

Population Genetic Analysis of Chehalis River Basin Chinook Salmon (*Oncorhynchus tshawytscha*)



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Partners/Collaborators/Funders/Sample Collectors

- Field Crews
- Todd Kassler WDFW MGL
- Mitch Kissler WDFW MGL
- Washington State Conservation Office

Purpose

- Understanding the population structure of wild Chinook salmon in the Chehalis basin
- Previous studies
 - Lower resolution genetic markers
 - Lower geographic resolution



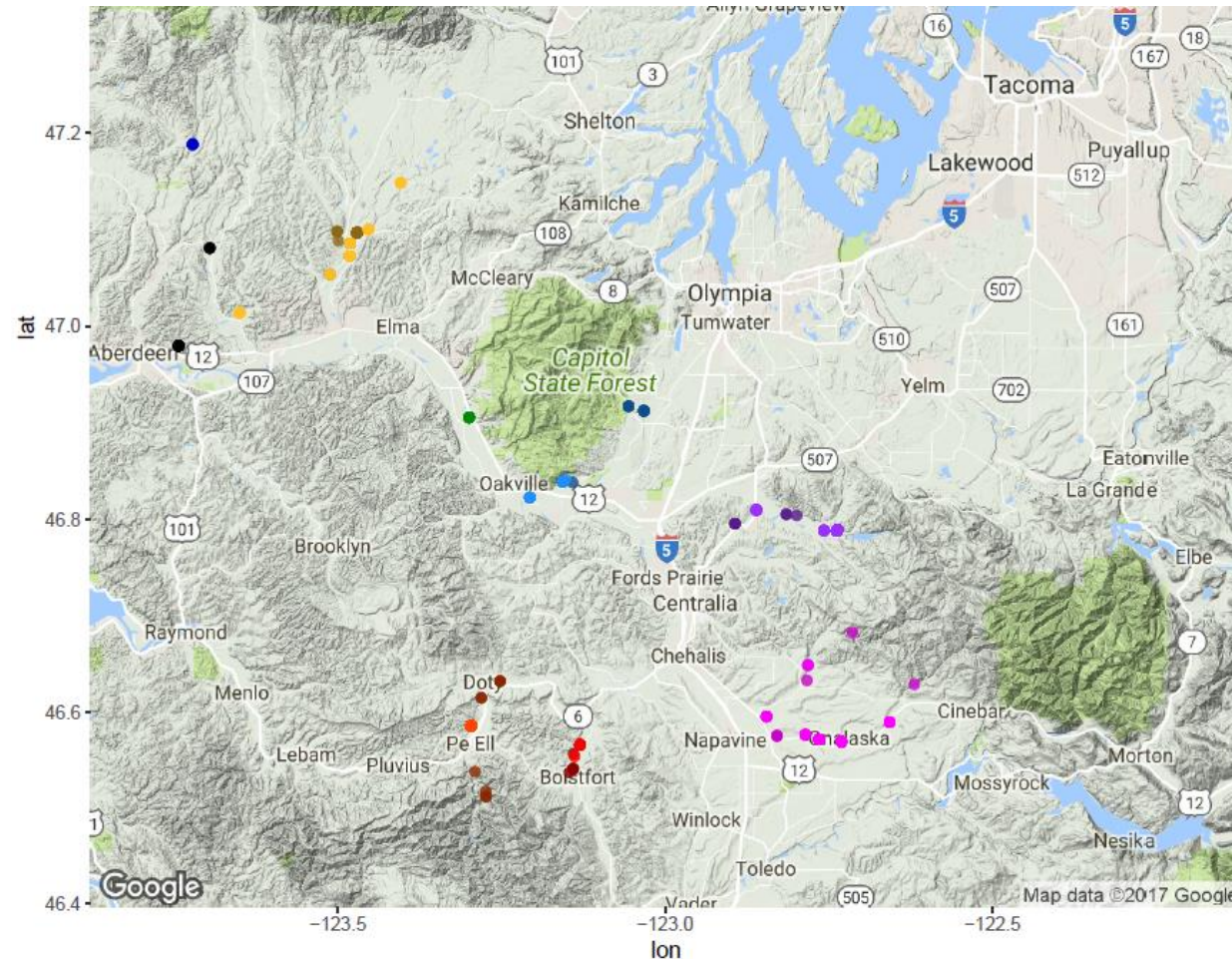
Objectives

- Is there genetic grouping/clustering within
 - 1) the Chehalis River and its tributaries
 - 2) the different run timings (Fall/Spring) of Chinook salmon
 - 3) the Chehalis Basin in relation to the surrounding coast-wide region and Puget Sound

Q1: Is There Population Structure of the Chehalis and Tributaries

- Processed 432 Chinook salmon
- Genotyped for 299 SNPs
- Analysis
 - STRUCTURE
 - Dendrograms
 - FST

Figure 1



Chehalis Basin Weakly Structured Between Lower and Upper Watershed

Figure 2

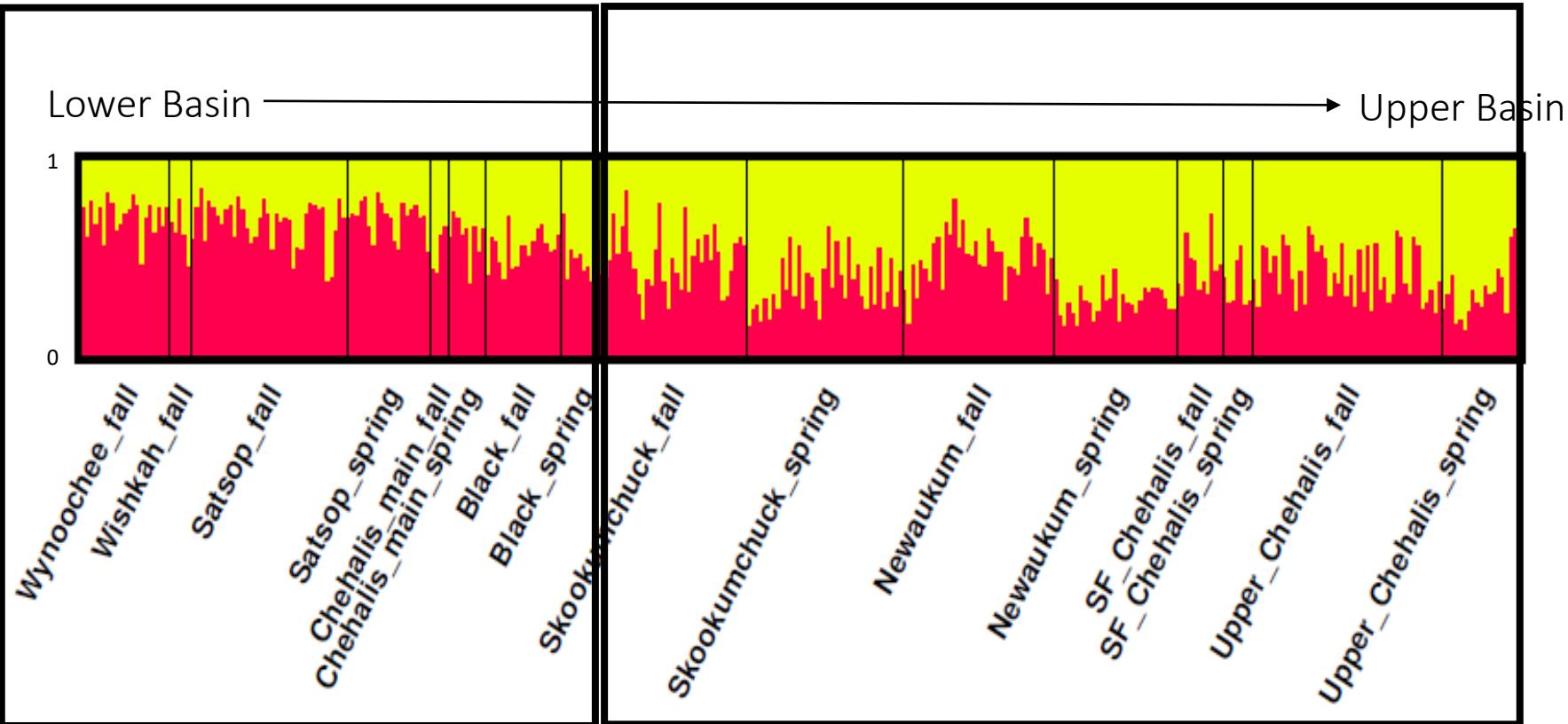
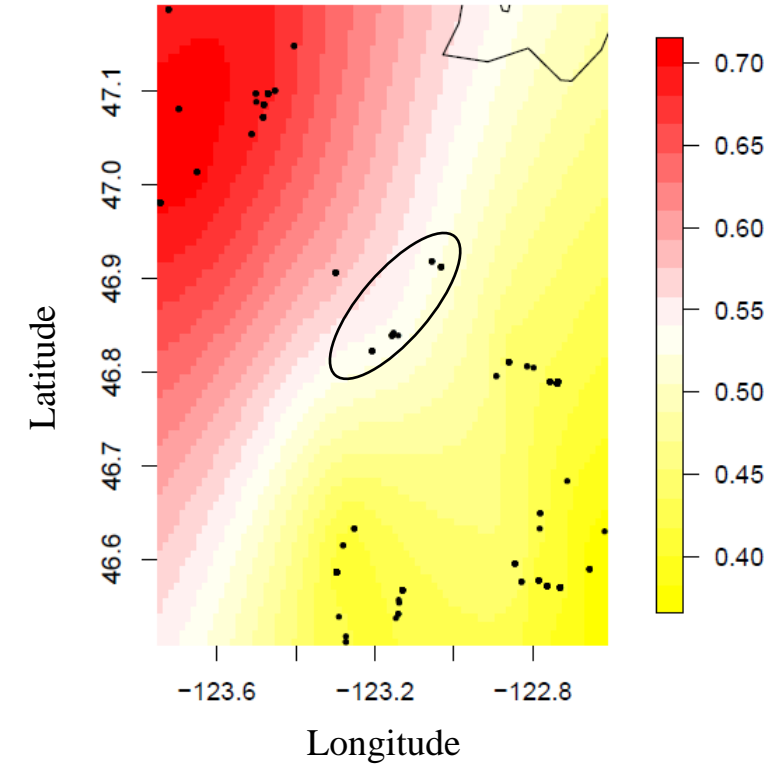


Figure 3



Chehalis Basin Weakly Structured Between Lower and Upper Watershed

Figure 4

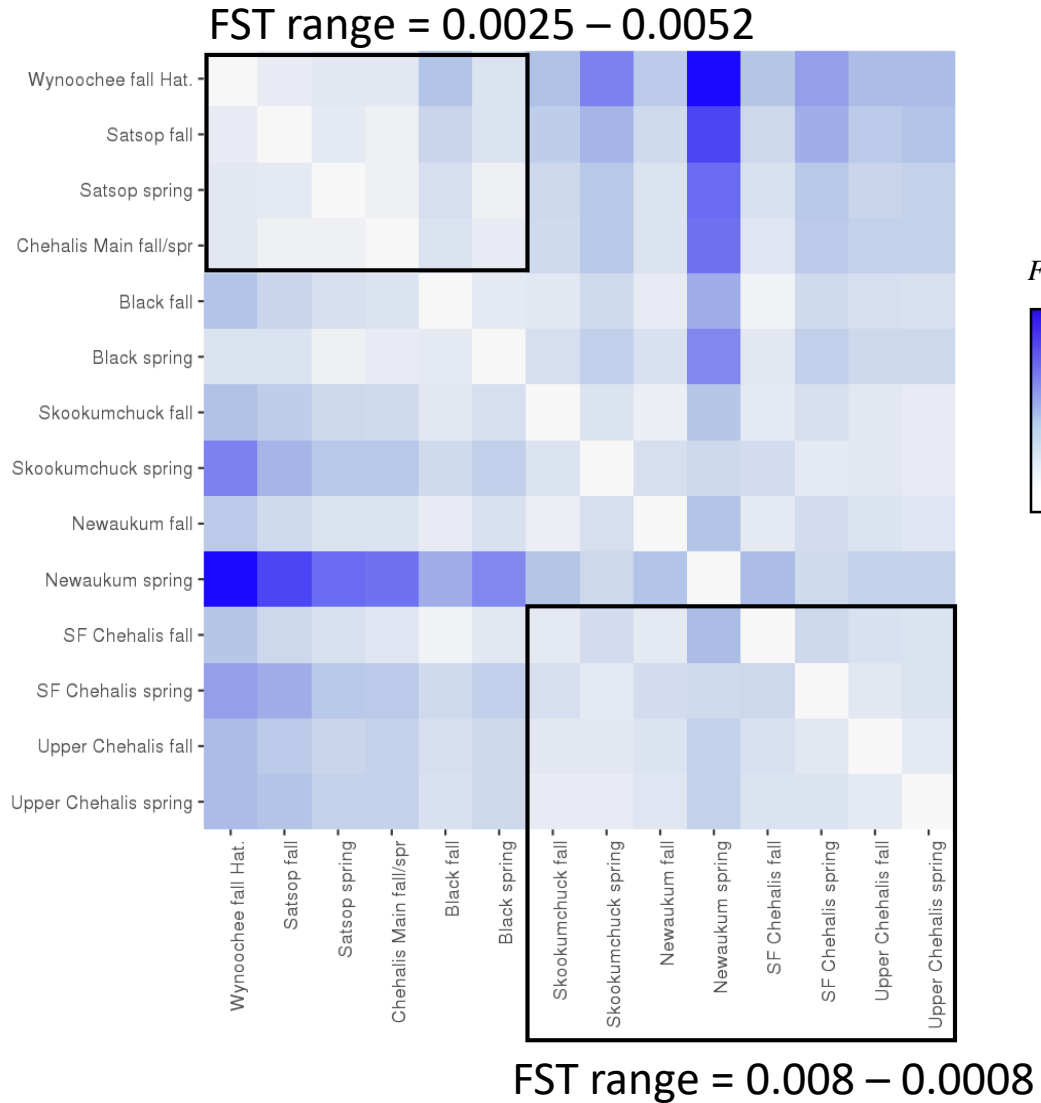
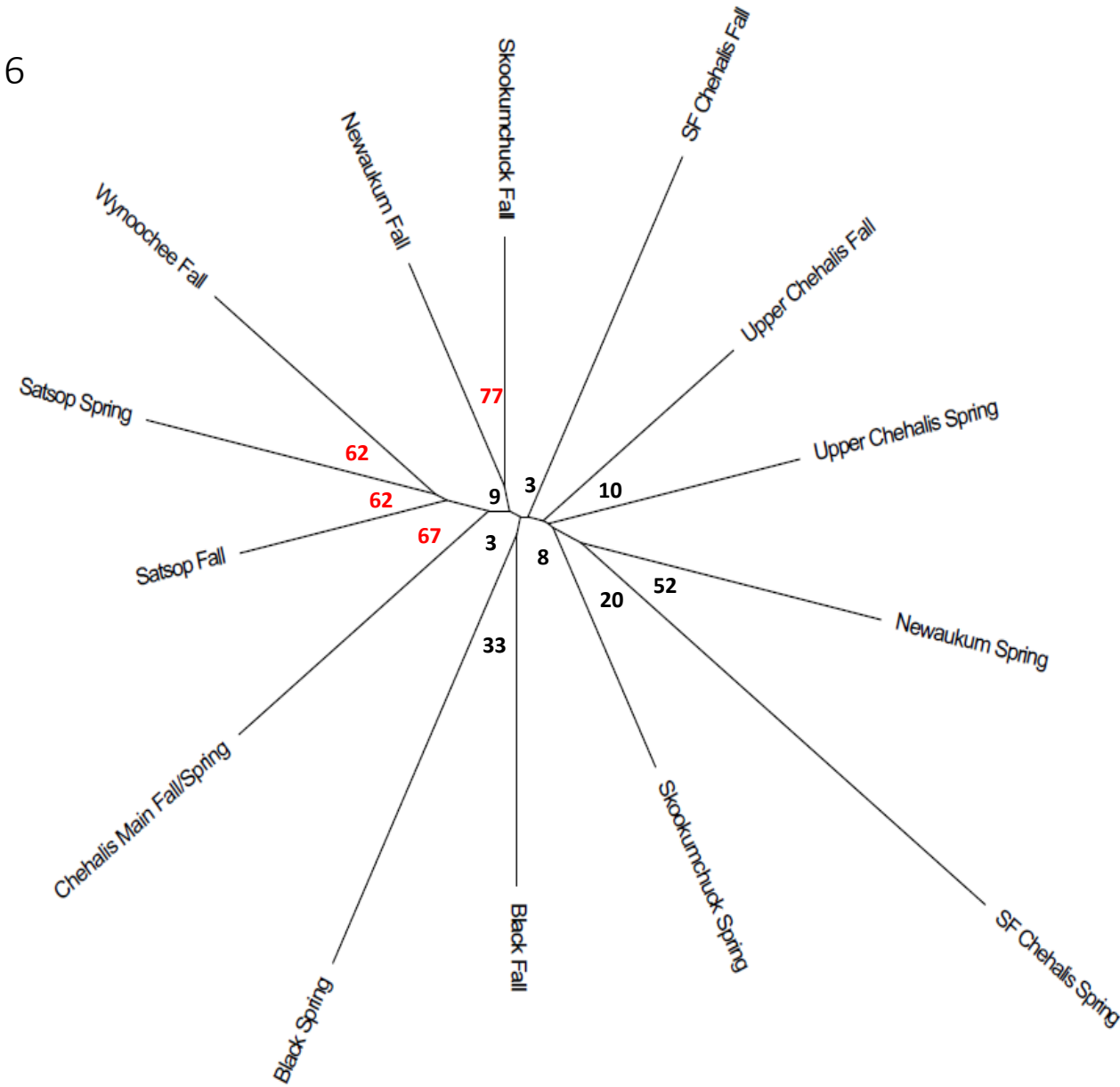
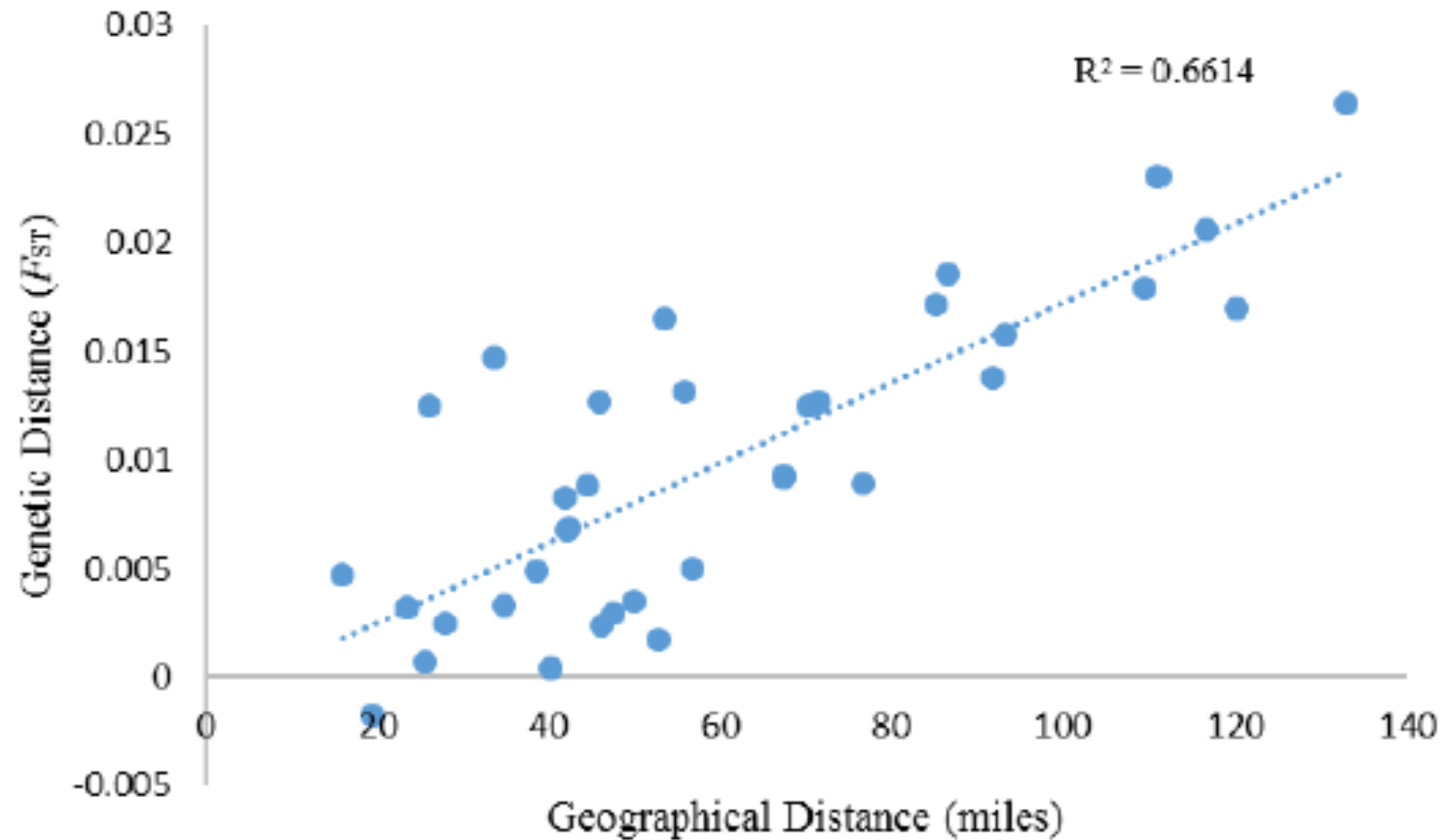


Figure 6



Chehalis Basin Structure Driven By Isolation By Distance

Figure 5



Conclusions: Population Structure of the Chehalis and Tributaries

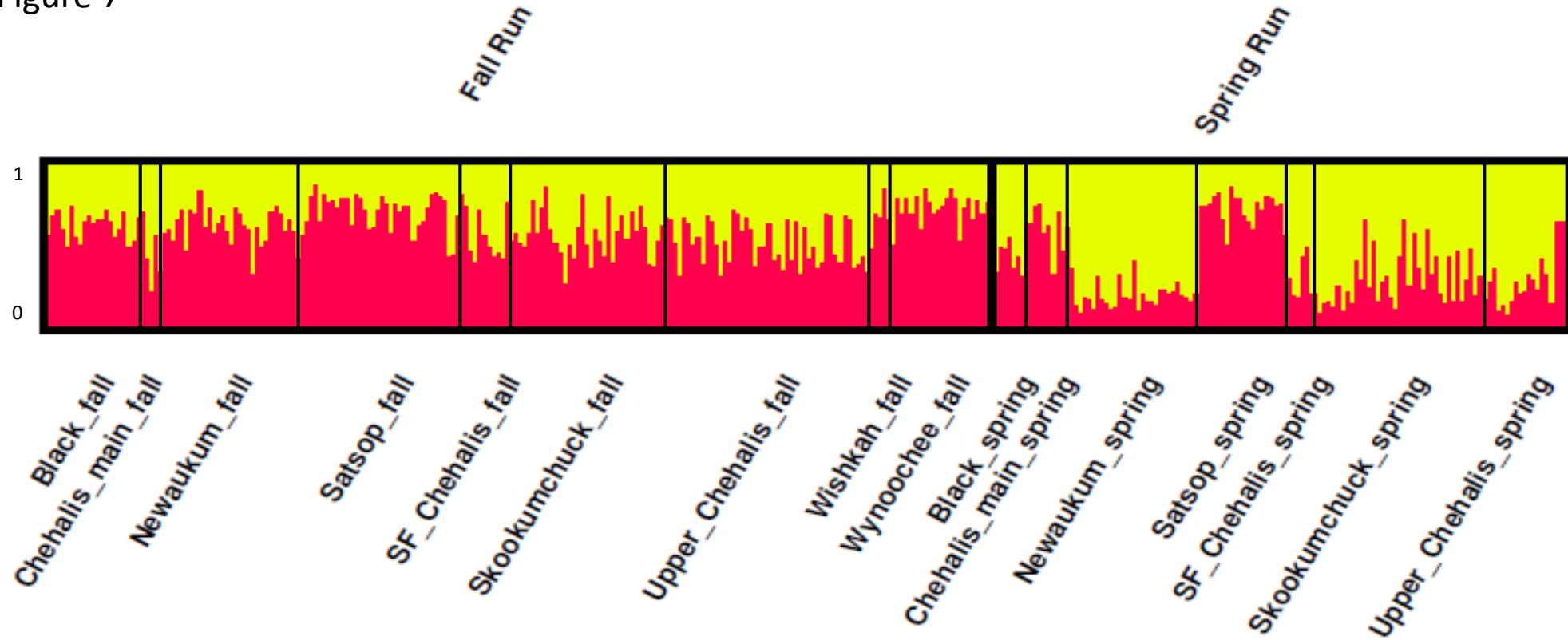
- Weak population structure
 - Lower watershed = Wynoochee Fall, Satsop Spr, Chehalis Main Fall/Spr, Black River Fall/Spr
 - Upper Watershed = Upper Chehalis Fall/Spr, Skookumchuck Spr, SF Chehalis Fall/Spr, and Newaukum Fall
- Newaukum Spr highly differentiated from most collections
- Overall structure is possibly due to Isolation by Distance (IBD)

Q2: Is the population structured based on spring/fall run timing differences?

- Used a model (*locprior*) in STRUCTURE which used run timing as prior information to assist with clustering
- Compared STRUCTURE plots of Chehalis Basin to
 - Hoh River Fall/ Spr/Summer types
 - Skagit River Fall/Spr/ Summer types

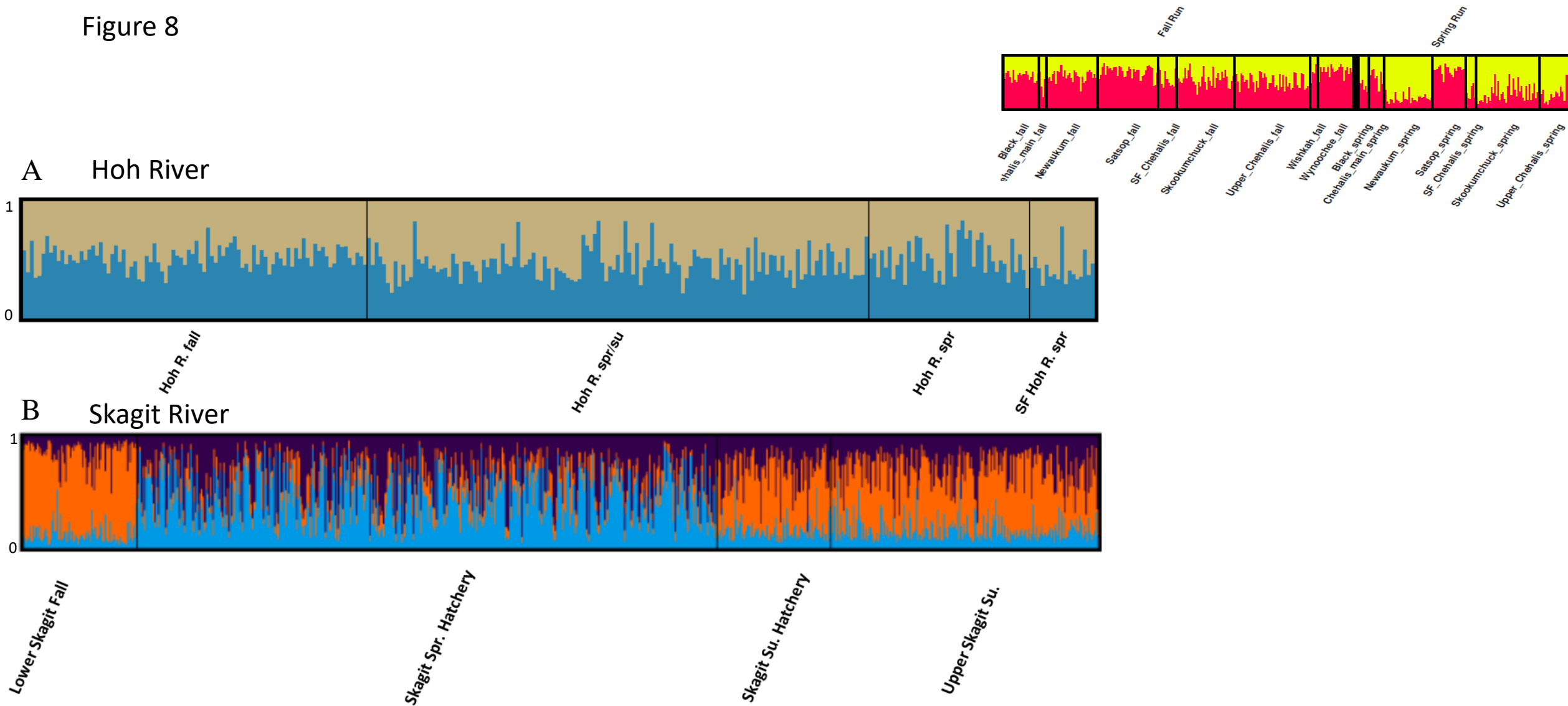
Lack of Run Timing Structure in the Chehalis Basin

Figure 7



Run Timing Structure in Other Populations

Figure 8

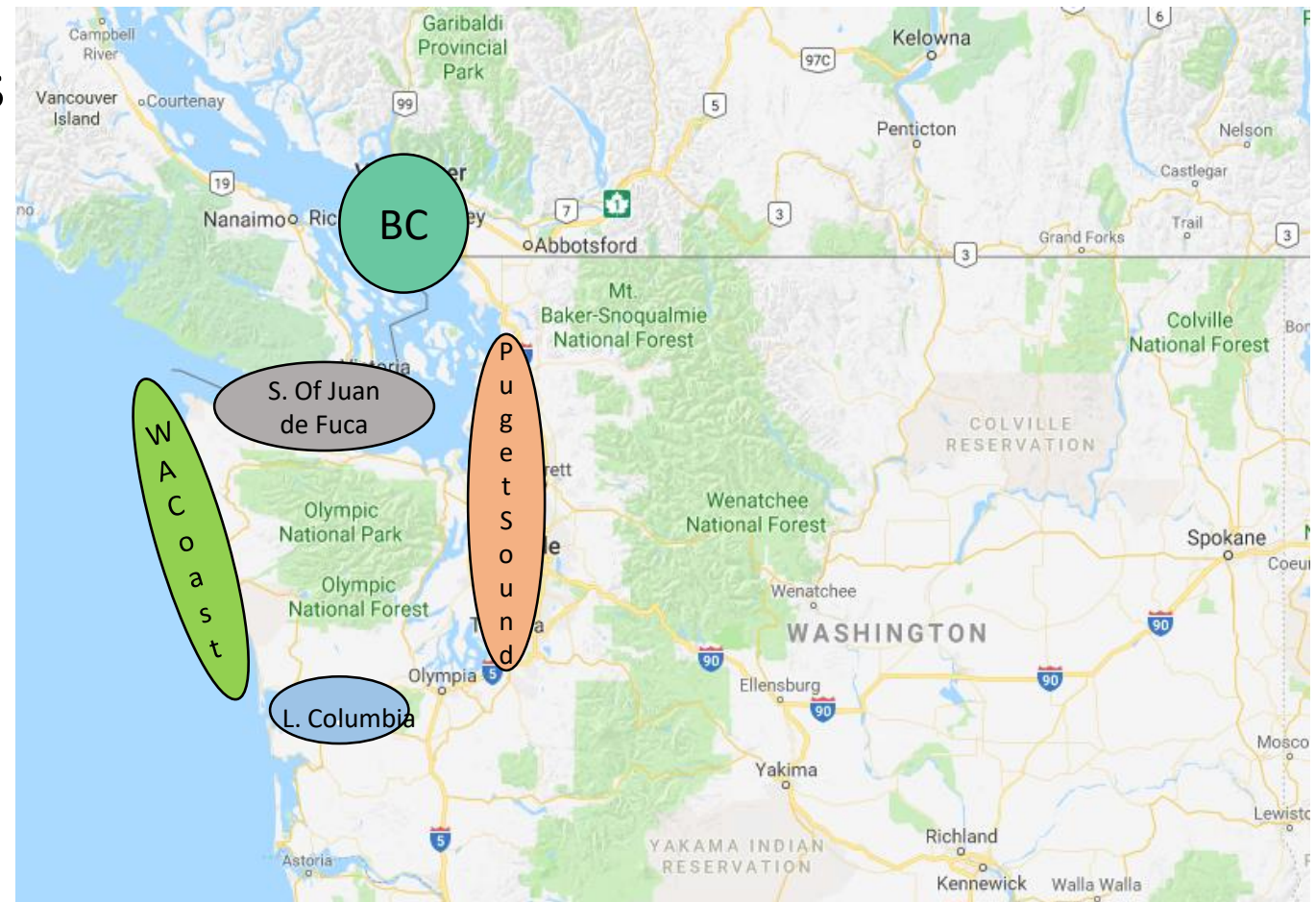


Conclusions: Is the population structured based on spring/fall run timing differences?

- Genetic results support differentiation of Lower vs. Upper watershed
- No apparent structuring based on timing
 - Similar to Hoh River and Skagit River populations
- “Spring” collections in the lower river (Satsop Spr, Chehalis Main Spr, Black River Spr) cluster with lower river fall run collections
 - Are “spring” collections from lower river truly spring chinook?

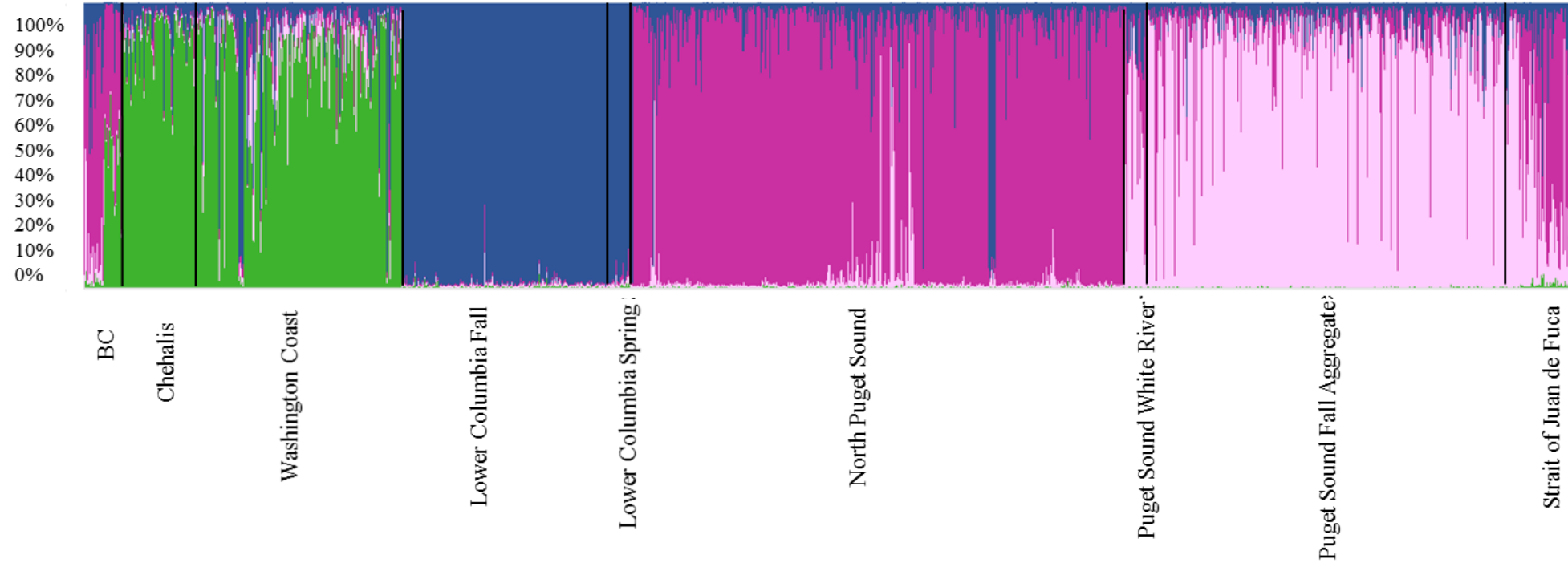
Q3: What is the population structure of the Chehalis in relation to Washington Coast and Puget Sound

- 341 Chehalis Basin samples
- Baseline Washington samples
- Analysis
 - STRUCTURE
 - Dendrograms



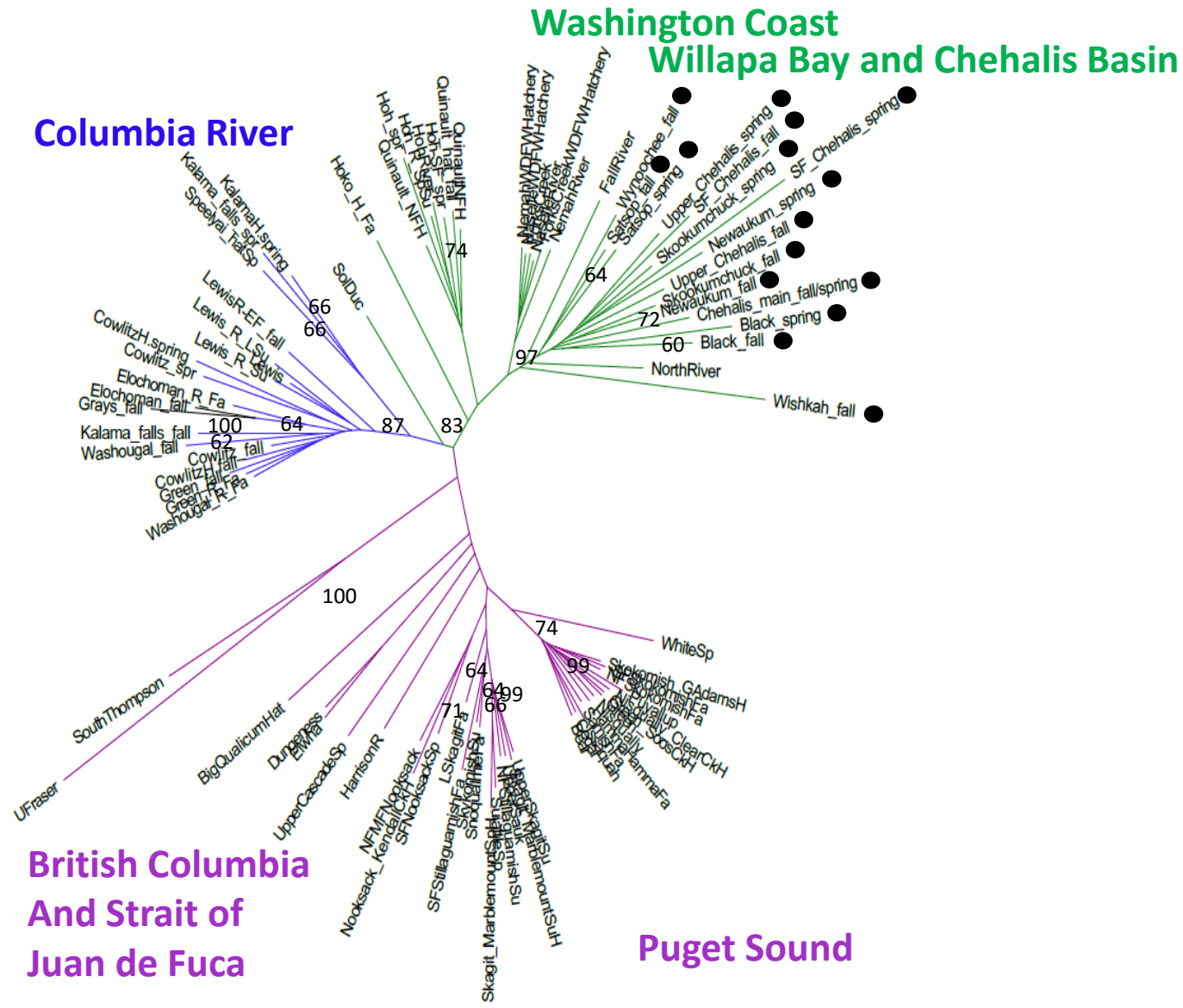
Chehalis Basin Clusters With the Washington Coast

Figure 9



Chehalis Basin Clusters With the Washington Coast

Figure 10



Conclusions: Population structure of the Chehalis in relation to Washington Coast and Puget Sound

- Chehalis Basin populations cluster with the Washington Coast DPS
 - Cluster most closely to the Willapa Bay

Conclusions/Discussion

- Chehalis Chinook salmon show weak population structure of lower watershed and upper watershed
 - Due to IBD?
- Chehalis Chinook salmon structure most likely not influenced by run timing
- Chehalis Chinook salmon cluster with the Washington coast DPS
 - Cluster most closely with Willapa Bay populations