Run Timing of Summer vs. Fall Chum Salmon on the Yukon River, Alaska

Introduction

All chum salmon entering the Yukon River after July 15 are considered fall run for purposes of in-season management. During the summer of 1999, Alaska Department of Fish and Game began a four-year study to determine the variation in entry timing of summer-run and fall-run chum salmon. Use of genetic markers to estimate run-timing patterns provide a better understanding of the nature and variability of these stock characteristics.

Baseline Development

A genetic baseline of 22 allozyme loci was developed for 37 populations of summer- and fall-run chum salmon from the Yukon River (Figure 1). Pairwise genetic distances were calculated from allele frequencies and the following regional genetic lineages were identified with metric multidimensional scaling analysis (Figures 1, 2): 1) Lower Summer – Lower Yukon River summer run and early runs from the Koyukuk and Melozitna rivers, 2) Middle Summer – Tozitna, Chena and Salcha rivers and Koyukuk River late run, 3) Fall Tanana River, 4) Border – Chandalar, Sheenjek, Canadian Mainstem and Fishing Branch rivers, 5) Teslin River, and 6) White River. The ability to identify these regional groups in mixtures was investigated by simulating situations where each region comprised 100% of a mixture. All regions, with the exception of the Middle Summer, showed correct allocations greater than 90% (Figure 3). When populations were combined into summer and fall groups, correct allocations to the two reporting groups were well above 90% (Figure 3).

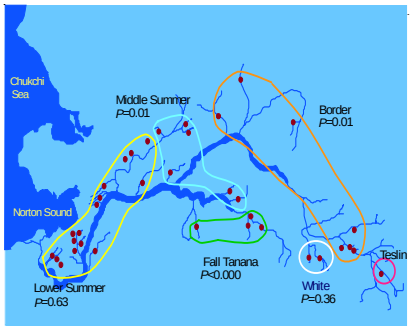

Figure 1. The six reporting regions. P-values show levels of heterogeneity among populations within regions.

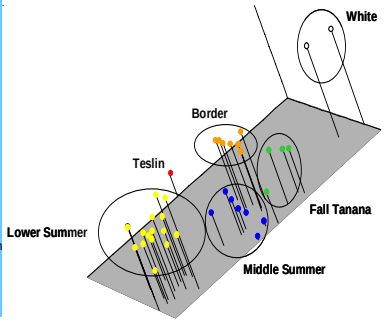

Figure 2. Multidimensional scaling depicts genetic relationships among populations.

Results

Over the four-year study, the relative contributions of summer- to fall-run chum showed a steady decline from June-August with fall-run chum salmon becoming dominant during the week of July 12-18. In some years, fall-run chum salmon contribute up to 25% of the test fishery in the week prior to the July 15 management date.

Summary

Genetic markers from allozyme loci reveal the contributions during the summer verses fall-run chum salmon in theYukon River. The data can be used to address management concerns of chum salmon harvested in commercial and subsistence fisheries and defines appropriate run timing for chum salmon in the Yukon River management units.

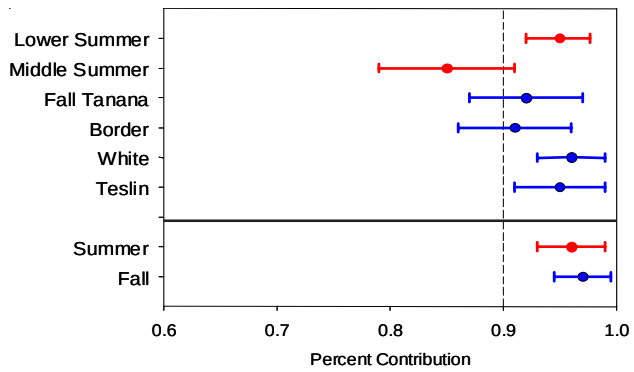

Figure 3. Average mixture estimates for each reporting region from 100% simulations.