NPAFC
Doc. 1057
Rev. _______
Rev. Date: ____

Annual Survey of Juvenile Salmon and Ecologically Related Species and Environmental Factors in the Marine Waters of Southeastern Alaska, May–August 2006

by

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Submitted to the

NORTH PACIFIC ANADROMOUS FISH COMMISSION

by

the United States of America

October 2007

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:

Orsi, J. A., E. A. Fergusson, M. V. Sturdevant, B. L. Wing, A. C. Wertheimer, and W. R. Heard. 2007. Annual Survey of Juvenile Salmon and Ecologically Related Species and Environmental Factors in the Marine Waters of Southeastern Alaska, May–August 2006. NPAFC Doc. 1057. 72 pp. (Available at http://www.npafc.org).

Annual Survey of Juvenile Salmon and Ecologically Related Species and Environmental Factors in the Marine Waters of Southeastern Alaska, May–August 2006

Abstract

Juvenile Pacific salmon (*Oncorhynchus* spp.), ecologically-related species, and associated biophysical data were collected along primary marine migration corridors in the northern and southern regions of southeastern Alaska in 2006. Up to 21 stations were sampled over four time periods (39 sampling days) from May to August. This survey marks 10 consecutive years of systematic monitoring on how juvenile salmon interact in marine ecosystems, and was implemented to identify the relationships among biophysical parameters that influence the habitat use, marine growth, predation, stock interactions, and year-class strength of salmon. Typically, at each station, fish, zooplankton, surface water samples, and physical profile data were collected using a surface rope trawl, conical and bongo nets, water sampler, and a conductivity-temperature-depth profiler during daylight. Surface (3-m) temperatures and salinities ranged from 7.1 to 15.4 ºC and 15.1 to 32.0 PSU from May to August. A total of 10,641 fish and squid, representing 20 taxa, were captured in 94 rope trawl hauls from June to August. Juvenile salmon comprised about 98% of the total fish and squid catch in each region. Juvenile salmon occurred frequently in the trawl hauls, with pink (*O. gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), and coho salmon (*O. kisutch*) occurring in 52-100% of the trawls in both regions, whereas, juvenile Chinook salmon (*O. tshawytscha*) occurred in 25% and 28% of the hauls in the southern and northern regions. Of the 10,451 salmonids caught, over 99% were juveniles. In both regions, only two non-salmonid species represented catches of >27 individuals: walleye pollock (*Theragra chalcogramma*) in the southern region and Pacific herring (*Clupea pallasi*) in the northern region. Temporal and spatial differences were observed in the catch rates, size, condition, and stock of origin of juvenile salmon species. Catch rates of juvenile salmon in both regions were generally highest in June for all species except Chinook, which had the highest catch rates in July. Size of juvenile salmon increased from June and July; mean fork lengths were: 102 and 121 mm for pink; 112 and 138 mm for chum; 110 and 131 mm for sockeye; 168 and 200 mm for coho; and 202 and 223 mm for Chinook salmon. Coded-wire tags were recovered from 13 juvenile coho salmon, two juvenile and one immature Chinook salmon; all but two were from hatchery and wild stocks of southeastern Alaska origin. The non-Alaska stocks were juvenile Chinook salmon originating from the Similkameen River and the Wells Hatchery within the Columbia River Basin. Alaska enhanced stocks were also identified by thermal otolith marks from 77% of the chum and 7% of the sockeye salmon. Onboard stomach analysis of 95 potential predators, representing 12 species, revealed one predation incident on juvenile salmon by an adult coho salmon. This research suggests that in southeastern Alaska, juvenile salmon exhibit seasonal patterns of habitat use and display species- and stock-dependent migration patterns. Long-term monitoring of key stocks of juvenile salmon, on both intra- and interannual bases, will enable researchers to understand how growth, abundance, and ecological interactions affect year-class strength and to better understand the role salmon play in North Pacific marine ecosystems.

Introduction

The Southeast Coastal Monitoring Project (SECM), a coastal monitoring study focused in the northern region of southeastern Alaska, was initiated in 1997 to annually study the early marine ecology of Pacific salmon (*Oncorhynchus* spp.) and associated epipelagic icthyofauna and to better understand effects of environmental change on salmon production. Salmon are a keystone species that constitute an important ecological link between marine and terrestrial habitats, and therefore play a significant, yet poorly understood, role in marine ecosystems. Fluctuations in the survival of this important living marine resource have broad ecological and socio-economic implications for coastal localities throughout the Pacific Rim. Evidence for relationships between production of Pacific salmon and shifts in climate conditions has renewed interest in processes governing salmon year-class strength (Beamish 1995). In particular, climate variation has been associated with ocean production of salmon during El Niño and La Niña events, such as the recent warming trends that benefited many wild and hatchery stocks of Alaskan salmon (Wertheimer et al. 2001). However, research is lacking in areas such as the links between salmon production and climate variability, between intra- and interspecific competition and carrying capacity, and between stock composition and biological interactions. Past research has not provided adequate time-series data to explain such links (Pearcy 1997). Because the numbers of salmonids produced in the region have increased over the last few decades (Wertheimer et al. 2001), mixing between stocks with different life history characteristics has also increased. The consequences of such changes on the growth, survival, distribution, and migratory rates of salmonids remain unknown.

One SECM goal is to identify mechanisms linking salmon production to climate change using a time series of synoptic data that combines stock-specific life history characteristics of salmon and their ocean conditions. Until recently, stock-specific information relied on labor-intensive methods of marking individual fish, such as coded-wire tagging (CWT; Jefferts et al. 1963), which could not practically be applied to all of the fish released by enhancement facilities. However, mass-marking with thermally induced otolith marks (Hagen and Munk 1994) is a technological advance implemented in many parts of Alaska. The high incidence of these marking programs in southeastern Alaska (Courtney et al. 2000) offers an opportunity to examine growth, survival, and migratory rates of specific salmon stocks during high levels regional hatchery production of chum salmon (*O. keta*) and historically high returns of wild pink salmon (*O. gorbuscha*). For example, in recent years, two private non-profit enhancement facilities in the northern region of southeastern Alaska annually produced more than 150 million otolith-marked juvenile chum salmon. Consequently, since the mid-1990s, commercial harvests of adult chum salmon in the common property fishery in the region have averaged about 12 million fish annually with an exvessel commercial value of 27 million $U.S. (ADFG 2007), including a high proportion of otolith-marked fish from regional enhancement facilities. In addition, sockeye salmon (*O. nerka*), coho salmon (*O. kisutch*), and Chinook salmon (*O. tshawytscha*) are otolith-marked by some enhancement facilities. Therefore, examining the early marine ecology of these marked stocks provides an opportunity to study stock-specific abundance, distribution, and species interactions of juvenile salmon that will later recruit to the fishery.

Increased hatchery production of juvenile salmon in southeastern Alaska has raised concern over potential hatchery and wild stock interactions during their early marine residence. A recent study using a bioenergetics approach and SECM data from Icy Strait concluded that hatchery and wild stocks consumed only a small percentage of the available zooplankton (Orsi et al. 2004a); this study also suggested that abundant, vertically-migrating planktivores have a greater impact on the zooplankton standing stock than hatchery stock groups of chum salmon. These findings stress the importance of examining the entire epipelagic community of ichthyofauna in the context of trophic interactions.

To broaden the SECM research scope in southeastern Alaska, sampling was expanded to include strait habitat within the southern region in 2005. This new regional study component was added to the SECM project to support an increased emphasis on forecasting of adult pink salmon returns and to understand regional differences in prey, competitor, and predation dynamics. This study component supplements the core sampling of eight stations in strait habitat of the northern region, and geographically broadens the monitoring to include a southern migration corridor in the opposite end of southeastern Alaska. This study is currently proposed for continued funding over a 3-year period by the Northern Fund of the Pacific Salmon Commission. A primary focus of this study component is to explore the concordance of adult pink salmon harvests in both the southern and northern regions in southeastern Alaska with biophysical parameters such as juvenile abundance, temperature, and zooplankton abundance in each region.

This document summarizes catches of juvenile salmon, ecologically-related species, and the associated biophysical data collected by SECM scientists in 2006.

Methods

Up to 21 stations were sampled in four time periods from May to August 2006 (Table 1). Sampling was accomplished, as conditions permitted, by the National Oceanic and Atmospheric Administration (NOAA) ship *John N. Cobb*, a 29-m long research vessel with a main engine of 325 hp and a cruising speed of 10 knots. Stations were located along two primary seaward migration corridors used by juvenile salmon that originate in southeastern Alaska. The northern corridor extends 250 km from inshore waters, within the Alexander Archipelago, along Chatham Strait, Icy Strait, and off Icy Point into the Gulf of Alaska, whereas the southern corridor extends 175 km from middle Clarence Strait to Dixon Entrance near the Gulf of Alaska (Figure 1). At each station, the physical environment, zooplankton, and fish were typically sampled during daylight hours.

The selection of the 13 core sampling stations in the northern migration corridor was determined by 1) the presence of historical time series of biophysical data in the region, 2) the objective of sampling habitats that transition the primary seaward migration corridor used by juvenile salmon, and 3) the operational constraints of the vessel. The inshore station (Auke Bay Monitor) and the four Icy Strait stations were selected initially because historical data exist for them (Bruce et al. 1977; Jaenicke and Celewycz 1994; Landingham et al. 1998; Murphy and Orsi 1999; Murphy et al. 1999; Orsi et al. 1997, 1998, 1999, 2000a and 2000b, 2001a, 2001b, 2002, 2003, 2004b, 2005, 2006). The Chatham Strait stations were selected to intercept juvenile otolith-marked salmon entering Icy Strait from both the south (i.e., Hidden Falls Hatchery (HF), operated by Northern Southeast Alaska Regional Aquaculture Association (NSRAA), and from the north (i.e., Douglas Island Pink and Chum Hatchery (DIPAC) facilities) (Figure 1). The Icy Point stations were selected to monitor conditions in the coastal habitat of the Gulf of Alaska. Vessel and sampling gear constraints limited operations to offshore distances between 1.5 km and 65 km, and to bottom depths greater than 75 m; this precluded trawling at the Auke Bay Monitor station (Table 1). Sea conditions of waves less than 2.5 m and winds less than 12.5

m/sec were usually necessary to operate the sampling gear safely, which particularly influenced sampling opportunities in coastal waters.

The selection of the eight sampling stations in the southern migration corridor was made in the vicinity of Clarence Strait, which is approximately 350 km south of the northern migration corridor and funnels southward to Dixon Entrance near the Gulf of Alaska. Several salmon enhancement facilities are also operated in this region by the Southern Southeast Alaska Regional Aquaculture Association (SSRAA, Figure 1). One facility in particular, Neets Bay (NB), is a major producer of chum salmon in the region near Ketchikan. This facility began releasing thermally marked juvenile chum salmon in 2003.

Oceanographic sampling

Oceanographic data were collected at each station immediately before or after each trawl haul, and consisted of one conductivity-temperature-depth profiler (CTD) cast, one or more vertical plankton hauls with conical nets, and one or more double oblique plankton haul with a bongo net system. The CTD data were collected with a Sea-Bird[1] SBE 19 Seacat profiler to 200 m or within 10 m of the bottom. Surface (3-m) temperature and salinity data were collected at 1-minute intervals with an onboard thermosalinograph (Sea-Bird SBE 21). Surface water samples were taken at each station for later nutrient and chlorophyll analysis contracted to the Marine Chemistry Laboratory at the University of Washington School of Oceanography. To quantify ambient light levels, light intensities (W/m^2) were recorded at each station with a Li-Cor Model 189 radiometer.

Zooplankton was sampled at all stations with several net types during each month. At least one shallow vertical haul (20 m) was made at each station with a 50-cm, 243-µm mesh NORPAC net. One deep vertical haul ($\leq$ 200 m or within 10 m of bottom) was made at the Auke Bay Monitor station and the Icy Point stations with a 57-cm, 202-µm mesh WP-2 net (Table 2). One double oblique bongo haul was made at stations along the Icy Strait and Lower Clarence Strait transects and in Auke Bay, to a depth of 200 m or within 20 m of the bottom, using a 60-cm diameter tandem frame with 505-µm and 333-µm mesh nets. Complementary shallow (20 m depth) bongo hauls were made at each station along the Icy Strait transect in May, June, and July, and also at each station along the Lower Clarence Strait transect in June and July. A VEMCO ML-08-TDR time-depth recorder was used with the oblique bongo hauls to record the maximum sampling depth of each haul. General Oceanics model 2031 or Rigosha flow meters were placed inside the bongo and deep conical nets for calculation of filtered water volumes.

Zooplankton samples were preserved in a 5% formalin-seawater solution. In the laboratory, settled volumes (SV, ml) and total settled volumes (TSV, ml) of each 20-m vertical zooplankton haul were measured after settling the samples for a 24-hr period in Imhof cones. Mean SVs were determined for pooled stations by habitat and month. Displacement volumes (DV, ml) of zooplankton were measured for bongo net samples (333-µm and 505-µm mesh) collected in Icy Strait and Lower Clarence Strait. Samples were brought to a constant volume (500 ml) by adding water, and then were sieved through 243-µm mesh to separate the zooplankton from the liquid. The volume of decanted liquid was measured and subtracted from the sample starting volume to yield zooplankton DV. Standing stock of shallow (20 m) and deep

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[1]Reference to trade names does not imply endorsement by the Auke Bay Laboratories, National Marine Fisheries Service, NOAA Fisheries.

($\leq$ 200 m) bongo samples was calculated using DV (ml) divided by the volume of water filtered (m^3) based on flow meter revolutions per haul. Detailed zooplankton species composition of these hauls was determined microscopically from subsamples obtained using a Folsom splitter. Density was then estimated by multiplying the count in the subsample by the split fraction and dividing the expanded count by the volume filtered. Percent total composition was summarized by major taxa, including small calanoid copepods ($\leq$ 2.5 mm TL), large calanoid copepods (> 2.5 mm TL), euphausiids (principally larval and juvenile stages), oikopleurans (Larvacea), decapod larvae, amphipods, chaetognaths, and combined minor taxa. Laboratory processing is ongoing.

Fish sampling

Fish sampling was accomplished with a Nordic 264 rope trawl modified to fish the surface water directly astern of the *John N. Cobb*. The trawl was 184 m long and had a mouth opening of 24 m by 30 m (depth by width). A pair of 3-m foam-filled Lite trawl doors, each weighing 544 kg (91 kg submerged), was used to spread the trawl open. Earlier gear trials with this vessel and trawl indicated the actual fishing dimensions of the trawl to be 18 m deep (head rope to foot rope) by 24 m wide (wingtip to wingtip), with a spread between the trawl doors ranging from 52 m to 60 m (Orsi et al., unpubl. cruise report 1996). Trawl mesh sizes from the jib lines aft to the cod end were 162.6 cm, 81.3 cm, 40.6 cm, 20.3 cm, 12.7 cm, and 10.1 cm over the 129.6-m meshed length of the rope trawl. A 6.1-m long, 0.8-cm knotless liner mesh was sewn into the cod end. The trawl also contained a small mesh panel of 10.2-cm mesh sewn along the jib lines on the top panel between the head rope and the 162.6-cm mesh to reduce loss of small fish. To keep the trawl headrope at the surface, a cluster of three A-4 Polyform buoys, each encased in a knotted mesh bag, was tethered to each wingtip of the headrope, and one A-3 Polyform float was clipped onto the center of the headrope. The trawl was fished with 137 m of 1.6-cm wire main warp attached to each door, a 9.1 m length of 1.6-cm wire trailing off the top and bottom of each trawl door (back strap), and each back strap connected with a “G” hook and flat link to a 70.1-m wire swiveled bridle. The head rope bridles were 1.0-cm wire and the footrope bridles were 1.3-cm wire.

For each haul, the trawl was fished across a station for 20 min at about 1.5 m/sec (3 knots), covering approximately 1.9 km (1.0 nautical mile). Station coordinates were targeted as the midpoint of the trawl haul; however, current, swell, and wind conditions dictated the direction in which the trawl was set. Trawling effort in the strait habitat was augmented to ensure that sufficient samples of marked juvenile salmon were obtained for interannual comparisons. In particular, replicate trawls were conducted in Icy Strait when weather and time allowed, with minimal accompanying oceanographic sampling.

After each trawl haul, the fish were anesthetized with tricaine methanesulfonate (MS-222), identified, enumerated, measured, labeled, bagged, and frozen. After the catch was sorted, fish and squid were measured to the nearest mm fork length (FL) or mantle length with a Limnoterra FMB IV electronic measuring board (Chaput et al. 1992). Usually all fish and squid were measured, but very large catches were subsampled due to processing time constraints. Up to 50 juvenile salmon of each species were bagged individually; the remainder was bagged in bulk. All fish were frozen immediately after measurement. During times of extended processing, fish were chilled with ice packs to minimize tissue decomposition and gastric activity. All Chinook and coho salmon were examined for missing adipose fins that would indicate the possible presence of implanted CWTs; those with adipose fins intact were again screened with a detector in the laboratory. The snouts of these fish were dissected in the laboratory to recover CWTs, which were then decoded and verified to determine fish origin.

Frozen individual juvenile salmon were weighed in the laboratory to the nearest 0.1 gram (g). Mean lengths, weights, Fulton condition factor ($g/mm^3 \cdot 10^5$; Cone 1989), and length-weight residuals were computed for each species by habitat and sampling interval. To identify stock of origin of juvenile chum, sockeye, coho, and Chinook salmon, the sagittal otoliths were extracted from the crania and preserved in 95% ethyl alcohol. Laboratory processing of otoliths for thermal marks was contracted to DIPAC. Otoliths were prepared for microscopic examination of potential thermal marks by mounting them on slides and grinding them down to the primordia (Secor et al. 1992). Ambiguous otolith thermal marks were verified by personnel at the Alaska Department of Fish and Game otolith laboratory. Stock composition and growth trajectories of thermally marked fish were then determined for each month and habitat.

Potential predators of juvenile salmon from each haul were identified, measured, and weighed onboard the vessel. Their stomachs were excised, weighed, and visually classified by percent fullness (nearest 10%). Stomach contents were removed, empty stomachs weighed, and total content weight determined by subtraction. General prey composition was determined by estimating contribution of major taxa to the nearest 10% of total volume. The wet-weight contribution of each prey taxon to the diets was then calculated by multiplying its percent volume by the total content weight. Fish prey was identified to species, if possible, and lengths were estimated. The incidence of predation on juvenile salmon was computed for each potential predator species. Overall diets were summarized by percent weight of major prey taxa and the frequency of feeding fish.

Results and Discussion

During the 4-month (39-d) survey in 2006, data were collected from 94 rope trawl hauls, 100 CTD casts, 54 bongo net samples (double oblique, including tandem 333-µm and 505-µm samples [shallow, to 20 m and deep, to ≤200 m depths]), 115 conical net hauls (108 from 20 m depths and 7 from depths to 200 m), and 52 surface water samples (Table 2). The sampling periods occurred near the end of each month from May to August in the northern region, and in June and July in the southern region. Oceanographic sampling was completed at all stations from May to August. Rope trawling occurred in strait localities of both regions from June to July, and additionally in May and August in the northern region.

Oceanography

Surface (3-m) temperature data in the northern region followed a similar seasonal pattern among habitats, and for the strait habitat, was higher in the southern region than in the northern region (Figure 2a). Overall, surface temperatures ranged from 7.1 to 15.4 ºC from May to August (Table 3). In the northern region, seasonal surface temperature patterns in the inshore and strait habitats increased ~4 ºC from May until June, then declined ~3 ºC from July to August. Surface temperatures in straits were similar between regions in June, but temperature was 2-3 ºC higher in the southern region compared to the northern region in July.

Surface salinity data in the northern region followed a similar seasonal pattern among habitats, and for the strait habitat, salinities were higher in July in the southern region than in the northern region (Figure 2b). Overall, surface salinities ranged from 15.1 to 32.0 PSU from May to August (Table 3).

A total of 52 surface water samples were taken at 17 stations over the course of the season (Tables 2 and 4). Nutrient concentration ranges and means were 0.0–1.7 and 0.4 µM for PO_4, 0.6–26.5 and 7.4 µM for $Si(OH)_4$, 0.0–12.0 and 2.8 µM for NO_3, 0.0–0.5 and 0.1 µM for NO_2, and 0.1–3.0 and 0.6 µM for NH_4. Chlorophyll ranged from 0.1 to 5.5 µg/L, with a mean of 1.6 µg/L, and phaeopigment concentrations ranged from 0.0 to 1.4 µg/L, with a mean of 0.5 µg/L (Table 4).

Ambient light intensities for 100 daylight (0720–1832 h) rope trawls over the season ranged from 42 to 822 W/m^2, with a mean of 286 W/m^2. A total of 100 water clarity measurements were made by observing the disappearance of the CTD during deployment; relative visibility depths ranged from 1.5 to 15.0 m, with a mean of 4.6 m.

Seasonal patterns in plankton settled volumes, SV, were not evident from the 20-m NORPAC (243-µm mesh) vertical hauls (Table 5, Figure 2c). The SV was similar between habitats in the northern region from May to July, then in August increased in the inshore habitat and decreased in the strait habitat. The SV declined from June to July in both the northern and the southern regions: the lowest SVs were reported in July in the southern region and in May in coastal habitat in the northern region. Qualitative, visual examination of samples indicated a wide diversity of mesozooplankton taxa and phytoplankton present.

Seasonal patterns in zooplankton were evident in the shallow (upper 20 m) and, to a lesser extent, deep (integrated 200 m) bongo samples collected at the Icy Strait stations (Table 6, Figure 3). Standing stock ranged by an order of magnitude across all stations, from 0.2 to 2.1 ml/m^3 in both shallow and deep hauls for both mesh sizes (Table 6). Seasonal patterns were similar for the two mesh sizes, but varied by depth. For the shallow bongo samples, taken only in straits of the northern and southern regions, monthly zooplankton standing stock declined from May to July. For the deep bongo samples, monthly zooplankton standing stock declined in the inshore habitat from May to July; in the northern region strait, zooplankton standing stock increased from May to June and then declined from June to July, whereas in the southern region strait, it remained stable from June to July. Thus, in the northern region zooplankton standing stock peaked in different months for different water column strata, in May for shallow samples and in June for deep samples.

Zooplankton 333-µm mesh bongo samples were further analyzed to characterize seasonal, daytime prey fields present for planktivorous juvenile salmon and ecologically-related ichthyofauna. Zooplankton samples from shallow and deep 333-µm mesh bongo nets were examined in detail from Icy Strait, May to July, and from Lower Clarence Strait, June to July; no samples were available for August (Table 6, Figures 4 and 5). Zooplankton density ranged by more than an order of magnitude across all samples, from 452 to 5,580 organisms/m^3 (Table 6). Mean zooplankton density and taxonomic composition differed between regions and in the shallow vs. deep water column. In the northern region, a strong peak in zooplankton density was observed in June, with about 50% greater density in the shallow (3,975/m^3) vs. deep (2,748/m^3) water column; in the southern region, density declined from 3,794/m^3 in June in shallow samples, but was considerably lower (~700/m^3) and stable in the deep samples from June to July. These seasonal patterns are similar to those for zooplankton standing stock (Figure 3) and also reflect different taxonomic compositions. Zooplankton taxa present across the season included small and large calanoid copepods, euphausiids, oikopleurans, decapod larvae, and combined minor taxa (Figures 4 and 5). The minor taxa mainly included chaetognaths, cladocera, bryozoan larvae, pteropods, hyperiid amphipods, barnacle larvae, and coelenterates. Zooplankton composition was dominated by calanoid copepods across the season in both regions, but large calanoids were more prominent in deep samples than in shallow samples (Figures 4 and 5). Non-calanoid taxa were most diverse and abundant in June, reaching 10-30% of total density in the northern region and 35-59% of all taxa in southern region. These taxa have different life history strategies and may respond differently to environmental conditions (Park et al. 2004). Euphausiids (mainly larvae and juveniles) comprised the highest percentages of zooplankton taxa in June, when they are prominent in juvenile salmon and other piscivore diets (Landingham et al. 1998; Sturdevant et al. 2005; Orsi et al. 2004a). Gastropods and larvaceans were the only other taxa that composed more than 5% at any time. These invertebrates are commonly consumed by pink and chum salmon juveniles, in particular (Landingham et al. 1998; Purcell et al. 2005; Sturdevant et al. 2005).

Catch composition

A total of 10,641 fish and squid, representing 20 taxa, were captured in 94 rope trawl hauls in the northern and southern regions from May to August (Tables 7 and 8). Juvenile salmon were the primary catch component each sampling period and overall comprised about 98% of the total fish and squid catch in each region (Figure 6). Juvenile salmon occurred frequently in the trawl hauls, with pink, chum, sockeye, and coho salmon occurring in 52-100% of the trawls in both regions, whereas juvenile Chinook salmon occurred in 28% and 25% of the hauls in the southern and northern regions (Tables 9 and 10). Of the 10,451 salmonids caught, over 99% were juveniles. Catches and life history stages of the salmon are listed by date, haul number, and station in Appendix 1. In both regions, only two non-salmonid species represented catches of >27 individuals: walleye pollock (*Theragra chalcogramma*) in the southern region and Pacific herring (*Clupea pallasi*) in the northern region. Temporal and spatial differences were observed in the catch rates, size, condition, and stock of origin of juvenile salmon species. Catch rates of juvenile salmon in both regions were generally highest in June for all species except Chinook salmon, which had highest catch rates in July. Juvenile salmon comprised about 98% of the total fish catch in each region.

Monthly distribution patterns of juvenile salmon were similar by region and species sampled: the highest catch per haul was found in June for all species except Chinook salmon that had catch rates highest in July (Figure 7). In the northern region, where sampling extended until August, catch per haul increased from July to August only for coho salmon.

Size and condition of juvenile salmon differed among the species and sampling periods (Tables 11–15, Figures 8–10). Juvenile coho and Chinook salmon were consistently 25-100 mm longer and 50-150 g heavier than sockeye, chum, and pink salmon in a given time period. Most species increased in both length and weight in successive time periods, indicating growth despite the influx of additional stocks with varied times of saltwater entry. Mean FLs of juvenile salmon in June and July were: 101.7 and 120.8 mm for pink; 111.6 and 137.8 mm for chum; 109.5 and 130.7 mm for sockeye; 168.0 and 199.8 mm for coho; and 201.5 and 223.0 for Chinook salmon. Mean weights of juvenile salmon in June and July were: 10.9 and 17.6 g for pink; 14.9, and 26.6 g for chum; 16.6 and 26.5 g for sockeye; 58.7 and 98.9 g for coho; and 197.7 and 208.3 g for Chinook salmon. Mean condition factor values for juvenile salmon in June and July were: 0.9 and 0.9 for pink; 1.0 and 1.0 for chum; 1.0 and 1.0 for sockeye; 1.2 and 1.2 for coho; and 3.0 and 2.0 for Chinook salmon. Condition factor generally increased seasonally; mean values near 1.0 indicated healthy feeding environments.

Sixteen of the 32 juvenile and immature salmon lacking adipose fins contained CWTs (Table 16). The CWTs were recovered from 13 juvenile coho salmon, two juvenile and one immature Chinook salmon; all but two were from hatchery and wild stocks of southeastern Alaska origin. The non-Alaska stocks were juvenile Chinook salmon originating from the Similkameen River and the Wells Hatchery within the Columbia River Basin. Both of these stream-type juvenile Chinook salmon were recovered in the southern region in July and had migrated 1,100-1,200 km of marine distance in a period of 83-98 days. An extremely high proportion of tags were not present in adipose clipped juvenile coho (46%, 11 of 24) and Chinook salmon (63%, 5 of 8). These fish with no CWTs present were almost exclusively found in the southern region and suggest that most were of hatchery origin from southerly release localities because the removal of the adipose fin of all hatchery produced salmon is mandatory in these areas.

In addition to the CWT information on stock origins, stock-specific information was obtained from otolith-marked enhanced salmon recovered in both regions (Figures 11–12, Tables 17–18). This enabled stock information to be obtained from species like chum and sockeye that are normally not CWTed but comprise a major enhancement component in southeastern Alaska.

For juvenile chum salmon, stock-specific information was derived from the otoliths of a subsample of 1,287 fish, representing >99% of those caught (Tables 7 and 8, Figure 11). These fish were the same individuals sampled for weight and condition (Table 17). Of all chum salmon otoliths examined, 988 (77%) were marked from hatcheries in southeastern Alaska: 312 (24%) were from DIPAC, 357 (28%) were from NSRAA, and 319 (25%) were from SSRAA. The remaining 299 (23%) chum salmon examined were unmarked and probably included both wild stocks and unmarked hatchery stocks from southern release localities. Chum salmon stock composition differed by region. In the southern and northern regions, hatchery stocks comprised about 45% and 84% of the chum salmon sampled. An unexpected result was the occurrence of 27 fish from northern hatcheries found in the southern region. Further validation of these recoveries is ongoing.

For juvenile sockeye salmon, stock-specific information was derived from the otoliths of a subsample of 792 fish, representing 29% of those caught (Tables 7 and 8, Figure 12). These fish were the same individuals sampled for weight and condition (Table 18). Of all the sockeye salmon otoliths examined, 54 (7%) were marked and originated from three stock groups: 46 from Speel Arm, AK (6%), 6 from Sweetheart Lake, AK (<1%), and 1 from Tatsamenie Lake, Taku River, BC (<1%). The remaining 738 (93%) sockeye salmon examined were unmarked and presumably from wild stocks. Sockeye salmon stock composition differed by region. In the southern region, no thermally marked sockeye were detected in June or July. In the northern region, all but one of the 56 thermally marked sockeye were recovered in June, and in this region, 18% if the juvenile sockeye salmon were thermally marked.

Monthly samples of thermally marked juvenile chum and sockeye salmon were used to examine stock-specific growth trajectories. Weights of juvenile salmon from marked stocks were compared with weights of juvenile salmon from unmarked stocks (Figure 13). The marked chum salmon stocks were from DIPAC, NSRAA, and SSRAA hatcheries. The marked sockeye salmon stocks were from Speel Arm, Sweetheart Lake, and Tatsamenie Lake. Both of these salmon species were released in 2006 at the following approximate dates and size ranges: chum in April–May (1–4 g) and sockeye in April–June (5–10 g). Stock-specific size of salmon increased monthly for all groups (Figure 13).

One incident of predation on juvenile salmon was observed among the 95 potential predators representing the 12 fish species examined. The stomach of an adult coho salmon caught in the northern region (Icy Strait station ISD in July) contained a 180 mm unidentifiable juvenile salmon (Table 19, Figure 14); at this size and time, the prey salmon was likely a chum or sockeye (Tables 11–15).

Although juvenile salmon were rarely preyed on by the salmonids or other potential predators, four species examined were piscivorous on a variety of other teleosts (Figure 15). Overall, fish prey dominated the diets of immature Chinook salmon both in frequency and gravimetric contribution to diet; fish were eaten by 22 of 28 individuals (95% prey weight) and 5 of 7 individuals (88% prey weight), in the northern and southern regions, respectively. Taxa consumed by immature Chinook salmon were also diverse, including flatfish, Pacific herring, lanternfish (Myctophidae), walleye pollock, Pacific sandlance (*Ammodytes hexapterus*), poachers (Agonidae), unidentified larvae, and digested fish remains. Other piscivores included half of the coho salmon examined, which consumed herring or unknown fish, in addition to the incident of predation on juvenile salmon. Pink salmon adults (3 of 8 in the northern region) consumed unidentified fish larvae, and 2 walleye pollock from the southern region contained digested fish remains.

A variety of pelagic invertebrate prey was consumed by the potential predators examined (Figure 14). Pteropods were prominent in diets of pink salmon, starry flounder, walleye pollock, and dusky rockfish (*Sebastes ciliatus*). Euphausiids occurred among immature Chinook salmon, pink salmon, and spiny dogfish (*Squalus acanthias*). Decapod larvae were prominent only in starry flounder (*Platichthys stellatus*) and adult pink salmon diets, but were also present in Pacific herring and walleye pollock diets. Gelatinous taxa (including oikopleurans) were prominent in chum salmon and spiny dogfish. Amphipods never constituted more than 5% of prey and copepods were only found in herring guts. The adult pink salmon and immature Chinook salmon examined from both northern and southern regions had similar diets (Figure 14).

Laboratory processing of juvenile salmon stomach and calorimetry samples to examine trophic interactions and energetic condition is ongoing. Diets and energy density of wild and specific hatchery stocks of juvenile chum salmon and juvenile pink salmon will be compared using subsamples selected from each transect and month, matched as closely as possible by date (Table 20). This information will provide a seasonal comparison of inter- and intraspecific prey utilization and energetic condition for use in bioenergetic models and for regional comparisons.

Over the past ten years, coastal monitoring in southeastern Alaska has shown both similar and contrasting patterns with respect to the temporal and spatial occurrence of biophysical data from prior years. A common annual pattern of seasonality existed in surface temperatures and salinity levels, which increased progressively westward from inshore to coastal habitats, however coastal sampling this year was restricted to May. The coastal monitoring of stations in the northern and southern regions of southeastern Alaska is currently ongoing; in 2007, stations in strait habitats of both regions were sampled in June and July, while the northern region was additionally sampled in May and August. Long-term ecological monitoring of key juvenile salmon stocks, in concert with ocean sampling programs that measure appropriate biophysical parameters across adequate spatial and temporal scales, is needed to better understand how marine habitat use patterns, growth, species interactions, and hatchery stock interactions affect year-class strength in dynamic marine ecosystems.

Acknowledgments

For their superb cooperation and performance throughout the cruises, we thank the command and crew of the NOAA ship *John N. Cobb*: Chad Cary, Rick Feller, Peter Fischel, Sam Hardy, Bill Lamoureux, Strydr Nutting, Jeff Sage, Del Sharp, and Jonathan Wendland, and the crew of the Alaska Department of Fish and Game (ADFG) research vessel *MEDEIA*: Jim DeLabruere, Bob Frampton, Rick Gottwald, Russell Sandstrom. For additional participation on cruises, we are grateful to Dave Clausen, Dean Courtney, Brandon Howard, Michael Kohan, Jacqueline Mitchell, and Jamal Moss, and Clay Wertheimer. For laboratory assistance, we thank Brandon Howard, Michael Kohan, Wongyu Park, Jacqueline Mitchell, Josh Clarke, Dylan Rhea-Fournier, and Sean Burril. We appreciate the assistance of David King and Jim Smart of the NMFS Alaska Fisheries Science Center, Seattle, for their excellent support on trawl gear setup. Finally, we thank DIPAC hatchery employees Sarah Ballard, Brock Meridith, Mike Wunderlich and for laboratory processing of juvenile salmon. We also appreciate the help of Ron Josephson of the ADFG Mark and Tag lab for assistance on mark recovery information.

Literature Cited

ADFG. 2007. Salmon fisheries harvest statistics. Alaska Department of Fish and Game. <http://www.cf.adfg.state.ak.us/geninfo/finfish/salmon/salmcatch.php>.

Beamish, R. J. (editor). 1995. Climate change and northern fish populations. Can. Spec. Publ. Fish. Aquat. Sci. 121. 739 p.

Bruce, H. E., D. R. McLain, and B. L. Wing. 1977. Annual physical and chemical oceanographic cycles of Auke Bay, southeastern Alaska. NOAA Tech. Rep. NMFS SSRF-712. 11 p.

Chaput, G. J., C. H. LeBlanc, and C. Bourque. 1992. Evaluation of an electronic fish measuring board. ICES J. Mar. Sci., 49:335-339.

Cone, R. S. 1989. The need to reconsider the use of condition indices in fishery science. Trans. Amer. Fish. Soc. 118:510-514.

Courtney, D. L., D. G. Mortensen, J. A. Orsi, and K. M. Munk. 2000. Origin of juvenile Pacific salmon recovered from coastal southeastern Alaska identified by otolith thermal marks and coded wire tags. Fish. Res. 46:267-278.

Hagen, P., and K. Munk. 1994. Stock separation by thermally induced otolith microstructure marks. Pp. 149-156 *In*: Proceedings of the 16th Northeast Pacific Pink and Chum Salmon Workshop. Alaska Sea Grant College Program AK-SG-94-02, University of Alaska, Fairbanks.

Jaenicke, H. W., and A. C. Celewycz. 1994. Marine distribution and size of juvenile Pacific salmon in Southeast Alaska and northern British Columbia. Fish. Bull. 92:79-90.

Jefferts, K. B., P. K. Bergman, and H. F. Fiscus. 1963. A coded wire identification system for macro-organisms. Nature (Lond.) 198:460-462.

Landingham, J. H., M. V. Sturdevant, and R. D. Brodeur. 1998. Feeding habits of juvenile Pacific salmon in marine waters of southeastern Alaska and northern British Columbia. Fish. Bull. 96:285-302.

Murphy, J. M., and J. A. Orsi. 1999. NOAA Proc. Rep. 99-02. Physical oceanographic observations collected aboard the NOAA Ship *John N. Cobb* in the northern region of southeastern Alaska, 1997 and 1998. 239 p.

Murphy, J. M., A. L. J. Brase, and J. A. Orsi. 1999. An ocean survey of juvenile salmon in the northern region of southeastern Alaska, May–October. NOAA Tech. Memo. NMFS-AFSC-105. Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 40 p.

Orsi, J. A., J. M. Murphy, and A. L. J. Brase. 1997. Survey of juvenile salmon in the marine waters of southeastern Alaska, May–August 1997. (NPAFC Doc. 277) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 27 p.

Orsi, J. A., J. M. Murphy, and D. G. Mortensen. 1998. Survey of juvenile salmon in the marine waters of southeastern Alaska, May–August 1998. (NPAFC Doc. 346) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 27 p.

Orsi, J. A., D. G. Mortensen, and J. M. Murphy. 1999. Early marine ecology of pink and chum salmon in southeastern Alaska. Pp. 64-72 *In*: Proceedings of the 19th Northeast Pacific Pink and Chum Workshop. Juneau, Alaska.

Orsi, J. A., M. V. Sturdevant, J. M. Murphy, D. G. Mortensen, and B. L. Wing. 2000a. Seasonal habitat use and early marine ecology of juvenile Pacific salmon in southeastern Alaska. NPAFC Bull. 2:111-122.

Orsi, J. A., M. V. Sturdevant, J. M. Murphy, D. G. Mortensen, B. L. Wing, and B. K. Krauss. 2000b. Survey of juvenile salmon in the marine waters of southeastern Alaska, May–October 1999. (NPAFC Doc.497) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 51 p.

Orsi, J. A., M. V. Sturdevant, A. C. Wertheimer, B. L. Wing, J. M. Murphy, D. G. Mortensen, E. A. Fergusson, and B. K. Krauss. 2001a. Survey of juvenile salmon in the marine waters of southeastern Alaska, May–September 2000. (NPAFC Doc. 536) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 49 p.

Orsi, J. A., M. V. Sturdevant, J. M. Murphy, D. G. Mortensen, B. L. Wing, A. C. Wertheimer, and W. R. Heard. 2001b. Southeast Alaska coastal monitoring for habitat use and early marine ecology of juvenile Pacific salmon. NPAFC Tech. Rep. 2:38-39.

Orsi, J. A., E. A. Fergusson, W. R. Heard, D. G. Mortensen, M. V. Sturdevant, A. C. Wertheimer, and B. L. Wing. 2002. Survey of juvenile salmon in the marine waters of southeastern Alaska, May–September 2001. (NPAFC Doc. 630) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 51 p.

Orsi, J. A., E. A. Fergusson, M. V. Sturdevant, B. L. Wing, W. R. Heard, A. C. Wertheimer, and D. G. Mortensen. 2003. Survey of juvenile salmon in the marine waters of southeastern Alaska, May–August 2002. (NPAFC Doc. 702) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 60 p.

Orsi, J. A., A. C. Wertheimer, M. V. Sturdevant, E. A. Fergusson, D. G. Mortensen, and B. L. Wing. 2004a. Juvenile chum salmon consumption of zooplankton in marine waters of southeastern Alaska: a bioenergetics approach to implications of hatchery stock interactions. Rev. Fish Biol. Fish. 14: 335-359.

Orsi, J. A., E. A. Fergusson, M. V. Sturdevant, B. L. Wing, W. R. Heard, A. C. Wertheimer, and D. G. Mortensen. 2004b. Survey of juvenile salmon in the marine waters of southeastern Alaska, May–August 2003. (NPAFC Doc. 798) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 59 p.

Orsi, J. A., E. A. Fergusson, M. V. Sturdevant, B. L. Wing, A. C. Wertheimer, and W. R. Heard. 2005. Survey of juvenile salmon and associated epipelagic ichthyofauna in the marine waters of southeastern Alaska, May–August 2004. (NPAFC Doc. 871) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 61 p.

Orsi, J. A., E. A. Fergusson, M. V. Sturdevant, B. L. Wing, A. C. Wertheimer, and W. R. Heard. 2006. Survey of Juvenile Salmon and Ecologically-related Species in the Marine Waters of Southeastern Alaska, May–August 2005. (NPAFC Doc. 955) Auke Bay Lab., Alaska Fish. Sci. Cen., Nat. Mar. Fish. Serv., NOAA, 11305 Glacier Highway, Juneau, AK 99801-8626, USA, 108 p.

Park, W., M. Sturdevant, J. Orsi, A. Wertheimer, E. Fergusson, W. Heard, and T. Shirley. 2004. Interannual abundance patterns of copepods during an ENSO event in Icy Strait, southeastern Alaska. ICES J. Mar. Sci. 61(4):464-477.

Pearcy, W. G. 1997. What have we learned in the last decade? What are research priorities? Pp. 271–277 *In*: R. L. Emmett and M. H. Schiewe (eds.), Estuarine and ocean survival of northeastern Pacific salmon: Proceedings of the workshop. NOAA Tech. Memo. NMFS-NWFSC-29.

Purcell, J. E., M.V. Sturdevant and C. P. Galt. 2005. A review of appendicularians as prey of invertebrate and fish predators. Pp. 359-435 *In*: G. Gorsky, M.J. Youngbluth and D. Deibel (eds.). Response of Marine Ecosystems to Global Changes: Ecological Impact of Appendicularians.

Secor, D. H., J. M. Dean, and E. H. Laban. 1992. Otolith removal and preparation for microstructure examination. Can. Spec. Publ. Fish. Aquat. Sci. 117:19-57.

Sturdevant, M.V., E.A. Fergusson, J.A. Orsi, and A.C. Wertheimer. 2005. Seasonal patterns in diel feeding, gastric evacuation, and energy density of juvenile chum salmon in Icy Strait, Southeast Alaska, 2001. Proceedings of the 22nd Northeast Pacific Pink and Chum Workshop, February 23-25, 2005, Ketchikan, Alaska.

Wertheimer, A. C., W. W. Smoker, T. L. Joyce, and W. R. Heard. 2001. Comment: A review of the hatchery programs for pink salmon in Prince William Sound and Kodiak Island, Alaska. Trans. Amer. Fish. Soc. 130:712-720.

Table 1.—Localities and coordinates of stations sampled in the marine waters of the northern and southern regions of southeastern Alaska using the NOAA ship *John N. Cobb*, May–August 2006. Transect and station positions are shown in Figure 1.

Station	Latitude north	Longitude west	Distance: Offshore (km)	Distance: Between adjacent station (km)	Bottom depth (m)
Northern region					
Auke Bay Monitor					
ABM	58°22.00'	134°40.00'	1.5	—	60
Upper Chatham Strait transect					
UCA	58°04.57'	135°00.08'	3.2	3.2	400
UCB	58°06.22'	135°00.91'	6.4	3.2	100
UCC	58°07.95'	135°01.69'	6.4	3.2	100
UCD	58°09.64'	135°02.52'	3.2	3.2	200
Icy Strait transect					
ISA	58°13.25'	135°31.76'	3.2	3.2	128
ISB	58°14.22'	135°29.26'	6.4	3.2	200
ISC	58°15.28'	135°26.65'	6.4	3.2	200
ISD	58°16.38'	135°23.98'	3.2	3.2	234
Icy Point transect					
IPA	58°20.12'	137°07.16'	6.9	16.8	160
IPB	58°12.71'	137°16.96'	23.4	16.8	130
IPC	58°05.28'	137°26.75'	40.2	16.8	150
IPD	57°53.50'	137°42.60'	65.0	24.8	1,300
Southern region					
Middle Clarence Strait transect					
MCA	55°23.05'	131°55.49'	3.2	3.2	346
MCB	55°24.26'	131°58.23'	6.4	3.2	439
MCC	55°25.06'	132°01.19'	6.4	3.2	412

Table 1.—cont.

Station	Latitude north	Longitude west	Distance: Offshore (km)	Distance: Between adjacent station (km)	Bottom depth (m)
MCD	55°25.79'	132°03.93'	3.2	3.2	461
		Lower Clarence Strait transect			
LCA	55°07.53'	131°48.09'	3.2	3.2	413
LCB	55°07.32'	131°51.09'	6.4	3.2	459
LCC	55°07.14'	131°56.79'	6.4	3.2	466
LCD	55°06.93'	131°56.79'	3.2	3.2	315

Table 2.—Numbers and types of data collected in different habitats sampled monthly in marine waters of the northern and southern regions of southeastern Alaska, May–August 2006.

		Data collection type[1]						
Dates (days)	Habitat	Rope trawl	CTD cast	Deep oblique bongo	Shallow oblique bongo	20-m vertical	WP-2 vertical	Chlorophyll & nutrients
		Northern region						
22-24 May (3 days)	Inshore	0	1	2	0	3	1	1
	Strait	2	4	8	8	4	0	4
	Coastal	4	4	8	0	4	4	4
21 June-02 July (6 days)	Inshore	0	1	2	0	3	1	1
	Strait	20	20	8	8	20	0	8
	Coastal	0	0	0	0	0	0	0
21-31 July (13 days)	Inshore	0	1	2	0	3	1	1
	Strait	20	20	8	8	20	0	8
	Coastal	0	0	0	0	0	0	0
23-29 August (7 days)	Inshore	0	1	0	0	3	0	1
	Strait	8	8	0	0	8	0	8
	Coastal	0	0	0	0	0	0	0
		Southern region						
21-25 June (5 days)	Strait	20	20	8	8	20	0	8
21-25 July (5 days)	Strait	20	20	8	8	20	0	8
Total		94	100	54	40	108	7	52

[1]Rope trawl = 20-min hauls with Nordic 264 surface trawl 18 m deep by 24 m wide; CTD casts = to 200 m or within 10 m of the bottom; oblique bongo = 60-cm diameter frame, 505- and 333-µm meshes, towed double obliquely down to and up from a depth of 20 m (shallow) or 200 m or within 20 m of the bottom (deep); 20-m vertical = 50-cm diameter frame, 243-µm conical net towed vertically from 20 m; WP-2 vertical = 57-cm diameter frame, 202-µm conical net towed vertically from 200 m or within 10 m of the bottom; chlorophyll and nutrients are surface seawater samples.

Table 3.—Surface (3-m) temperature and salinity data collected monthly in marine waters of the northern and southern regions of southeastern Alaska, May–August 2006. Station code acronyms are listed in Table 1. August temperature and salinity data were collected aboard the Auke Bay Laboratories vessel *Quest*.

Month	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)
Northern region								
Auke Bay Monitor								
	ABM							
May	8.9	28.6						
June	11.6	18.1						
July	12.0	15.6						
August	11.5	15.1						
Upper Chatham Strait transect								
	UCA		UCB		UCC		UCD	
May	—	—	—	—	—	—	—	—
June	10.6	28.5	10.7	27.6	10.9	27.5	11.0	26.4
July	13.6	17.8	13.4	19.9	12.8	24.1	12.8	25.0
August	10.7	29.3	10.0	29.9	10.1	29.7	10.4	29.3
Icy Strait transect								
	ISA		ISB		ISC		ISD	
May	7.1	31.0	7.5	30.7	8.1	30.8	8.0	30.4
June	11.4	27.4	11.1	28.2	11.0	28.3	11.1	27.7
July	12.3	26.5	12.2	26.0	12.6	25.5	12.2	26.9
August	9.4	29.4	9.1	29.8	10.8	28.9	10.8	28.5
Icy Point transect								
	IPA		IPB		IPC		IPD	
May	9.3	30.7	8.1	31.5	8.6	31.9	8.8	32.0
June	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—
August	—	—	—	—	—	—	—	—
Southern region								
Middle Clarence Strait transect								
	MCA		MCB		MCC		MCD	
June	12.1	28.4	11.8	28.4	11.9	28.2	11.5	29.4
July	14.2	28.2	14.0	28.3	13.9	28.4	13.0	29.3

Table 3.—cont.

Month	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)
	Lower Clarence Strait transect							
	LCA		LCB		LCC		LCD	
June	12.6	26.0	12.4	26.6	12.2	27.9	11.3	29.9
July	15.4	27.7	15.1	27.4	14.8	27.5	14.1	27.5

Table 4.—Nutrient and chlorophyll concentrations from 200-ml surface water samples in marine waters of the northern and southern regions of southeastern Alaska, May–August 2006. Station code acronyms are listed in Table 1. Water samples were not collected in May at Upper Chatham Strait.

		Nutrients [µM]						
Station	Date	[PO_4]	[$Si(OH)_4$]	[NO_3]	[NO_2]	[NH_4]	Chlorophyll (µg/L)	Phaeopigment (µg/L)
				Northern region				
ABM	22 May	0.04	3.52	0.05	0.01	0.32	1.47	0.61
	28 June	0.16	2.19	0.00	0.13	0.82	1.64	0.59
	27 July	0.04	3.99	0.07	0.03	0.96	3.54	1.42
	19 August	0.09	3.29	0.01	0.00	1.11	0.45	0.12
IPA	23 May	0.55	7.26	2.86	0.06	0.59	0.91	0.38
IPB	23 May	0.86	19.01	7.63	0.15	0.24	2.17	0.86
IPC	23 May	0.91	9.88	7.31	0.15	0.45	0.43	0.11
IPD	23 May	0.90	11.18	7.95	0.16	0.49	0.18	0.06
UCA	29 June	0.23	1.65	0.49	0.01	0.16	1.85	0.38
	30 July	0.03	8.20	0.02	0.00	0.44	0.59	0.22
	19 August	0.84	17.50	7.44	0.21	0.32	1.34	0.73
UCB	29 June	0.51	1.65	0.72	0.03	0.55	3.19	0.62
	30 July	0.04	8.19	0.01	0.00	0.55	0.68	0.22
	19 August	1.05	26.46	11.95	0.31	0.50	1.14	0.63
UCC	29 June	1.74	3.11	0.96	0.04	2.50	5.54	1.18
	30 July	0.03	6.49	0.09	0.00	0.38	0.81	0.20
	19 August	0.64	12.42	5.82	0.18	0.69	0.98	0.57
UCD	29 June	0.19	1.38	1.49	0.03	0.55	2.17	0.48
	30 July	0.06	5.97	0.12	0.00	0.37	0.68	0.19
	19 August	0.66	13.15	5.81	0.21	0.89	0.66	0.51
ISA	24 May	1.23	17.61	11.96	0.24	2.01	0.44	0.18
	30 June	0.18	1.67	4.05	0.05	0.39	1.18	0.18
	28 July	0.18	8.67	0.87	0.04	0.29	1.06	0.49
	20 August	0.63	17.97	7.17	0.13	0.35	1.72	0.88
ISB	24 May	1.11	10.81	8.94	0.24	2.54	—	—
	30 June	0.51	1.49	0.42	0.05	0.81	1.10	0.11
	28 July	0.27	10.19	2.14	0.07	0.60	0.52	0.31
	20 August	0.55	12.40	4.97	0.09	0.46	1.56	0.79
ISC	24 May	0.99	6.05	5.51	0.46	3.02	0.61	0.15

Table 4.—cont.

Station	Date	Nutrients [μM] [PO_4]	[$Si(OH)_4$]	[NO_3]	[NO_2]	[NH_4]	Chlorophyll (μg/L)	Phaeopigment (μg/L)
	30 June	0.30	2.35	0.33	0.03	0.20	1.58	0.12
	28 July	0.53	12.99	3.61	0.11	0.63	0.68	0.31
	20 August	0.71	19.81	7.46	0.18	0.35	1.70	0.84
ISD	24 May	1.20	10.44	9.77	0.26	2.52	0.10	0.03
	30 June	0.30	3.12	0.32	0.03	0.43	2.04	0.23
	28 July	0.41	13.32	3.65	0.11	0.58	0.58	0.26
	20 August	0.34	12.47	3.90	0.10	0.43	0.87	0.46
				Southern region				
MCA	21 June	0.12	0.76	0.29	0.13	0.12	2.20	0.87
	21 July	0.21	5.92	0.60	0.03	0.21	1.29	0.42
MCB	21 June	0.27	4.09	0.52	0.07	0.27	4.75	0.87
	21 July	0.23	5.33	0.32	0.03	0.23	1.45	0.47
MCC	21 June	0.27	4.09	0.51	0.07	0.27	2.91	0.84
	21 July	0.27	4.90	0.21	0.03	0.27	1.39	0.52
MCD	21 June	—	—	—	—	—	2.46	0.84
	21 July	0.41	7.67	2.85	0.09	0.41	1.21	0.50
LCA	22 June	0.19	0.77	0.28	0.00	0.19	3.29	0.69
	22 July	0.17	4.69	0.26	0.00	0.17	1.13	0.34
LCB	22 June	0.22	1.46	0.47	0.02	0.22	3.17	0.63
	22 July	0.30	3.25	0.31	0.02	0.30	0.63	0.20
LCC	22 June	0.09	0.94	0.17	0.04	0.09	3.48	1.01
	22 July	0.35	2.82	0.29	0.03	0.35	0.65	0.17
LCD	22 June	0.05	0.59	0.15	0.00	0.05	3.08	1.05
	22 July	0.21	3.07	0.23	0.03	0.21	0.53	0.16

Table 5.— Mean zooplankton settled volumes (ZSV, ml) and total plankton settled volumes (TSV, ml) from vertical 20-m NORPAC hauls sampled in marine waters of the northern and southern regions of southeastern Alaska, May–August 2006. Plankton samples were not collected at Upper Chatham Strait in May. Station code acronyms are listed in Table 1. Phytoplankton not present in any samples. Volume differences between SV and TSV are caused by presence of slub in sample. Standing stock (ml/m^3) can be computed by dividing by the water volume filtered, a factor of 3.9 m^3 for these samples.

Month	*n*	ZSV	TSV	*n*	ZSV	TSV	*n*	ZSV	TSV	*n*	ZSV	TSV
Northern region												
Auke Bay Monitor												
	ABM											
May	3	8.0	23.2									
June	3	59.3	87.7									
July	3	18.3	36.0									
August	3	9.7	15.0									
Upper Chatham Strait transect												
	UCA			UCB			UCC			UCD		
May												
June	2	35.0	35.5	2	45.0	45.0	2	31.0	30.5	2	25.3	24.0
July	2	4.5	3.8	2	3.5	3.0	2	2.5	1.5	2	2.3	1.8
August	1	0.1	0.1	1	0.1	0.1	1	0.3	0.3	1	1.0	1.0
Icy Strait transect												
	ISA			ISB			ISC			ISD		
May	1	8.5	8.5	1	30.0	30.0	1	45.0	45.0	1	8.0	8.0
June	3	31.7	24.4	3	30.7	18.0	3	31.0	26.3	3	31.3	25.0
July	3	9.7	9.0	3	15.5	15.2	3	4.3	3.7	3	2.8	2.7
August	1	1.5	0.8	1	0.3	0.3	1	4.0	1.0	1	1.0	1.0
Icy Point transect												
	IPA			IPB			IPC			IPD		
May	1	10.0	10.0	1	8.5	8.5	1	36.0	36.0	1	42.0	42.0
Southern region												
Middle Clarence Strait transect												
	MCA			MCB			MCC			MCD		
June	2	39.5	33.0	2	47.5	26.8	2	29.5	28.0	2	27.0	23.3
July	2	10.0	9.5	2	7.0	6.3	2	9.5	8.5	2	5.0	5.0

Table 5.—cont.

Month	*n*	ZSV	TSV	*n*	ZSV	TSV	*n*	ZSV	TSV	*n*	ZSV	TSV
Lower Clarence Strait transect												
	LCA			LCB			LCC			LCD		
June	3	56.7	31.2	3	49.2	13.7	3	62.3	22.5	3	15.3	12.3
July	3	10.2	10.2	3	14.0	14.0	3	12.0	12.0	3	6.5	6.5

Table 6.—Zooplankton displacement volumes (DV, ml), standing stock (DV/m^3), and total density (number/m^3, 333-µm only) from daytime, shallow (20 m) and deep (≤ 200 m) double oblique bongo (333- and 505-µm mesh) hauls sampled in the marine waters of the northern and southern regions of southeastern Alaska, May–July 2006. No bongo samples were collected in August. Standing stock (ml/m^3) is computed using flow meter readings to determine water volume filtered. Northern region is represented by the Icy Strait transect and the southern region is represented by the Lower Clarence Strait transect.

Month	Depth (m)	DV	DV/m^3	Total density	Depth (m)	DV	DV/m^3	Total density	Depth (m)	DV	DV/m^3	Total density	Depth (m)	DV	DV/m^3	Total density
Shallow samples																
333-µm mesh																
Southern region																
	LCA				LCB				LCC				LCD			
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	20	35	1.3	4,475.4	20	26	1.4	5,308.3	20	22	0.8	3,368.5	20	15	0.6	2,022.2
July	20	10	0.3	3,543.1	20	12	0.4	3,427.2	20	20	0.6	3,894.8	20	6	0.2	1,261.7
Northern region																
	ISA				ISB				ISC				ISD			
May	20	11	0.3	452.0	20	27	0.8	1,632.1	20	55	1.9	4,578.3	20	66	2.1	3,130.3
June	20	29	1.1	3,365.2	20	42	1.4	4,295.8	20	41	1.6	5,580.4	20	16	0.6	2,658.3
July	18	6	0.2	787.0	19	11	0.4	1,440.7	19	6	0.2	1,074.7	19	5	0.2	830.1
505-µm mesh																
Southern region																
	LCA				LCB				LCC				LCD			
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	20	50	1.8	—	20	20	0.7	—	20	5	0.2	—	20	5	0.2	—
July	20	1	0.0	—	—	—	—	—	20	1	0.0	—	20	1	0.0	—
Northern region																

Table 6.—cont.

Month	Depth (m)	DV	DV/m³	Total density	Depth (m)	DV	DV/m³	Total density	Depth (m)	DV	DV/m³	Total density	Depth (m)	DV	DV/m³	Total density
	ISA				ISB				ISC				ISD			
May	20	15	0.4	—	20	18	0.5	—	20	37	1.2	—	20	57	1.6	—
June	20	15	0.6	—	20	10	0.3	—	20	30	1.2	—	20	8	0.3	—
July	18	2	0.1	—	19	5	0.2	—	19	5	0.2	—	19	5	0.2	—
Deep samples																
333-µm mesh																
Southern region																
	LCA				LCB				LCC				LCD			
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	219	83	0.4	1,004.9	230	49	0.2	618.2	218	40	0.2	453.8	200	95	0.4	690.8
July	202	79	0.3	954.3	185	52	0.2	630.7	197	81	0.3	894.4	221	58	0.2	468.4
Northern region																
	ISA				ISB				ISC				ISD			
May	72	68	0.6	3,273.3	184	108	0.6	1,392.9	185	162	0.8	1,680.5	207	160	0.7	1,362.1
June	60	82	0.9	4,256.6	180	285	1.3	2,173.3	190	228	1.0	2,462.7	205	473	2.0	2,099.5
July	80	92	0.8	1,657.8	156	220	1.1	1,145.6	230	78	0.3	803.0	205	96	0.4	516.3
505-µm mesh																
Southern region																
	LCA				LCB				LCC				LCD			
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	219	60	0.2	—	230	35	0.2	—	218	50	0.2	—	200	70	0.3	—
July	202	35	0.1	—	185	45	0.2	—	197	55	0.2	—	221	40	0.2	—

Table 6.—cont.

Month	Depth (m)	DV	DV/m^3	Total density	Depth (m)	DV	DV/m^3	Total density	Depth (m)	DV	DV/m^3	Total density	Depth (m)	DV	DV/m^3	Total density
	Northern region															
	ISA				ISB				ISC				ISD			
May	72	37	0.3	—	184	78	0.4	—	185	120	0.6	—	207	105	0.4	—
June	60	30	0.3	—	180	225	1.0	—	190	185	0.8	—	205	345	1.4	—
July	80	70	0.6	—	156	180	0.9	—	230	55	0.2	—	200	85	0.4	—

Table 7.—Numbers of fish and squid captured in 54 rope trawl hauls in marine waters of the northern region of southeastern Alaska, June–August 2006.

		Number caught				
Common name	Scientific name	May	June	July	August[4]	Total
	Salmonids					
Pink salmon[1]	*Oncorhynchus gorbuscha*	0	897	821	1	1,719
Sockeye salmon[1]	*O. nerka*	0	752	43	0	795
Chum salmon[1]	*O. keta*	0	377	400	1	778
Coho salmon[1]	*O. kisutch*	0	352	177	98	627
Chinook salmon[2]	*O. tshawytscha*	4	7	12	5	28
Coho salmon[3]	*O. kisutch*	0	1	5	2	8
Pink salmon[3]	*O. gorbuscha*	0	5	2	1	8
Chinook salmon[1]	*O. tshawytscha*	0	0	5	0	5
Chum salmon[3]	*O. keta*	0	2	0	0	2
Salmonid subtotals		4	2,393	1,465	108	3,970
	Non-salmonids					
Pacific herring	*Clupea pallasi*	1	0	27	0	28
Crested sculpin	*Blepsias bilobus*	0	1	14	3	18
Market squid	Loligo	9	3	0	0	12
Smooth lumpsucker	*Aptocyclus ventricosus*	1	3	3	0	7
Prowfish	*Zaprora silenus*	0	1	3	2	6
Spiny lumpsucker	*Eumicrotremus orbis*	0	2	2	0	4
3-spine stickleback	*Gasterosteus aculeatus*	4	0	0	0	4
Wolf-eel	*Anarrhichthys ocellatus*	0	0	2	2	4
Soft sculpin	*Psychrolutes sigalutes*	0	1	1	0	2
Unknown larvae		0	0	2	0	2
Walleye pollock	*Theragra chalcogramma*	0	1	0	0	1
Starry flounder	*Platichthys stellatus*	0	0	0	1	1
Dolly Varden	*Salvelinus malma*	0	1	0	0	1
Dusky rockfish	*Sebastes ciliatus*	0	1	0	0	1
Pacific hake	*Merluccius productus*	0	0	1	0	1
Walleye Pollock larvae	*T. chalcogramma*	0	1	0	0	1
Non-salmonid subtotals		15	15	55	8	93
Grand total fish and squid		19	2,408	1,520	116	4,063

[1]Juvenile
[2]Immature
[3]Adult
[4]August rope trawl sampling was conducted aboard the ADF&G vessel *Medeia*.

Table 8.—Numbers of fish and squid captured in 40 rope trawl hauls in marine waters of the southern region of southeastern Alaska, June–July 2006.

Common name	Scientific name	Number caught		
		June	July	Total
	Salmonids			
Pink salmon[1]	*Oncorhynchus gorbuscha*	3,064	718	3,782
Sockeye salmon[1]	*O. nerka*	1,852	93	1,945
Chum salmon[1]	*O. keta*	304	208	512
Coho salmon[1]	*O. kisutch*	126	88	214
Chinook salmon[1]	*O. tshawytscha*	6	7	13
Chinook salmon[2]	*O. tshawytscha*	5	2	7
Pink salmon[3]	*O. gorbuscha*	1	2	3
Chum salmon[3]	*O. keta*	1	2	3
Chum salmon[2]	*O. keta*	1	0	1
Sockeye salmon[3]	*O. nerka*	0	1	1
Salmonid subtotals		5,360	1,121	6,481
	Non-salmonids			
Walleye pollock larvae	*Theragra chalcogramma*	26	4	30
Spiny dogfish	*Squalius acanthias*	0	21	21
Pacific herring	*Clupea pallasi*	4	8	12
Market squid (black)	*Loligo* spp.	5	3	8
Walleye pollock	*T. chalcogramma*	6	0	6
Wolf-eel	*Anarrhichthys ocellatus*	0	6	6
Starry flounder	*Platichthys stellatus*	4	0	4
Prowfish	*Zaprora silenus*	0	3	3
Soft sculpin	*Psychrolutes sigalutes*	2	0	2
Pacific sandlance	*Ammodytes hexapterus*	0	2	2
Pleuronectidae	Pleuronectidae	0	1	1
Salmon shark	*Lamna ditropis*	0	1	1
Skate	Rajidae	1	0	1
Non-salmonid subtotals		48	49	97
Grand total fish and squid		5,408	1,170	6,578

[1]Juvenile
[2]Immature
[3]Adult

Table 9.—Frequency of occurrence of fishes and squid captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2006. The percent occurrence of fish per 54 total hauls is shown in parentheses.

		Frequency of occurrence					
Common name	Scientific name	May	June	July	August[4]	Total	(%)
	Salmonids						
Pink salmon[1]	*Oncorhynchus gorbuscha*	0	18	16	1	35	(65)
Sockeye salmon[1]	*O. nerka*	0	18	10	0	28	(52)
Chum salmon[1]	*O. keta*	0	18	18	1	37	(69)
Coho salmon[1]	*O. kisutch*	0	20	18	8	46	(85)
Chinook salmon[2]	*O. tshawytscha*	1	5	7	2	15	(28)
Coho salmon[3]	*O. kisutch*	0	1	4	2	7	(13)
Pink salmon[3]	*O. gorbuscha*	0	3	2	1	6	(11)
Chinook salmon[1]	*O. tshawytscha*	0	0	4	0	4	(7)
Chum salmon[3]	*O. keta*	0	2	0	0	2	(4)
	Non-salmonids						
Pacific herring	*Clupea pallasi*	1	0	3	0	4	(7)
Crested sculpin	*Blepsias bilobus*	0	1	10	2	13	(24)
Market squid	Loligo	2	2	0	0	4	(7)
Smooth lumpsucker	*Aptocyclus ventricosus*	1	3	2	0	6	(11)
Prowfish	*Zaprora silenus*	0	1	3	2	6	(11)
Spiny lumpsucker	*Eumicrotremus orbis*	0	2	2	0	4	(7)
3-spine stickleback	*Gasterosteus aculeatus*	4	0	0	0	4	(7)
Wolf-eel	*Anarrhichthys ocellatus*	0	0	2	2	4	(7)
Soft sculpin	*Psychrolutes sigalutes*	0	1	1	0	2	(4)
Unknown larvae		0	0	1	0	1	(2)
Walleye pollock	*Theragra chalcogramma*	0	1	0	0	1	(2)
Starry flounder	*Platichthys stellatus*	0	0	0	1	1	(2)
Dolly Varden	*Salvelinus malma*	0	1	0	0	1	(2)
Dusky rockfish	*Sebastes ciliatus*	0	1	0	0	1	(2)
Pacific hake	*Merluccius productus*	0	0	1	0	1	(2)
Walleye pollock larvae	*T. chalcogramma*	0	1	0	0	1	(2)

[1]Juvenile
[2]Immature
[3]Adult
[4]August rope trawl sampling was conducted aboard the ADF&G vessel *Medeia*.

Table 10.—Frequency of occurrence of fishes and squid captured in marine waters of the southern region of southeastern Alaska by rope trawl, June–July 2006. The percent occurrence of fish per 40 total hauls is shown in parentheses.

		Frequency of occurrence			
Common name	Scientific name	June	July	Total	(%)
	Salmonids				
Pink salmon[1]	*Oncorhynchus gorbuscha*	20	20	40	(100)
Sockeye salmon[1]	*O. nerka*	20	16	36	(90)
Chum salmon[1]	*O. keta*	19	19	38	(95)
Coho salmon[1]	*O. kisutch*	20	20	40	(100)
Chinook salmon[1]	*O. tshawytscha*	5	5	10	(25)
Chinook salmon[2]	*O. tshawytscha*	5	2	7	(18)
Pink salmon[3]	*O. gorbuscha*	1	2	3	(8)
Chum salmon[3]	*O. keta*	1	2	3	(8)
Chum salmon[2]	*O. keta*	1	0	1	(3)
Sockeye salmon[3]	*O. nerka*	0	1	1	(3)
	Non-salmonids				
Walleye pollock larvae	*Theragra chalcogramma*	10	4	14	(35)
Spiny dogfish	*Squalius acanthias*	0	5	5	(13)
Pacific herring	*Clupea pallasi*	4	1	5	(13)
Market squid (black)	*Loligo* spp.	3	2	5	(13)
Walleye pollock	*T. chalcogramma*	2	0	2	(5)
Wolf-eel	*Anarrhichthys ocellatus*	0	6	6	(15)
Starry flounder	*Platichthys stellatus*	3	0	3	(8)
Prowfish	*Zaprora silenus*	0	3	3	(8)
Soft sculpin	*Psychrolutes sigalutes*	2	0	2	(5)
Pacific sandlance	*Ammodytes hexapterus*	0	1	1	(3)
Pleuronectidae	Pleuronectidae	0	1	1	(3)
Salmon shark	*Lamna ditropis*	0	1	1	(3)
Skate	Rajidae	1	0	1	(3)

[1]Juvenile
[2]Immature
[3]Adult

Table 11.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and length-weight residuals of juvenile pink salmon captured in the strait marine habitats of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. A subset of samples was preserved for diet analysis; only their fresh lengths are reported in this table.

		June				July				August[4]			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper Chatham Strait	Length	36	88-131	109.6	1.9	38	95-158	121.3	2.2	—	—	—	—
	Weight	23	8.6-21.8	14.4	0.9	38	6.9-35.3	17.2	1.0	—	—	—	—
	Condition	23	8-1	0.9	0.0	38	8-1.2	0.9	0.0	—	—	—	—
	Residual	23	-0.04-0.05	0.00	0.01	38	-0.07-0.10	0.00	0.01	—	—	—	—
Icy Strait	Length	638	71-138	101.2	0.5	783	81-174	117.7	0.4	1	135	135.0	0.0
	Weight	385	3.2-26	9.3	0.2	322	4.2-57.8	15.6	0.3	—	—	—	—
	Condition	385	0.6-1.2	0.9	0.0	322	0.4-1.2	0.9	0.0	—	—	—	—
	Residual	385	-0.20-0.12	0.00	0.00	322	-0.31-0.10	-0.02	0.00	—	—	—	—
Middle Clarence Strait	Length	1,026	67-153	98.9	0.4	262	92-163	126.0	0.8	—	—	—	—
	Weight	352	3-34.9	10.2	0.3	219	5.7-37.3	18.9	0.4	—	—	—	—
	Condition	352	0.3-3.4	1.0	0.0	219	0.7-1.2	0.9	0.0	—	—	—	—
	Residual	352	-0.540.59	0.03	0.00	219	-0.09-0.10	-0.01	0.00	—	—	—	—
Lower Clarence Strait	Length	1,558	69-190	103.6	0.3	466	92-182	122.9	0.7	—	—	—	—
	Weight	382	4.3-77.8	13.0	0.3	346	6.7-58.7	18.6	0.4	—	—	—	—
	Condition	382	0.4-2.1	1.0	0.0	346	0.4-1.5	0.9	0.0	—	—	—	—
	Residual	382	-0.40-0.37	0.04	0.00	346	-0.35-0.22	-0.01	0.00	—	—	—	—
Total	Length	3,258	67-190	101.7	0.2	1,549	81-182	120.8	0.3	1	135	135.0	0
	Weight	1,142	3-77.8	10.9	0.1	925	4.2-58.7	17.6	0.2	—	—	—	—
	Condition	1,142	0.3-3.4	0.9	0.0	925	0.4-1.5	0.9	0.0	—	—	—	—
	Residual	1,142	-0.54-0.59	0.02	0.00	925	-0.35-0.22	-0.01	0.00	—	—	—	—

[4]August rope trawl sampling was conducted aboard the ADF&G vessel *Medeia*.

Table 12.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and length-weight residuals of juvenile chum salmon captured in the strait marine habitats of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. A subset of samples was preserved for diet analysis, only their fresh lengths are reported in this table.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	85	85-133	109.2	1.2	25	96-167	135.0	3.9	—	—	—	—
Chatham	Weight	85	5.9-24.5	12.3	0.5	25	8.4-42.6	24.3	2.0	—	—	—	—
Strait	Condition	85	0.5-1.3	0.9	0.0	25	0.6-1.4	0.9	0.0	—	—	—	—
	Residual	85	-0.26-0.12	-0.03	0.01	25	-0.12-0.16	-0.01	0.01	—	—	—	—
Icy	Length	324	81-136	108.1	0.7	374	93-205	137.3	0.9	—	—	—	—
Strait	Weight	146	4.7-24.4	11.9	0.35	244	8.5-93.7	26.2	0.7	—	—	—	—
	Condition	146	0.3-1.2	0.9	0.0	244	0.8-1.6	1.0	0.0	—	—	—	—
	Residual	146	-0.46-0.09	-0.01	0.00	244	-0.10-0.22	-0.01	0.00	—	—	—	—
Middle	Length	218	81-152	117.0	0.8	107	97-197	139.0	1.8	—	—	—	—
Clarence	Weight	109	7.0-37.5	18.5	0.5	63	8.4-69.0	28.6	1.5	—	—	—	—
Strait	Condition	109	0.9-1.4	1.1	0.0	63	0.9-1.1	1.0	0.0	—	—	—	—
	Residual	109	-0.02-0.16	0.05	0.00	63	-0.05-0.07	0.01	0.00	—	—	—	—
Lower	Length	87	81-179	113.3	1.6	101	105-191	139.4	1.9	—	—	—	—
Clarence	Weight	48	6.3-70.5	17.1	1.4	59	10.3-65.3	27.0	1.5	—	—	—	—
Strait	Condition	48	0.9-1.6	1.1	0.0	59	0.8-1.9	1.0	0.0	—	—	—	—
	Residual	48	-0.01-0.22	0.07	0.01	59	-0.07-0.30	0.01	0.01	—	—	—	—
Total	Length	714	81-179	111.6	0.5	607	93-205	137.8	0.7	—	—	—	—
	Weight	361	4.7-70.5	14.9	0.3	391	8.4-93.7	26.6	0.6	—	—	—	—
	Condition	361	0.3-1.6	1.0	0.0	391	0.6-1.9	1.0	0.0	—	—	—	—
	Residual	361	-0.46-0.22	0.02	0.00	391	-0.18-0.30	-0.00	0.00	—	—	—	—

Table 13.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and length-weight residuals of juvenile sockeye salmon captured in the strait marine habitats of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. A subset of samples was preserved for diet analysis, only their fresh lengths are reported in this table.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	Mean	se	*n*	range	mean	se
Upper	Length	20	89-167	135.8	5.7	2	97-113	105.0	8.0	—	—	—	—
Chatham	Weight	13	14.3-52.5	36.7	2.8	2	8.8-14.6	11.7	2.9	—	—	—	—
Strait	Condition	13	1.0-1.2	1.0	0.0	2	1.0-1.0	1.0	0.0	—	—	—	—
	Residuals	13	-0.02-0.06	0.01	0.01	2	-0.01-0.01	0.00	0.01	—	—	—	—
Icy	Length	454	88-188	136.5	0.8	41	66-195	130.1	5.0	—	—	—	—
Strait	Weight	185	7.1-69.7	27.0	0.7	17	2.5-72.3	35.4	6.2	—	—	—	—
	Condition	185	0.6-1.9	1.0	0.0	17	0.3-1.9	1.0	0.1	—	—	—	—
	Residuals	185	-0.22-0.27	0.01	0.00	17	-0.58-0.29	-0.02	0.04	—	—	—	—
Middle	Length	699	75-163	102.3	0.5	36	90-177	131.7	2.6	—	—	—	—
Clarence	Weight	200	4.9-41.4	11.1	0.4	28	14.4-56.4	23.9	1.9	—	—	—	—
Strait	Condition	200	0.6-2.3	0.9	0.0	28	0.9-1.2	1.0	0.0	—	—	—	—
	Residuals	200	-0.23-0.36	-0.02	0.00	28	-0.05-0.07	0.00	0.01	—	—	—	—
Lower	Length	1,108	68-180	102.4	0.5	57	101-177	131.3	2.1	—	—	—	—
Clarence	Weight	201	3.9-32.3	11.2	0.3	33	9.5-59.9	25.0	1.9	—	—	—	—
Strait	Condition	201	0.6-1.3	1.0	0.0	33	0.9-1.1	1.0	0.0	—	—	—	—
	Residuals	201	-0.23-0.14	0.00	0.00	33	-0.05-0.05	0.00	0.00	—	—	—	—
Total	Length	2,281	68-188	109.5	0.4	136	66-195	130.7	1.9	—	—	—	—
	Weight	599	3.9-69.7	16.6	0.4	80	2.5-72.3	26.5	1.7	—	—	—	—
	Condition	599	0.6-2.3	1.0	0.0	80	0.3-1.9	1.0	0.0	—	—	—	—
	Residuals	599	-0.24-0.37	-0.00	0.00	80	-0.58-0.29	-0.00	0.01	—	—	—	—

Table 14.— Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and length-weight residuals of juvenile coho salmon captured in the strait marine habitats of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. A subset of samples was preserved for diet analysis, only their fresh lengths are reported in this table.

		June				July				August[4]			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper Chatham Strait	Length	119	108-268	167.7	2.3	72	121-245	194.3	2.7	72	185-291	230	2.5
	Weight	119	12.9-218.3	57.5	2.6	72	20.0-185.3	90.2	3.7	72	180.0-276.0	222.9	2.4
	Condition	119	1.0-1.4	1.2	0.0	72	1.0-1.4	1.2	0.0	72	1.1-2.8	1.9	0.0
	Residuals	119	-0.08-0.07	-0.00	0.00	72	-0.08-0.07	-0.00	0.00	72	-0.05-0.39	0.18	0.01
Icy Strait	Length	232	104-221	163.9	1.6	105	136-249	197.5	2.2	23	186-267	228.8	4.4
	Weight	232	11.2-138.5	52.8	1.5	105	27.4-176.5	93.1	3.1	23	178.0-259.0	220.8	4.2
	Condition	232	0.9-1.4	1.1	0.0	105	1.0-1.4	1.2	0.0	23	1.3-2.8	1.9	0.1
	Residuals	232	-0.11-0.10	-0.01	0.00	105	-0.06-0.06	-0.01	0.00	23	0.04-0.37	0.19	0.02
Middle Clarence Strait	Length	49	135-227	171.2	2.7	36	148-264	207.2	4.3	—	—	—	—
	Weight	49	29.8-138.8	61.9	3.1	36	35.6-237.6	115.6	7.5	—	—	—	—
	Condition	49	1.0-1.6	1.2	0.0	36	1.0-1.5	1.2	0.0	—	—	—	—
	Residuals	49	-0.06-0.14	0.01	0.01	36	-0.07-0.08	0.01	0.01	—	—	—	—
Lower Clarence Strait	Length	77	109-261	178.9	2.9	52	174-255	206.7	2.7	—	—	—	—
	Weight	77	16.7-217.4	76.6	3.9	51	62.3-186.6	111.1	4.5	—	—	—	—
	Condition	77	1.1-1.6	1.3	0.0	51	1.0-1.5	1.2	0.0	—	—	—	—
	Residuals	77	-0.05-0.14	0.04	0.00	51	-0.09-0.09	0.01	0.01	—	—	—	—
Total	Length	477	104-268	168.0	1.1	265	121-264	199.8	1.4	95	185-291	229.7	2.2
	Weight	477	11.2-218.3	58.7	1.3	264	20.0-237.6	98.9	2.3	95	178-276	222.4	2.1
	Condition	477	0.9-1.6	1.2	0.0	264	1.0-1.5	1.2	0.0	95	1.1-2.8	1.9	0.0
	Residuals	477	-0.11-0.14	0.00	0.00	264	-0.09-0.09	0.00	0.00	95	-0.05-0.39	0.19	0.01

[4]August rope trawl sampling was conducted aboard the ADF&G vessel *Medeia*.

Table 15.— Length (mm, fork), weight (g), Fulton's condition [(g/mm^3)·(10^5)], and length-weight residuals of juvenile Chinook salmon captured in the strait marine habitats of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006.

Locality	Factor	June *n*	June range	June mean	June se	July *n*	July range	July mean	July se	August *n*	August range	August mean	August se
Upper	Length	—	—	—	—	—	—	—	—	—	—	—	—
Chatham	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residuals	—	—	—	—	—	—	—	—	—	—	—	—
Icy	Length	—	—	—	—	5	206-230	218.0	4.1	—	—	—	—
Strait	Weight	—	—	—	—	5	137.8-217.0	195.0	14.5	—	—	—	—
	Condition	—	—	—	—	5	1.1-2.3	1.9	0.2	—	—	—	—
	Residuals	—	—	—	—	5	-0.07-0.25	0.16	0.06	—	—	—	—
Middle	Length	3	207-291	236.3	27.4	1	305	305.0	0.0	—	—	—	—
Clarence	Weight	3	200.0-287.0	232.0	27.6	1	294.0	294.0	0.0	—	—	—	—
Strait	Condition	3	1.2-2.3	1.9	0.4	1	1.0	1.0	0.0	—	—	—	—
	Residuals	3	-0.09-0.25	0.13	0.11	1	-0.14	-0.14	0.00	—	—	—	—
Lower	Length	3	121-194	166.7	23.0	6	183-255	213.5	11.8	—	—	—	—
Clarence	Weight	3	122.0-190.0	163.3	21.0	6	175.0-244.0	205.2	11.4	—	—	—	—
Strait	Condition	3	2.6-6.9	4.1	1.4	6	1.5-2.9	2.2	0.2	—	—	—	—
	Residuals	3	0.32-0.80	0.49	0.16	6	0.03-0.36	0.22	0.05	—	—	—	—
Total	Length	6	121-291	201.5	22.3	12	183-305	223.0	9.5	—	—	—	—
	Weight	6	122.0-287.0	197.7	21.8	12	137.8-294.0	208.3	11.1	—	—	—	—
	Condition	6	1.2-6.9	3.0	0.8	12	1.0-2.9	2.0	0.2	—	—	—	—
	Residuals	6	-0.09-0.80	0.31	0.12	12	-0.14-0.36	0.16	0.04	—	—	—	—

Table 16.—Release and recovery information, decoded from coded-wire tags recovered from coho and Chinook salmon lacking an adipose fin. Fish were captured in marine waters of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. Station code acronyms and coordinates are shown in Table 1.

		Release information						Recovery information							
Species	Coded-wire tag code	Brood year	Agency[1]	Locality	Date	FL (mm)	Wt. (g)	Locality	Station code	2006 date	FL (mm)	Wt. (g)	Age	Days[2] since release	Distance traveled (km)
							June								
Coho	04:10/12	2004	ADFG	Taku River, AK	4/14/2006	—	—	U. Chatham	UCC	6/29	158	42.9	1.0	77	100
Coho	04:11/88	2004	NSRAA	Kasnyku Bay, AK	5/24/2006	—	17.8	U. Chatham	UCC	6/29	186	72.7	1.0	36	110
Coho	04:11/91	2004	NSRAA	Kasnyku Bay, AK	5/24/2006	—	17.8	U. Chatham	UCD	7/02	187	73.1	1.0	39	110
Coho	04:12/16	2004	ADFG	Berners River, AK	5/23/2006	100	—	Icy Strait	ISA	6/30	152	44.6	1.0	38	95
Coho	04:12/16	2004	ADFG	Berners River, AK	5/23/2006	100	—	Icy Strait	ISD	7/01	163	51.2	1.0	39	90
Coho	04:12/80	2004	AKI	Port Armstrong, AK	6/07/2006	—	19.3	Icy Strait	ISD	7/01	179	63.7	1.0	24	235
Coho	04:12/80	2004	AKI	Port Armstrong, AK	6/07/2006	—	19.3	Icy Strait	ISD	7/01	163	45.5	1.0	24	235
Coho	No tag	—	—	—	—	—	—	L. Clarence	LCD	6/23	203	108.3	—	—	—
Coho	No tag	—	—	—	—	—	—	L. Clarence	LCC	6/24	241	151.1	—	—	—
Chinook	04:11/16	2003	DIPAC	Fish Creek, AK	6/07/2005	—	28.0	Icy Strait	ISB	7/01	380	750.0	1.1	389	80
Chinook	No tag	—	—	—	—	—	—	M. Clarence	MCA	6/21	207	114.6	—	—	—
Chinook	No tag	—	—	—	—	—	—	L. Clarence	LCB	6/22	194	101.1	—	—	—
Chinook	No tag	—	—	—	—	—	—	L. Clarence	LCC	6/23	185	185.0	—	—	—
Chinook	No tag	—	—	—	—	—	—	L. Clarence	LCA	6/24	585	2600.0	—	—	—
							July								
Coho	04:12/16	2004	ADFG	Berners River, AK	5/23/2006	100	—	Icy Strait	ISB	7/29	213	118.4	1.0	67	90
Coho	04:12/16	2004	ADFG	Berners River, AK	5/23/2006	100	—	Icy Strait	ISC	7/29	209	111.5	1.0	67	90
Coho	04:12/80	2004	AKI	Port Armstrong, AK	6/07/2006	—	19.3	Icy Strait	ISA	7/29	211	113.7	1.0	52	240
Coho	04:13/13	2004	NSRAA	Mist Cove. AK	5/31/2006	—	19.0	Icy Strait	ISA	7/28	249	166.2	1.0	58	215
Coho	No tag	—	—	—	—	—	—	L. Clarence	LCA	7/22	213	130.3	—	—	—
Coho	No tag	—	—	—	—	—	—	L. Clarence	LCC	7/22	216	127.4	—	—	—
Coho	No tag	—	—	—	—	—	—	L. Clarence	LCD	7/23	254	181.0	—	—	—

Table 16.—cont..

		Release information						Recovery information							
Species	Coded-wire tag code	Brood year	Agency[1]	Locality	Date	FL (mm)	Wt. (g)	Locality	Station code	2006 date	FL (mm)	Wt. (g)	Age	Days[2] since release	Distance traveled (km)
Coho	No tag	—	—	—	—	—	—	M. Clarence	MCC	7/21	238	168.1	—	—	—
Coho	No tag	—	—	—	—	—	—	M. Clarence	MCD	7/21	221	134.0	—	—	—
Coho	No tag	—	—	—	—	—	—	M. Clarence	MCD	7/21	249	191.5	—	—	—
Coho	No tag	—	—	—	—	—	—	L. Clarence	LCC	7/24	244	167.2	—	—	—
Coho	No tag	—	—	—	—	—	—	M. Clarence	MCB	7/25	249	194.5	—	—	—
Coho	No tag	—	—	—	—	—	—	U. Chatham	UCC	7/30	213	112.7	—	—	—
Chinook	63:30/94	2004	WDFW	Columbia R., WA	5/01/2006	—	58.9	L. Clarence	LCD	7/23	255	222.1	1.0	83	1,200
Chinook	63:31/68	2004	WDFW	Similkameen R., WA	4/17/2006	—	29.8	L. Clarence	LCA	7/24	241	183.6	1.0	98	1,100
Chinook	No tag	—	—	—	—	—	—	M. Clarence	MCD	7/21	305	329.0	—	—	—
							August								
Coho	04:08/16	2004	ADFG	Chilkat River, AK	5/30/2006	—	—	U. Chatham	UCC	8/19	207	100.1	1.0	81	120
Coho	04:12/21	2004	DIPAC	Gastineau Chan., AK	6/15/2006	—	17.1	Icy Strait	ISC	8/20	212	137.4	1.0	66	120

[1] ADFG = Alaska Department of Fish and Game; AKI = Armstrong Keta Inc.; DIPAC = Douglas Island Pink and Chum; NSRAA = Northern Southeast Regional Aquaculture Association; WDFW = Washington Department of Fish and Wildlife.
[2] Days since release may potentially include freshwater residence periods.

Table 17.—Stock-specific information on juvenile chum salmon released from regional enhancement facilities and captured at transects in marine strait habitats of the northern and southern regions of southeastern Alaska by rope trawl, June-August 2006. Length (mm, fork), weight (g), Fulton's condition $[(g/mm^3) \cdot (10^5)]$, and length-weight residuals are reported for each stock group by range, mean, standard error (se) of the mean along with sample size (*n*). See Table 16 for agency acronyms. Abbreviations: L/L = Late Large release.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
						Northern region stocks							
						DIPAC							
Upper	Length	34	85-109	99.7	0.9	7	96-157	130.0	8.4	—	—	—	—
Chatham	Weight	34	5.9-11.6	8.4	0.2	7	8.3-31.2	21.5	3.5	—	—	—	—
Strait	Condition	34	0.5-1.3	0.9	0.0	7	0.8-1.0	0.9	0.0	—	—	—	—
	Residual	34	-0.26-0.12	-0.05	0.02	7	-0.07-0.01	-0.01	0.01	—	—	—	—
Icy	Length	191	81-133	103.9	0.7	79	109-175	137.9	1.6	—	—	—	—
Strait	Weight	191	4.7-19.2	9.7	0.2	79	11.4-43.8	24.4	0.8	—	—	—	—
	Condition	191	0.3-2	0.9	0.0	79	0.4-2.2	0.9	0.0	—	—	—	—
	Residual	191	-0.45-0.31	-0.05	0.01	79	-0.41-0.36	-0.02	0.01	—	—	—	—
Middle	Length	—	—	—	—	—	—	—	—	—	—	—	—
Clarence	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Lower	Length	1	101	101.0	0.0	—	—	—	—	—	—	—	—
Clarence	Weight	1	10.7	10.7	0.0	—	—	—	—	—	—	—	—
Strait	Condition	1	1.0	1.0	0.0	—	—	—	—	—	—	—	—
	Residual	1	0.04	0.04	0.0	—	—	—	—	—	—	—	—
Total	Length	226	81-133	103.3	0.6	86	96-175	137.2	1.6	—	—	—	—
	Weight	226	4.7-19.2	9.5	0.2	86	8.3-43.8	24.2	0.8	—	—	—	—

Table 17.—cont..

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
	Condition	226	0.3-2.0	0.9	0.0	86	0.4-2.2	0.9	0.0	—	—	—	—
	Residual	226	-0.45-0.31	-0.05	0.01	86	-0.41-0.36	-0.02	0.01	—	—	—	—
NSRAA Kasnyku Bay													
Upper Chatham Strait	Length	33	102-133	118.0	1.2	5	142-167	152.4	4.4	—	—	—	—
	Weight	33	10-24.5	15.7	0.6	5	29.1-42.5	34.1	2.7	—	—	—	—
	Condition	33	0.8-1.1	0.9	0.0	5	0.9-1.1	1.0	0.0	—	—	—	—
	Residual	33	-0.07-0.05	-0.00	0.01	5	-0.02-0.05	0.01	0.01	—	—	—	—
Icy Strait	Length	67	95-136	118.0	1.1	75	101-185	143.6	2.0	—	—	—	—
	Weight	67	7.9-24.4	16.3	0.4	75	9-56.5	30.3	1.2	—	—	—	—
	Condition	67	0.4-1.7	1.0	0.0	75	0.5-2.5	1.0	0.0	—	—	—	—
	Residual	67	-0.35-0.25	0.02	0.01	75	-0.26-0.43	0.02	0.01	—	—	—	—
Middle Clarence Strait	Length	—	—	—	—	1	113	113	0.0	—	—	—	—
	Weight	—	—	—	—	1	28.7	28.7	0.0	—	—	—	—
	Condition	—	—	—	—	1	2.0	2.0	0.0	—	—	—	—
	Residual	—	—	—	—	1	0.32	0.32	0.00	—	—	—	—
Lower Clarence Strait	Length	1	91	91.0	0.0	—	—	—	—	—	—	—	—
	Weight	1	12.1	12.1	0.0	—	—	—	—	—	—	—	—
	Condition	1	1.6	1.6	0.0	—	—	—	—	—	—	—	—
	Residual	1	0.23	0.23	0.00	—	—	—	—	—	—	—	—
Total	Length	101	91-136	117.7	0.9	81	101-185	143.8	1.9	—	—	—	—
	Weight	101	7.9-24.5	16.1	0.3	81	9-56.5	30.6	1.1	—	—	—	—
	Condition	101	0.4-1.7	1.0	0.0	81	0.5-2.5	1.0	0.0	—	—	—	—
	Residual	101	-0.35-0.25	0.01	0.01	81	-0.26-0.43	0.02	0.01	—	—	—	—

Table 17.—cont..

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
						Kasnyku Bay L/L							
Upper	Length	3	110-125	116.3	4.5	1	165	165.0	0.0	—	—	—	—
Chatham	Weight	3	14-16.9	15.5	0.8	1	42.6	42.6	0.0	—	—	—	—
Strait	Condition	3	0.9-1.2	1.0	0.1	1	0.9	0.9	0.0	—	—	—	—
	Residual	3	-0.04-0.09	0.02	0.04	1	-0.00	-0.00	0.00	—	—	—	—
Icy	Length	6	94-125	106.8	5.3	13	111-164	143.8	4.5	—	—	—	—
Strait	Weight	6	12.7-18.3	15.0	1.0	13	12.3-42.4	30.4	2.7	—	—	—	—
	Condition	6	0.9-1.6	1.3	0.1	13	0.8-1.4	1.0	0.0	—	—	—	—
	Residual	6	-0.02-0.22	0.12	0.04	13	-0.05-0.18	0.01	0.02	—	—	—	—
Middle	Length	—	—	—	—	—	—	—	—	—	—	—	—
Clarence	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Lower	Length	—	—	—	—	—	—	—	—	—	—	—	—
Clarence	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	9	94-125	110.0	4.0	14	111-165	145.3	4.4	—	—	—	—
	Weight	9	12.7-18.3	15.2	0.7	14	12.3-42.6	31.3	2.6	—	—	—	—
	Condition	9	0.9-1.6	1.2	0.1	14	0.8-1.4	1.0	0.0	—	—	—	—
	Residual	9	-0.04-0.22	0.08	0.03	14	-0.05-0.18	0.01	0.02	—	—	—	—
						Takatz							
Upper	Length	5	109-117	113.2	1.5	6	111-133	123.7	4.3	—	—	—	—
Chatham	Weight	5	12.1-14.8	13.8	0.5	6	12.2-25.7	19.8	2.4	—	—	—	—

Table 17.—cont..

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
Strait	Condition	5	0.9-1	1.0	0.0	6	0.9-1.4	1.0	0.1	—	—	—	—
	Residual	5	-0.03-0.03	0.00	0.01	6	-0.03-0.16	0.03	0.03	—	—	—	—
Icy	Length	9	99-125	112.7	2.8	112	99-168	137.9	1.5	—	—	—	—
Strait	Weight	9	12-16.7	14.1	0.4	112	6.8-46	24.7	0.9	—	—	—	—
	Condition	9	0.6-1.4	1.0	0.1	112	0.2-3.2	0.9	0.0	—	—	—	—
	Residual	9	-0.19-0.18	0.02	0.04	112	-0.71-0.53	-0.03	0.01	—	—	—	—
Middle	Length	10	117-129	124.5	1.3	1	147	147.0	0.0	—	—	—	—
Clarence	Weight	10	10.6-21.8	14.2	1.2	1	31.7	31.7	0.0	—	—	—	—
Strait	Condition	10	0.5-1.2	0.7	0.1	1	1.0	1.0	0.0	—	—	—	—
	Residual	10	-0.24-0.09	-0.12	0.04	1	0.02	0.02	0.00	—	—	—	—
Lower	Length	3	102-111	106.7	2.6	3	136-173	153.3	10.7	—	—	—	—
Clarence	Weight	3	12.8-16.6	14.4	1.1	3	11.1-48	30.5	10.7	—	—	—	—
Strait	Condition	3	1.1-1.2	1.2	0.0	3	0.4-0.9	0.8	0.2	—	—	—	—
	Residual	3	0.08-0.11	0.10	0.01	3	-0.33--0.00	-0.12	0.11	—	—	—	—
Total	Length	27	99-129	116.5	1.7	122	99-173	137.7	1.5	—	—	—	—
	Weight	27	10.6-21.8	14.1	0.5	122	6.8-48	24.6	0.8	—	—	—	—
	Condition	27	0.5-1.4	0.9	0.0	122	0.2-3.2	0.9	0.0	—	—	—	—
	Residual	27	-0.24-0.18	-0.03	0.02	122	-0.71-0.53	-0.03	0.01	—	—	—	—
						Deep Inlet							
Middle	Length	1	111	111.0	0.0	—	—	—	—	—	—	—	—
Clarence	Weight	1	15.1	15.1	0.0	—	—	—	—	—	—	—	—
Strait	Condition	1	1.1	1.1	0.0	—	—	—	—	—	—	—	—
(total)	Residual	1	0.07	0.07	0.0	—	—	—	—	—	—	—	—

Table 17.—cont..

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
						Deep Inlet L/L							
Lower	Length	—	—	—	—	1	151	151.0	0.0	—	—	—	—
Clarence	Weight	—	—	—	—	1	32.1	32.0	0.0	—	—	—	—
Strait	Condition	—	—	—	—	1	0.9	0.9	0.0	—	—	—	—
(total)	Residual	—	—	—	—	1	-0.01	-0.01	0.00	—	—	—	—
						17MI Chilkat							
Icy	Length	1	97	97.0	0.0	—	—	—	—	—	—	—	—
Strait	Weight	1	7.5	7.5	0.0	—	—	—	—	—	—	—	—
(total)	Condition	1	0.8	0.8	0.0	—	—	—	—	—	—	—	—
	Residual	1	-0.06	-0.06	0.00	—	—	—	—	—	—	—	—
						Southern region stocks							
						SSRAA Anita							
Upper	Length	—	—	—	—	—	—	—	—	—	—	—	—
Chatham	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Icy	Length	—	—	—	—	2	113-141	127.0	14.0	—	—	—	—
Strait	Weight	—	—	—	—	2	12.6-19.6	16.1	3.5	—	—	—	—
	Condition	—	—	—	—	2	0.7-0.9	0.8	0.1	—	—	—	—
	Residual	—	—	—	—	2	-0.13--0.04	-0.08	0.05	—	—	—	—
Middle	Length	—	—	—	—	1	117	117.0	0.0	—	—	—	—
Clarence	Weight	—	—	—	—	1	14.1	14.1	0.0	—	—	—	—

Table 17.—cont..

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
Strait	Condition	—	—	—	—	1	0.9	0.9	0.0	—	—	—	—
	Residual	—	—	—	—	1	-0.03	-0.03	0.00	—	—	—	—
Lower	Length	—	—	—	—	—	—	—	—	—	—	—	—
Clarence	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	—	—	—	—	3	113-141	123.7	8.7	—	—	—	—
	Weight	—	—	—	—	3	12.6-19.6	15.4	2.1	—	—	—	—
	Condition	—	—	—	—	3	0.7-0.9	0.8	0.1	—	—	—	—
	Residual	—	—	—	—	3	-0.13--0.03	-0.07	0.03	—	—	—	—
						Kendrick							
Upper	Length	—	—	—	—	1	137	137	0.0	—	—	—	—
Chatham	Weight	—	—	—	—	1	20.9	20.9	0.0	—	—	—	—
Strait	Condition	—	—	—	—	1	0.8	0.8	0.0	—	—	—	—
	Residual	—	—	—	—	1	-0.07	-0.07	0.0	—	—	—	—
Icy	Length	1	91	91	0.0	5	136-162	150.4	4.2	—	—	—	—
Strait	Weight	1	9.8	9.8	0.0	5	22.8-43.0	30.9	3.7	—	—	—	—
	Condition	1	1.3	1.3	0.0	5	0.7-1.0	0. 9	0.1	—	—	—	—
	Residual	1	0.14	0.14	0.00	5	-0.13-0.03	-0.03	0.03	—	—	—	—
Middle	Length	28	100-133	114.7	1.7	4	127-173	145.5	10.0	—	—	—	—
Clarence	Weight	28	11.0-27.7	16.2	0.7	4	20.1-56	32.7	8.0	—	—	—	—
Strait	Condition	28	0.6-1.5	1.1	0.0	4	0.9-1.1	1.0	0.0	—	—	—	—
	Residual	28	-0.19-0.20	0.05	0.01	4	-0.02-0.05	0.02	0.02	—	—	—	—
Lower	Length	14	91-123	106.8	2.8	8	111-155	137.8	5.3	—	—	—	—

Table 17.—cont..

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
Clarence	Weight	14	7.9-18.8	12.6	0.9	8	14.5-33.2	26.7	2.4	—	—	—	—
Strait	Condition	14	0.5-1.2	1.0	0.0	8	0.7-2.2	1.1	0.2	—	—	—	—
	Residual	14	-0.26-0.11	0.03	0.02	8	-0.13-0.37	0.02	0.05	—	—	—	—
Total	Length	43	91-133	111.6	1.6	18	111-173	142.9	3.5	—	—	—	—
	Weight	43	7.9-27.7	14.9	0.6	18	14.5-56.0	28.9	2.2	—	—	—	—
	Condition	43	0.5-1.5	1.1	0.0	18	0.7-2.2	1.0	0.1	—	—	—	—
	Residual	43	-0.26-0.20	0.04	0.01	18	-0.13-0.37	0.00	0.02	—	—	—	—
Neets (summer)													
Upper	Length	—	—	—	—	—	—	—	—	—	—	—	—
Chatham	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Middle	Length	110	82-152	116.9	1.2	28	105-197	146.4	3.6	—	—	—	—
Clarence	Weight	110	7.5-37.5	17.0	0.5	28	19.5-69.0	31.3	2.0	—	—	—	—
	Condition	110	0.4-2.5	1.1	0.0	28	0.3-2.0	1.0	0.1	—	—	—	—
	Residual	110	-0.33-0.42	0.04	0.01	28	-0.47-0.32	0.01	0.03	—	—	—	—
Lower	Length	10	103-131	116.5	2.6	20	105-177	138.0	3.8	—	—	—	—
Clarence	Weight	10	14.8-20.7	17.7	0.6	20	13.8-50.9	27.4	1.9	—	—	—	—
	Condition	10	0.8-1.6	1.1	0.1	20	0.9-1.9	1.0	0.1	—	—	—	—
	Residual	10	-0.06-0.23	0.07	0.03	20	-0.04-0.30	0.03	0.02	—	—	—	—

Table 17.—cont..

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
Total	Length	120	82-152	116.8	1.1	48	105-197	142.9	2.7	—	—	—	—
	Weight	120	7.5-37.5	17.1	0.5	48	13.8-69.0	29.7	1.4	—	—	—	—
	Condition	120	0.4-2.5	1.1	0.0	48	0.3-2.0	1.0	0.0	—	—	—	—
	Residual	120	-0.33-0.42	0.04	0.01	48	-0.47-0.32	0.02	0.02	—	—	—	—
						Neets (fall)							
Upper Chatham Strait	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Icy Strait	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Middle Clarence	Length	28	103-135	118.3	1.5	16	99-182	139.6	4.2	—	—	—	—
	Weight	28	8.2-21.6	15.1	0.7	16	16.1-32.5	26.1	1.0	—	—	—	—
	Condition	28	0.4-1.3	0.9	0.0	16	0.4-2.4	1.0	0.1	—	—	—	—
	Residual	28	-0.33-0.13	-0.03	0.02	16	-0.36-0.41	0.01	0.04	—	—	—	—
Lower Clarence	Length	7	85-130	116.4	5.5	5	129-153	141.8	4.3	—	—	—	—
	Weight	7	7-20.5	14.0	1.9	5	24.1-33.2	28.5	1.6	—	—	—	—
	Condition	7	0.4-1.2	0.9	0.1	5	0.8-1.1	1.0	0.1	—	—	—	—
	Residual	7	-0.35-0.11	-0.05	0.06	5	-0.06-0.07	0.02	0.02	—	—	—	—
Total	Length	35	85-135	118.0	1.6	21	99-182	140.1	3.3	—	—	—	—
	Weight	35	7.0-21.6	14.9	0.6	21	16.1-33.2	26.7	0.9	—	—	—	—
	Condition	35	0.4-1.3	0.9	0.0	21	0.4-2.4	1.0	0.1	—	—	—	—

Table 17.—cont..

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
	Residual	35	-0.35-0.13	-0.03	0.02	21	-0.36-0.41	0.01	0.03	—	—	—	—
						Nakat (summer)							
Upper	Length	—	—	—	—	—	—	—	—	—	—	—	—
Chatham	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Middle	Length	3	117-136	126.0	5.5	2	133-153	143.0	10.0	—	—	—	—
Clarence	Weight	3	13.1-29.9	21.3	4.9	2	31.6-42.7	37.1	5.6	—	—	—	—
	Condition	3	0.8-1.2	1.0	0.1	2	0.9-1.8	1.3	0.5	—	—	—	—
	Residual	3	-0.06-0.10	0.03	0.05	2	-0.03-0.28	0.12	0.16	—	—	—	—
Lower	Length	23	98-143	117.3	2.3	3	121-174	154.3	16.8	—	—	—	—
Clarence	Weight	23	11.9-29.6	18.9	1.0	3	30.3-50.3	41.6	5.9	—	—	—	—
	Condition	23	0.7-2.0	1.2	0.1	3	0.9-1.7	1.2	0.3	—	—	—	—
	Residual	23	-0.10-0.32	0.08	0.02	3	-0.01-0.26	0.08	0.09	—	—	—	—
Total	Length	26	98-143	118.3	2.2	5	121-174	149.8	10.1	—	—	—	—
	Weight	26	11.9-29.9	19.2	1.0	5	30.3-50.3	39.8	3.9	—	—	—	—
	Condition	26	0.7-2.0	1.2	0.1	5	0.9-1.8	1.3	0.2	—	—	—	—
	Residual	26	-0.10-0.32	0.08	0.02	5	-0.03-0.28	0.10	0.07	—	—	—	—

Table 17.—cont..

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
Northern and southern region unmarked stocks													
Upper	Length	9	93-128	110.1	4.0	5	106-163	131.6	9.5	—	—	—	—
Chatham	Weight	9	6.1-23.2	13.0	2.0	5	10.7-39.6	20.7	4.9	—	—	—	—
Strait	Condition	9	0.5-1.1	1.0	0.0	5	0.6-0.9	1.0	0.0	—	—	—	—
	Residual	9	-0.25-0.07	-0.03	0.04	5	-0.18--0.00	-0.05	0.03	—	—	—	—
Icy	Length	35	88-136	107.8	2.2	82	93-205	128.5	2.0	—	—	—	—
Strait	Weight	35	5.9-24.4	12.9	0.9	82	8.5-93.7	21.5	1.3	—	—	—	—
	Condition	35	0.6-2.1	1.0	0.0	82	0.3-2.1	1.0	0.0	—	—	—	—
	Residual	35	-0.21-0.34	0.01	0.02	82	-0.47-0.35	-0.00	0.01	—	—	—	—
Middle	Length	31	81-133	115.0	2.1	52	97-179	135.3	2.5	—	—	—	—
Clarence	Weight	31	5.6-25.7	13.3	1.0	52	7.6-73.9	24.3	2.0	—	—	—	—
	Condition	31	0.3-2.5	1.0	0.0	52	0.3-2.7	1.0	0.0	—	—	—	—
	Residual	31	-0.52-0.42	-0.07	0.04	52	-0.53-0.45	-0.03	0.03	—	—	—	—
Lower	Length	25	81-179	112.6	4.1	60	107-191	138.6	2.7	—	—	—	—
Clarence	Weight	25	6.3-70.5	16.5	2.5	60	10.3-66.8	25.2	1.7	—	—	—	—
	Condition	25	0.4-1.6	1.0	0.0	60	0.2-4.0	1.0	0.0	—	—	—	—
	Residual	25	-0.40-0.24	0.03	0.03	60	-0.58-0.62	-0.04	0.02	—	—	—	—
Total	Length	100	81-179	111.4	1.5	199	93-205	133.4	1.4	—	—	—	—
	Weight	100	5.6-70.5	13.9	0.8	199	7.6-93.7	23.3	0.9	—	—	—	—
	Condition	100	0.3-2.5	1.0	0.0	199	0.2-4.0	1.0	0.0	—	—	—	—
	Residual	100	-0.52-0.42	-0.01	0.02	199	-0.58-0.62	-0.02	0.01	—	—	—	—

Table 18.—Stock-specific information on juvenile sockeye salmon released from regional enhancement facilities and captured at transects in marine strait habitats of the northern and southern regions of southeastern Alaska by rope trawl, June-August 2006. Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3) \cdot (10^5)$], and length-weight residuals are reported for each stock group by range, mean, standard error (se) of the mean along with sample size (*n*). See Table 16 for agency acronyms. Abbreviations: L/L = Late Large release.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
						Speel Arm							
Upper	Length	1	112	112.0	0.0	—	—	—	—	—	—	—	—
Chatham	Weight	1	14.3	14.3	0.0	—	—	—	—	—	—	—	—
Strait	Condition	1	1.0	1.0	0.0	—	—	—	—	—	—	—	—
	Residual	1	0.01	0.01	0.00	—	—	—	—	—	—	—	—
Icy	Length	45	107-160	125.2	1.6	1	188	188.0	0.0	—	—	—	—
Strait	Weight	45	11.1-32.9	19.1	0.6	1	70.6	70.6	0.0	—	—	—	—
	Condition	45	0.3-1.2	1.0	0.0	1	1.1	1.1	0.0	—	—	—	—
	Residual	45	-0.53-0.09	-0.01	0.02	1	0.03	0.03	0.00	—	—	—	—
Middle	Length	—	—	—	—	—	—	—	—	—	—	—	—
Clarence	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Lower	Length	—	—	—	—	—	—	—	—	—	—	—	—
Clarence	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—

Table 18.—cont..

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
Total	Length	46	107-160	124.9	1.6	1	188	188.0	0.0	—	—	—	—
	Weight	46	11.1-32.9	19.0	0.6	1	70.6	70.6	0.0	—	—	—	—
	Condition	46	0.3-1.2	1.0	0.0	1	1.1	1.1	0.0	—	—	—	—
	Residual	46	-0.53-0.09	-0.01	0.02	1	0.03	0.03	0.00	—	—	—	—
Tatsamenie Lake													
Icy Strait (Total)	Length	1	146	146.0	0.0	—	—	—	—	—	—	—	—
	Weight	1	20.4	20.4	0.0	—	—	—	—	—	—	—	—
	Condition	1	0.7	0.7	0.0	—	—	—	—	—	—	—	—
	Residual	1	-0.18	-0.18	0.00	—	—	—	—	—	—	—	—
Sweetheart Lake													
Upper Chatham Strait	Length	1	107	107.0	0.0	—	—	—	—	—	—	—	—
	Weight	1	11.0	11.0	0.0	—	—	—	—	—	—	—	—
	Condition	1	0.9	0.9	0.0	—	—	—	—	—	—	—	—
	Residual	1	-0.04	-0.04	0.00	—	—	—	—	—	—	—	—
Icy Strait	Length	5	117-136	125.8	3.4	—	—	—	—	—	—	—	—
	Weight	5	16.4-25.4	21.2	1.5	—	—	—	—	—	—	—	—
	Condition	5	1.0-1.1	1.1	0.0	—	—	—	—	—	—	—	—
	Residual	5	0.01-0.05	0.03	0.01	—	—	—	—	—	—	—	—
Middle Clarence Strait	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—

Table 18.—cont..

Locality	Factor	June				July				August			
		n	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Lower	Length	—	—	—	—	—	—	—	—	—	—	—	—
Clarence	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	Residual	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	6	107-136	122.7	4.2	—	—	—	—	—	—	—	—
	Weight	6	11.0-25.4	19.5	2.1	—	—	—	—	—	—	—	—
	Condition	6	0.9-1.1	1.0	0.0	—	—	—	—	—	—	—	—
	Residual	6	-0.04-0.05	0.02	0.01	—	—	—	—	—	—	—	—
						Unmarked							
Upper	Length	18	89-167	139	5.9	2	97-113	105.0	8.0	—	—	—	—
Chatham	Weight	18	5.9-52.5	28.7	3.7	2	8.8-14.6	11.7	2.9	—	—	—	—
Strait	Condition	18	0.5-1.2	0.9	0.0	2	1.0-1.0	1.0	0.0	—	—	—	—
	Residual	18	-0.27-0.07	-0.03	0.02	2	-0.01-0.01	0.00	0.00	—	—	—	—
Icy	Length	187	91-188	140.6	1.2	40	66-195	128.7	5.0	—	—	—	—
Strait	Weight	187	7.1-69.7	28.8	0.7	40	2.5-74.7	24.5	3.1	—	—	—	—
	Condition	187	0.3-3.7	1.0	0.0	40	0.2-8.4	1.2	0.2	—	—	—	—
	Residual	187	-0.45-0.58	0.00	0.01	40	-0.64-0.94	-0.02	0.00	—	—	—	—
Middle	Length	200	80-157	103.6	1.0	36	90-177	131.7	2.6	—	—	—	—
Clarence	Weight	200	4.9-41.4	11.1	0.4	36	6.1-56.4	23.1	1.5	—	—	—	—
Strait	Condition	200	0.6-2.3	0.9	0.0	36	0.3-2.8	1.0	0.1	—	—	—	—
	Residual	200	-0.23-0.36	-0.02	0.00	36	-0.54-0.45	-0.01	0.00	—	—	—	—

Table 18.—cont..

Locality	Factor	June *n*	June range	June mean	June se	July *n*	July range	July mean	July se	August *n*	August range	August mean	August se
Lower	Length	198	82-144	102.5	0.9	57	101-177	131.3	2.1	—	—	—	—
Clarence	Weight	198	3.9-32.3	11.3	0.3	57	8.4-59.9	22.4	1.3	—	—	—	—
Strait	Condition	198	0.6-1.3	1.0	0.0	57	0.2-1.7	1.0	0.0	—	—	—	—
	Residual	198	-0.23-0.36	-0.01	0.00	57	-0.64-0.25	-0.03	0.00	—	—	—	—
Total	Length	603	80-188	115.8	0.9	135	66-195	130.2	1.9	—	—	—	—
	Weight	603	3.9-69.7	17.2	0.5	135	2.5-74.7	23.1	1.2	—	—	—	—
	Condition	603	0.3-3.7	1.0	0.0	135	0.2-8.4	1.0	0.1	—	—	—	—
	Residual	603	-0.45-0.58	-0.01	0.00	135	-0.64-0.94	-0.02	0.00	—	—	—	—

Table 19.—Number of potential predators of juvenile salmon examined at sea, captured by rope trawl in the marine waters of the northern and southern regions of southeastern Alaska, June–August 2006.

Predator species	Life history stage	Number examined	Number empty	Percent feeding	Number with salmon	Percent feeders with salmon
		Northern region				
Pink salmon	Adult	8	0	100.0	0	0.0
Chum salmon	Adult	2	1	50.0	0	0.0
Coho salmon	Adult	8	1	87.5	1	14.3
Chinook salmon	Immature	28	0	100.0	0	0.0
Dusky rockfish	Adult	1	0	100.0	0	0.0
Pacific herring	Adult	1	0	100.0	0	0.0
Pacific hake	Immature	1	1	0.0	0	0.0
Starry flounder	Adult	1	0	100.0	0	0.0
Walleye pollock	Immature	1	1	0.0	0	0.0
		Southern region				
Pink salmon	Adult	3	2	33.3	0	0.0
Chum salmon	1-ocean	1	0	100.0	0	0.0
Chum salmon	Adult	3	2	33.3	0	0.0
Chinook salmon	Immature	7	2	71.4	0	0.0
Sockeye salmon	Adult	1	0	100.0	0	0.0
Spiny dogfish	Adult	21	13	38.1	0	0.0
Starry flounder	Adult	4	0	100.0	0	0.0
Walleye pollock	Immature	4	0	100.0	0	0.0
Total		95	23	24.2	1	1.4

Table 20.—Subsamples of unmarked and hatchery juvenile chum salmon stocks and unmarked juvenile pink salmon collected in the northern and southern regions of the marine waters of southeastern Alaska in June and July, 2006, and available for process studies of diet (D) and energy content (E). Stocks are grouped by their region of origin (see text). Only hauls with chum salmon catches that were analyzed for otolith thermal marks are included; samples will be selected for processing to isolate stock differences and minimize the potential for temporal and spatial effects on diet and condition. Abbreviations: IS, Icy Strait; UC, Upper Chatham Strait; LC, Lower Clarence Strait; MC, Middle Clarence Strait.

Locality	Unmarked-D	Unmarked-E	DIPAC-D	DIPAC-E	Chilkat-D	Chilkat-E	Takatz-D	Takatz-E	Kasnyku-D	Kasnyku-E	Kasnyku LL-D	Kasnyku LL-E	Deep Inlet LL-E	Deep Inlet-D	Anita-D	Anita-E	Kendrick-D	Kendrick-E	Nakat (summer)-D	Nakat (summer)-E	Neets (fall)-D	Neets (fall)-E	Neets (summer)-D	Neets (summer)-E
Northern region																								
Chum June																								
IS	15	20	102	89	0	1	6	3	38	29	4	2	0	0	0	0	1	0	0	0	0	0	0	0
UC	4	5	22	12	0	0	0	5	0	33	0	3	0	0	0	0	0	0	0	0	0	0	0	0
Chum July																								
IS	27	55	33	46	0	0	35	77	25	50	2	11	0	0	1	1	2	3	0	0	0	0	0	0
UC	0	5	0	7	0	0	0	6	0	5	0	1	0	0	0	0	0	1	0	0	0	0	0	0
Pink June																								
IS	97	338	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
UC	13	23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pink July																								
IS	60	322	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
UC	0	38	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Table 20.—cont.

Locality	Unmarked-D	Unmarked-E	DIPAC-D	DIPAC-E	Chilkat-D	Chilkat-E	Takatz-D	Takatz-E	Kasnyku-D	Kasnyku-E	Kasnyku LL-D	Kasnyku LL-E	Deep Inlet LL-E	Deep Inlet-D	Anita-D	Anita-E	Kendrick-D	Kendrick-E	Nakat (summer)-D	Nakat (summer)-E	Neets (fall)-D	Neets (fall)-E	Neets (summer)-D	Neets (summer)-E
Southern region																								
Chum June																								
LC	6	19	0	1	0	0	0	3	1	0	0	0	0	0	0	0	4	10	12	11	5	2	8	2
MC	19	12	0	0	0	0	8	2	0	0	0	0	0	1	0	0	11	17	1	2	16	12	46	64
Chum July																								
LC	29	31	0	0	0	0	1	2	0	0	0	0	1	0	0	0	3	5	2	1	2	3	5	15
MC	24	28	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	4	1	1	5	11	11	17
Pink June																								
LC	70	400	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MC	105	352	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pink July																								
LC	54	347	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
MC	43	219	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Appendix 1.—Catch and life history stage of salmonids captured in marine waters of the northern and southern regions of southeastern Alaska, June–August 2006.

			Juvenile salmon					Immature and adult salmon				
Date	Haul #	Station	Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
23 May	10002	IPA	0	0	0	0	0	0	0	0	0	4
23 May	10003	IPB	0	0	0	0	0	0	0	0	0	0
24 May	10006	ISA	0	0	0	0	0	0	0	0	0	0
24 May	10007	ISB	0	0	0	0	0	0	0	0	0	0
24 May	10008	ISD	0	0	0	0	0	0	0	0	0	0
24 May	10009	ISC	0	0	0	0	0	0	0	0	0	0
21 June	10010	MCA	168	22	165	6	1	0	0	0	0	0
21 June	10011	MCB	40	5	75	7	0	0	0	0	0	0
21 June	10012	MCC	175	11	126	8	0	0	0	0	0	0
21 June	10013	MCD	91	4	96	5	1	0	0	0	0	0
22 June	10014	LCD	76	6	234	4	0	0	0	0	0	1
22 June	10015	LCC	151	6	136	4	0	0	1	0	0	0
22 June	10016	LCB	67	5	91	10	2	0	0	0	0	0
22 June	10017	LCA	8	1	25	1	0	1	0	0	0	1
23 June	10018	LCD	10	0	54	10	0	0	0	0	0	0
23 June	10019	LCC	121	5	103	9	1	0	0	0	0	0
23 June	10020	LCB	131	6	85	6	0	0	0	0	0	0
23 June	10021	LCA	331	8	37	2	0	0	0	0	0	0
24 June	10022	LCD	7	2	36	4	0	0	0	0	0	0
24 June	10023	LCC	118	5	204	9	0	0	1	0	0	1
24 June	10024	LCB	211	2	107	2	0	0	0	0	0	0
24 June	10025	LCA	672	41	41	16	0	0	0	0	0	1
25 June	10026	MCA	501	75	81	14	0	0	0	0	0	0
25 June	10027	MCB	71	67	34	7	1	0	0	0	0	0
25 June	10028	MCC	20	12	40	1	0	0	0	0	0	0
25 June	10029	MCD	95	21	82	1	0	0	0	0	0	1
29 June	10031	UCD	1	2	2	6	0	0	0	0	0	2

Appendix 1.—cont.

Date	Haul #	Station	Juvenile salmon					Immature and adult salmon				
			Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
29 June	10032	UCC	0	0	0	12	0	0	0	0	0	1
29 June	10033	UCB	5	8	2	4	0	0	0	0	0	0
29 June	10034	UCA	14	32	1	22	0	1	0	0	0	0
29 June	10035	UCA	0	0	0	5	0	0	0	0	0	2
29 June	10036	UCB	2	5	3	13	0	0	0	0	0	0
29 June	10037	UCC	1	1	5	16	0	1	0	0	0	0
30 June	10038	ISA	465	41	517	52	0	0	0	0	0	0
30 June	10039	ISB	73	7	14	2	0	0	0	0	1	0
30 June	10040	ISC	37	6	46	31	0	0	0	0	0	0
30 June	10041	ISD	17	10	33	29	0	0	0	0	0	0
1 July	10042	ISA	1	3	1	4	0	0	1	0	0	1
1 July	10043	ISB	60	50	16	10	0	0	0	0	0	1
1 July	10044	ISC	72	58	13	2	0	0	0	0	0	0
1 July	10045	ISD	46	35	45	73	0	3	0	0	0	0
1 July	10046	ISB	11	5	8	3	0	0	0	0	0	0
1 July	10047	ISC	23	37	16	6	0	0	0	0	0	0
1 July	10048	ISD	10	28	13	11	0	0	0	0	0	0
2 July	10049	ISA	46	12	10	10	0	0	1	0	0	0
2 July	10050	UCD	13	37	7	41	0	0	0	0	0	0
22 July	10051	LCA	1	5	0	8	0	0	0	1	0	0
22 July	10052	LCB	16	6	7	3	0	0	0	0	0	0
22 July	10053	LCC	113	13	9	2	2	0	0	0	0	0
22 July	10054	LCD	6	4	0	4	0	0	0	0	0	0
23 July	10055	LCA	12	0	0	2	1	0	0	0	0	0
23 July	10056	LCB	23	4	1	2	0	0	0	0	0	0
23 July	10057	LCC	55	10	12	3	0	0	0	0	0	0
23 July	10058	LCD	74	11	4	15	1	1	0	0	0	0
21 July	10059	MCA	7	10	2	1	0	0	0	0	0	1

Appendix 1.—cont.

			Juvenile salmon					Immature and adult salmon				
Date	Haul #	Station	Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
21 July	10060	MCB	52	20	11	2	0	0	0	0	0	0
21 July	10061	MCC	53	29	9	7	0	0	0	0	0	0
21 July	10062	MCD	19	11	3	8	1	0	1	0	0	0
21 July	10063	MCD	46	8	8	4	0	0	0	0	0	0
24 July	10064	LCD	10	1	1	1	0	0	0	0	0	1
24 July	10065	LCC	53	18	6	4	0	0	0	0	0	0
24 July	10066	LCB	29	13	15	2	0	0	0	0	0	0
24 July	10067	LCA	64	16	2	6	2	0	0	0	0	0
25 July	10068	MCC	5	12	0	2	0	0	0	0	0	0
25 July	10069	MCB	72	7	2	9	0	0	0	0	0	0
25 July	10070	MCA	8	10	1	3	0	1	1	0	0	0
27 July	10072	UCD	0	2	0	18	0	0	0	0	0	0
27 July	10073	UCC	6	2	0	13	0	0	0	0	0	3
30 July	10074	UCB	7	2	0	2	0	0	0	0	0	0
29 July	10075	UCA	3	4	0	5	0	0	0	0	1	0
28 July	10076	ISA	12	32	0	8	0	0	0	0	0	0
28 July	10077	ISB	69	50	12	0	0	0	0	0	2	2
28 July	10078	ISC	222	67	11	5	0	0	0	0	0	0
28 July	10079	ISD	2	3	0	0	0	1	0	0	0	2
29 July	10080	ISA	0	1	0	11	0	0	0	0	0	0
29 July	10081	ISB	0	1	3	7	0	1	0	0	0	1
29 July	10082	ISC	63	31	3	14	1	0	0	0	0	0
29 July	10083	ISD	153	86	3	9	1	0	0	0	1	0
30 July	10084	UCA	9	6	1	8	0	0	0	0	0	0
30 July	10085	UCB	7	5	0	4	0	0	0	0	0	1
30 July	10086	UCC	1	0	0	16	0	0	0	0	0	0
30 July	10087	UCD	5	4	1	6	0	0	0	0	0	0
31 July	10088	ISA	0	0	1	25	0	0	0	0	0	1

Appendix 1.—cont.

Date	Haul #	Station	Juvenile salmon					Immature and adult salmon				
			Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
31 July	10089	ISB	203	82	7	14	0	0	0	0	0	0
31 July	10090	ISC	9	10	0	3	1	0	0	0	0	2
31 July	10091	ISD	50	12	1	9	2	0	0	0	1	0
20 August	10092	ISA	0	0	0	7	0	1	0	0	0	2
20 August	10093	ISB	0	1	0	7	0	0	0	0	1	0
20 August	10094	ISC	0	0	0	11	0	0	0	0	0	0
20 August	10095	ISD	1	0	0	1	0	0	0	0	0	0
19 August	10096	UCA	0	0	0	11	0	0	0	0	0	0
19 August	10097	UCB	0	0	0	11	0	0	0	0	0	0
19 August	10098	UCC	0	0	0	32	0	0	0	0	1	0
19 August	10099	UCD	0	0	0	18	0	0	0	0	0	3

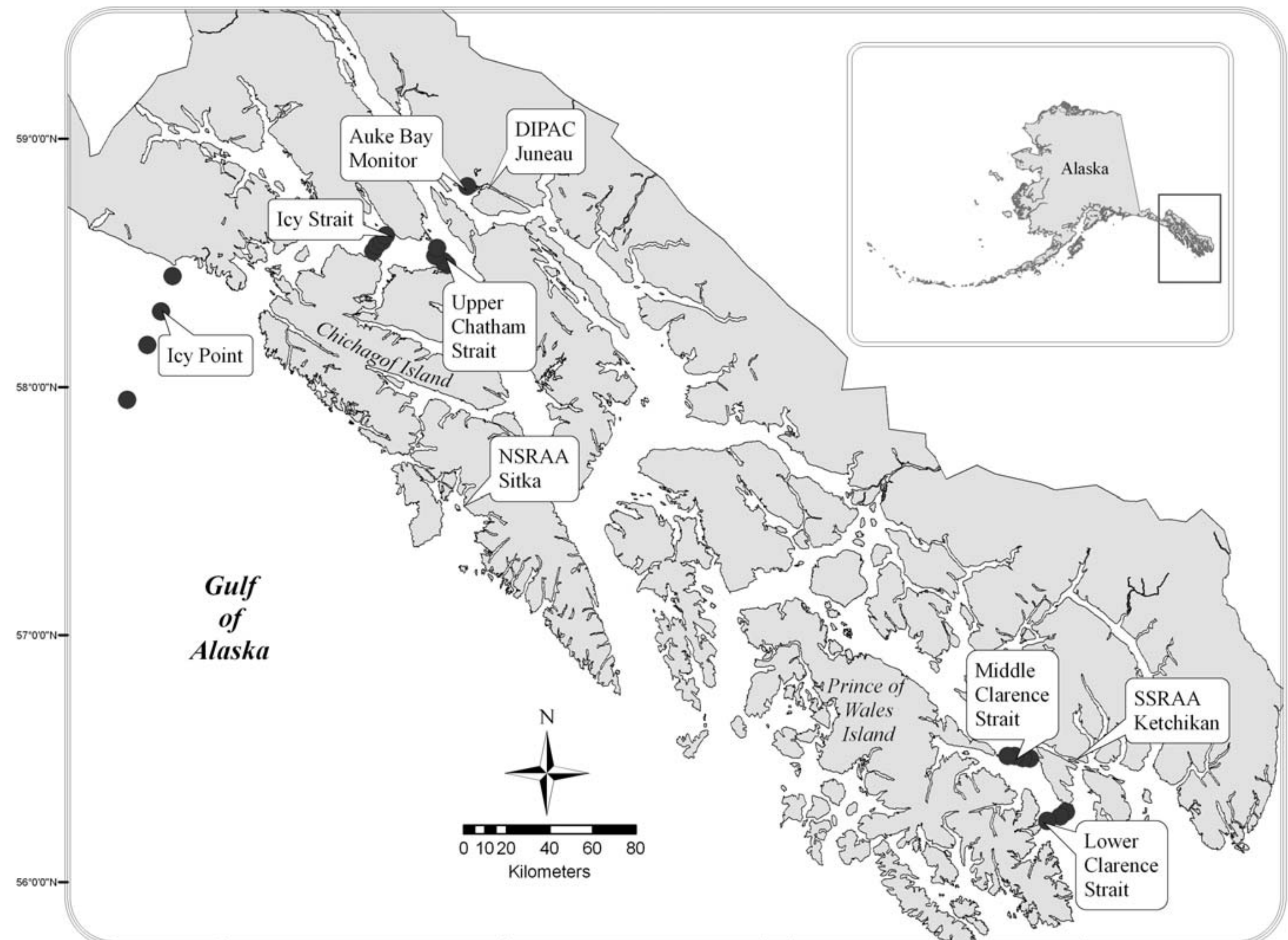

Figure 1.—Stations sampled in marine waters of the northern and southern regions of southeastern Alaska, May–August 2006. Transect and station coordinates are shown in Table 1.

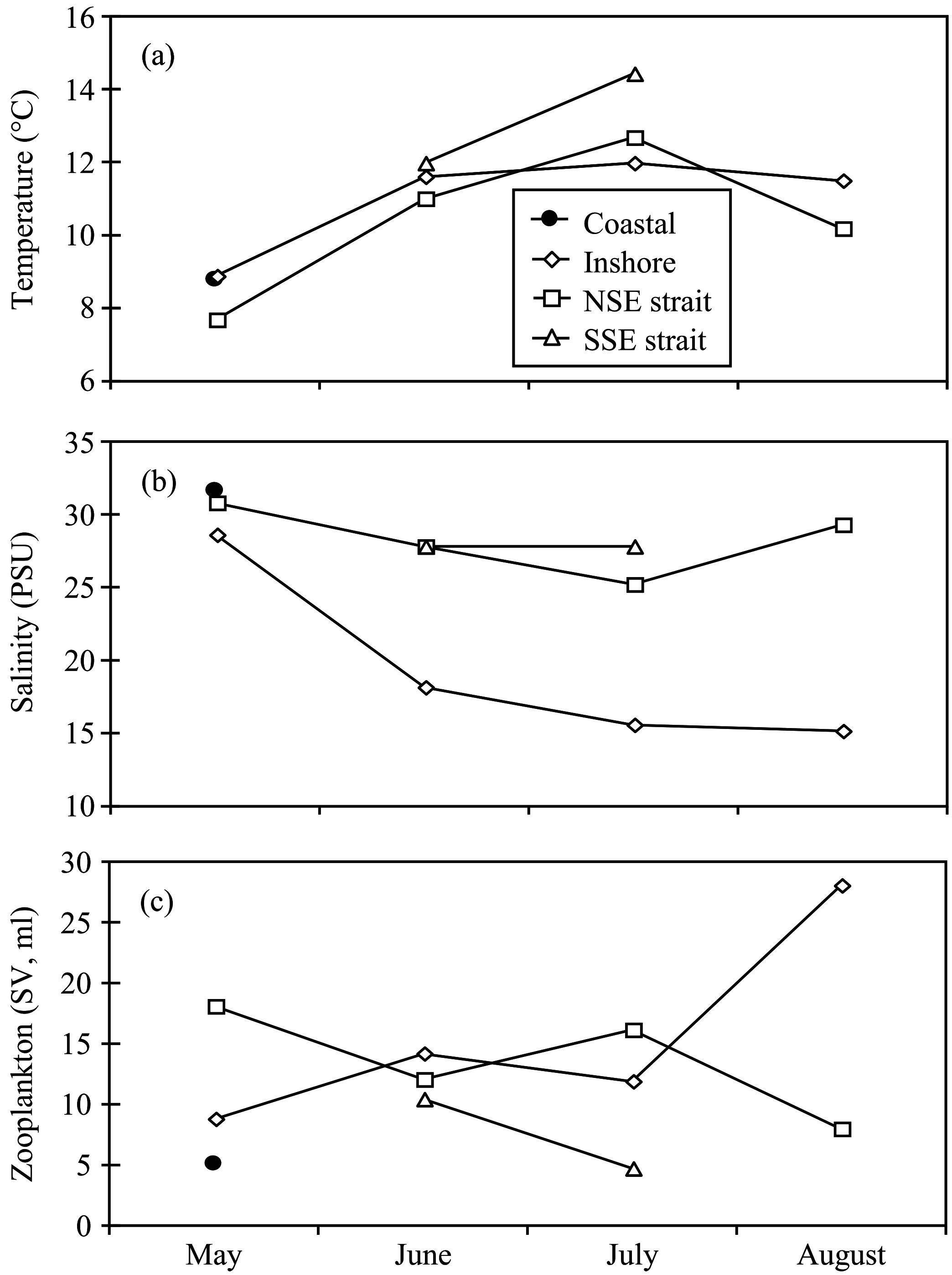

Figure 2.—Surface 3-m temperature (a), salinity (b), and 20-m zooplankton settled volumes from vertical NORPAC hauls (c) in inshore, strait, and coastal marine habitats of the northern region and strait habitats of the southern region of southeastern Alaska, May–August 2006. Zooplankton standing stock (ml/m^3) can be computed by dividing by water volume filtered, a factor of 3.9 m^3 for these samples.

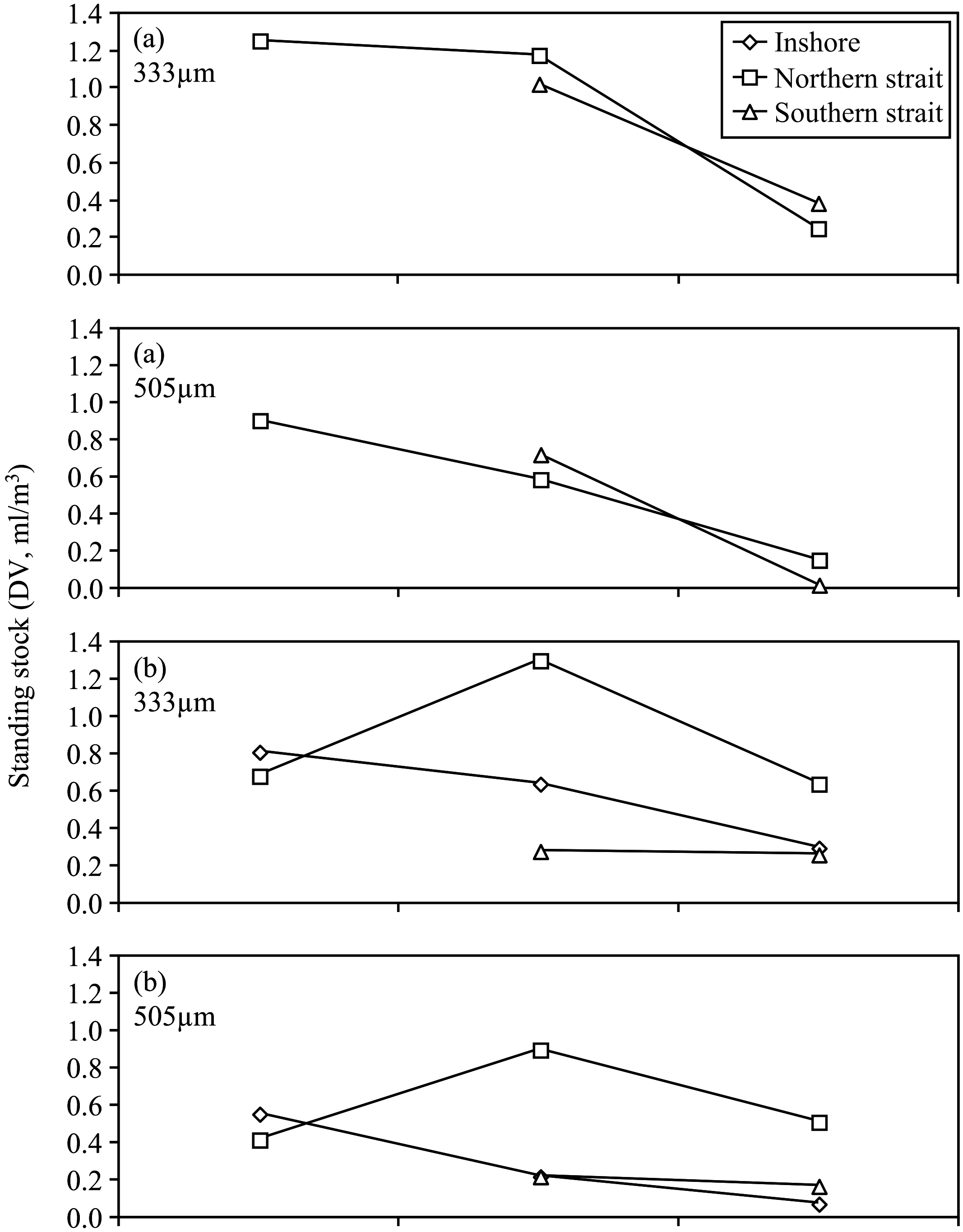

Figure 3.—Monthly zooplankton standing stock (mean ml/m^3, ± 1 standard error) from 333-µm and 505-µm mesh shallow (a) and deep (b) double oblique bongo net samples hauled from ≤ 200 m depths at localities in southeastern Alaska, May-August 2006. No samples were collected in August. Strait habitat is represented by Lower Clarence Strait in the southern region and by Icy Strait in the northern region; inshore habitat is represented by Auke Bay Monitor in the northern region.

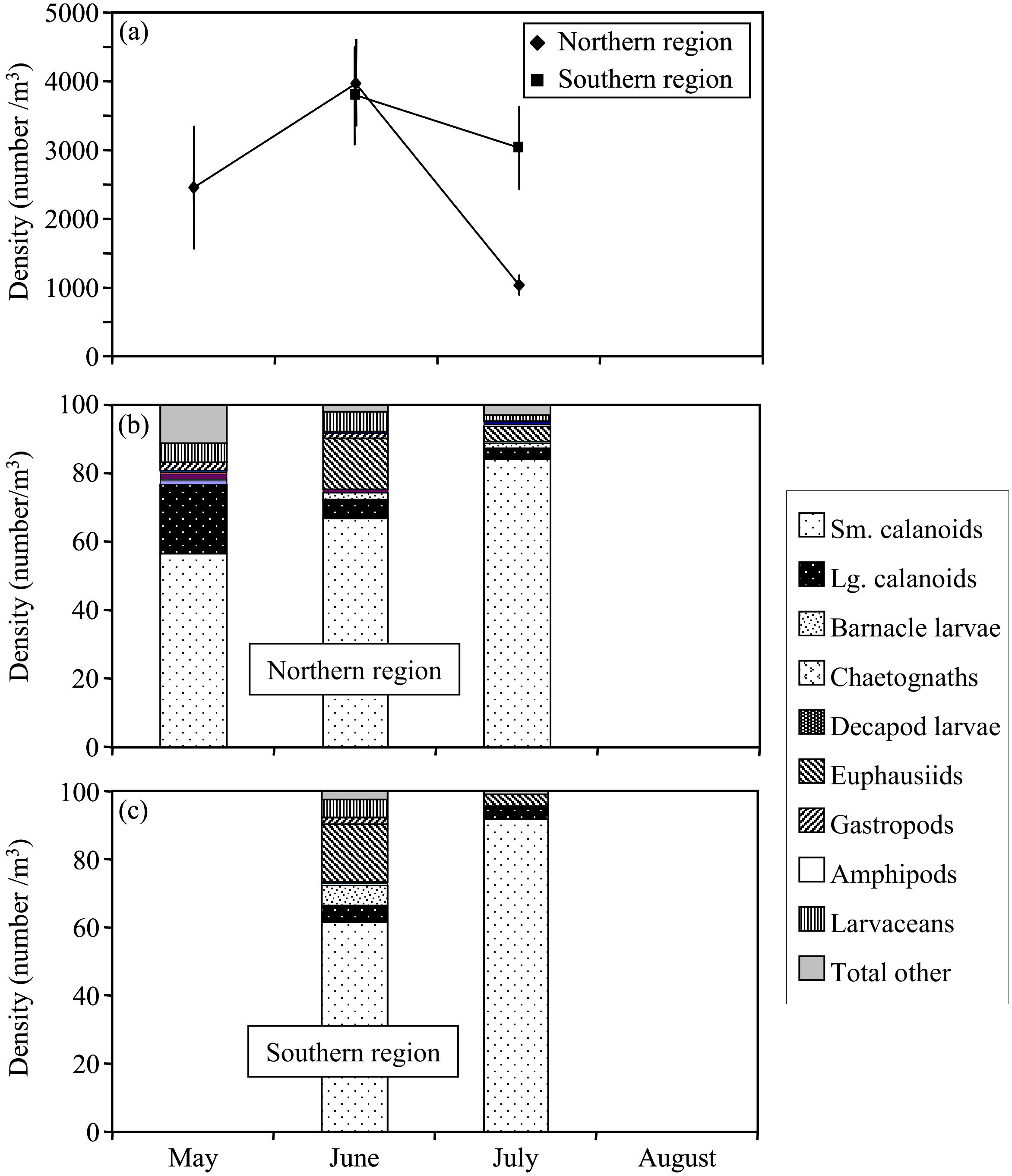

Figure 4.— Monthly "shallow" (20 m depths) zooplankton at strait habitats in the northern and southern regions of southeastern Alaska, May-August 2006, from 333-µm mesh, double oblique bongo net samples, as.(a) density (mean total number/m^3), ± 1 standard error; (b) and (c) taxonomic composition (mean percent number/m^3). The northern region is represented by Icy Strait and the southern region is represented by Lower Clarence Strait.

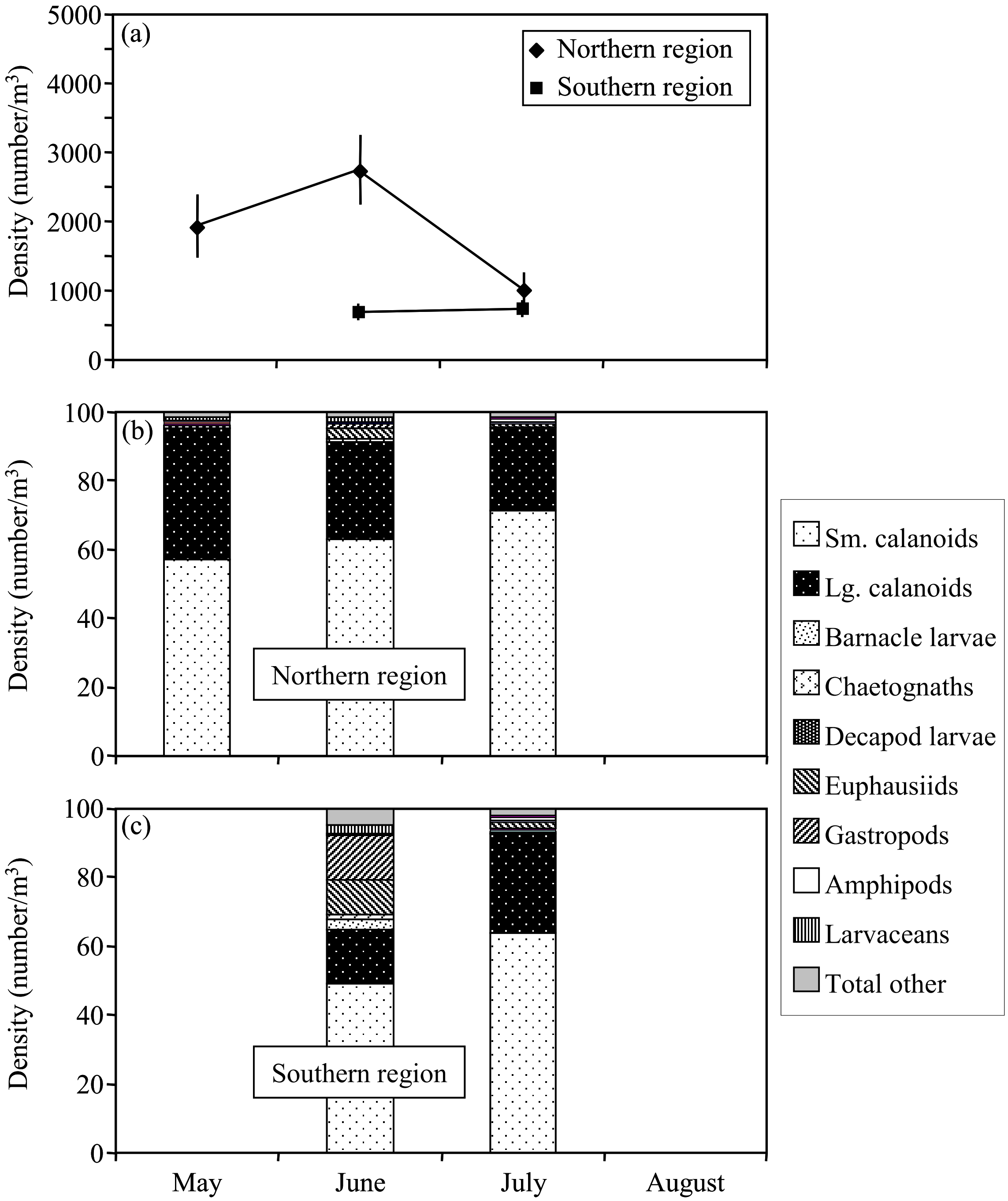

Figure 5.—Monthly "deep" (≤200 m depths) zooplankton at strait habitats in the northern and southern regions of southeastern Alaska, May-August 2006, from 333-µm mesh, double oblique bongo net samples, as.(a) density (mean total number/m^3), ± 1 standard error; (b) and (c) taxonomic composition (mean percent number/m^3). The northern region is represented by Icy Strait and the southern region is represented by Lower Clarence Strait.

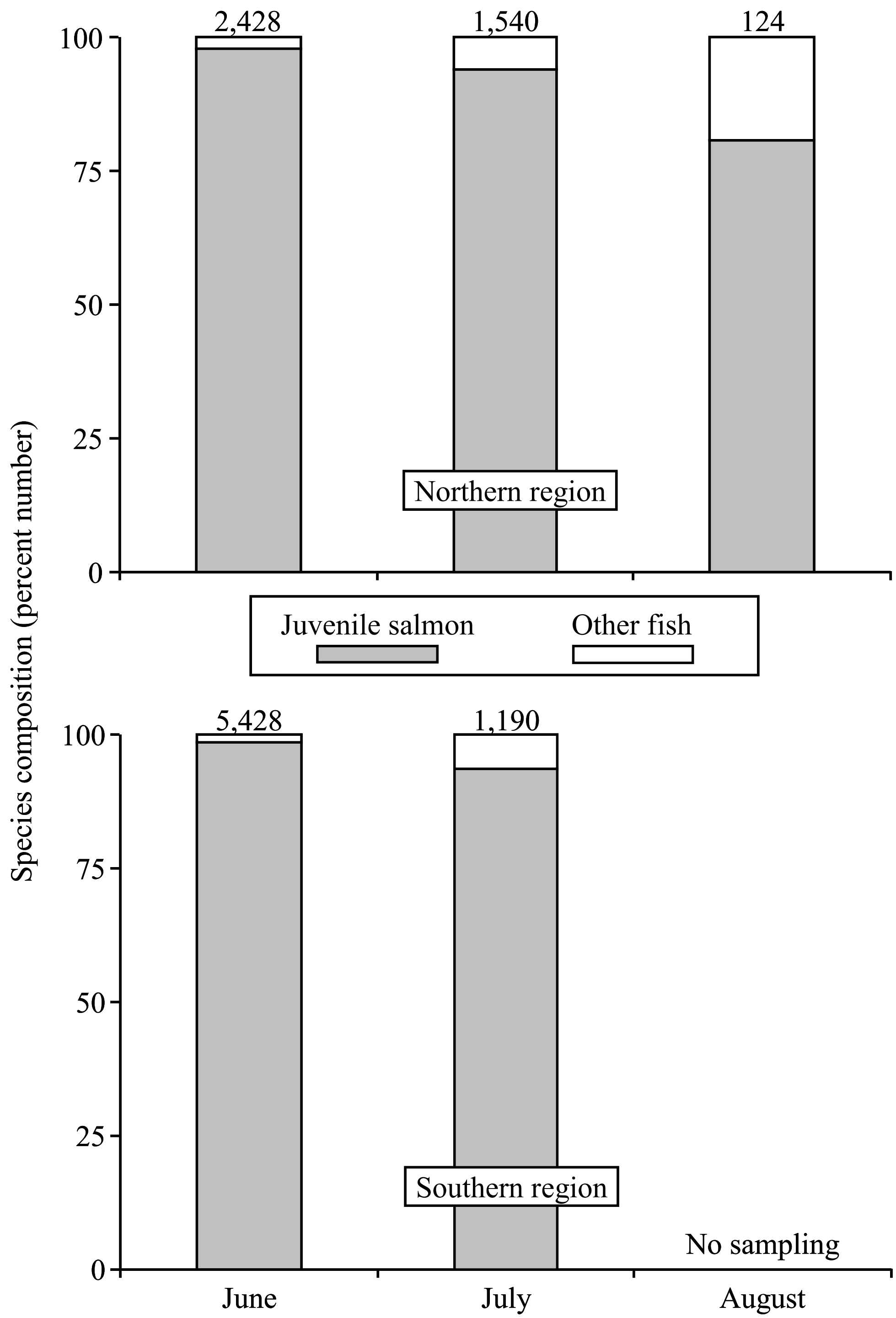

Figure 6.—Fish composition from rope trawl catches in marine strait habitats of the northern and southern regions of southeastern Alaska, June–August 2006. Number of fish is indicated above each bar.

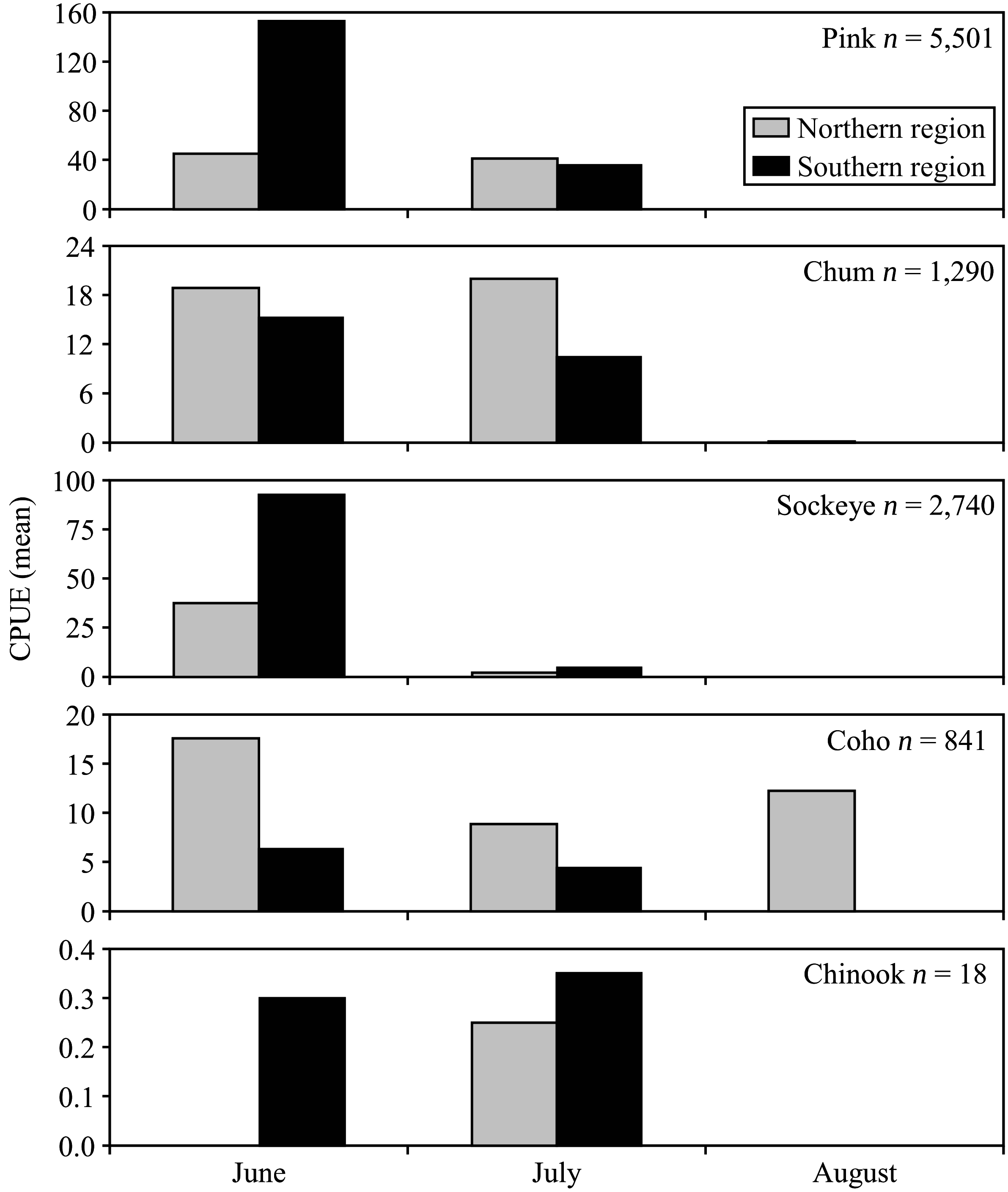

Figure 7.—Mean catch per rope trawl haul of juvenile salmon in marine strait habitats of the northern and southern region of southeastern Alaska, June–August, 2006. Total catch is indicated for each species.

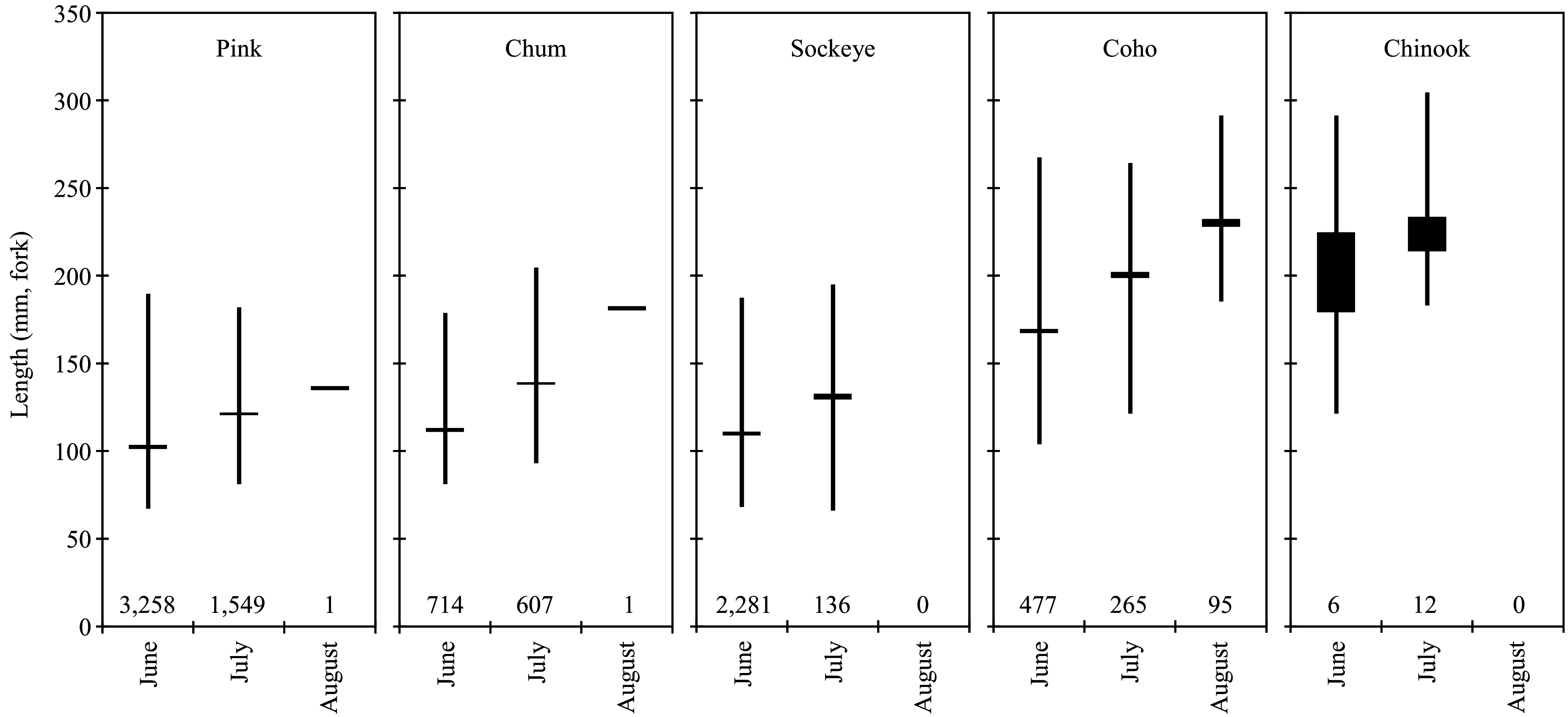

Figure 8.—Length (mm, fork) of juvenile salmon captured in marine waters of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. Length of vertical bars is the size range for each sample, and the boxes within the size range are one standard error on either side of the mean. Sample sizes are reported for each month.

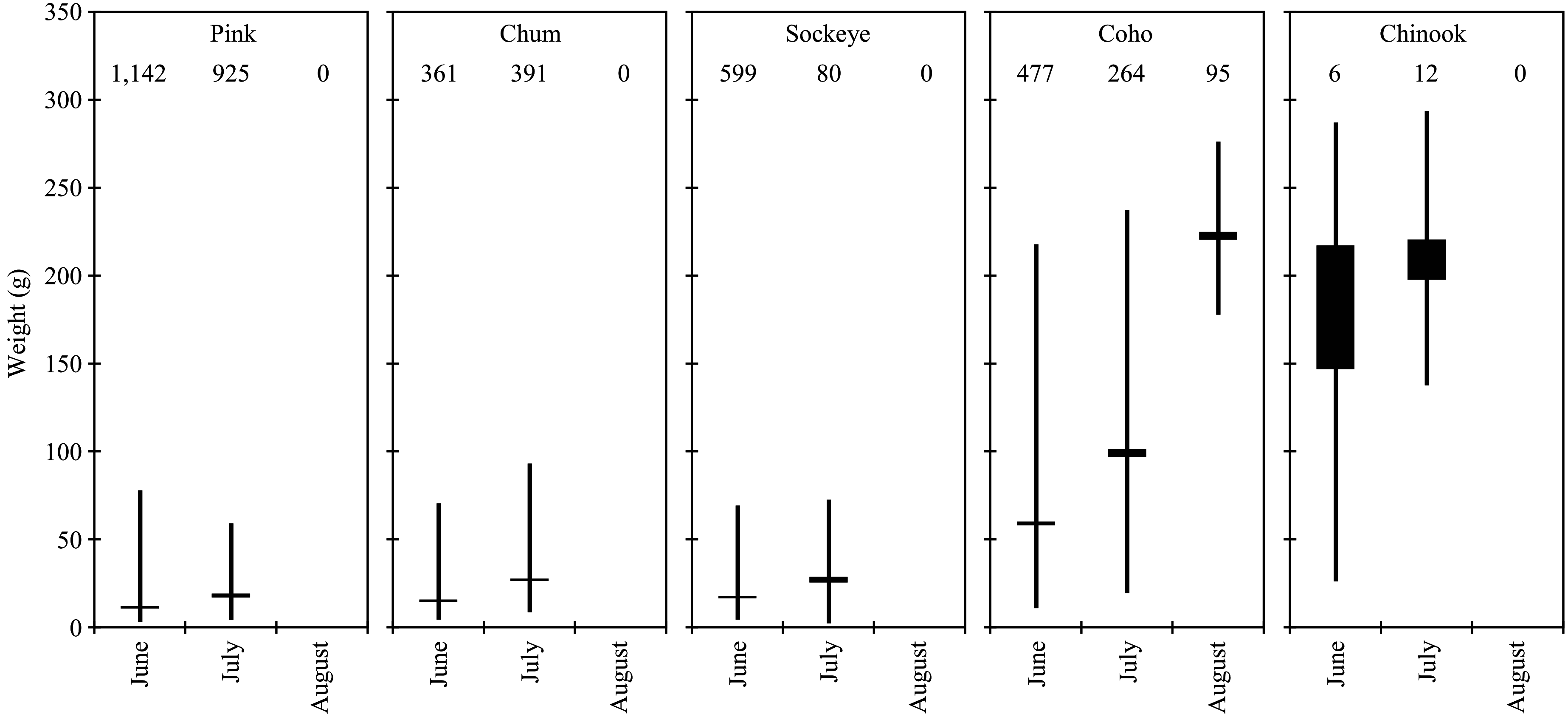

Figure 9.—Weight (g) of juvenile salmon captured in marine waters of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. Length of vertical bars is the size range for each sample, and the bars within the size range are one standard error on either side of the mean. Sample sizes are reported for each month.

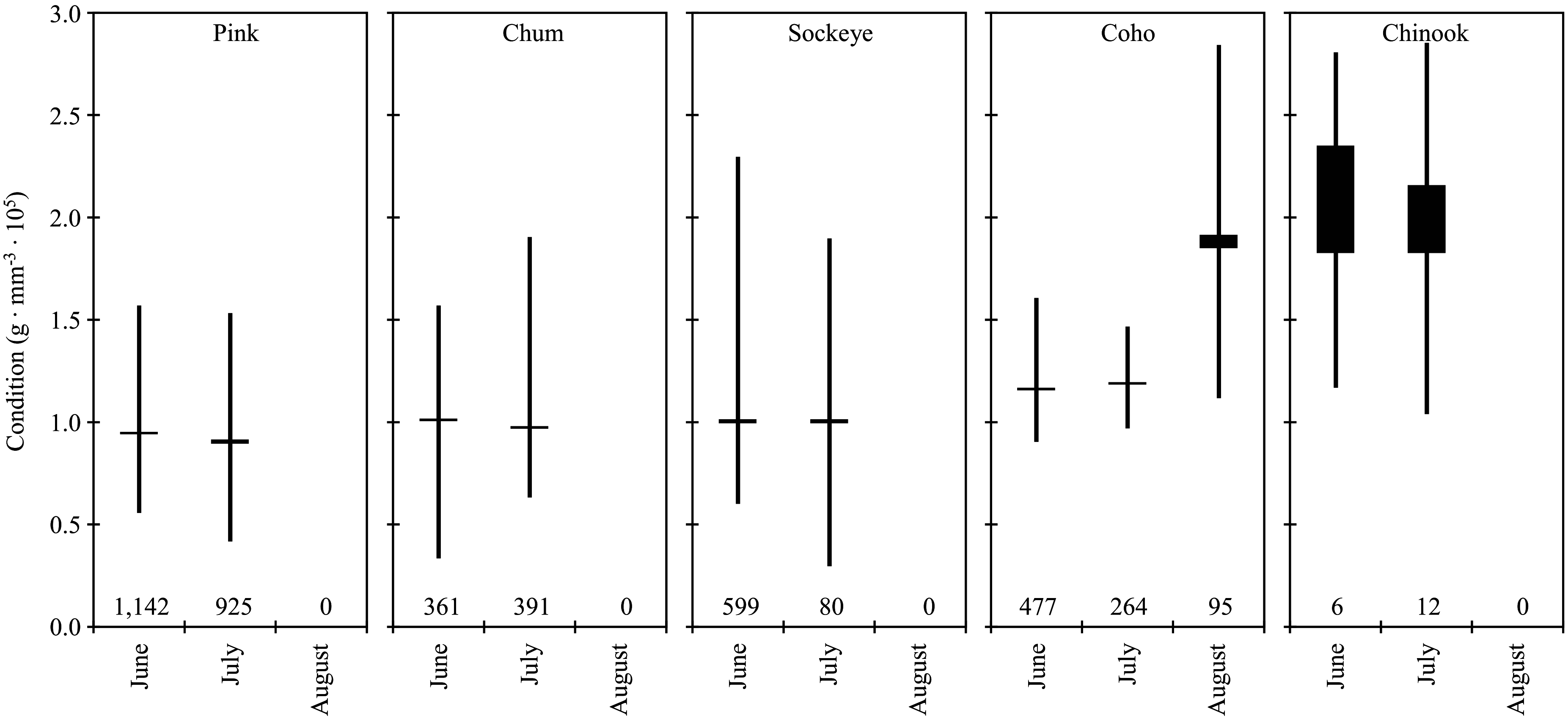

Figure 10.—Fulton's condition (g/mm^3 · 10^5) of juvenile salmon captured in marine waters of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. Length of vertical bars is the size range for each sample, and the boxes within the size range are one standard error on either side of the mean. Sample sizes are reported for each month.

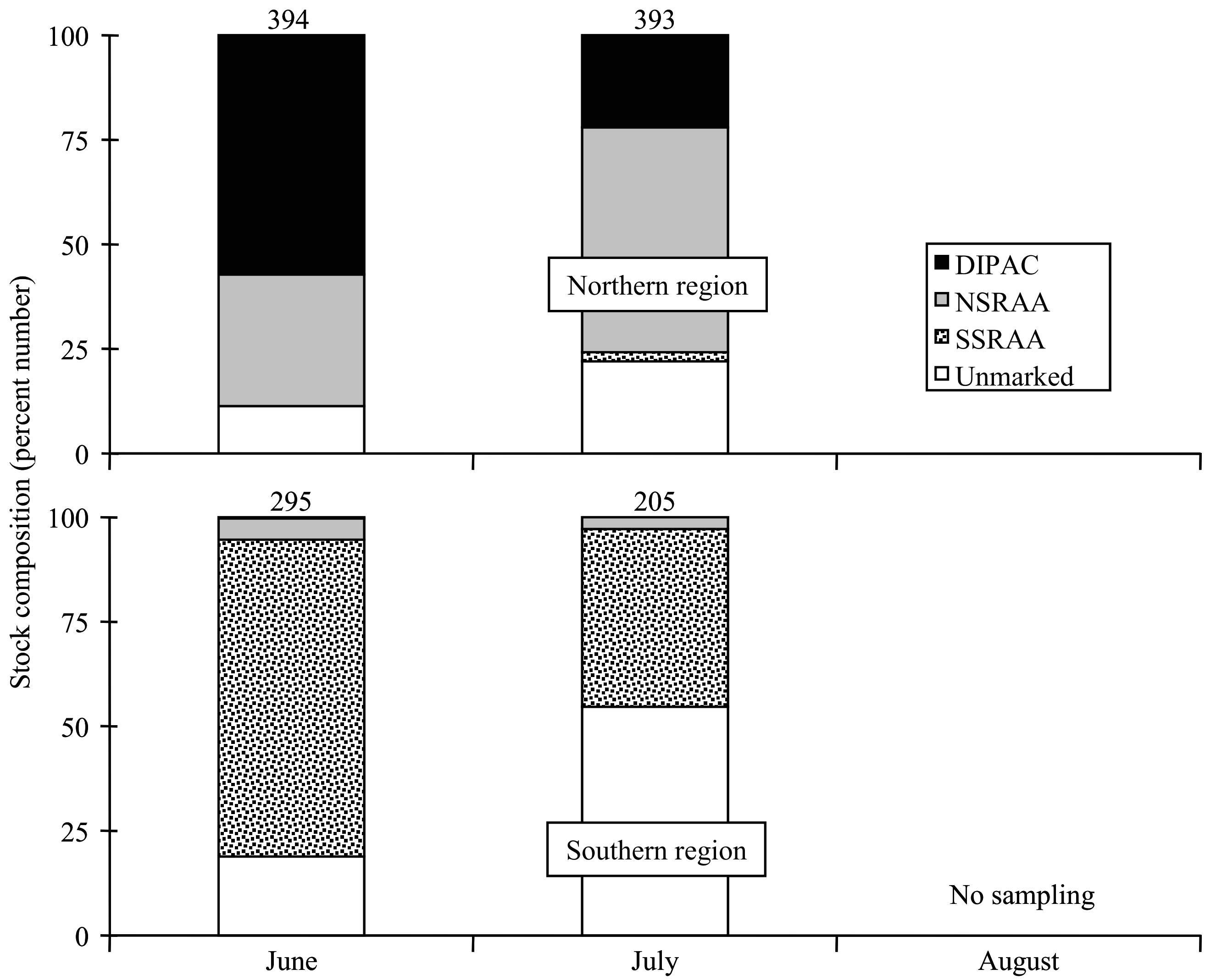

Figure 11.—Monthly stock composition of juvenile chum salmon based on otolith thermal marks in marine strait habitats of the northern and southern regions of southeastern Alaska, June–August 2006. Number of salmon sampled per month and region is indicated above each bar.

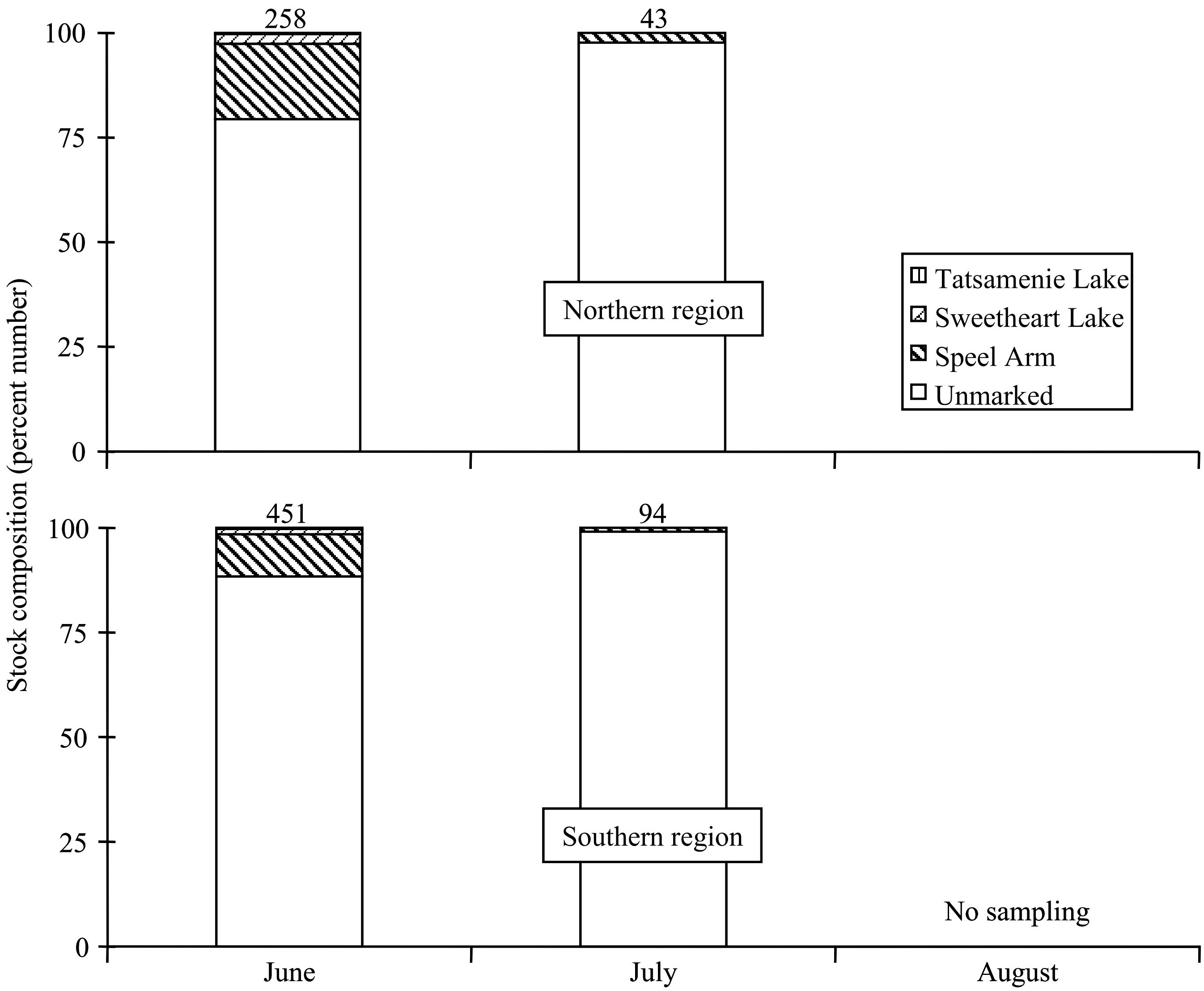

Figure 12.—Monthly stock composition of juvenile sockeye salmon based on otolith thermal marks in marine strait habitats of the northern and southern regions of southeastern Alaska, June–August 2006. Number of salmon sampled per month and region is indicated above each bar.

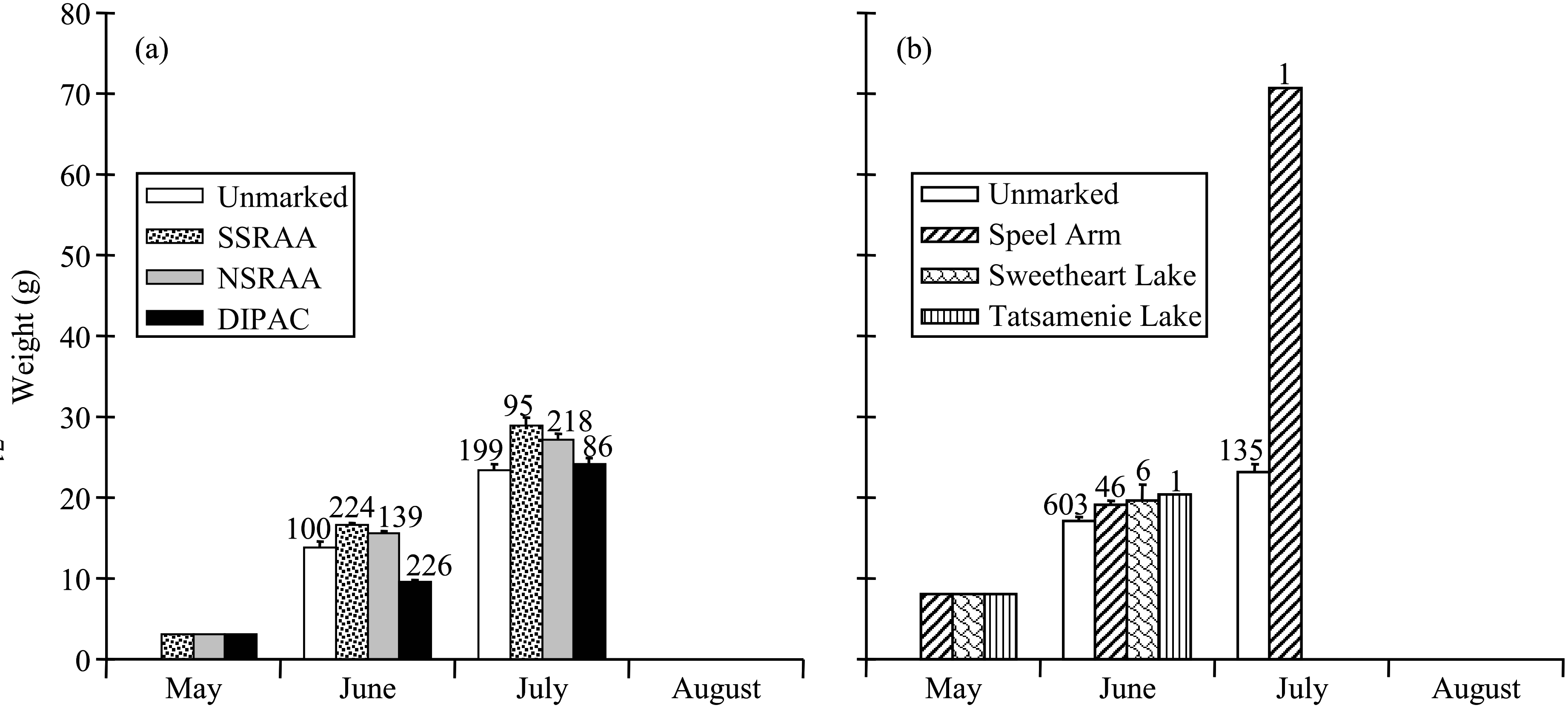

Figure 13.—Stock-specific growth trajectories of juvenile chum (a) and sockeye (b) salmon captured in marine waters of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. Weights of May fish are mean values at time of hatchery release. The sample sizes and the standard error of the mean are indicated above each bar.

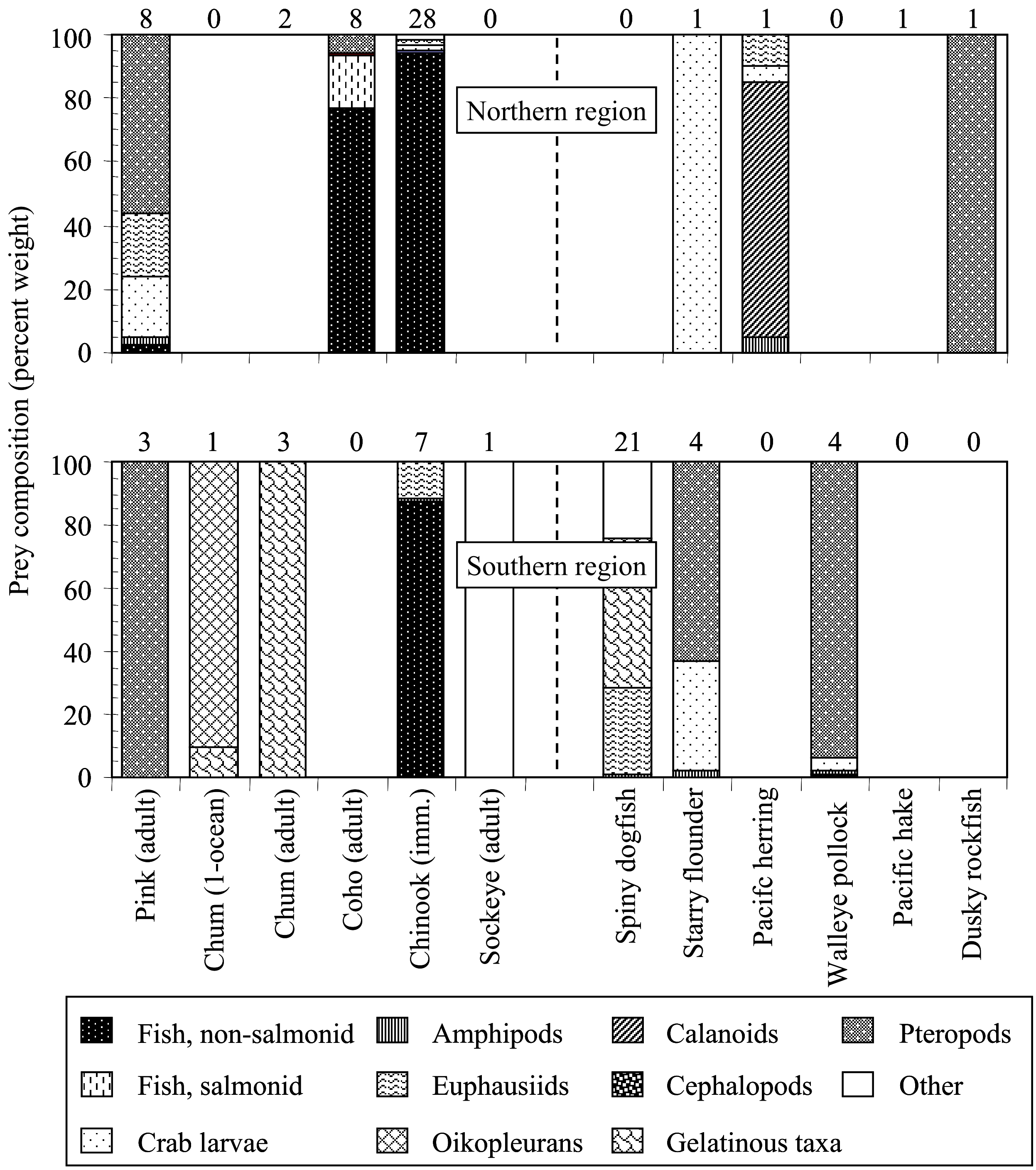

Figure 14.—Prey composition of potential salmon predator species captured in marine habitats of the northern and southern regions of southeastern Alaska by rope trawl, June–August 2006. See also Table 19 for feeding rates. Panels are divided to show salmon on the left, non-salmon on the right. The numbers of fish examined are shown above the bars.