CWT + Ad • 75,000 CWT only DIT Group
Fish Management needs	<ul style="list-style-type: none"> • Adipose clip required to allow harvest in mark-selective fisheries. • CWT validation of age composition.
Evaluation Needs	<ul style="list-style-type: none"> • Adipose clip allows for evaluation of pHOS.. • CWT validation/ age composition (compared to scale). • DIT group evaluates mark selective harvest.

Summary of Hatchery Configuration/Infrastructure:

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

Program Performance Metrics

pHOS level	Target: TBD (currently in recolonization phase) Recent Performance: Mean: 54% (2010-2021)
pNOB levels	Target: NA Recent Performance: NA
Broodstock mining rate*	Target: NA

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

Current Monitoring Program:

- Lower Lewis mainstem and tributary spawning ground surveys.
- Lower Lewis spot creel surveys conducted by WDFW staff interviews anglers to collect in season biological data and numbers of released NOR coho. These data are then compared post season with Catch Record Card data submitted by anglers.
- Broodstock sampling at hatchery facilities.

Lower Lewis Subbasin Coho Salmon

Program Type: Integrated late fall (Type N) – current program

Population Recovery Phase: Recolonization

Goal of Program(s): Conservation (Reintroduction Outcome Goal)/Harvest

Adult Broodstock Collection	
Broodstock Source	Lower Lewis HOR & NOR fish
Broodstock Collection location/methods	Lewis Hatchery and Merwin Fish Facility
Integration Rate Target	pNOB goal of 0.30

Collection timing curves:

Estimated Broodstock Collection Curve (2020)

Week Of	Males	Females	Jacks
20-Nov	80	80	8
27-Nov	80	80	8
4-Dec	882	882	48
11-Dec	883	883	48
18-Dec	80	80	8
TOTAL	2005	2005	120

*Includes US v OR, RSI, and Lewis on-station Late Program

Secondary sources/plans for lack of adults; HOR coho from the Cedar Creek trap.

Hatchery Adult Transportation & Disposition

Target	Rank	Quantity (range)	Location	Dates
Upper Lewis River	1	Up to 9,500 total coho AHN (in combination with Type-S Early-Coho)	Eagle Cliffs/Swift Forrest Camp	Nov-Dec
Yale Reservoir	NA	0 (see Yale HPP)	NA	NA
Surplus -Food Quality	2	Above transport and hatchery needs	Food Bank	Sept-March
Nutrient Enhancement	3	Spawned carcasses, non-food grade fish above transport and hatchery needs.	Lewis Basin	Sept-March

Juvenile Release(s)

Release Strategy	1 group volitional followed by force out.
Quantity (range)	900,000
Release Age/size	1+/Released at 16fpp
Release Location/Timing	Lewis Hatchery – April/May
Marking/Tagging strategy	<ul style="list-style-type: none"> • 750,000 Ad • 75,000 Ad + CWT • 75,000 CWT only DIT group
Fish Management needs	<ul style="list-style-type: none"> • Adipose clip required to allow harvest in mark-selective fisheries • CWT evaluation of age composition
Evaluation Needs	<ul style="list-style-type: none"> • Adipose clip allows for evaluation of pHOS/pHOB and PNI. • CWT evaluation of age composition • DIT group evaluates mark selective harvest

Summary of Hatchery Configuration/Infrastructure:

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

Program Performance Metrics

pHOS level	Target: TBD (currently in recolonization phase) Recent Performance: Mean: 54% (2010-2021)
pNOB levels	Target: 0.30 Recent Performance: 21% (5yr. avg.)
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:

- Lower Lewis mainstem and tributary spawning ground surveys.
- Lower Lewis spot creel surveys conducted by WDFW staff to collect in season biological data and numbers of released NOR coho. These data are then compared post season with Catch Record Card data submitted by anglers.
- Broodstock sampling at hatchery facilities. Current Lower Lewis Coho Harvest Management Strategy

Lewis coho harvest strategies are the same for both segregated (Type S Early) and the integrated (Type N late) coho programs.

Current (until we have management targets for NOR populations)

Area	Abundance		
	Low	Normal	Above Normal
Lower Lewis	Currently, pre-season management based on overall coho forecast strength; Seasons set via North of Falcon.	Currently, pre-season management based on overall coho forecast strength; Seasons set via North of Falcon.	Currently, pre-season management based on overall coho forecast strength; Seasons set via North of Falcon.
	Excess HORs transported to upper Lewis ABOVE those needed for Lewis hatchery program in support of reintroduction program.	Excess HORs transported to upper Lewis ABOVE those needed for Lewis hatchery program in support of reintroduction program..	Excess HORs transported to upper Lewis ABOVE those needed for Lewis hatchery program in support of reintroduction program..
	Restricted Mark-Selective fishery (reduced bag limit or full closure); (generally 6 hatchery fish with 2 adults).	Full Season Mark-Selective fishery (generally 6 hatchery fish with 2 adults).	Full Season Mark-Selective fishery (generally 6 hatchery fish with 2 adults). Potential for increased bag limits.
	In-season management based on actual hatchery/Merwin FF returns of HOR adults.	In-season management based on actual hatchery/Merwin FF returns of HOR adults.	In-season management based on actual hatchery/Merwin FF returns of HOR adults.
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	Mark-Selective fishery (reduced bag limit or full closure); Seasons set via	Mark-Selective fishery (increased bag limit duration); Seasons set via

	of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip	North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip	North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip
	In-season management based on creel surveys.	In-season management based on creel surveys.	In-season management based on creel surveys.

Proposed Program(s)

This section provides a description of coho hatchery programs proposed to replace current programs upon approval of this Transition Plan by the ACC.

Proposed Program #1: Lower North Fork Lewis Subbasin Early Coho Salmon

Program Type: Segregated Early-Fall (Type S) – proposed program

Population Recovery Phase: Recolonization

Goal of Program(s): Harvest

Timing for Transition 2023-2025

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

Collection timing curves:

Estimated Broodstock Collection Curve (2020)

Week Of	Males	Females	Jacks	
6-Sep	50	55	5	8%
13-Sep	63	68	6	10%
20-Sep	94	102	6	15%
27-Sep	125	136	7	20%
4-Oct	138	150	7	22%
11-Oct	94	102	6	15%
18-Oct	63	68	5	10%
Total	626	682	42	

Adult Transportation & Disposition

Lewis HORs (early segregated)

Target Area	Rank	Quantity (range)	Location	Dates
Broodstock	1	Up to program need	Merwin Upstream Collection Facility and Lewis River Hatchery and Cedar Creek trap (potentially)	Sept - Oct
Swift, Yale and Merwin basins	2	AHN; Available for HPP Available for reintroduction in low abundance years if deemed appropriate and approved by ACC.	See HPP	Sept - Oct
Surplus	3	All food grade quality fish above hatchery and upstream transport needs.	N/A	Sept - Oct
Nutrient Enhancement	4	Spawned carcasses, non-food grade fish above transport and hatchery needs.	Lewis River Basin	Sept - Oct

Juvenile Release(s)

Release Strategy	1 group volitional followed by force out.
Quantity (range)	1,100,000
Release Age/size	1+/- Released at 16fpp
Release Location/Timing	Lewis Salmon Hatchery – April-May
Marking/Tagging strategy ¹	<ul style="list-style-type: none"> • 950,000 Ad/Vent clip • 75,000 CWT + Ad/Vent clip • 75,000 CWT only DIT Group
Fish Management needs	<ul style="list-style-type: none"> • Differential mark needed to identify early segregated returns from integrated program. • Adipose clip required to allow harvest in mark-selective fisheries. • CWT allows for evaluation of stock composition to fisheries. • CWT validation of age composition.
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. • CWT allows for evaluation of stock composition on spawning grounds. • CWT validation/training of age composition (compared to scale). • DIT group evaluates mark selective harvest.

Summary of Hatchery Configuration/Infrastructure:

- Adult collection for this program occurs at the Merwin Upstream Collection Facility and Lewis River Hatchery.
- Broodstock is held at the Speelyai Hatchery.
- Eyed eggs from Speelyai are transferred to Lewis River Hatchery.
- Juvenile rearing and releases occur at the Lewis River Hatchery in raceways.

Lower Lewis Segregated Early Harvest Management Strategy

Proposed (until we have updated management targets for NOR populations)

Area	Abundance		
	Low	Normal	Above Normal
Lower Lewis	Pre-season management based on overall coho forecast strength; Seasons set via North of Falcon Mark-Selective fishery (reduced bag limit or full closure); (generally 6 hatchery fish with 2 adults) In-season management based on actual Lewis hatchery/Merwin FF returns of HOR adults.	Pre-season management based on overall coho forecast strength; Seasons set via North of Falcon Full Season Mark-Selective fishery (generally 6 hatchery fish with 2 adults) In-season management based on actual Lewis hatchery/Merwin FF returns of HOR adults.	Pre-season management based on overall coho forecast strength; Seasons set via North of Falcon Full Season Mark-Selective fishery (generally 6 hatchery fish with 2 adults) Potential for increased bag limits In-season management based on actual Lewis Hatchery/Merwin FF returns of HOR and NOR adults.
Ocean/Columbia River	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 coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys	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 coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys	Currently, pre-season management based on combined Lower Columbia forecast coho forecast strength Mark-Selective fishery (increased bag limit duration); Seasons set via North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys

Program Performance Metrics

Proportionate Natural Influence (PNI)	NA
pHOS level	TBD – currently in recolonization phase
pNOB levels	pNOB = 0.0
Brood stock mining rate	NA – NORs not needed for program

Monitoring and Analysis needs associated with Adaptive Management trigger points

- Monitor SARs for program.
- Evaluate fishery contributions and harvest rates.

Bio-programming considerations for all programs (capacity, water, how it fits with other programs): WDFW hatchery staff in conjunction with PacifiCorp will evaluate bio-programming considerations for the suite of all hatchery programs upon completion of transition plans.

Proposed Program #2: North Fork Lewis Subbasin Integrated Coho Salmon

Program Type: Integrated – proposed program

Integration will occur across the full breadth of the natural origin coho return and will capture both early and late timing.

Population Recovery Phase: Recolonization

Goal of Program: Conservation (Reintroduction Outcome Goal)/Harvest

Timing for Transition 2023-2025

Adult Broodstock Collection: The following table outlines a prioritized matrix of broodstock collection and spawning strategies across a range of NOR and HOR abundance. The integration rate target for the program is a pNOB of 0.5, but actual pNOB will be allowed to vary based on actual NOR returns and the maximum broodstock mining rate of 30%. The table also identifies the concept of “demographic replacement” which is defined as the total number of “wild equivalent” spawners (i.e., hatchery-origin spawner discounted by their relative reproductive success) that must be allowed to spawn in the wild to replace the number of natural-origin adults that are collected for broodstock. Demographic replacement must be equal to or greater than one to have a neutral or positive impact on population demographics, respectively. If demographic replacement is less than 1, the hatchery is having a net negative impact on the population. To achieve demographic replacement ≥ 1 , $NOB/HOS < RRS$.

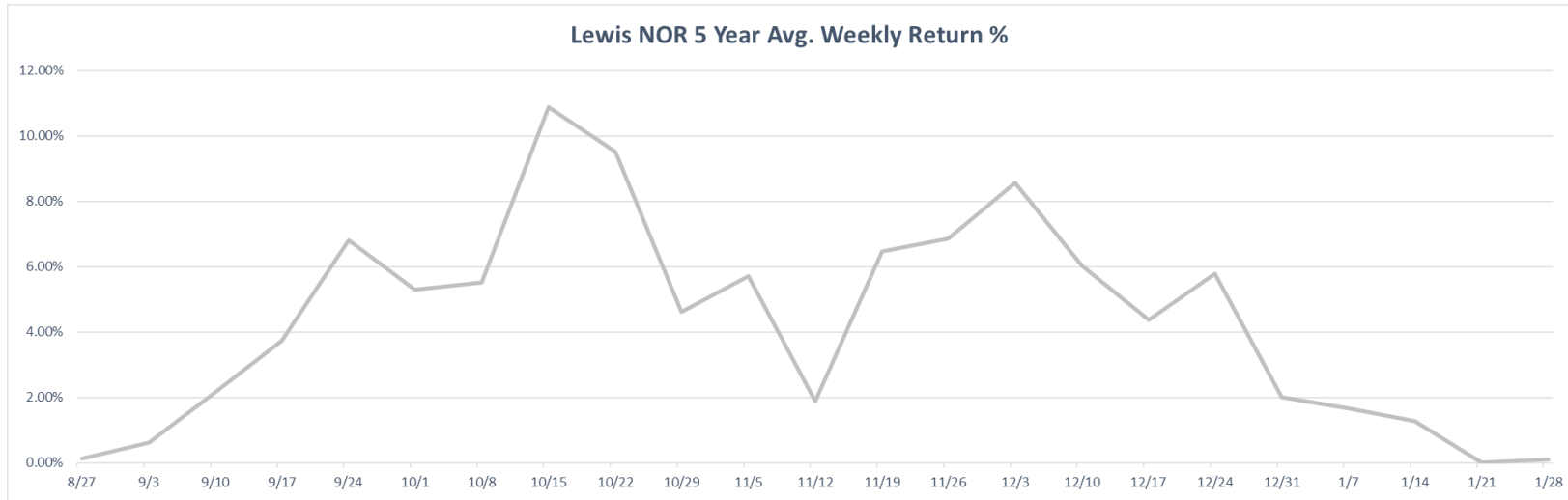
Adult Broodstock Collection	
Broodstock Source	Integrated Lewis HOR and Lewis Basin NOR fish
Broodstock Collection location/methods	Lewis River Hatchery and Merwin Upstream Collection Facility (Merwin FF)
Integration Rate Target	pNOB target of 0.5

Priority		Collection Strategy	pNOB Target	Brood Source	Spawning Strategy
1	Normal HOR/NOR return, no shortage	Collect at Lewis R. Hatchery and Merwin Upstream Collection Facility (Merwin FF)	50%; actual will be variable	a. Lewis Basin NORs and integrated HORs	a. HOR x NOR when possible b. HOR x HOR when necessary to backfill c. Re-use NOR males once, if needed,
2	Low NOR, Normal HOR	Collect at Lewis R. Hatchery and Merwin Upstream Collection Facility (Merwin FF)	50% or lower if necessary	b. Lewis Basin NORs and integrated HORs c. Reduce pNOB goal to less than 50%.	a. HOR x NOR when possible, b. HOR x HOR when necessary to backfill. c. Re-use NOR males (potentially more than once) d. Accept a lower pNOB/integration rate
3	Low HOR return, Normal NOR	Collect at Lewis R. Hatchery and Merwin Upstream Collection Facility (Merwin FF) and potentially Cedar Creek trap	50%; or High as achievable while meeting seeding targets for NORs	a. Lewis Basin NORs and integrated HORs -Retain all HORs above demographic replacement needs b. Retain up to 30% Lewis Basin NOR c. Restrict harvest	a. HOR x NOR; b. Exceed pNOB limit but not mining rate (potentially unless seeding target is established) c. Re-use NOR males once, if needed.
4	Shortages across board	Collect at Lewis R. Hatchery and Merwin Upstream Collection Facility (Merwin FF) and potentially Cedar Creek trap	10-50%	a. Retain all HORs as needed to meet program goals b. Retain up to 30% NOR c. Restrict harvest	a. HOR x NOR when possible 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.

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

Integration Target: 50% or less if necessary; NOR brood stock mining rate: 30% max; Demographic Replacement: ≥ 1 wild spawner equivalent

Collection timing curves and weekly collection goal table: Example only, actual collection goals will be set via Annual Operating Plan



Recent, 5 year average (2017-2021) return per program by week and respective broodstock collection goals for the proposed integrated program.

Table reflects HOR and NOR collection/return example. This collection is updated annually and documented in the Annual Operating Plan (AOP). The table does not include an additional 3,210 adults needed to provide eggs for the US. v. Oregon coho program transferred to the Klickitat and educational Remote Site Incubator (RSI) program. Eggs for US. v. Oregon program are collected from this program when available, but can also be collected from other WDFW facilities (i.e., Washougal) if needed. Eggs to fulfill these obligations come from HOR x HOR crosses only. Fish collected from Aug. 27 to the beginning of November (shaded) are retained at Speelyai Hatchery until water temperatures improve. After that, brood are retained at Lewis River Hatchery.

	Week Ending	Brood Adults**	Males	Females	Percent Brood	5yr Ave. Cumulative Return	Jack Collection	
<u>Speelyai H</u>	27-Aug	3	1	2	0.30%	0.30%	0	
	3-Sep	10	5	5	1.00%	1.30%	1	
	10-Sep	36	17	19	3.40%	4.70%	2	
	17-Sep	46	22	24	4.40%	9.20%	2	
	24-Sep	116	55	61	11.20%	20.30%	6	
	1-Oct	67	32	35	6.40%	26.80%	3	
	8-Oct	71	33	37	6.80%	33.60%	4	
*US v OR & RSI	15-Oct	168	79	88	16.20%	49.80%	8	
	22-Oct	104	49	55	10.00%	59.80%	5	
	29-Oct	42	20	22	4.00%	63.90%	2	
<u>Lewis R. H</u>	5-Nov	75	36	40	7.30%	71.20%	4	
	12-Nov	14	6	7	1.30%	72.50%	1	
	19-Nov	46	22	24	4.40%	76.90%	2	
	26-Nov	46	22	24	4.40%	81.30%	2	
	3-Dec	35	17	18	3.40%	84.70%	2	
	10-Dec	28	13	14	2.70%	87.40%	1	
	17-Dec	37	17	19	3.60%	90.90%	2	
	24-Dec	65	31	34	6.30%	97.20%	3	
	31-Dec	20	10	11	2.00%	99.20%	1	
	7-Jan	6	3	3	0.60%	99.80%	0	
	14-Jan	1	1	1	0.10%	99.90%	0	
	21-Jan	0	0	0	0.00%	100.00%	0	
	28-Jan	0	0	0	0.00%	100.00%	0	
	Total***		1,035	490	545	100.00%		52

* US. v. Oregon and RSI fish (inset) collected over approximately 4-5 weeks from mid-Oct to mid-Nov.

Total 3,210 additional adults needed for US v Oregon and RSI.

**Weekly collection totals may vary slightly from Male/Female numbers due to rounding.

*** Total brood collection for all programs is approximately 4,245 adults.

Adult Transportation & Disposition

Lewis NORs

Target Area	Rank	Quantity (range)	Location	Dates (Range)
Follow Mining Rate	1	< or = 30% of all returning NOR adults	Upper Lewis River (Swift, Yale and Merwin basins)	Sept – Jan
Broodstock	2	Up to program need not to exceed 30% mining rate	Merwin Upstream Collection Facility, Lewis River Hatchery, Cedar Creek trap (potentially)	Sept – Jan
Upper Lewis River (Swift, Yale and Merwin basins)	3	AHN	Swift (Eagle Cliff Bridge), Yale and Merwin Basins (TBD) See Upper Lewis River Salmon and Steelhead Transport Plan	Sept – Feb.
Surplus	N/A	N/A	N/A	N/A
Nutrient Enhancement	4	Spawned carcasses	Lewis River Basin	Sept – Jan.

Lewis HORs (integrated)

Target Area	Rank	Quantity (range)	Location	Dates (Range)
Demographic Replacement	1	Dependent on # of NOR fish taken for broodstock, establish an HOR RRS value. Currently no harvest. When future harvest is established, develop, and incorporate harvest rate.	See Upper Lewis River Salmon and Steelhead Transport Plan	Sept - Jan
Broodstock (including U. v. OR and RSI program)	2	Up to program need	Merwin Upstream Collection Facility, Lewis River Hatchery, Cedar Creek trap (potentially)	Sept - Jan
Upper Lewis River (Swift, Yale and Merwin basins)	3	AHN; Goal of 9,500 adults released above Swift Dam. Adjust to incorporate transport goals for Yale and Merwin when established. Also available for HPP.	Swift (Eagle Cliff Bridge), Yale and Merwin Basins (TBD) See Upper Lewis River Salmon and Steelhead Transport Plan and HPP	Sept - Jan
Surplus	4	All food grade quality fish above hatchery and transport needs	N/A	Sept - Jan
Nutrient Enhancement	5	Spawned carcasses, non-food grade fish above transport and hatchery needs.	Lewis River Basin	Sept - Jan

Juvenile Releases

Release Group	1 group – additional groups to evaluate the effect of release timing and release size may occur to optimize program performance.
Quantity (range)	900,000
Release Age/size	16 fpp
Release Location/Timing	April-May
Marking/Tagging strategy	<ul style="list-style-type: none"> • HORS: Majority will be adipose fin clipped and a portion of fish will be Ad+CWT or CWT only (DIT group) as determined by M&E needs. • Note: Early coho program (segregated) will be differentially marked. <ul style="list-style-type: none"> ○ Identify this need in the marking/tagging strategy document that will need to be developed along with implementation of downstream transport at Merwin and Yale.
Fish Management needs	<ul style="list-style-type: none"> • Differential mark needed to identify early segregated returns from integrated program. • Adipose clip required to allow harvest in mark-selective fisheries • CWT allows for evaluation of stock composition to fisheries <ul style="list-style-type: none"> ○ CWT validation of age composition
Evaluation Needs	<ul style="list-style-type: none"> • Differential marking of segregated program allows for independent evaluation of these two programs. • Adipose clip allows for evaluation of pHOS • CWT allows for evaluation of stock composition on spawning grounds • CWT validation/training of age composition (compared to scale) <ul style="list-style-type: none"> ○ DIT group evaluates mark selective harvest

Summary of Hatchery Configuration/Infrastructure Modifications:

- Prolonged collection and numerous egg takes of integrated brood over the entire run timing will require implementation of hatchery infrastructure to accommodate this change. One option is installation of industrial chillers to manipulate development of the earliest egg takes while in the hatchery. Reviewing other potential alternatives and implementing the preferred alternative should be completed before transition of this program is fully implemented.
- Utilize/install crowder channels in ponds 1-5 to divide egg takes during early rearing.
- Evaluate water to water adult transfer system at Lewis River Hatchery and repair/upgrade as needed.
- Adult collection for this program occurs primarily at the Merwin Upstream Collection Facility and Lewis River Hatchery.
- Broodstock is held at the Speelyai Hatchery and Lewis River Hatchery.
- Eggs are transferred to Lewis River Hatchery from Speelyai Hatchery
- Juvenile rearing and release occurs at the Lewis River Hatchery in raceways

Fishery Management Strategy

Currently, directed angling and harvest opportunity for hatchery coho 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 coho 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/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 in fishery options. This “long-term” conceptual strategy will be adjusted to reflect decisions made in future technical/policy discussions, including consideration of Settlement Agreement Section 8.3.2.3 regarding reductions in hatchery targets.

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
Upper Lewis	No harvest proposed.	No harvest proposed.	No harvest proposed.
Lower Lewis	Managed based on forecasted hatchery returns; Seasons set via North of Falcon; Restricted Mark-Selective fishery (generally 6 hatchery fish with 2 adults); In-season management based on actual Lewis hatchery/Merwin FF returns of HOR/NOR and/or estimates of returns back to the Lewis River, when available.	Managed based on forecasted hatchery returns; Seasons set via North of Falcon; Full Season Mark-Selective fishery (generally 6 hatchery fish with 2 adults); In-season management based on actual Lewis hatchery/Merwin FF returns of HOR/NOR and/or estimates of returns back to the Lewis River, when available.	Managed based on forecasted hatchery returns; Seasons set via North of Falcon; Full Season Mark-Selective fishery (generally 6 hatchery fish with 2 adults); Potential for increased bag limits. In-season management based on actual Lewis/Merwin FF returns of HOR/NOR and/or estimates of returns back to the Lewis River, when available.
Ocean/Columbia River	Mark-Selective fishery; Seasons set via North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys	Mark-Selective fishery; Seasons set via North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys	Mark-Selective fishery (increased bag limit/duration); Seasons set via North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys

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 – (conceptual framework for future discussion).

Area	Abundance		
	Low	Normal	Above Normal
Lower Lewis	Managed based on forecasted HOR/NOR returns, broodstock needs and management goals; Fishery on excess HORs; Seasons set via North of Falcon; Restricted Mark-Selective fishery (reduced bag limit or full closure); In-season management based on actual Lewis Hatchery/Merwin FF returns of HOR/NOR and/or estimates of returns back to the Lewis River, when available.	Managed based on forecasted HOR/NOR returns, broodstock needs and management goals; Fishery on both HOR/ <u>NOR</u> (non-mark selective fisheries) could occur consistent with management plans that assure natural origin populations will meet goals; Seasons set via North of Falcon; Full Season Non-Mark-Selective fishery (HOR/ <u>NOR</u> bag limits TBD); In-season management based on actual Lewis hatchery/Merwin FF returns of HOR/NOR and/or estimates of returns back to the Lewis River, when available.	Managed based on forecasted HOR/NOR returns, broodstock needs and management goals; Fishery on both HOR/NOR (non-mark selective fisheries) could occur consistent with management plans that assure natural origin populations will meet goals; Seasons set via North of Falcon; Full Season Non-Mark-Selective fishery (increased bag limits); In-season management based on actual Lewis Hatchery/Merwin FF returns of HOR/NOR and/or estimates of returns back to the Lewis River, when available.
Upper Lewis	Managed based on forecasted HOR/NOR returns, broodstock needs and management goals; Potential fishery on excess HORs transported to Upper Lewis Basin ABOVE those needed to replace NORs used for broodstock (hatchery equivalents); Seasons set via North of Falcon; Restricted Mark-Selective fishery (reduced bag limit or full closure); In-season management	Managed based on forecasted HOR/NOR returns, broodstock needs and management goals; Potential fishery on both HOR/ <u>NOR</u> transported to Upper Lewis Basin (non-mark selective fisheries) could occur consistent with management plans that assure natural origin populations will meet goals; Seasons set via North of Falcon; Full Season Non-Mark-Selective fishery (HOR/ <u>NOR</u> bag limits TBD); In-season management based	Managed based on forecasted HOR/NOR returns, broodstock needs and management goals; Potential fishery on both HOR/NOR transported to Upper Lewis Basin (non-mark selective fisheries) could occur consistent with management plans that assure natural origin populations will meet goals; Seasons set via North of Falcon; Full Season Non-Mark-Selective fishery (increased

	based on actual Lewis Hatchery/Merwin FF returns of HOR/NOR.	on actual Lewis hatchery/Merwin FF returns of HOR/NOR.	bag limits); In-season management based on actual Lewis Hatchery/Merwin FF returns of HOR/NOR.
Ocean/Columbia River	Pre-season management based on combined Lower Columbia forecast strength. Mark-Selective fishery (reduced bag limit/duration); Seasons set via North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys	Pre-season management based on combined Lower Columbia forecast strength. Mark-Selective fishery; Seasons set via North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys	Pre-season management based on combined Lower Columbia forecast strength. Mark-Selective fishery (increased bag limit/duration); Seasons set via North of Falcon; Lewis stock part of CR coho aggregate. Limited by Non-Ad-Clip In-season management based on creel surveys

Harvest Management Notes:

Steps needed to achieve long term management:

- Better define current transport target for areas above Swift (i.e., 9500 coho transport goal). Is it the total transport target (NOS + HOS), just HOS independent of NOS, or a ceiling for HOS dependent on the number of NOS that return? Also, is this absolute number of HOS or “wild equivalents”?
- Establish biological reference points and management targets (i.e., Rmax and transport targets).
- Determine hatchery equivalent value (“wild spawner equivalent”) used for NOR 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 aggregates.
- Develop earlier in-season predictors of total return for management purposes.

Program Performance Metrics

Proportionate Natural Influence (PNI)	TBD – currently in recolonization phase
pHOS level	TBD – currently in recolonization phase
pNOB levels	pNOB target of 0.5
Brood stock mining rate	<0.3

Monitoring and Analysis needs associated with Adaptive Management trigger points

- Complete analysis of SARs for current programs (Early and Late and Seg vs Int) to determine what impacts transitioning to one integrated program will have on adult returns.
- 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 is held at the Speelyai and Lewis River Hatchery.
- Eggs are transferred to Lewis River Hatchery from Speelyai Hatchery.
- Juvenile rearing and release occurs at the Lewis River Hatchery in raceways.

List of Reference Materials

- Fishery contribution analysis
- Integrated vs. Segregated program size modeling

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)

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](HSRG_2020_White_Paper_Final_Draft.pdf) (streamnet.org)

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. Mobernd, 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)

Note: This Transition Plan is intended to serve as a step toward Recovery goals. It will be Evaluated for its progress toward achieving those objectives through the Annual Operating Plan (AOP) and will be updated through adaptive management as described in that process as necessary. The Hatchery Scientific Review Group (HSRG) evaluation guidelines will be evaluated for applicability during each step of recovery.

Lewis Coho Transition Plan Review- ACC Question and Response Matrix

Distributed To ACC April 25, 2023

Org.	Page	Text/Section Reference	Comment/Question	WDFW Response
US Fish and Wildlife Service	p. 12; p. 18	Adult Transportation & Disposition Tables	The proposed quantity of adult coho to be released into Yale and Swift reservoirs is unclear. Please provide additional detail. USFWS continues to prefer early-fall (type S) coho to be prioritized for release in these reservoirs to limit superimposition of bull trout redds. USFWS would also appreciate a slow introduction of coho into these reservoirs to document any competitive interactions that may occur between coho and bull trout.	Upstream transport quantity and other protocols for reintroduction are outside the scope of the transition plans and will be detailed in the Fish Transport Plans associated with fish passage implementation. H&S plan section 3.2.2 describes the stock origin for coho supplementation.
PacifiCorp	19	Water conditions	Is this temp?	Yes temperature
PacifiCorp	20	Adult Transport and Disposition Table	Date range collect brood into Jan?	Collection table in doc. is an example only based on recent return timing. Actual collection goals will be set via Annual Operating Plan
PacifiCorp	20	Adult Transport and Disposition Table	I don't believe brood collection goes into the new year.	See previous response
PacifiCorp	22	Fish Management Strategy	This section needs to specific reference to Section 8.3.2.3 (reductions in hatchery targets) as part of any long-term strategy and as it relates to the reintroduction outcome goal.	Added reference to this section.

PacifiCorp	24	Table: Long Term Conceptual Harvest Framework	In season management based on actual Lewis Hatchery and Merwin FF returns? Replace with "back to Lewis River"	There is currently no in-season estimate of river mouth returns available. When this method is developed, we will use this tool as well. We modified language in framework to include and or back to Lewis River.
PacifiCorp	24	Table: Long Term Conceptual Harvest Framework	Upper basin harvest should only follow after achievement of the priority objective of recovery of wild stocks in the basin to healthy and harvestable levels.	This is a conceptual framework. The determination of when upper basin harvest should be implemented has not been decided and will come through future discussions as described in the Fish Management Strategy Section.
PacifiCorp	24	Table: Long Term Conceptual Harvest Framework	HORs used to supplement NORs to reach upstream transport goals? What is excess HORs here?	See previous response. This will depend on recovery phase and future agreement on management targets
PacifiCorp	24	Table: Long Term Conceptual Harvest Framework	If Excess NORs transported upstream, then no HOR supplementation needed upstream. Not sure what is being referred to here.	We did not find a reference to "excess NORs" in the doc.
PacifiCorp	25	Harvest Management Notes:	Not sure I follow – transport target is based on the EDT capacity estimate of adult coho needed to fully seed the available habitat existing upstream of Swift Dam. HOR coho are used to supplement this target, but to achieve the Reintroduction outcome goal adults should be composed entirely of NOR.	It appears from your answer that your understanding is that the transport target applies to NORs. If this is the case, more detail is needed on how HOR vs NOR transport occurs in season. We suggest that this be discussed at ATS/ACC