

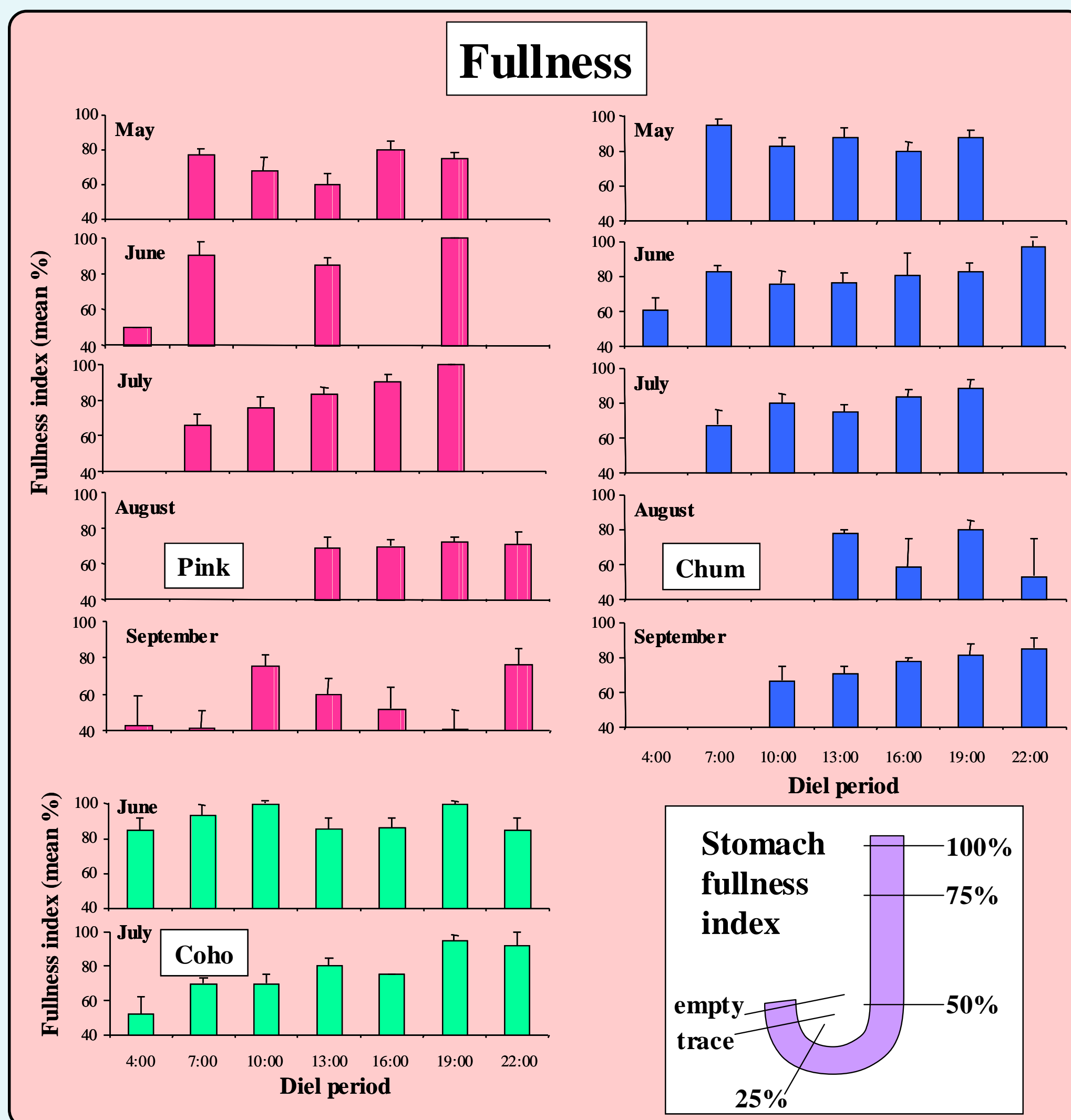


# Diel Feeding and Gastric Evacuation of Juvenile Salmon



Beach seining salmon fry

## Diel Feeding Rhythm



We studied the diel feeding rhythms and gastric evacuation rates of juvenile pink (*Oncorhynchus gorbuscha*), chum (*O. keta*), and coho (*O. kisutch*) salmon in marine waters of the northern region of southeastern Alaska from May–September 2001. These process studies were conducted as part of the Southeast Coastal Monitoring (SECM) Project of the Auke Bay Laboratory, National Marine Fisheries Service, designed to study the trophic ecology, habitat biophysical parameters, and carrying capacity of juvenile salmon transiting through the principal migration corridor in the region. Monthly sampling was conducted on a transect in Icy Strait by beach seining near shore in May and by surface trawling at a station 6.4 km offshore in June–September. The objectives of the diel feeding study were to monitor feeding rhythms and prey compositions throughout the day each month by salmon species and to quantify zooplankton densities and composition from samples collected concurrently (work remaining to be done). The objectives of the gastric evacuation study were to monitor the passage of food from stomachs of juvenile pink and chum salmon caught in single hauls in May and July, when environmental conditions and fish sizes differed.

For the diel feeding study, we examined 220 pink, 226 chum and 137 coho salmon at seven 3-hr intervals between 04:00 and 22:00. Juvenile pink, chum and coho salmon fed actively during all months; in all diel periods, stomachs of all species averaged 50–100% fullness index and prey percent body weight (%BW) generally averaged 1–4%, with only six empty stomachs observed. With these consistently good feeding conditions over the five months, juvenile pink and chum salmon size increased by a factor of five from about 40–200 mm fork length. Diel rhythms of feeding were evident only for pink and chum salmon in June and July and for coho salmon in July, with mean fullness index and %BW increasing from minima in the morning to maxima late in the day. In May, in the near shore habitat, pink and chum salmon ate a varied diet, comprised predominantly of small and large calanoid and harpacticoid copepods. In June and July, when all three salmon species were present further offshore, juvenile pink and chum salmon diets shifted to larvaceans and larval euphausiids, while juvenile coho salmon diets were comprised of larval decapods and fish. In August and September, juvenile pink and chum salmon ate juvenile euphausiids, larvaceans and hyperiid amphipods.

For the evacuation study, we examined stomach contents of 301 pink and 260 chum salmon held at ambient temperatures and sacrificed at 16 time intervals from the time of capture up to 32 hours later. At the time of catch, stomachs averaged 60–95% full. Evacuation rates were similarly described by exponential declines in numbers of prey and in percent stomach fullness over time, but varied with starting diet composition. For juvenile chum salmon, gastric evacuation of small fish feeding mainly on hard-bodied prey (calanoids and harpacticoids) in colder water temperatures during May (~7° C) was slower than gastric evacuation of larger fish feeding mainly on soft-bodied prey (larvaceans) in warmer water temperatures during July (~13° C). Gastric evacuation of juvenile pink salmon in May was more rapid than for chum salmon in May, but was still slower than for July chum salmon; evacuation samples for July pink salmon remain to be processed. These results will be used to estimate daily ration and as input parameters for bioenergetic modelling.



John N. Cobb  
surface trawling for juvenile salmon

## Gastric Evacuation

