LOWER SNAKE RIVER COMPENSATION PLAN

FISH FOR THE FUTURE

MATT HOW GRAPHIC - USFWS

HAGERMAN PRAS STEELHEAD

WHAT'S BEEN HAPPENING IN LSRCP

APRIL 2023

SALMONID EGGS - SAM STUKEL

Lower Snake River Compensation Plan

FISH FOR THE FUTURE

COORDINATOR'S CORNER

It was great seeing many of you in Lewiston this month for the Annual LSRCP meeting. We had about 65 attendees in-person and up to 30 online. Thanks for attending! Also, a huge thank-you to the Fall Chinook Acclimation Project that hosted the field trip to Captain John's acclimation site and accomodations for the BBQ. The after-BBQ ax-throwing was an added bonus - and some of you have absolutely scary aim with those things!

For those of you that couldn't make it, thanks for everything you're doing out there. Fish were still being hauled to release sites, field season is underway, and the show continues to go on while we met and talked the future of LSRCP.

On another note, it's great to have Spring arrive. I took our daughters out for what's becoming an annual turkey hunt in the Idaho mountains. They've developed a knack for finding turkeys out there.

You'll find summaries of several of the LSRCP presentations. Thanks to all our presenters and hope you'll make it out again next year.

Stay safe, have fun, and Thanks for being Fish for the Future!

-Nate

The most reliable way to predict the future is to create it.

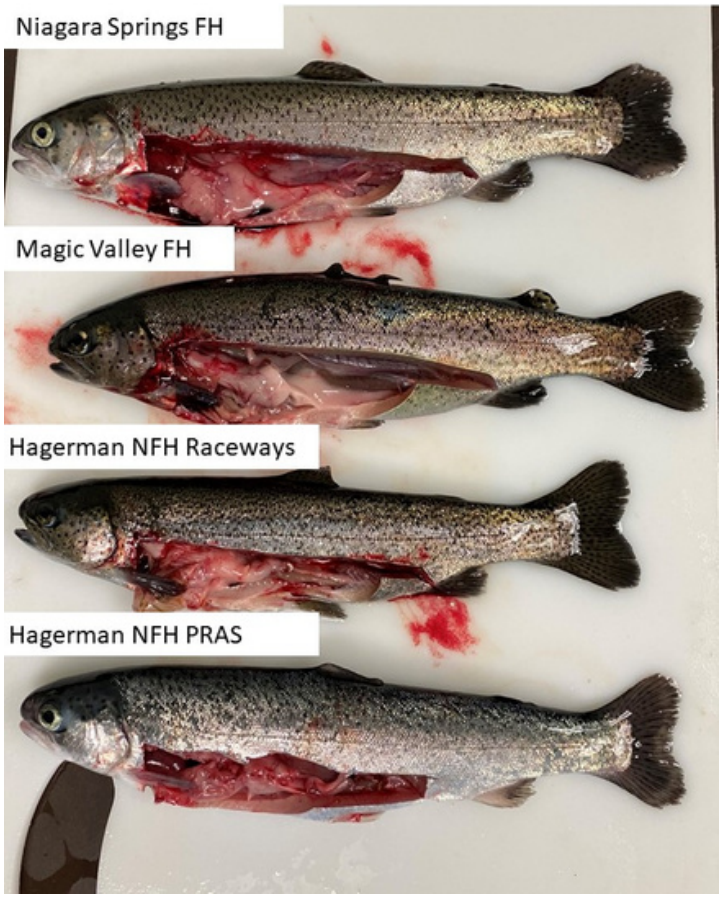
-Abraham Lincoln

A COUPLE OF MOUNTAIN TURKEYS

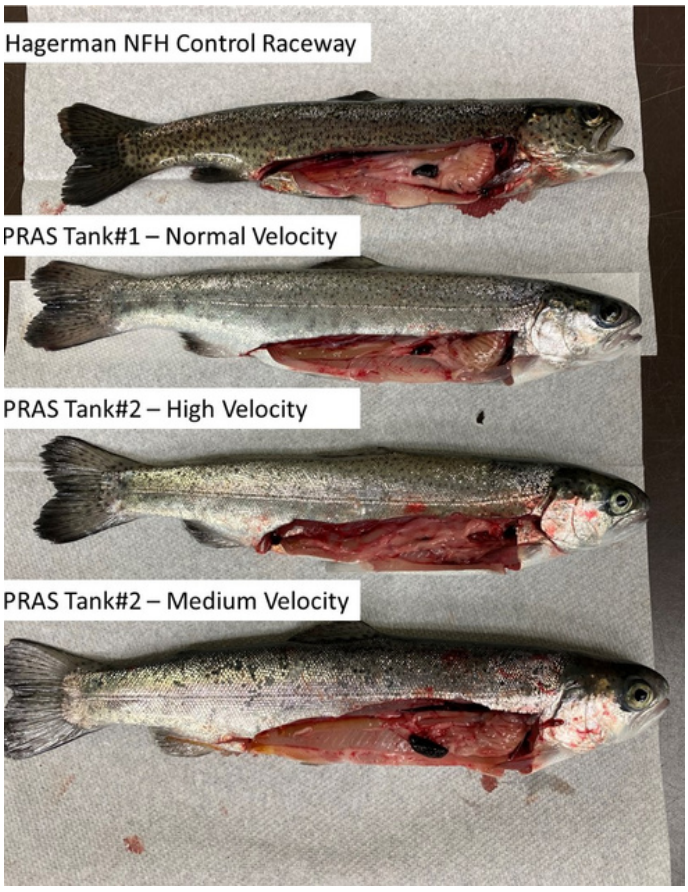
Hagerman Partial Recirculating Aquaculture System (PRAS)

They say a picture is worth a thousand words. Well, here's some pictures of the Hagerman PRAS steelhead from BY20 and BY22. But, when you're dealing with thousands of fish, just looking at a handful, probably isn't worth a thousand words.

That said, Hagerman staff changed things up since BY20 and ran the PRAS at higher velocities. I'd say looking at these 8 fish, you're seeing lower fat content in the BY22 smolts. More to come as the staff keep teasing apart the nuances of PRAS performance after the smolts leave the hatchery.



BY20 STEELHEAD



BY22 STEELHEAD

Chinook Infrastructure - Nate Wiese

Work over the past year looked at what the LSRCP concrete could do towards meeting spring/summer Chinook mitigation targets. Those "infrastructure reports" were summarized and presented at the annual meeting.

A large range of potential exists depending on infrastructure investment, movement of existing programs, and additional transportation of smolts from rearing to release locations.

The next step in the process is to build agreement on viable paths forward and develop an options paper. The options paper will give us a larger picture plan of how individual actions fit and also a communication strategy to NOAA, all of us in LSRCP, and our funding entity, Bonneville Power Administration.

Basin	Facility	Smolts	Expected Adults
NE Oregon	Lookingglass	100,000	485
Salmon	McCall	340,000	1,020
Salmon	Sawtooth	520,000	1,560
	Total	**960,000**	**3,065**

INFRASTRUCTURE POTENTIAL IN THE PROGRAM

Facility	Smolts
Dworshak	500,000 -2,300,000
Clearwater	0 – 1,600,000
Lyons Ferry	500,000 – 1,500,000
Irrigon	800,000 – 2,000,000
Lookingglass	100,000 – 910,000
Total Smolts	**1,800,000 – 8,210,000**
Expected Adults (0.3% SAR)	**5,400 – 24,630**

EAST FORK MAINTENANCE

Debris at the East Fork Satellite

It's always amazed me to find those people that look at something impossible and just jump in on it. The East Fork debris pile was starting to look that way. Fortunately, Lytle Denny, and the Shoshone Bannock Tribe staff found a contractor that did just that - jumped in.

Great work all around and glad we're back up and ready for the spring trapping season!

DEBRIS REMOVAL AT THE EAST FORK SALMON RIVER TRAP

LITTLE SHEEP EMERGENCY RELEASE

Little Sheep Acclimation

The staff of Wallowa Hatchery had to release the Little Sheep acclimation steelhead about three weeks early (April 10th) after 10 days of acclimation due to high run-off conditions.

Adult steelhead were hauled back to the hatchery and the site will be excavated when conditions allow. What a close call!

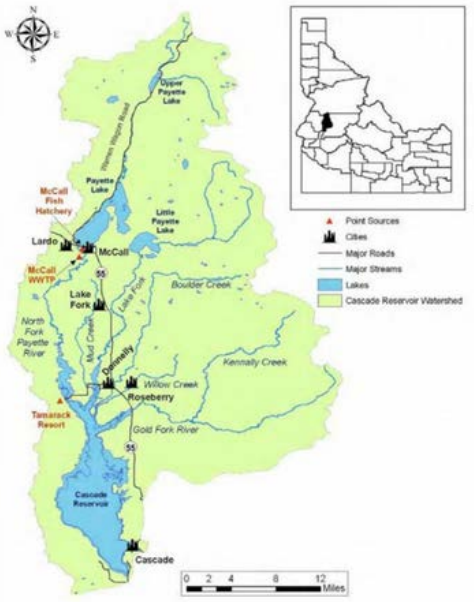
NPDES AND IPDES

NPDES and IPDES - Cassie Sundquist

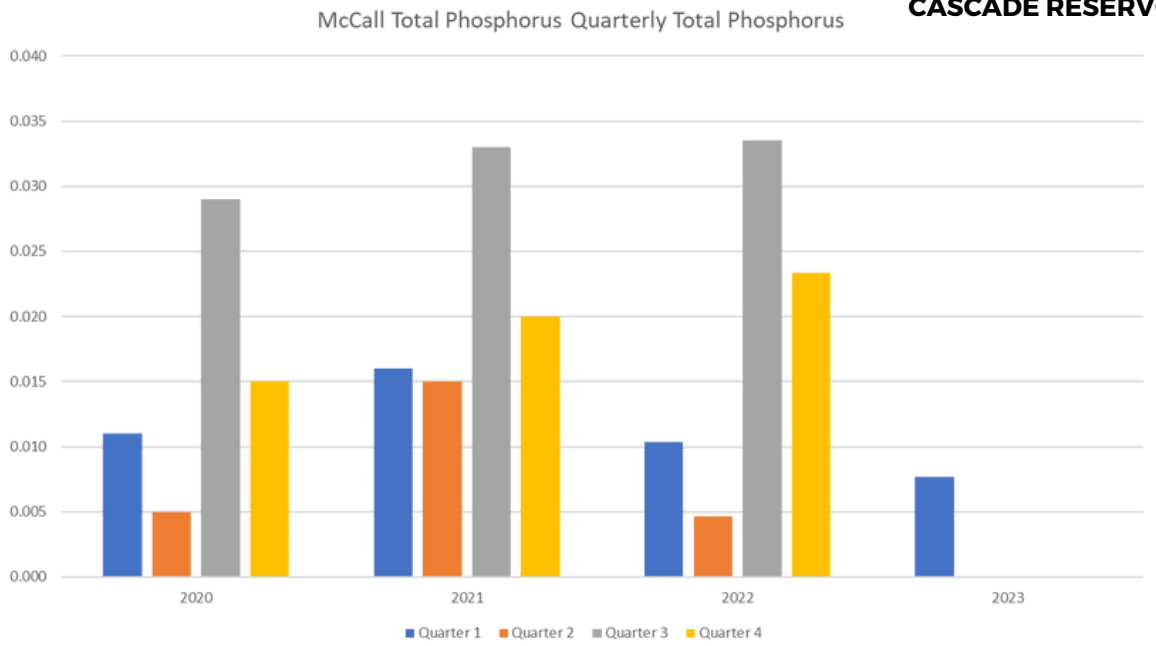
Cassie Sundquist, Idaho Department of Fish and Game, presented information on the National Pollution Discharge Elimination System (NPDES) and Idaho Pollution Discharge Elimination System (IPDES) permits for Idaho hatchery facilities.

Magic Valley and Hagerman hatcheries are both in the process of receiving new wasteload allocations. When first proposed, these facilities had a 78% and 90% reduction. IDFG noted errors in the data roll-up and the subsequent reductions are 39% and 45% respectively.

McCall Hatchery also has a stringent (0.025 mg/l) phosphorus limit under the Cascade Reservoir Total Maximum Daily Load (TMDL). Adding smolt production at McCall will be difficult while trying to maintain within current permit limitations.



CASCADE RESERVOIR TMDL



MCCALL PHOSPHORUS DISCHARGE - MONTHLY LIMIIT IS 0.025 MG/L

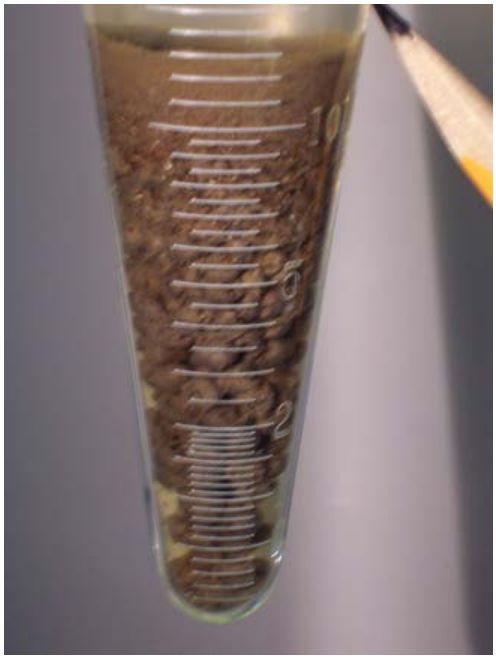
LOW PHOS FEEDS

Low Phosphorus Feeds - Dr. Ann Gannam

Ann Gannam, Abernathy Fish Technology Center, presented information on low phosphorus feeds for meeting NPDES permit requirements. In general, Pacific Salmon require 0.6% available/digestible phosphorus. As context, BioVita Fry has phosphorus of 1.2% to 1.5% and Bio Dry 1000 LP (Low Phosphorus) has a 0.9% phosphorus concentration.

As phosphorus is reduced in the diet, salmon tend to use phosphorus more efficiently meaning that overall phosphorus levels in waste are decreased. Generally 55% of total phosphorus from feed can be contained in fecal material, but 30% or more of the phosphorus can leach from the feces. Hence, removing or consolidating feces quickly can also aid in decreasing phosphorus discharges.

During Abernathy trials, hatchery effluent was reduced by 55.3% on average using low phosphorus feed.



FECAL CAST SIZE COMPARISON

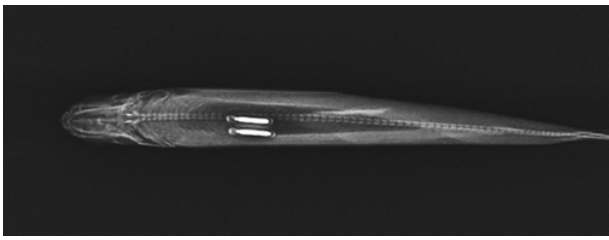
	Fecal settling		P leaching	
	6 wk	12 wk	6 wk	12 wk
	cm/sec		ųg/ml/g feces	
Dietary treatment				
Practical Diet w/o guar	2.1	2.9	4.2	0.09[a]
Practical diet w/guar	2.7	3.4	0.07	0.04[b]
Commercial diet	3.7	4.3	0.25	0.15
P-value	0.212	0.315	0.056	0.0065

PIT TAG RETENTION

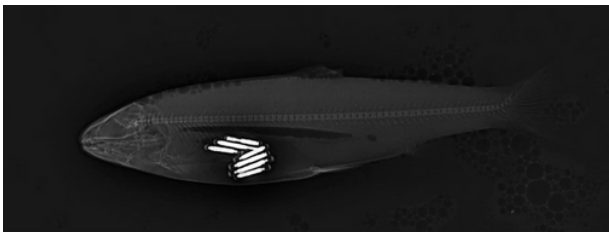
Journey of a PIT Tag - Kathleen Hemeon

Kathleen Hemeon presented data on tag collisions in Coho, Steelhead, and Chinook from shed and subsequently ingested PIT tags. In experiments, spring Chinook didn't ingest loose tags, Coho ingested 51%, and steelhead ingested 69% of loose tags presented in a hatchery setting.

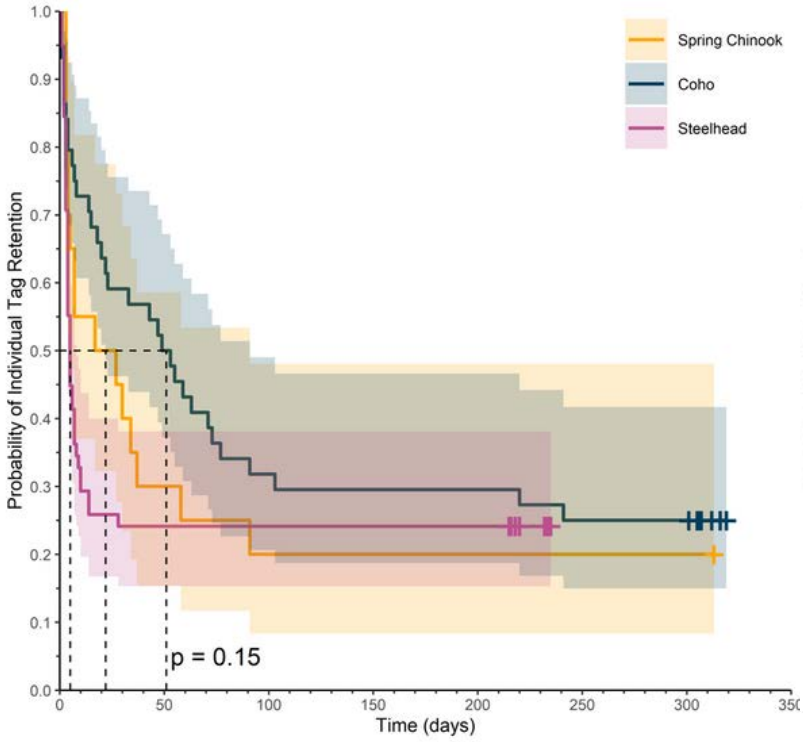
Ingested tags can be retained for a long time and 30% of Coho and 24% of steelhead retained the tags for greater than 200 days. In the case of two tags being in one fish (tagged fish ingests another tag), tag detection is reduced by 85-94% due to tag collision.

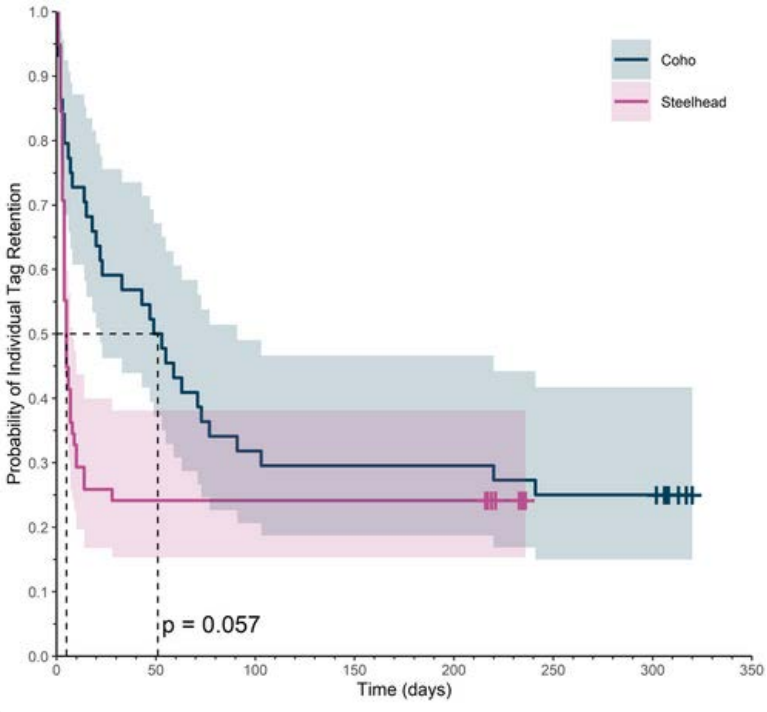


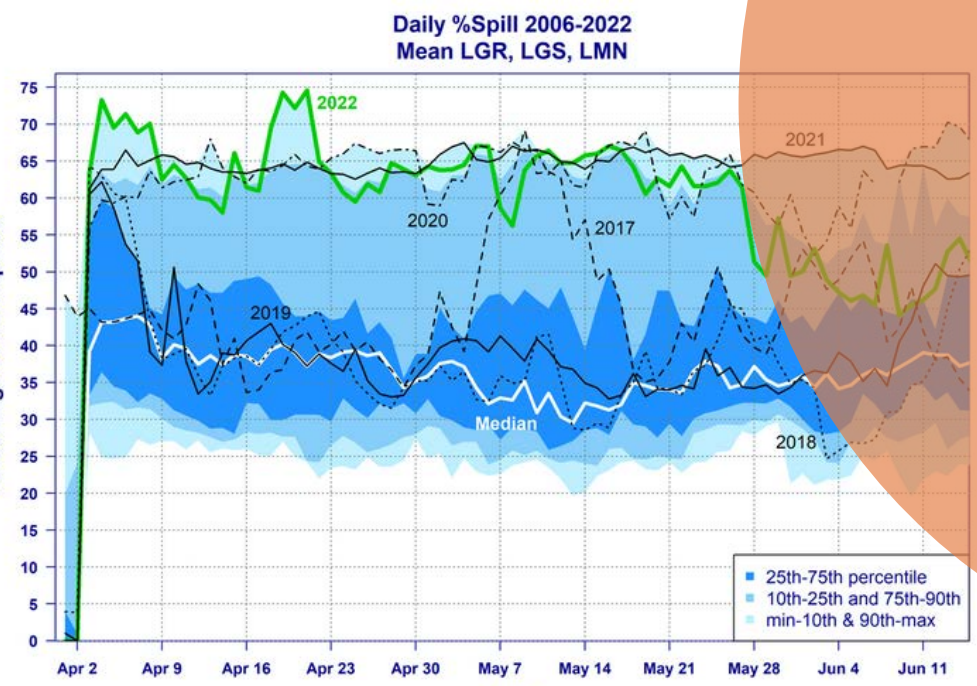
INJECTED AND INGESTED PIT TAGS



STEELHEAD WITH 10 INGESTED TAGS







SPILL AND TRANSPORT

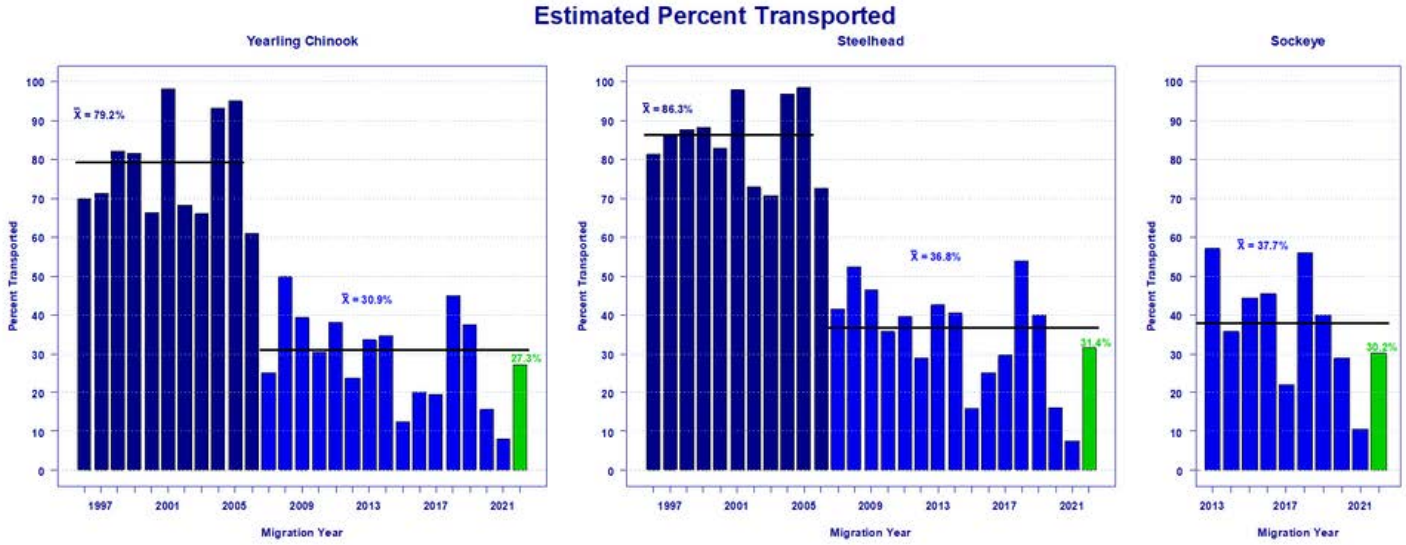
Spill and Transport - Jay Heese and Jonathon Ebel

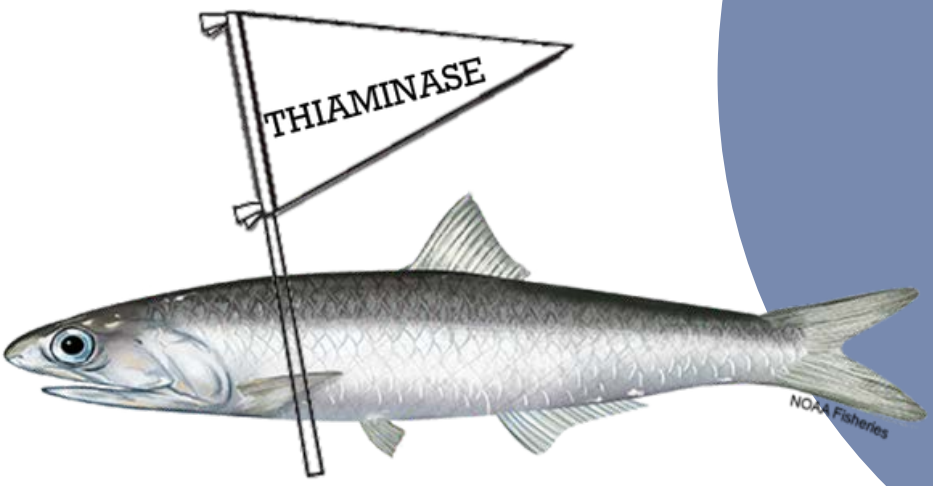
Jay Heese, Nez Perce Tribe, and Jonathon Ebel, Idaho Department of Fish and Game, discussed overall spill and transport trends in recent years. Overall, spill has increased as a strategy since 2006 as transport has decreased. Currently, Flex spill operations occur from April until June with a maximum Total Dissolved Gas (TDG) cap of 125% - meaning that spill can't drive TDG over 125% supersaturated. Increased spill has decreased smolt in-river transit times which should increase overall survival to adults.

Jonathan Ebel also ran some sensitivity scenarios using a million smolts at Lower Granite Dam for various LSRCP programs to compare transport versus In-river. His question was - Should we be concerned by declining transportation rates?

His conclusions were:

- Wild steelhead benefit from transport more than other species.
- In some years, transport of hatchery origin chinook would have returned 2X the adults. but other years there was no difference.
- Improved river conditions through higher spill has decreased the benefit of transport
- In most years, 100% transport would return more adults than in-river, but not significantly more





THIAMINE DEFICIENCY

Thiamine Deficiency - Christine Parker-Graham, Aimee Reed, Brandon Taro, Laura Krogman

Christine Parker-Graham, US Fish and Wildlife Service, Aimee Reed, Oregon Department of Fish and Wildlife, Brandon Taro, Idaho Department of Fish and Game, and Laura Krogman, Washington Department of Fish and Wildlife, served as panel members for a discussion on Thiamine deficiency across the basin.

Thiamine deficiency has been around quite awhile and was widely accepted as part of the demise of lake trout in the Great Lakes when alewives dominated the food chain there. Warming Pacific Ocean trends have increased the percentage of anchovy predation which are high in thiaminase - effectively blocking the uptake of Thiamine (Vitamin B1). This has been associated with hatchery fish health issues in California and more recently identified in Oregon Department of Fish and Wildlife (ODFW) facilities and at Winthrop National Fish Hatchery steelhead (2022).

Treatment options include injecting adult broodstock, bath treating eggs, or bath treating sac-fry. Once fry are introduced to Vitamin B1 supplemented feed, any problems are usually quickly remedied. ODFW and the USFWS have begun some treatment/control groups to better understand thiamine deficiency and Idaho and Washington are in a monitoring mode at this point. More research is needed to understand what egg-concentrations mean for different species - i.e. Coho vs Chinook vs. Steelhead.

PUTATIVELY DEFICIENT	SUBCLINICAL	THIAMINE REPLETE
• Early mortality • Up to 100% mortality	• Increased likelihood of clinical syndrome(s) • Unknown long-term effects	• Unlikely to experience clinical syndromes under normal circumstances
<6.5 nmol/g	6.5-10 nmol/g	>10 nmol/g

EGG CONCENTRATIONS OF THIAMINE AND EFFECTS ON SALMON/STEELHEAD FRY

CRYSTAL SPRINGS

Crystal Springs Hatchery - Lytle Denny

Lytle Denny, Shoshone Bannock Tribes, discussed the plans for Crystal Springs hatchery. The Crystal Springs hatchery site was purchased and intended to produce a 1M Chinook smolt program for the Yankee Fork (600,000) and Panther Creek (400,000). After smolt rearing using :Springfield Hatchery as a surrogate, the smolt program was halted due to the large difference in water hardness between the Springfield/Crystal Springs aquifer (240 ppm) and the Salmon River (50 ppm). This difference was associated with lower smolt survival after release.

The Shoshone Bannock Tribes are now changing gears to develop a hatchery facility at the acquired Waterwheel site, another old hatchery location in the same aquifer at 50 F. This facility will rear captive brood to provide 1 million eyed eggs for a 15-year pilot program to supplement Panther Creek and Yankee Fork watersheds.

Program/Life Stage	Time Frame	No. of Fish	Water Requirement	Holding Volume/Type
Chinook Incubation – Egg Box Program	~ Aug – Nov	1.68M green eggs; ~ 1.0M eyed eggs	5 gpm ambient spring water per ½ stack; 540 gpm total need	54 double stacks (108 - half stacks)
Chinook Incubation – Brood Replacement	~ Aug – Jan	~ 3,000 eyed eggs	5 gpm ambient spring water per ½ stack; 15 gpm total need	3 half stacks
Chinook Fry-Parr	~ Feb – Jun	~ 2,000 – 3.97" fish	15 gpm ambient spring water	Ten (10) – 1m first-feed circulars
Chinook Parr-Smolt	~ Jul - May	~ 2,000 – 6.93" fish	40 gpm ambient spring water	Six (6) - 6' diameter circulars
Chinook Age-3 Module	Smolt through Age-3 Maturation	1,680 Age-3 Adults	2,062 gpm ambient spring water	Three (3) - 30' diameter circulars
Chinook Age-4 and Age-5 Module	Final Age-4 & Age-5 Maturation	1,839 Combined Age-4 & Age-5 Adults	2,062 gpm ambient spring water	Three (3) - 30' diameter circulars

CRYSTAL SPRINGS BIO-PROGRAMMING FOR CAPTIVE BROOD AND EGG PRODUCTION

DWORSHAK DAM PIPELINE

Dworshak Dam Pipeline - Gary Bryne and Becky Johnson

Gary Byrne, Idaho Department of Fish and Game and Becky Johnson, Nez Perce Tribe, presented concepts related to increasing water supplies from Dworshak reservoir through new pipeline projects. Since commissioning in the early 1990's, Clearwater hatchery has not had enough water to run all the raceways. Similarly, since Dworshak hatchery mothballed it's re-use systems in the 2010's, it doesn't have enough water to supply all Burrows Ponds onsite.

The proposals seek to fill the empty raceways and Burrows Ponds with disease-free water from the reservoir and subsequently increase rearing space for an additional 1.6M spring Chinook smolts at Clearwater and an additional 1.8M at Dworshak hatchery.

The first idea builds a new pipeline on the Clearwater side of the river to provide 125 cfs to Clearwater Hatchery. :The existing pipline (90 cfs total) would then be available to Dworshak hatchery with some additional piping modifications. Total cost is $56.8M estimated by the Idaho Department of Water Resources.

A second idea would build a new pipeline to Dworshak National Fish Hatchery with a primary and secondary line both about 4 feet in diameter and place a new hydro in the existing penstock at Dworshak Dam. This idea was conceptually run by the Corps of Engineers and had a cost estimate of $60M to provide 200 cfs to Dworshak hatchery and eliminate the pump station at that facility.

The Dworshak pipeline concept has been around for about a decade, but was recently re-invigorated by the Idaho Governor's Salmon workgroup as a tangible way to "move the needle" in spring/summer Chinook deficits. The Governor's upcoming budget includes $150M for water resources project proposals through the Idaho Department of Water Resources. This could be a potential funding source that the Dworshak pipeline could compete against other projects in Idaho.

NEWEST LSRCP 5000 GALLON TANKER - ODFW

LSRCP FISH TRUCKS

LSRCP Fish Trucks - Chris Starr, USFWS

LSRCP transports about 15 million smolts annually. These smolts weigh over 1.5 million pounds. To accomplish this task, the LSRCP fleet is nearing 30 vehicles. About half of these are 4000-5000 gallon Class-A semis that can haul upwards of 20,000 steelhead or 80,000 spring/summer Chinook per load.

The replacement cost of the LSRCP fleet is somewhere between $4,000,000 to $6,000,000 and most transport tanks are as old as the program. In 2022, ODFW received a new 5,000 gallon tanker making it the newest in the fleet at a cost of about $300,000.

LSRCP will be working with cooperators in the near future to identify what trucks need to be replaced, where additional trucking capacity may be needed, and how the LSRCP truck fleet can be optimized to provide safe and flexible releases in the future.

At a Glance:

- 15M smolts transported
- 1.5M pounds delivered
- 120K gallons of tankers available

FCAP - 4000 GALLON TRANSPORT - NPT

MIKE KEY ACCEPTING STATION OF THE YEAR FOR FCAP

STATION OF THE YEAR

Fall Chinook Acclimation Project - LSRCP Station of the Year

Mike Key, Nez Perce Tribe, accepted the LSRCP Station of the Year award for the Fall Chinook Acclimation Project (FCAP) at the annual meeting.

FCAP has been a cornerstone to the success of the fall Chinook program over several decades and for the last five years within LSRCP. The temporary nature of some of the acclimation sites requires constant attention and trouble shooting to ensure success.

The FCAP staff have gone above and beyond not only ensure the success of fall Chinook, but are routinely lending a hand when other programs need fish moved or assistance.

Great job and Congratulations!

LOWER SNAKE RIVER COMPENSATION PLAN

STATION OF THE YEAR

FALL CHINOOK ACCLIMATION PROJECT
NEZ PERCE TRIBE

2022

Nathaniel Wiese
LSRCP Project Manager

4/26/2023
Date