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Southeast Alaska Coastal Monitoring

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Surface trawling off the NOAA ship *John N. Cobb*

Southeast Alaska Coastal Monitoring for Habitat Use and Early Marine Ecology of Juvenile Pacific Salmon

The Southeast Coastal Monitoring Project in Alaska was initiated in 1997 to study the habitat use and early marine ecology of juvenile (age -.0) Pacific salmon. From May through October 1997–2000, biophysical parameters were sampled in inshore, strait, and coastal habitats along a primary seaward migration corridor used by juvenile salmon. Up to 24 stations spanning 250 km were sampled five times annually. These habitats extended geographically from inshore localities near large glacial rivers to 65 km offshore in the Gulf of Alaska. Fish were sampled diurnally with a NORDIC 264 surface rope trawl from the NOAA ship *John. N. Cobb*.

Juvenile salmon dominated the catch. A total of 38,538 fish from 42 taxa were captured in 374 hauls. Five species of juvenile salmon comprised 65% of the catch, with pink and chum salmon each representing 29%. Sablefish (13%), Pacific herring (8%), and capelin (7%) were the dominant non-salmonid species.

Distribution and abundance of juvenile salmon varied by season and habitat. Juvenile salmon were absent in May and were most abundant in June and July. Abundance of juvenile salmon was higher in the straits than in other habitats; declining abundance in August coincided with declining zooplankton biomass. Abundance of juvenile salmon in coastal habitats declined with distance offshore; most juveniles were captured over the continental shelf <25 km from shore.

Annual and seasonal differences in biophysical parameters were related to early marine growth of salmon. Surface water temperature and zooplankton biomass were higher in spring of the El Niño years of 1997–98 compared to the La Niña years of 1999–2000. In 1999, decreased temperature and zooplankton biomass translated into lower apparent growth during June-July for pink and chum salmon in strait habitats. Lower growth of juveniles may lead to increased mortality by decreasing the ability to compete or by increasing vulnerability to size-selective predation.

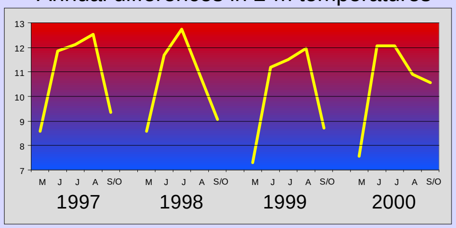
Predation on juvenile salmon occurred in five of 19 fish species examined. Salmon were present in 4% of the 876 stomachs examined. The percentage occurrence of salmon for each predator species was 29% for age-1+ sablefish, 9% for adult coho salmon, 8% for Pacific sandfish, 3% for spiny dogfish, and <1% for walleye pollock.

Stock composition and migration rates of juvenile salmon were examined from thermal-marked otoliths and coded-wire tags (CWT's). Juveniles caught in inshore and strait habitats originated from Southeast Alaska, whereas juveniles caught in coastal habitats originated from Southeast Alaska as well as from British Columbia and the Columbia River. Thermal marks were found in 38% of juvenile chum and 12% of juvenile sockeye, while CWTs were found in 9% of juvenile chinook and 4% of juvenile coho. In inshore and strait habitats in June and July, Alaska hatchery chum salmon comprised 50-100% of total chum salmon catch; in coastal habitats, they comprised 5-35% of the catch. Marine migration rates of juvenile chinook and coho salmon averaged 1 and 3 km.d-1 for Alaska stocks, and 19 and 25 km.d-1 for Columbia River stocks.

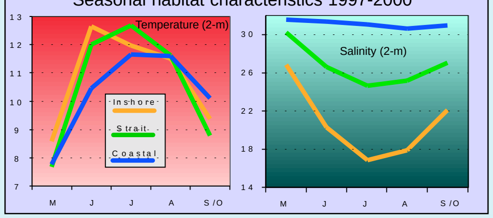
Long-term ecological monitoring of key juvenile salmon stocks, in several regions of the North Pacific Rim and encompassing a variety of environmental conditions, is needed to understand the relationships of habitat use, marine growth, and hatchery-wild stock interactions to year-class strength and ocean carrying capacity.

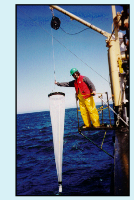
Oceanographic sampling in the Gulf of Alaska

Annual differences in 2-m temperatures



Seasonal habitat characteristics 1997-2000

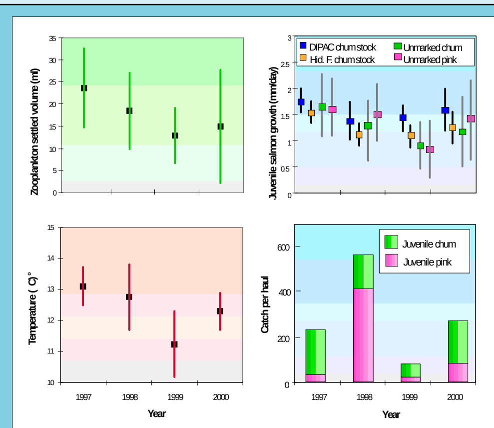


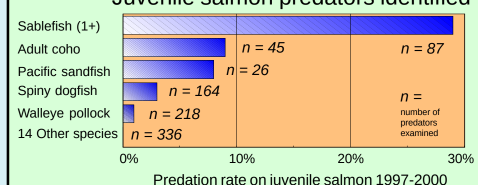
Zooplankton sampling

Growth of juvenile salmon influenced by temperature and zooplankton levels

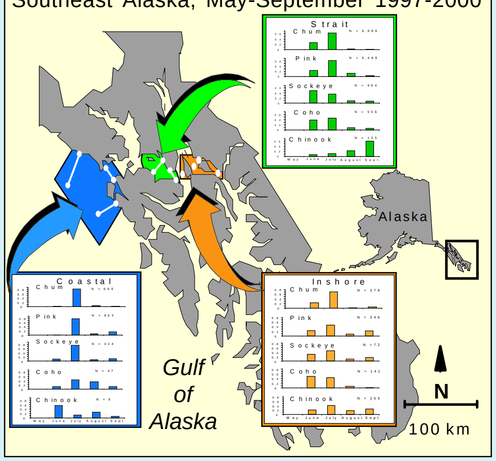
Relationships among annual measures of zooplankton, temperature, apparent and stock-specific growth of juvenile chum salmon, and apparent growth of juvenile pink salmon from June to July in strait habitats of Southeast Alaska

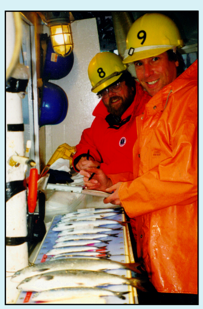
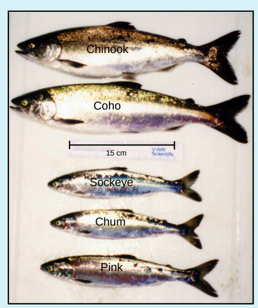


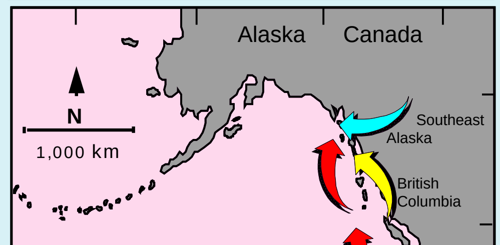
Juvenile salmon predators identified



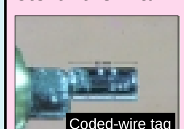
Seasonal distribution of juvenile salmon in Southeast Alaska, May-September 1997-2000





Stock migration of juvenile salmon into the study area based on coded-wire tag and otolith thermal mark recaptures



Coded-wire tag

Thermal mark