

Statewide Washington *Oncorhynchus mykiss* SNP baseline development

**Todd R. Seamons and
Kenneth I. Warheit**

**Washington Department of Fish and Wildlife
Science Division**



Partners/collaborators/funders/sample collectors

- Maureen Small WDFW
- Todd Kassler WDFW
- Bonneville Power Administration
- Douglas County PUD
- Colville Tribe
- Seattle City Light
- Spokane Tribe
- Yakama Nation
- NOAA
- Upper Skagit Indian Tribe
- Bill McMillan WFC
- Skagit River system Cooperative

- Holly McLellan Colville Tribe
- Chuck Lee WDFW
- Gabe Temple WDFW
- Chris Frederiksen Yakama Nation
- Charlie Snow WDFW
- Ben Goodman WDFW
- Steelhead Trout Club of Washington
- University of Washington
- Jeff Stephenson CRITFC
- WDFW general fund
- Quinault Tribe
- WDFW regional staff

WA State *Oncorhynchus mykiss* genetic resources

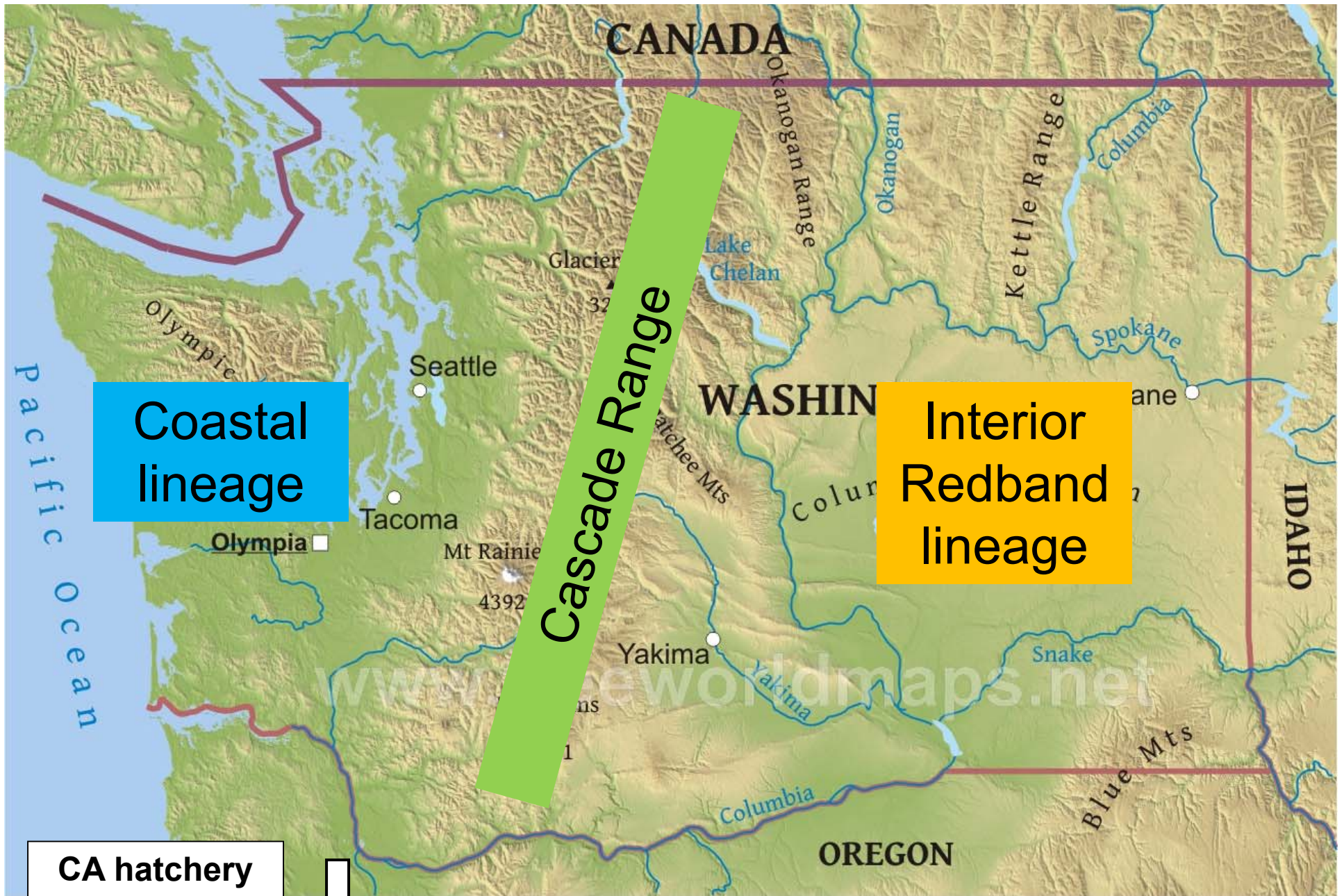


- Non-native hatchery rainbow trout
- Two lineages of native steelhead/rainbow trout
 - Hatchery broodstocks
 - Wild anadromous/resident populations
 - Rainbow trout isolated upstream of barriers
- 189 SNP loci
 - (+ 3 loci that identify *O. clarki* and hybrids)

Two major lineages of native *O. mykiss*



- Interior redband *O. mykiss gairdneri*
 - Summer-run
 - Resident
 - Up- and downstream of natural barriers
- Coastal *O. mykiss irideus*
 - Summer-run
 - Winter-run
 - Resident
 - Up- and downstream of natural barriers



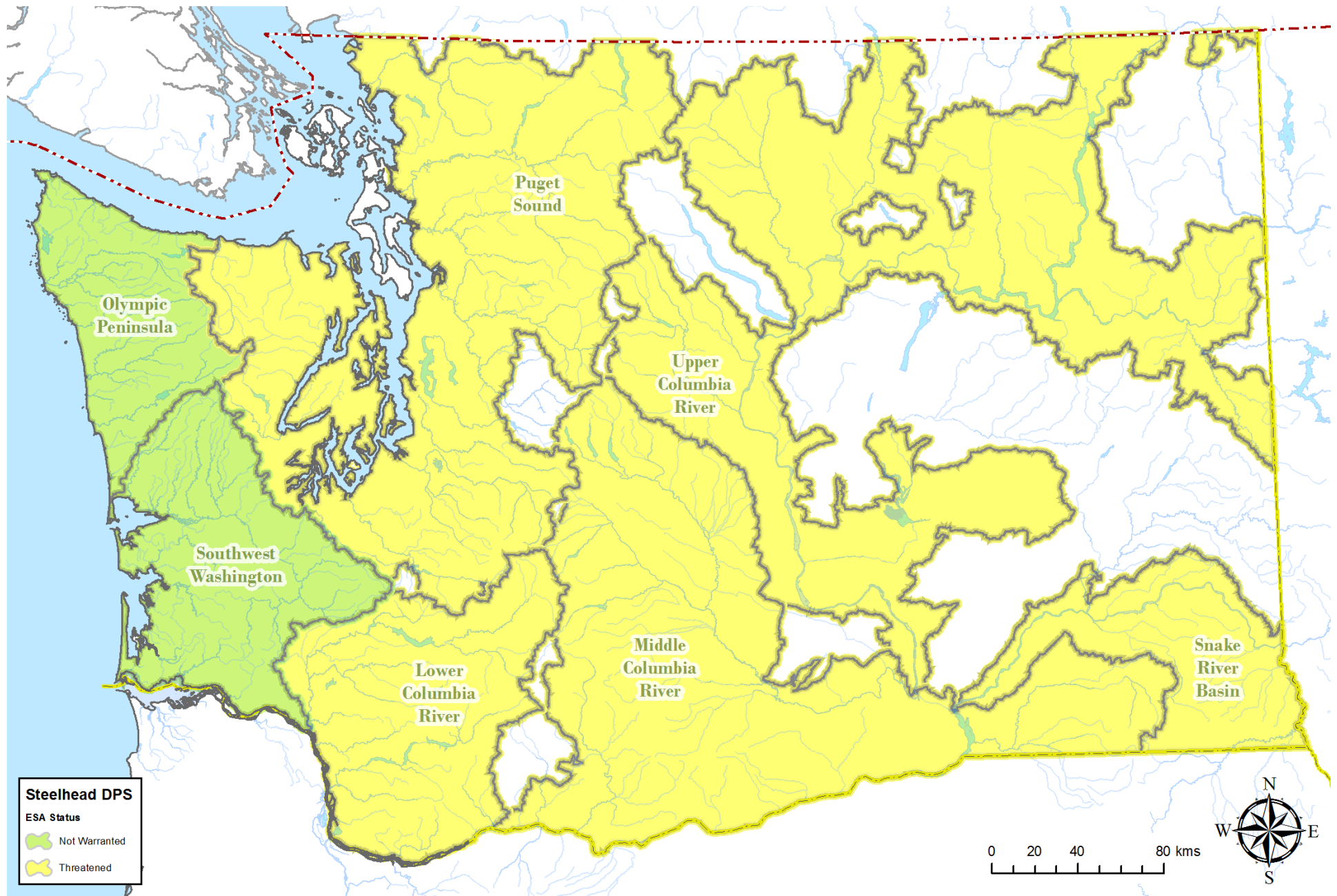
Coastal
lineage

Cascade Range

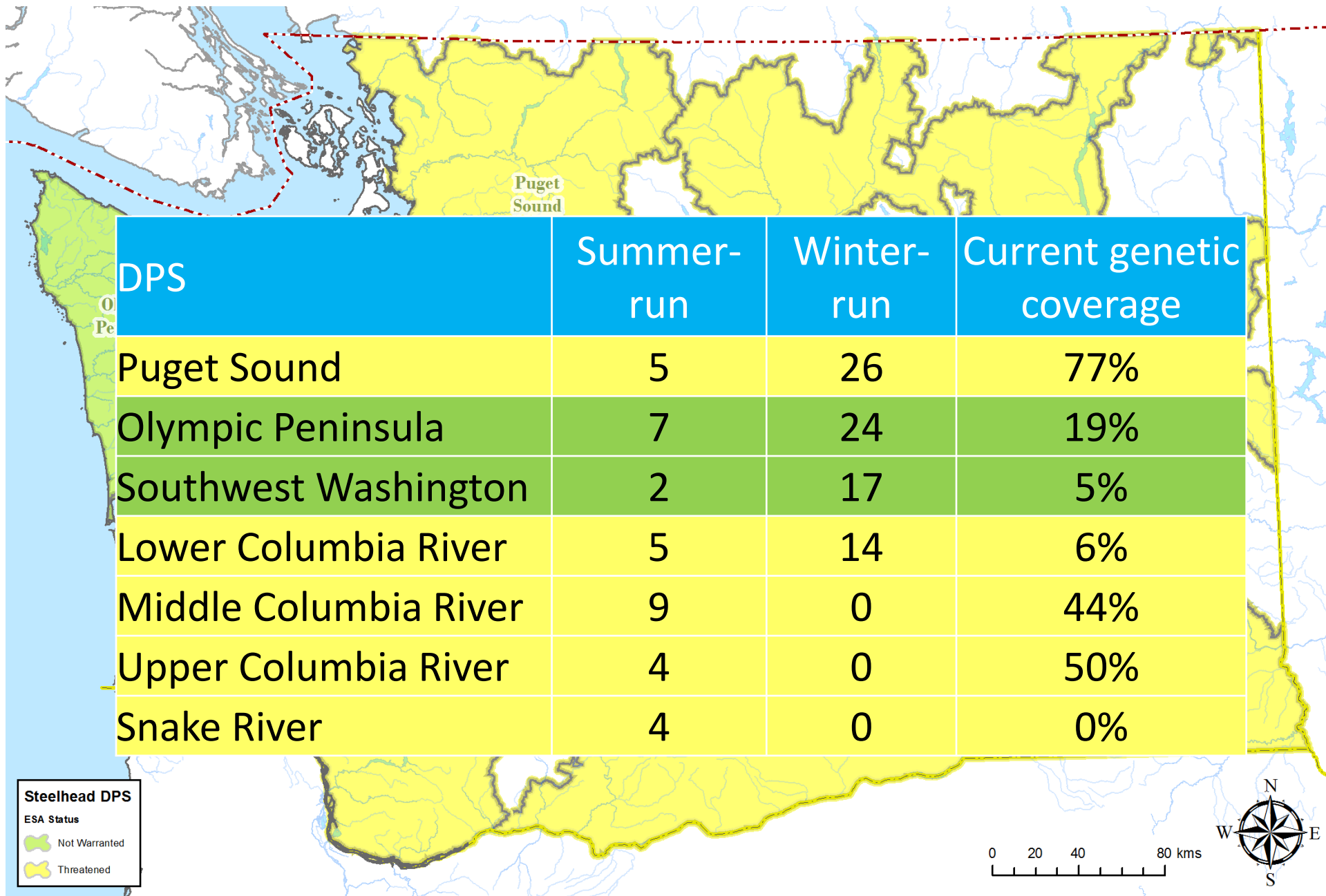
Interior
Redband
lineage

CA hatchery
trout

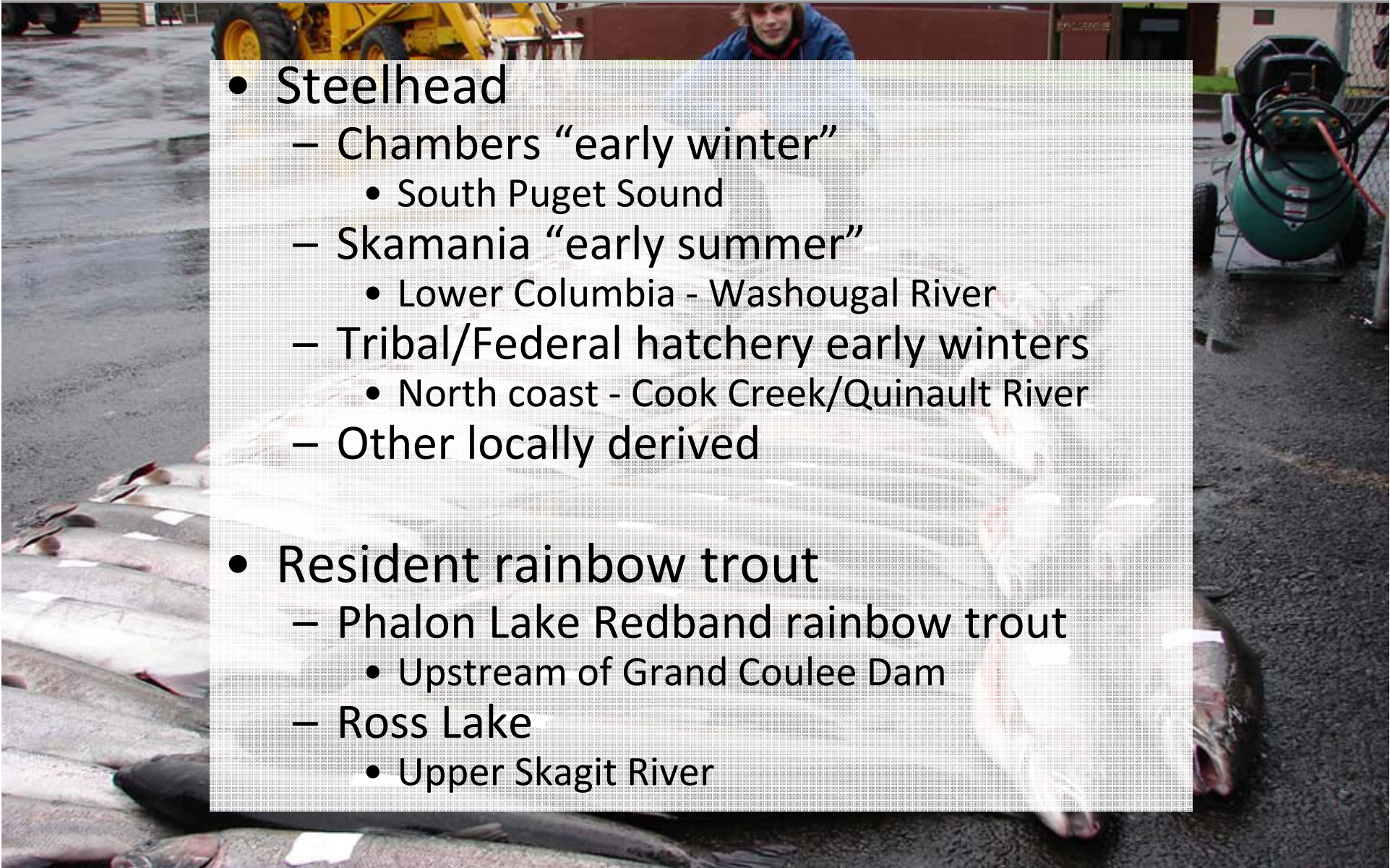




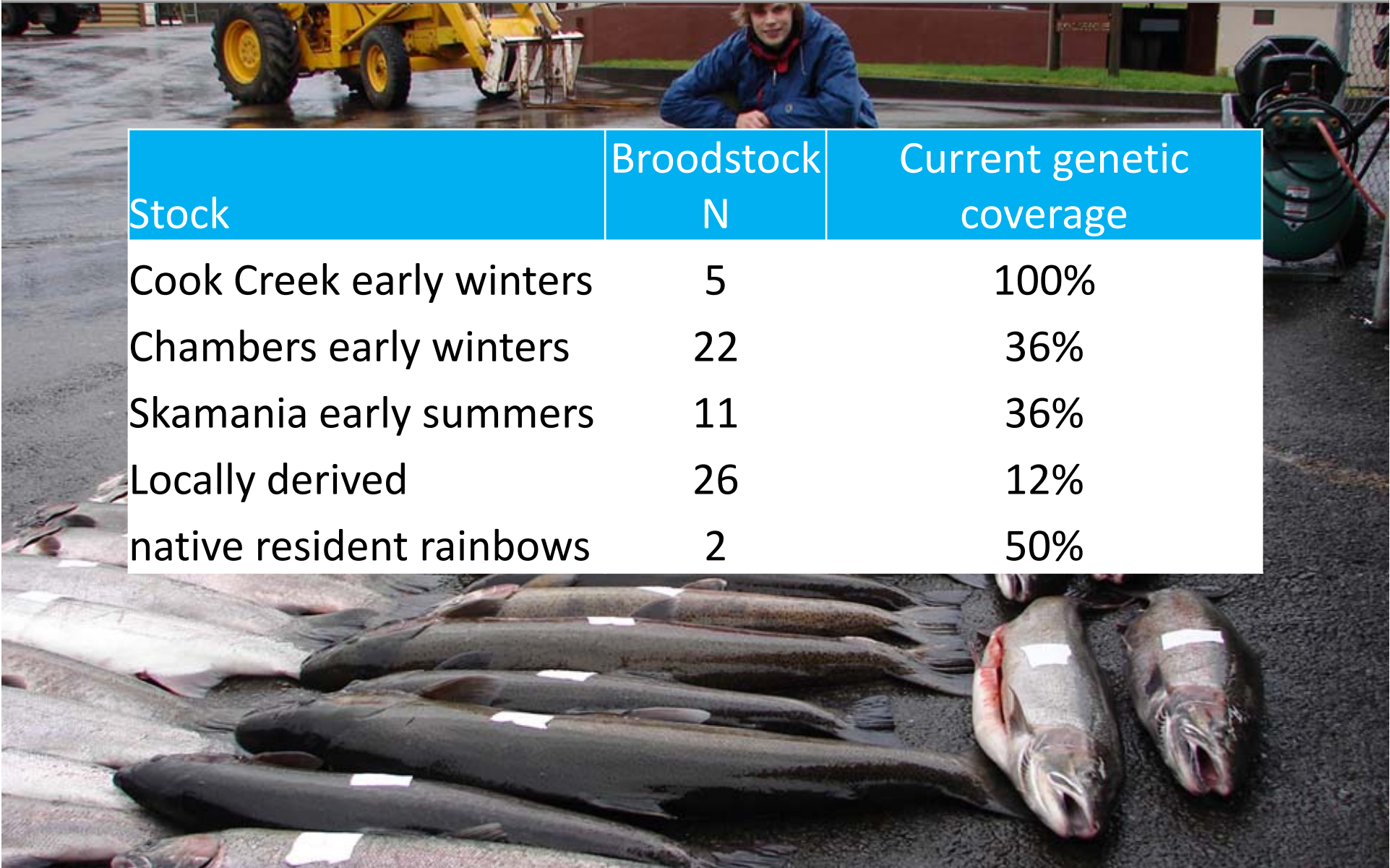
Primary goal: collections from all DIPs, from all DPS



Native hatchery broodstocks

- 
- Steelhead
 - Chambers “early winter”
 - South Puget Sound
 - Skamania “early summer”
 - Lower Columbia - Washougal River
 - Tribal/Federal hatchery early winters
 - North coast - Cook Creek/Quinault River
 - Other locally derived
 - Resident rainbow trout
 - Phalon Lake Redband rainbow trout
 - Upstream of Grand Coulee Dam
 - Ross Lake
 - Upper Skagit River

Native hatchery broodstocks



Stock	Broodstock N	Current genetic coverage
Cook Creek early winters	5	100%
Chambers early winters	22	36%
Skamania early summers	11	36%
Locally derived	26	12%
native resident rainbows	2	50%

Non-native hatchery rainbow trout



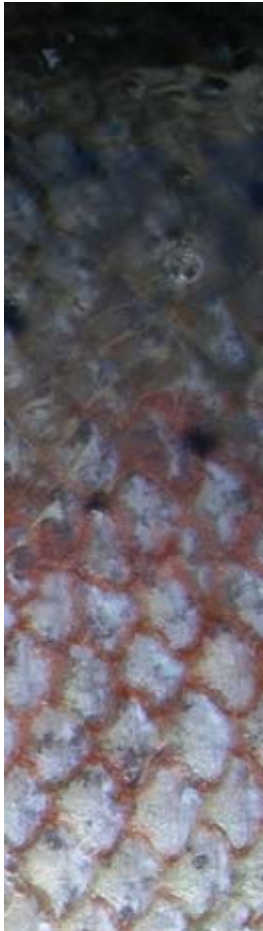
- Three strains currently propagated, all of N. California ancestry

- Mt. Whitney
- Goldendale
- Spokane
- S. Tacoma

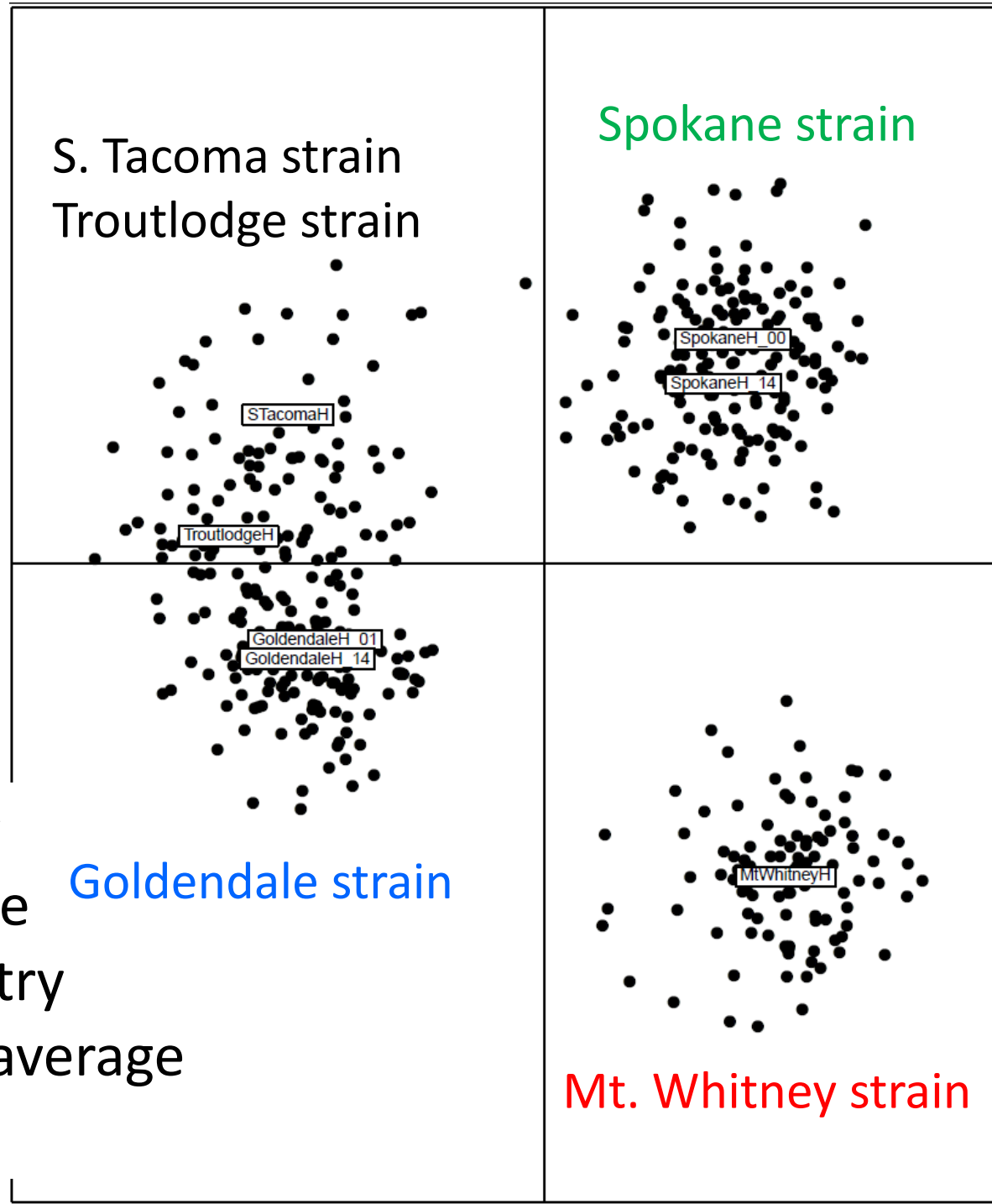
- Also purchase
 - Troutlodge

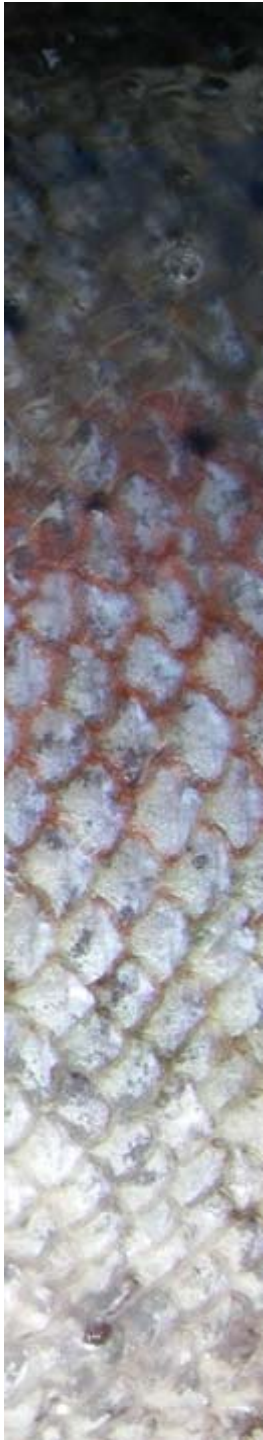


- Broodstock kept distinct – space and time
 - but strains all reared and stocked widely



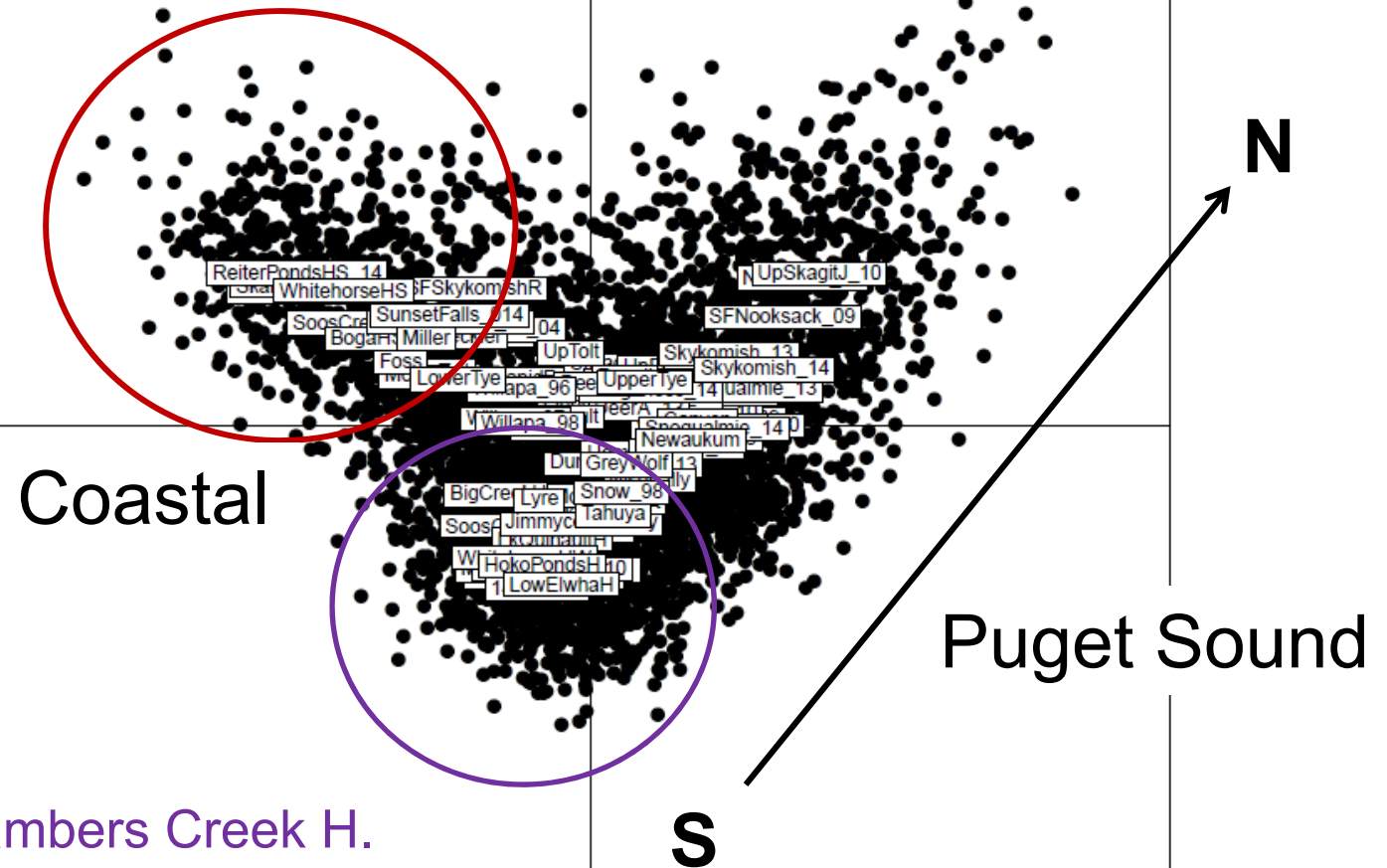
Strains are very
different despite
common ancestry
Among strains average
 $F_{st} = 0.16$

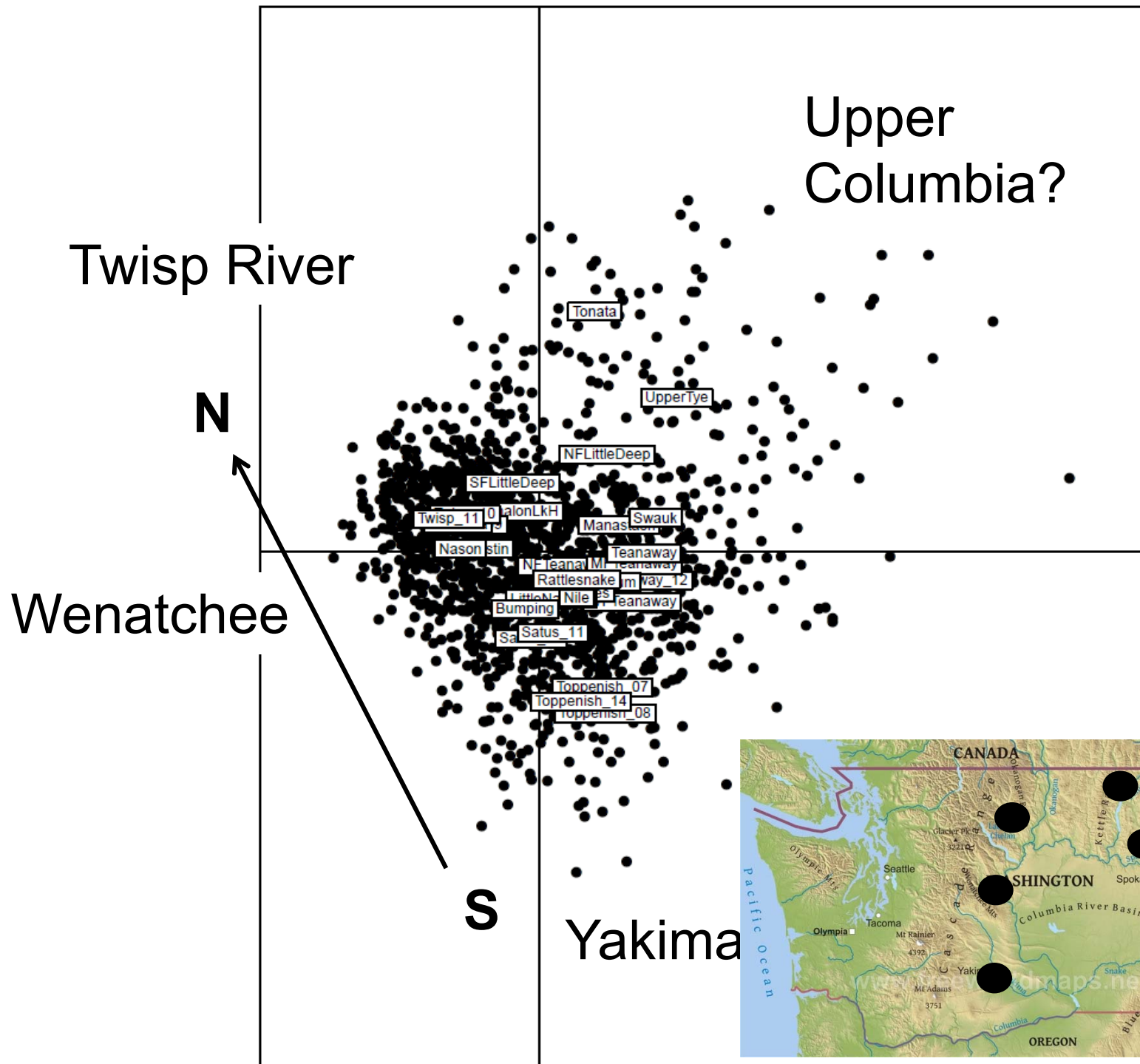


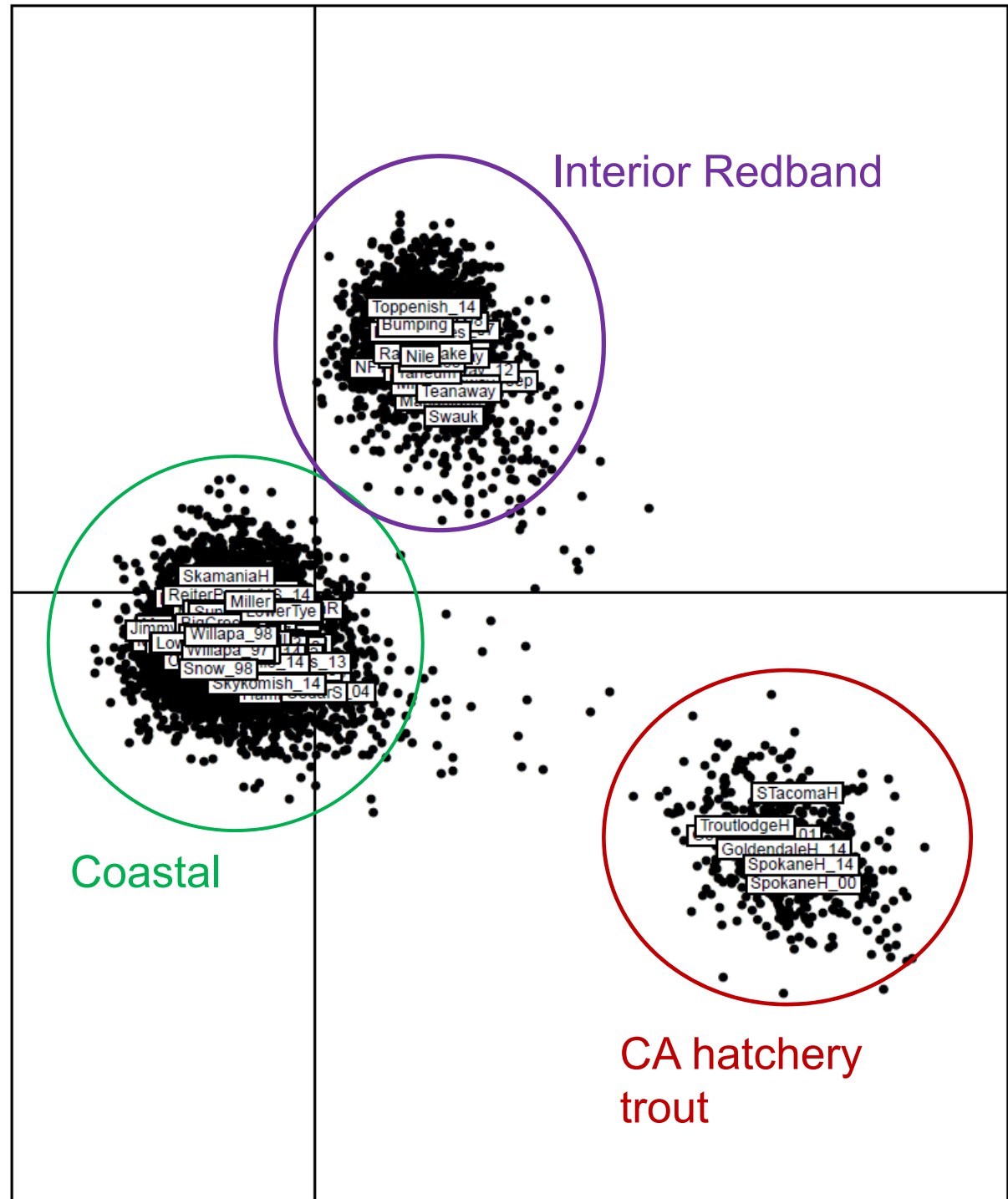
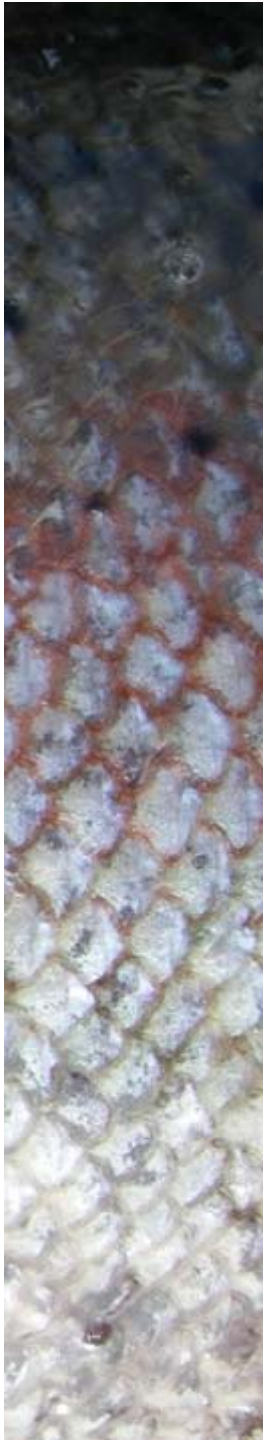


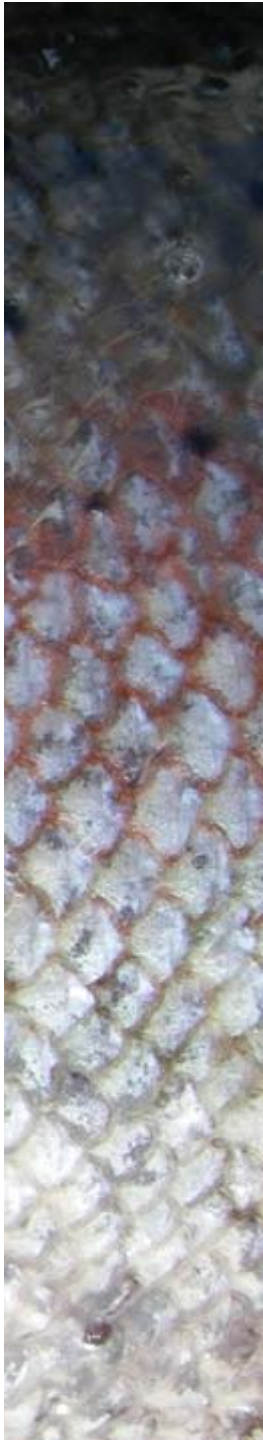
Lower Columbia
(Washougal R.)
Skamania H.

axis 1 = 4.6%
axis 2 = 3.2%

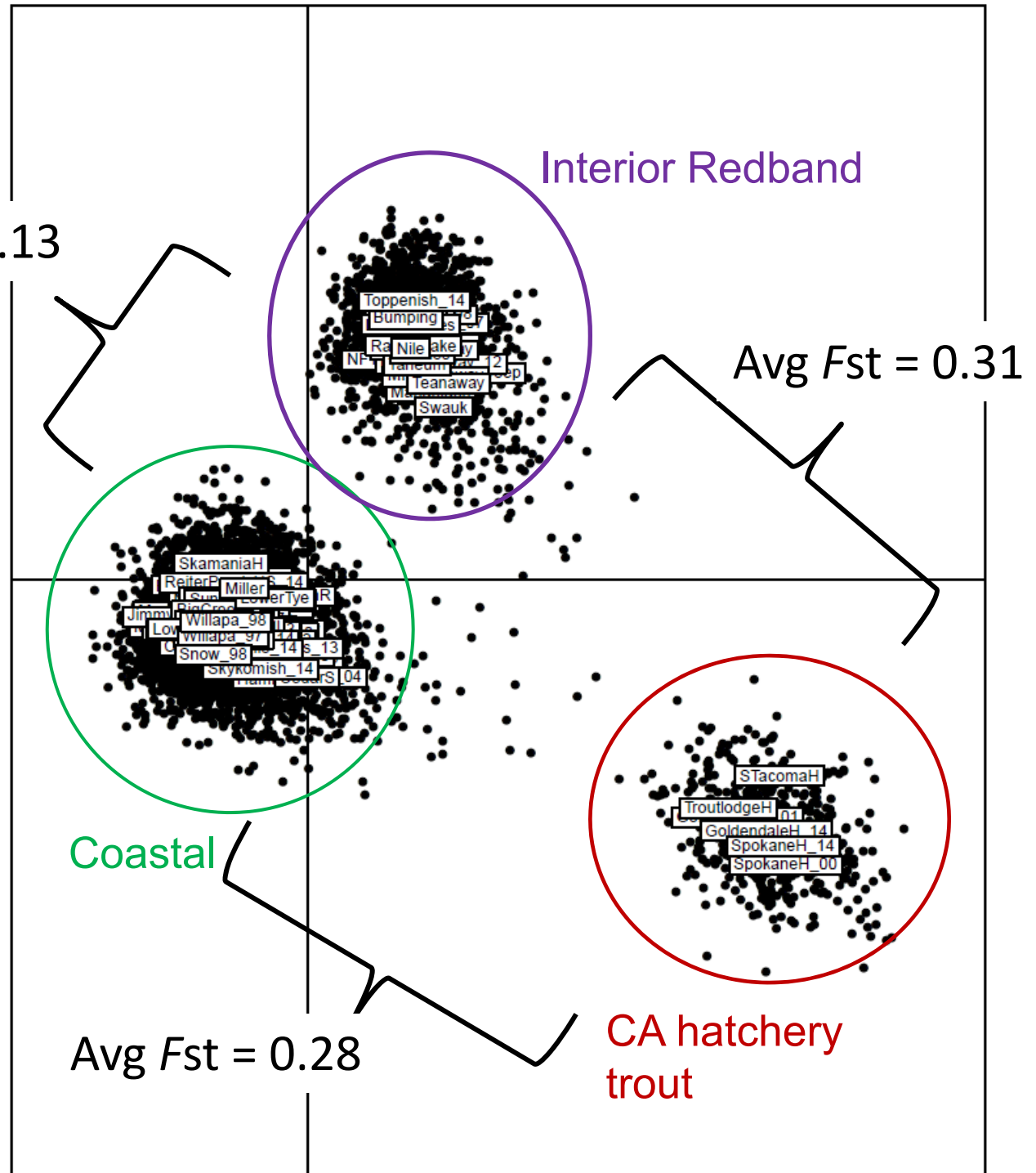




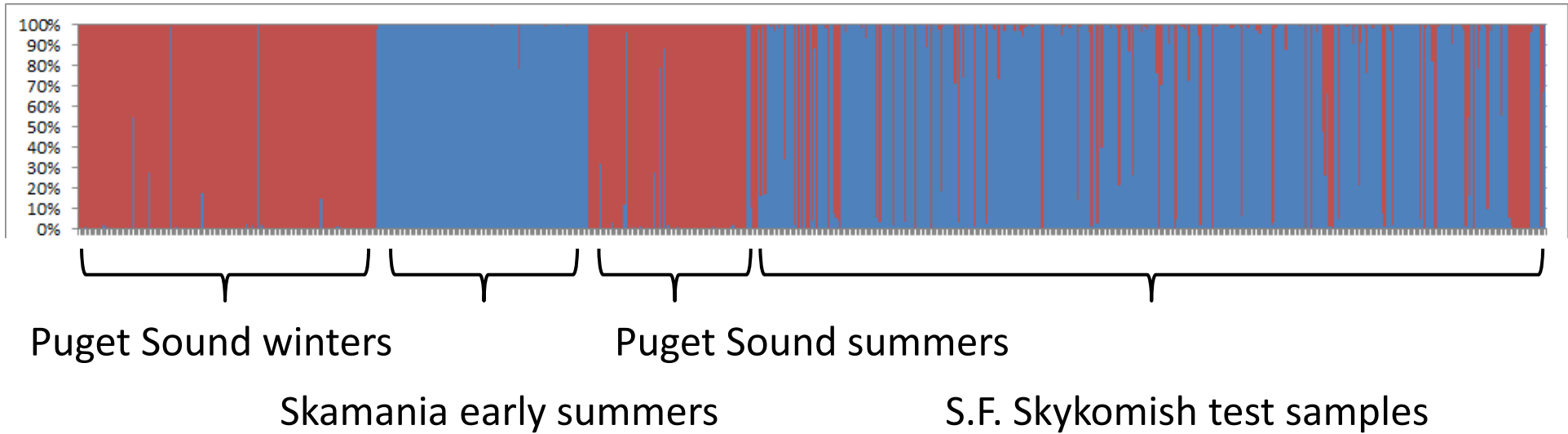




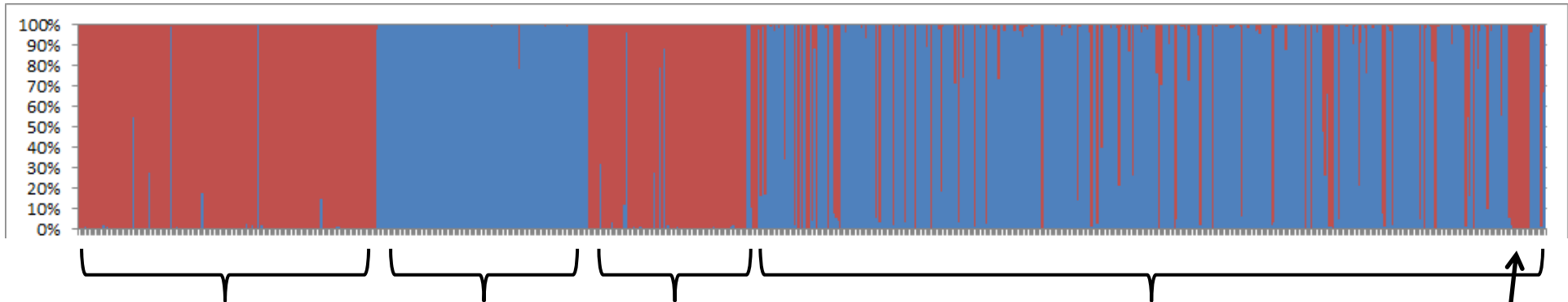
Avg F_{st} = 0.13



What is the ancestry of S.F. Skykomish rainbow trout?



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Puget Sound winters

Puget Sound summers

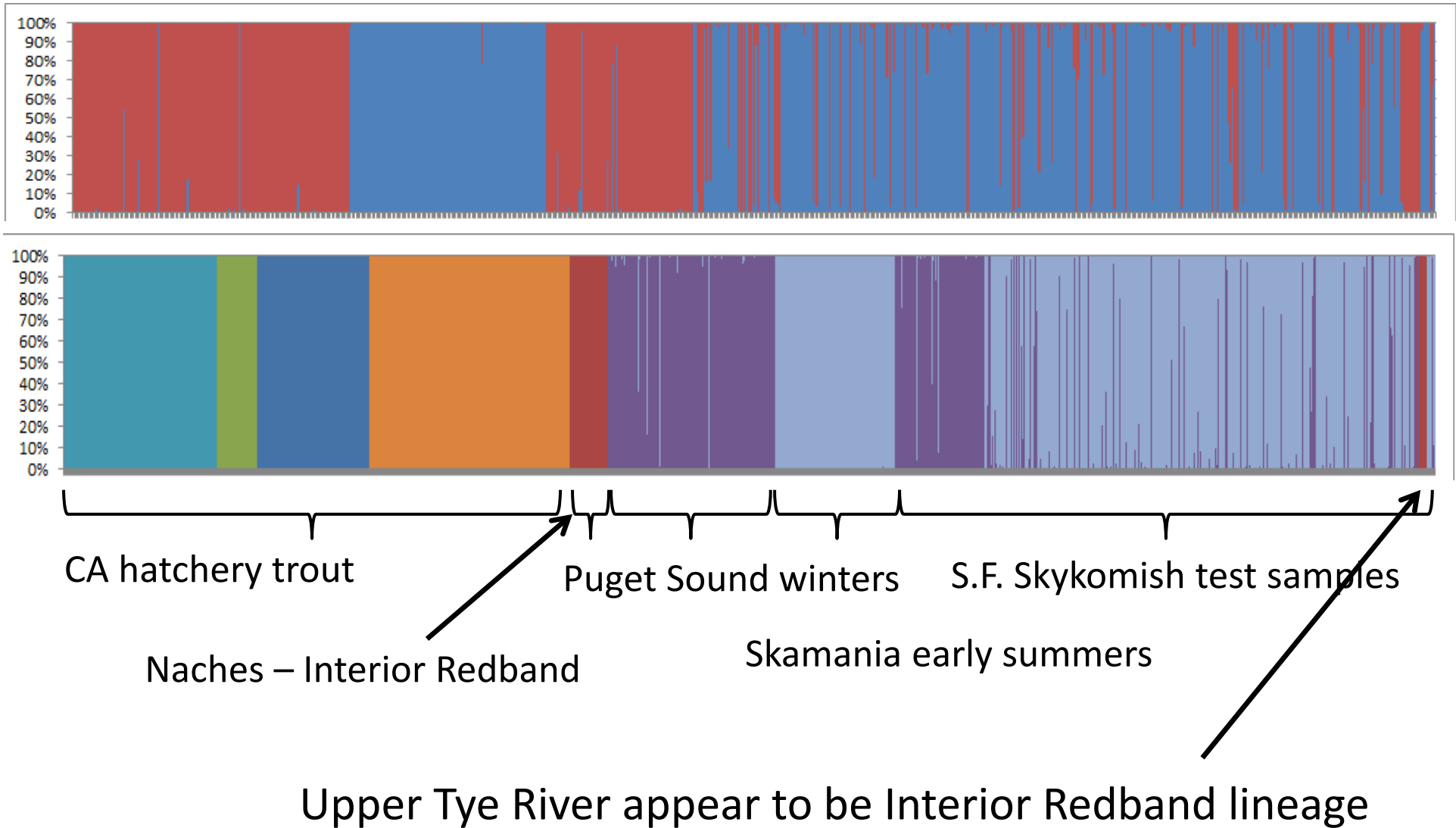
Skamania early summers

S.F. Skykomish test samples

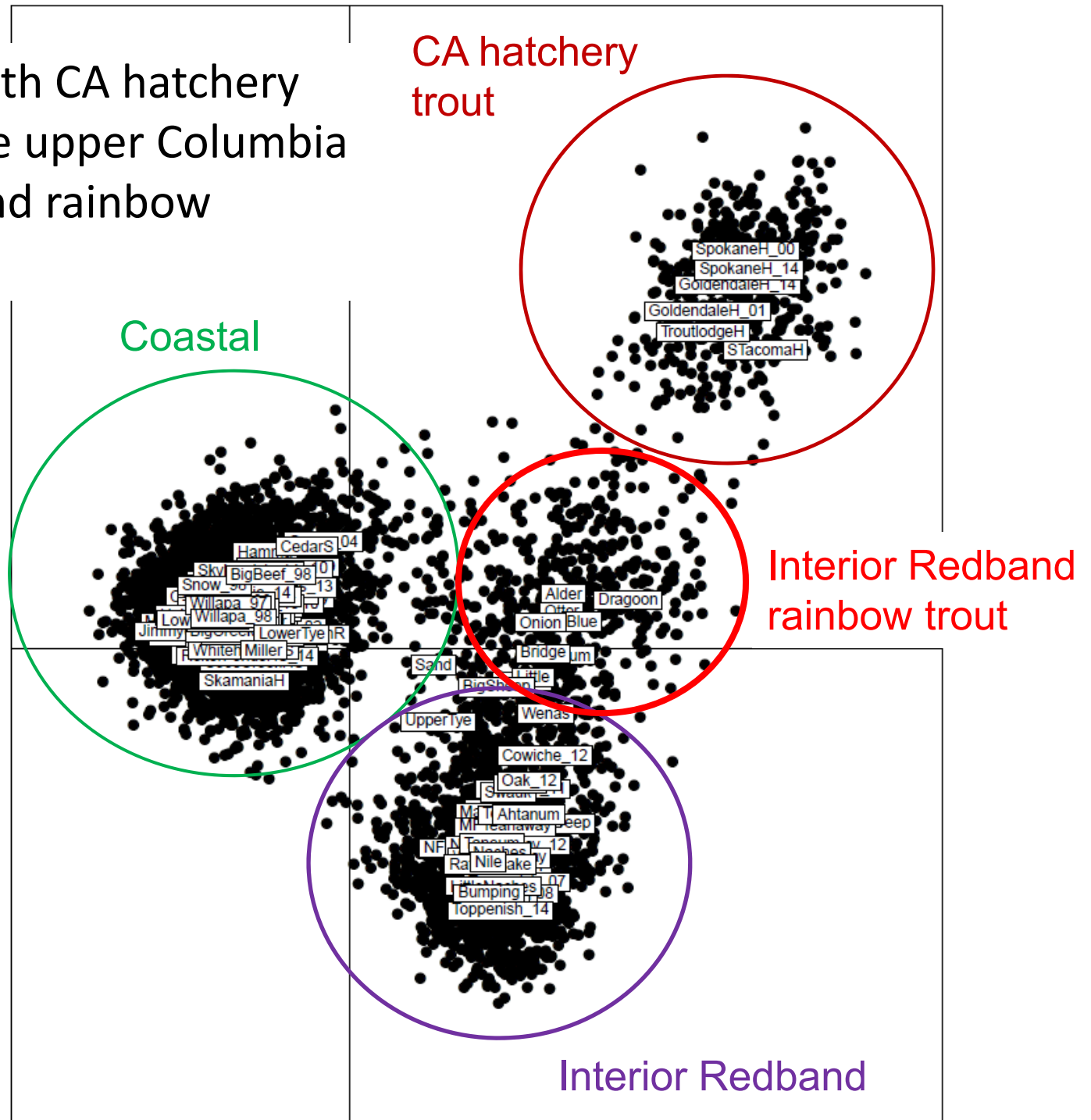
Looks like mostly introduced Lower
Columbia (Skamania early summers)

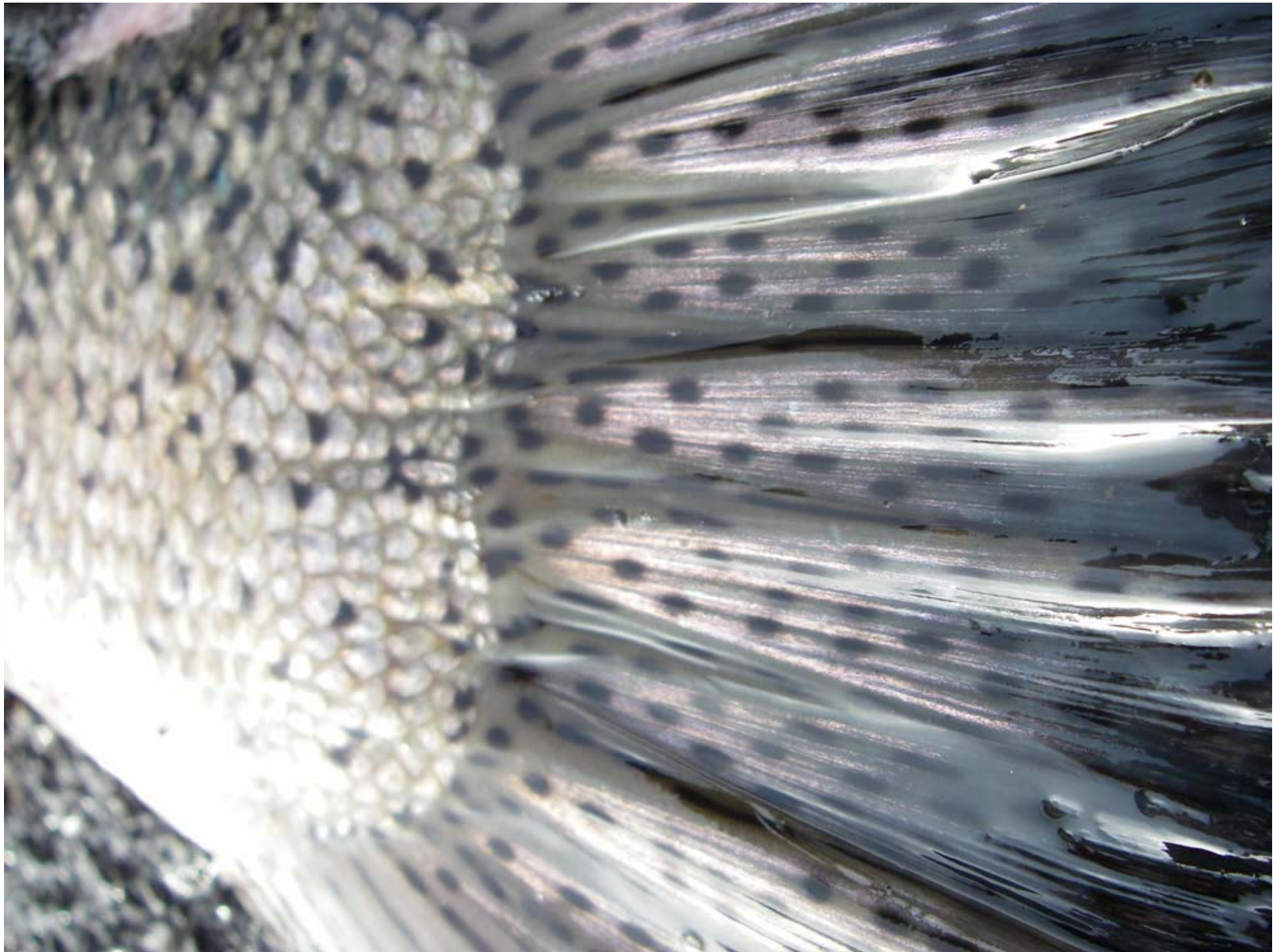
Upper Tye River

What is the ancestry of S.F. Skykomish rainbow trout?



Introgression with CA hatchery lineages in some upper Columbia resident Redband rainbow populations





Expected Improvements over previous work

- Better spatial coverage
 - Especially once we get collections genotyped
- Eventual inclusion of all hatchery stocks
- Better coverage of resident populations
- Better statistical power
 - E.g., assignment tests