LEWIS RIVER AQUATIC COORDINATION COMMITTEE

Facilitator: ERIK LESKO
503-412-8401

Location: TEAMS MEETING ONLY

Date: January 12, 2022

Time: 9:30 AM – 12:00 PM

AGENDA

9:30 AM	Welcome ➢ Review and Accept 01/12/2023 Agenda ➢ Review and Accept 11/10/2022 Meeting Notes ➢ Review and Accept 12/08/2022 Meeting Notes
9:45 AM	Public Comment Opportunity
10:00 AM	2022 Swift FSC Collection Efficiency Evaluation Review (*Haffey, Karchesky*)
11:00 AM	Finalize letter to FERC regarding Fish Passage Proposal (*Olson*)
11:15 AM	Spring Chinook Run Forecasts (*Holowatz*)
11:30 AM	Study/Work Product Updates ➢ Flows/Reservoir Conditions (*Lesko*) ➢ Aquatic Fund Schedule (*Lesko*) ➢ Reservoir Shoreline Development Projects (*ACC*) ➢ WASHDOT - Cougar Creek (*Lesko*) ➢ ATS Update (*Lesko, Montgomery*) ➢ FPS Update (*Glaser, Olson*) ➢ Fish Passage/Operations Update (*Karchesky*)
11:45 AM	Public Comment Opportunity Next Meeting Agenda
12:00 PM	Meeting Adjourn

Note: all meeting notes and the meeting schedule can be located at:
https://www.pacificorp.com/energy/hydro/lewis-river/acc-tcc.html

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Or call in (audio only)

+1 563-275-5003,,214435300# United States, Davenport

Phone Conference ID: 214 435 300#

FINAL Meeting Notes
Lewis River License Implementation
Aquatic Coordination Committee (ACC) Meeting
January 12, 2023
TEAMS Meeting Only

ACC Representatives and Affiliates Present (23)
Bridget Moran, American Rivers
Larissa Rohrbach (on behalf of Sarah Montgomery), Anchor QEA
Christina E. Donehower, Cowlitz Indian Tribe
Dalton Fry, Cowlitz Indian Tribe
Amanda Froberg, Cowlitz PUD
Anne Baxter, Ecology
Sam Haffey, Four Peaks Environmental
Amelia Johnson, LCFRB
Melissa Jundt, NMFS
Bonnie Shorin, NMFS (joined late)
Jeremiah Doyle, PacifiCorp
Chris Karchesky, PacifiCorp
Erik Lesko, PacifiCorp
Todd Olson, PacifiCorp
Jim Byrne, Trout Unlimited
JD Jones, USFS
Jeffrey Garnett, USFWS
Josua Holowatz, WDFW
Kale Bentley, WDFW
Peggy Miller, WDFW
Sam Gibbons, WDFW (joined late)
Bryce Glaser, WDFW
Bill Sharp, Yakama Nation

Guests (0)
None

Calendar:

January 12, 2023	ACC Meeting	TEAMS Meeting

Assignments from January 12, 2023	**Status**
All: Review Aquatic Fund Proposals and send scoring template to Erik Lesko by February 3, 2023.	**Complete (2/3/2023)**

Assignments from December 8, 2022	**Status**
All: Provide comments on the Yale License Amendment to Beth Bendickson by March 8, 2023.	**Ongoing.**

Olson: Revise the FERC letter and provide to the Settlement Agreement parties for review.	**Complete. (1/12/2023)**

Assignments from November 10, 2022	**Status**
Karchesky: Discuss potential impacts of Merwin conveyance system work with the ATS to determine broodstock collection modifications.	**Ongoing.**

Assignments from April 14, 2022	**Status**
Erik Lesko: Coordinate with the TCC regarding the timing for WSDOT's Cougar Creek culvert project.	**Ongoing.**

Opening, Review of Agenda and Meeting Notes
Erik Lesko (PacifiCorp) called the meeting to order at 9:32 a.m. and reviewed the agenda. Lesko reviewed the November 10 and December 8, 2022, meeting notes.

A question was asked in the comments on November 10 minutes, if after 2027 when deposits to the ACC-fund cease and all funds are distributed, whether there would be any more ACC-funded habitat restoration work? Lesko answered that the Lewis River Settlement Agreement obligations to fund habitat restoration work would end in 2027.

The November 10, and December 8, 2022, minutes were accepted with minor edits.

Public Comment Opportunity
None.

2022 Swift FSC Collection Efficiency Evaluation Review
Chris Karchesky (PacifiCorp) gave introductory background on this topic and introduced Sam Haffey (Four Peaks Environmental) who gave a presentation on the most recent results of the Swift Reservoir Floating Surface Collector (FSC) Efficiency Evaluation (Attachment A).

Karchesky said the update presented today relates to Objective 2 of the Aquatic Monitoring and Evaluation Plan (AMEP), for the Swift FSC to achieve the performance metric of 98% collection efficiency. PacifiCorp and their contractor, Four Peaks Environmental, have been refining the acoustic telemetry data to better understand fish behavior in and around the FSC. Study of the FSC performance, which has been ongoing since the inception of the collector in 2013, has been instrumental in determining where fish are rejecting collection and directing facility adjustments and modifications to improve facility performance to safely and efficiently capture juvenile out-migrants. Over the years, this study has been refined to better understand fish passage and remains aimed at assessing the core passage metrics outlined in Objective 2 of the AMEP. In the past few years, the study has focused on the collection channel and entrance to the collection facility where most fish rejection is observed. Today's presentation summarized the second component of the work that was previously completed and presented in 2021.

Haffey gave a presentation summarizing adjustments made to the collection system and passage results since 2013.

Swift Floating Surface Collector History Review

Since 2019, detection of marked fish that enter the forebay has improved to near 100%, but then too many fish are rejecting passage within the collection channel (the portion of the collector that connects the mouth of the collector to the collection facility) to meet passage efficiency metrics. There is a weir at the downstream end of the collection channel leading to the fish collection facility. Somewhere between the entrance to the collection channel and the weir, fish are turning around and rejecting collection.

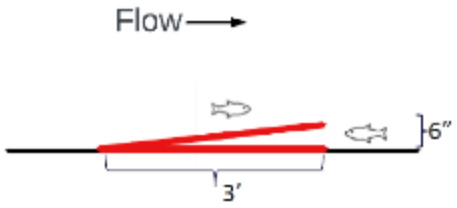
The 2021 study focused on identifying the zones where fish are rejecting collection. Fish are rejecting collection in both the upstream and downstream sections of the collection channel (see table below). Work in 2021 confirmed the importance of increasing the attraction flow velocity into the collector; by making adjustments to the number of pumps operating to modify hydraulics showed that when fewer pumps were operating, fewer fish entered the collector.

Zone	Rejections	
	Coho	Steelhead
Upstream Section Collection Channel	~30%	~30%
Downstream Section Secondary Channel	40%	31%

2022 Study Objectives

The primary objective of the 2022 Study was to again calculate collection efficiency. Additional secondary objectives were included in 2022 based on what was learned in 2021.

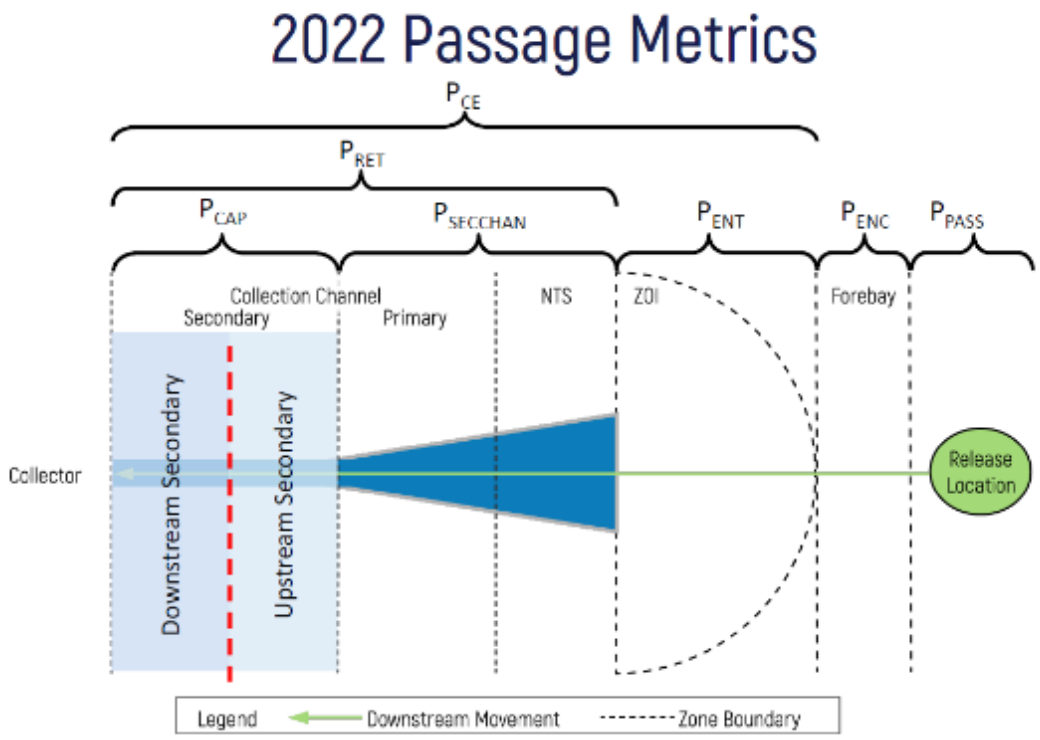
- Debris is a significant issue in this collector; the previous strategy was to periodically and briefly cycle two of the pumps in the downstream secondary channel to create a wave that pushes debris through the collection channel. It was hypothesized that those cleaning cycles were creating hydraulic conditions that were allowing fish to escape. PacifiCorp has now done work to make those cleaning cycles unnecessary.
- A horizontal V trap (see below) was installed and evaluated in 2022. Fish were observed moving into the lower level of the collection channel, where velocities are lower due to friction with the sides of the channel, and the lower velocities were allowing them to turn around and escape. It was hypothesized that a V trap would prevent fish from escaping by pushing them upward in the water column into high velocity flows.



- The height of the weir at the end of the channel was experimentally adjusted, which affects hydraulics at the downstream end of the channel. It was hypothesized that there is a preferrable position of that weir that promotes more fish to move into the collector.

2022 Passage Metrics

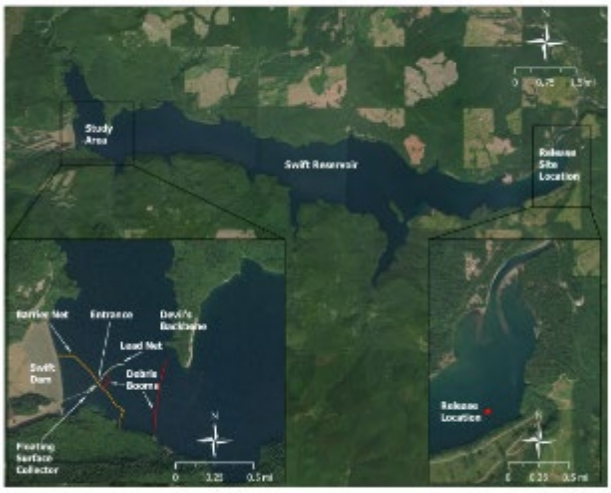
- Probabilities of fish passing from one zone of the collector to the next were measured.



Fish Tracking Field Study Overview, Weir Height Study

- Fish were tracked via acoustic telemetry from release through the collection channel until July 18, 2022. Acoustic tags had an estimated 45-day battery life from the time of release.
- Secondary tagging with PIT tags provided detections used to confirm collection in the fish collection facility during the study and after the 45-day battery life had ended.
- Jim Byrne (Trout Unlimited) noted that the fish used had traveled through the reservoir, were collected in the FSC, tagged, then transported back up to the head of the reservoir for the evaluation, so they were not naïve to the FSC. He asked if there had been any attempt to track the migration of naïve fish? Karchesky said an evaluation was attempted a few years ago using naïve fish collected from the upper portion of the reservoir including the screw trap at Eagle Cliff, but it was challenging to collect enough fish of the appropriate size for acoustic telemetry tagging. In the most recent AMEP Plan, PacifiCorp has made a concerted effort to understand naïve fish passage better. There is currently an ongoing study to PIT tag fish of all sizes from both the FSC and from the Eagle Cliff screw trap to compare the collection rates of those two groups of fish and detect any effect of fish being naïve to the FSC.

Fish Tracking Field Study Overview

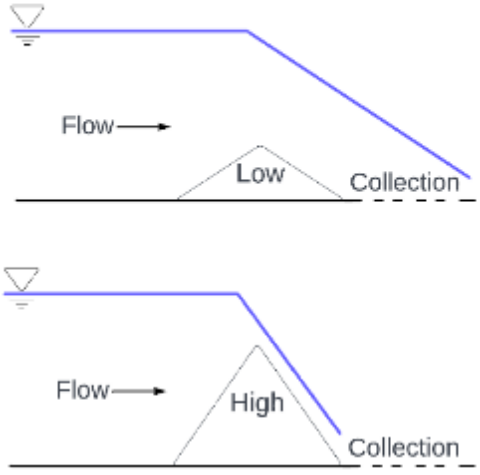


- 413 dual-tagged* fish released
  - 231 Coho Salmon
  - 182 steelhead
  - 0 Chinook Salmon
- Site: 9 miles upstream of the Swift FSC
- Release dates: April 20 to June 1

* dual tags consist of passive integrated transponder (PIT) and acoustic telemetry

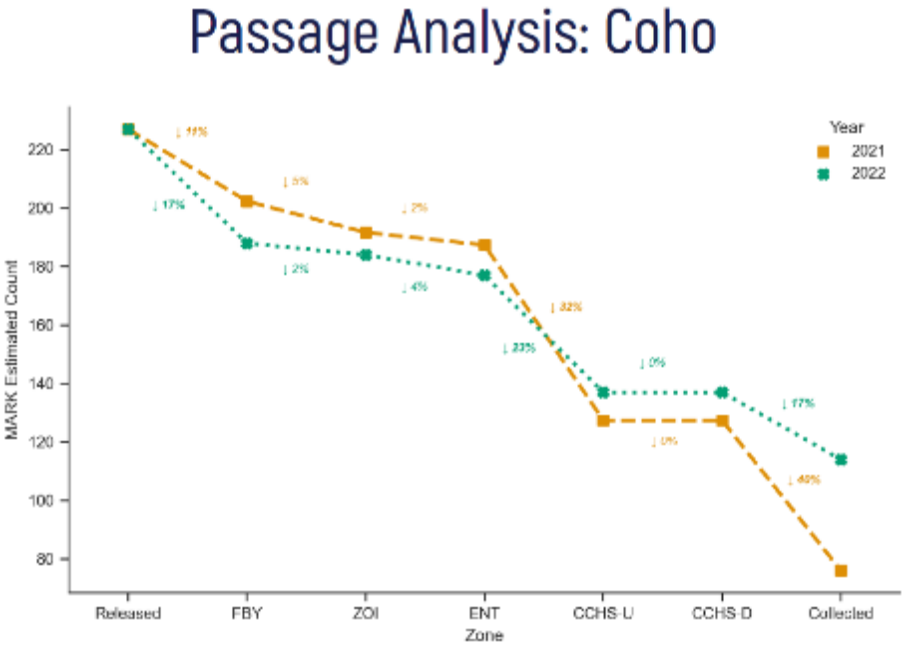
Weir Height Study

- Experimentally vary control weir height at downstream end of collection channel
  - LOW (high flow) vs. HIGH (low flow) settings
- Blocked to control for varying environmental and passage conditions

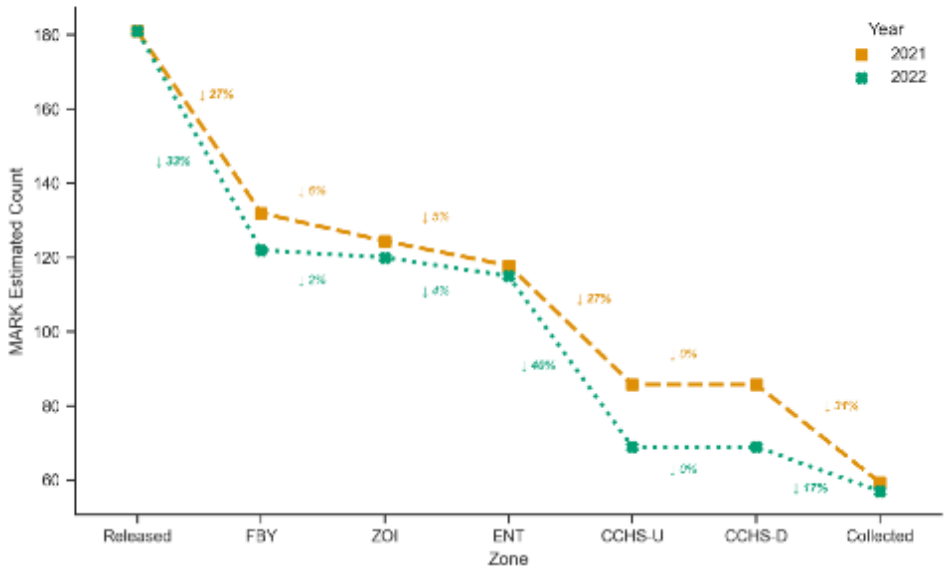


Passage Analysis

- Data for 2021 and 2022 were shown on the same axis, applying the starting number of fish from 2022 to both years to directly compare the fish passage metrics between years. Coho and steelhead collection from the downstream end of the collection channel over the weir was improved in 2022. Around 30% of steelhead were observed rejecting the entrance of the Zone of Influence (ZOI), the area where attraction velocities are detectable to fish, and then the upstream end of the collection channel, occurring in both years.



Passage Analysis: Steelhead



Causes of Improvement

Coho collection was higher in 2022 than in past years due to the improvement of the retention through the collection channel, and was similar to 2019 when there was less reservoir debris and the cleaning cycle was used less often. Steelhead retention was similar as in past years, but retention within the channel was better. Fish were observed escaping over the horizontal V trap.

Comparison to Past Studies

Fish detecting and entering the entrance of the FSC after entering the forebay has been nearly 100% since 2019 when adjustments to attraction flow were made, but retention has remained low, which is driving collection efficiencies down and below the desired performance targets.

Comparison to Past Studies

Year	Species	P_{ZOI} (%)	P_{ENT} (%)	P_{RET} (%)	P_{CE} (%)
2017	Chinook Salmon	57	47	24	11
	Coho Salmon	74	65	41	27
	Steelhead	59	49	40	20
2019	Chinook Salmon	54	78	65	51
	Coho Salmon	82	98	64	64
	Steelhead	58	97	28	27
2020	Chinook Salmon	58	95	47	44
	Coho Salmon	62	95	42	39
	Steelhead	73	99	42	42
2021	Chinook Salmon	64	100	52	52
	Coho Salmon	84	98	41	40
	Steelhead	69	95	50	48
2022	Coho Salmon	81	96	64	62
	Steelhead	74	96	50	48

Weir Height Study
There was no discernable effect of weir height on fish passage success.

Summary
- Modifications in the ZOI and FSC have been successful in encouraging fish to enter FSC
- Since 2019, nearly all study fish that enter the forebay enter FSC
- However, a large proportion of the fish that enter the FSC reject passage and are not captured
- Recent studies have found that rejection is occurring in both the upper and lower portion of the collection channel
- Adjustments made between 2021 and 2022 has dramatically improved fish retention within the lower portion of the collection channel
- While the upper portion of the collection channel was not directly quantified in 2022, it appears that this area is now the largest bottleneck for successful passage of fish entering the forebay of Swift Dam

Questions
Anne Baxter (Ecology) asked if monitoring of the sound-scape has been part of the analysis. Karchesky answered that acoustic monitoring has been done extensively through the years. In 2017, a low frequency noise was detected on the back of the FSC associated with the facility's bilge pumps that help regulate water into the collection facility. At the time, they were operated as a lead and lag system, with one pump working hard and others lagging. This arrangement created a pulse of acoustic noise that likely was detrimental for fish passage. The pumps were reprogrammed to operate consistently and together in a way that eliminated the low-frequency, intermittent disruption. A dramatic change in fish behavior in front of the FSC was subsequently observed (before increasing the attraction velocity in 2019). PacifiCorp has more recently detected noise in a frequency that would affect fish and isolated the source as the pumps inside the collection channel, but the amplitude is low and at a much more consistent level compared to sounds that were detected in 2017. The sound is detected at the entrance of the collection channel, but because 100% of the fish are entering the channel, it does not appear to be the driving factor causing rejection. The sound data have been included in a multivariate analysis, which have also included activity on the FSC, debris levels, and other known factors that can drive fish passage success.

Kale Bentley (WDFW) asked if changes to hydraulics in the downstream portion of the channel had effects on passage into the upstream portion of the channel. Haffey said it does not appear to be the case; the decline in steelhead collection through the upstream portion of the channel is within the range of year-to-year variability.

Bentley asked if there is an among-year comparison of losses within the reservoir, which might inform differences in environmental effects and a potential study effect. Haffey agreed there is a lot of variation in the proportion that enter the ZOI between years, but PacifiCorp has not changed operations in a way that would have affected that.

Bryce Glaser asked for a reminder on where the accounting for the collection efficiency metric (P_{CE}) starts. Karchesky reminded the group that measurement of P_{CE} starts at the ZOI, which is spelled out in Objective 2 of the AMEP. The other metric in Objective 1 of the AMEP, not discussed today, is Overall Downstream Survival (ODS) of the fish that enter the reservoir to

passage out of the reservoir, which incorporates the ecological interactions within the reservoir as well as collection efficiency at the FSC.

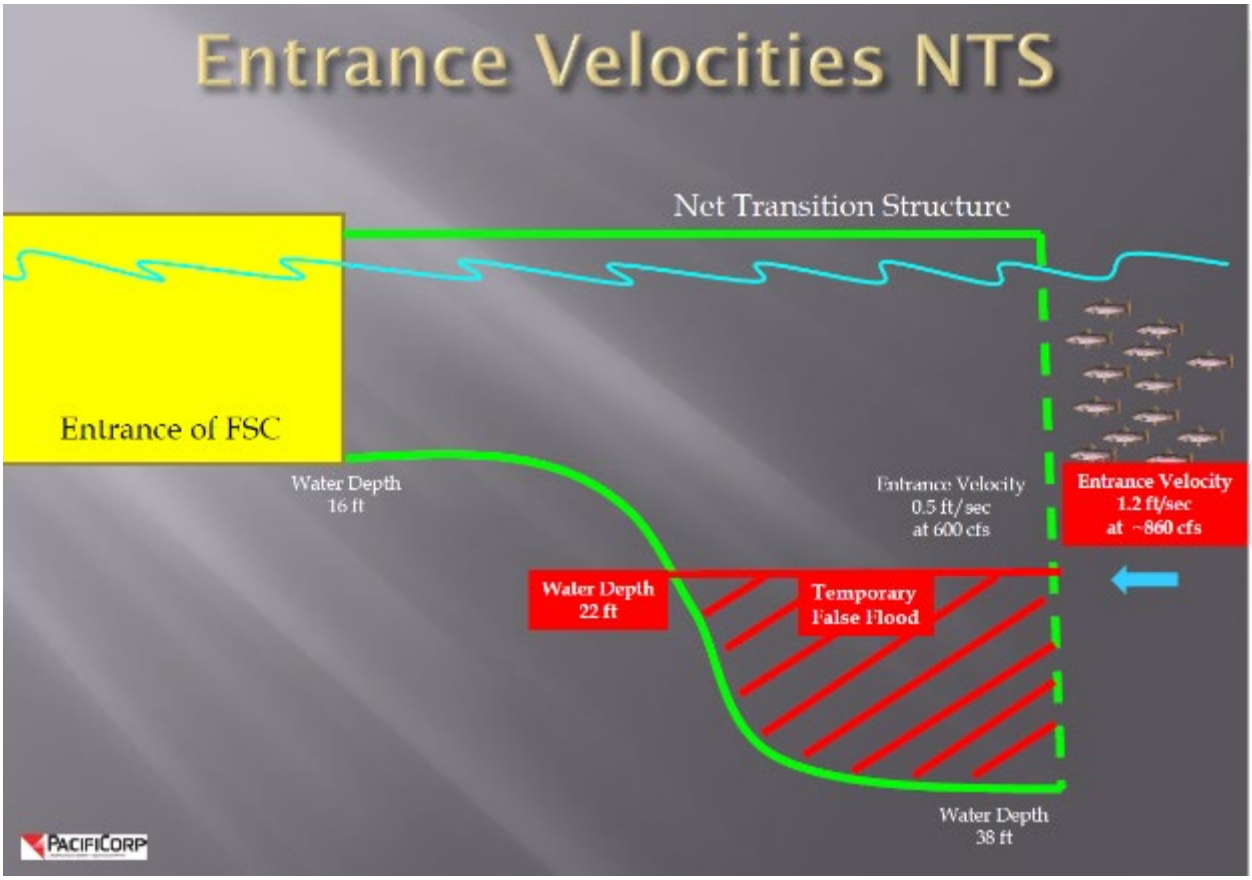
Josua Holowatz (WDFW) said there can be a significant migration of spring Chinook in the fall, and while fish during this time of year may not be as abundant, the species composition might be different in the fall. Based on the number of spring Chinook adults transported into the basin in 2022, there should be adequate juveniles to evaluate fish passage trends for that species in 2024. Karchesky agreed and noted that while some spring Chinook do outmigrate in the fall, there is also major outmigration is late winter through early spring at the FSC, peaking in March and early April. PacifiCorp has not had the opportunity in the past to expand that monitoring period due to adequate numbers of spring Chinook.

Karchesky then presented a review of changes to operations and additional improvements that have been done in recent years as a part of informing the ACC of next steps plan for the Swift FSC.

Entrance Velocity
The net transition structure, essentially a ramp leading from the guidance net to the entrance of the collection channel, was designed as a load bearing structure and to reduce water velocity at the entrance of the FSC. This design was based on observations made the Baker Lake facility, which was the only floating surface collector in operation at the time of the Swift FSC design and construction. Installation of guidance nets in 2016 dramatically changed the behavior of fish in the forebay of Swift Reservoir from once having a difficult time finding the entrance of the FSC to nearly all fish entering the forebay being detected at the entrance of the FSC. While the guide net improved orientation of fish to the entrance, it appeared that fish at the entrance of the FSC were reluctant to enter the collection channel. Observations at the FSC operated by PGE at the Clackamas River North Fork Reservoir that came online at this time, showed that their collector had much higher attraction and capture velocities. In 2019, changes were made to the Swift FSC to elevate the floor of the net transition structure entrance and reduce the entrance area to produce higher entrance velocities. Adjustments to pump operations were also made. The goal was to evaluate whether an increase in velocity at the entrance would improve rates of fish moving into the structure, and improvements have been observed since 2019. However, once fish enter the collector, they are still rejecting passage within the collector channel at a relatively high rate. The changes to hydraulics made in 2019 and how they are affecting fish behavior are being evaluated closely.

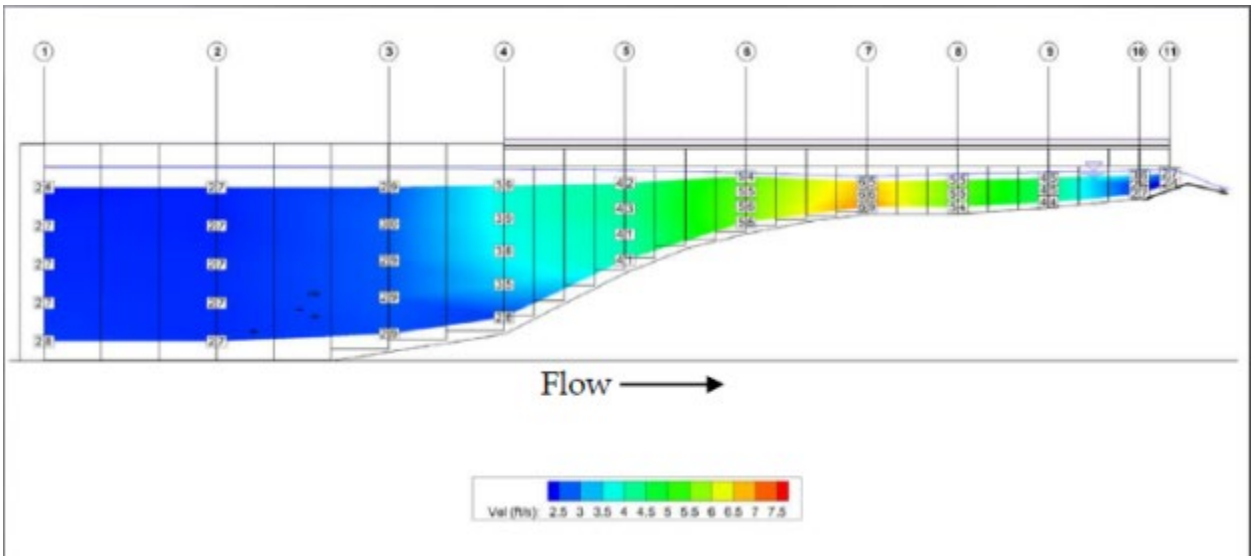
Entrance Velocity

Entrance Velocities NTS



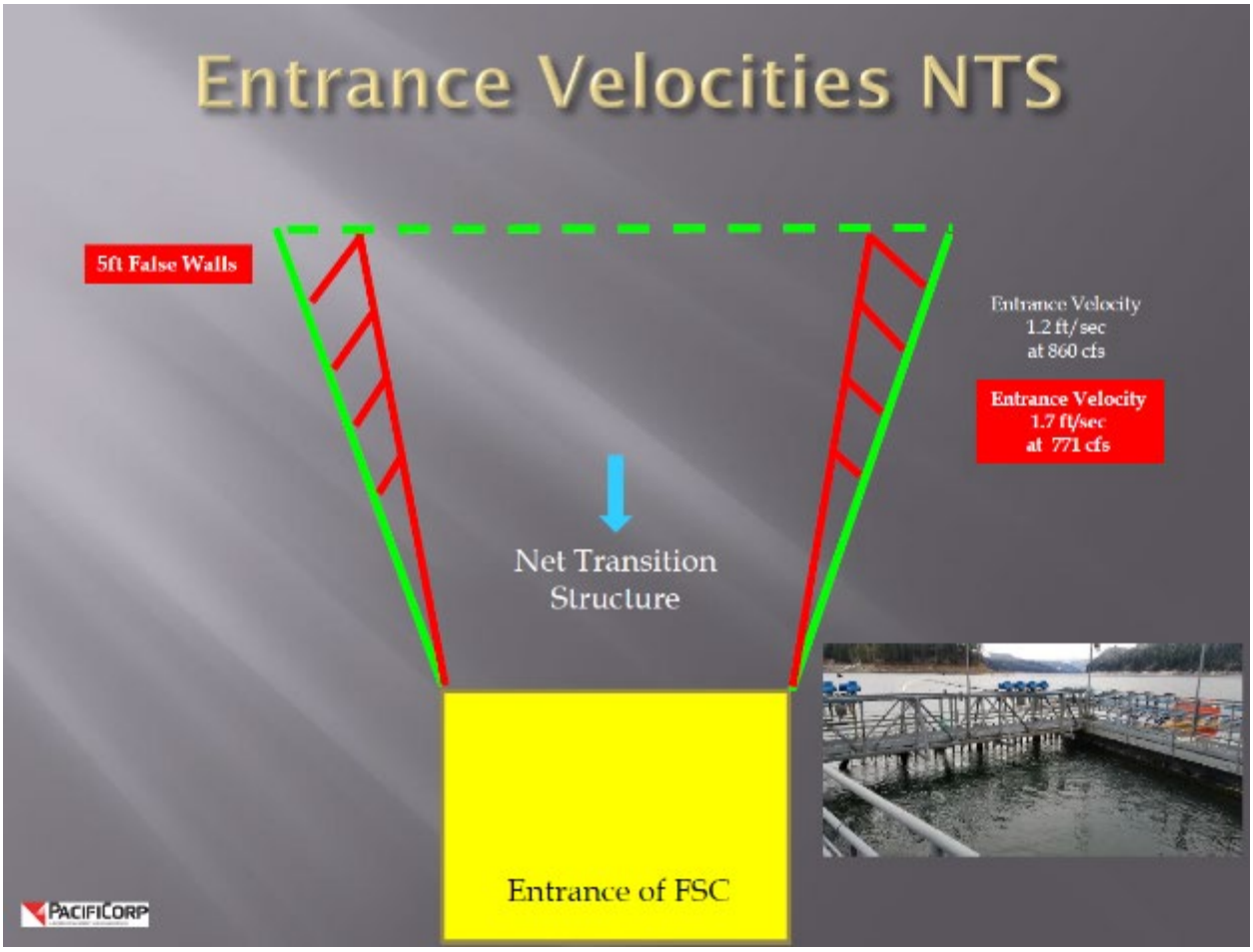
Fish Collection Channel Hydraulics

The fish collection channel was designed to mimic a surface outfall in which water flow slowly accelerates across channel until reaching a desired capture velocity. Modifications made in 2019 to increase entrance velocity disrupted this hydraulic effect and created areas of slight deceleration. Acoustic telemetry data has shown fish appear to be turning around is in the same area where the design engineers are showing a slight disruption or deceleration of the flow for fish. The disruption of flow can be a behavioral cue for fish to stop moving forward and turn around. Tests to evaluate this in 2021 by turning off extra attraction pump were inconclusive because of reduced entrance velocity (Four Peaks 2021).



Next Steps

Additional adjustments are being made to the net transition structure in summer 2023 to reduce the entrance area further, which is expected to smooth out the hydraulics in the collection channel by allowing for the reduction in attraction flow while maintain the high entrance velocities. The work will be done during the summer outage period in 2023. No acoustic telemetry study will be conducted in spring of 2023 and the effect of these changes will be evaluated with acoustic telemetry in 2024. The end goals is to use this information as PacifiCorp considers more permanent modifications to the entrance of the Swift FSC to improve collection efficiency.



Questions
Bentley asked if there would be any evaluation in 2023 to continue to understand the year-to-year variation due to the fine-scale hydraulic conditions. Karchesky said in the four years since higher velocity at the entrance, there is a lot of data collected under varying conditions. There has been a large number of fish released for the study with PIT tags in parallel with the dual-tagged fish; PIT tagged fish will be released in 2023 and work will be done to evaluate those fish further. There is also an ongoing ODS evaluation and an evaluation of naïve versus non-naïve fish mentioned earlier.

Bentley noted the velocities under consideration (e.g. 1.7 fps) are still quite a bit lower than in the Clackamas River North Fork Reservoir FSC (3 fps). Karchesky noted that once FSCs have been designed, its challenging to make really big changes while still meeting all the NMFS fish passage design criteria. Even with this smaller increase in velocity, fish have been observed transitioning into the collection channel at a high rate. The limitation at this time appears to be the need to smooth out the hydraulics within the collection channel.

Bryce Glaser (WDFW) said he appreciated the amount of effort that has been done but noted the ACC will need to consider in the near-term whether more aggressive changes should be considered to progress beyond 40% to 60% collection. Melissa Jundt (NMFS) said she is interested in this modification and these study results; there are still some big pieces that are unknown. She noted that it is interesting to see how large the effect of modifications to the net transition structure have been. Amelia Johnson (LCFRB) noted she agreed with other

commenters and appreciated today's presentation but is wondering about the feasibility of achieving the ultimate fish passage goals.

Karchesky noted while he understands the desire for more aggressive changes, he reminded the group that this is a process and without information to help direct these more substantial changes, there is a high risk of making a large permanent modification that will ultimately not improve collection efficiency. Then what? It is better to understand the conditions that lead to better overall facility performance and build around that. We need to understand the effect of changing the channel back to a more slowly accelerating condition, which will inform whether more significant changes to the net transition structure, and if so, what those changes look like. We need to do the due diligence to understand what those more permanent and significant changes should be.

Finalize Fish Passage Proposal Letter to FERC

Todd Olson (PacifiCorp) said as everyone is aware, the utilities are working together with the ACC Fish Passage subcommittee on development of a future fish passage plan. FERC has a direct interest in this process and the utilities have been providing quarterly reports to FERC. It was suggested that a letter be prepared for submittal to FERC noting that the ACC is supportive of the work being done, and April 30, 2023 has been identified as a targeted deadline for reaching consensus on a fish passage plan. A draft letter was provided to the ACC in December, discussed in the December 8, 2022 meeting and some detail was then added in response to ACC comments. A revised draft was distributed to the ACC with the request to provide additional comments by January 4th, none were received. The utilities would like to finalize and submit this letter to FERC, and at this time request confirmation from ACC members supporting submission of the letter to FERC. Bryce Glaser suggested some additional edits, which were made in the meeting, to describe the details of the process to achieve consensus.

Lesko called a vote from all representatives present in support of the utilities submitting the letter to the FERC with suggested edits.

DECISION: All representatives present voted in support of the letter as edited. Ecology deferred to WDFW's position on this topic, which is supportive. Olson thanked everyone for their support on the matter.

Spring Chinook Run Forecasts

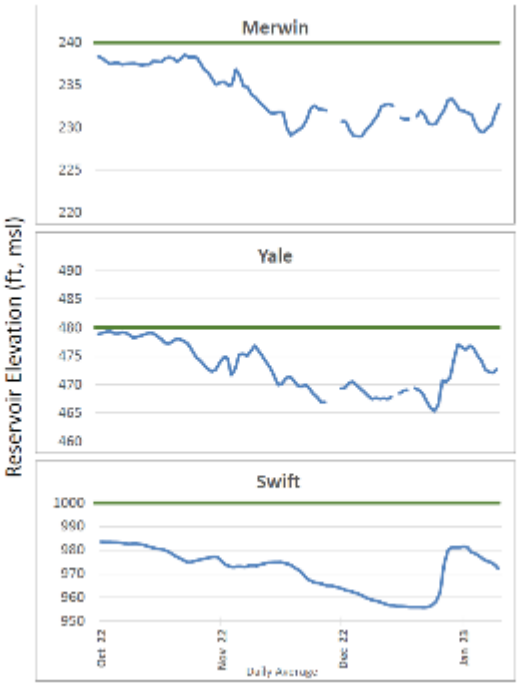
Josua Holowatz said spring Chinook run forecasts are based mainly on the run size of the same cohort from the previous year. This year's forecast is 4,400 fish returning to the Lewis River mouth. The 2023 forecast is greater than the 10-year average of about 2,300 fish and better than last year's forecast. Good ocean conditions since 2018 may be the positive signal driving forecasted returns, additionally boosted by an increase in release sizes due to better in-hatchery survival and additional releases for Southern Resident Killer Whale forage. WDFW is currently working on fishery rules, however under permanent rules for the recreational fishery in the Lower Lewis River, the spring Chinook season is January 1 to April 30.
Holowatz will share the Cowlitz-Lewis-Kalama (CKL) document with the ACC once it is finalized; this is a document that encompasses hatchery releases, harvest, and needs for hatchery programs.

Study/Work Product Updates

Flows/Reservoir Conditions Update

Erik Lesko shared the flows and reservoir conditions update:

Daily Average Reservoir Elevations – October 1, 2022 to January 11, 2023



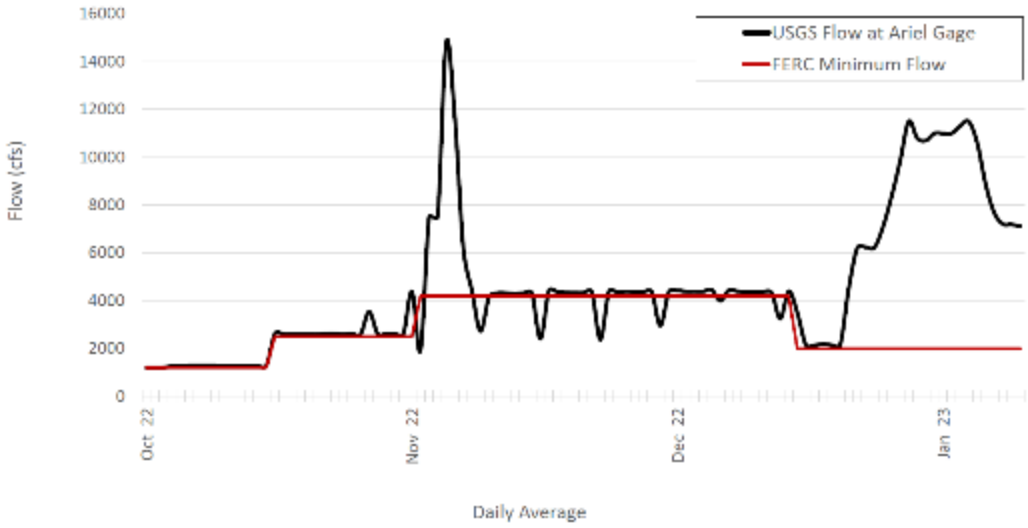
Total Draft: -52.15 feet
(-42.15 with Yale restriction)
Δ Dec. (+10.24)

Rainfall (in inches) at Cougar, WA

December Totals:
Dec 2022 = 21.12"
Max Dec = 57.04" (1933)
Dec mean = 19.19"

Annual Totals (since 1927)
Annual Mean = 114.28"
2022 total = 112.19"
Annual Max = 171.88" (1933)
Annual Min = 78.27" (1957)

North Fork Lewis River Flows, Daily Average: October 1, 2022 to January 11, 2023



In December, the total draft was 52 feet, 42 feet with the Yale restriction. This draft amount provided for the major rain events in December; reservoir levels were still relatively high at the end of December due to the rain. Lesko compared the rain totals from 2022 to past years; they were above average but still well below maximum levels. Lesko pointed out the daily averages in the flow figures, shown below.

Aquatic Fund Proposals Schedule
Erik Lesko thanked the ACC representatives for providing comments on the two draft Aquatic Fund proposals. He provided the comments back to the applicants, and final applications were due to PacifiCorp on December 30. The next step is the selection process in February.

Lesko sent the proposal scoring template and materials to ACC representatives on January 10, 2023. There are two proposals to score: Pine Creek Restoration (submitted by Phil Roni, Cramer Fish Sciences) and Clear and Clearwater Restoration (submitted by the USFS). Lesko asked members to fill out the scoring template and send back to him by February 3. He will consolidate scores and send them back out the ACC members by February 6, in preparation for the project approval meeting will be on February 9. The template format and 14 evaluation questions are largely the same as last year, the only substantive change is that the maximum score is now 100, instead of 140, to reduce confusion.

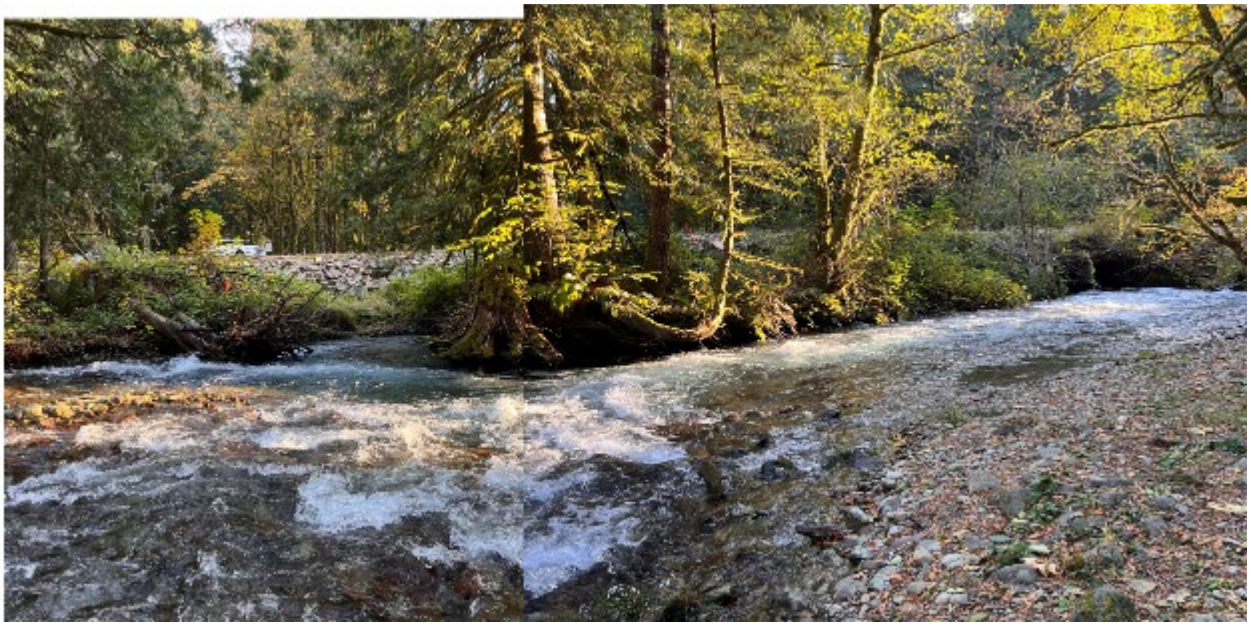
The last column on the scoring template includes a box marked "Project of Concern" box which should be checked if there are concerns that require discussion during the selection meeting. This box should be checked independent of the score received.

Peggy Miller (WDFW) noted there are two options within the Clear and Clearwater Creeks proposal, to do work in just one creek or both, and asked whether those projects should be scored separately or together. Lesko said representatives could indicate whether they support one approach over the other in the "Project of Concern" box with notes. The merits of each option will be discussed during the selection meeting. Lesko said he is available to answer any questions by phone or email.

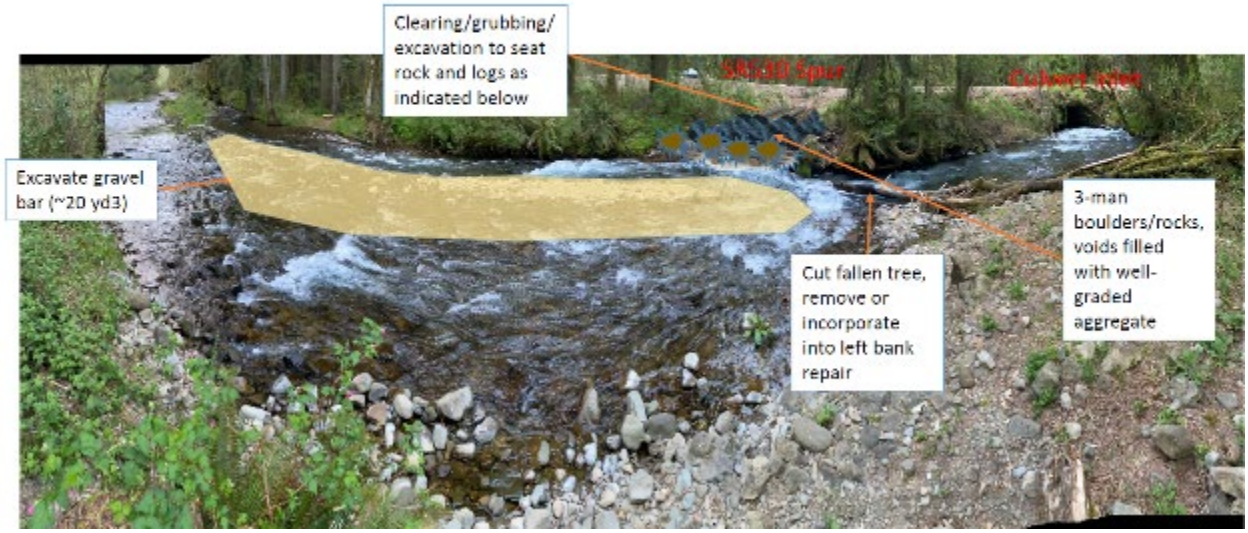
Reservoir Shoreline Development Project Update
There were no major updates on known shoreline development projects within the project limits.

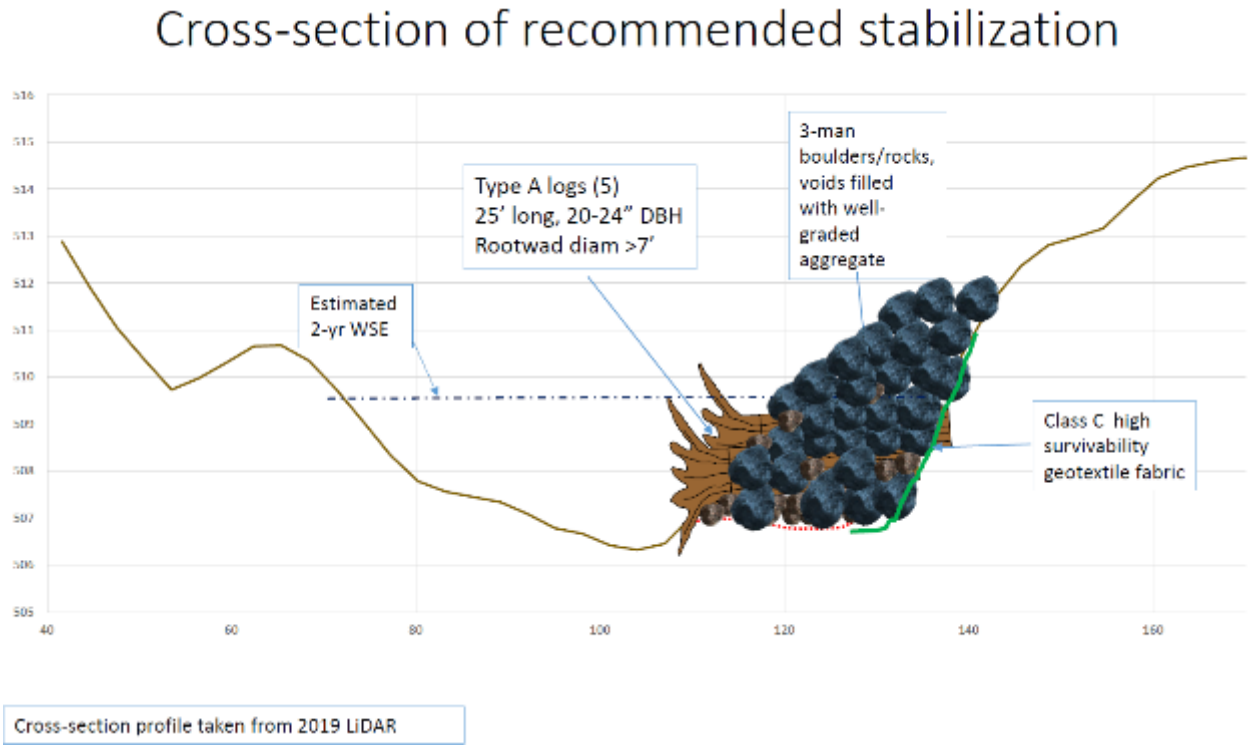
In response to notification of the Beaver Bay group campground renovation project by Peggy Miller, Olson noted that this project is a full renovation of the campground, as directed by the Settlement Agreement. Work will not affect the reservoir. There is an adjacent wetland that has been contributing to flooding of certain campsites, and PacifiCorp is working through final design and permitting at this time. The work is not likely to start until after Labor Day 2023. Ecology and Cowlitz County planning department recently toured the project site.

Cougar Creek – WSDOT Culvert Replacement
Erik Lesko provided an update on the WSDOT culvert replacement project on Cougar Creek at highway 503. The TCC has been discussing the Cougar Creek bank stabilization, which is scheduled to start in June of this year. It will take approximately 1 week, involve excavation of approximately 20 cu. yd and placement of boulders and logs in east bank scour area to redirect flows to the culvert. There is talk about placing additional logs to further disperse the sediment load. As a long-term solution, WSDOT recommends replacing the culvert with a bridge (~100 ft).



Conceptual Recommended action





Cross-section profile taken from 2019 LiDAR

ATS Update

The 2023 Annual Operating Plan will look very similar to the recently-approved 2022 plan. In the upcoming January 26 meeting, PacifiCorp will propose accepting the 2022 plan edited for dates and other minor edits as the 2023 plan. This strategy will allow the ATS the necessary time to focus discussions and initiate modifications on what hatchery operations and monitoring approaches should be adjusted for 2024. The ATS continues to organize their activity around a list of priorities for addressing hatchery operations and monitoring in the near term.

FPS Update

During the last meeting on December 8, 2022, a discussion continued around comments on the draft Elements of Lewis River Future Fish Passage proposal. Formal comments were due December 22, 2022. The FPS is also continuing a process of due diligence to walk through the fish passage facility alternatives analysis. The discussion has focused on objectives and criteria for evaluating those alternatives. The FPS will aim to resolve the remaining draft Elements of Lewis River Future Fish Passage proposal topics by April 30, 2023, as identified in the FERC letter. There will be a meeting this afternoon; the design team would like to hear of any initial responses to the 30% design packages.

Merwin Fish Passage Update (see also Attachment B)

Chris Karchesky (PacifiCorp) informed the ACC that the goal of 9,000 adult Coho salmon transported upstream was met this year. He complimented the PacifiCorp Fish Passage Team and WDFW field staff who processed over 35,000 coho salmon that were collected at the Merwin Trap this fall, which was considerably more than the previous record of 22,000 fish.
They are starting to see NOR late-winter steelhead coming in; early spring is when they tend to increase in numbers. There are about 30 fish collected so far, half wild and half BWT. Spring Chinook tend to increase in numbers in early February. No outages are planned at the facility.

Swift Floating Surface Collector (see also Attachment C)
Not many fish are passing through the FSC at this time, mainly coho parr. Typically spring Chinook outmigrants first arrive in late February, followed by juvenile steelhead and coho. No outages are planned at the facility. Bonnie Shorin (NMFS) asked where the fish passage reports can be found so they can be passed forward to the Northwest Fisheries Science Center for their viability reporting. Karchesky noted the reports come out on a monthly basis in emails to the ACC; they are also available on the PacifiCorp website.

Lewis River Fish Passage
See Attachment D.

Administrative Updates
None.

Public Comment Opportunity
None present.

Agenda Items for February 9, 2023
- Project Selection
- ACC Summer Meeting Schedule
- Study/Work Product Updates

Adjourn 12:15 pm

Next Scheduled Meeting

February 9, 2023
Teams Call
9:30 a.m. – 12:00 p.m.

Meeting Handouts & Attachments
- Meeting Notes from 11/10/2022, 12/8/2022
- Agenda from 1/12/2023
- **Attachment A –** Swift Reservoir 2022 Floating Surface Collector Efficiency Evaluation, Sam Haffey, Four Peaks Environmental
- **Attachment B –** Merwin Adult Trap Collection Report (December 2022)
- **Attachment C –** Swift FSC Facility Collection Report (December 2022)
- **Attachment D** – Lewis River Fish Passage Report (December 2022)

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Swift Reservoir 2022 Floating Surface Collector Efficiency Evaluation

Lewis River Aquatic Coordination Committee Meeting

January 12, 2023

Swift Floating Surface Collector History Review

- Floating surface collector (FSC) commissioned December 2012
- Initial studies (2013-15) revealed that fish had difficulty locating FSC
  - Collection efficiency < 30% for most species
- Several adjustments successful in helping fish find and enter FSC
  - Lead net installation (2016)
  - Operational noise reduction (2017)
  - Attraction flow velocity increase (2019)
- Currently, nearly 100% of the fish that enter the forebay also enter FSC; however, retention within FSC limits collection efficiency
- Studies since 2019 have focused on fish behavior within fish collection channel

Floating Surface Collector Orientation

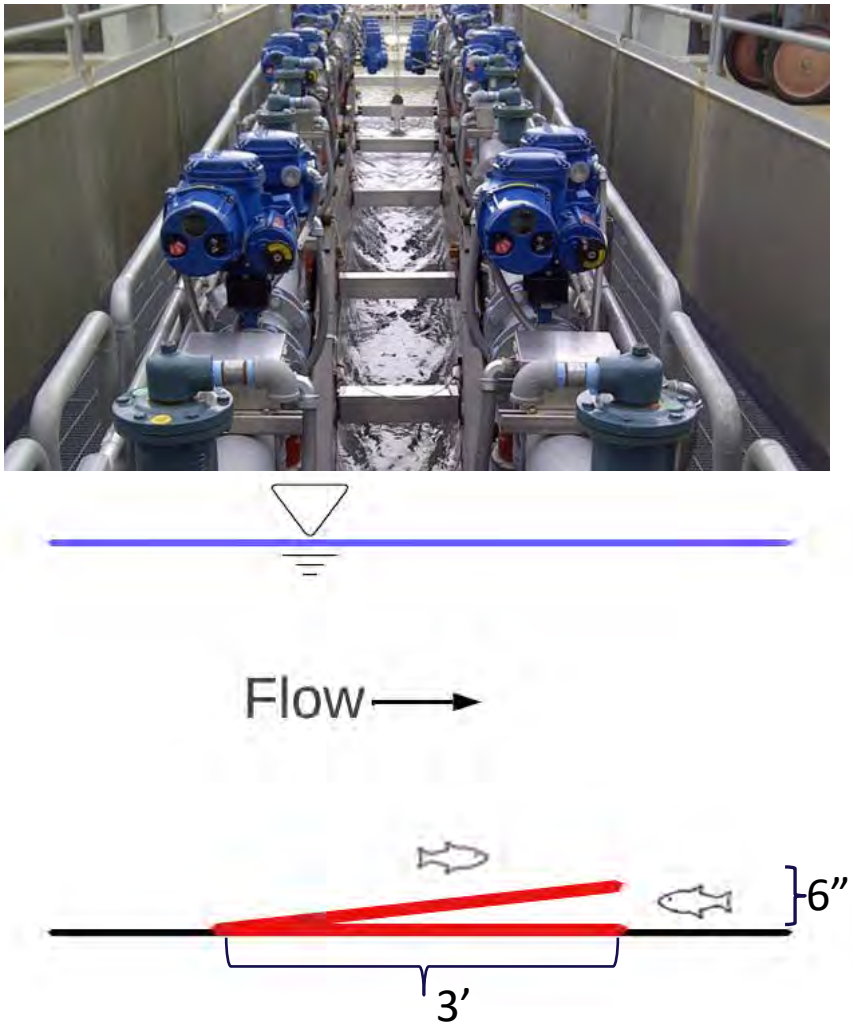
2021 Study

- Identified zones where fish reject collection and turn back upstream
- Confirmed importance of attraction flow (2019)

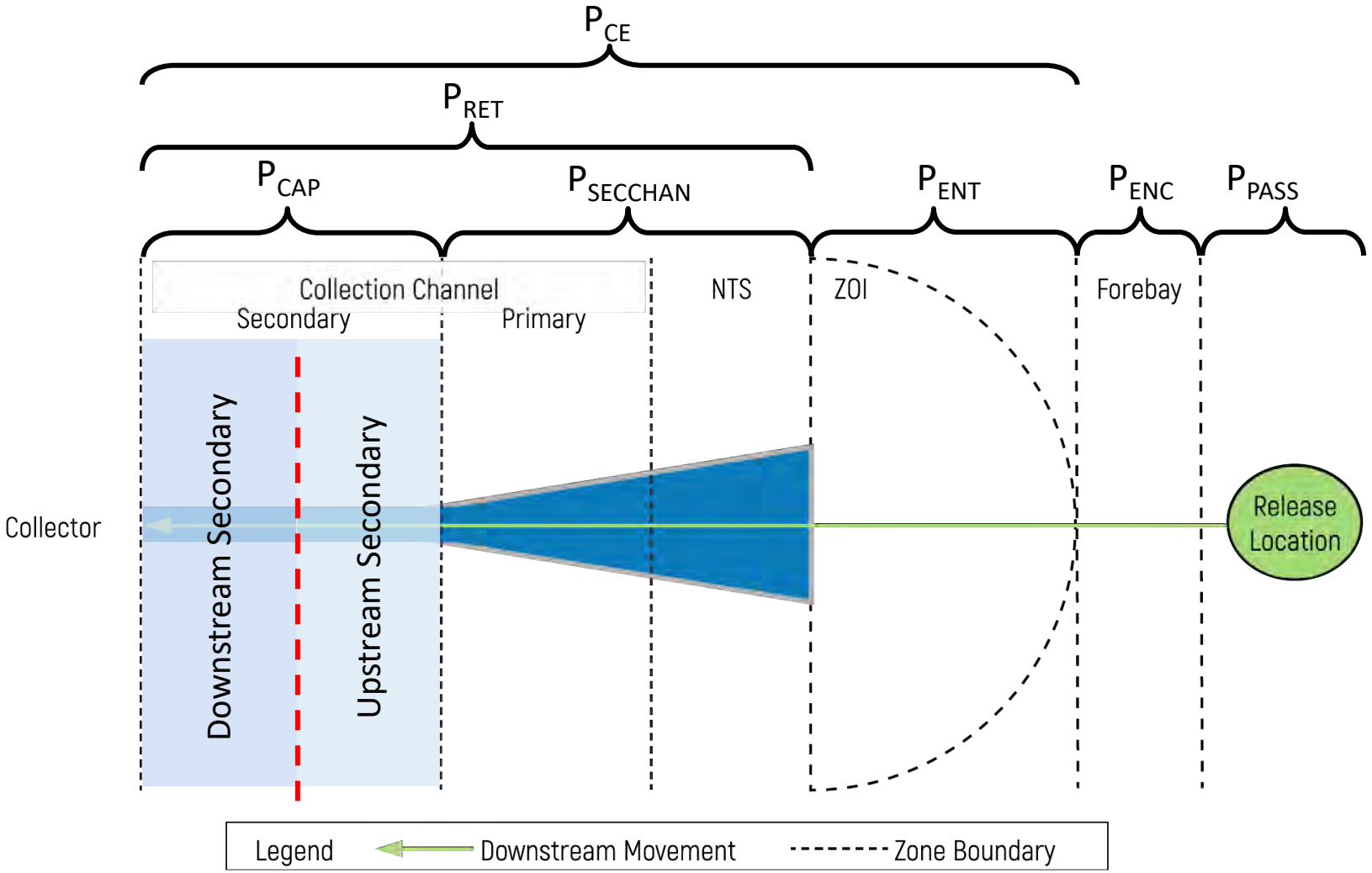
Zone	Rejections	
	Coho	Steelhead
Upstream Section Collection Channel	~30%	~30%
Downstream Section Secondary Channel	40%	31%

2022 Study Objectives

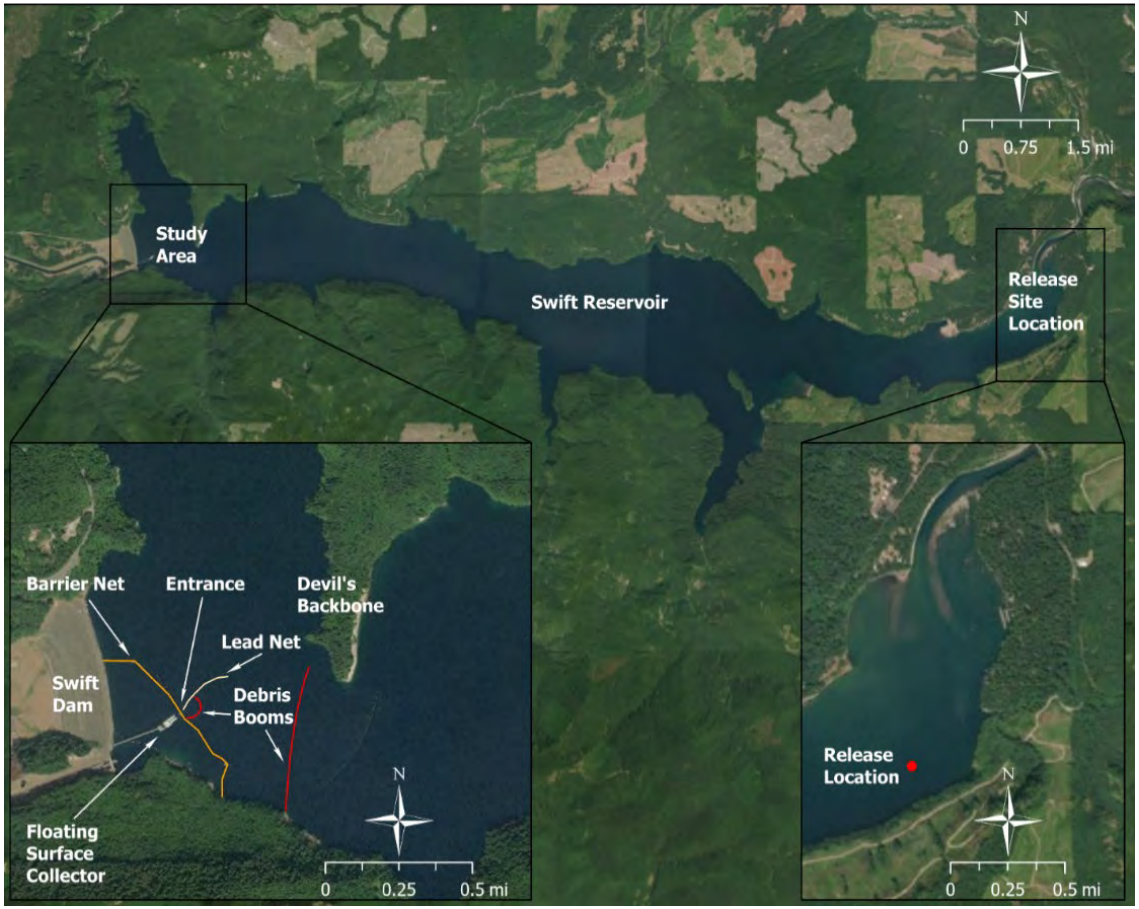
- Primary: Calculate passage metrics (per Objective 2 of the Monitoring and Evaluation Plan)
- Additional objectives
  - Evaluate two adjustments intended to improve retention in the downstream secondary channel and improve collection
  - Experimentally vary control weir height



2022 Passage Metrics



Fish Tracking Field Study Overview



- 413 dual-tagged* fish released
  - 231 Coho Salmon
  - 182 steelhead
  - 0 Chinook Salmon
- Site: 9 miles upstream of the Swift FSC
- Release dates: April 20 to June 1

* dual-tags consist of passive integrated transponder (PIT) and acoustic telemetry

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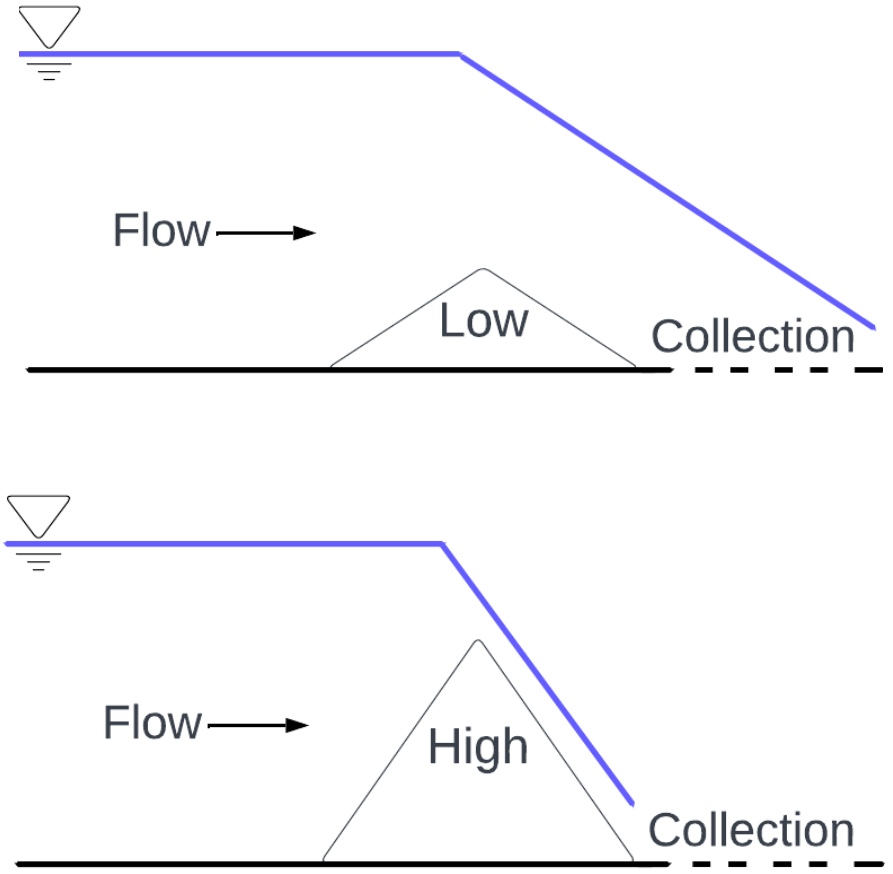
Fish Tracking Field Study Overview (cont.)

- Fish tracked via acoustic telemetry from release through the collection channel
- Fish tracking continued until July 18
  - Each tag has an estimated 45-day battery life from time of release
- Collection confirmed with PIT tags

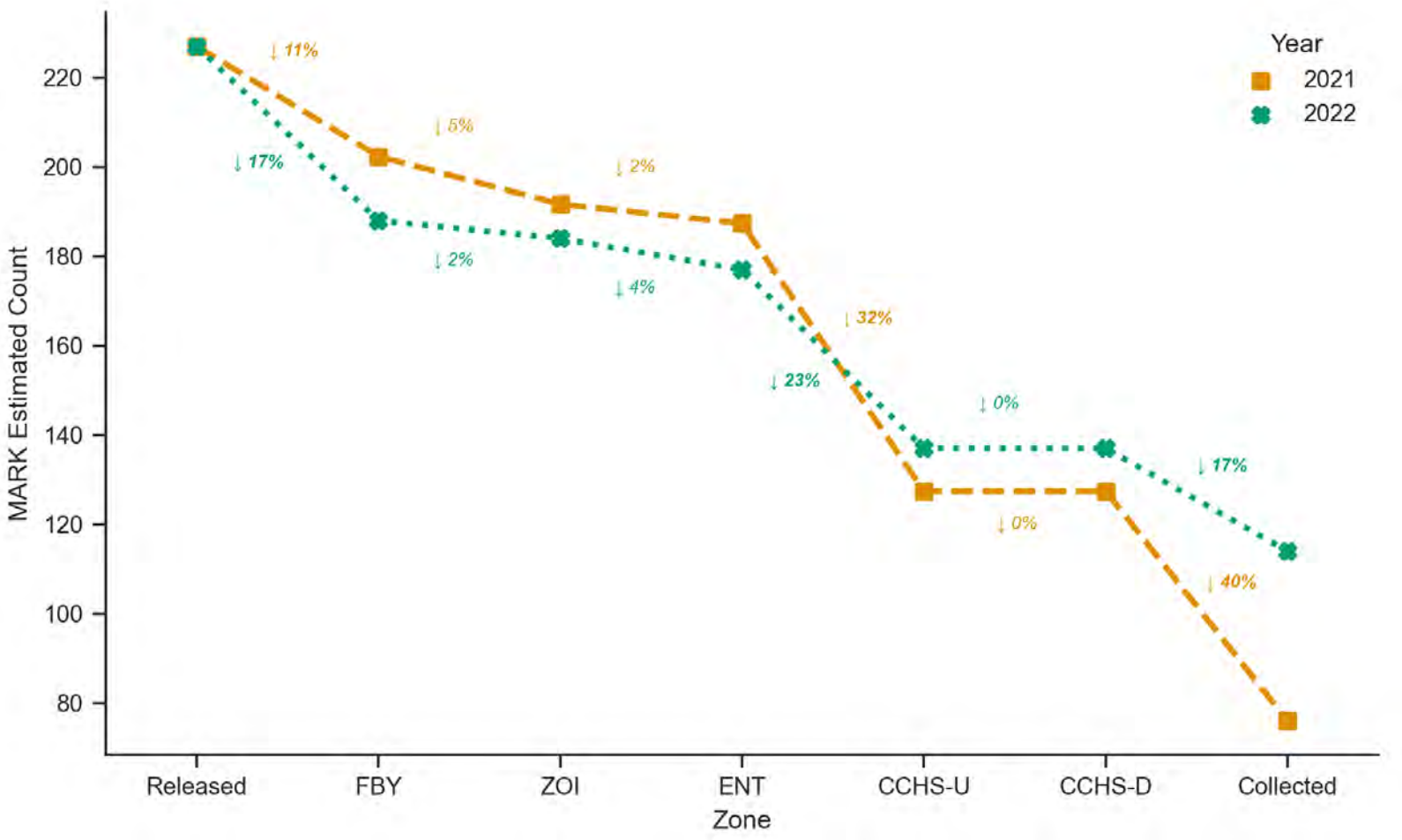
Weir Height Study

- Experimentally vary control weir height at downstream end of collection channel
  - LOW (high flow) vs. HIGH (low flow) settings
- Blocked to control for varying environmental and passage conditions



Passage Zones Review

Passage Analysis: Coho



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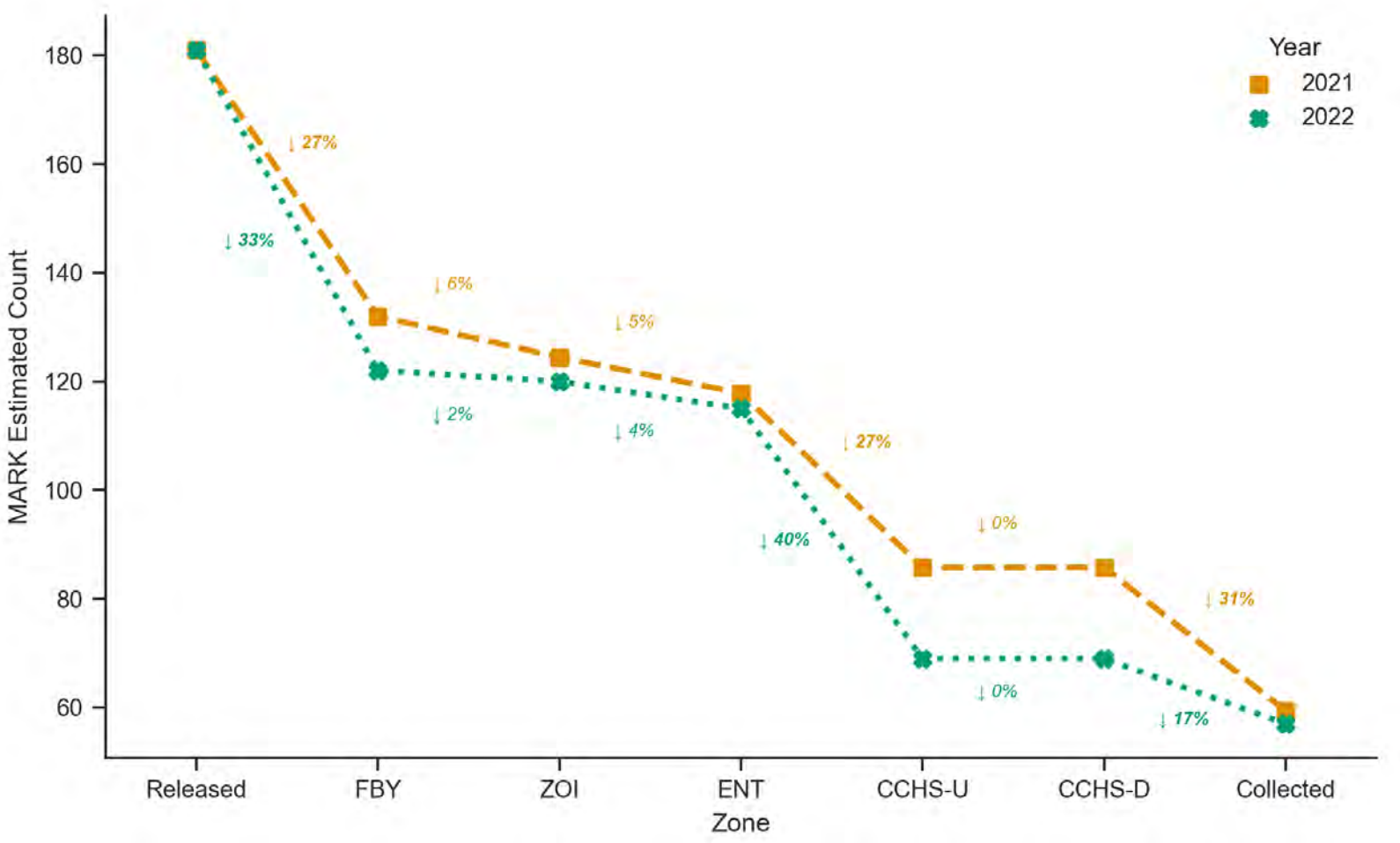
Passage Analysis: Steelhead



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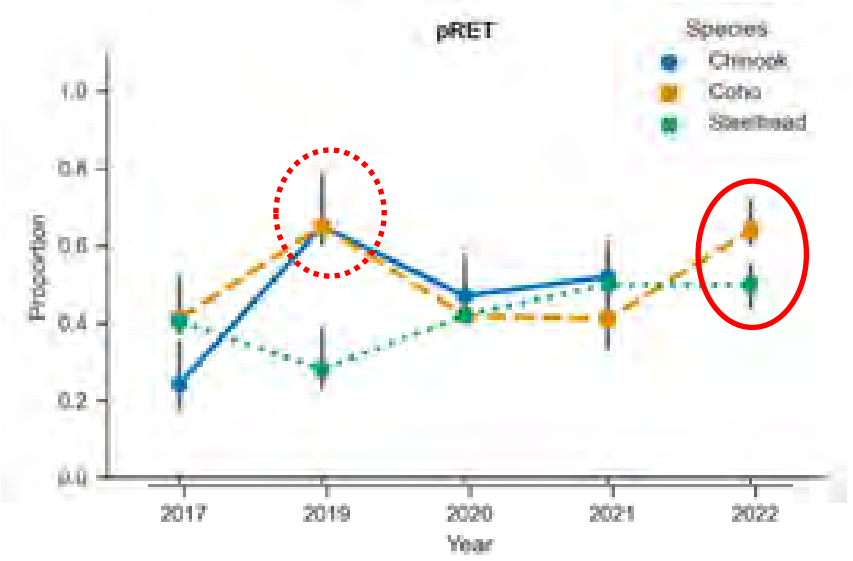
Causes for Improvement

- Similarities to previous study years suggest cleaning cycle elimination may have been largely responsible for improvements
  - Cleaning cycle was used less frequently in 2019
- V-trap may have contributed as well, though fish were observed escaping the trap

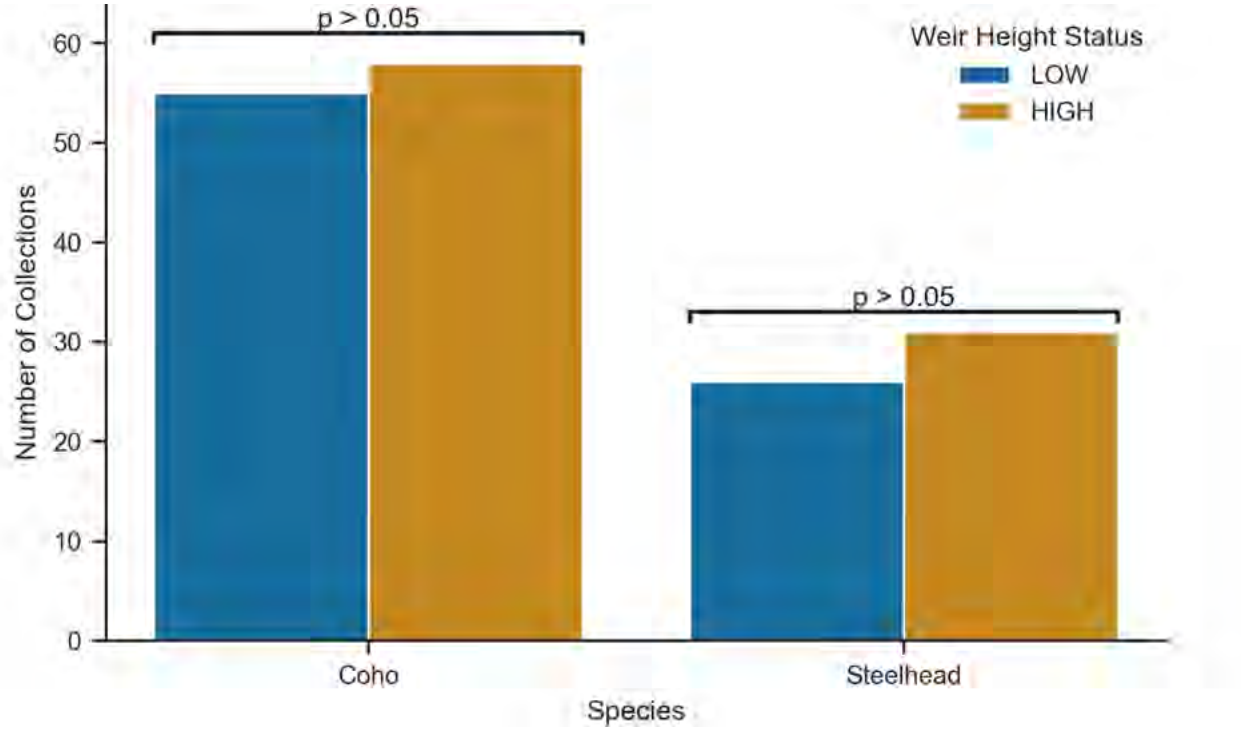


Comparison to Past Studies

Year	Species	P_{ZOI} (%)	P_{ENT} (%)	P_{RET} (%)	P_{CE} (%)
2017	Chinook Salmon	57	47	24	11
	Coho Salmon	74	65	41	27
	Steelhead	59	49	40	20
2019	Chinook Salmon	54	78	65	51
	Coho Salmon	82	98	64	64
	Steelhead	58	97	28	27
2020	Chinook Salmon	58	95	47	44
	Coho Salmon	62	95	42	39
	Steelhead	73	99	42	42
2021	Chinook Salmon	64	100	52	52
	Coho Salmon	84	98	41	40
	Steelhead	69	95	50	48
2022	Coho Salmon	81	96	64	62
	Steelhead	74	96	50	48

Weir Height Study Results

- No discernable effect of weir height on fish passage success



Summary

- Project History
  - Modifications in the zone of influence (ZOI) and FSC have been successful in encouraging fish to enter FSC
  - Since 2019, nearly all study fish that enter the forebay enter FSC
  - However, a large proportion of the fish that enter the FSC reject passage and are not captured
  - Recent studies have found that rejection is occurring in both the upper and lower portion of the collection channel
- 2022 Study Objectives
  - Evaluate modifications to the downstream collection channel
  - Test whether high or low settings of the control weir were favorable
  - Calculate collection efficiency and other passage metrics

Summary (cont.)

- Nearly all fish that enter the forebay enter FSC
  - Gains in this metric indicate that FSC adjustments continue to be effective at encouraging fish to enter
- Elimination of the debris management cleaning cycle may have been effective at improving passage through the lower portion channel
  - Capture rate in this zone increased substantially for both test species
  - Proportion of fish rejecting in the upper portion collection is similar with 2021
- Collection efficiency varied among species
  - Coho P_{CE} virtually tied the best year so far (2019)
  - Steelhead P_{CE} was consistent with recent years

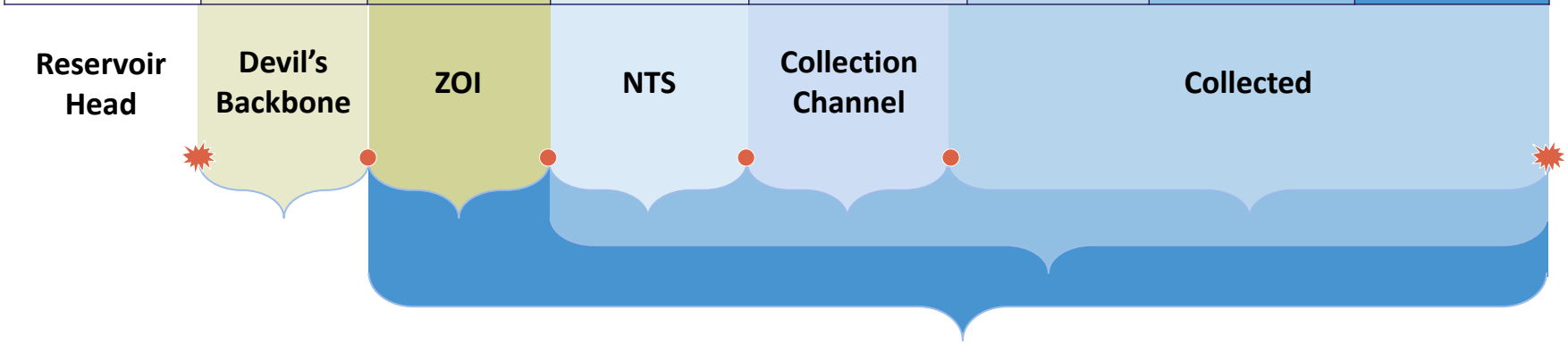
Summary (cont.)

- Retention within FSC continues to be the limiting factor to achieving collection efficiency targets
- Rejection within the upper portion of the collection channel is now a more significant bottleneck to successful passage
  - Upcoming adjustments target passage through these areas and will be tested once complete
- Varying flow through the control weir does not influence passage success

Questions?

Passage Metrics

Species	P_{PASS} (%)	P_{ENC} (%)	P_{ENT} (%)	$P_{SECCHAN}$ (%)	P_{CAP} (%)	P_{RET} (%)	P_{CE} (%)
Coho Salmon	83	98	96	78	83	64	62
	(79, 87)	(96, 100)	(93, 99)	(72, 83)	(78, 88)	(59, 70)	(56, 68)
Steelhead	67	98	96	60	82	50	48
	(62, 73)	(97, 100)	(93, 99)	(53, 68)	(75, 90)	(42, 57)	(40, 55)
All	76	98	96	71	83	59	56
	(73, 80)	(97, 99)	(94, 98)	(66, 75)	(78, 87)	(54, 63)	(54, 63)



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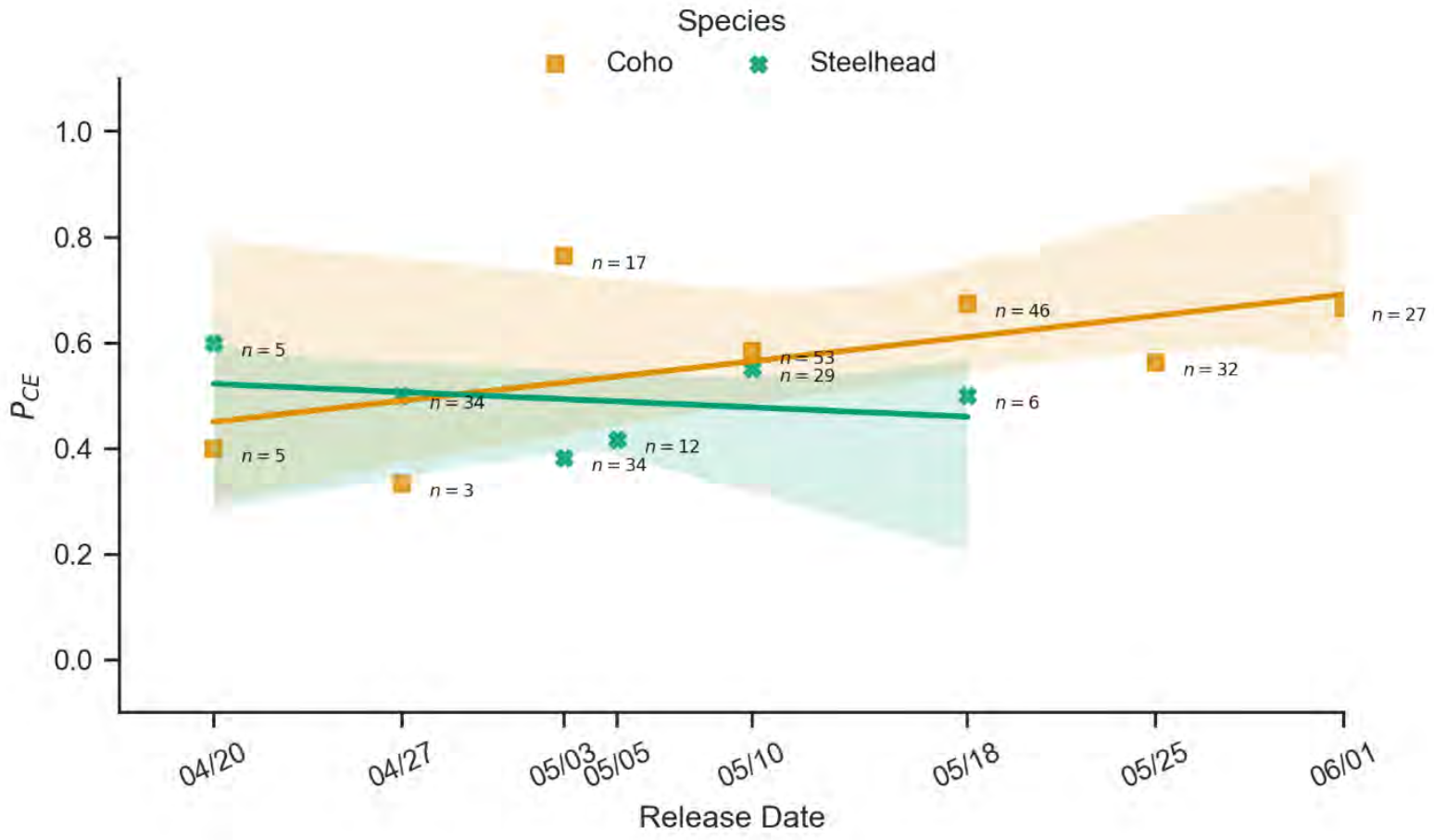
Collection Efficiency Variability



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Passage Metrics

Species	P_{CE} (90% CI)
Coho Salmon	62% (56% - 68%)
Steelhead	48% (40% - 55%)

Entrance Velocity

Net Transition Structure.

Original Swift FSC Design
Entrance Velocity
0.5 ft/sec
at 600 cfs

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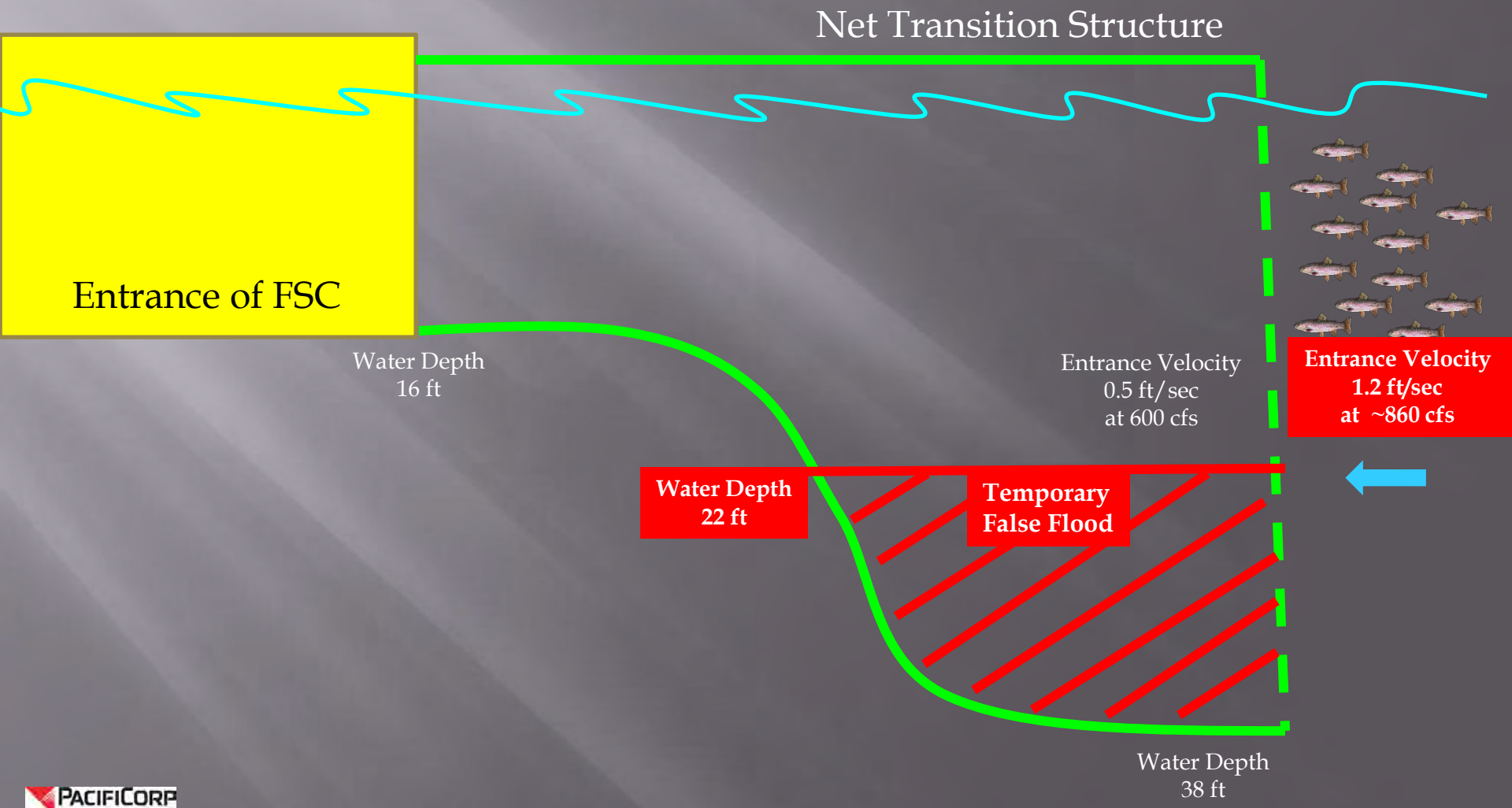
Entrance Velocities NTS



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Increased NTS Flow

NTS false floor installed February 2019

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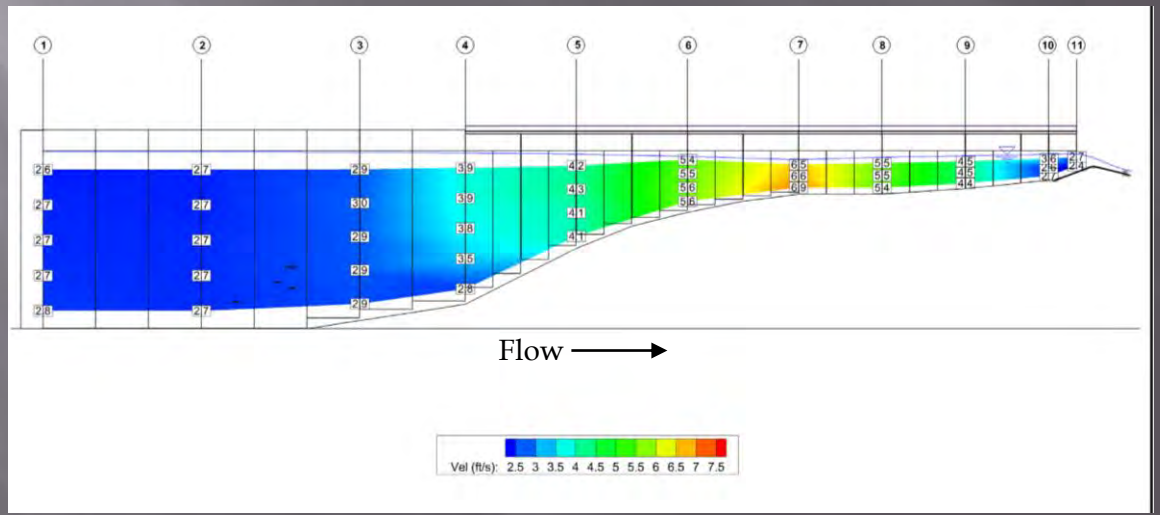
Fish Collection Channel Hydraulics

- Fish collection channel designed to mimic a surface outfall in which water flow slowly accelerates across channel until reaching a desired capture velocity.
- Modifications made in 2019 to increase entrance velocity disrupted this hydraulic effect and created areas of slight deceleration.
- Acoustic telemetry data has shown that fish may be turning around in these areas.
- Tests to evaluate this in 2021 by turning off extra attraction pump were inconclusive because of reduced entrance velocity (Four Peaks 2021).



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Next Steps

- Planning to make a second adjustment to the NTS to support eliminating areas of hydraulic deceleration within the fish channel that were created by increasing water velocity at the entrance of the FSC in 2019.

- The adjustment will further reduce the surface area of the NTS in order to maintain a similar entrance velocity but allow for a reduction in attraction flow (CFS).

- This adjustment will allow for evaluation of passage success through the collection channel without the areas of deceleration at higher entrances velocities.

Entrance Velocities NTS

5ft False Walls

Entrance Velocity
1.2 ft/sec
at 860 cfs

Entrance Velocity
1.7 ft/sec
at 771 cfs

Net Transition Structure

Entrance of FSC

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Schedule

- Side wall adjustments to be completed during the summer 2023 summer outage season.
- No acoustic telemetry study conducted in spring 2023; will resume in spring 2024 to evaluate fish passage metrics and behavior under the new conditions.
- Determine if areas of hydraulic deceleration are contributing to high rates of rejection in the fish channel.
- End goal is to use information as we consider more permanent modifications to the entrance of the Swift FSC to improve collection efficiency.

Lewis River Fish Passage Report

December 2022

Merwin Fish Collection Facility and General Operations

During the month of December, a total of 6,474 fish were captured at the Merwin Dam Adult Fish Collection Facility (MFCF). This was similar to the previous monthly total for November of 6,769. The majority of the adult fish collected during December were late coho (n= 5,259), followed by winter steelhead (1,169), summer steelhead (n= 34), cutthroat trout (n= 8), and fall Chinook (n= 4). The total number of NOR coho collected at the MFCF in 2022 is nearly double the 2014 – 2021 average (Figure 1).

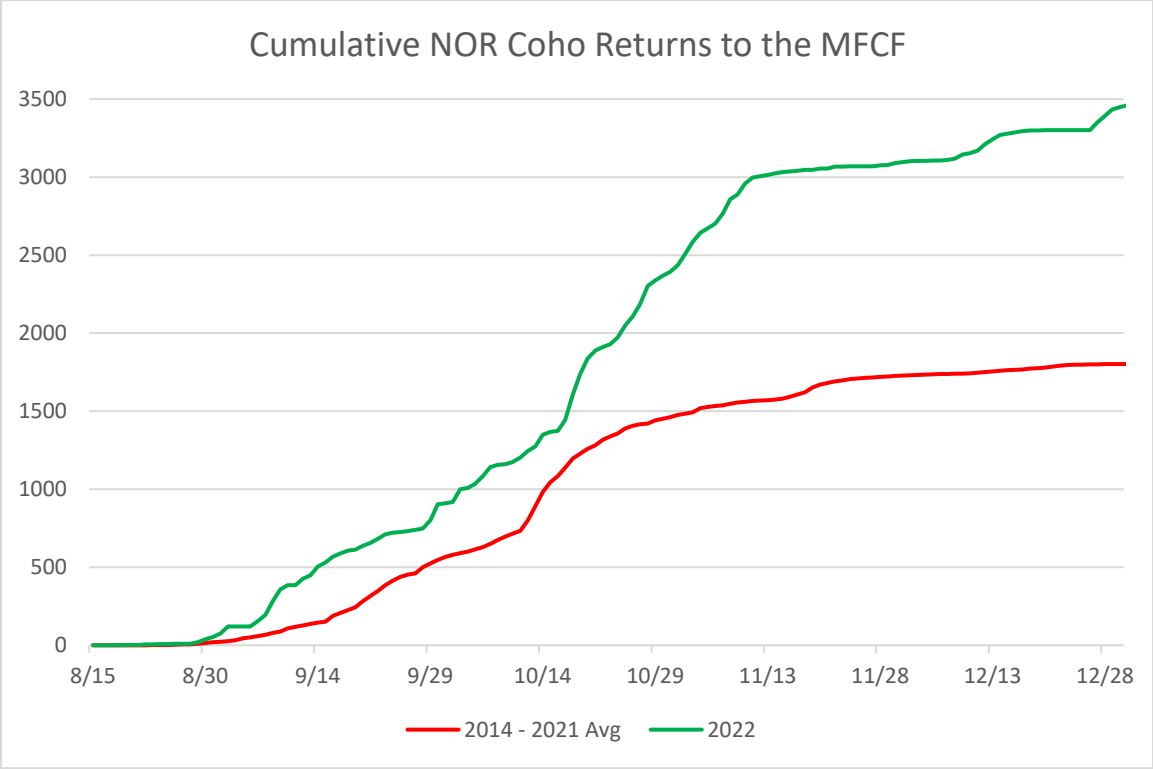

Figure 1. Cumulative number of Natural origin (NOR) coho collected at Merwin Adult Fish Collection Facility in 2022, relative to the 2014-2021 average.

The Merwin Fish Collection Facility lift and conveyance system were taken offline on December 6th to troubleshoot and repair an electrical fault that occurred within the system's controls. The lift and conveyance system was place back in service on December 7, 2022. The facility was also taken offline from December 22 to 26 due to unsafe operating conditions as the result of extreme winter weather and freezing rain. Flows below Merwin Dam in the month of December ranged from approximately 2,200 to 8,500 cubic feet per second (Figure 2).

Figure 2. Discharge in cubic feet per second recorded at the USGS Ariel, WA gauge (14220500) located immediately downstream of Merwin Dam. The two flow reduction periods were performed to accommodate lower river fish spawning surveys. Note: Flow data are not available for Dec 29 – 31, 2022.

Seven adult coho salmon and one steelhead collected at the MFCF in December had been previously PIT tagged. All of the coho had been tagged at the Swift FSC in 2021. The steelhead was tagged on the Kalama River as a juvenile in April of 2020. A total of ninety coho, sixteen spring Chinook, sixteen cutthroat trout, eleven wild winter steelhead, and one summer steelhead captured at the Merwin Trap had been previously PIT tagged in 2022. All PIT tag detection data collected at the Merwin Fish Collection Facility is available on-line through PITAGIS.

Upstream Transport

The total number of adults transported upstream decreased substantially in December, relative to the previous month. A total of 760 adult fish were transported above Swift Dam in December, compared to 2,944 in November. Coho made up the majority of fish transported in December (n= 735). Winter steelhead (n= 17) and Cutthroat trout (n= 8) made up the balance of fish transported upstream. For calendar year 2022, 9,571 coho (5,817 HOR/ 3,729 NOR), 3,600 spring Chinook (3,047 HOR/ 553 NOR), 594 winter steelhead (458 BWT/ 136 NOR), and 101 cutthroat trout have been transported upstream of Swift Dam.

Floating Surface Collector (FSC)

The Swift Reservoir Floating Surface Collector (FSC) was returned to service on October 21, 2022, following the summer maintenance outage. A total of 633 fish were collected in November (Table 1). The majority of fish collected were juvenile coho (n= 535), followed by Chinook (n= 70), steelhead (n= 16), and cutthroat trout (n= 12).

Table 1: Total number of out-migrating salmonids (by species) collected at the Swift FSC and transported downstream of Merwin Dam during the month of December since 2013.

Run Year	December Collection Totals by Run Year at the Swift FSC				
	Coho	Chinook	Steelhead	Cutthroat	**TOTAL**
2013	11	148	1	7	**167**
2014	424	179	7	73	**683**
2015	1,795	642	40	105	**2,582**
2016	162	39	3	3	**207**
2017	3,452	1,819	112	190	**5,573**
2018	992	25	10	15	**1,042**
2019	42	74	5	4	**125**
2020	380	41	20	35	**476**
2021	3,756	511	61	33	**4,361**
2022	535	70	16	12	**633**

Fish Facility Report
Merwin Adult Trap
December 2022

Reporting Date	Spring Chinook (1)									Early Coho											
	AD-Clip			Wild			Recap			AD-Clip			CWT			Wild			Recap		
	M	F	JK	M	F	JK	M	F	JK	M	F	JK	M	F	JK	M	F	JK	M	F	JK
1-Dec																					
2-Dec																					
3-Dec																					
4-Dec																					
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29-Dec																					
30-Dec																					
31-Dec																					
Monthly	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Annual	2093	1886	432	322	210	10	0	0	0	6906	7702	1395	1527	1837	218	920	939	241	0	0	0

Reporting Date	Late Coho											
	AD-Clip			CWT			Wild			Recap		
	M	F	JK	M	F	JK	M	F	JK	M	F	JK
1-Dec	106	180	7	25	31		1	5				
2-Dec	160	232	11	40	48	6	2	4				
3-Dec	91	156	10	21	23	1		2				
4-Dec	45	52	4	8	7	4						
5-Dec	76	97	15	19	16	1	1	1				
6-Dec												
7-Dec	35	85	2	6	21			6				
8-Dec	56	130		20	26		2	6				
9-Dec	238	442	23	90	122	3	8	16	2			
10-Dec	81	126	4	24	30	2	4	5				
11-Dec	42	103	2	15	12	1	7	8				
12-Dec	58	196	10	8	33	3	21	19	2			
13-Dec												
14-Dec	42	164	5	9	58	1	11	19	1			
15-Dec	40	123	7	5	20		13	13	1			
16-Dec	8	28	6				4	5				
17-Dec	8	20	2				5	2				
18-Dec	7	9		1	2			5				
19-Dec	3	1										
20-Dec	4	2	2	2				1	1			
21-Dec	7	15		1	9							
22-Dec												
23-Dec												
24-Dec												
25-Dec												
26-Dec												
27-Dec	15	45		7	11		27	18	3			
28-Dec	39	128	9	14	29		22	18	4			
29-Dec	54	131	8	10	24		17	21	2			
30-Dec	52	82	4	7	15	1	8	5	2			
31-Dec	16	28	2	7	7		3	9				
Monthly	1283	2575	133	339	544	23	156	188	18	0	0	0
Annual	4359	5441	631	723	845	184	622	598	142	0	0	0

Reporting Date	S. Steelhead						W. Steelhead							
	Fresh		Recap		Wild		AD-Clip		BWT		Recap		Wild	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
1-Dec							2	5						
2-Dec							22	11						
3-Dec							7	6						
4-Dec								1						
5-Dec	2	5					3	4						
6-Dec														
7-Dec							9	8						1
8-Dec							3	8						
9-Dec							120	145						1
10-Dec							29	35	1					
11-Dec							12	12						
12-Dec		1					34	27						
13-Dec														
14-Dec	2	2					9	18					1	
15-Dec							42	70					1	
16-Dec	1	1					16	27						
17-Dec	1						13	24						
18-Dec	9	2					8	15	1					
19-Dec							5	4						
20-Dec							4	9					1	
21-Dec							16	11					1	
22-Dec														
23-Dec														
24-Dec														
25-Dec														
26-Dec														
27-Dec							47	56						
28-Dec							48	63	1					1
29-Dec							22	53	1					1
30-Dec							12	22	2	1				
31-Dec	3	5					5	30		2				
Monthly	18	16	0	0	0	0	488	664	6	3	0	0	4	4
Annual	1097	2031	357	882	2	8	977	1026	316	150	3	0	90	96

Reporting Date	Fall Chinook									Sockeye		Chum		Pink		Cutthroat	Rainbow (< 20 inches)	Bull Trout	Daily Total
	AD-Clip			Wild			Recap												
	M	F	JK	M	F	JK	M	F	JK	M	F	M	F	M	F				
1-Dec																			362
2-Dec																			536
3-Dec				1															318
4-Dec																			121
5-Dec																1			241
6-Dec																			
7-Dec																			173
8-Dec																			251
9-Dec																			1210
10-Dec				2		1										1			345
11-Dec																1			215
12-Dec																			412
13-Dec																			
14-Dec																			342
15-Dec																			335
16-Dec																1			97
17-Dec																			75
18-Dec																2			61
19-Dec																1			14
20-Dec																			26
21-Dec																			60
22-Dec																			
23-Dec																			
24-Dec																			
25-Dec																			
26-Dec																			
27-Dec																1			230
28-Dec																			376
29-Dec																			344
30-Dec																			213
31-Dec																			117
Monthly	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0	8	0	0	6474
Annual	114	130	47	53	45	47	0	0	0	11	1	3	0	0	0	102	0	0	47771

1 Only hatchery verses wild distinctions are currently being made. All hatchery fish are labeled as "AD-Clip".
2 Total counts do not include recaptured salmon.

Fish Facility Report

Swift Floating Surface Collector

December 2022

	Coho			Chinook			Steelhead				Cutthroat			Bull	Planted	
Day	**fry**	**parr**	**smolt**	**fry**	**parr**	**smolt**	**fry**	**parr**	**smolt**	**kelt**	**fry**	**<13 in**	**> 13 in**	**Trout**	**Rainbow**	**Total**
1																
2		2	22			3		2	0					0	0	**29**
3		3	8			9			0			2		0	0	**22**
4	1		65			9	3		2				1	0	0	**81**
5		6	8			3			0			1		0	0	**18**
6			3			0			0					0	0	**3**
7			4			0			0					0	0	**4**
8			4			1			0					0	0	**5**
9		1	4			0			0					0	0	**5**
10			1		1	1			0					0	0	**3**
11		1	1			0			0					0	0	**2**
12		1	0			2			0			1		0	0	**4**
13		1	0			1			0					0	0	**2**
14			0			0			0					0	0	**0**
15			6			1			0					0	0	**7**
16			24			2			0					0	0	**26**
17		4	10			5			0					0	0	**19**
18		2	7		2	2			0			1		0	0	**14**
19			3			3			0					0	0	**6**
20		1	1			3		1	1					0	0	**7**
21		2	3			0			1					0	0	**6**
22																
23																
24																
25																
26																
27																
28																
29		12	160			12			4			1		0	0	**189**
30		50	62			10			1			1		0	0	**124**
31	1	34	17			0			1			4		0	0	**57**
Monthly	2	120	413	0	3	67	3	3	10	0	0	11	1	0	0	**633**
Total	655	14693	49346	60	234	2240	22	38	5466	27	2	755	119	16	4336	**78009**