# GLOBEC RESEARCH: Food Habits and Feeding Patterns of Gulf of Alaska Juvenile Pink Salmon

Janet L. Armstrong[1], Jennifer L. Boldt[2], Alison D. Cross[1], Jamal H. Moss[1], Nancy D. Davis[1], Katherine W. Myers[1], Robert V. Walker[1], David A. Beauchamp[1], and Lewis J. Haldorson[2]

[1]School of Aquatic and Fishery Sciences, University of Washington, Box 355020 Seattle, WA 98195-5020
[2]School of Fisheries and Ocean Sciences, University of Alaska Fairbanks, 11120 Glacier Hwy, Juneau, AK 99801

## INTRODUCTION

The Global Ocean Ecosystem Dynamics program (GLOBEC) was developed to advance our understanding of marine ecosystems and their response to climatic changes. An integral part of assessing the ecosystem of the northern Gulf of Alaska (GOA) is the analysis of the food habits and feeding patterns of abundant zooplantivorous fish. Juvenile pink salmon have been selected for study because they are zooplanktivorous, highly abundant in the study area, and as adults support valuable commercial fisheries. In addition, pink salmon have a short two-year lifespan, which might provide a clear link between short-term climatic changes and associated biological response. We present major trends in food habits by summarizing interannual (August 1999, 2000, and 2001), seasonal (July to October 2001,) and diel (August 2000, and July and August 2001) feeding patterns based on analysis of stomach contents of juvenile pink salmon collected along the Seward/GAK Line (GAK stations 1-6) and in Prince William Sound (PWS), Alaska.
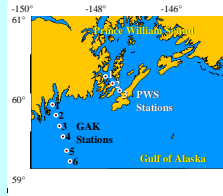


Juvenile pink salmon average size doubled from about 100mm, pictured here, in July to over 200 mm fork length in October (see poster by Haldorson and Boldt, 2003, "Seasonal and Annual Patterns of Abundance and Size of Juvenile Pink Salmon on the Shelf of the Northern Gulf of Alaska."
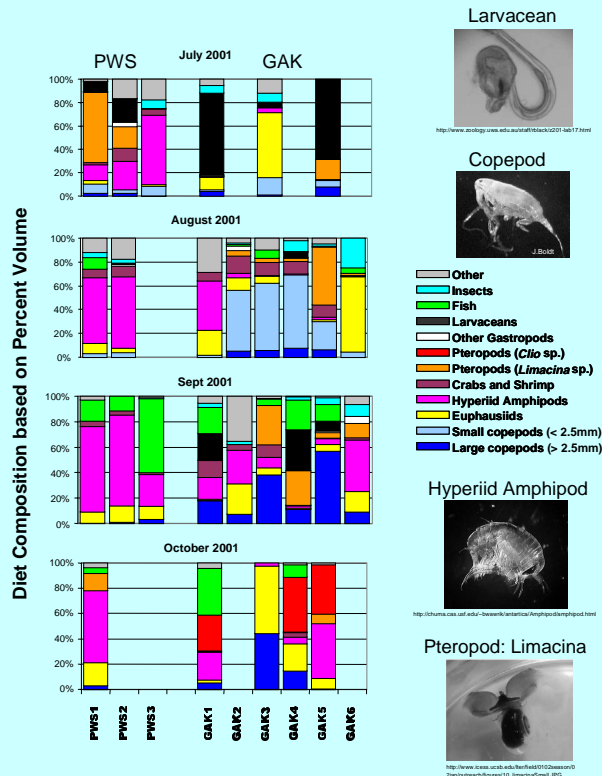
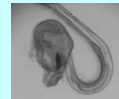### INTERANNUAL PINK SALMON DIETS
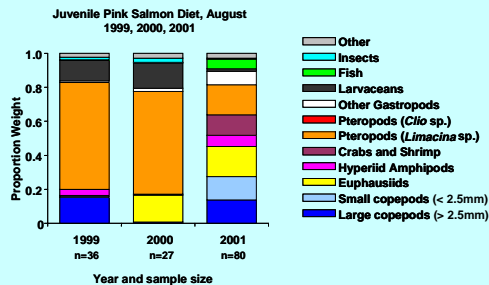


Juvenile pink salmon diets varied interannually and were more diverse in 2001 compared to either 1999 or 2000. Pteropods (*Limacina helicina*) comprised the majority of prey consumed in 1999 and 2000; whereas high proportions of copepods, pteropods, euphausiids, amphipods, crabs, gastropods, and fish were consumed in 2001.
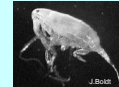
## SEASONAL DIETS

Seasonal changes indicated that juvenile pink salmon consumed increasingly large prey items from July to October 2001, in the GOA. Pink salmon diets were more diverse from GAK stations than from PWS. Hyperiid amphipods were the main prey in PWS from July to October. Along the GAK line, the primary prey in July were larvaceans and euphausiids. In August, while small copepods comprised the majority of the prey, pteropods (*Limacina helicina*), hyperiid amphipods, euphausiids, crabs, and shrimp were also important.
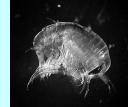


September and October diets contained a high proportion of larger prey items including fish, euphausiids, and large pteropods (*Clio* sp.). Sample numbers were generally higher at all stations in July and August (8-15 fish/station) while fewer fish made up the September and October samples (2-15 fish/station).

## DIEL COMPARISON

Pink salmon fed during daylight hours so that stomach fullness increased from dawn to maximum fullness 12 hours after sunrise, and declined thereafter (dark periods represented by shaded panels in graphs below). Pteropods, (*Limacina* sp.) were the predominant prey in the August 2000 diel samples from the Seward line (GAK 3 & 4). Euphausiids were present early in the day. Dominant prey in PWS July 2001 were larvaceans and pteropods (*Limacina* sp.) while in August hyperiid amphipods were dominant. Euphausiids were present in the stomach contents in the morning, or at midnight. Sample sizes averaged 10-15 fish per time period
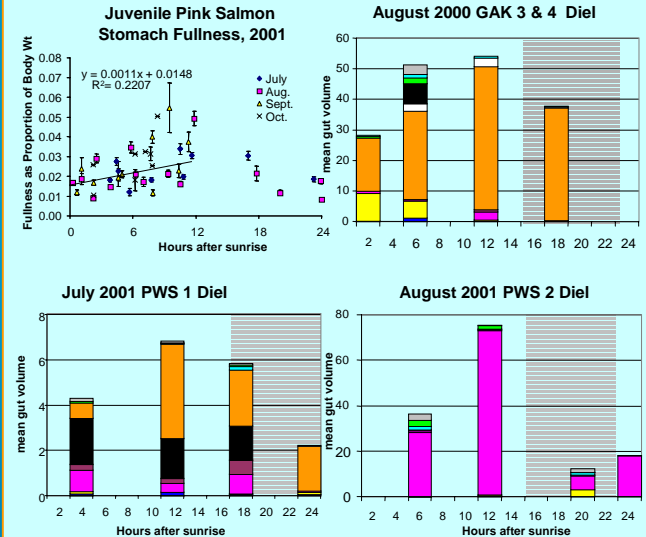


### CONCLUSIONS

- Diets were more diverse in 2001 than in 1999 or 2000.
- Predominant prey of juvenile pink salmon included hyperiid amphipods, copepods, larvaceans and pteropods.
- Pink salmon diet diversity was greater from fish sampled from stations along the GAK line compared to PWS.
- Prey size increased from July to October.
- Pink salmon fed during daylight hours.