



AYK SUSTAINABLE SALMON INITIATIVE

Project Synopsis

NORTON SOUND AREA



(Christian E. Zimmerman)

PROJECT 502

PRINCIPAL INVESTIGATOR

Jeffrey B. Olsen
United States Fish and Wildlife Service

CONTRIBUTING ORGANIZATIONS

Department of Fisheries and Oceans Canada

Kawerak, Inc.

Norton Sound Economic Development Corporation

RESEARCH PERIOD

June 2005 - May 2006

BUDGET

\$175,635.00

NORTON SOUND CHUM SALMON GENETICS

Norton Sound has suffered a progressive collapse in salmon populations since the mid-1960s that greatly affected the lifestyle and culture of most residents. An adequate inventory of genetic variability and population structure is critical for effective salmon conservation. While past genetic studies have enhanced our understanding of chum salmon stock structure and migration patterns, higher resolution data are needed to better monitor population responses to management changes, and to estimate the origin of chum salmon sampled in Norton Sound.

OUR OBJECTIVES

Estimate the extent of genetic variation within and among chum salmon populations in Norton Sound and make comparisons with Yukon River estimates.

Test whether or not Nome Subdistrict populations, which have declined more rapidly than other Norton Sound populations, have less variability than, and are divergent from, those populations.

Determine the population structure to identify conservation units, estimate patterns of gene flow, and estimate the effective population size in order to evaluate genetic health.

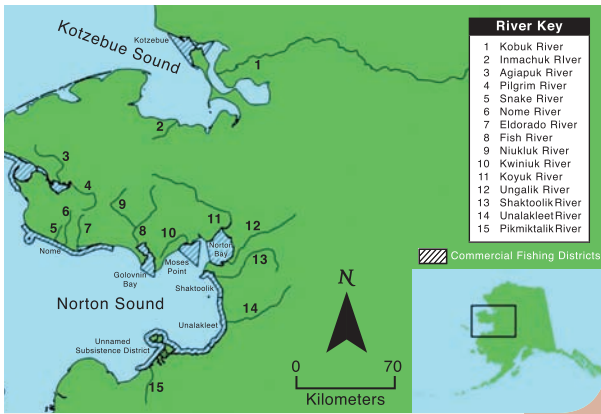
RESEARCH FRAMEWORK:
SYNTHESIS & PREDICTION – PRIORITY #10

SNAPSHOT

An analysis was conducted of the genetic diversity of chum salmon populations from 13 rivers in Norton Sound and two in Kotzebue Sound. This project found that run timing greatly affects the population structure of this area, and that population connectivity is important to maintaining genetic diversity.

While a high risk of short-term genetic loss wasn't found, the chum salmon populations in the Inmachuk and Koyuk rivers are most vulnerable.

NORTON SOUND



Map of Norton Sound showing the 15 sample locations for chum salmon. (Olsen, USFWS)



(Mike Dinneen)

HOW WE DID IT

We collected fin tissue samples from 200 chum salmon from each of 13 rivers in Norton Sound, and two in Kotzebue Sound. We examined each population using 20 different microsatellite genetic markers, and conducted a series of analyses to determine genetic diversity within and among populations, spatial and temporal separation of different stocks, and effective population sizes.

WHAT WE DISCOVERED

Run timing is the single largest factor affecting the significant population structure that we found to exist. The Nome Subdistrict populations exhibited similar variation to others, and the diversity for Norton Sound was similar to that of the Yukon River. We found that divergence is correlated with geographic distance for early-run populations while late-run populations may differ in the extent to which their spawn timing overlaps with early-run populations. We also found that while current effective population sizes do not indicate a high risk of short-term genetic loss, Inmachuk and Koyuk river populations are most vulnerable. Finally, we found that the genetic health of the early-run population complex depends upon maintaining connectivity among populations.

PRODUCTS AND OUTREACH

The results from this study were included in a poster presented at the AYK SSI 2007 Symposium *Pacific Salmon: Ecology and Management of Western Alaska's Populations* and is available online. A copy of the poster was given to Kawerak, Inc. The results are also included in a peer-reviewed journal paper published in 2008.

WHAT'S NEXT?

Based on our findings, we recommend that managers maintain the connectivity between populations; continue to monitor genetic diversity, especially within the Inmachuk and Koyuk rivers; and use a comprehensive review of life history, ecology, and genetic variation to define conservation boundaries for western Alaska chum salmon. Further tests are needed on the Koyuk River stocks as there is evidence for multiple populations that vary in run timing.

AYK SSI Mission: *To collaboratively develop and implement a comprehensive research plan to understand the causes of the declines and recoveries of AYK salmon.*

ARCTIC-YUKON-KUSKOKWIM SUSTAINABLE SALMON INITIATIVE

BERING SEA FISHERMEN'S ASSOCIATION
110 W. 15TH AVENUE
ANCHORAGE, AK 99501
(907) 279-6519