



AYK SUSTAINABLE SALMON INITIATIVE

Project Synopsis

NORTON SOUND AREA



(Christian E. Zimmerman)

PROJECT 731

PRINCIPAL INVESTIGATOR

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*University of Alaska
Fairbanks*

CONTRIBUTING ORGANIZATION

*Alaska Department
of Fish and Game*

RESEARCH PERIOD

July 2007 -
May 2009

BUDGET

\$87,892.00

SEWARD PENINSULA SMOLT STUDIES

THE KEYS TO FISHABLE ABUNDANCE

The sockeye salmon populations of the Seward Peninsula are the most northerly in North America and are therefore likely to have unique life history characteristics. The abundance of these populations has increased dramatically in recent years, which may be a response to climate warming, lake fertilization, or to some combination of factors. In managing salmon resources it is important to understand all of the factors controlling abundance.

OUR OBJECTIVES

Determine if the production in Seward Peninsula lakes, and the marine nutrients provided by returning adults, affect fry growth and recruitment any more than does escapement from the fishery (number of spawning adults). Specifically, to compare sockeye salmon adult and juvenile growth rates with annual counts of spawning adults, migrating juveniles, and lake biological production, including the effects of artificial fertilization to increase prey abundance.

Evaluate the effects of smolt age and growth on marine survival, in particular, whether faster-growing smolts are more likely to survive.

HOW WE DID IT

Ms. Lorna Wilson, the project's Graduate Research Assistant, investigated sockeye salmon populations from Salmon Lake, which had been artificially fertilized and has an extensive estuary, and nearby Glacier Lake,

RESEARCH FRAMEWORKS:

SALMON LIFE CYCLE –
PRIORITY #2;

SYNTHESIS &
PREDICTION –
PRIORITY #10

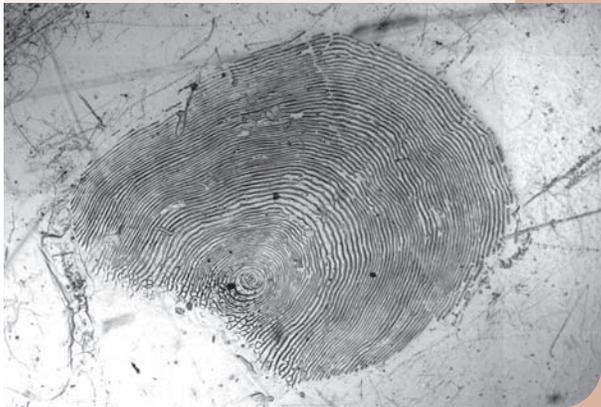
SNAPSHOT

Sockeye salmon growth and environmental conditions in two Seward Peninsula lakes were compared in order to test whether escapement censuses are an adequate predictor of future populations or, alternatively, whether other factors also influence abundance.

Escapement correlates with future abundance better than lake environmental factors, and artificial fertilization cannot be demonstrated to have increased juvenile sockeye salmon growth.



(Lorna Wilson)



(Lorna Wilson)



(Lorna Wilson)

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

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which has not been artificially fertilized, and has no extensive estuary, but tends to produce larger smolts. She measured 1,153 adult and 1,323 smolt scale samples taken from these populations between 1995 and 2008, and compared these measurements with climatological records and observations from Salmon Lake of lake productivity collected over the same time period.

WHAT WE DISCOVERED

Life histories of Seward Peninsula sockeye salmon are not remarkably different from southern populations. Larger smolts are more likely to survive to adulthood, and recruitment was not any better predicted by measures of lake productivity than it was simply by the numbers of adults spawning in the parent generation. Growth was not necessarily better during years of more productive lake conditions, including years of artificial fertilization. Glacier Lake smolts appear to experience more size-related mortality when they enter the sea than do Salmon Lake smolts.

PRODUCTS AND OUTREACH

The project provided the material for a Master's of Science in Fisheries thesis by Lorna Wilson. She and her advisers are submitting two manuscripts for publication in peer-reviewed journals. Wilson also presented the findings at a regional science conference and instructed high school students from the Bering Strait Region at Salmon Lake.

WHAT'S NEXT?

Fishery managers should understand that artificial fertilization of lakes may not be a useful tool to increase juvenile salmon growth on the Seward Peninsula. Climate warming could improve the rearing environment for Seward Peninsula sockeye salmon populations by increasing both season length and average lake temperature. Smolt production and growth in the ocean environment would be expected to increase as well.