KUSKOKWIM RIVER WATERSHED

(Christian E. Zimmerman)

BODY CONDITION AND FEEDING ECOLOGY OF KUSKOKWIM RIVER CHUM SALMON

PROJECT 424

PRINCIPAL INVESTIGATOR

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CONTRIBUTING ORGANIZATION

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RESEARCH PERIOD

April 2004 - June 2006

BUDGET

$130,670.00

JUVENILE CHUM SALMON FEEDING

Freshwater and estuarine habitat use may have a critical influence on overall survival of salmon. Declines in chum salmon runs since 1998 have been attributed to factors in the marine environment—possibly influenced by high mortality during early life stages in transitional environments. Research on the freshwater early life history of Kuskokwim River chum salmon, however, is currently nonexistent, and little is known about juvenile salmon in Alaskan rivers in general.

OUR OBJECTIVES

Conduct a pilot study to evaluate methods of capturing Kuskokwim River chum salmon fry before and during spring ice break-up in order to document out-migration timing.

Examine variations in feeding ecology, size, and body condition in fry emerging close to or far from the ocean and originating from summer- or fall-run parent stocks.

HOW WE DID IT

We sampled fish from the Kwethluk and Takotna rivers to represent fry emerging close to and far from the Kuskokwim River estuary. We also sampled fry in Kuskokwim Bay to represent juveniles transitioning into salt water. Additionally, we collected juveniles from southeast Alaska to serve as standards representing newly emerged, fed, and starved fry. We examined the stomach contents from a portion of the collected juveniles for lipid class

RESEARCH FRAMEWORK:
SALMON LIFE CYCLE – *PRIORITY #2*

SNAPSHOT

Body condition and feeding ecology of Kuskokwim River juvenile chum salmon was studied to determine if populations of chum salmon demonstrate local adaptation related to distance of migration from the sea.

Upstream fry had higher energy densities than those in the estuary, but the highest energy densities were found in the Kwethluk River, which was farther downstream than other sampled populations.

Marine-derived nutrients, passed to them from the mother, and freshwater nutrients obtained after emergence were important for survival.

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composition, total fatty acid content, nutrient content, length, and weight for all samples collected.

WHAT WE DISCOVERED

Kuskokwim River chum salmon had the highest energy density shortly after they emerged. Upstream fry had higher average energy density than those from Kuskokwim Bay, but Kwethluk River fry had a higher average energy density than those from the Takotna River, which is much farther upstream. We found that nutrients provided by the mother, and freshwater nutrients obtained as soon after emergence as possible, are both important energy sources for juvenile survival. Dependence on freshwater nutrients also applied to the time fry spent in the estuary. Our data suggest that the proportion of energy allocated to lipid class composition during residence in estuaries by juvenile chum salmon may predict future survival.

PRODUCTS AND OUTREACH

Our results were published in three collections of workshop and symposium proceedings.

WHAT'S NEXT?

Our findings highlight some important management considerations. Ocean conditions are likely to have a much stronger influence on the productivity of upriver stocks because the amount of energy supplied to emergent fry will depend directly on the amount of energy passed to them by their maturing mothers. Also, managers should be aware that juvenile chum salmon residing in the estuarine environment have only small energy reserves and are still dependant on freshwater nutrients. Consequently, reductions in the availability of these freshwater energy sources are likely to reduce survival.

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

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