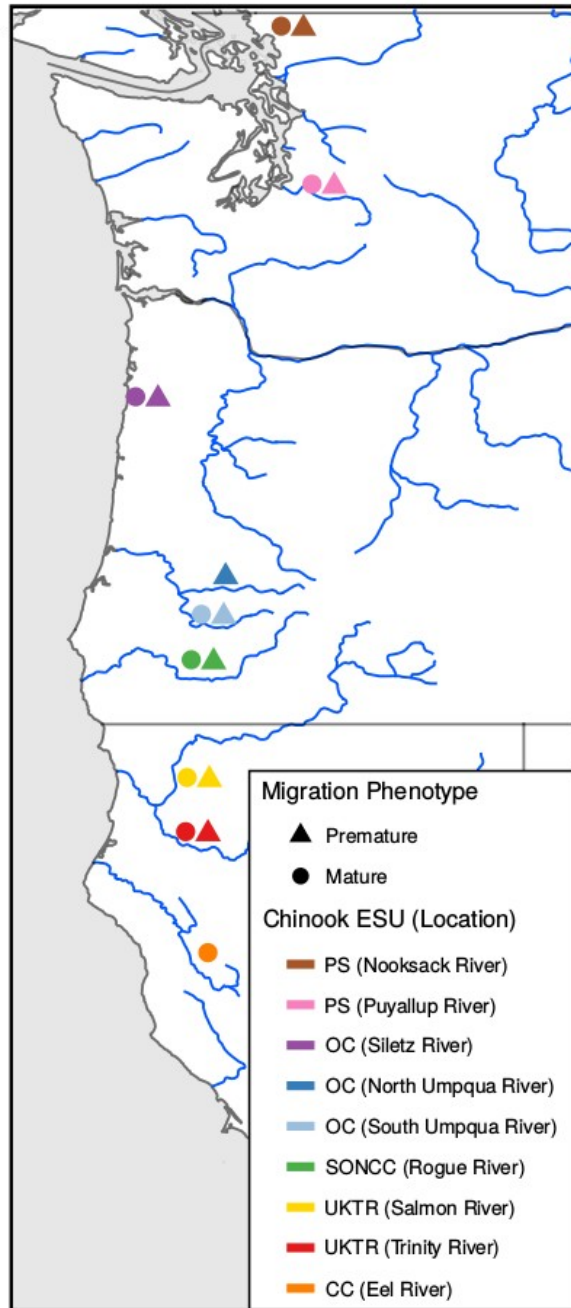


Run-Type Genetic Markers and Genomic Data Provide Insight for Monitoring Spring-Run Chinook Salmon in the Chehalis Basin

Tasha Q. Thompson



Prince et al. (2017) found a single genomic region is strongly associated with spring vs. fall runtime in coastal Chinook salmon

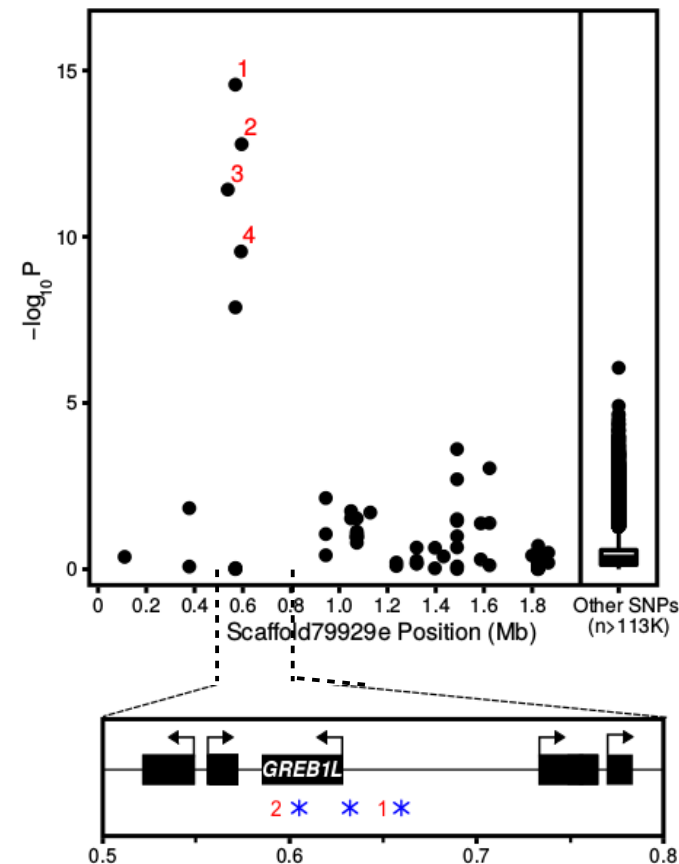


SCIENCE ADVANCES | RESEARCH ARTICLE

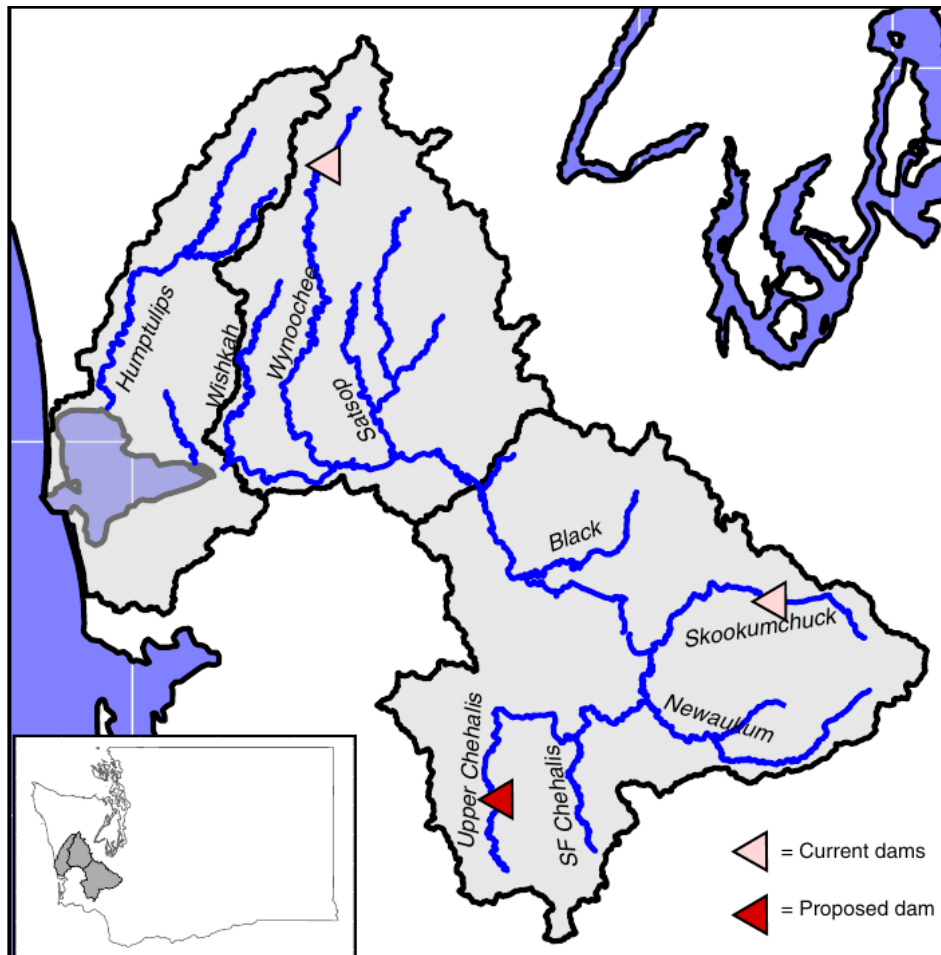
EVOLUTIONARY GENETICS

The evolutionary basis of premature migration in Pacific salmon highlights the utility of genomics for informing conservation

Daniel J. Prince,^{1,2} Sean M. O'Rourke,^{1*} Tasha Q. Thompson,^{1*} Omar A. Ali,¹ Hannah S. Lyman,¹ Ismail K. Saglam,^{1,3} Thomas J. Hotaling,⁴ Adrian P. Spidle,⁵ Michael R. Miller^{1,2†}



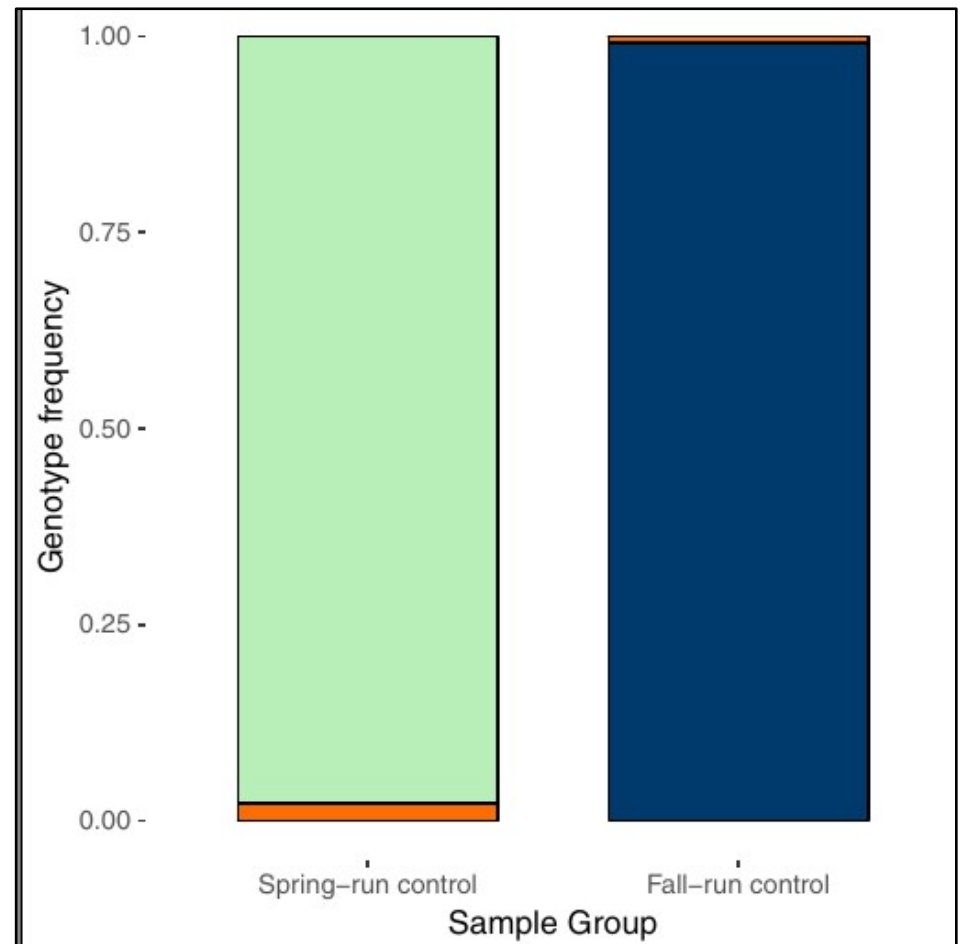
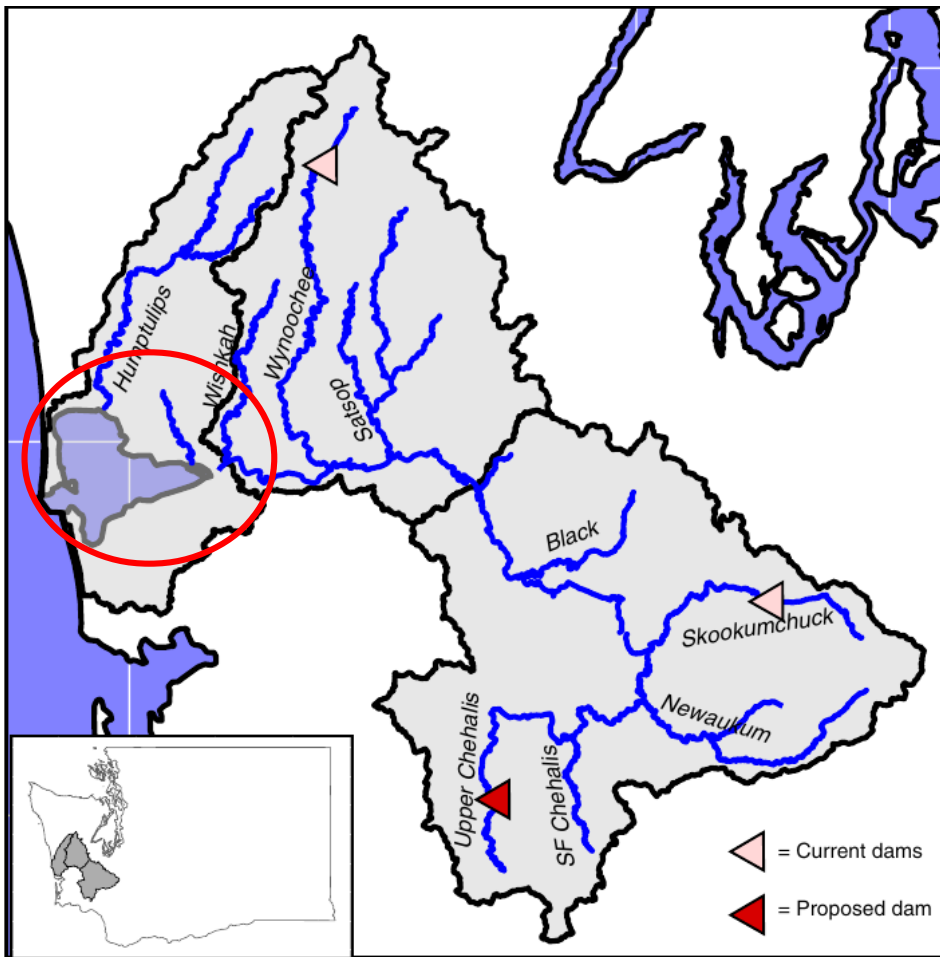
The Chehalis River Basin faces common challenges in monitoring spring- and fall-run abundances



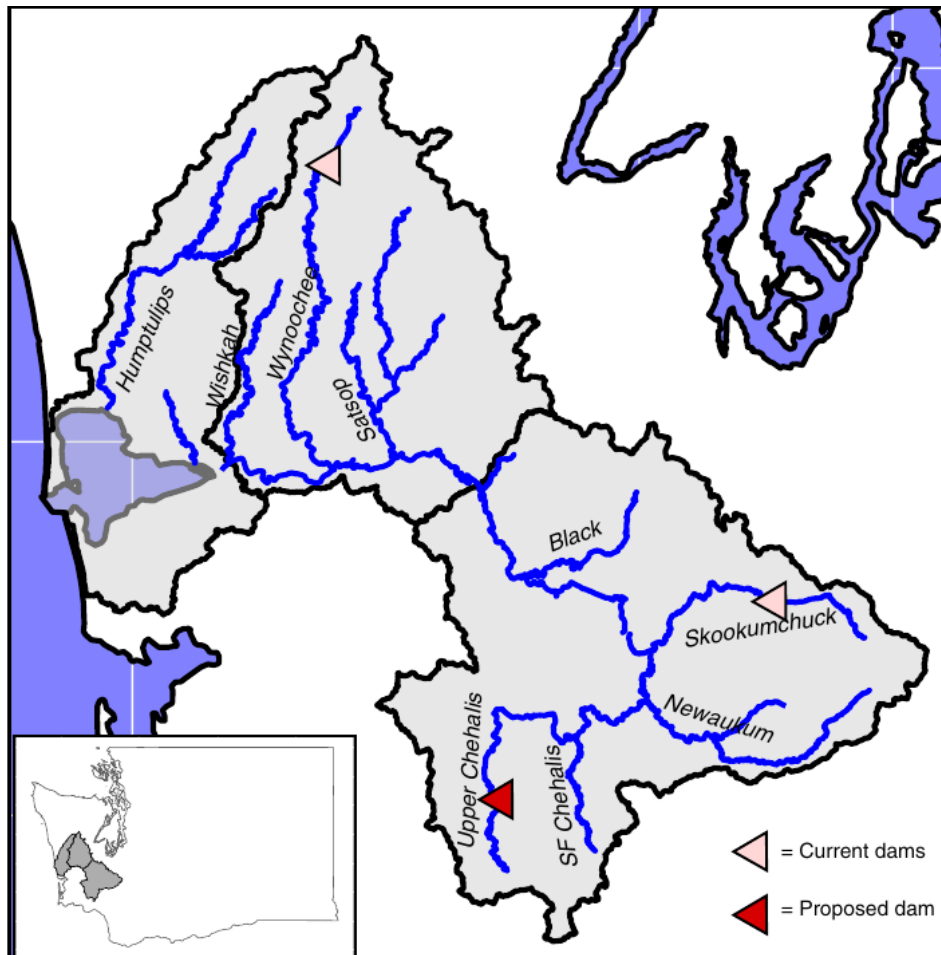
- No weir or fish counting facility exists in the basin, so spring- and fall-run abundance estimates are derived from indirect observations (e.g., spawner surveys)

Well-phenotyped samples captured in the fishery provide validation of the run-type markers in Chehalis Basin Chinook salmon

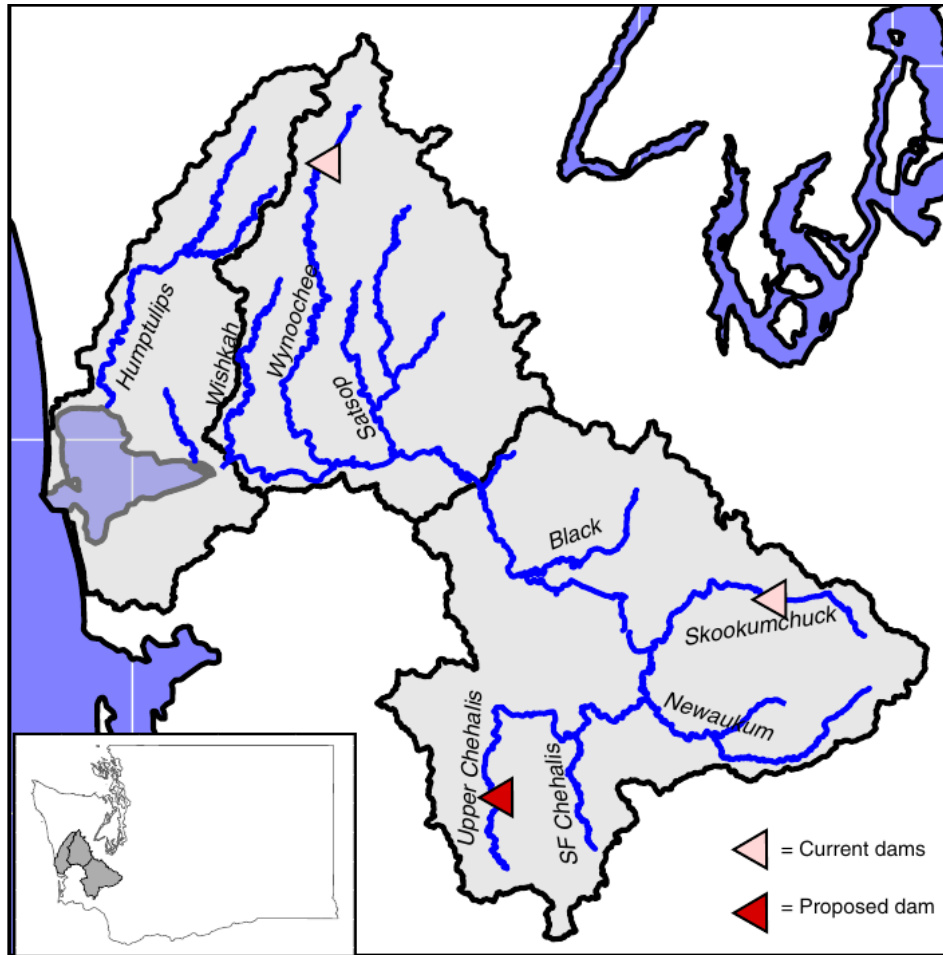
■ Homozygous spring ■ Heterozygous ■ Homozygous fall



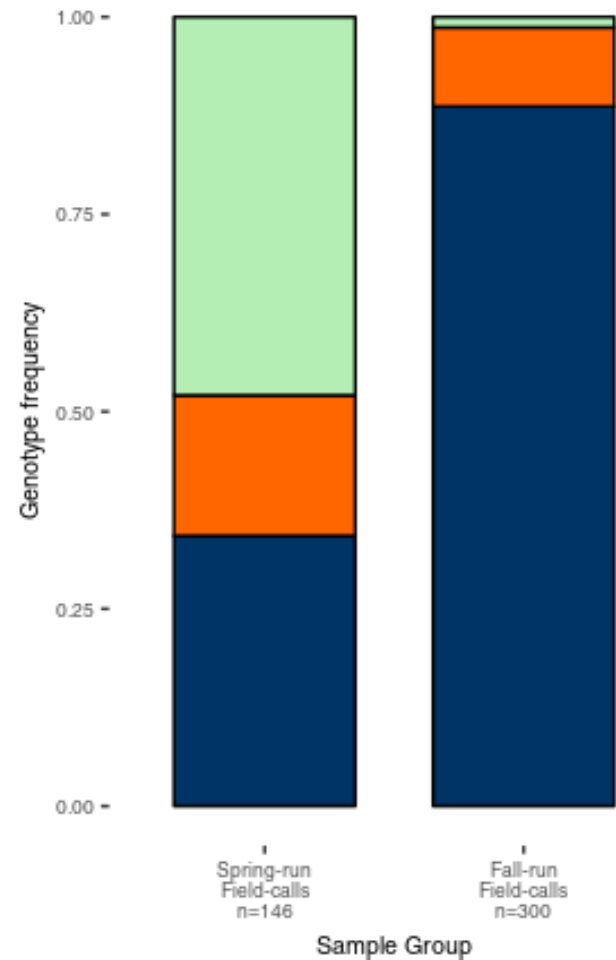
A sample set derived from carcasses encountered during surveys and that were field-called as either spring- or fall-run were analyzed at the run-type marker



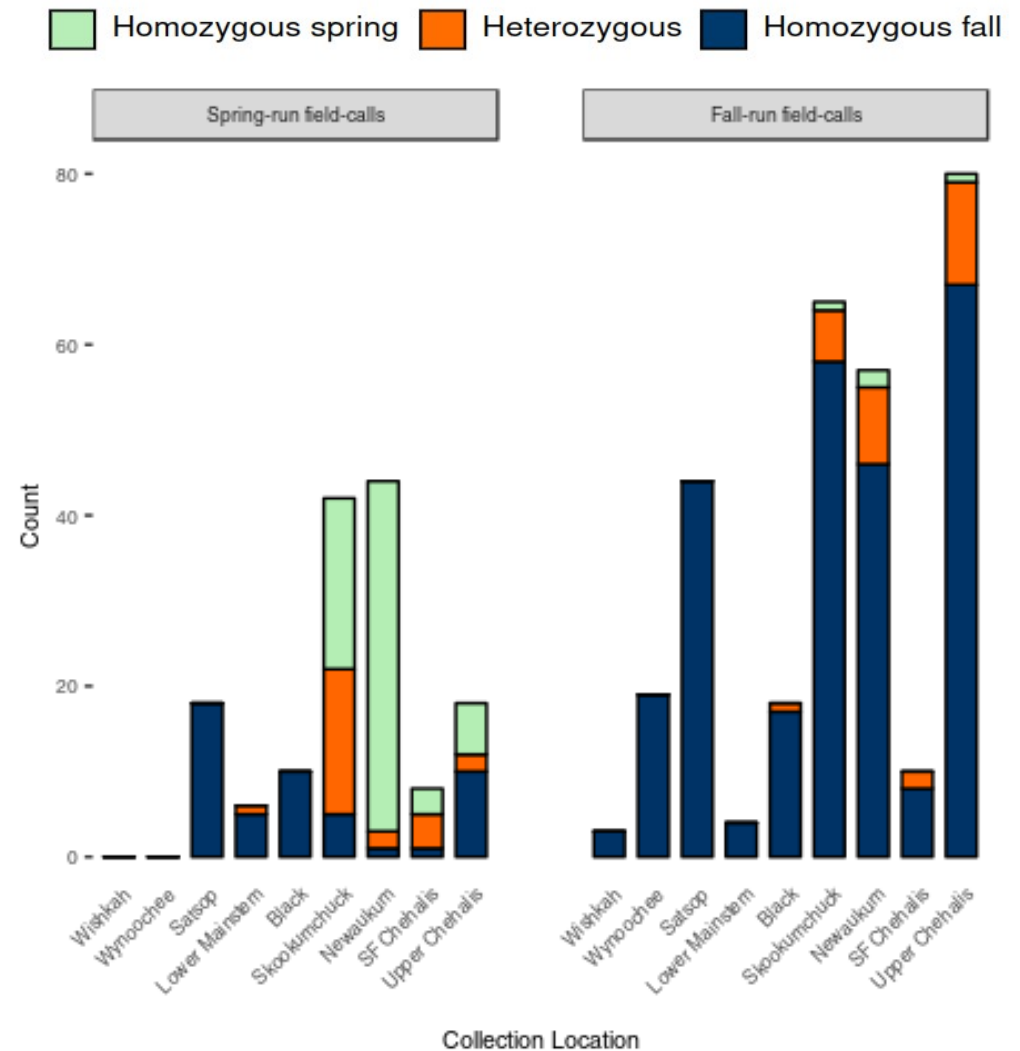
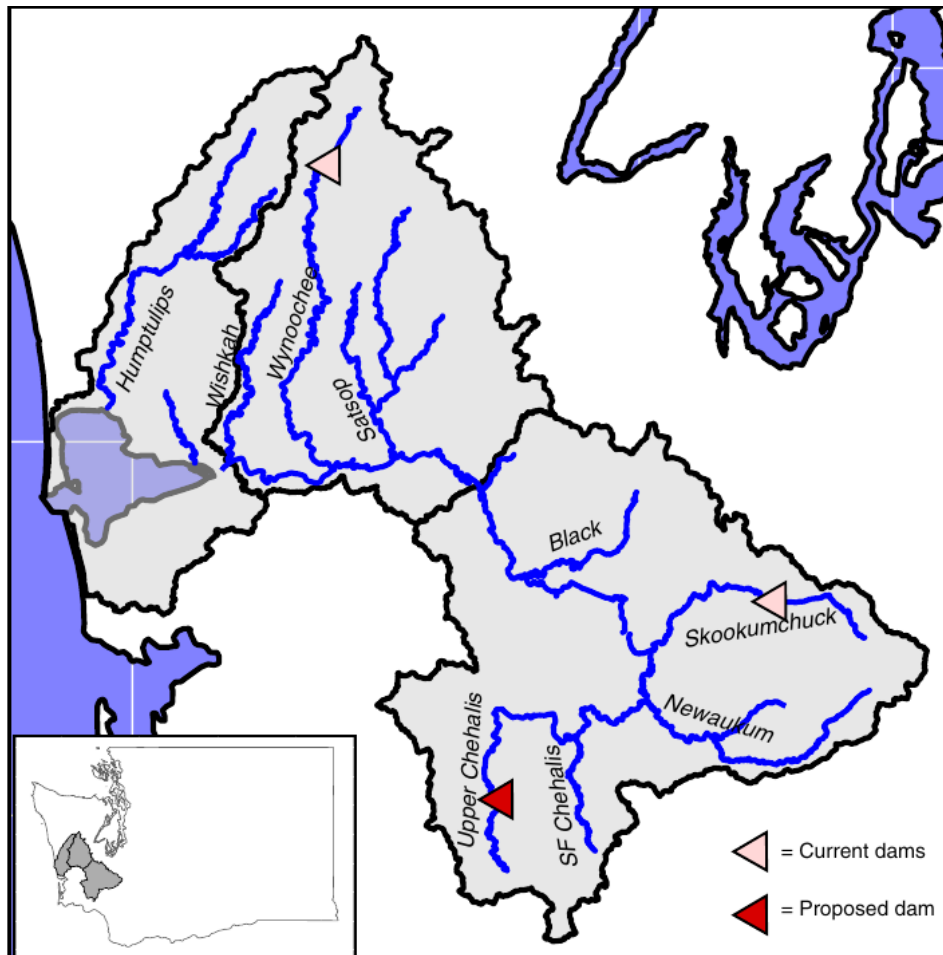
Carcass spring-run field calls contained a high error rate while fall-run field calls had a much higher accuracy



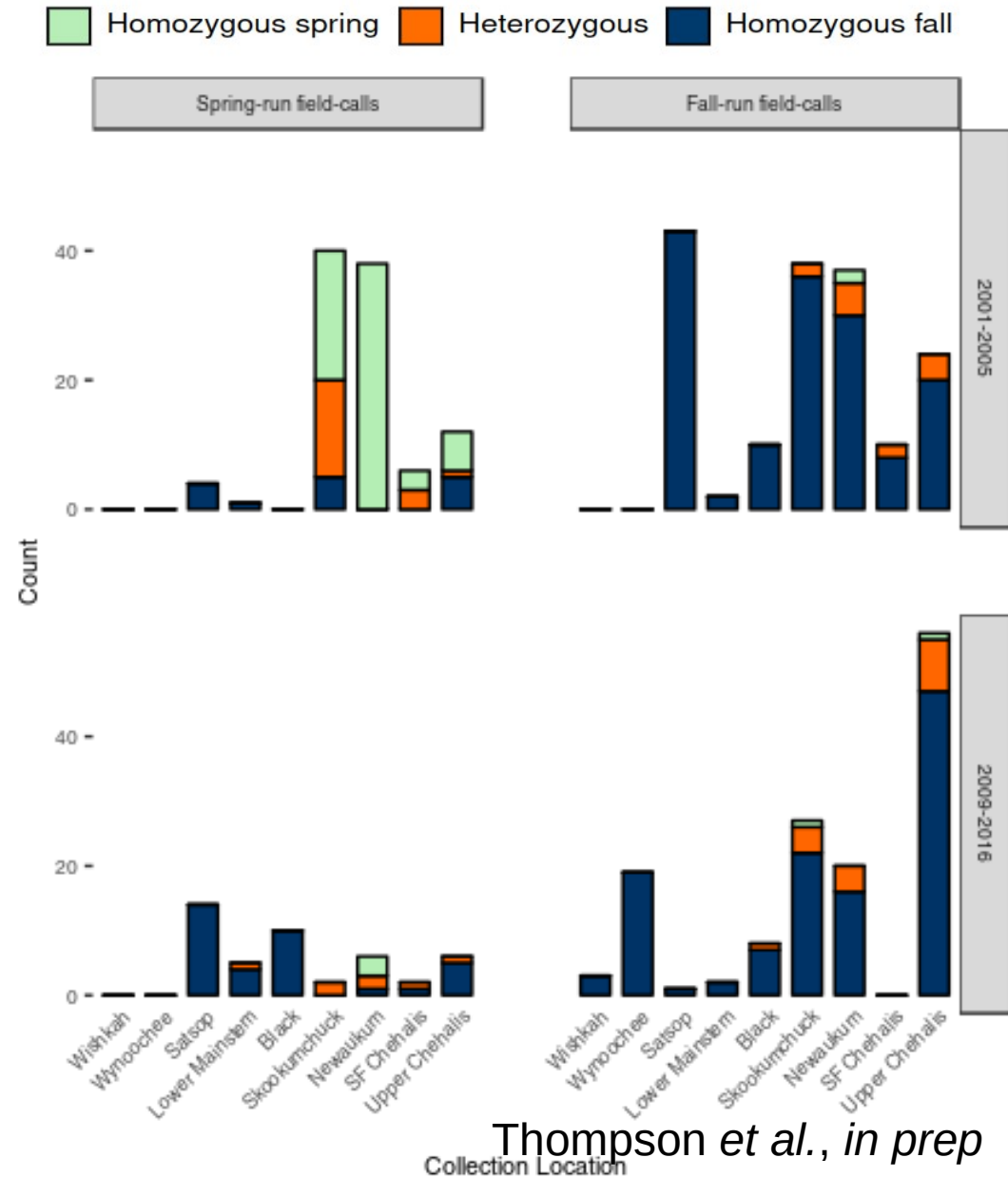
■ Homozygous spring ■ Heterozygous ■ Homozygous fall



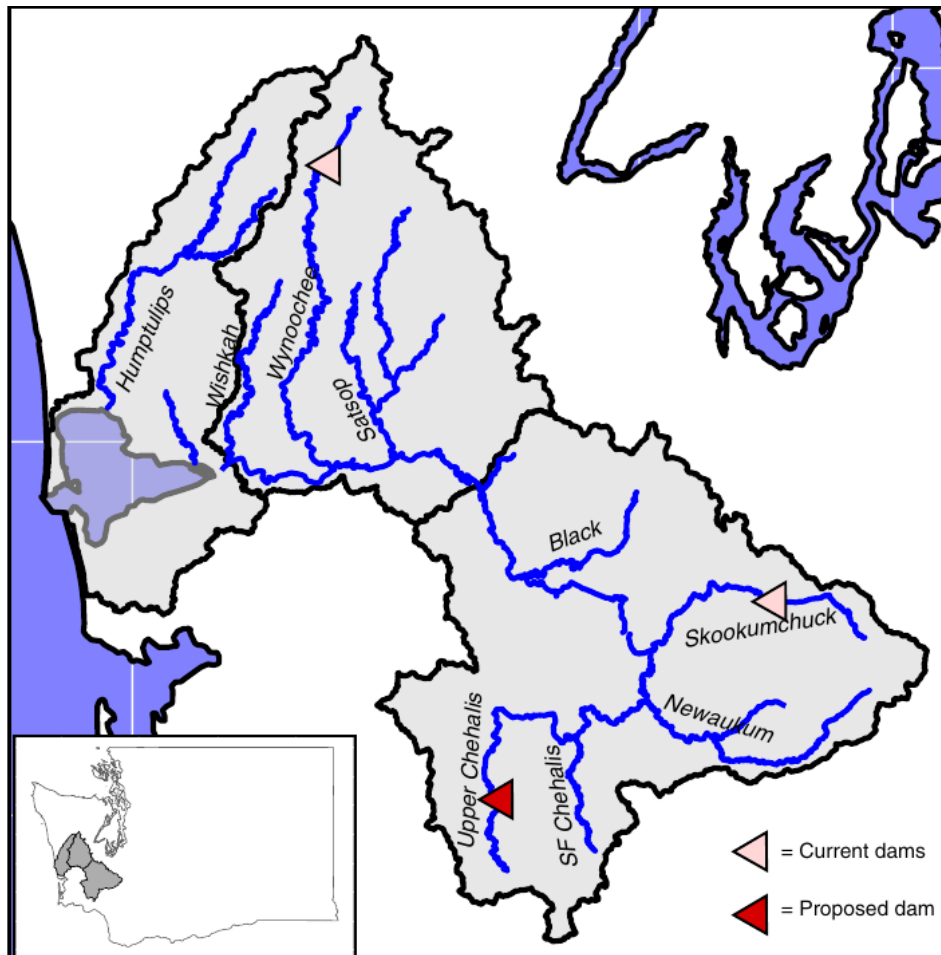
Spring-run carcass field-call accuracy varied substantially by location



Most accurate spring-run field calls were collected ~15-20 years ago

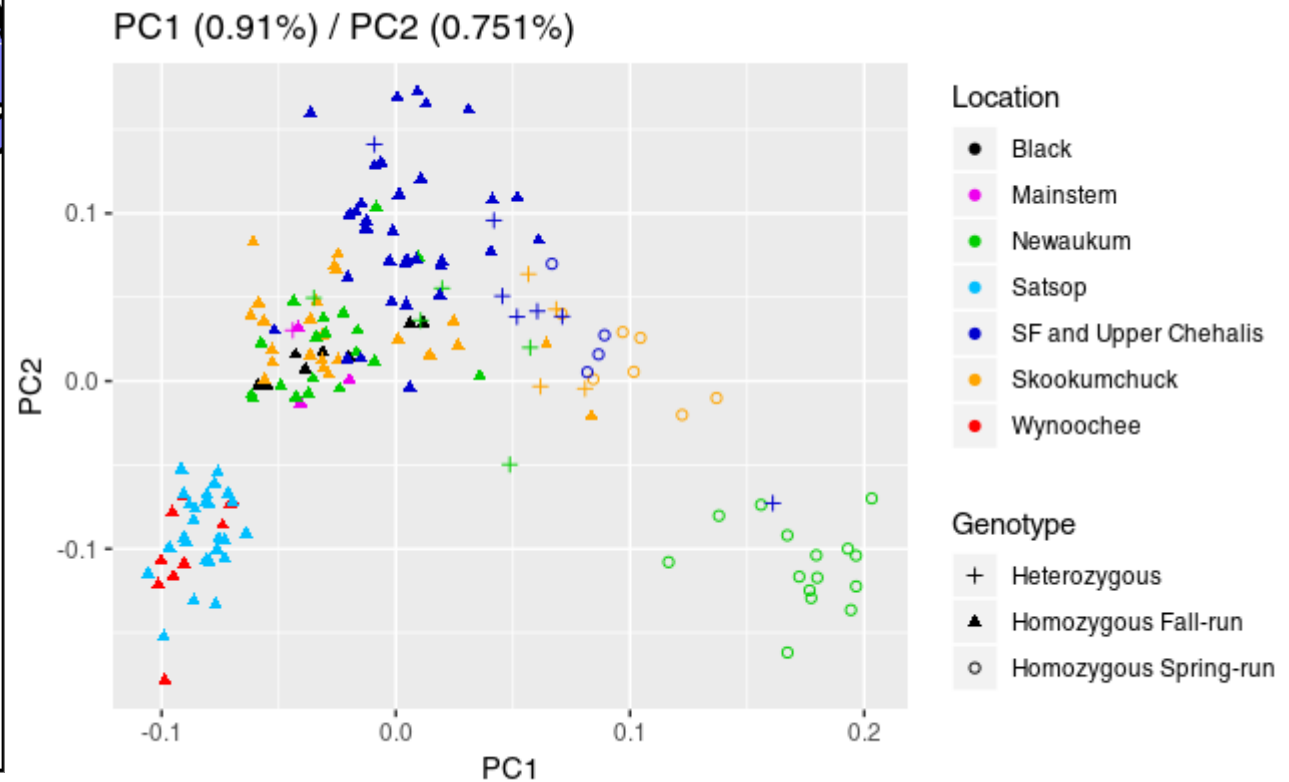
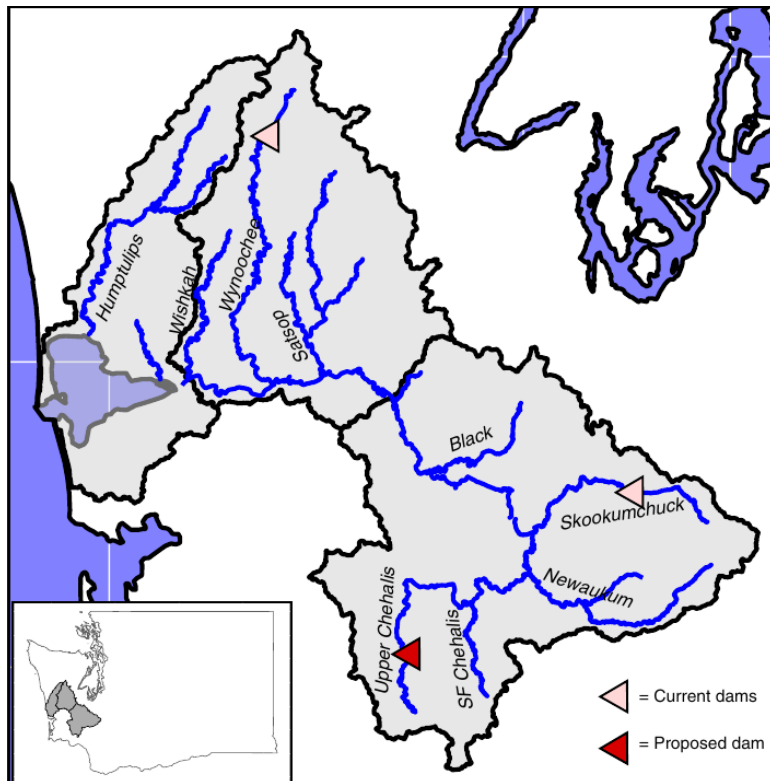


Conclusions and limitations of carcass genotyping analysis

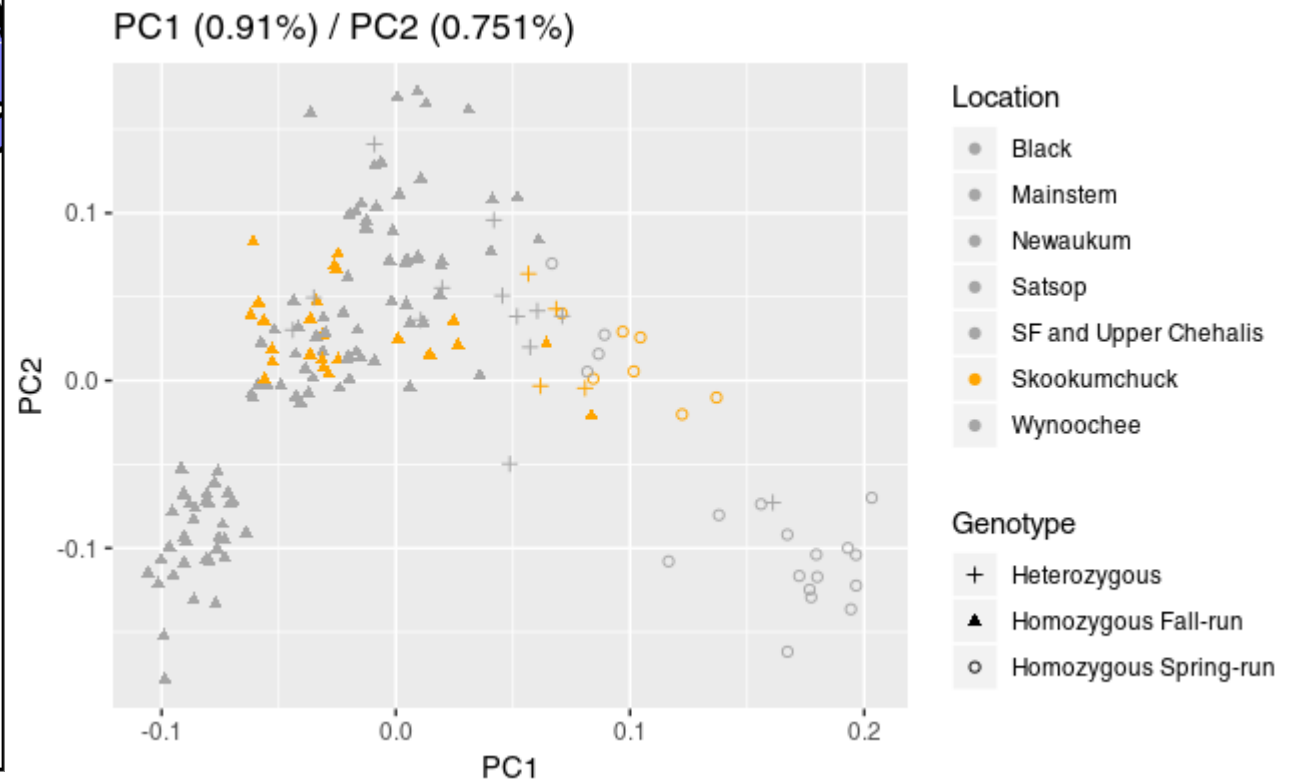
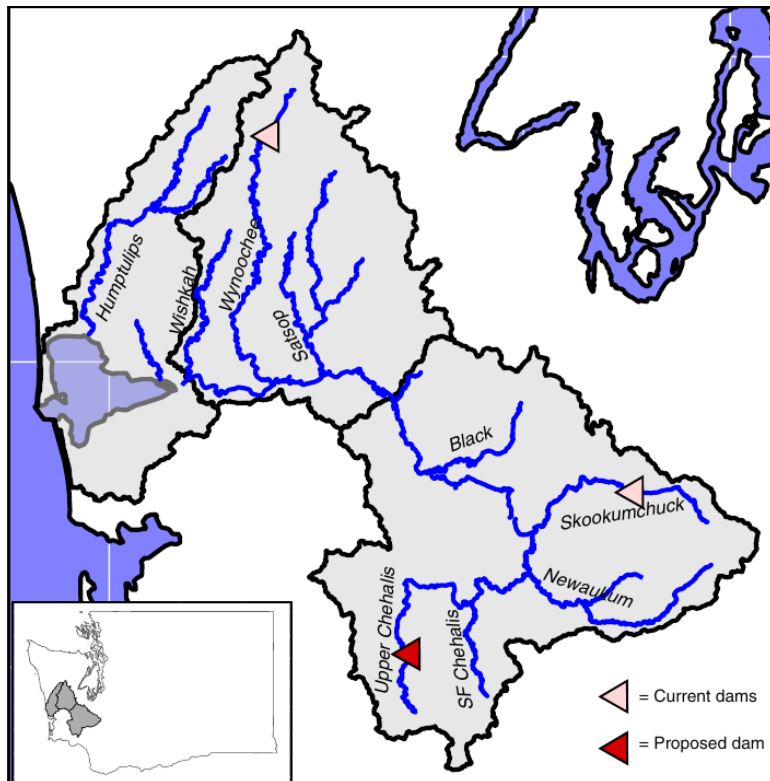


- Conclusions
 - Carcass spring-run field-calls have a high error rate—suggests low confidence/precision of run-type field-calls in general.
 - No spring-run sample observed below the Skookumchuck.
- Caveats
 - Unknown how closely carcass field-call accuracy mirrors spawner/redd field-call accuracy.
 - Many samples in data set are ~15-20 years old—accuracy may have changed over time.

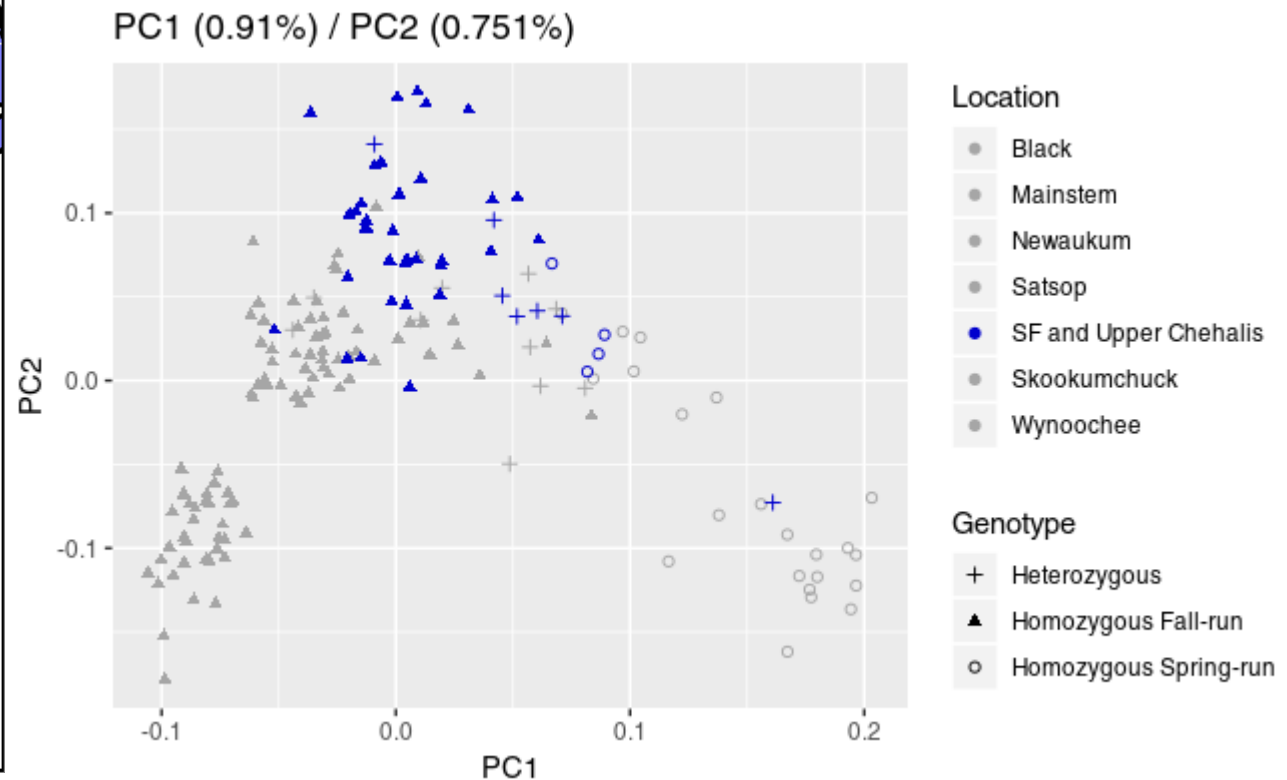
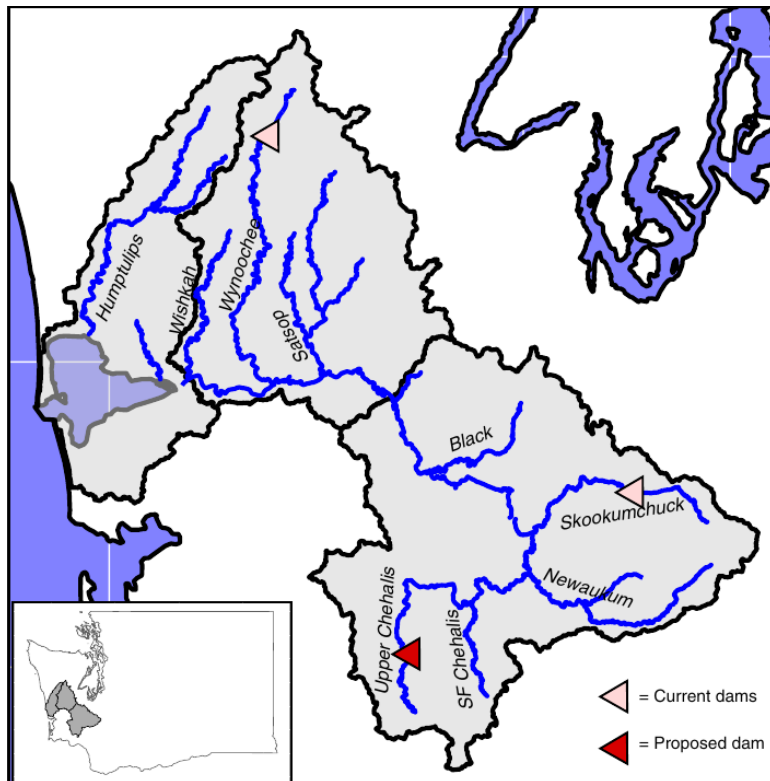
Both geography and adult migration type appear to influence structure in the Chehalis



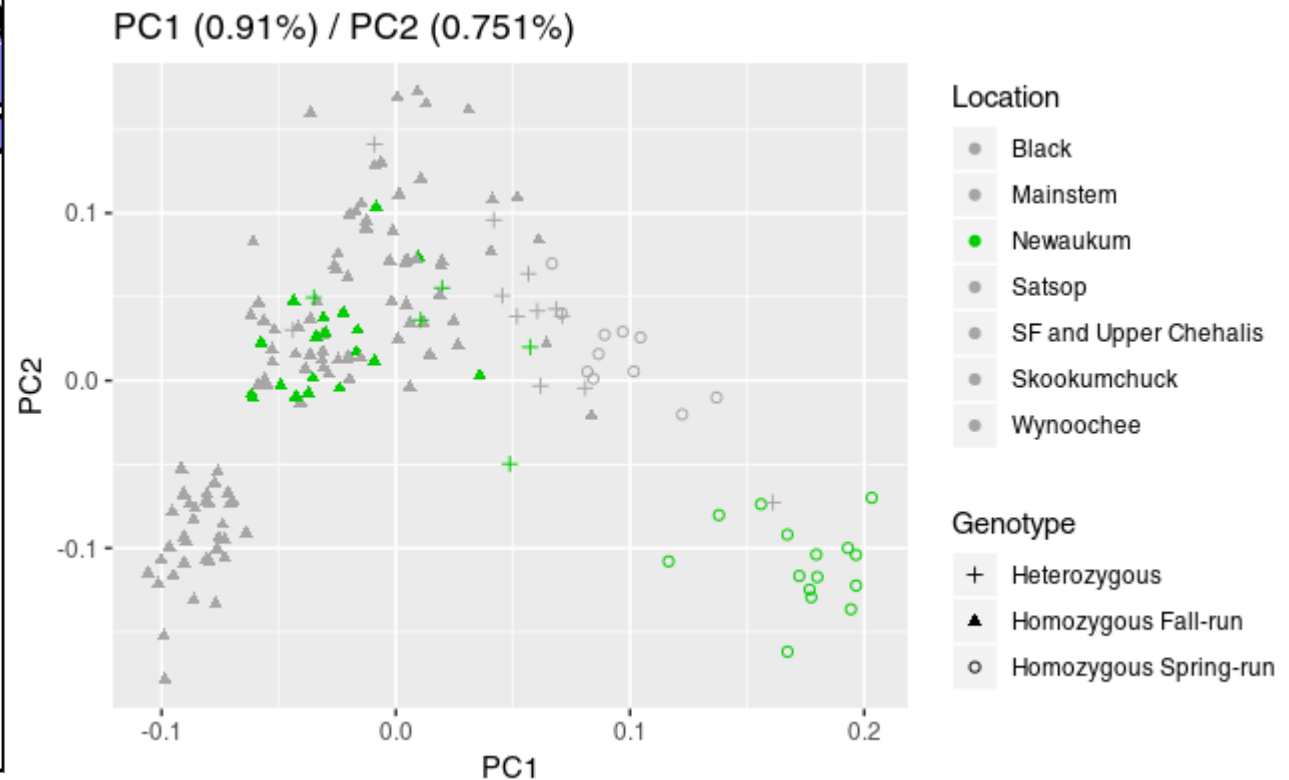
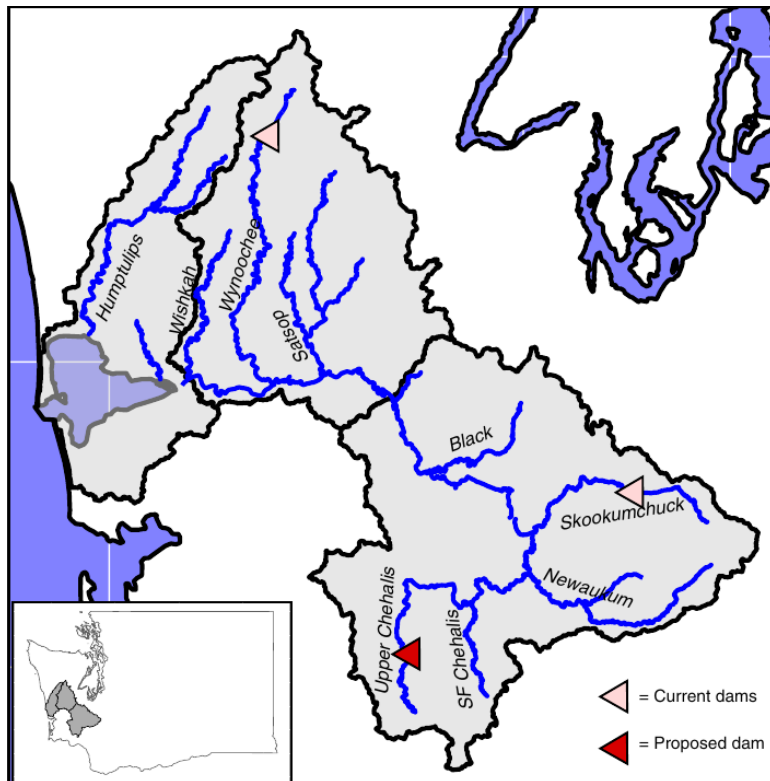
Both geography and adult migration type appear to influence structure in the Chehalis



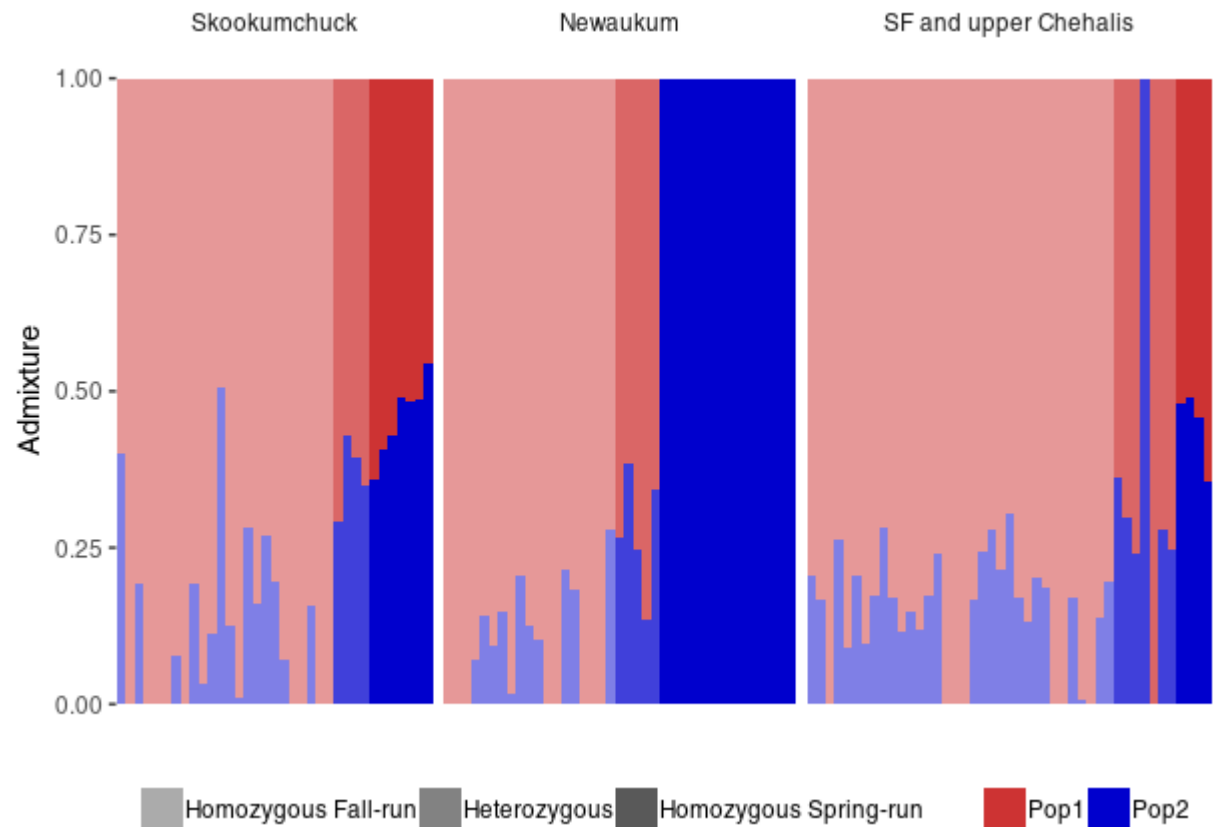
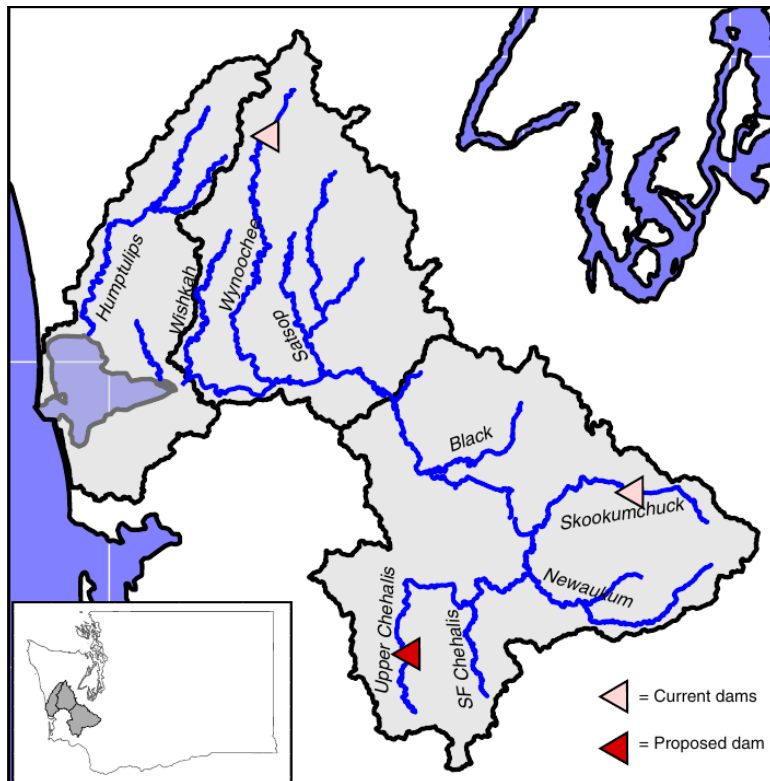
Both geography and adult migration type appear to influence structure in the Chehalis



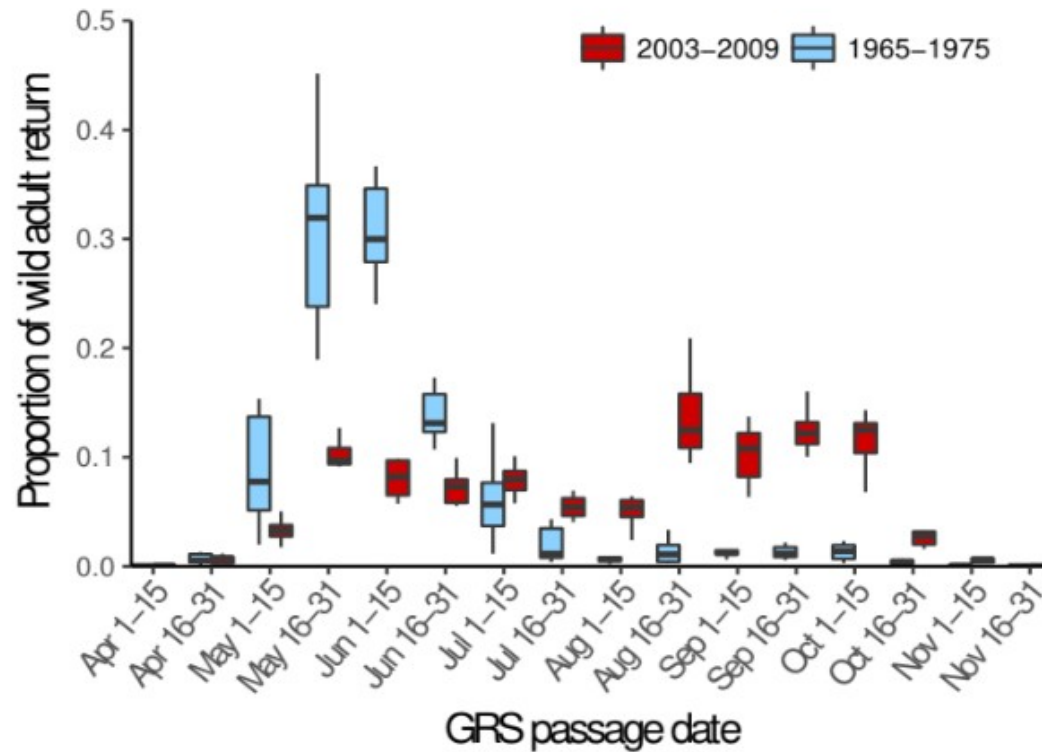
Differentiation between run-types appears to be strongest in the Newaukum



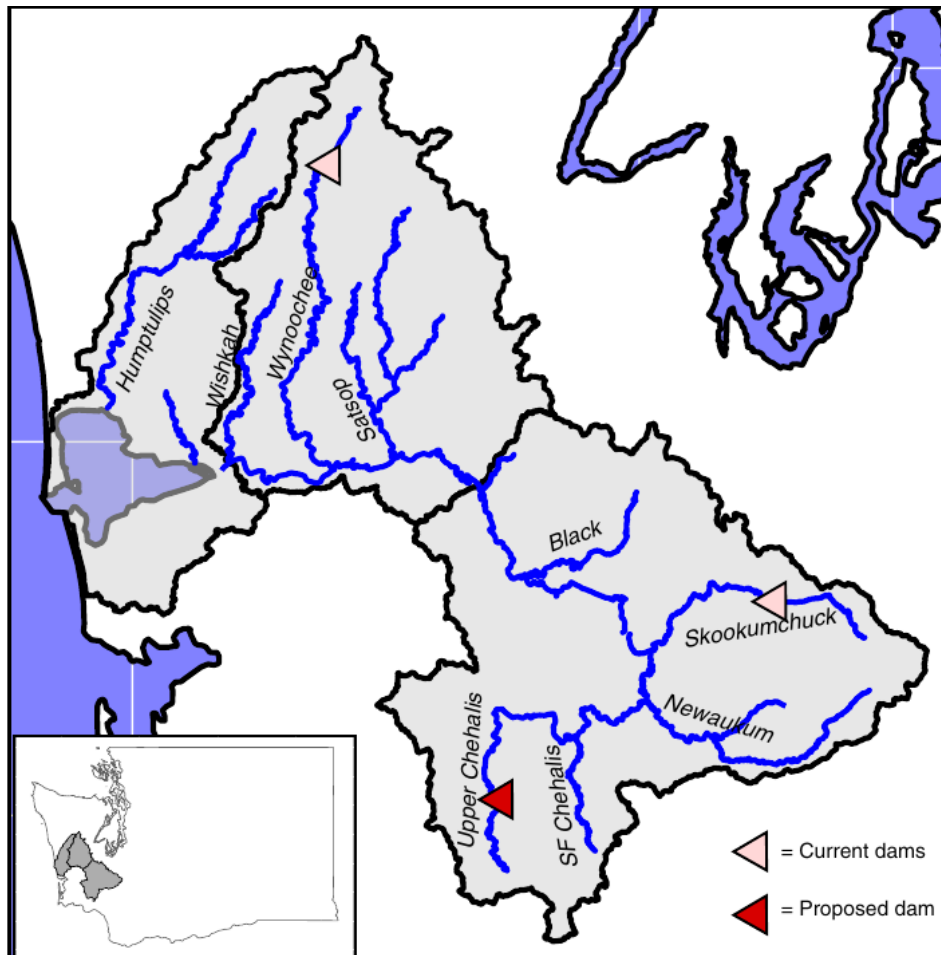
Differentiation between run-types appears to be strongest in the Newaukum



Spring-run Chinook need an evolutionary reason to exist



Potential options for monitoring run-types in the Chehalis Basin



- Systematic collection of larger number of **carcasses**
- Analysis of **smolt samples**
- **Fry trap** at high spatial/temporal resolution throughout basin
 - Create high resolution map of run-types in the basin
 - Comparing results to spawner survey data could inform abundance estimates
 - Target restoration efforts
 - Predict impacts of habitat modifications (e.g., from the proposed dam)

Acknowledgments

- Todd Seamons
- Mara Zimmerman
- Sarah Brown
- Sean M. O'Rourke
- Michael R. Miller



- **Many more!**