

Population structure of chum salmon in Prince William Sound and Southeast Alaska



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Alaska Department of Fish and Game
AHRP Informational Meeting
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Alaska Hatchery Research Program

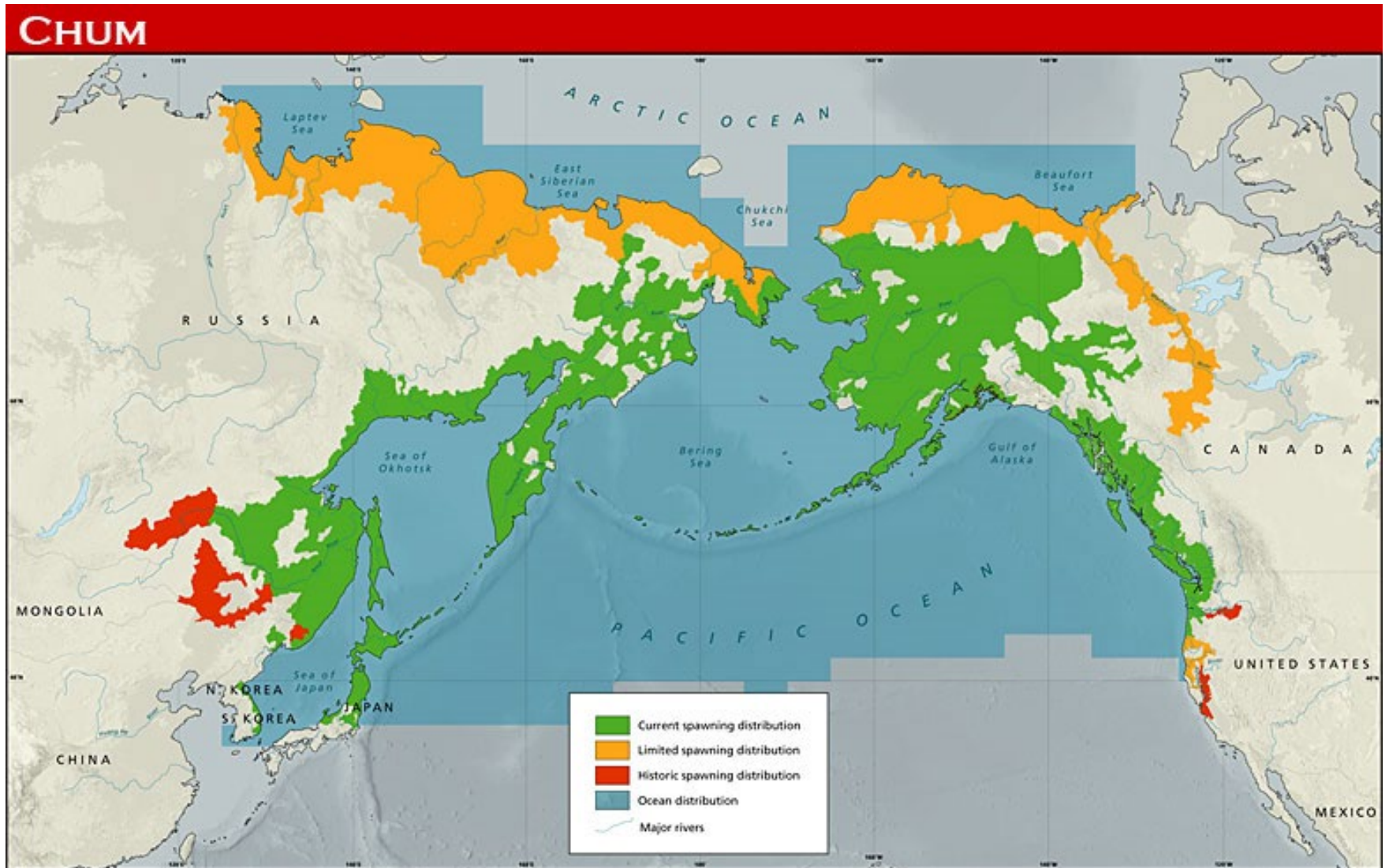
- 1) What is the genetic structure of pink and chum in PWS and SEAK?
- 2) What is the extent and annual variability of straying?
- 3) What is the impact on fitness (productivity) of natural pink and chum stocks due to straying hatchery pink and chum salmon?

Life History of Chum Salmon

- Migrate as juveniles to ocean
- Typically 2-4 years spent at sea
- Two run timings: summer & fall



Distribution of Chum Salmon



http://www.salmonnation.org/fish/meet_species.html

Quick break to understand concepts

Understanding Genetic Structure

- Differences between populations:
 - Influenced by: selection, mutation, genetic drift, migration

Understanding Genetic Structure

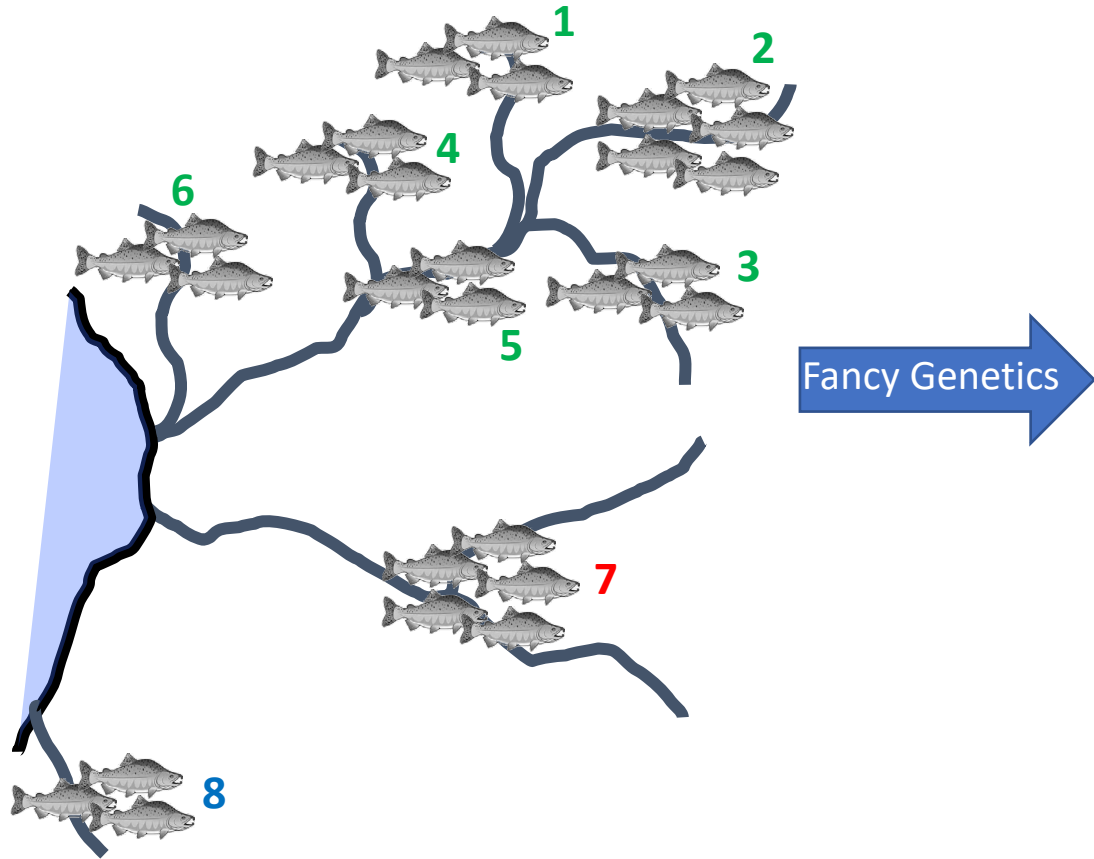
- Differences between populations:
 - Influenced by: selection, mutation, *genetic drift*, *migration*

genetic drift ~ **homing**

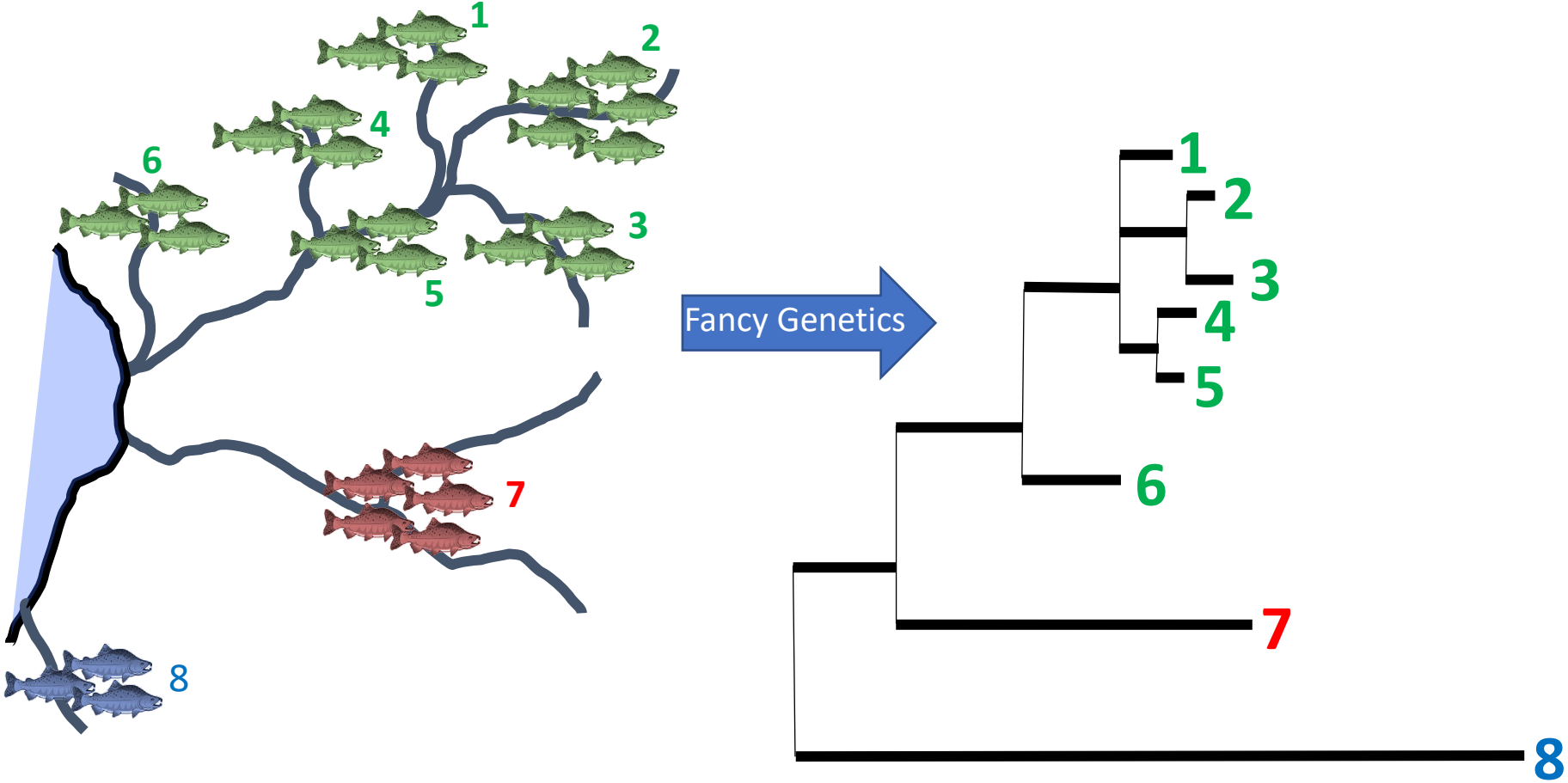
migration ~ **straying**

- *Measuring the balance between these within a species across an area*
- Measured by quantifying pairwise genetic differences
- Visualize using genetic trees

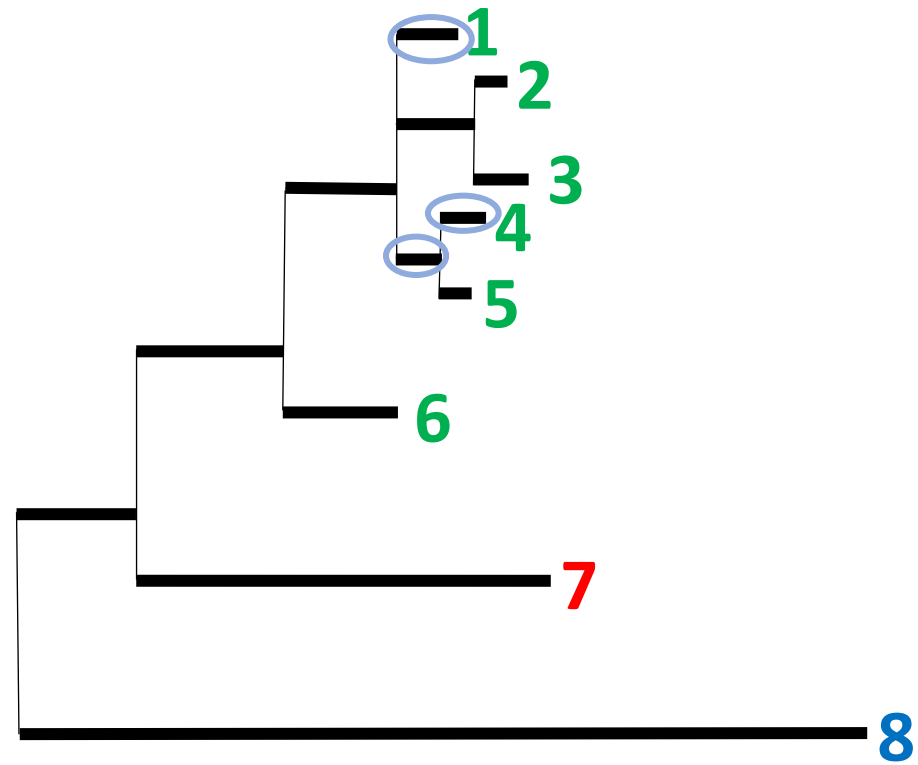
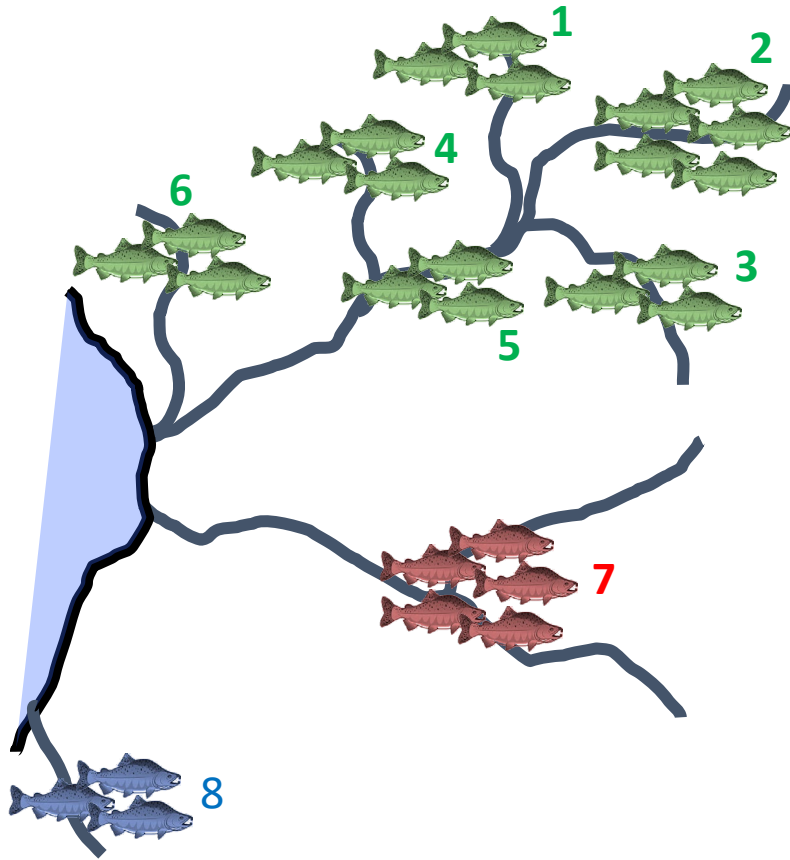
Population Structure: An example



Population Structure: An example

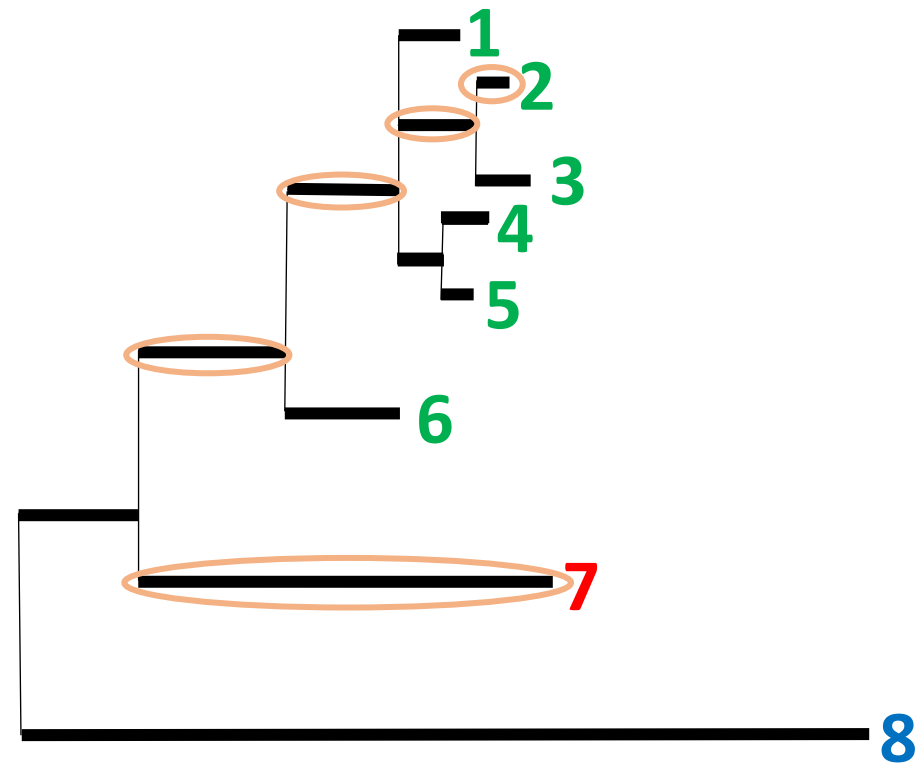
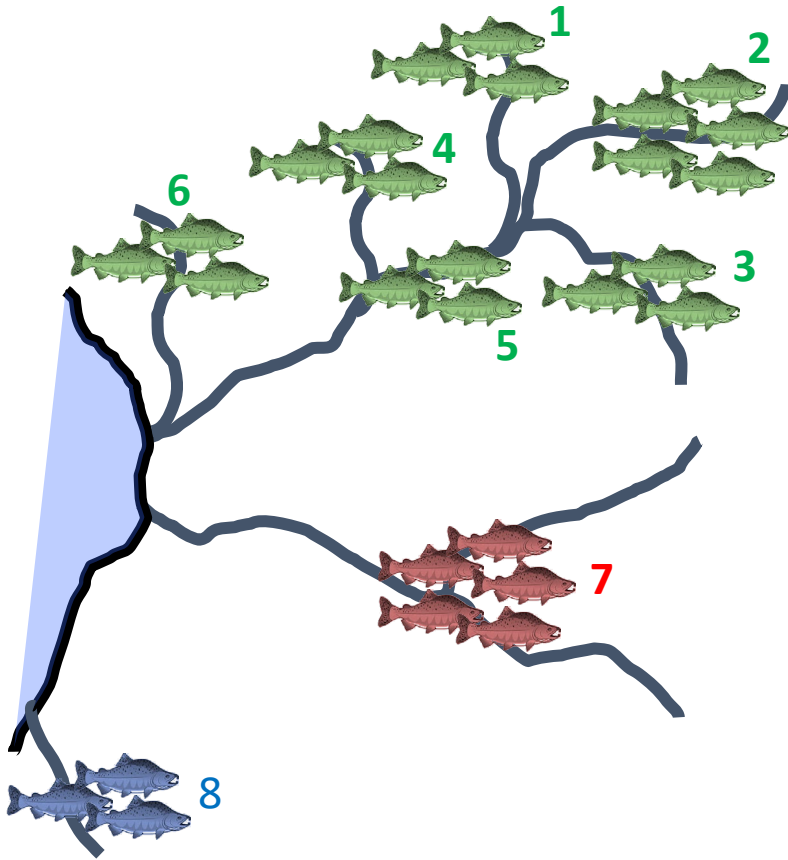


Population Structure: An example



Difference between 1 and 4: $\text{---} + \text{---} + \text{---} = \text{---}$

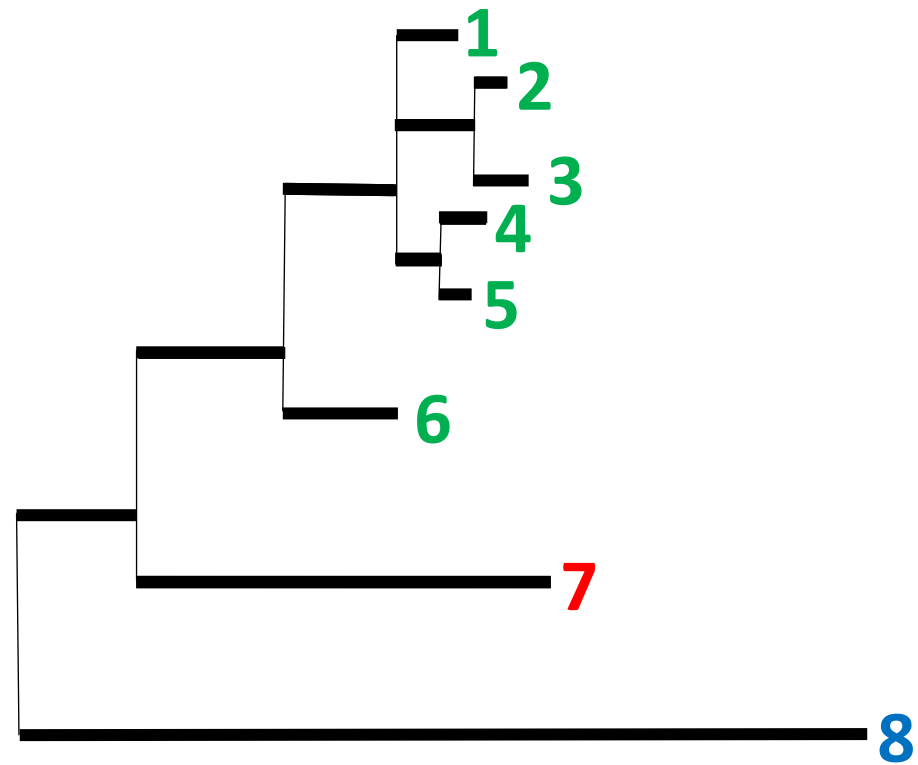
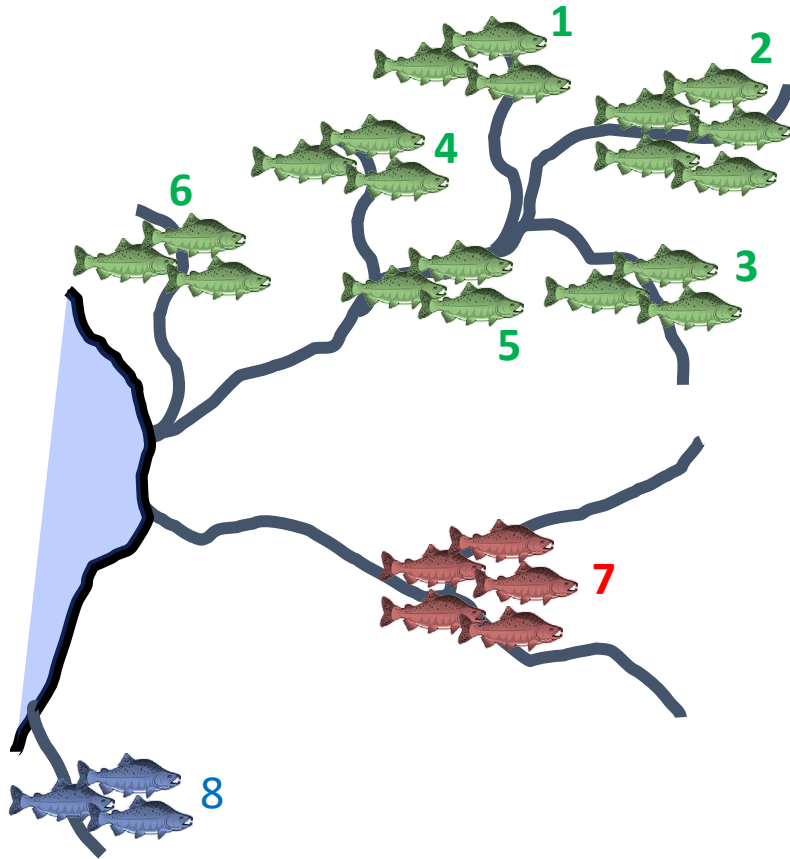
Population Structure: An example



Difference between 1 and 4:

Difference between 2 and 7: =

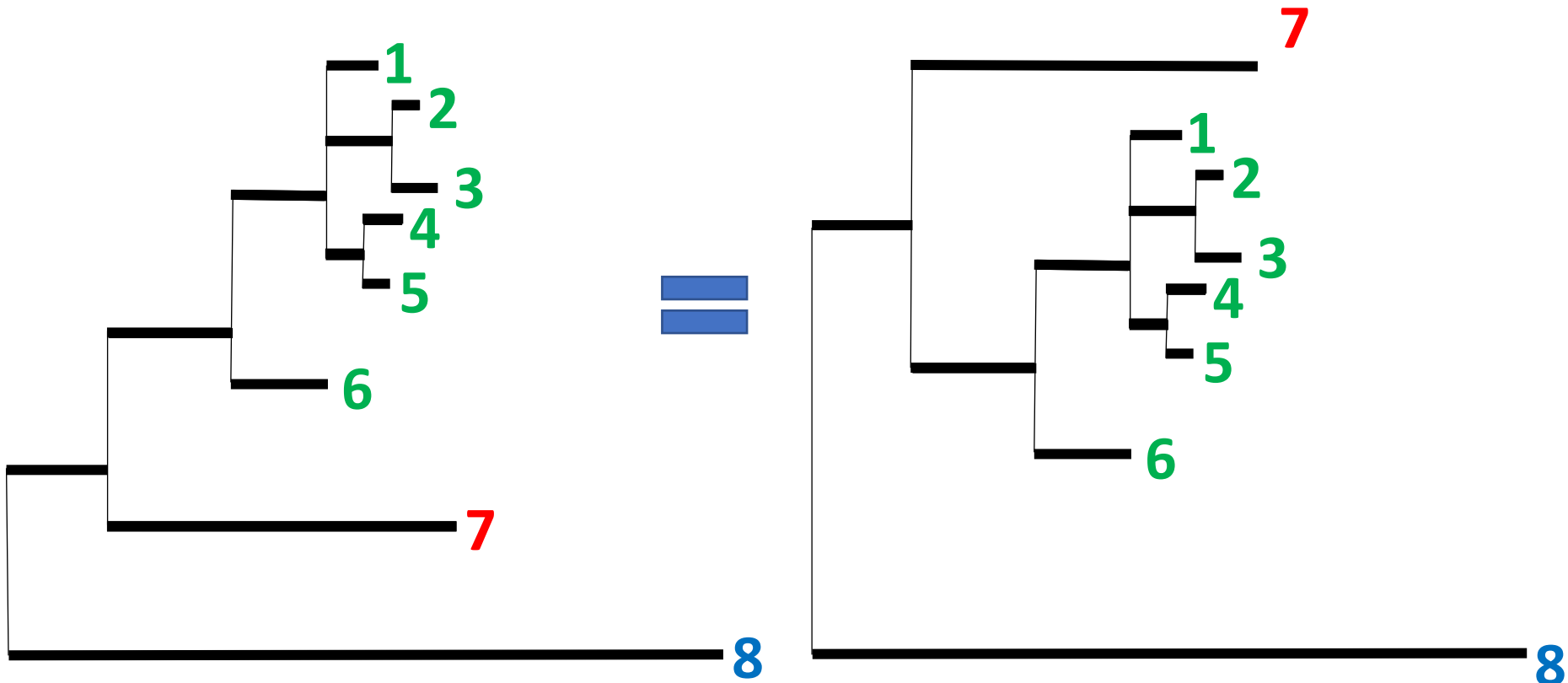
Population Structure: An example



Difference between 1 and 4: _____

Difference between 2 and 7: _____

Population Structure: An example



Now back to chum salmon...



Previous work (a sampling)

Determining Continent of Origin of Chum Salmon (*Oncorhynchus keta*) Using Genetic Stock Identification Techniques: Status of Allozyme Baseline in Asia

Gary A. Winans and Paul B. Aebbersold

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and Nataly V. Varnavskaya

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Genetic Relationships Among Chum Salmon Populations in Southeast Alaska and Northern British Columbia

C.M. Kondzela, C.M. Guthrie, S.L. Hawkins, C.D. Russell, and J.H. Helle

Auke Bay Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, National Oceanographic and Atmospheric Administration, 11305 Glacier Highway, Juneau, AK 99801-8626, U.S.A.

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Population structure and stock identification of chum salmon (*Oncorhynchus keta*) from British Columbia determined with microsatellite DNA variation

Terry D. Beacham, Brian Spilsted, Khal D. Le, and Michael Wetklo

Microsatellite Stock Identification of Chum Salmon on a Pacific Rim Basis

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Environmental Biology of Fishes 69: 37–54, 2004.
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Genetic population structure of chum salmon in the Pacific Rim inferred from mitochondrial DNA sequence variation

Shunpei Sato^a, Hiroyuki Kojima^b, Junko Ando^c, Hironori Ando^c, Richard L. Wilmot^d, Lisa W. Seeb^e, Vladimir Efremov^f, Larry LeClair^g, Wally Buchholz^h, Deuk-Hee Jin^h, Shigehiko Urawaⁱ, Masahide Kaeriyama^j, Akihisa Urano^{k,l} & Syuiti Abe^{k,l}

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Chum Salmon Genetic Diversity in the Northeastern Pacific Ocean Assessed with Single Nucleotide Polymorphisms (SNPs): Applications to Fishery Management

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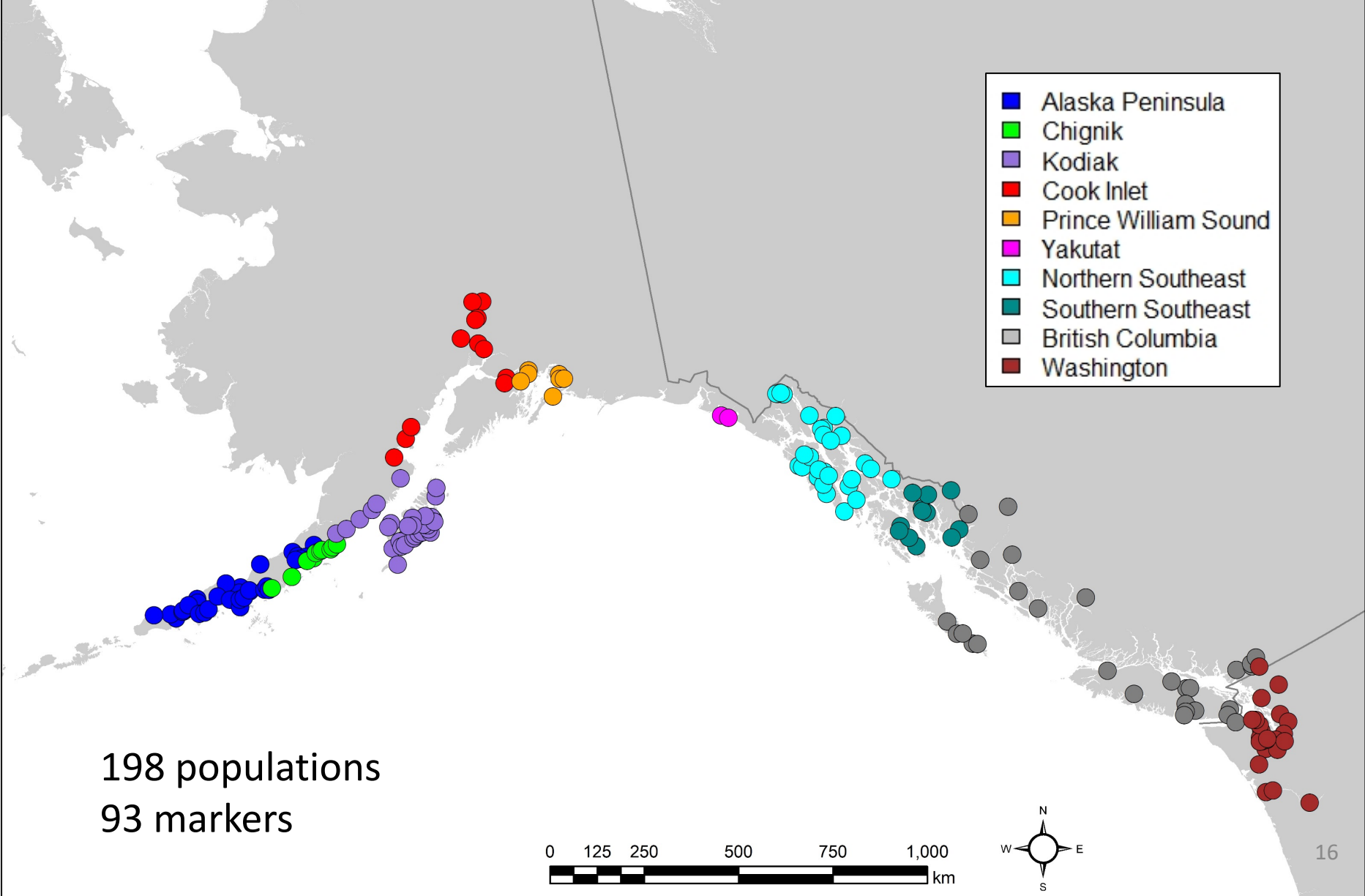
Kenneth I. Warheit

Washington Department of Fish and Wildlife, Molecular Genetics Lab,
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William Templin

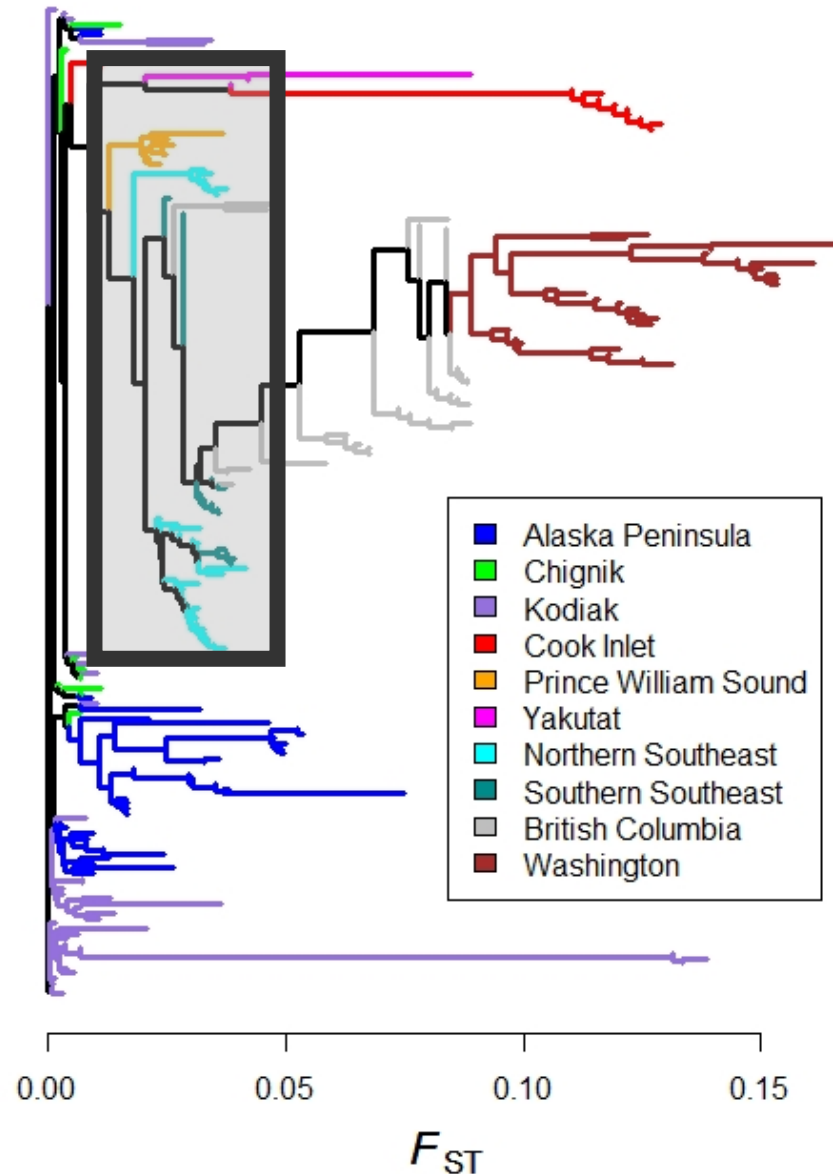
Alaska Department of Fish and Game, Division of Commercial Fisheries,
Gene Conservation Laboratory, 333 Raspberry Road, Anchorage, Alaska 99518, USA

Chum salmon in the Gulf of Alaska



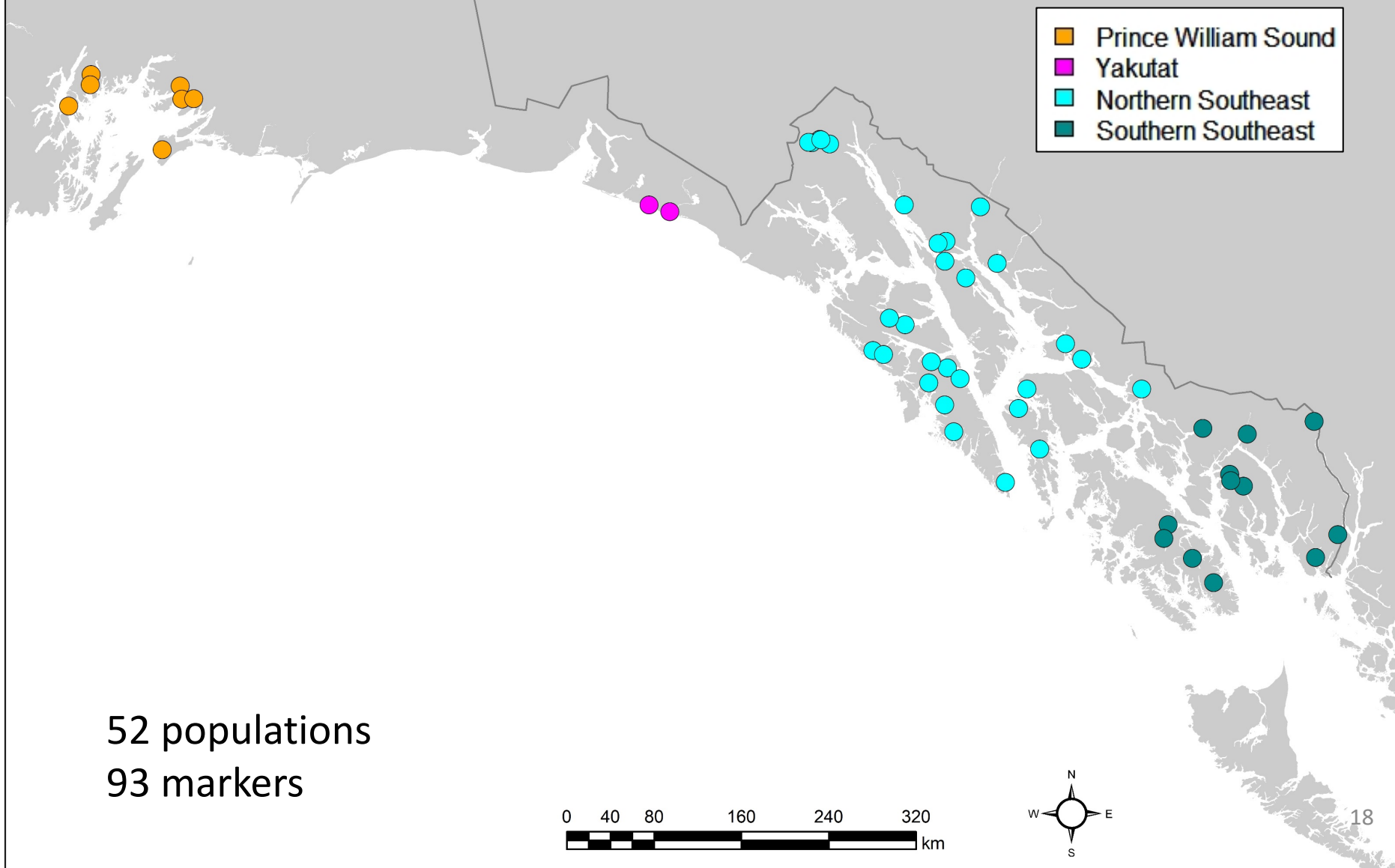
Chum salmon in the Gulf of Alaska

198 populations
93 markers



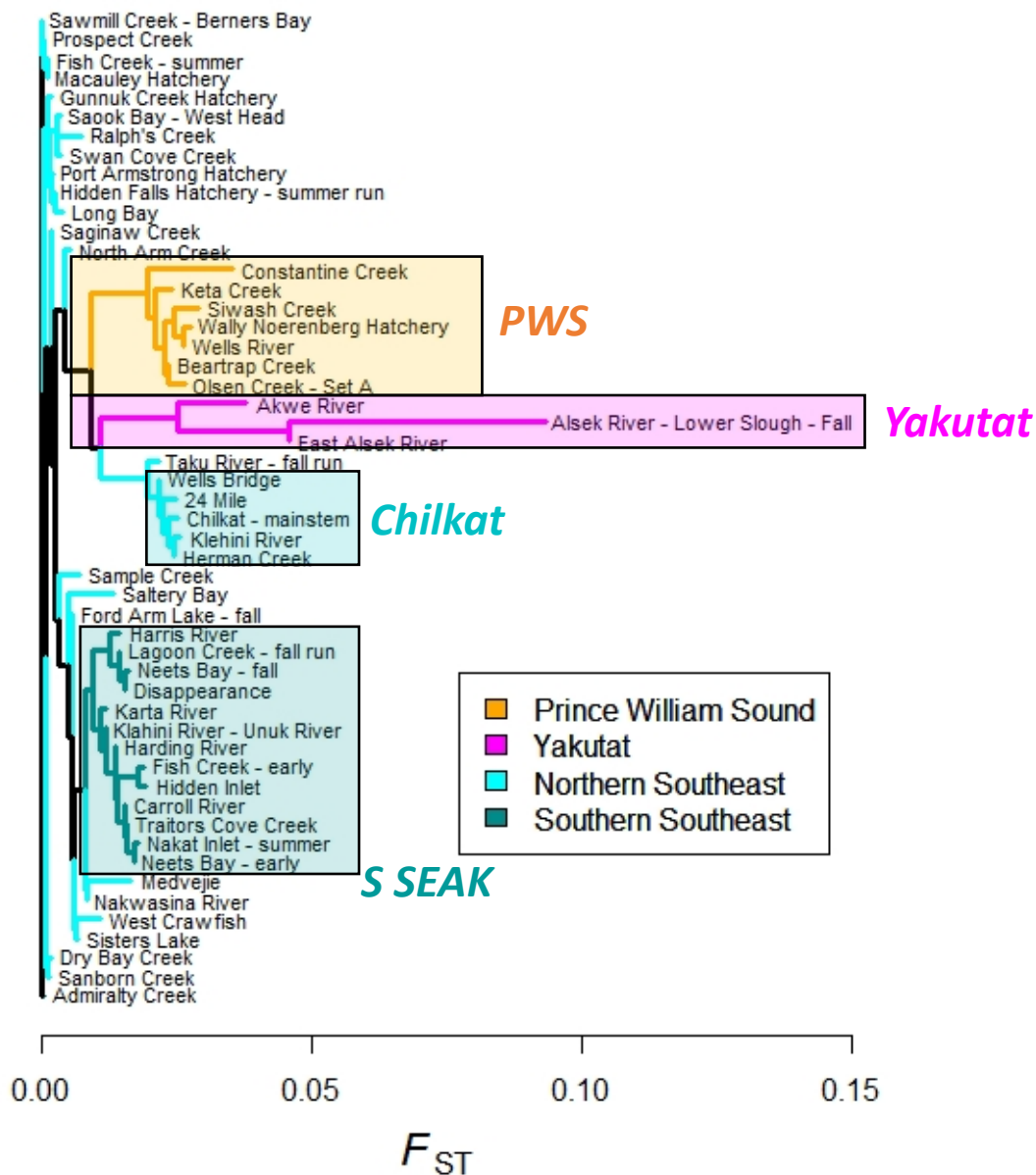
PWS to SEAK

Chum salmon in PWS and SEAK



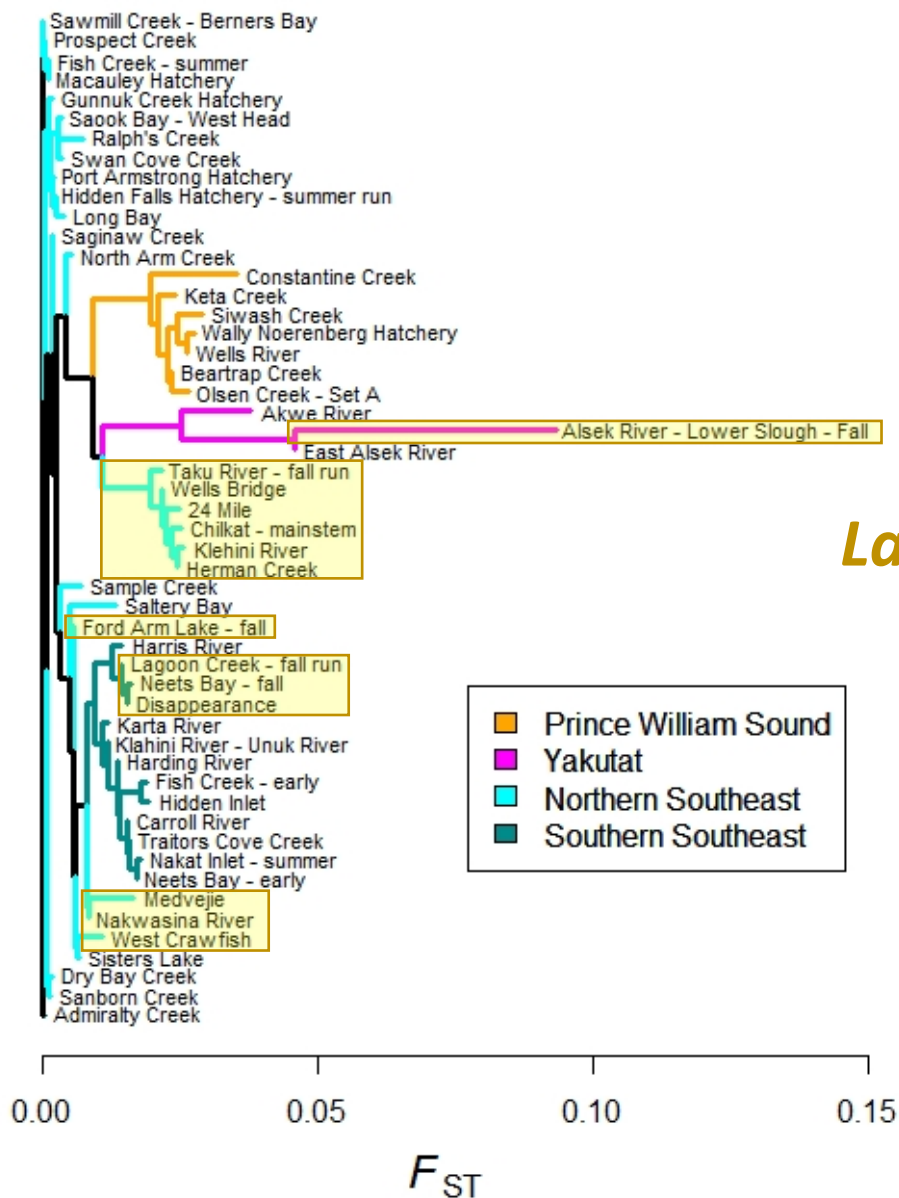
Chum salmon in PWS and SEAK

52 populations
93 markers



Chum salmon in PWS and SEAK

52 populations
93 markers



Late run timing

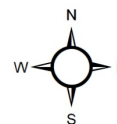
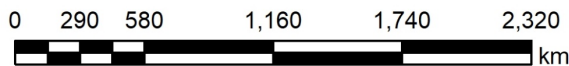
Conclusions: Chum salmon structure in AHRP study area

- Generally correlated with geography
- Some differentiation by run timing
- Similar to other studies

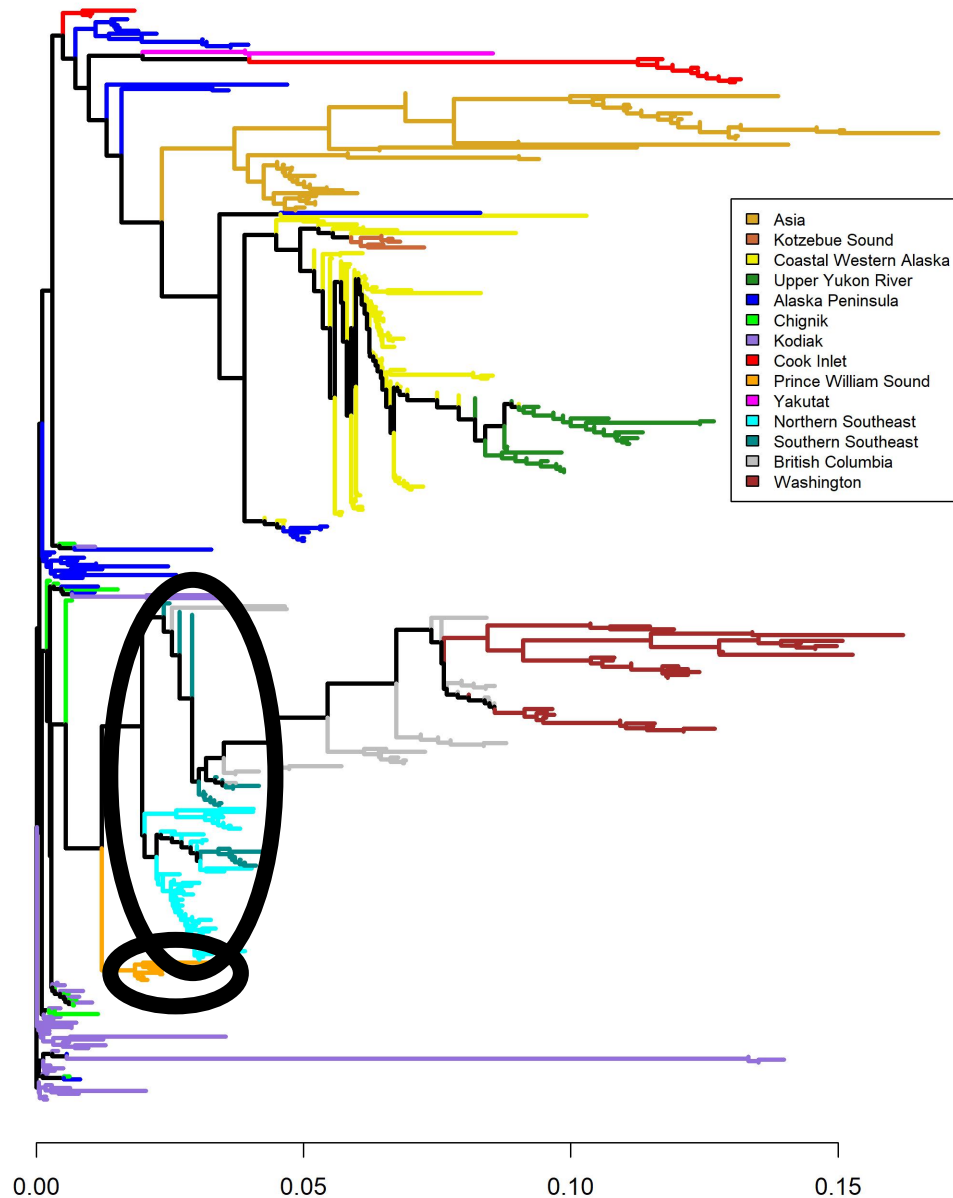
In progress: Coastwide Baseline



383 populations
93 markers



In progress: Coastwide Baseline



383 populations
93 markers

Questions?



