Reproductive Success of Transported Chinook Salmon in the Nisqually River

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Two stories of Nisqually Chinook salmon

Reproductive success and population genetics

- Data = variants (alleles) at genomic locations (loci) that are variable among individuals and show allele frequency variability among populations

- Methods = Parentage, Genetic Stock ID, PCA

Story 1 – reproductive success of transported fish

Photo: Walker Duvall NIT

Photo: Alan Chapman, Lummi Nation

Photo: Walker Duvall NIT

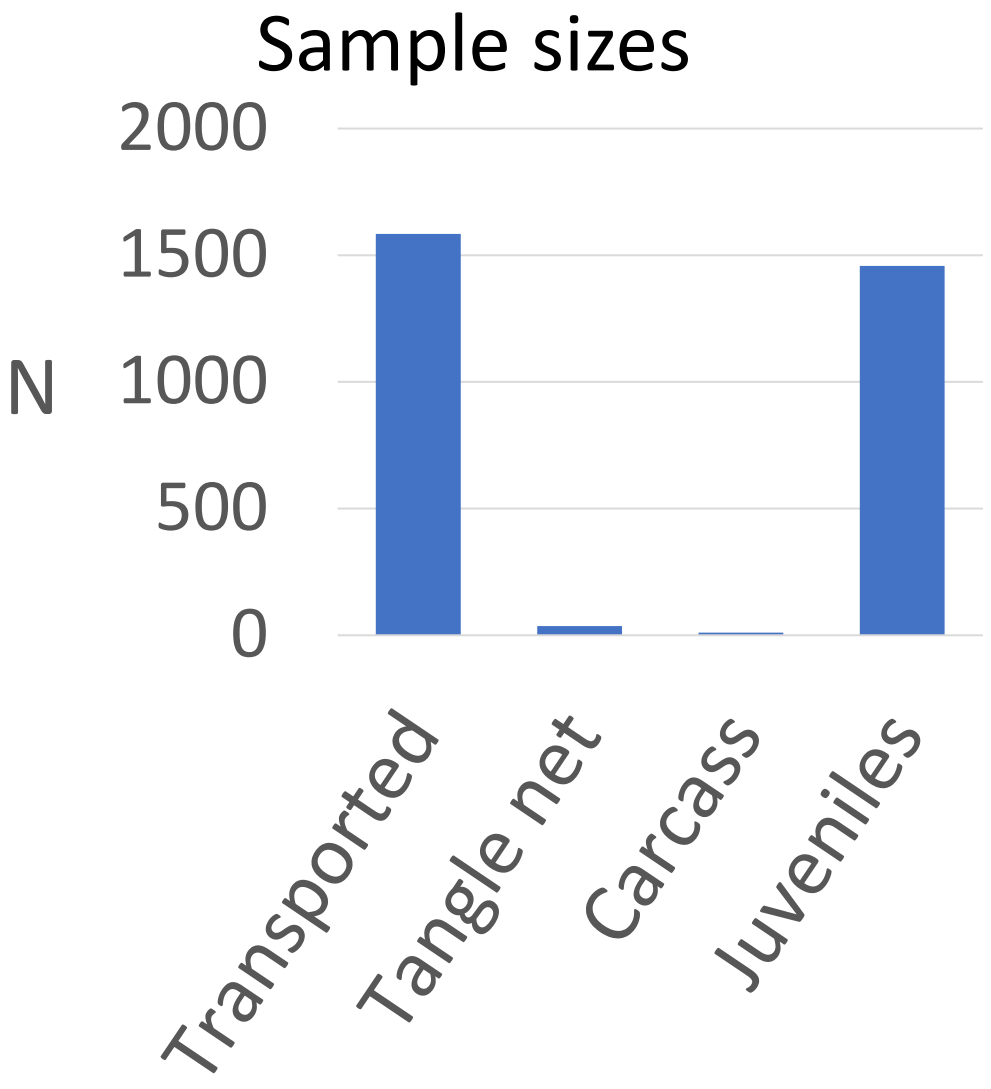
Photo: Pete Topping WDFW

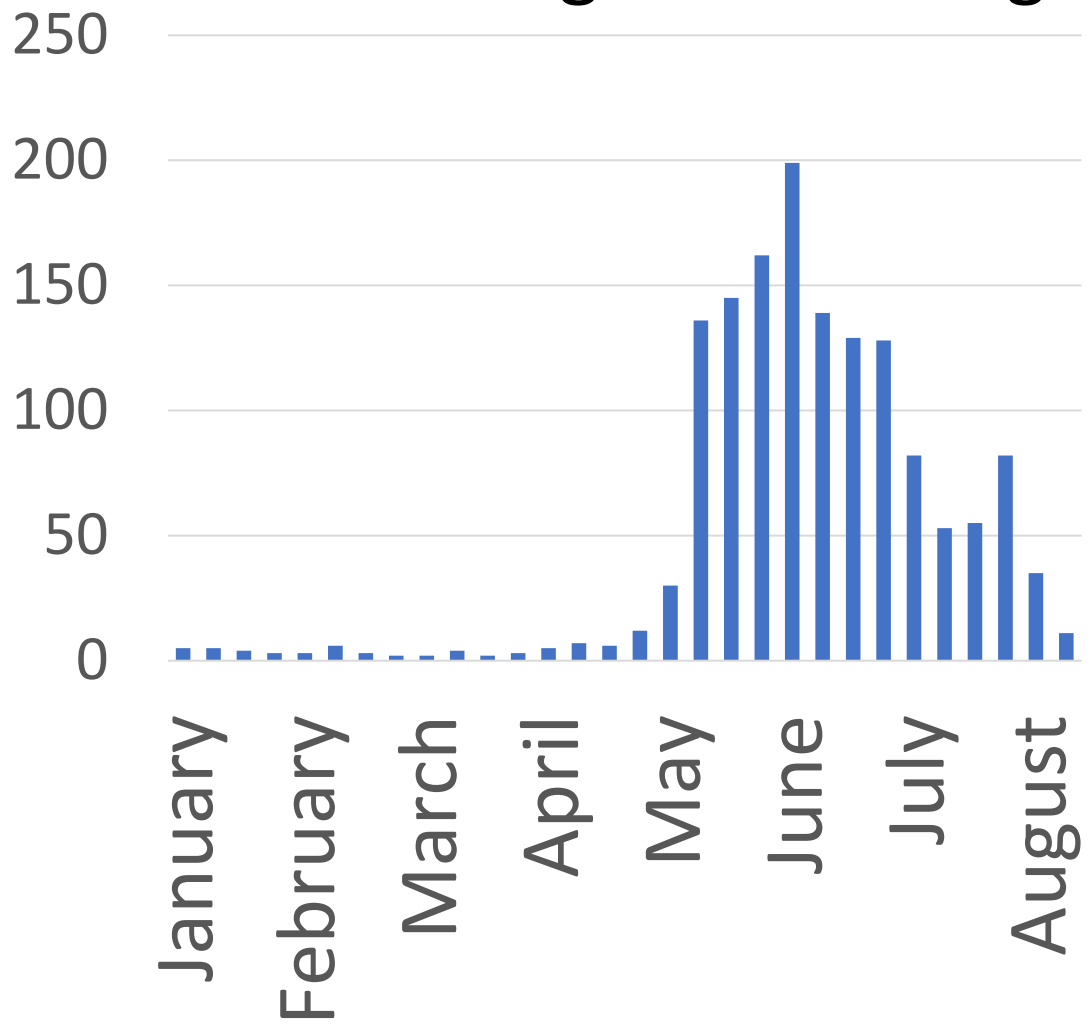
Story 1 – reproductive success of transported fish

- Primary question: do transported spawners from the hatchery successfully produce juvenile outmigrant offspring?

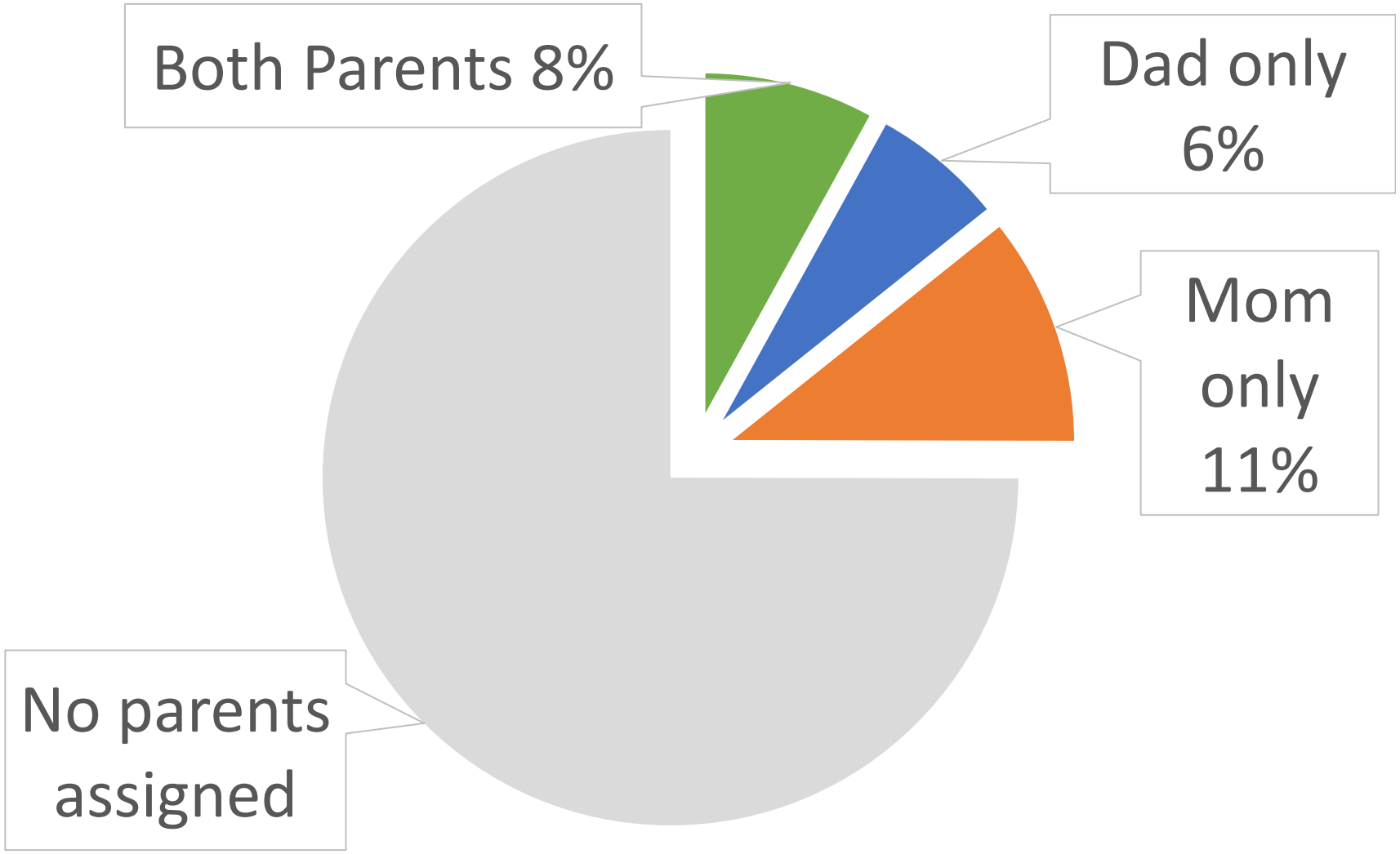
- Secondary question: how does the reproductive success of transported fish compare to spawners intercepted in the tangle nets and to those that swam to the spawning grounds without being caught in the tangle net?

Sample size overall was very large, but was small for Tangle net and Carcass treatments



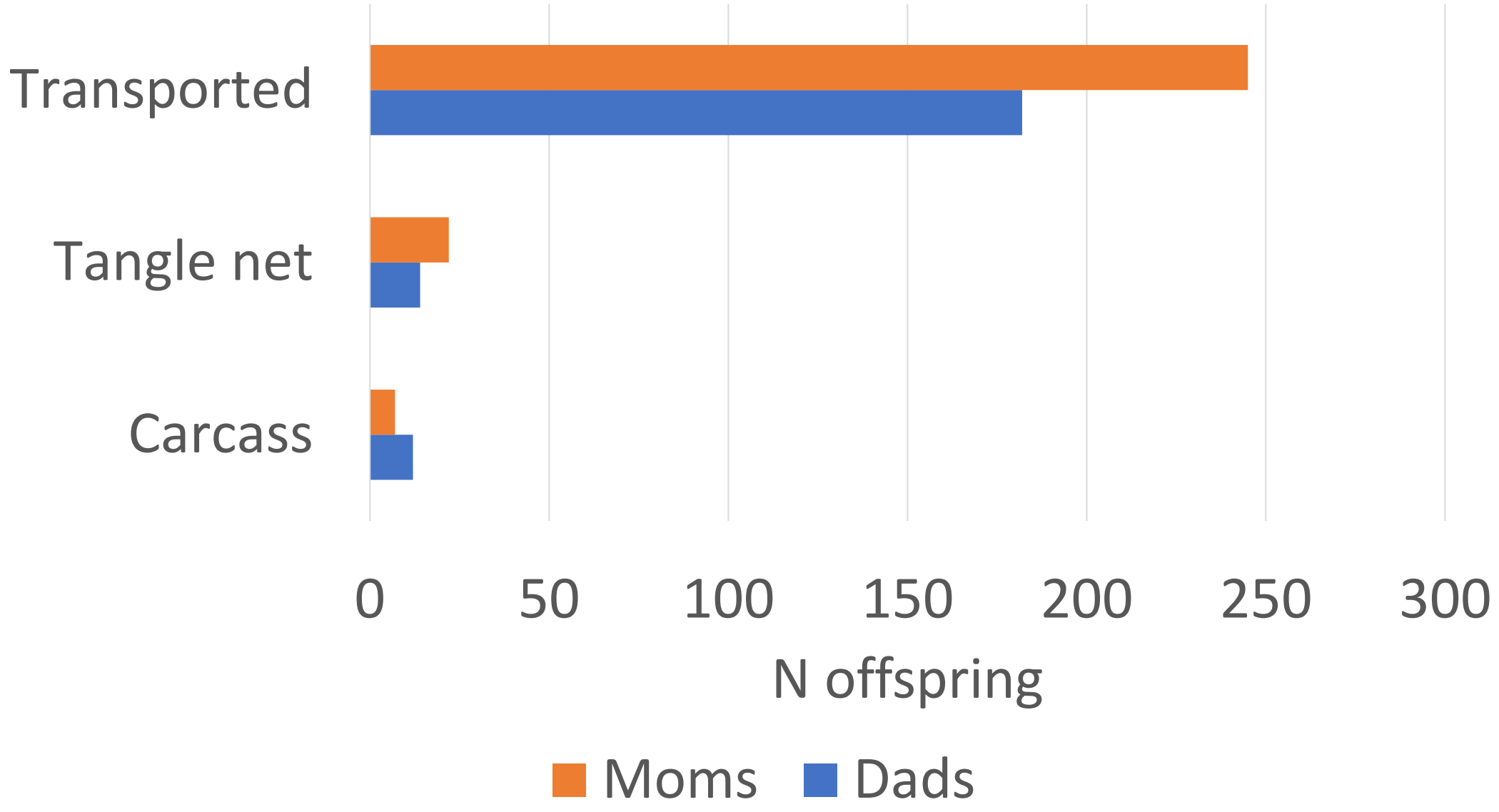


Parentage results summary

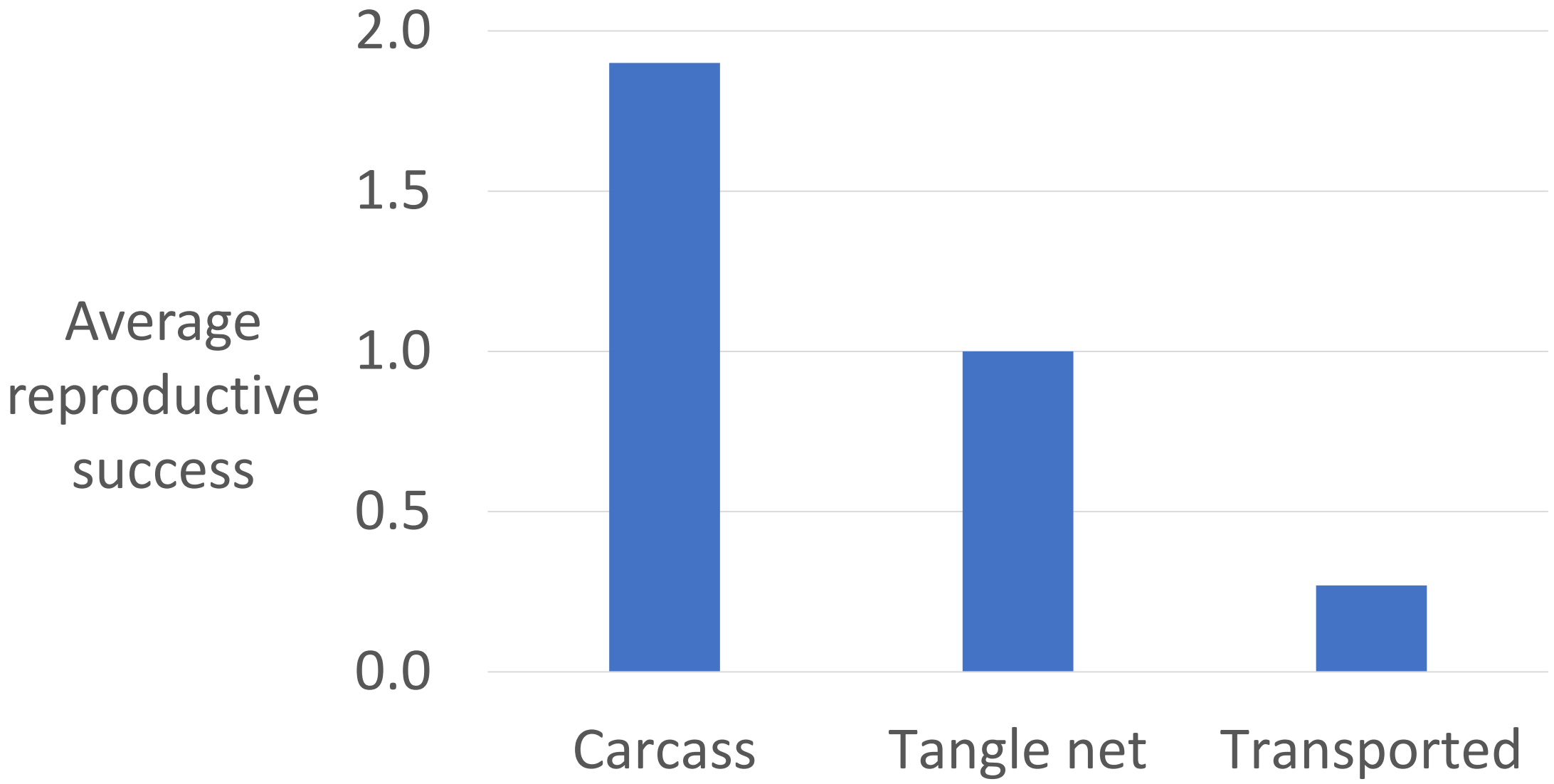


Total 1,458 juvenile offspring

Primary question: transported fish successfully produced juvenile offspring



Secondary question: reproductive success of transported fish was lower than that of other treatments



Story 2 – who are the Nisqually Chinook salmon

Photos: Walker Duvall, NIT

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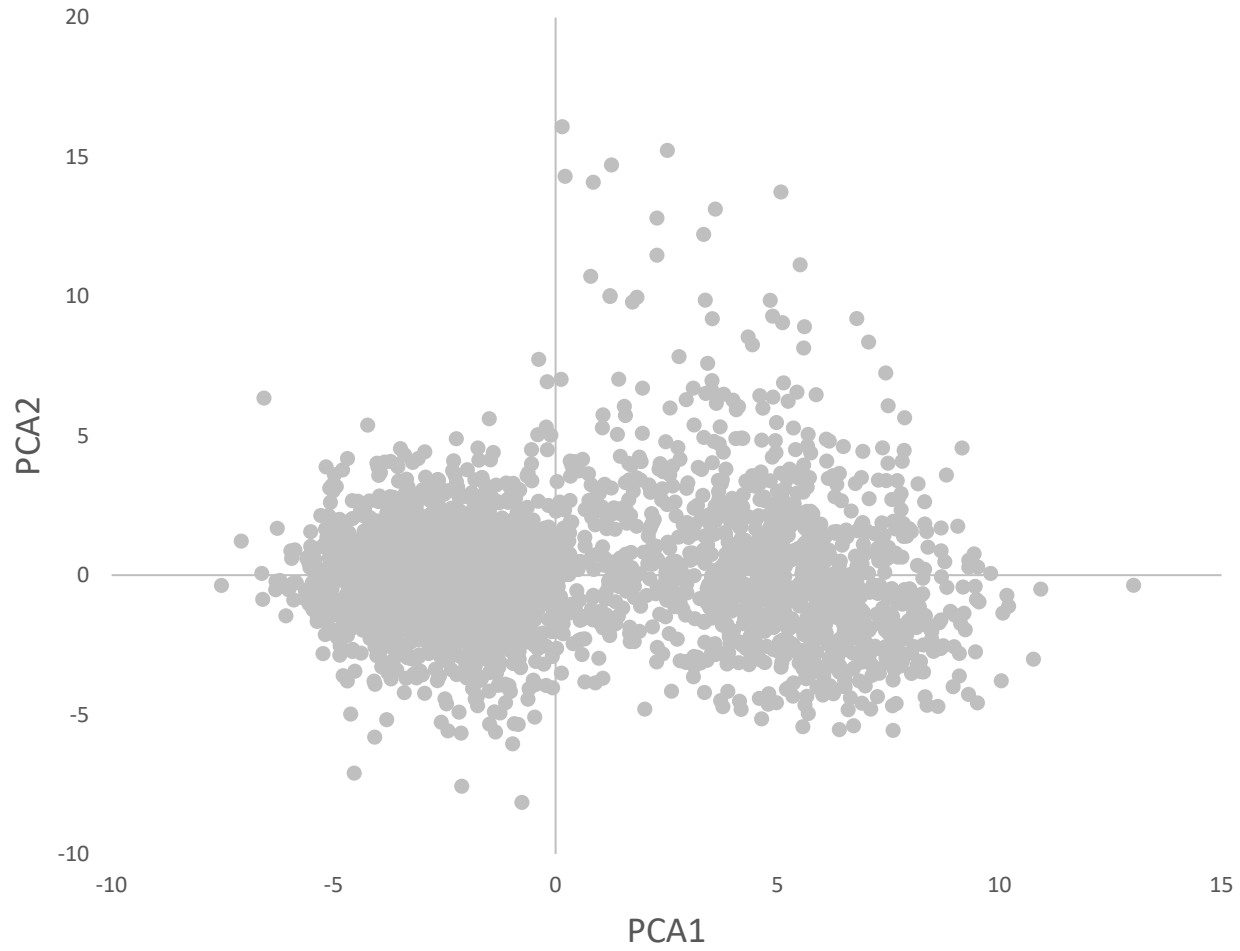
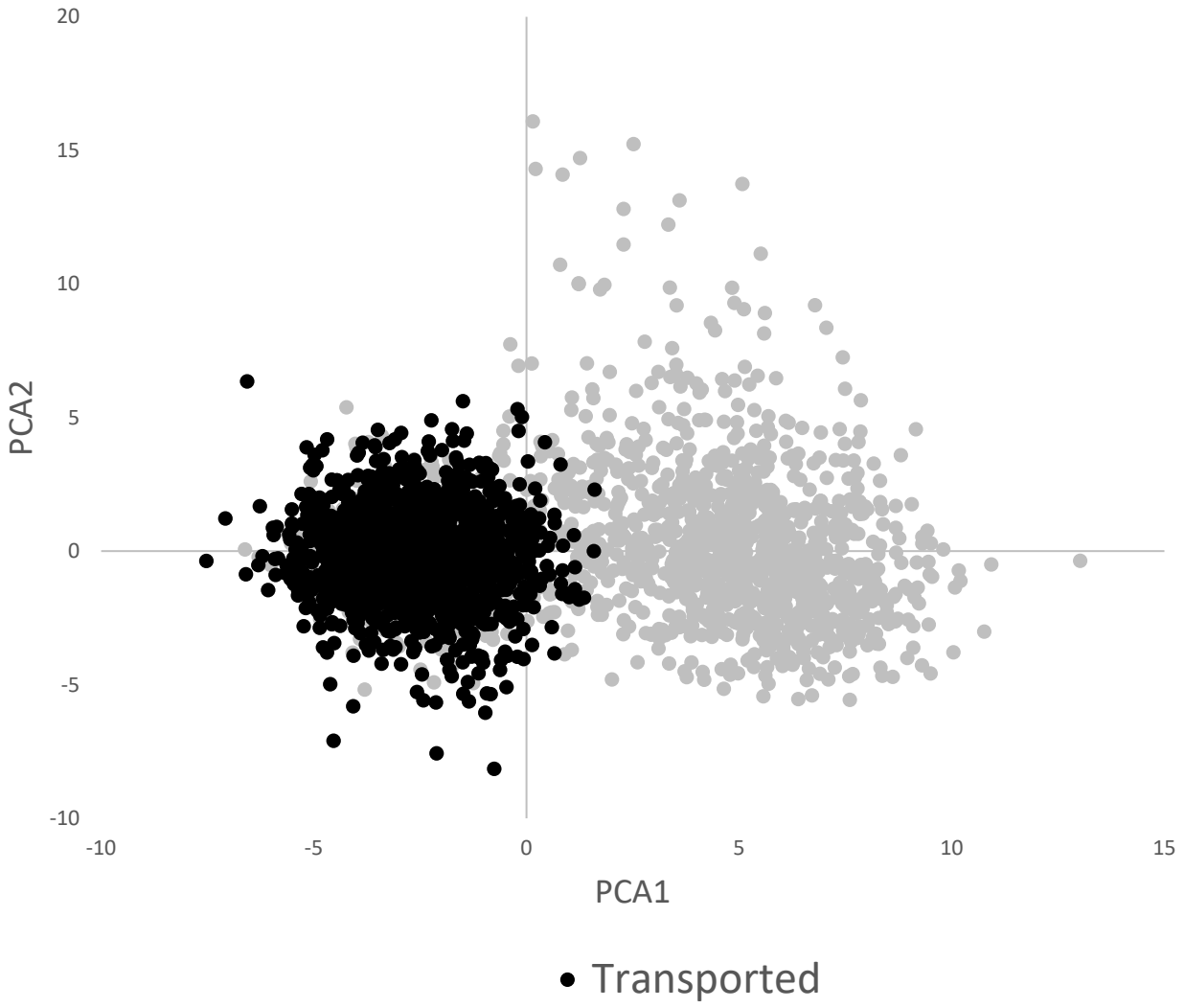
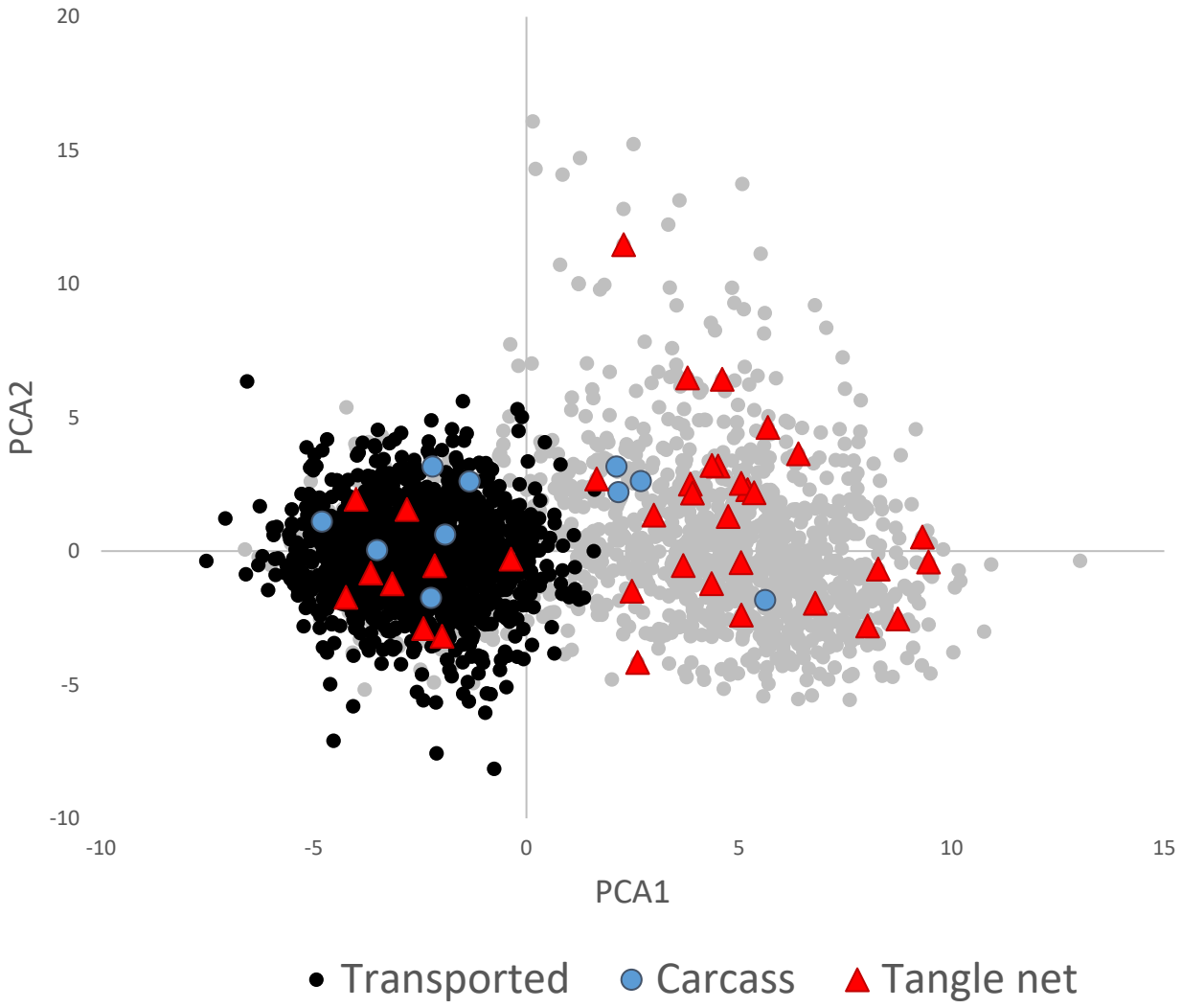


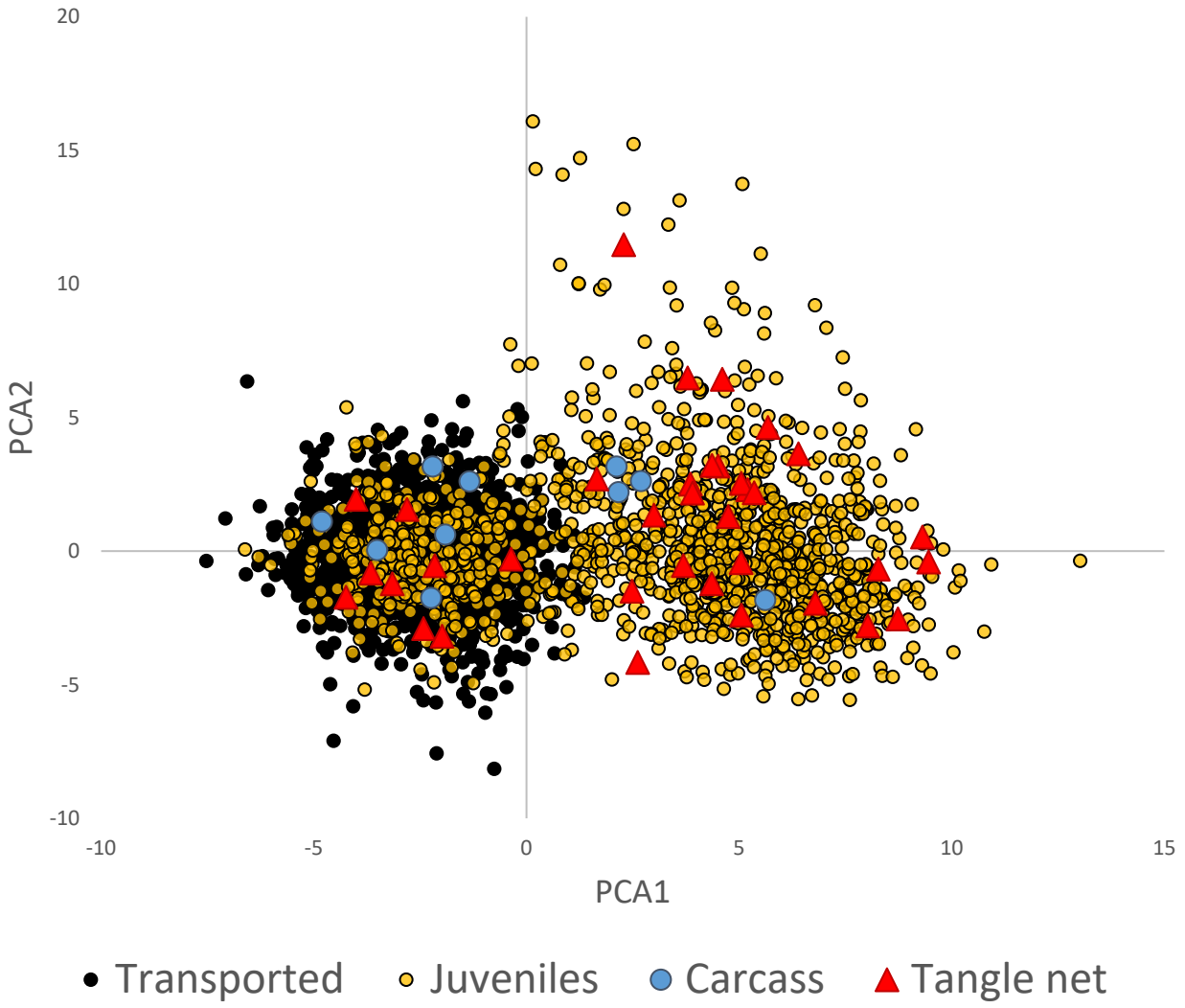
Transported adult Chinook salmon form one cluster



Adult Chinook salmon found on the spawning grounds or caught in the tangle net fall into both clusters

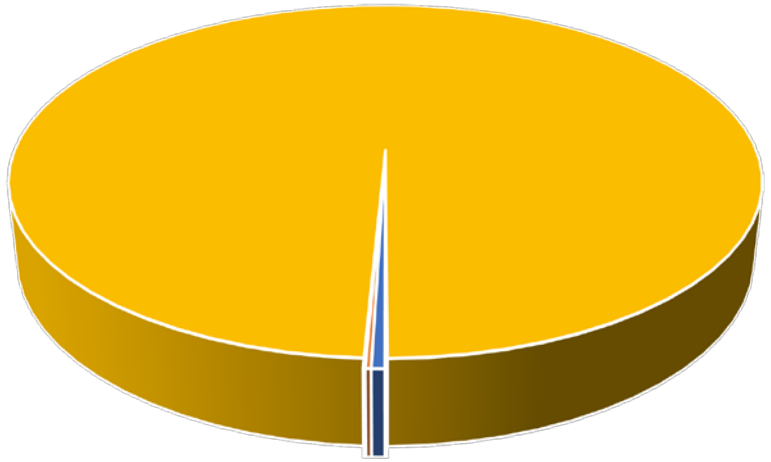


Outmigrating juvenile Chinook salmon also fall into both clusters



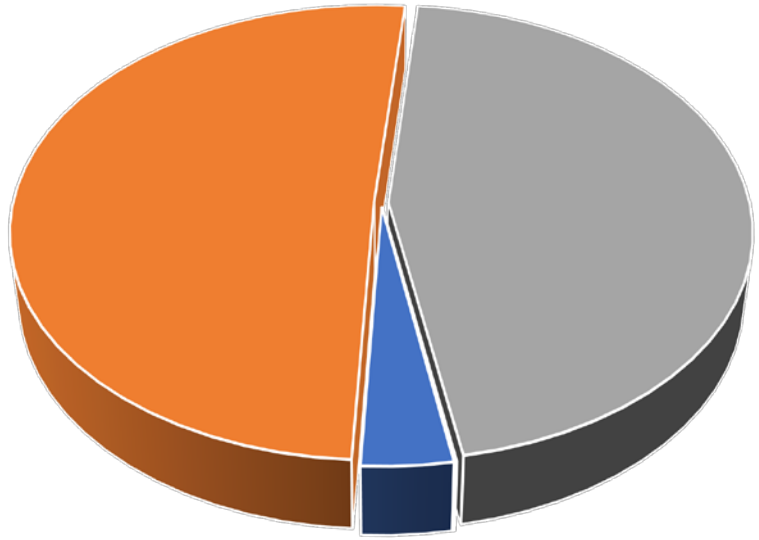
The mystery cluster mostly assigns to the Salish Sea, in particular to the North Puget Sound aggregate

Coastwide baseline



Lower Columbia-fall
Lower Columbia-sp
Mid OR-Coast
Salish Sea
SE-Alaska

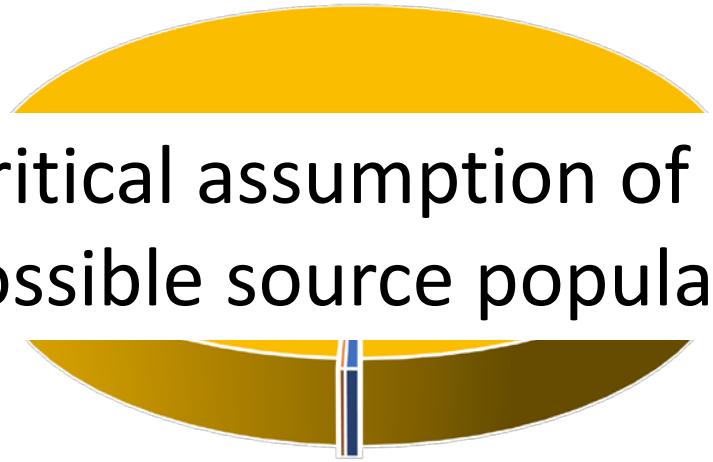
Puget Sound baseline



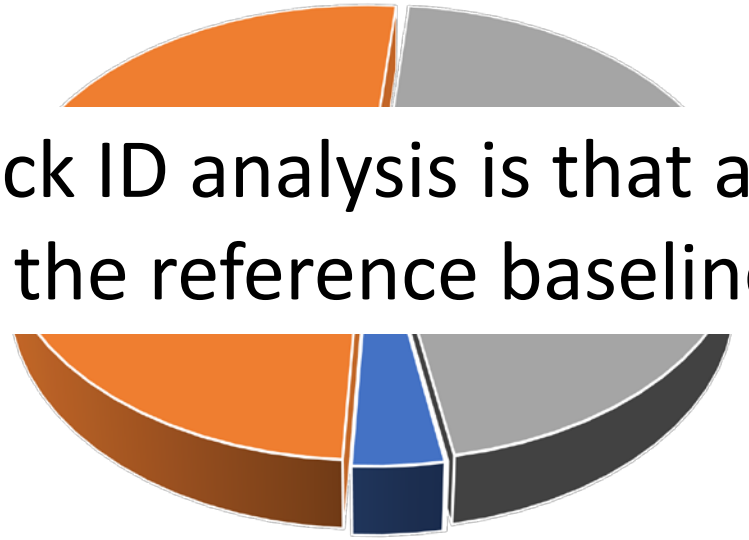
British Columbia
North Puget Sound
PS Fall Aggregate
Strait of Juan de Fuca

Assumptions of the analysis need to be tested

Coastwide baseline



Puget Sound baseline



Critical assumption of Genetic Stock ID analysis is that all possible source populations are in the reference baseline.

Summary: Nisqually Chinook salmon are very interesting

- Transported surplus hatchery Chinook salmon successfully produce offspring when spawning naturally
- A genetically different group of Chinook salmon exist in the Nisqually River
  - Who they are is still unknown, but genetically assign to Puget Sound

Work is ongoing to dig deeper into both stories

- Evaluating annual variation in reproductive success
  - Multiple years of transported, tangle net, carcass, and juvenile samples
- Testing assumptions of genetic stock ID analysis
- Doing more extensive genetic analysis to evaluate the ancestry of the mysterious group of fish

Thank you!