

## North Pacific Research Board: Semiannual Progress Report

Project #: R0327

Title: Early marine ecology of juvenile chum salmon (*Oncorhynchus keta*) in Kuskokwim Bay, Alaska

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Contract Period and Amount of Funding: May 1, 2003 – April 30, 2006 \$624,025

Report Period: May 1 to June 30, 2003

Report Date: July 15, 2003

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Project Summary: This project examines the early marine ecology of chum salmon in Kuskokwim Bay, Alaska. Our goal is to assess the effect of physical and biological environmental factors on feeding, condition, and growth of juvenile chum salmon in Kuskokwim Bay. Using a bioenergetically-based food web model coupled with directed sampling for prey and diet composition, growth, size structure, and energy content will help us to understand patterns observed in feeding, growth and condition of chum salmon juveniles. Specifically, our objectives include (1) determining the spatial and seasonal distribution of chum salmon juveniles throughout Kuskokwim Bay, (2) assessing the spatial and seasonal patterns of environmental variables, and (3) describing the relationship between juvenile distribution patterns and these variables. In addition, we will (4) describe food habits, (5) analyze length, weight, condition, (6) diurnal feeding patterns, and (7) growth of chum salmon. Finally, (8) we will model the bioenergetics and growth of chum salmon juveniles in Kuskokwim Bay. An improved knowledge of environmental conditions, food resource availability, duration of residence, and growth of juvenile chum salmon during their early marine residence is needed to evaluate hypotheses of population regulation in western Alaska chum salmon. This work will serve to fill significant data gaps concerning the early life history of chum salmon in the Kuskokwim watershed.

Progress Summary:

Upon receiving funding from NPRB, a qualified graduate student was identified and accepted to the graduate fisheries program of the University of Alaska Fairbanks. At the same time, we initiated a search for an adequate research platform for the intended shallow water work in Kuskokwim Bay. Peacock Marine of Port Townsend, Washington was contracted to provide a 48-foot vessel (the "Eileen O'Farrell") and support for the 2003 sampling season. Other field equipment, including a CTD, surface trawl nets, and a tucker trawl were acquired.

The first research cruise, which was originally planned for the end of May 2003, had to be postponed due to later than expected allocation of funds. A first exploratory research cruise to Kuskokwim Bay was conducted from June 23 to June 26, 2003, to test all research equipment and establish sampling protocols for future cruises. Sampling protocols established for station work include a

CTD and a Secchi disk cast, Tucker Trawl to collect zooplankton and larval fish, and a modified Kvichack surface trawl to collect juvenile salmon and other fishes.

During the first exploratory research cruise, a total of 11 stations were sampled. The most abundant fish species collected were pond smelt (*Hypomesus olidus*), contributing 54.2% of the total catch, rainbow smelt (*Osmerus mordax*) with 29.2%, and chum salmon with 7.7% (Table 1).

<b>Taxon</b>	<b>Total count (all samples)</b>	<b>% Occurrence (all samples)</b>
<i>Hypomesus olidus</i>	392	54.2
<i>Osmerus mordax</i>	212	29.3
<i>Oncorhynchus keta</i>	56	7.7
<i>Pungitius pungitius</i>	49	6.8
<i>Lampetra camtschatica</i>	6	0.8
<i>Oncorhynchus tshawytscha</i>	3	0.4
<i>Oncorhynchus gorbuscha</i>	2	0.3
<i>Oncorhynchus kisutch</i>	1	0.1
<i>Clupea pallasii</i>	1	0.1
Pleuronectidae	1	0.1
<b>Total</b>	<b>723</b>	

Table 1. Total count and percentage occurrence of all fish taxa collected with the modified Kvichak tow net during Cruise 1, Kuskokwim Bay, Alaska, 23 to 26 June, 2003.

Juvenile chum salmon were caught in 8 of the 11 stations sampled. They were most abundant close to the mouth of Kuskokwim River and had a mean fork length of 54.2 mm (s.d.= 4.4). Other juvenile salmonids collected in low numbers were pink salmon (*O. gorbuscha*), coho salmon (*O. kisutch*), and Chinook salmon (*O. tshawytscha*).

Identification and enumeration of the Tucker Trawl plankton samples has been initiated and, to date, a total of three samples have been processed. Mean density of zooplankton was 268.1 organisms per m<sup>3</sup> (s.d. = 29.1). Plankton samples were composed of large numbers of small (< 2.5 mm) copepods, cladocerans, and larval fish. While the larval fish identification is still pending, a cursory examination revealed them as predominantly belonging to the smelt family, Osmeridae.

For the remainder of the 2003 sampling season, two additional research cruises are scheduled one for July 21 to July 29 and August 25 to August 31, 2003.