

The Yakama Nation's Effort to Return Sockeye Salmon To Cle Elum Lake



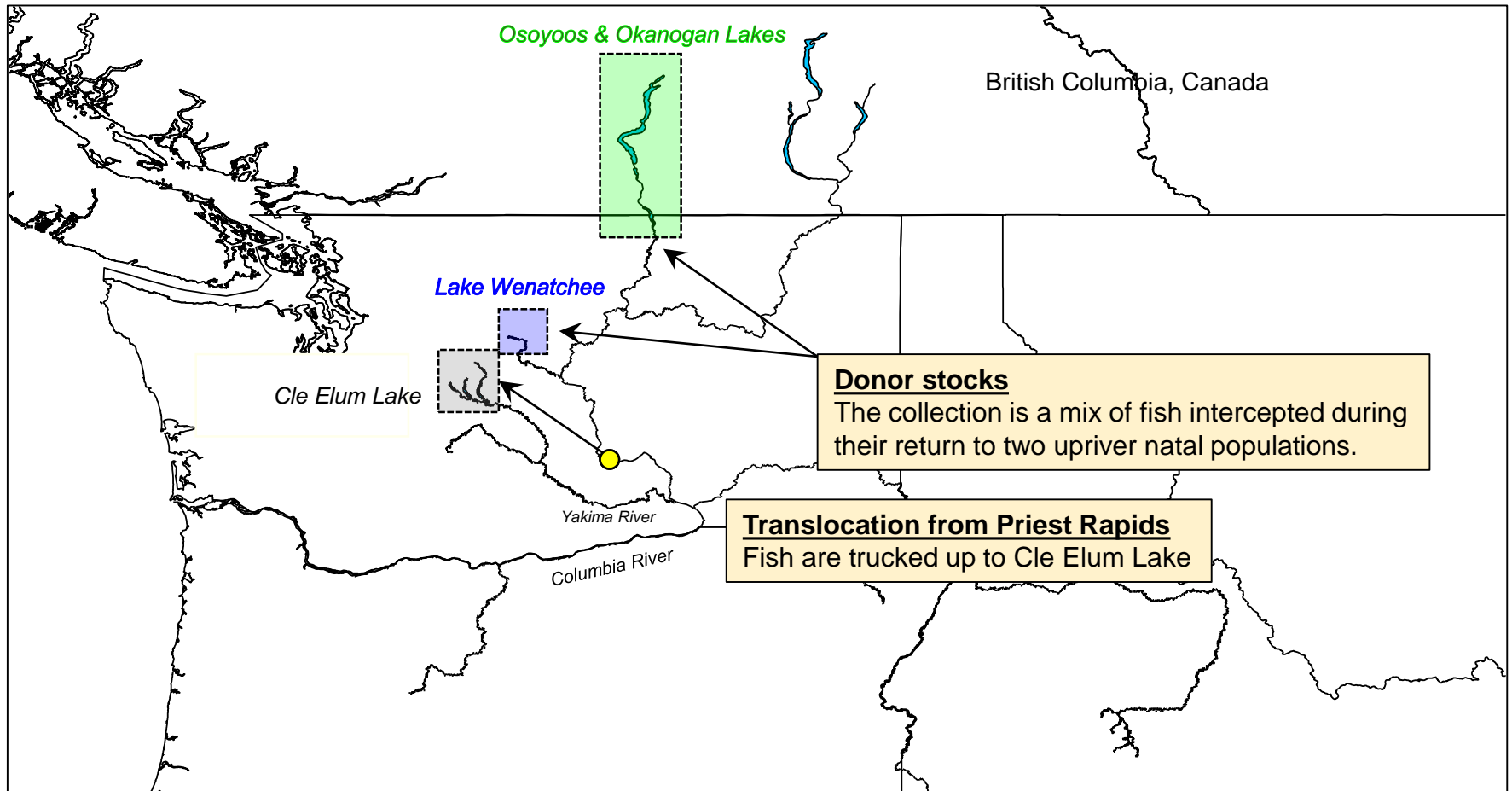
- A. Matala



— BUREAU OF —
RECLAMATION



The program is founded on the translocation of donor stocks



Characteristics of donor stocks

Lake Wenatchee

Osoyoos/Okanogan Lakes

adult return age

- age-4, age-5

- age-3, age-4, age-5

spawn time

- mid September

- mid October

spawning habitat

- cooler; headwater tribs

- warmer, connecting river

*relative abundance

- 20-30%

- 70-80%

lake environment

- Oligotrophic, high elevation

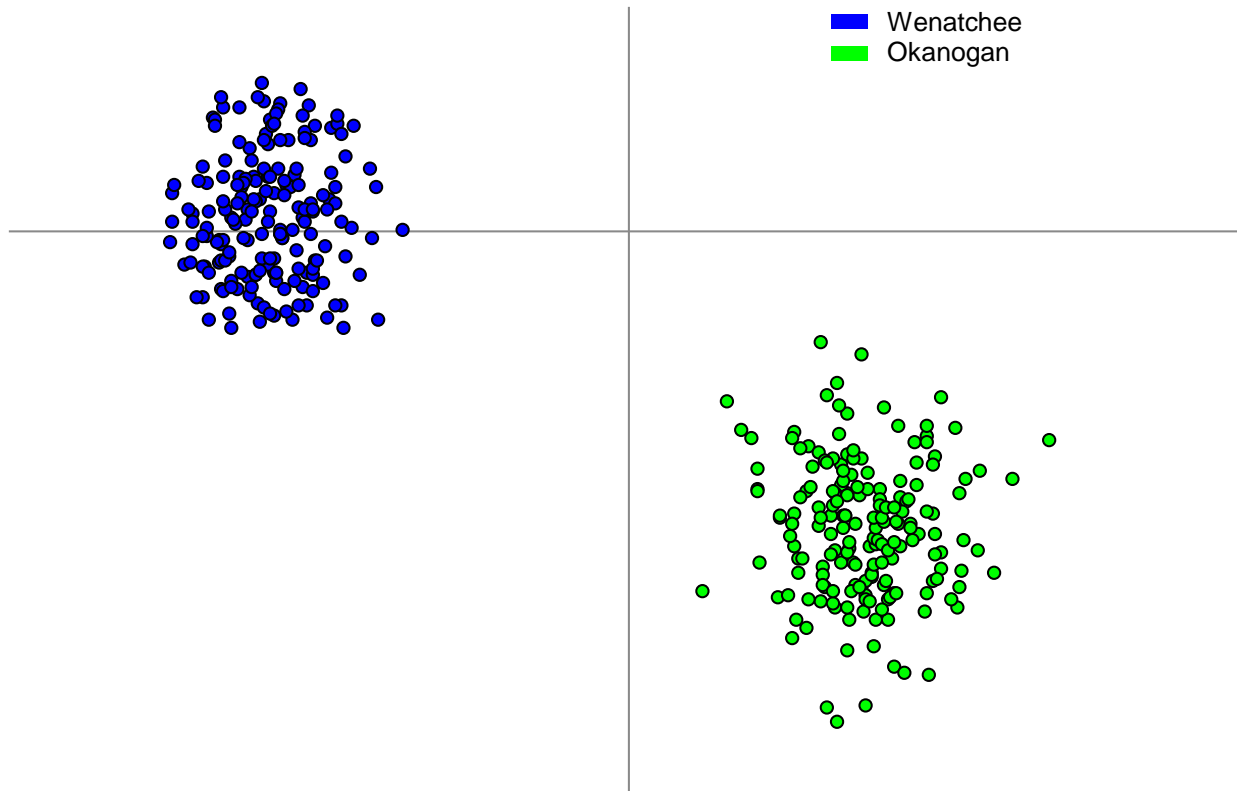
- Eutrophic, low elevation

**Columbia River escapement*



Characteristics of donor stocks

- Strongly differentiated populations (PCoA plot using genetic distance)

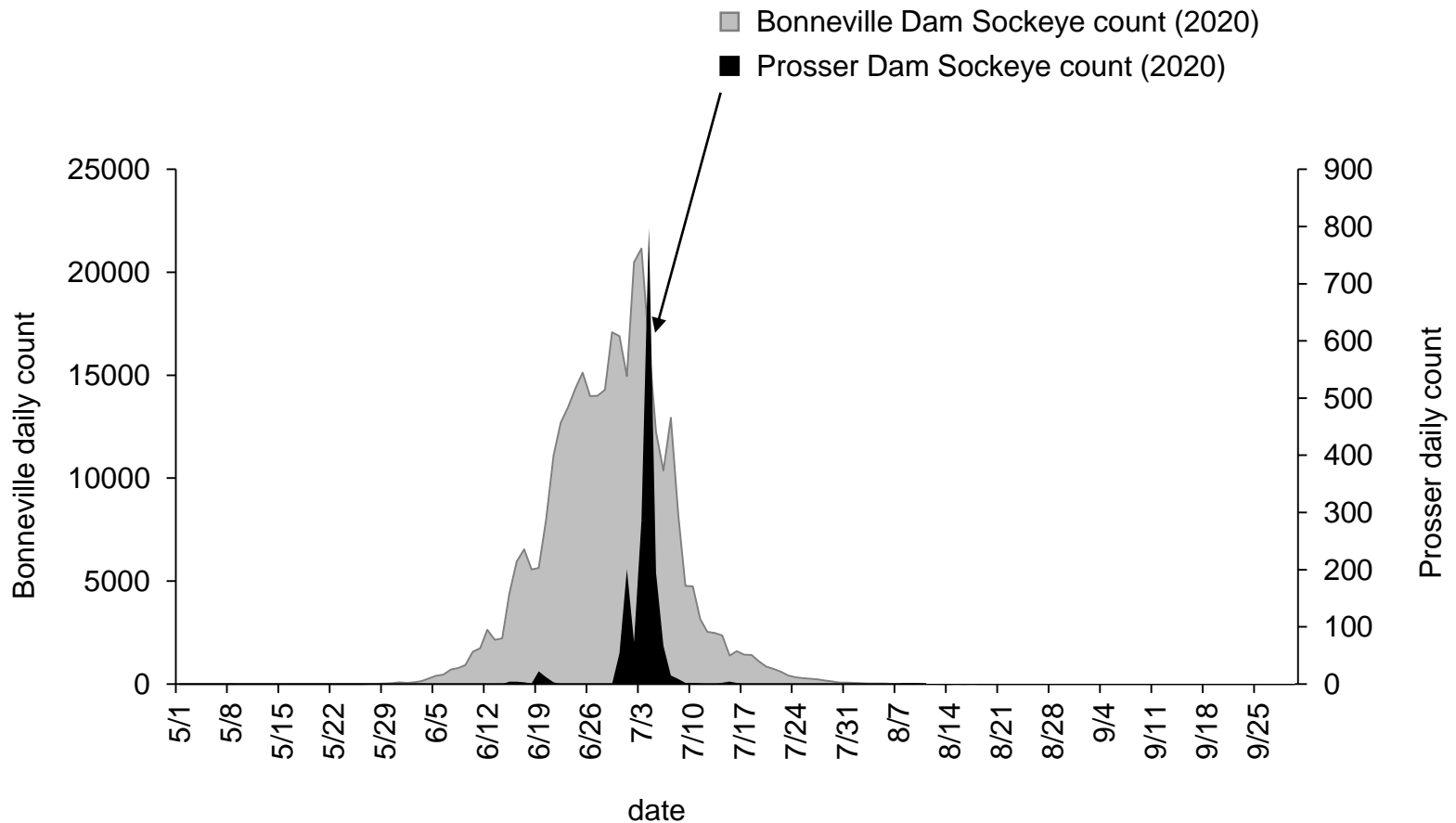


Adult demographics & characteristics



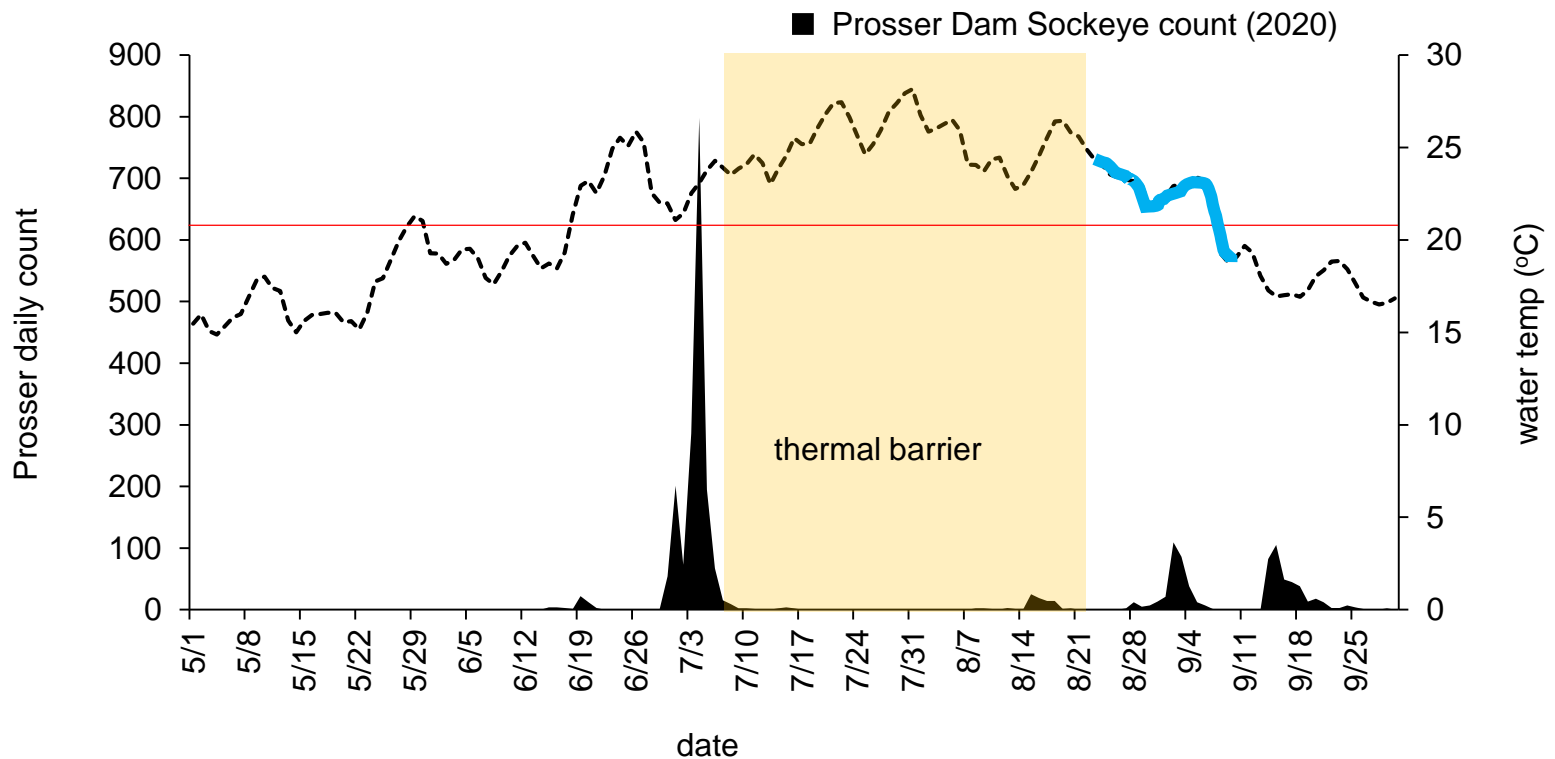
Sockeye return time to the Columbia River

- The early return of natural origin fish to the Yakima River follows closely on the heels of the Bonneville return



Return timing - Yakima River NOR

- Elevated water temperatures (>21°C) starting in late June deter salmon from entering the Yakima River
- Fish begin migrating up the Yakima River again in late summer as temperatures drop; this phenomenon has occurred each year since 2015



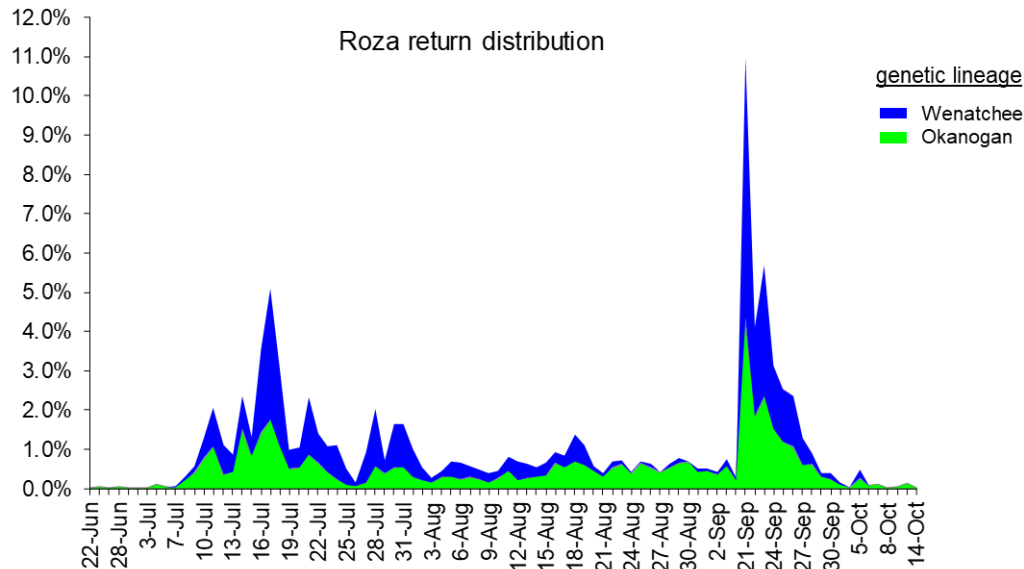
Delayed migration is associated with

- Elevated pre-spawn mortality rate



Delayed migration has resulting in

- **Elevated stray rates & wandering**
- no stock specific difference in return time
- two stocks may be differentially impacted by delayed migration



2020 Bonneville estimate for the Yakima return = 11,790 (C.I. 5,995 - 18,951)

2020 count at Roza = 4,379

Even at the low end of the confidence range >1500 Yakima Sockeye were MIA

Delayed migration has resulting in

- Greater risk of predation
- Greater occurrence of pathology



Adult demographics & characteristics

A release of translocated fish from Priest Rapids July 2022



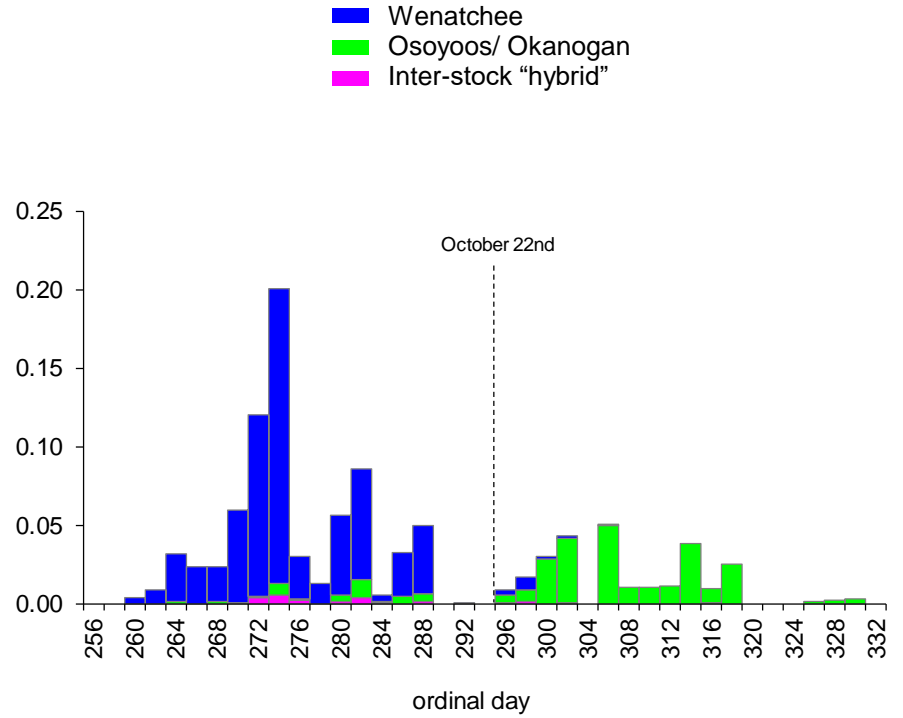
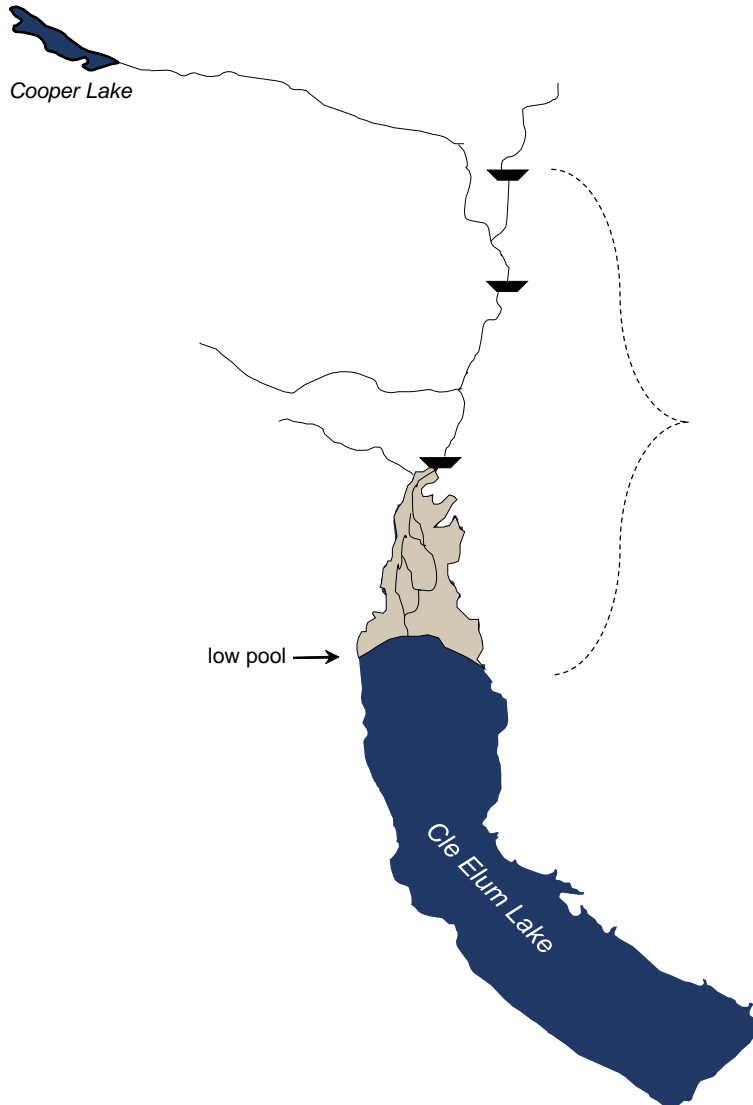
Spawning Ground Surveys:

Stock-specific difference in use of habitat



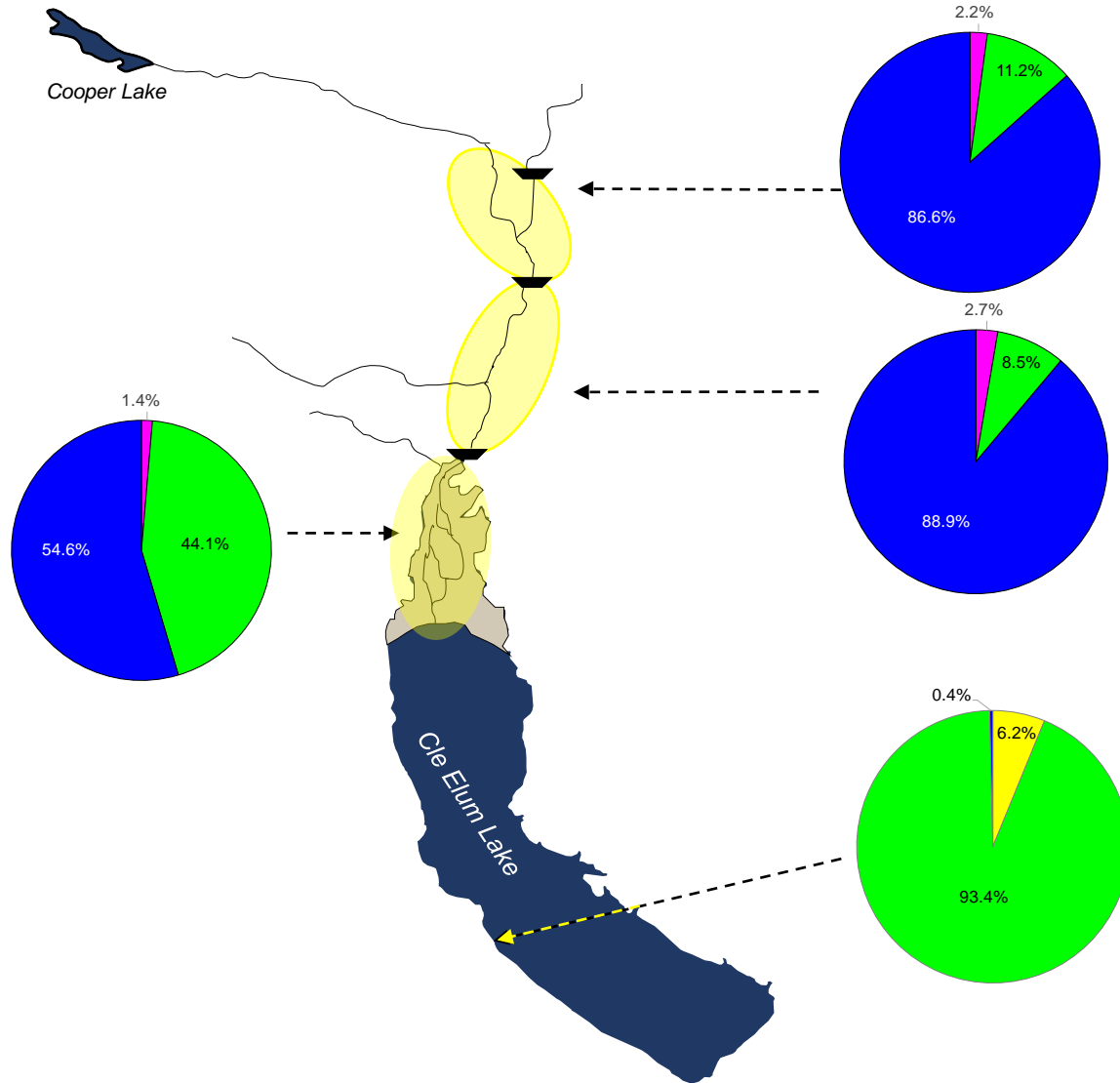
Spawning Ground Surveys:

temporal assortative mating



Spawning Ground Surveys:

spatial distribution differs



**Tangent.....
Pink sockeye caught in
Priest Rapids trap last year??**



Please let me know later if you know why

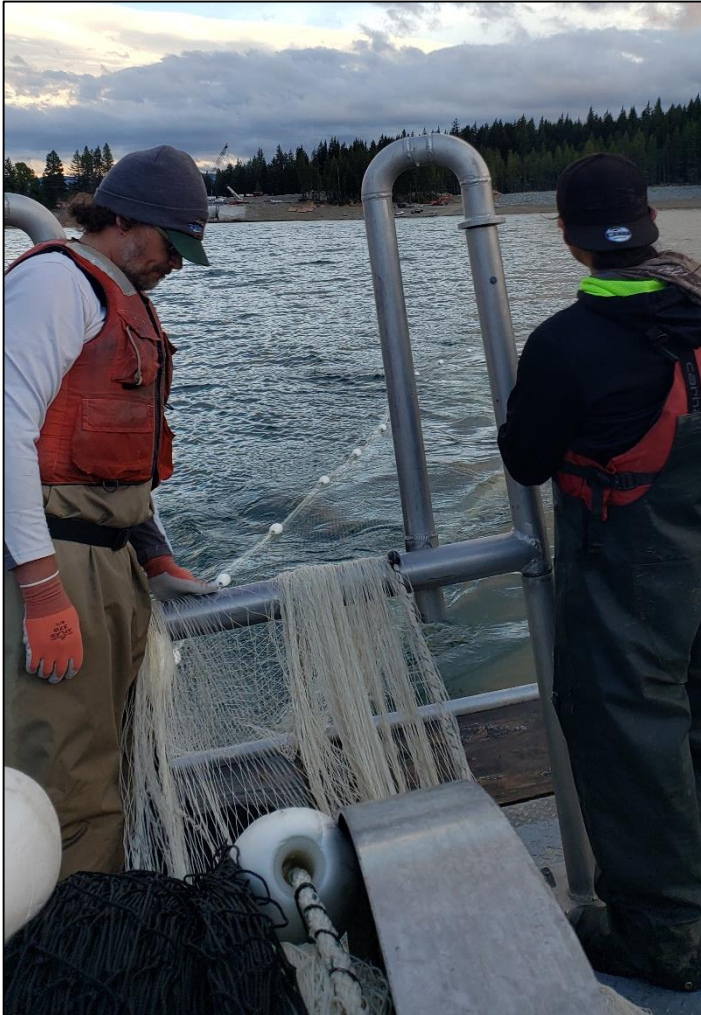
Juvenile demographics & characteristics



Lampara seining:

Started in 2021 to PIT-tag and track smolt emigration

(thanks to all the volunteers)



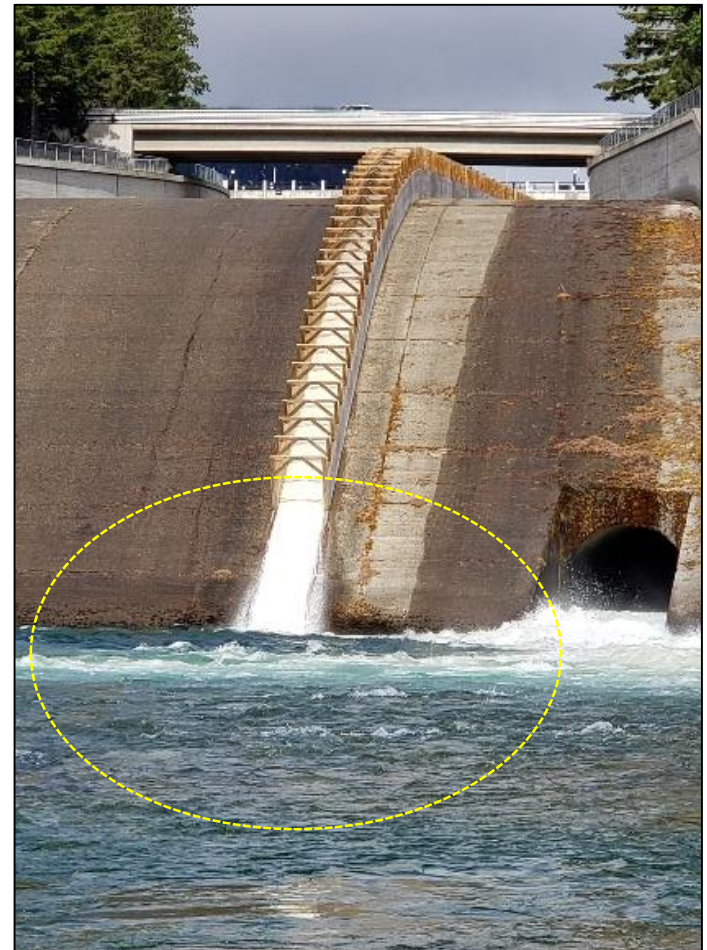
Juvenile & Smolt Monitoring: Emigration

- Bypass flume on the dam spillway
- This route is BRUTAL!
- Mortality may be as high as 50%



severe trauma in tail race samples

- torn operculum
- missing eyes
- descaling
- disorientation

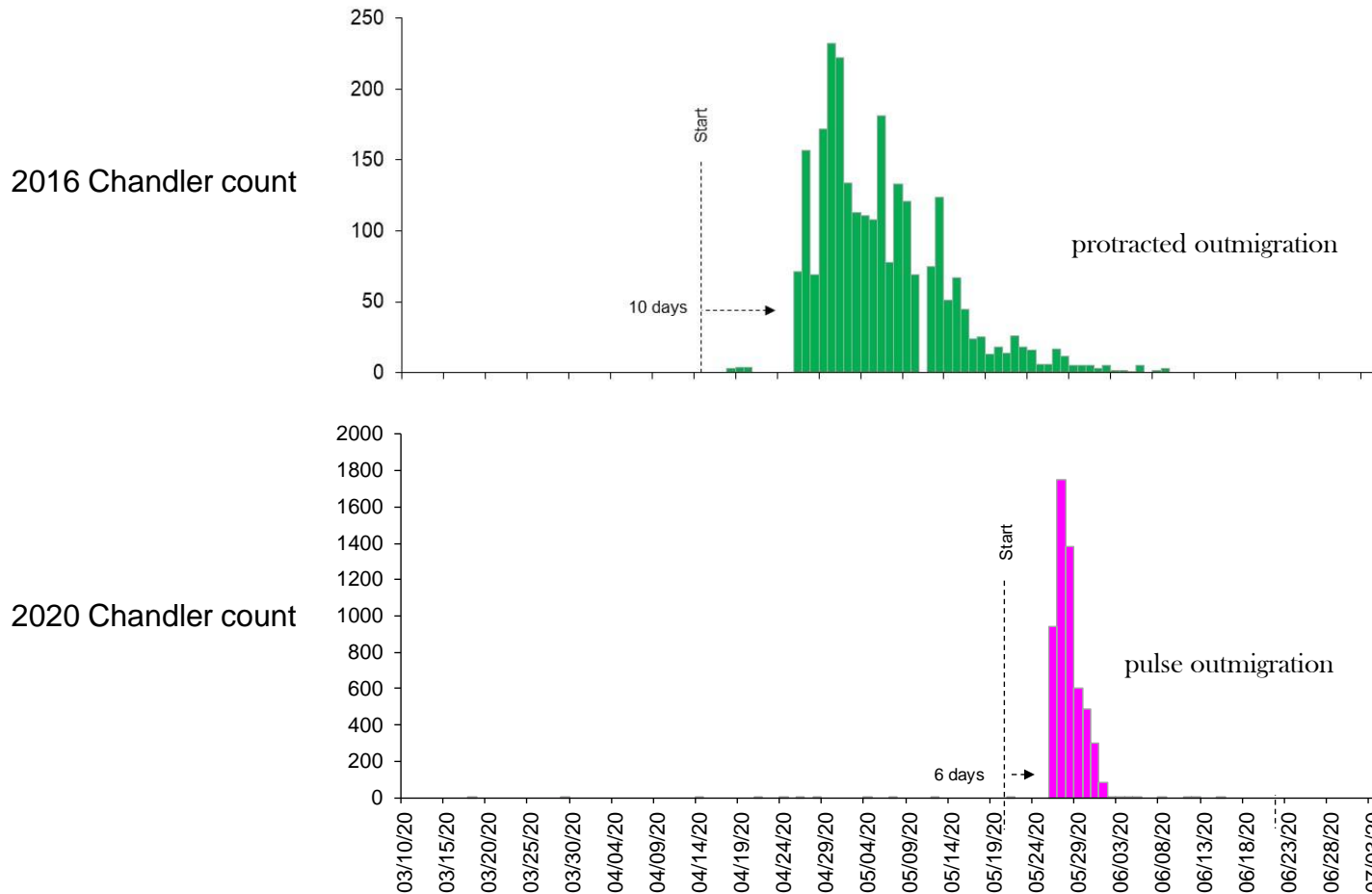


Night Video in the tail race (2022)



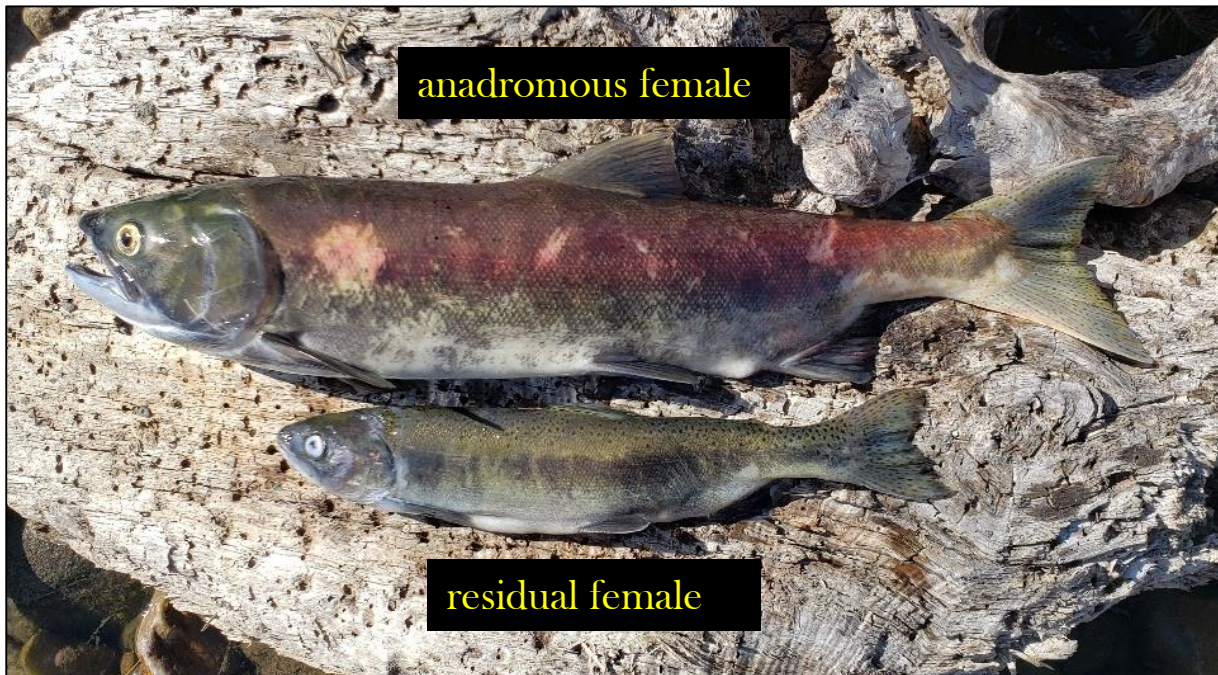
Smolt Emigration via the bypass flume

- Start date for flume operations varies annually
- Emigration timing doesn't follow a natural schedule
- “Residualizing” is being observed more frequently

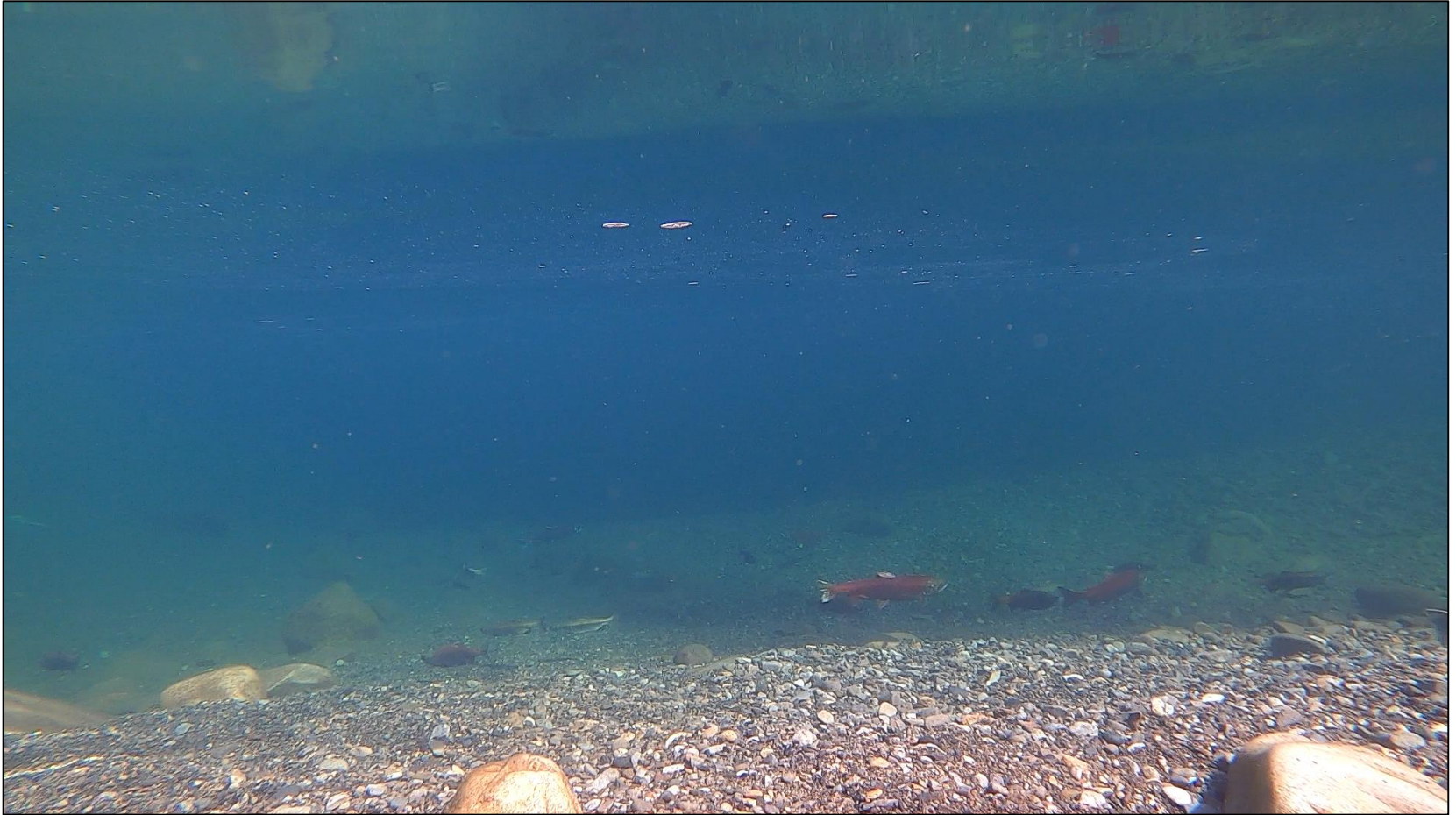


“Holdover” adults: Fish that residualize and spawn

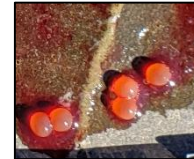
- Consequence of no emigration access (2019)
- Consequence of late emigration access
- Natural phenomenon



“Holdover” adults: Can outnumber anadromous

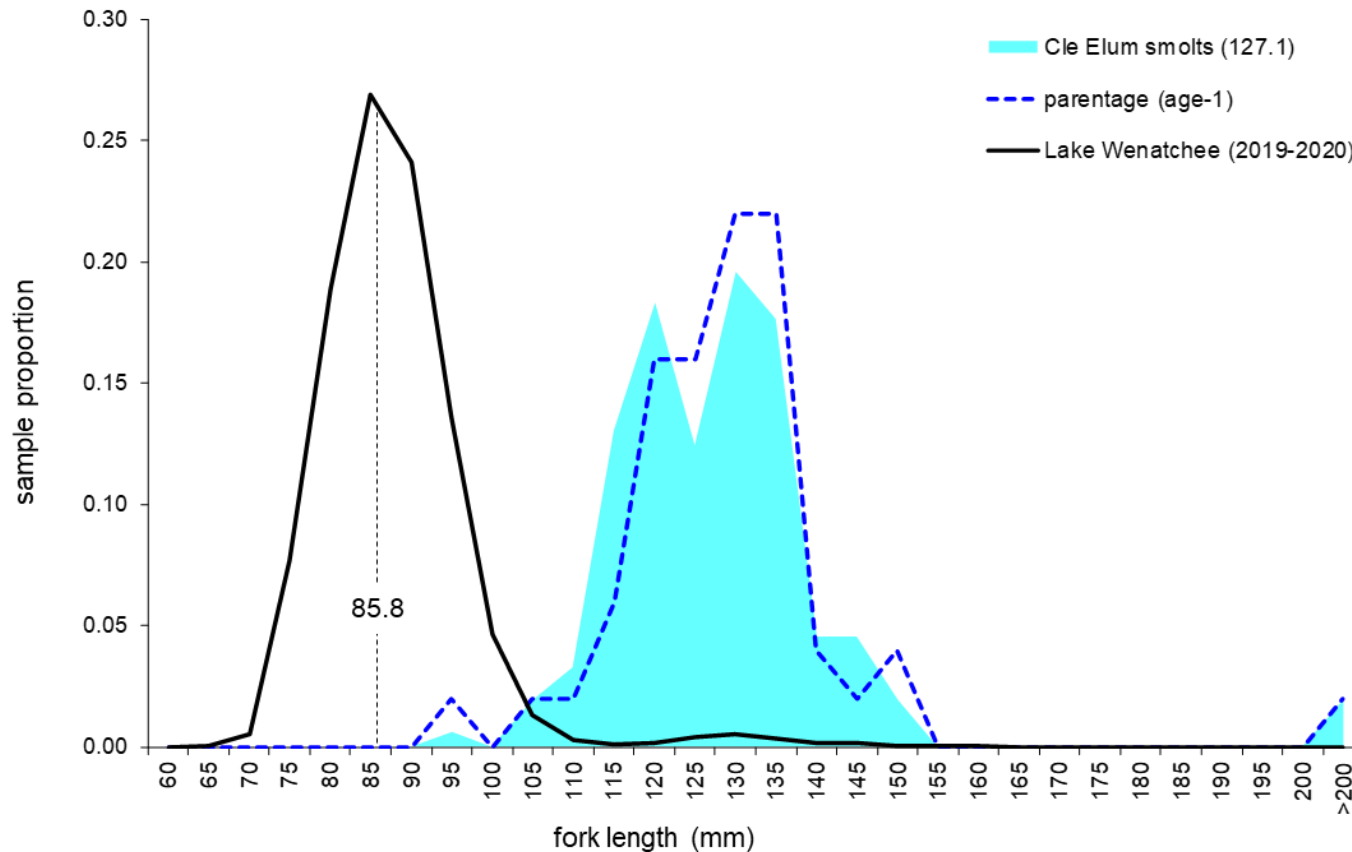


Egg size appears comparable



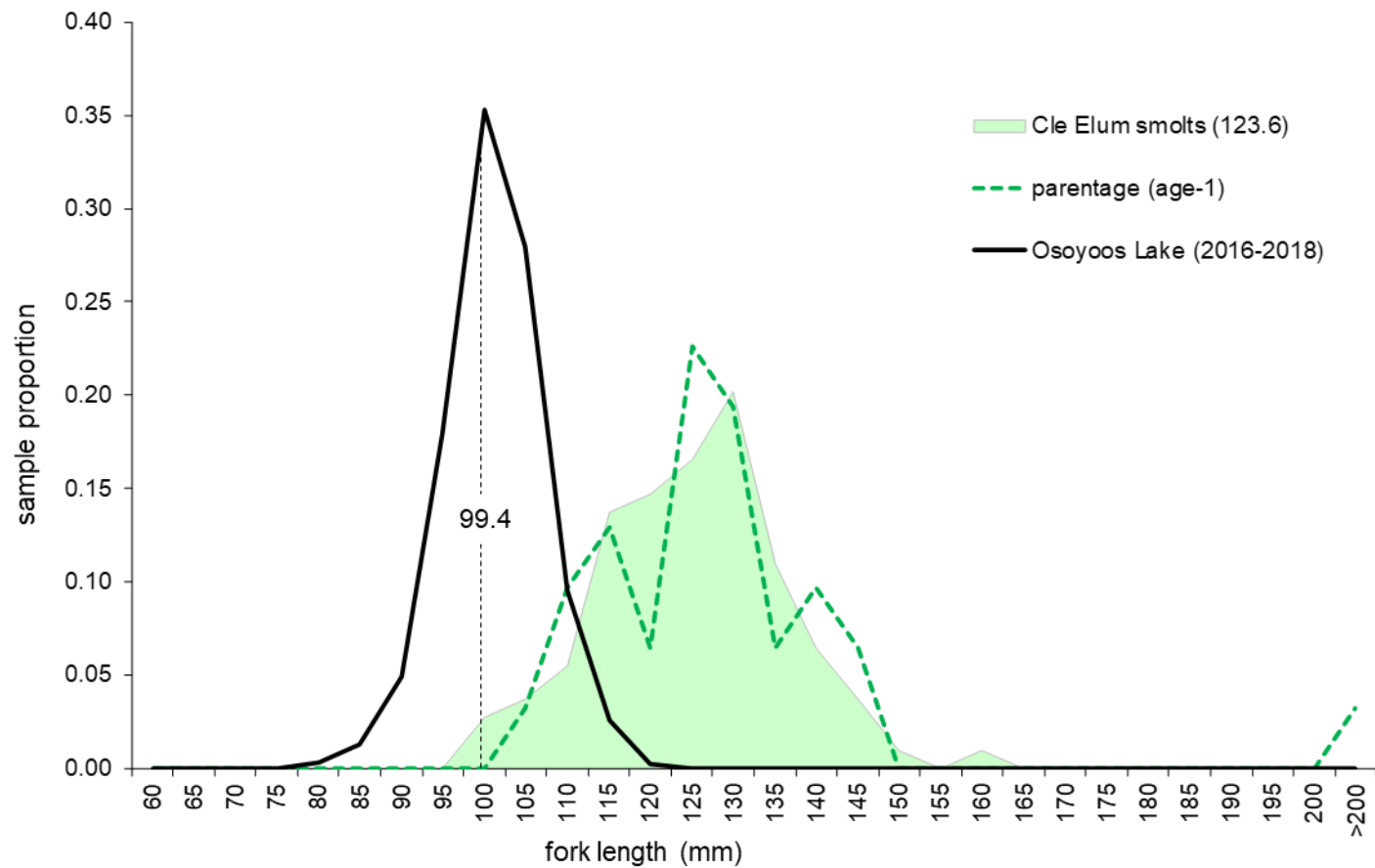
Juvenile Growth & Smolt Monitoring

The rearing environment of Cle Elum Lake produces larger fish than donor population



Juvenile Growth & Smolt Monitoring

The rearing environment of Cle Elum Lake produces larger fish than donor population

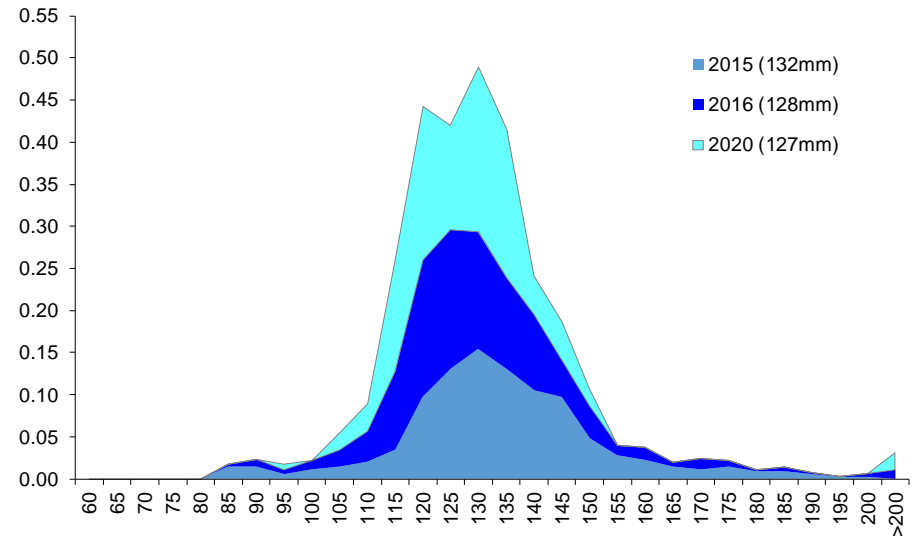
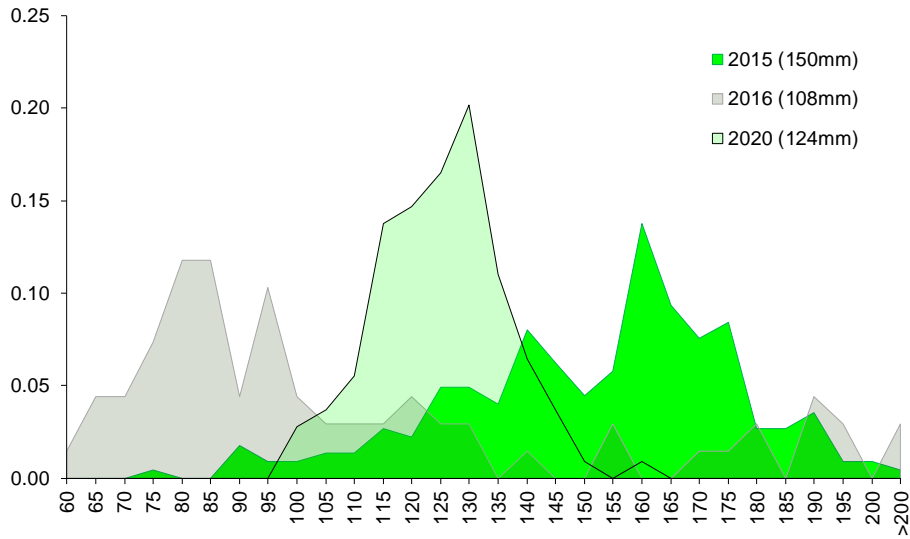


Juvenile Growth & Smolt Monitoring

Size-at-age differs between stocks: spawning habitat? emergence time?

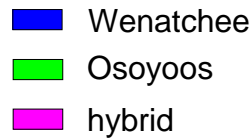
significant variation

uniform

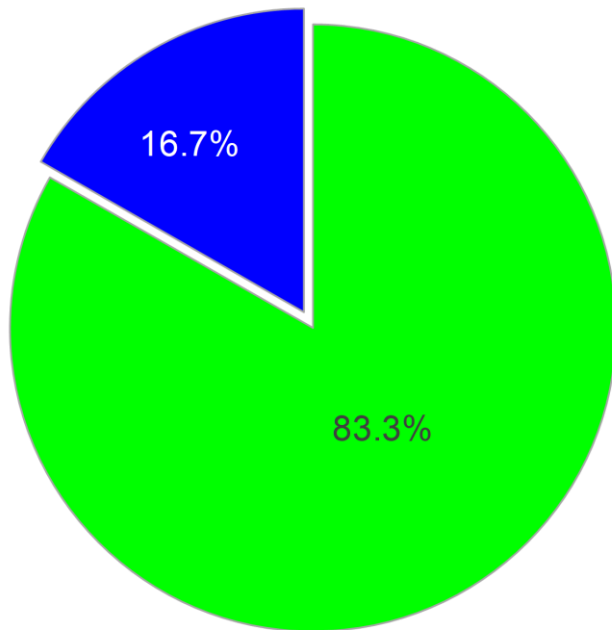


Juvenile Production & Lake Rearing

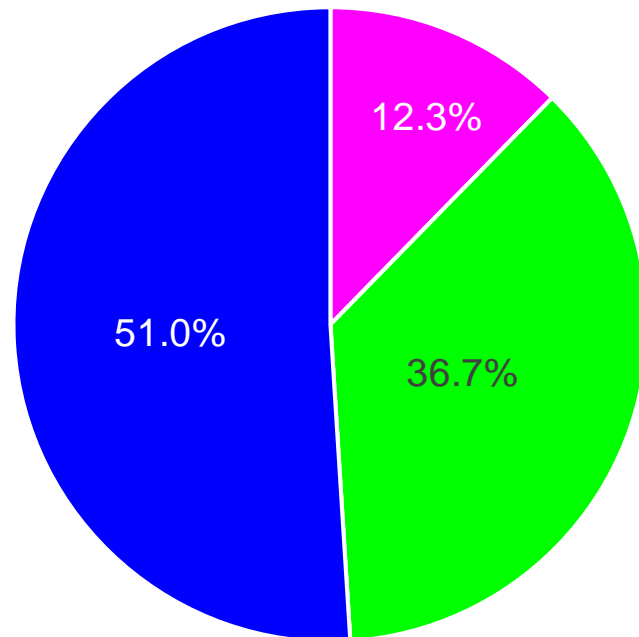
favors Wenatchee lineage.....but why?



Brood year 2018
total spawners



age-1+ smolt emigrants (2020)



Demographic differences spurred further Investigation

- Monitoring early life stage survival

digging artificial redds



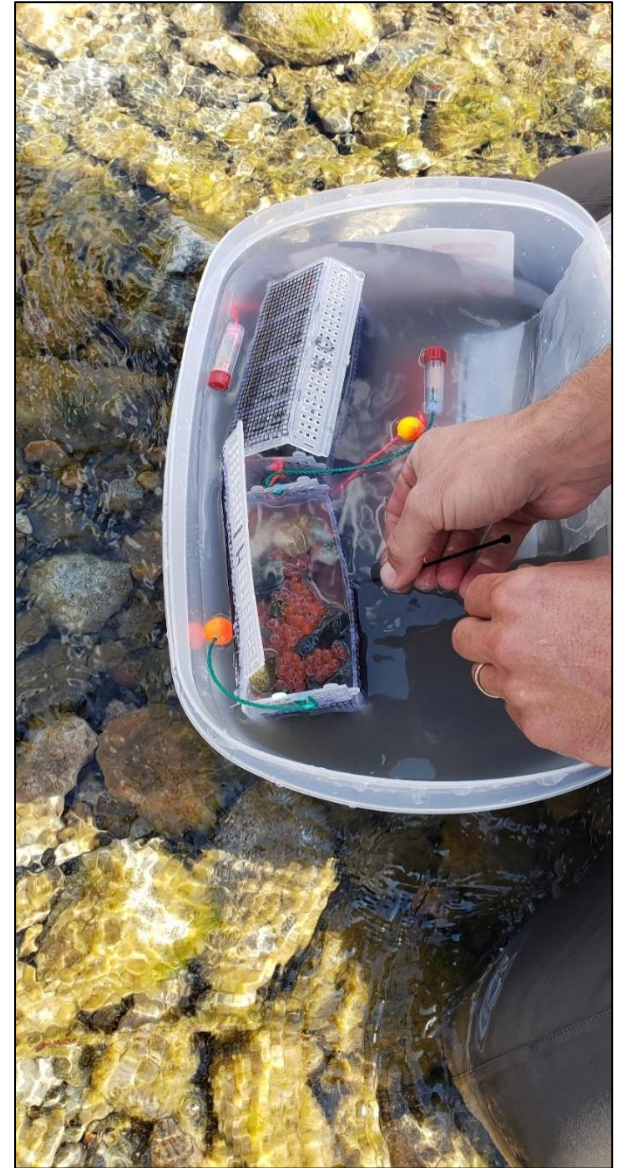
collecting brood



streamside spawning



preparing egg boxes



Study is in progress; Results Pending

Recover egg boxes from artificial redds – record survival

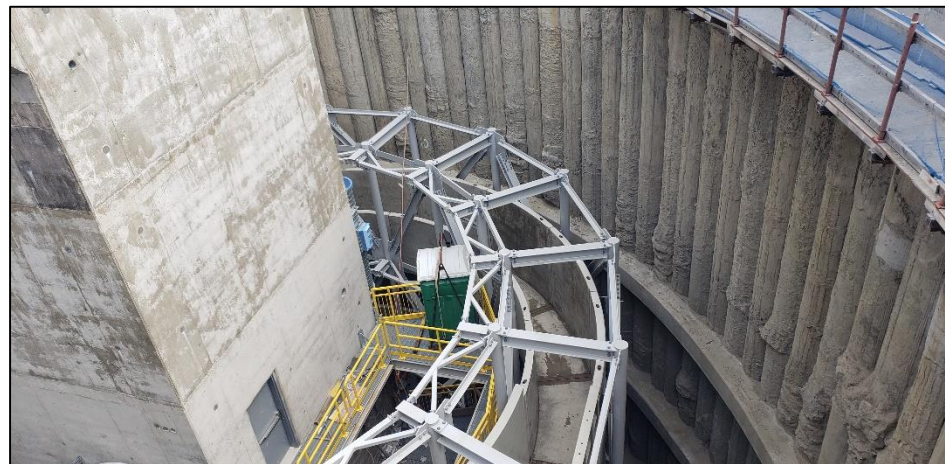
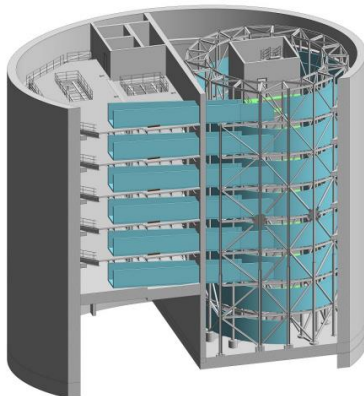


Innovative Juvenile Passage: the HELIX

- Remedy for high passage mortality
- Remedy for delayed emigration schedule



Bureau of Reclamation



Innovative Juvenile Passage: the HELIX

- Remedy for high passage mortality
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**There is much more that I don't have time to share
So I'll leave you with this.....**



Thanks!

Brian Saluskin - YN
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Ted Martin - YN
Quin James - YN
Michael Fiander - YN
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Philip Haner - USGS
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Paul Hoffarth - WDFW
Rod O'connor - GPUD



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