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Survey of Juvenile Salmon and Associated Epipelagic Ichthyofauna in the Marine Waters of Southeastern Alaska, May–August 2004

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Abstract

Juvenile Pacific salmon (*Oncorhynchus* spp.), ecologically-related species, and associated biophysical data were collected along a primary marine migration corridor in the northern region of southeastern Alaska. Thirteen stations were sampled over six time periods (31 sampling days) from May to August 2004. This survey marks the eighth consecutive year 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. Habitats sampled included stations in inshore (Auke Bay and Taku Inlet), strait (four stations each in Chatham Strait and Icy Strait), and coastal (four stations off Icy Point) localities. 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, usually during daylight. Surface (3-m) temperatures and salinities ranged from 6.9 to 17.4 ºC and 9.5 to 31.6 PSU from May to August. A total of 13,460 fish and squid, representing 29 taxa, were captured in 75 rope trawl hauls from June to August. Juvenile salmon comprised 48% of the total catch and occurred frequently in the trawl hauls, with pink (*O. gorbuscha*) occurring in 75% of the trawls, sockeye (*O. nerka*) in 73%, chum (*O. keta*) in 72%, coho (*O. kisutch*) in 51%, and chinook salmon (*O. tshawytscha*) in 19%. Of the 6,552 salmonids caught, over 99% were juveniles. Walleye pollock (*Theragra chalcogramma*) and Pacific herring (*Clupea pallasi*) were the only non-salmonid species that comprised more than 1% of the total catch. 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 were generally highest in June for all species except coho that had catch rates highest in August. Between habitat types, juvenile salmon catch rates were almost always highest in the strait habitat for each species and in each time period. Size of juvenile salmon increased steadily throughout the season; mean fork lengths in June, July, and August were, respectively: 98, 129, and 163 mm for pink; 104, 139, and 166 mm for chum; 111, 137, and 165 mm for sockeye; 170, 203, and 246 mm for coho; and 199, 228, and 279 for chinook salmon. Coded-wire tags were recovered from 14 juvenile coho, three juvenile and six immature chinook salmon; all but one were from hatchery and wild stocks of southeastern Alaska origin. The non-Alaska stock was a juvenile chinook originating from Oregon. Alaska hatchery stocks were also identified by thermal otolith marks from 74% of the chum, 18% of the sockeye, 9% of the coho, and 45% of the chinook salmon. Onboard stomach analysis of 199 potential predators, representing 10 species, revealed four predation instances on juvenile salmon: three by adult coho salmon and one by an immature chinook salmon. This research suggests that in southeastern Alaska, juvenile salmon exhibit seasonal patterns of habitat use synchronous with environmental change, 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 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 to better understand effects of environmental change on salmon production. Salmon are a keystone species that constitute important ecological links 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. Increasing 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 12.5 million fish annually (ADFG 2003), 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. 2004); 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

This document summarizes catches of juvenile salmon, ecologically-related species, and the associated biophysical data collected by SECM scientists in 2004.

Methods

Up to 13 stations were sampled in each of six time periods, 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, from May to August 2004 (Table 1). Stations were located along the primary seaward migration corridor used by juvenile salmon that originate in the northern region of southeastern Alaska. This 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 (Figure 1). At each station, the physical environment, zooplankton, and fish were typically sampled during daylight hours (0655–1920); however, additional sampling during nocturnal hours (0030–0115) was conducted at the Icy Strait stations with 13 two-boat trawl hauls and three rope trawl hauls (Appendix 1).

The selection of the 13 core sampling stations 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 stations (Auke Bay Monitor and Taku Inlet) 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, 2004). 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.

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

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

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. Up to one deep vertical haul (to 200 m or within 10 m of bottom) was made at most stations with a 57-cm, 202-µm mesh WP-2 net (Table 2). One double oblique bongo haul was made at all stations, except the Upper Chatham Strait stations, 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. A Bendix bathykymograph 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, zooplankton settled volumes (SV, ml) and total settled volumes (TSV, ml) of each 20-m vertical 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. 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 ($\leq$ 200 m) bongo samples was calculated using DV (ml) divided by the volume of water filtered (m^3) based on flowmeter 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 and three 55-m (two 1.0-cm and one 1.3-cm) wire bridles.

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, and Fulton condition factors ($g/mm^3 \cdot 10^5$; Cone 1989) 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 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 (31-d) survey in 2004, data were collected from 78 rope trawl hauls (75 day and 3 night), 13 two-boat trawl hauls (all night), 93 CTD casts, 132 bongo net samples (26 from 20-m depths and 106 from depths to 200 m), 136 conical net hauls (100 from 20-m depths and 36 from depths to 200 m), and 58 surface water samples (Table 2). The sampling periods occurred near the ends of each month from May to August. Oceanographic sampling was completed at all stations from May to August. Rope trawling occurred in strait and coastal localities from June to August, and in inshore localities at the Taku Inlet stations in May and June.

Oceanography

Surface (3-m) temperature and salinity data followed similar seasonal patterns but differed between habitats. Overall, surface temperatures and salinities during the survey ranged from 6.9 to 17.4°C and from 9.5 to 31.6 PSU from May to August (Table 3). In general, inshore habitat was the least saline, while coastal habitat was warmest and most saline. In all habitats temperatures generally increased from May to August (Figure 2a). Salinities were consistently high and stable in the coastal habitat from May to July and were lowest in inshore habitat in July (Figure 2b). Salinities in the inshore and strait habitats declined from May to July, then increased in August.

A total of 58 surface water samples were taken at 16 stations over the course of the season (Tables 2 and 4). Nutrient concentration ranges and means were 0.1–1.4 and 0.4 µM for PO_4, 0.5–53.2 and 10.2 µM for $Si(OH)_4$, 0.0–12.6 and 1.4 µM for NO_3, 0.0–0.3 and 0.1 µM for NO_2, and 0.2–4.8 and 1.5 µM for NH_4. Chlorophyll ranged from 0.0 to 18.9 mg/m^3 with a mean of 2.0 mg/m^3, and phaeopigment concentrations ranged from 0.0 to 5.3 mg/m^3 with a mean of 0.8 mg/m^3 (Table 4).

Ambient light intensities for 67 daylight (0700–1930 h) rope trawls over the season ranged from 3.2 to 880 W/m^2, with a mean of 67.6 W/m^2, while ambient light during for 3 nocturnal rope trawls (0030–0115 h) ranged from 0 to 0.1 W/m^2, with a mean of ~0.05 W/m^2. Ninety two water clarity measurements were made by observing the disappearance of the CTD following deployment. Depth of visibilities ranged from 0.5 to 11 m, with a mean of 4.5 m.

Seasonal patterns in plankton settled volumes, SV, were evident from the 20-m NORPAC (243-µm mesh) vertical hauls, although SV was highly variable among habitats (Table 5; Figure 2c). Qualitative, visual examination of samples indicated a wide diversity of mesozooplankton taxa and phytoplankton present. Average zooplankton SV peaked in May or June in all habitats, and generally declined over the season.

Seasonal patterns in zooplankton were also evident in the deep and shallow bongo samples collected at the Icy Strait stations (Table 6). From May to August, zooplankton displacement volumes (DV, ml) and total density (organisms /m^3) of bongo (333-µm mesh) peaked in June at most stations, although shallow bongo samples were not collected in May. Density values ranged from 0.02 to 2,761.4 organisms/m^3 in shallow samples and from 21.7 to 2,142.0 organisms/m^3 in deep samples (Table 6, Figure 3).

Zooplankton bongo samples were summarized to characterize prey fields present for planktivorous juvenile salmon and ecologically-related ichthyofauna. A total of 13 samples from each bongo net type, 333-µm and 505-µm mesh, were examined in detail; the complete set of matched samples was not available for May (Table 6; Fig. 3). Zooplankton taxa present in Icy Strait across the season included small calanoid copepods, large calanoid copepods, euphausiids, oikopleurans, decapod larvae, and combined minor taxa (Figure 3). The minor taxa mainly included chaetognaths, cladocera, bryozoan larvae, pteropods, hyperiid amphipods, barnacle larvae, and coelenterates. Zooplankton density and taxonomic composition differed strikingly by mesh size, shallow vs. deep water column, and day vs. night. Total densities were generally twice as great in 333-µm mesh (range 629 to1908 organisms per cubic meter) as in 505-µm mesh samples (range 27 to 844 organisms per cubic meter) (Table 6). Seasonally, total zooplankton densities peaked in May-June for day and night 505-µm mesh samples, but for 333-µm samples, densities were highest in June for day samples and lowest in June for night samples. These patterns reflect the different taxonomic compositions of the sample types (Figure 3). The 333-µm samples were dominated by small calanoid copepods, while the 505-µm samples were dominated by large calanoid copepods. Deep and night samples generally had higher percentages of copepods than shallow or day samples. These taxa have different life history strategies and may respond differently to environmental conditions (Park et al. 2004). Euphausiids comprised the highest percentages of zooplankton taxa in May and June; their higher abundance in shallow night samples was masked in composition figures by the abundant, smaller taxa. This taxon is prevalent in juvenile salmon diets during these months (Landingham et al., 1998; Sturdevant et al., 2005). Larvaceans were comprised the greatest percentages of daytime, shallow samples of both mesh sizes and were present throughout the season (Figure 3). These gelatinous invertebrates are consumed by many fish, chum salmon in particular (Purcell et al. 2005; Sturdevant et al., 2005).

Catch composition

For the entire season across all habitats, a total of 13,460 fish and squid, representing 29 taxa, were captured in 75 rope trawl hauls from June to August (Table 7). These catches do not include fish from the 13 two-boat trawl hauls and three nocturnal rope trawl hauls; salmonid catches from these hauls are reported in Appendix 1. Juvenile salmon comprised 48% of the total fish catch and 99% of the total salmonid catch. Juvenile salmon were generally the most frequently occurring species, with pink occurring in 75% of the trawls, sockeye in 73%, chum in 72%, coho in 51%, and chinook salmon in 19% (Table 8). Non-salmonid species making up more than 1% of total catch included walleye pollock (*Theragra chalcogramma*) and Pacific herring (*Clupea pallasi*); these species occurred in 28% and 12% of the trawl hauls. In addition, large catches of larval fish from the Osmeridae family in Taku Inlet totaled 4,006 and represented 30% of the catch.

Catch composition differed by habitat for juvenile salmon and abundant non-salmonids. Juvenile salmon comprised 70–75% of the catch in the strait habitat from June to August, while in the coastal habitat they represented about 5% of the catch in June and August and 90% of the catch in July (Figure 4). Walleye pollock was the dominant non-salmonid species, representing about 20% of the catch in the strait habitat in June and July. Catches and life history stages of the salmon are listed by date, haul number, and station in Appendix 1.

Distribution of juvenile salmon differed for the months, habitats, and species sampled; however, in 2004, the temporal patterns of distribution generally shifted earlier for most species than in previous years. In the strait habitat, where catches were considerably higher than the coastal habitat, all species of juvenile salmon, except coho salmon peaked in June, rather than in

July (Figure 5). In the coastal habitat, the peak catches for most species of juvenile salmon occurred in July as typical.

Size and condition of juvenile salmon differed among the species and sampling periods (Tables 9–13; Figures 6–8). Juvenile coho and chinook salmon were consistently 25 to 100 mm longer 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, July, and August were: 97.9, 129.2, and 163.2 mm for pink; 103.6, 139.4, and 165.6 mm for chum; 111.2, 137.1, and 164.6 mm for sockeye; 169.5, 203.1, and 245.7 mm for coho; and 199.0, 228.4, and 278.8 for chinook salmon. Mean weights of juvenile salmon in June, July, and August were: 8.4, 20.7, and 43.9 g for pink; 10.7, 26.6, and 46.1 g for chum; 15.4, 27.7, and 46.6 g for sockeye; 60.0, 102.3, and 183.3 g for coho; and 70.4, 144.2, and 289.1 g for chinook salmon. Mean condition factor values for juvenile salmon in June, July, and August were: 0.9, 0.9, and 1.0 for pink; 1.0, 0.9, and 1.0 for chum; 1.1, 1.0, and 1.0 for sockeye; 1.2, 1.2, and 1.2 for coho; and 1.1, 1.4, and 1.3 for chinook salmon. Condition factor generally increased seasonally; mean values near 1.0 indicated healthy feeding environments.

Twenty-three of the 29 juvenile and immature salmon lacking adipose fins contained CWTs (Table 14). Fourteen CWTs were recovered from juvenile coho, one in June, two in July, and 11 in August. Three CWTs were recovered from juvenile chinook, all in July. Six CWTs were recovered from immature chinook, two in June, two in July, and two in August. All specimens were recovered in Icy Strait and originated from wild and hatchery stocks indigenous to the northern region of southeastern Alaska, except one juvenile chinook which originated from a hatchery stock on the Clackamas River in Oregon.

For juvenile chum salmon, stock-specific information was derived from the otoliths of a subsample of 1,280 fish, representing 41% of those caught (Table 15). These fish were the same individuals sampled for weight and condition. Of all chum salmon otoliths examined, 943 (74%) were marked: 791 (62%) were from DIPAC, 60 (5%) were from HF, and 92 (7%) were from Neets Bay (NB). Neets Bay is an enhancement facility located more than 500 km south of the study area near Ketchikan, in the southern region of southeastern Alaska; this facility began releasing thermally marked juvenile salmon in 2003. The remaining 337 (26%) chum salmon examined were unmarked and probably included both wild stocks and unmarked hatchery stocks from southern release localities. Seasonally, the contribution of hatchery stocks of chum salmon was highest (> 75%) in June in the strait habitat and was < 50% in other months and in the coastal habitat (Figure 9). Despite the apparently earlier migration of juvenile chum salmon based on peak catch rates in the strait habitat in June, the stock-specific migration pattern was similar to past years, where the stock compositions were highest for DIPAC in June and HF in July.

For juvenile sockeye salmon, stock-specific information was derived from the otoliths of a subsample of 262 fish, representing 98% of those caught (Table 16). These fish were the same individuals sampled for weight and condition. Of all the sockeye salmon otoliths examined, 47 (18%) were marked and originated from two stock groups: 42 from Snettisham Hatchery (16%) and 5 from Tatsamenie Lake, Taku River (2%). The remaining 215 (82%) sockeye salmon examined were unmarked and presumably from wild stocks. The contribution of marked stocks of sockeye salmon was highest (50%) in the coastal habitat in July, but was < 25% in other months and in the strait habitat (Figure 10).

For juvenile coho salmon, stock-specific information was derived from the otoliths of 290 fish, representing 97% of those caught (Table 17). These fish were the same individuals sampled for weight and condition. Of all the coho salmon otoliths examined, 25 (9%) were marked and originated from 2 stock groups: 23 (8%) from DIPAC and 2 (1%) from Port Armstrong on southern Baranof Island. The remaining 265 (91%) coho salmon examined were unmarked and included both wild stocks and possibly unmarked hatchery stocks from southern release localities. In the strait habitat, hatchery stock contribution of coho salmon increased from < 5% in June to about 15% in August (Figure 11).

For juvenile chinook salmon, stock-specific information was derived from the otoliths of 11 fish, representing 48% of those caught (Table 18). These fish were the same individuals sampled for weight and condition. Of all the chinook salmon otoliths examined, 5 (45%) were marked and all originated from HF hatchery. The remaining 6 (55%) chinook salmon examined were unmarked and included both wild stocks and possible unmarked hatchery stocks from southern release localities. All HF hatchery fish were caught in the strait habitat their composition declined from ~70% in June to 25% in August (Figure 12).

Monthly samples of thermally marked juvenile chum, sockeye, coho, and chinook 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 (Figures 13 and 14). The marked salmon stocks were from DIPAC, HF, NB, and Snettisham hatcheries; these fish were released in 2004 at the following approximate dates and size ranges: chum in April–May (1–4 g); sockeye in April–June (5–10 g); coho in May–June (15–23 g); and chinook salmon in May–July (9–59 g). Stock-specific size of salmon increased monthly for all groups (Figures 13 and 14).

Four incidents of predation on juvenile salmon were observed among the 199 potential predators examined. The stomach of a 313 mm, immature chinook salmon caught in Upper Chatham Strait in June contained a single juvenile pink salmon approximately 80 mm; the prey fish was 26% of the predator length and the stomach was approximately 75% full. In total, salmon constituted only 0.4% of total prey weight among the 34 immature chinook salmon predators. In contrast, three adult coho salmon in Icy Strait had consumed juvenile salmon, In July, the full stomach of an 810 mm adult coho salmon contained two unidentifiable juvenile salmon, one at approximately 165 mm. In August, a 560 mm adult coho salmon stomach contained a 136 mm juvenile pink salmon (50% volume) and a 208 mm herring, while a 730 mm adult coho salmon stomach contained a 148 mm juvenile chum salmon (33% volume) and the remains of two digested non-salmonids. In total, these juvenile salmon prey constituted 63.7% of total prey weight among the six adult coho salmon predators.

Although juvenile salmon were not prominent prey items for any of the potential predators, other fish prey were common (Figure 15). Overall, fish prey dominated the diets of immature chinook salmon (95% prey weight), adult coho salmon (97%), and spiny dogfish (89%); fish composed < 22% of the prey weight of walleye pollock and adult chum salmon. A wide variety of taxa were consumed by the most piscivorous species, immature chinook salmon, including capelin, Pacific herring, lanternfish, fish larvae, Pacific sandfish, Pacific sandlance, and walleye pollock, as well as unidentifiable remains.

A wide variety of pelagic invertebrate prey was consumed by the potential predators examined, including decapod larvae, euphausiids, amphipods, cephalopods, oikopleurans, copepods, gelatinous taxa (salps, ctenophores, and cnidarians), and pteropods (Figure 15). The most varied planktivory was observed for walleye pollock, which ate 49% euphausiids and 3-12% each of amphipods, copepods, decapod larvae, and oikopleurans, as well as smaller amounts of other taxa. The majority of invertebrate prey taxa constituted small amounts, <1% weight, of several predators' diets. Decapod larvae were predominant only among adult pink salmon, constituting nearly 82% of prey weight. Substantial predation on euphausiids occurred among immature chinook salmon (14% prey weight) and spiny dogfish (10% prey weight). Amphipods contributed the greatest prey weight, 13%, to spiny dogfish, and up ≤ 7% among adult pink and chum salmon and walleye pollock. Cephalopods were eaten only by adult pink salmon (16% prey weight), while oikopleurans were prominent only in adult chum salmon (31% weight). Copepods were minor dietary components to all predator species except walleye pollock. Gelatinous taxa and pteropods contributed <1% prey weight to all predator species (Figure 15).

In the past 8 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. In 2004, surface temperatures were generally warmer than in previous years and consequently catches of juvenile salmon peaked a month earlier than usual for most species. The coastal monitoring of stations in the northern region of southeastern Alaska is currently ongoing; in 2005, most stations in each habitat were sampled monthly from May to 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.

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Table 1.—Localities and coordinates of stations sampled in the marine waters of the northern region of southeastern Alaska using the NOAA ship *John N. Cobb*, May–August 2004. Station positions are shown in Figure 1.

Station	Latitude North	Longitude West	Distance offshore km	Distance between km	bottom depth m
Inshore					
Auke Bay					
ABM	58°22.00'	134°40.00'	1.5	—	60
Taku Inlet transect					
TKG	58°15.88'	134°05.74'	1.4	—	71
TKH	58°12.62'	134°06.55'	1.4	6.1	105
TKI	58°11.19'	134°11.71'	2.2	5.7	175
Strait					
Upper Chatham Strait transect					
UCA	58°04.57'	135°00.08'	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	—	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
Coastal					
Icy Point transect					
IPA	58°20.12'	137°07.16'	6.9	—	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

Table 2.—Numbers and types of data collected in different habitats sampled monthly in marine waters of the northern region of southeastern Alaska, May–August 2004.

		Data collection type[1]						
Dates (days)	Habitat	Rope trawl	Two-boat trawl	CTD cast	Oblique bongo	20-m vertical	WP-2 vertical	Chlorophyll & nutrients
18-22 May	Inshore	3	0	5	10	7	1	4
(5 days)	Strait	0	0	8	8	8	4	8
	Coastal	0	0	4	8	4	4	4
20-28 June	Inshore	3	0	4	14	6	1	4
(9 days)	Strait	13	13	14	24	13	4	8
	Coastal	4	0	4	8	4	4	4
23-31 July	Inshore	0	0	1	2	3	1	1
(9 days)	Strait	25	0	25	20	25	4	8
	Coastal	4	0	4	8	4	4	4
21-28 August	Inshore	0	0	1	2	3	1	1
(8 days)	Strait	22*	0	19	20	19	4	8
	Coastal	4	0	4	8	4	4	4
Total		78	13	93	132	100	36	58

[1]Rope trawl = 20-min hauls with NORDIC 264 surface trawl 18 m deep by 24 m wide, asterisks denotes 40-min hauls (*n* = 5); Two-boat trawl = 10-min hauls with KODIAK pair trawl, 3 m deep by 6 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 200 m or within 20 m of the bottom (20-m depths were also included in these totals); 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 that are summarized in Table 4.

Table 3.—Surface (3-m) temperature and salinity data collected monthly in marine waters of the northern region of southeastern Alaska, May–August 2004. Station code acronyms are listed in Table 1.

Month	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)	Temp (°C)	Salinity (PSU)
Inshore								
	Auke Bay		Taku Inlet transect					
	ABM		TKG		TKH		TKI	
May	12.0	25.1	6.9	27.4	7.6	22.1	9.9	21.3
June	14.5	20.8	10.1	9.5	9.2	16.2	12.2	15.6
July	14.6	14.6	—	—	—	—	—	—
August	14.3	18.1	—	—	—	—	—	—
Strait								
	Upper Chatham Strait transect							
	UCA		UCB		UCC		UCD	
May	9.7	29.7	9.7	29.5	8.1	30.2	7.2	30.3
June	15.0	20.7	13.7	23.9	13.5	24.5	15.0	21.0
July	12.9	28.3	13.7	27.8	14.9	27.3	14.6	26.3
August	14.6	25.1	13.8	26.4	14.5	24.3	14.6	23.1
	Icy Strait transect							
	ISA		ISB		ISC		ISD	
May	8.2	30.0	8.6	29.9	8.1	29.8	8.3	29.7
June	14.1	25.0	13.9	24.6	12.2	27.8	12.8	27.5
July	13.3	26.5	14.9	23.2	12.0	20.7	15.1	20.9
August	11.9	26.7	14.2	21.7	14.5	22.6	14.3	23.0
Coastal								
	Icy Point transect							
	IPA		IPB		IPC		IPD	
May	7.3	30.9	8.2	31.0	8.9	31.0	9.1	30.9
June	13.1	31.3	13.0	31.6	13.3	31.6	13.0	31.6
July	14.7	31.2	15.7	31.3	15.3	31.3	15.7	31.4
August	14.9	30.3	17.4	31.3	16.8	31.3	17.4	31.3

Table 4.—Nutrient and chlorophyll concentrations from 250-ml surface water samples in marine waters of the northern region of southeastern Alaska, May–August 2004. Station code acronyms are listed in Table 1.

		Nutrients [μM]						
Station	Date	[PO_4]	[$Si(OH)_4$]	[NO_3]	[NO_2]	[NH_4]	Chlorophyll (mg/m^3)	Phaeopigment (mg/m^3)
ABM	18 May	0.24	3.04	0.17	0.01	2.65	1.60	1.00
	21 June	0.32	0.82	0.06	0.00	1.28	0.38	0.80
	23 July	0.47	4.86	0.09	0.05	2.80	1.13	0.54
	21 Aug.	0.41	4.95	0.04	0.11	0.78	1.13	0.54
TKG	20 May	0.72	39.45	12.60	0.08	3.30	0.23	0.20
	24 June	0.64	32.78	4.22	0.04	3.20	0.05	0.05
TKH	20 May	0.66	53.16	11.11	0.03	4.79	0.16	0.15
	24 June	0.37	32.67	3.30	0.01	3.22	0.03	0.08
TKI	20 May	0.42	36.75	8.94	0.07	2.83	1.01	0.48
	24 June	0.50	27.55	3.78	0.04	3.30	1.91	0.42
UCA	19 May	0.15	2.03	0.26	0.03	0.33	4.30	1.30
	23 June	0.09	1.65	0.01	0.01	0.44	1.12	0.66
	27 July	0.32	13.26	0.38	0.13	2.08	1.75	0.96
	21 Aug.	0.10	13.61	0.36	0.08	3.54	1.20	0.44
UCB	19 May	0.18	2.13	0.28	0.05	0.42	5.96	1.87
	23 June	0.38	0.73	0.00	0.00	0.58	1.56	0.81
	27 July	0.26	11.81	0.04	0.10	1.56	0.72	0.50
	21 Aug.	0.39	14.42	0.15	0.14	0.71	0.89	0.46
UCC	19 May	0.30	2.03	0.22	0.04	0.31	10.68	3.69
	23 June	0.49	0.46	0.06	0.00	0.29	1.27	0.82
	27 July	0.33	10.19	0.00	0.09	2.21	0.75	0.44
	21 Aug.	0.40	12.45	0.11	0.11	1.41	0.81	0.26
UCD	19 May	0.56	4.62	1.21	0.11	0.63	18.87	5.32
	23 June	0.46	1.65	0.00	0.00	2.81	1.49	0.93
	27 July	0.36	10.73	0.02	0.09	3.88	0.75	0.46
	21 Aug.	0.20	12.45	0.05	0.06	1.32	0.72	0.18
ISA	19 May	0.27	4.54	0.48	0.10	1.18	4.81	2.10
	22 June	0.20	1.56	0.15	0.05	0.40	1.09	0.56
	25 July	0.16	5.44	0.00	0.09	0.15	0.53	0.20
	24 Aug.	0.51	21.71	6.16	0.10	1.93	0.96	0.48

Table 4.—(Cont.)

Station	Date	Nutrients [μM] $[PO_4]$	$[Si(OH)_4]$	$[NO_3]$	$[NO_2]$	$[NH_4]$	Chlorophyll (mg/m^3)	Phaeopigment (mg/m^3)
ISB	19 May	0.16	2.22	0.27	0.05	0.64	2.64	2.00
	22 June	0.19	0.92	0.11	0.02	0.89	1.13	0.67
	25 July	0.16	4.63	0.00	0.06	0.70	1.01	0.33
	24 Aug.	0.73	12.99	0.25	0.00	3.32	0.29	0.10
ISC	19 May	0.16	2.13	0.46	0.05	0.50	6.58	3.99
	22 June	0.20	0.83	0.07	0.02	0.32	0.69	0.57
	25 July	0.23	13.70	0.85	0.06	2.65	0.40	0.16
	24 Aug.	0.49	3.54	0.00	0.07	1.61	0.24	0.11
ISD	19 May	0.21	2.04	0.28	0.04	0.46	12.83	4.82
	22 June	0.17	0.55	0.04	0.01	0.36	0.81	0.58
	25 July	0.28	13.52	0.18	0.00	1.84	1.05	0.30
	24 Aug.	0.24	4.73	0.00	0.08	1.07	0.30	0.11
IPA	22 May	1.37	19.88	10.60	0.30	2.49	1.49	0.71
	21 June	0.46	10.30	0.28	0.06	0.51	0.64	0.29
	24 July	0.75	9.89	0.17	0.08	0.53	1.65	0.98
	23 Aug.	0.68	12.00	0.14	0.05	2.45	1.78	0.91
IPB	22 May	0.98	16.25	6.64	0.17	0.94	3.44	1.25
	21 June	0.41	8.74	0.19	0.04	0.45	0.59	0.30
	24 July	0.62	4.69	0.10	0.08	0.97	0.13	0.06
	23 Aug.	1.42	7.13	0.23	0.02	4.01	0.12	0.06
IPC	22 May	0.60	11.32	1.57	0.11	0.72	7.02	2.01
	21 June	0.56	6.99	0.16	0.07	0.30	0.44	0.21
	24 July	0.71	6.52	0.13	0.12	1.25	0.23	0.12
	23 Aug.	0.75	7.22	0.13	0.02	0.30	0.14	0.07
IPD	22 May	0.86	8.07	1.60	0.11	0.64	2.81	1.01
	21 June	0.45	8.73	0.14	0.05	0.92	0.54	0.29
	24 July	0.55	4.52	0.13	0.09	0.96	0.09	0.04
	23 Aug.	0.62	5.51	0.19	0.06	2.50	0.09	0.03

Table 5.— Mean zooplankton settled volumes (SV, ml) and total plankton settled volumes (TSV, ml) from vertical 20-m NORPAC hauls sampled in marine waters of the northern region of southeastern Alaska, May–August 2004. Station code acronyms are listed in Table 1. Asterisk denotes that separation of zooplankton from phytoplankton and slub was not distinct. Standing stock (ml/m^3) can be computed by dividing by the water volume filtered, a factor of 3.9 m^3.

Month	*n*	SV	TSV	*n*	SV	TSV	*n*	SV	TSV	*n*	SV	TSV
Inshore												
	Auke Bay			Taku Inlet								
	ABM			TKG			TKH			TKI		
May	4	14	22	1	11	11	1	23	23	1	9	24
June	3	10	37	1	11	15	1	14	14	1	*	100
July	3	11	11	—	—	—	—	—	—	—	—	—
August	3	*	60	—	—	—	—	—	—	—	—	—
Strait												
Upper Chatham Strait transect												
	UCA			UCB			UCC			UCD		
May	1	10	18	1	12	15	1	10	22	1	12	33
June	1	27	50	1	13	35	1	38	60	1	13	45
July	1	1	1	1	1	1	1	1	1	1	1	1
August	1	*	1	1	*	3	1	*	3	1	*	10
Icy Strait transect												
	ISA			ISB			ISC			ISD		
May	1	10	32	1	12	24	1	6	29	1	12	17
June	2	9	19	2	23	35	3	15	20	2	14	26
July	3	8	8	3	6	6	12	3	3	3	3	3
August	2	4	5	2	4	5	9	*	26	2	*	19
Coastal												
Icy Point transect												
	IPA			IPB			IPC			IPD		
May	1	28	28	1	20	20	1	14	14	1	13	13
June	1	*	3	1	*	2	1	*	3	1	10	10
July	1	2	2	1	3	3	1	4	4	1	200	200
August	1	4	4	1	1	1	1	3	3	1	3	3

Table 6.—Zooplankton displacement volumes (DV, ml), standing stock (DV/m^3), and total density (number/m^3) from shallow (20-m) and deep (≤ 200-m), day and night, double oblique bongo (333-and 505-µm mesh) hauls in the marine waters of Icy Strait in the northern region of southeastern Alaska, May–August 2004. Station codes for the Icy Strait transect are listed in Table 1.

Month	depth	DV	DV/m^3	Total density	depth	DV	DV/m^3	Total density	depth	DV	DV/m^3	Total density	depth	DV	DV/m^3	Total density
	ISA				**ISB**				**ISC**				**ISD**			
	333-µm mesh (daylight)															
May	60	73	0.86	1680	160	122	0.75	909	250	83	0.52	629	230	53	0.79	1135
June	20	28	1.13	2761	20	35	1.49	2767	20	22	0.87	1272	20	18	0.78	1204
	78	135	1.39	2142	175	160	0.94	1091	200	205	0.90	1017	175	131	0.68	767
July	22	9	0.29	705	15	10	0.37	1075	20	7	0.30	1512	20	6	0.23	1057
	88	85	0.82	1364	181	131	0.66	1094	200	142	0.61	1129	200	141	0.60	996
August	15	15	0.47	1556	20	8	0.25	1674	20	6	0.24	1035	19	4	0.12	1151
	70	20	0.19	761	177	80	0.37	729	229	90	0.40	665	220	97	0.40	402
	505-µm mesh (daylight)															
May	60	105	1.16	926	160	75	0.38	394	250	70	0.32	316	230	65	0.24	135
June	20	15	0.60	440	20	40	1.62	1431	20	10	0.39	460	20	12	0.52	248
	78	108	1.11	991	175	110	0.64	441	200	165	0.71	288	175	115	0.58	398
July	22	1	0.02	67	15	2	0.08	62	20	1	0.04	27	20	1	0.02	33
	88	65	0.63	475	181	89	0.45	375	200	100	0.43	276	200	110	0.47	358
August	15	1	0.01	6	20	1	0.03	17	20	2	0.08	33	19	1	0.03	11
	70	10	0.10	22	177	55	0.25	213	229	60	0.27	132	220	88	0.37	241

Table 6.—(cont.)

Month	depth	DV	DV/m³	Total density	depth	DV	DV/m³	Total density	depth	DV	DV/m³	Total density	depth	DV	DV/m³	Total density
	ISA				ISB				ISC				ISD			
								333-µm mesh (night)								
June	-	-	-	-	20	41	1.71	1436	-	-	-	-	-	-	-	-
					200	205	0.92	1667								
July	-	-	-	-	24	26	0.97	812	-	-	-	-	-	-	-	-
	-	-	-	-	232	168	0.74	960	-	-	-	-	-	-	-	-
August	-	-	-	-	17	25	1.03	1908	-	-	-	-	-	-	-	-
	-	-	-	-	221	137	0.59	833	-	-	-	-	-	-	-	-
								505-µm mesh (night)								
June	-	-	-	-	20	20	0.84	844	-	-	-	-	-	-	-	-
					200	275	1.23	650								
July	-	-	-	-	24	27	1.08	427	-	-	-	-	-	-	-	-
	-	-	-	-	232	143	0.63	360	-	-	-	-	-	-	-	-
August	-	-	-	-	17	25	1.04	334	-	-	-	-	-	-	-	-
	-	-	-	-	221	114	0.49	316	-	-	-	-	-	-	-	-

Table 7.—Numbers of fish and squid captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004.

Common name	Scientific name	Number caught June	July	August	Total
		Salmonids			
Chum salmon[1]	*Oncorhynchus keta*	2,854	237	50	3,141
Pink salmon[1]	*O. gorbuscha*	2,019	595	148	2,762
Sockeye salmon[1]	*O. nerka*	178	74	14	266
Coho salmon[1]	*O. kisutch*	70	94	135	299
Chinook salmon[1]	*O. tshawytscha*	12	7	4	23
Chinook salmon[2]	*O. tshawytscha*	12	21	2	35
Chum salmon[3]	*O. keta*	10	0	0	10
Pink salmon[3]	*O. gorbuscha*	1	7	0	8
Coho salmon[3]	*O. kisutch*	0	2	5	7
Sockeye salmon[3]	*O. nerka*	1	0	0	1
Total salmonids					6,552
		Non-salmonids			
Smelts	Osmeridae	4,006	0	0	4,006
Walleye pollock	*Theragra chalcogramma*	1,816	268	4	2,088
Pacific herring	*Clupea pallasi*	156	1	4	161
Painted greenling	*Oxylebius pictus*	132	0	0	132
Spiny dogfish	*Squalus acanthias*	4	2	118	124
Squid	Gonatidae	57	14	39	110
Pacific sandfish	*Trichodon trichodon*	68	2	0	70
Lampfish	Myctophidae	50	9	10	69
Crested sculpin	*Blepsias bilobus*	2	35	19	56
Eulachon	*Thaleichthys pacificus*	24	0	0	24
Pacific sandlance	*Ammodytes hexapterus*	13	0	0	13
Smooth lumpsucker	*Aptocyclus ventricosus*	8	2	1	11
Smoothtongue	*Leuroglossus stilbius schmidti*	10	0	1	11
Capelin	*Mallotus villosus*	10	0	0	10
Prowfish	*Zaprora silenus*	0	2	2	4
3 spine stickleback	*Gasterosteus aculeatus*	0	0	3	3
Wolf-eel	*Anarrhichthys ocellatus*	1	2	0	3
Salmon shark	*Lamna ditropis*	0	2	1	3
Black rockfish	*Sebastes melanops*	1	0	1	2
Lingcod	*Ophiodon elongates*	2	0	0	2
Walleye pollock larvae	*Theragra chalcogramma*	0	2	0	2
Starry flounder	*Platichthys stellatus*	1	0	0	1
Spiny lumpsucker	*Eumicrotremus orbis*	0	1	0	1

Table 7.—(Cont.)

Common name	Scientific name	Number caught			
		June	July	August	Total
Rockfish	*Sebastes sp.*	1	0	0	1
Arrowtooth flounder	*Atheresthes stomias*	1	0	0	1
Total non-salmonids					6,908
Total fish and squid		11,520	1,379	561	13,460

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

Table 8.—Frequency of occurrence of fishes and squid captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004. The percent occurrence of fish per 75 total hauls is shown in parentheses.

Common name	Scientific name	Frequency of occurrence				
		June	July	August	Total	(%)
	Salmonids					
Chum salmon[1]	*Oncorhynchus keta*	15	24	15	54	(72)
Pink salmon[1]	*O. gorbuscha*	13	23	20	56	(75)
Sockeye salmon[1]	*O. nerka*	12	18	8	38	(51)
Coho salmon[1]	*O. kisutch*	11	25	19	55	(73)
Chinook salmon[1]	*O. tshawytscha*	5	5	4	14	(19)
Chinook salmon[2]	*O. tshawytscha*	4	8	2	14	(19)
Chum salmon[3]	*O. keta*	6	0	0	6	(8)
Pink salmon[3]	*O. gorbuscha*	1	6	0	7	(9)
Coho salmon[3]	*O. kisutch*	0	2	4	6	(8)
Sockeye salmon[3]	*O. nerka*	1	0	0	1	(1)
	Non-salmonids					
Smelts	Osmeridae	3	0	0	3	(4)
Walleye pollock	*Theragra chalcogramma*	11	6	4	21	(28)
Pacific herring	*Clupea pallasi*	5	1	3	9	(12)
Painted greenling	*Oxylebius pictus*	1	0	0	1	(1)
Spiny dogfish	*Squalus acanthias*	2	1	2	5	(7)
Squid	Gonatidae	4	2	1	7	(9)
Pacific sandfish	*Trichodon trichodon*	6	2	0	8	(11)
Lampfish	Myctophidae	2	1	1	4	(5)
Crested sculpin	*Blepsias bilobus*	1	14	12	27	(36)
Eulachon	*Thaleichthys pacificus*	2	0	0	2	(3)
Pacific sandlance	*Ammodytes hexapterus*	2	0	0	2	(3)
Smooth lumpsucker	*Aptocyclus ventricosus*	3	2	1	6	(8)
Smoothtongue	*Leuroglossus stilbius schmidti*	1	0	1	2	(3)
Capelin	*Mallotus villosus*	2	0	0	2	(3)
Prowfish	*Zaprora silenus*	0	2	2	4	(5)
3 spine stickleback	*Gasterosteus aculeatus*	0	0	1	1	(1)
Wolf-eel	*Anarrhichthys ocellatus*	1	2	0	3	(4)
Salmon shark	*Lamna ditropis*	0	2	1	3	(4)
Black rockfish	*Sebastes melanops*	1	0	1	2	(3)
Lingcod	*Ophiodon elongates*	1	0	0	1	(1)
Walleye pollock larvae	*Theragra chalcogramma*	0	2	0	2	(3)
Starry flounder	*Platichthys stellatus*	1	0	0	1	(1)
Spiny lumpsucker	*Eumicrotremus orbis*	0	1	0	1	(1)
Rockfish	*Sebastes sp.*	1	0	0	1	(1)
Arrowtooth flounder	*Atheresthes stomias*	1	0	0	1	(1)

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

Table 9.—Length (mm, fork), weight (g), and condition [(g/mm^3)·(10^5)] of juvenile pink salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	205	71-124	88.9	0.5	6	117-141	128.0	3.3	58	123-215	155.4	2.3
Chatham	Weight	205	2.9-22.0	6.3	0.1	6	12.9-22.7	18.2	1.4	58	19.8-106.2	39.5	2.0
Strait	Condition	205	0.6-1.2	0.9	0.0	6	0.8-1.0	0.9	0.0	58	0.4-3.1	1.1	0.1
Icy	Length	708	69-136	100.5	0.4	432	99-168	130.2	0.5	89	132-211	168.3	1.7
Strait	Weight	432	3.5-19.5	9.4	0.1	403	7.7-47.0	21.5	0.3	87	24.8-97.4	46.9	1.5
	Condition	432	0.4-2.1	0.9	0.0	403	0.7-1.4	0.9	0.0	87	0.8-1.1	1.0	0.0
Icy	Length	1	113	113.0	0.0	67	91-164	122.7	1.4	1	164	164.0	0.0
Point	Weight	1	11.5	11.5	0.0	67	5.3-41.7	16.0	0.7	1	42.1	42.1	0.0
	Condition	1	0.8	0.8	0.0	67	0.5-1.6	0.0	0.1	1	1.0	1.0	0.0
Total	Length	914	69-136	97.9	0.3	505	91-168	129.2	0.5	148	123-215	163.2	1.4
	Weight	638	2.9-22.0	8.4	0.1	476	5.3-47.0	20.7	0.3	146	19.8-106.2	43.9	1.2
	Condition	638	0.4-2.1	0.9	0.0	476	0.5-1.6	0.9	0.0	146	0.4-3.1	1.0	0.0

Table 10.—Length (mm, fork), weight (g), and condition [$(g/mm^3)\cdot(10^5)$] of juvenile chum salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	496	73-121	97.3	0.4	2	123-160	141.5	18.5	25	119-223	163.8	5.5
Chatham	Weight	496	3.5-17.1	9.4	0.1	2	16.6-33.9	25.3	8.7	25	15.7-112.2	44.6	5.0
Strait	Condition	496	0.5-2.8	1.0	0.0	2	0.8-0.9	0.9	0.0	25	0.3-1.2	1.0	0.0
Icy	Length	1146	71-138	106.2	0.3	213	103-197	139.9	1.1	22	122-225	170.7	6.1
Strait	Weight	466	4.8-20.4	12.0	0.1	205	10.2-74.1	26.9	0.7	17	18.5-119.7	52.0	7.1
	Condition	466	0.6-1.9	1.0	0.0	205	0.6-1.2	0.9	0.0	17	0.9-1.1	1.0	0.0
Icy	Length	5	101-137	119.4	7.0	23	114-191	134.9	4.1	3	124-154	143.0	9.5
Point	Weight	—	—	—	—	23	11.8-65.5	23.4	2.9	3	16.5-30.8	25.6	4.6
	Condition	—	—	—	—	23	0.7-1.0	0.9	0.0	3	0.8-0.9	0.9	0.0
Total	Length	1647	71-138	103.6	0.2	238	103-197	139.4	1.1	50	119-225	165.6	4.0
	Weight	962	3.5-20.4	10.7	0.1	230	10.2-74.1	26.6	0.7	45	15.7-119.7	46.1	3.9
	Condition	962	0.5-2.8	1.0	0.0	230	0.6-1.2	0.9	0.0	45	0.3-1.2	1.0	0.0

Table 11.—Length (mm, fork), weight (g), and condition [(g/mm^3)·(10^5)] of juvenile sockeye salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	44	79-138	104.0	2.2	2	139-155	147.0	8.0	4	166-206	179.0	9.1
Chatham	Weight	44	5.2-29.1	12.3	0.8	2	25.6-40.3	33.0	7.3	4	49.6-93.5	63.3	10.2
Strait	Condition	44	0.4-2.4	1.1	0.0	2	1.0-1.1	1.0	0.1	4	1.1	1.1	0.0
Icy	Length	132	71-172	112.5	1.4	70	95-180	137.2	2.3	5	153-189	165.4	6.3
Strait	Weight	132	3.7-50.1	15.6	0.6	70	9.0-63.4	27.8	1.3	5	35.0-71.1	46.6	6.3
	Condition	132	0.2-1.8	1.1	0.0	70	0.9-1.4	1.0	0.0	5	1.0-1.1	1.0	0.0
Icy	Length	3	130-189	163.3	17.5	2	123-129	126.0	3.0	5	140-163	152.4	3.9
Point	Weight	3	21.0-69.0	47.8	14.1	2	15.9-20.5	18.2	2.3	5	23.6-41.3	33.3	3.3
	Condition	3	1.0-1.1	1.0	0.0	2	0.9-1.0	0.9	0.1	5	0.9-1.0	0.9	0.0
Total	Length	179	71-189	111.2	1.3	74	95-180	137.1	2.2	14	140-206	164.6	4.5
	Weight	179	3.7-69.0	15.4	0.6	74	9.0-63.4	27.7	1.3	14	23.6-93.5	46.6	4.8
	Condition	179	0.2-2.4	1.1	0.0	74	0.9-1.4	1.0	0.0	14	0.9-1.1	1.0	0.0

Table 12.—Length (mm, fork), weight (g), and condition $[(g/mm^3)\cdot(10^5)]$ of juvenile coho salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	38	121-195	159.4	3.0	3	219-227	222.7	2.3	5	213-257	229.2	7.5
Chatham	Weight	38	21.0-101.7	50.9	2.8	3	124.3-133.3	130.0	2.8	5	105.8-198.7	138.1	16.6
Strait	Condition	38	1.0-1.5	1.2	0.0	3	1.1-1.3	1.2	0.1	5	0.9-1.2	1.1	0.0
Icy	Length	32	125-237	181.4	4.9	81	157-249	201.0	2.4	130	188-302	146.3	1.7
Strait	Weight	31	22.0-158.7	71.1	5.6	81	42.7-204.1	99.3	3.8	129	79.1-341.6	185.1	4.0
	Condition	31	0.8-1.3	1.1	0.0	81	1.0-1.4	1.2	0.0	129	0.7-2.5	1.2	0.0
Icy	Length	—	—	—	—	10	182-243	214.4	6.5	—	—	—	—
Point	Weight	—	—	—	—	10	68.7-168.9	118.3	11.6	—	—	—	—
	Condition	—	—	—	—	10	1.1-1.3	1.2	0.0	—	—	—	—
Total	Length	70	121-237	169.5	3.0	94	157-249	203.1	2.3	135	188-302	245.7	1.7
	Weight	69	21.0-158.7	60.0	3.2	94	42.7-204.1	102.3	3.6	134	79.1-341.6	183.3	4.0
	Condition	69	0.8-1.5	1.2	0.0	94	1.0-1.4	1.2	0.0	134	0.7-2.5	1.2	0.0

Table 13.—Length (mm, fork), weight (g), and condition $[(g/mm^3)\cdot(10^5)]$ of juvenile chinook salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper Chatham Strait	Length	1	190	190.0	0.0	1	188	188.0	0.0	—	—	—	—
	Weight	1	99.6	99.6	0.0	1	84.4	84.4	0.0	—	—	—	—
	Condition	1	1.5	1.5	0.0	1	1.3	1.3	0.0	—	—	—	—
Icy Strait	Length	5	175-295	252.2	22.0	6	205-305	235.2	14.6	4	229-310	278.8	19.1
	Weight	2	60.5-220.8	140.7	80.2	4	116-185.7	159.1	15.0	4	143.8-377.7	289.1	54.1
	Condition	2	1.1-1.1	1.1	0.0	4	1.2-1.5	1.4	0.1	4	1.2-1.4	1.3	0.1
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	12	147-295	199.0	16.4	7	188-305	228.4	14.1	4	229-310	278.8	19.1
	Weight	9	33.9-220.8	70.4	20.0	5	84.4-185.7	144.2	18.9	4	143.8-377.7	289.1	54.1
	Condition	9	1.0-1.5	1.1	0.0	5	1.2-1.5	1.4	0.1	4	1.2-1.4	1.3	0.1

Table 14.—Data on salmon with a missing adipose fin, in addition to release and recovery information of coded-wire tagged chinook and coho salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004. 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	(mm)	(g)	Locality	Station code	Date	(mm)	(g)	Age	Days since release	Distance traveled (km)
						June									
Coho	04:10/10	2002	ADFG	Taku River (Wild)	5/15/04	88	6.2	Icy Strait	ISC	6/22/04	171	53.7	1.0	38	150
Coho	No tag	—	—	—	—	—	—	Icy Strait	ISB	6/22/04	169	40.4	—	—	—
Chinook	03:62/54	2001	NMFS	Little Port Walter	5/19/03	—	18.7	Icy Strait	ISA	6/22/04	450	1200	1.1	400	230
Chinook	04:07/25	2001	DIPAC	Fish Creek	6/12/03	—	23.9	Icy Strait	ISA	6/22/04	346	600	1.1	376	84
						July									
Coho	04:09/54	2002	AKI	Port Armstrong, AK	6/03/04	142	28.7	Icy Strait	ISC	7/28/04	217	116.5	1.0	440	240
Coho	04:48/43	2002	NSRAA	Kasnyku Bay	6/01/04	—	19.5	Icy Strait	ISC	7/25/04	213	107.6	1.0	46	140
Coho	No tag	—	—	—	—	—	—	Icy Strait	ISC	7/28/04	207	105.4	—	—	—
Chinook	04:04/53	2001	ADFG	Chilkat River (Wild)	4/11/03	—	—	Icy Strait	ISC	7/29/04	460	1150	1.1	475	150
Chinook	04:07/23	2001	DIPAC	Gastineau Channel	6/12/03	—	24.7	Icy Strait	ISC	7/29/04	403	800	1.1	413	130
Chinook	04:08/56	2002	NSRAA	Kasnyku Bay	6/04/04	—	35.4	Icy Strait	ISC	7/25/04	227	167.8	1.0	49	140
Chinook	04:08/56	2002	NSRAA	Kasnyku Bay	6/04/04	—	35.4	Icy Strait	ISC	7/28/04	228	168.9	1.0	52	140
Chinook	09:38/43	2002	ODFW	Clackamas River, OR	3/18/04	—	44.9	Icy Strait	ISC	7/25/04	305	390	1.0	129	~1600
						August									
Coho	04:06/94	2002	NSRAA	Kasnyku Bay	6/06/04	—	18.5	Icy Strait	ISA	8/25/04	277	256.2	1.0	443	140
Coho	04:06/94	2002	NSRAA	Kasnyku Bay	6/06/04	—	18.5	Icy Strait	ISA	8/25/04	277	256.2	1.0	443	140
Coho	04:09/31	2002	DIPAC	Gastineau Channel	6/09/04	—	21.2	Icy Strait	ISC	8/26/04	241	167	1.0	444	130
Coho	04:09/31	2002	DIPAC	Gastineau Channel	6/09/04	—	21.2	Icy Strait	ISA	8/25/04	249	196.3	1.0	445	130
Coho	04:06/94	2002	NSRAA	Kasnyku Bay	6/06/04	—	18.5	Icy Strait	ISA	8/25/04	277	256.2	1.0	443	140
Coho	04:06/94	2002	NSRAA	Kasnyku Bay	6/06/04	—	18.5	Icy Strait	ISA	8/25/04	277	256.2	1.0	443	140
Coho	04:09/31	2002	DIPAC	Gastineau Channel	6/09/04	—	21.2	Icy Strait	ISC	8/26/04	241	167	1.0	444	130

Table 14.—(Cont.)

		Release information						Recovery information							
Species	Coded-wire tag code	Brood year	Agency[1]	Locality	Date	(mm)	(g)	Locality	Station code	Date	(mm)	(g)	Age	Days since release	Distance traveled (km)
Coho	04:06/94	2002	NSRAA	Kasnyku Bay	6/06/04	—	18.5	Icy Strait	ISA	8/25/04	277	256.2	1.0	443	140
Coho	04:09/31	2002	DIPAC	Gastineau Channel	6/09/04	—	21.2	Icy Strait	ISC	8/26/04	241	167.0	1.0	444	130
Coho	04:09/31	2002	DIPAC	Gastineau Channel	6/09/04	—	21.2	Icy Strait	ISA	8/25/04	249	196.3	1.0	445	130
Coho	04:09/32	2002	DIPAC	Gastineau Channel	6/08/04	—	17.2	Icy Strait	ISB	8/25/04	234	142.4	1.0	445	130
Coho	No tag	—	—	—	—	—	—	Icy Strait	ISA	8/25/04	247	204.7	—	—	—
Coho	No tag	—	—	—	—	—	—	Icy Strait	ISC	8/26/04	225	137.5	—	—	—
Chinook	04:05/55	2000	DIPAC	Gastineau Channel	6/14/02	—	22.5	Icy Strait	ISC	8/26/04	600	2400	1.2	440	130
Chinook	04:06/88	2001	NSRAA	Kasnyku Bay	6/01/03	—	39.7	Icy Strait	ISC	8/26/04	440	1100	1.1	453	140
Chinook	No tag	—	—	—	—	—	—	Icy Strait	ISC	8/25/04	307	370.7	—	—	—
Chinook	No tag	—	—	—	—	—	—	Icy Strait	ISA	8/24/04	310	376.9	—	—	—

[1]ADFG = Alaska Department of Fish and Game; AKI = Armstrong Keta Inc.; DIPAC = Douglas Island Pink and Chum; NMFS = National Marine Fisheries Service; NSRAA = Northern Southeast Regional Aquaculture Association; ODFW = Oregon Department of Fish and Wildlife.

Table 15.—Stock-specific information on juvenile chum salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004. Length (mm, fork), weight (g), and condition [$(g/mm^3)\cdot(10^5)$] are reported for each stock group.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
DIPAC													
Upper	Length	408	73-121	98.7	0.4	—	—	—	—	3	163-188	174.7	7.3
Chatham	Weight	408	4.6-17.1	9.9	0.1	—	—	—	—	3	19.7-56.7	40.1	10.9
Strait	Condition	408	0.5-2.8	1.0	0.0	—	—	—	—	3	0.3-1.1	0.8	0.3
Icy	Length	360	85-130	107.4	0.4	18	123-166	143.4	2.6	2	167-225	196.0	29.0
Strait	Weight	360	5.2-20.4	12.3	0.1	18	16.4-41.4	28.7	1.5	2	47.4-119.7	83.6	36.2
	Condition	360	0.6-1.9	1.0	0.0	18	0.9-1.1	1.0	0.0	2	1.0-1.1	1.0	0.0
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	768	73-130	102.8	0.3	18	123-166	143.4	2.6	5	163-225	183.2	11.3
	Weight	768	4.6-20.4	11.0	0.1	18	16.4-41.4	28.7	1.5	5	19.7-119.7	57.5	16.7
	Condition	768	0.5-2.8	1.0	0.0	18	0.9-1.1	1.0	0.0	5	0.3-1.1	0.9	0.2
Hidden Falls													
Upper	Length	2	85-93	89.0	4.0	1	123	123.0	0.0	3	121-161	139.3	11.7
Chatham	Weight	2	6.6-8.1	7.4	0.8	1	16.6	16.6	0.0	3	16.0-42.1	27.0	7.8
Strait	Condition	2	1.0-1.1	1.0	0.0	1	0.9	0.9	0.0	3	0.9-1.0	0.9	0.0

Table 15.—(Cont.)

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Icy Strait	Length	3	101-117	107.0	5.0	43	111-158	131.8	2.0	1	185	185.0	0.0
	Weight	3	9.4-13.2	11.0	1.1	43	11.0-40.2	21.4	1.1	1	65.8	65.8	0.0
	Condition	3	0.8-1.0	0.9	0.0	43	0.6-1.1	0.9	0.0	1	1.0	1.0	0.0
Icy Point	Length	—	—	—	—	7	114-149	131.4	4.4	—	—	—	—
	Weight	—	—	—	—	7	11.8-30.5	20.4	2.4	—	—	—	—
	Condition	—	—	—	—	7	0.8-0.9	0.9	0.0	—	—	—	—
Total	Length	5	85-117	99.8	5.4	51	111-158	131.6	1.8	4	121-185	150.8	14.1
	Weight	5	6.6-13.2	9.6	1.1	51	11.0-40.2	21.2	1.0	4	16.0-65.8	36.7	11.2
	Condition	5	0.8-1.1	1.0	0.0	51	0.6-1.1	0.9	0.0	4	0.9-1.0	1.0	0.1
Neets Bay													
Upper Chatham Strait	Length	2	90-101	95.5	5.5	1	160	160.0	0.0	4	161-172	167.3	2.6
	Weight	2	9.1-13.5	11.3	2.2	1	33.9	33.9	0.0	4	39.9-53.7	47.8	3.2
	Condition	2	1.2-1.3	1.3	0.0	1	0.8	0.8	0.0	4	1.0-1.1	1.0	0.0
Icy Strait	Length	3	104-113	107.7	2.7	80	128-182	153.5	1.6	—	—	—	—
	Weight	3	9.5-15.2	12.3	1.6	80	14.8-63.8	34.2	1.1	—	—	—	—
	Condition	3	0.8-1.1	1.0	0.1	80	0.6-1.2	0.9	0.0	—	—	—	—
Icy Point	Length	—	—	—	—	2	148-153	150.5	2.5	—	—	—	—
	Weight	—	—	—	—	2	26.5-33.3	29.9	3.4	—	—	—	—
	Condition	—	—	—	—	2	0.8-0.9	0.9	0.1	—	—	—	—
Total	Length	5	90-113	102.8	3.8	83	128-182	153.5	1.6	4	161-172	167.3	2.6
	Weight	5	9.1-15.2	11.9	1.2	83	14.8-63.8	34.1	1.1	4	39.9-53.7	47.8	3.2
	Condition	5	0.8-1.3	1.1	0.1	83	0.6-1.2	0.9	0.0	4	1.0-1.1	1.0	0.0

Table 15.—(Cont.)

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Unmarked													
Upper	Length	75	76-113	90.9	0.8	—	—	—	—	15	119-223	165.5	8.4
Chatham	Weight	75	3.9-14.1	7.3	0.2	—	—	—	—	15	15.7-112.2	48.2	7.7
Strait	Condition	75	0.6-1.4	1.0	0.0	—	—	—	—	15	0.3-1.2	1.0	0.1
Icy	Length	74	82-129	106.7	1.1	143	103-197	135.5	1.3	13	122-222	161.8	7.7
Strait	Weight	74	4.8-18.6	11.5	0.4	143	10.2-74.1	24.3	0.8	13	18.5-115.5	46.8	7.4
	Condition	74	0.6-1.3	0.9	0.0	143	0.6-1.2	0.9	0.0	13	0.9-1.1	1.0	0.0
Icy	Length	—	—	—	—	14	117-191	134.4	6.3	3	124-154	143.0	9.5
Point	Weight	—	—	—	—	14	12.0-65.5	24.0	4.6	3	16.5-30.8	25.6	4.6
	Condition	—	—	—	—	14	0.7-1.0	0.9	0.0	3	0.8-0.9	0.9	0.0
Total	Length	149	76-129	98.8	0.9	157	103-197	135.4	1.3	31	119-223	161.8	5.3
	Weight	149	3.9-18.6	9.4	0.3	157	10.2-74.1	24.3	0.8	31	15.7-115.5	45.4	4.9
	Condition	149	0.6-1.4	0.9	0.0	157	0.6-1.2	0.9	0.0	31	0.3-1.2	1.0	0.0

Table 16.—Stock-specific information on juvenile sockeye salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004. Length (mm, fork), weight (g), and condition [$(g/mm^3) \cdot (10^5)$] are reported for each stock group.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Snettisham													
Upper	Length	8	85-121	108.3	4.3	—	—	—	—	1	166	166.0	0.0
Chatham	Weight	8	10.0-19.3	14.6	1.2	—	—	—	—	1	49.6	49.6	0.0
Strait	Condition	8	0.9-2.4	1.2	0.2	—	—	—	—	1	1.1	1.1	0.0
Icy	Length	27	91-172	113.9	3.1	5	146-169	157.0	4.6	—	—	—	—
Strait	Weight	27	10.2-26.7	15.9	0.8	5	33.2-53.4	40.6	3.6	—	—	—	—
	Condition	27	0.2-1.4	1.1	0.0	5	0.9-1.1	1.0	0.0	—	—	—	—
Icy	Length	—	—	—	—	1	129	129.0	0.0	—	—	—	—
Point	Weight	—	—	—	—	1	20.5	20.5	0.0	—	—	—	—
	Condition	—	—	—	—	1	1.0	1.0	0.0	—	—	—	—
Total	Length	35	85-172	112.6	2.6	6	129-169	152.3	6.0	1	166	166.0	0.0
	Weight	35	10.0-26.7	15.6	0.7	6	20.5-53.4	37.2	4.4	1	49.6	49.6	0.0
	Condition	35	0.2-2.4	1.1	0.1	6	0.9-1.1	1.0	0.0	1	1.1	1.1	0.0
Tatsamenie Lake (Total)													
Upper	Length	3	97-123	109.0	7.6	2	136-137	136.5	0.5	—	—	—	—
Chatham	Weight	3	8.8-17.8	11.9	3.0	2	27.0-27.6	27.3	0.3	—	—	—	—
Strait	Condition	3	0.7-1.0	0.9	0.1	2	1.1	1.1	0.0	—	—	—	—

Table 16.—(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
Unmarked													
Upper	Length	34	79-138	103.7	2.6	2	139-155	147.0	8.0	3	171-206	183.3	11.3
Chatham	Weight	34	5.2-29.1	12.0	0.9	2	25.6-40.3	33.0	7.3	3	53.0-93.5	67.8	12.9
Strait	Condition	34	0.4-2.3	1.1	0.0	2	1.0-1.1	1.0	0.1	3	1.1-1.1	1.1	0.0
Icy	Length	101	71-171	112.3	1.7	62	95-180	136.0	2.4	5	153-189	165.4	6.3
Strait	Weight	101	3.7-50.1	15.7	0.8	62	9.0-63.4	26.9	1.4	5	35.0-71.1	46.6	6.3
	Condition	101	0.7-1.8	1.1	0.0	62	0.9-1.4	1.0	0.0	5	1.0-1.1	1.0	0.0
Icy	Length	2	171-189	180.0	9.0	1	123	123.0	0.0	5	140-163	152.4	3.9
Point	Weight	2	53.3-69.0	61.2	7.9	1	15.9	15.9	0.0	5	23.6-41.3	33.3	3.3
	Condition	2	1.0-1.1	1.0	0.0	1	0.9	0.9	0.0	5	0.9-1.0	0.9	0.0
Total	Length	137	71-189	111.2	1.6	65	95-180	136.1	2.3	13	140-206	164.5	4.9
	Weight	137	3.7-69.0	15.5	0.8	65	9.0-63.4	27.0	1.3	13	23.6-93.5	46.4	5.2
	Condition	137	0.4-2.3	1.1	0.0	65	0.9-1.4	1.0	0.0	13	0.9-1.1	1.0	0.0

Table 17.—Stock-specific information on juvenile coho salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004. Length (mm, fork), weight (g), and condition [$(g/mm^3)\cdot(10^5)$] are reported for each stock group.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
DIPAC													
Upper	Length	1	156	156.0	0.0	—	—	—	—	2	213-222	217.5	4.5
Chatham	Weight	1	39.6	39.6	0.0	—	—	—	—	2	112.9-128.1	120.5	7.6
Strait	Condition	1	1.0	1.0	0.0	—	—	—	—	2	1.2	1.2	0.0
Icy	Length	—	—	—	—	3	177-189	184.7	3.8	17	213-270	239.2	3.6
Strait	Weight	—	—	—	—	3	60.9-81.0	72.5	6.0	17	108.4-209.9	163.9	7.4
	Condition	—	—	—	—	3	1.1-1.2	1.1	0.1	17	1.1-1.3	1.2	0.0
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	1	156	156.0	0.0	3	177-189	184.7	3.8	19	213-270	236.9	3.6
	Weight	1	39.6	39.6	0.0	3	60.9-81.0	72.5	6.0	19	108.4-209.9	159.4	7.3
	Condition	1	1.0	1.0	0.0	3	1.1-1.2	1.1	0.0	19	1.1-1.3	1.2	0.0
Port Armstrong													
Upper	Length	1	190	190.0	0.0	—	—	—	—	—	—	—	—
Chatham	Weight	1	75.1	75.1	0.0	—	—	—	—	—	—	—	—
Strait	Condition	1	1.1	1.1	0.0	—	—	—	—	—	—	—	—
Icy	Length	—	—	—	—	1	214	214.0	0.0	—	—	—	—
Strait	Weight	—	—	—	—	1	113.1	113.1	0.0	—	—	—	—
	Condition	—	—	—	—	1	1.2	1.2	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
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	1	190	190.0	0.0	1	214	214.0	0.0	—	—	—	—
	Weight	1	75.1	75.1	0.0	1	113.1	113.1	0.0	—	—	—	—
	Condition	1	1.1	1.1	0.0	1	1.2	1.2	0.0	—	—	—	—
Unmarked													
Upper	Length	36	121-195	158.7	3.0	3	219-227	222.7	2.3	3	224-257	237.0	10.1
Chatham	Weight	36	21.0-101.7	50.6	2.9	3	124.3-133.3	130.0	2.8	3	105.8-198.7	149.8	26.9
Strait	Condition	36	1.0-1.5	1.2	0.0	3	1.1-1.3	1.2	0.1	3	0.9-1.2	1.1	0.1
Icy	Length	30	125-237	182.1	5.2	77	157-249	201.4	2.5	106	188-302	247.2	2.0
Strait	Weight	30	22.0-158.7	71.4	5.7	77	42.7-204.1	100.2	4.0	106	79.1-341.6	188.2	4.5
	Condition	30	0.8-1.3	1.1	0.0	77	1.0-1.4	1.2	0.0	106	0.7-2.5	1.2	0.0
Icy	Length	—	—	—	—	10	182-243	214.4	6.5	—	—	—	—
Point	Weight	—	—	—	—	10	68.7-168.9	118.3	11.6	—	—	—	—
	Condition	—	—	—	—	10	1.1-1.3	1.2	0.0	—	—	—	—
Total	Length	66	121-237	169.3	3.2	90	157-249	203.6	2.3	109	188-302	246.9	1.9
	Weight	66	21.0-158.7	60.1	3.3	90	42.7-204.1	103.2	3.7	109	79.1-341.6	187.1	4.4
	Condition	66	0.8-1.5	1.2	0.0	90	1.0-1.4	1.2	0.0	109	0.7-2.5	1.2	0.0

Table 18.—Stock-specific information on juvenile chinook salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2004. Length (mm, fork), weight (g), and condition $[(g/mm^3)\cdot(10^5)]$ are reported for each stock group.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Hidden Falls													
Upper	Length	1	190	190.0	0.0	—	—	—	—	—	—	—	—
Chatham	Weight	1	99.6	99.6	0.0	—	—	—	—	—	—	—	—
Strait	Condition	1	1.5	1.5	0.0	—	—	—	—	—	—	—	—
Icy	Length	1	175	175.0	0.0	2	227-228	227.5	0.5	1	269	269.0	0.0
Strait	Weight	1	60.5	60.5	0.0	2	167.2-167.5	167.4	0.1	1	270.0	270.0	0.0
	Condition	1	1.1	1.1	0.0	2	1.4-1.4	1.4	0.0	1	1.4	1.4	0.0
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	2	175-190	182.5	7.5	2	227-228	227.5	0.5	1	269	269.0	0.0
	Weight	2	60.5-99.6	80.1	19.5	2	167.2-167.5	167.4	0.1	1	270.0	270.0	0.0
	Condition	2	1.1-1.5	1.3	0.2	2	1.4-1.4	1.4	0.0	1	1.4	1.4	0.0
Unmarked													
Upper	Length	—	—	—	—	1	188	188.0	0.0	—	—	—	—
Chatham	Weight	—	—	—	—	1	84.4	84.4	0.0	—	—	—	—
Strait	Condition	—	—	—	—	1	1.3	1.3	0.0	—	—	—	—
Icy	Length	1	272	272.0	0.0	1	213	213.0	0.0	3	229-310	282.0	26.5
Strait	Weight	1	220.8	220.8	0.0	1	116.0	116.0	0.0	3	143.8-377.7	295.4	75.9
	Condition	1	1.1	1.1	0.0	1	1.2	1.2	0.0	3	1.2-1.3	1.2	0.0

Table 18.—(Cont.)

Locality	Factor	June				July				August			
		n	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	1	272	272.0	0.0	2	188-213	200.5	12.5	3	229-310	282.0	26.5
	Weight	1	220.8	220.8	0.0	2	84.4-116.0	100.2	15.8	3	143.8-377.7	295.4	75.9
	Condition	1	1.1	1.1	0.0	2	1.2-1.3	1.2	0.0	3	1.2-1.3	1.2	0.0

Table 19.—Number of potential predators of juvenile salmon examined at sea, captured by rope trawl in the marine waters of the northern region of southeastern Alaska, May–August 2004.

Predator species	Life history stage	Number examined	Number empty	Percent feeding	Number with salmon	Percent feeders with salmon
			Salmonids			
Pink salmon	Adult	7	1	85.7	0	0
Chum salmon	Adult	10	0	100.0	0	0
Sockeye salmon	Adult	1	0	100.0	0	0
Coho salmon	Adult	6	0	100.0	3	50
Chinook salmon	Immature	34	5	85.3	1	3.4
			Non-salmonids			
Spiny dogfish	Adult	42	19	54.8	0	0
Starry flounder	Adult	1	0	100.0	0	0
Black rockfish	Adult	2	0	100.0	0	0
Pacific sandfish	Adult	1	1	0	0	0
Walleye pollock	Immature	95	6	93.7	0	0
Total		199	32	16.1	4	2.4

Appendix 1.—Catch and life history stage of salmonids captured in marine waters of the northern region of southeastern Alaska, June–August 2004. Nocturnal rope trawl hauls are denoted by one asterisk, 40-min rope trawl hauls are denoted by two asterisks, and nocturnal two-boat trawls are denoted by one plus sign.

			Juvenile					Immature	Adult			
Date	Haul#	Station	Pink	Chum	Sockeye	Coho	Chinook	Chinook	Pink	Chum	Sockeye	Coho
21-June	8019	IPA	—	—	—	—	—	—	—	—	—	—
21-June	8020	IPB	—	4	3	—	—	—	—	1	—	—
21-June	8023	IPA	1	1	—	—	—	—	—	—	—	—
21-June	8024	IPB	—	—	—	—	—	—	1	—	—	—
22-June	8025	ISA	4	115	—	2	—	5	—	1	—	—
22-June	8026	ISB	32	49	4	6	1	—	—	—	—	—
22-June	8027	ISC	20	27	3	4	—	—	—	—	—	—
22-June	8028	ISD	21	156	8	3	—	—	—	1	—	—
23-June	8029	UCA	139	208	11	5	1	—	—	—	—	—
23-June	8030	UCB	18	78	8	6	—	1	—	—	—	—
23-June	8031	UCC	40	163	14	21	—	—	—	—	—	—
23-June	8032	UCD	8	105	10	6	—	—	—	—	—	—
24-June	8033	TKI	—	—	—	—	6	—	—	—	—	—
24-June	8034	TKH	—	—	—	—	—	—	—	—	—	—
24-June	8035	TKG	—	—	—	—	—	—	—	—	—	—
25-June	8036	ISA	28	41	1	3	—	2	—	—	1	—
25-June	8037	ISB	641	665	45	12	3	4	—	1	—	—
25-June	8038	ISC	901	864	36	2	—	—	—	—	—	—
25-June	8039	ISD	166	375	35	—	1	—	—	1	—	—
26-June	8040+	ISC	30	90	4	—	—	—	—	—	—	—
26-June	8041+	ISC	36	70	4	1	—	—	—	—	—	—
26-June	8042+	ISC	43	185	3	—	—	—	1	—	—	—
26-June	8043+	ISD	—	1	—	—	—	—	—	—	—	—
27-June	8044+	ISD	—	—	—	—	—	—	—	—	—	—
27-June	8045+	ISD	—	—	—	—	—	—	—	—	—	—
27-June	8046+	ISC	35	90	—	—	—	—	—	—	—	—

Appendix 1.—(Cont.)

			Juvenile					Immature	Adult			
Date	Haul#	Station	Pink	Chum	Sockeye	Coho	Chinook	Chinook	Pink	Chum	Sockeye	Coho
27-June	8047+	ISC	14	35	3	—	—	—	—	—	—	—
27-June	8048+	ISC	7	10	1	2	—	—	—	—	—	—
27-June	8049+	ISC	1	5	—	—	—	—	—	—	—	—
27-June	8050+	ISC	13	39	2	—	—	—	—	—	—	—
28-June	8051*	ISC	—	3	—	—	—	—	—	5	—	—
27-June	8052+	ISC	1	19	1	—	—	—	—	—	—	—
27-June	8053+	ISC	4	29	3	1	—	—	—	—	—	—
24-July	8055	IPA	12	8	2	1	—	—	—	—	—	—
24-July	8056	IPA	21	9	—	4	—	—	—	—	—	—
24-July	8057	IPB	30	2	—	1	—	—	—	—	—	—
24-July	8058	IPB	10	3	—	4	—	—	—	—	—	—
25-July	8061	ISA	10	8	11	7	—	2	1	—	—	—
25-July	8062	ISB	16	10	3	1	—	—	—	—	—	—
25-July	8063	ISC	80	36	6	2	2	—	—	—	—	—
25-July	8064	ISD	3	1	1	—	—	—	—	—	—	—
26-July	8065	ISA	—	2	—	—	—	1	—	—	—	—
26-July	8066	ISB	2	1	—	2	—	—	—	—	—	—
26-July	8067	ISC	11	11	—	2	—	1	—	—	—	—
26-July	8068	ISD	—	—	1	—	—	—	1	—	—	—
27-July	8069	UCD	—	—	1	1	—	—	—	—	—	—
27-July	8070	UCC	6	2	—	1	—	1	—	—	—	—
27-July	8071	UCB	—	—	—	1	1	—	—	—	—	—
27-July	8072	UCA	—	—	1	—	—	—	—	—	—	1
28-July	8073	ISA	—	—	—	1	—	2	2	—	—	—
28-July	8074	ISB	2	5	2	2	—	—	—	—	—	—
28-July	8075	ISC	13	7	1	12	1	—	—	—	—	—
28-July	8076	ISD	22	9	—	3	—	—	—	—	—	—
29-July	8077	ISC	39	5	9	3	—	—	—	—	—	—

Appendix 1.—(Cont.)

Date	Haul#	Station	Juvenile Pink	Juvenile Chum	Juvenile Sockeye	Juvenile Coho	Juvenile Chinook	Immature Chinook	Adult Pink	Adult Chum	Adult Sockeye	Adult Coho
29-July	8078	ISC	8	4	4	1	—	—	—	—	—	—
29-July	8079	ISC	31	8	4	7	1	—	—	—	—	—
29-July	8080	ISC	22	2	—	13	—	9	—	—	—	—
29-July	8081	ISC	8	4	4	5	—	1	1	—	—	—
29-July	8082	ISC	6	2	8	1	—	—	1	—	—	—
30-July	8083	ISC	83	39	5	10	—	—	—	—	—	—
30-July	8084	ISC	106	26	7	5	—	—	—	—	—	1
30-July	8085*	ISC	54	33	4	4	2	4	1	—	—	—
21-August	8087	UCD	—	1	—	3	—	—	—	—	—	—
21-August	8088	UCC	19	8	2	1	—	—	—	—	—	—
22-August	8089	UCB	33	6	—	—	—	—	—	—	—	—
22-August	8090	UCA	6	10	2	1	—	—	—	—	—	2
23-August	8091	IPA	—	1	2	—	—	—	—	—	—	—
23-August	8092	IPA	1	2	3	—	—	—	—	—	—	—
23-August	8093	IPB	—	—	—	—	—	—	—	—	—	—
23-August	8094	IPB	—	—	—	—	—	—	—	—	—	—
24-August	8097	ISA	11	2	—	20	1	—	—	—	—	—
24-August	8098	ISB	—	3	—	16	1	—	—	—	—	—
24-August	8099	ISC	2	—	—	3	—	—	—	—	—	—
24-August	8100	ISD	1	—	—	—	—	—	—	—	—	—
25-August	8101	ISA	—	—	—	28	—	—	—	—	—	—
25-August	8102	ISB	3	—	—	5	—	—	—	—	—	—
25-August	8103	ISC	3	1	—	5	1	—	—	—	—	1
25-August	8104**	ISC	3	2	—	11	1	—	—	—	—	—
25-August	8105	ISD	4	2	—	6	—	—	—	—	—	—
26-August	8106	ISC	2	—	—	3	—	—	—	—	—	—
26-August	8107**	ISC	1	—	1	17	—	—	—	—	—	1
26-August	8108	ISC	2	1	—	1	—	—	—	—	—	—

Appendix 1.—(Cont.)

			Juvenile					Immature	Adult			
Date	Haul#	Station	Pink	Chum	Sockeye	Coho	Chinook	Chinook	Pink	Chum	Sockeye	Coho
26-August	8109**	ISC	4	2	—	1	—	1	—	—	—	—
26-August	8110	ISC	2	—	—	—	—	—	—	—	—	—
26-August	8111**	ISC	16	5	2	7	—	1	—	—	—	1
27-August	8112**	ISC	29	4	1	4	—	—	—	—	—	—
27-August	8113	ISC	3	—	—	1	—	—	—	—	—	—
28-August	8114*	ISC	3	—	1	2	—	—	—	—	—	—

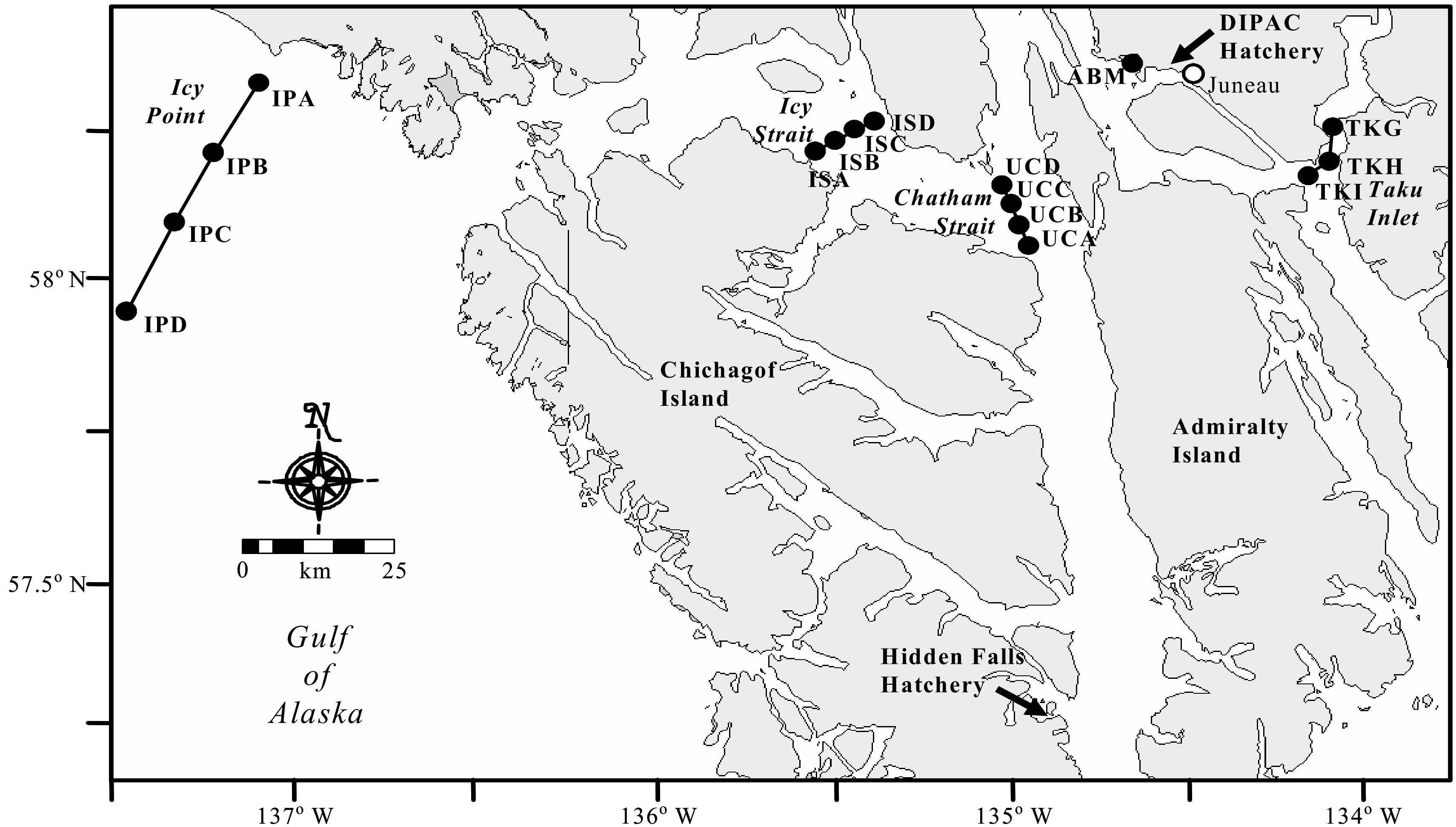

Figure 1.—Stations sampled in marine waters of the northern region of southeastern Alaska, May–August 2004. Small arrows indicate two major enhancement facilities: Douglas Island Pink and Chum (DIPAC) Hatchery and Hidden Falls Hatchery.

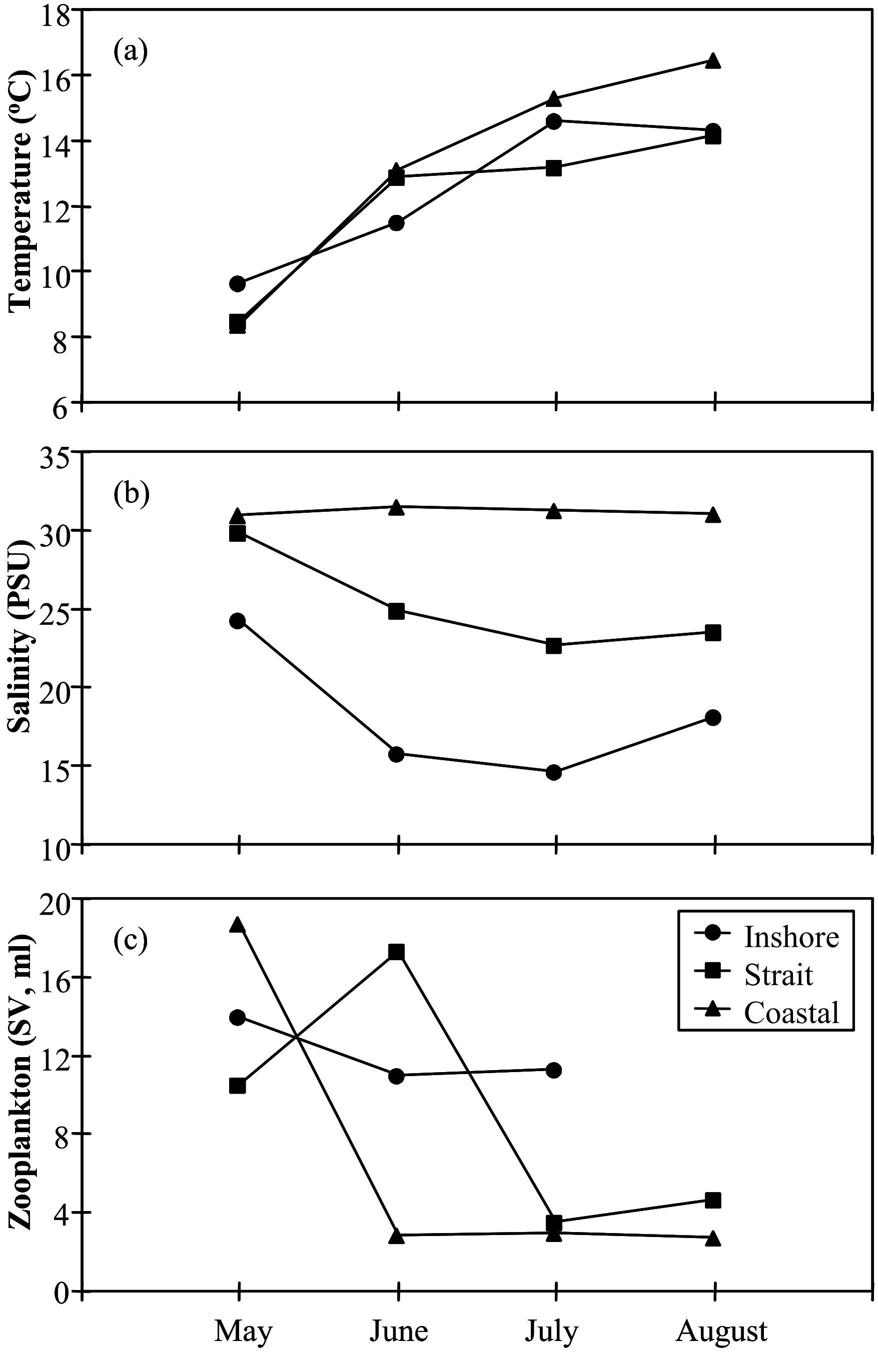

Figure 2.—Surface temperature (3 m, a), salinity (3 m, b), and zooplankton settled volumes from vertical NORPAC hauls (20 m, c) in inshore, strait, and coastal marine habitats of the northern region of southeastern Alaska, May–August 2004. Zooplankton standing stock (ml/m^3) can be computed by dividing by water volume filtered, a factor of 3.9 m^3 for these samples.

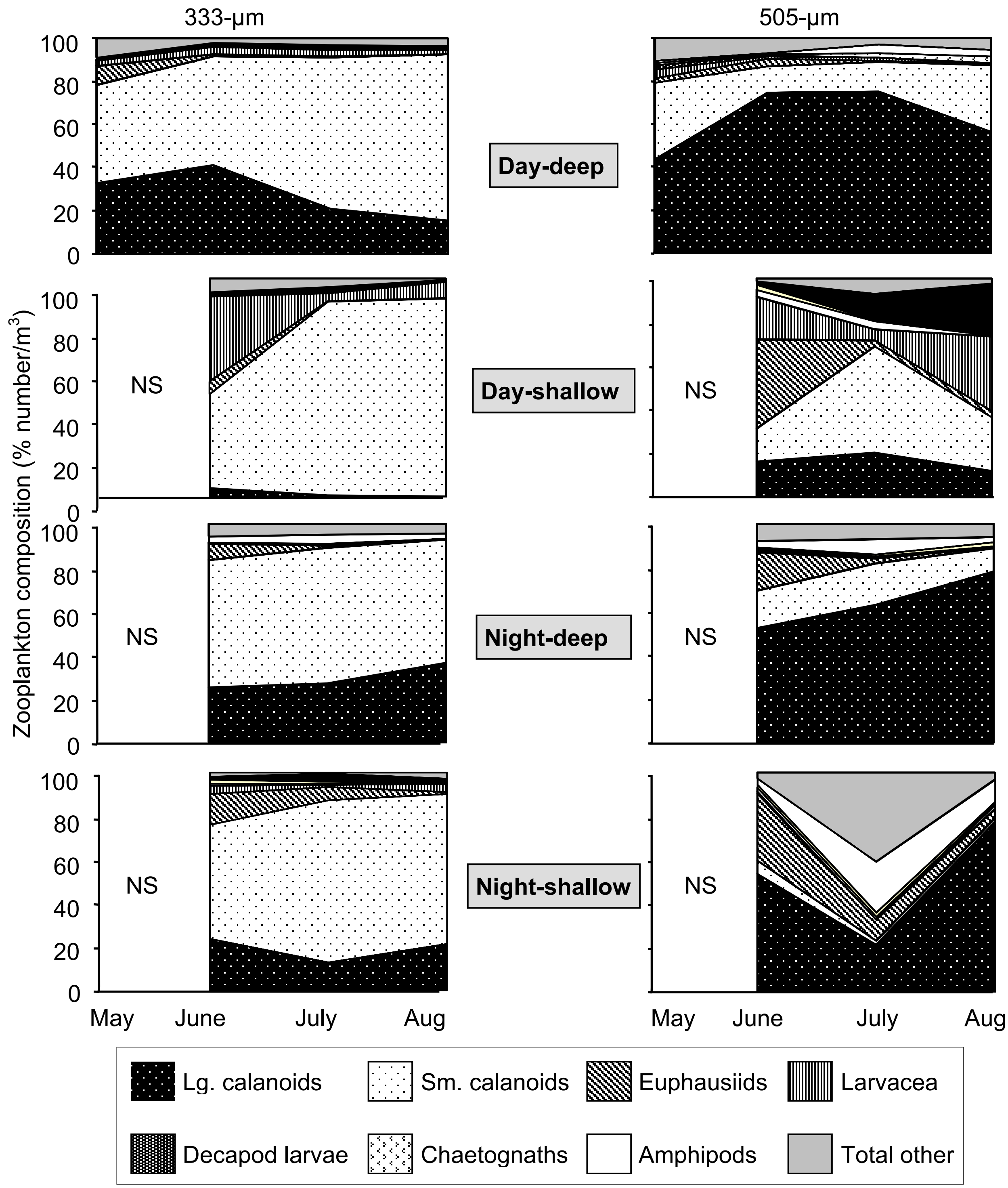

Figure 3.— Monthly zooplankton composition (percent number per m^3) from day and night, shallow (20-m) and deep ($\leq$ 200-m) double oblique bongo net samples collected at station ISC in Icy Strait in the northern region of southeastern Alaska, May-August 04. Left panels represent 333-µm mesh, right panels represent 505-µm mesh. NS indicates no sample.

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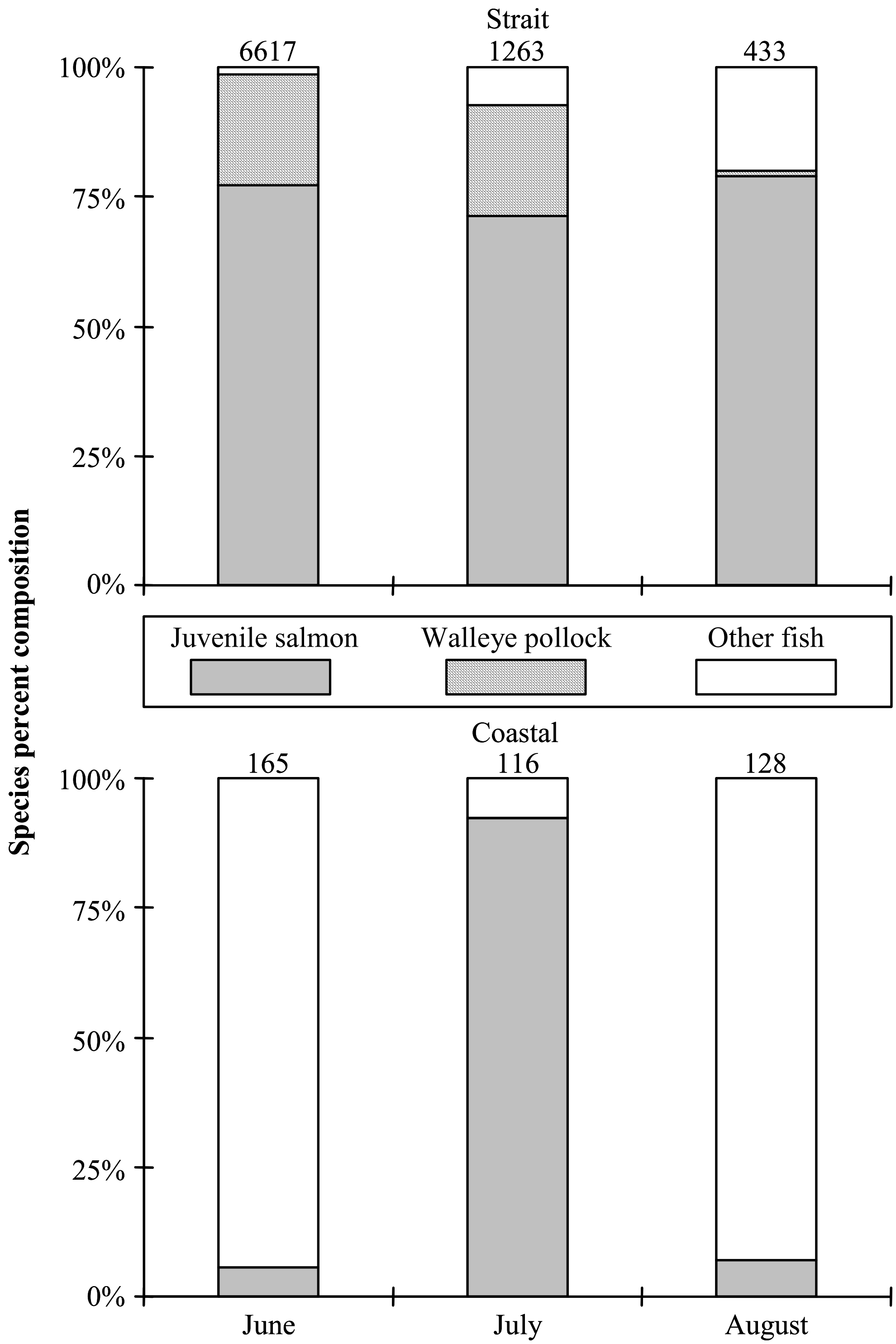

Figure 4.—Fish composition from rope trawl catches in strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2004. Number of fish is indicated above each bar.

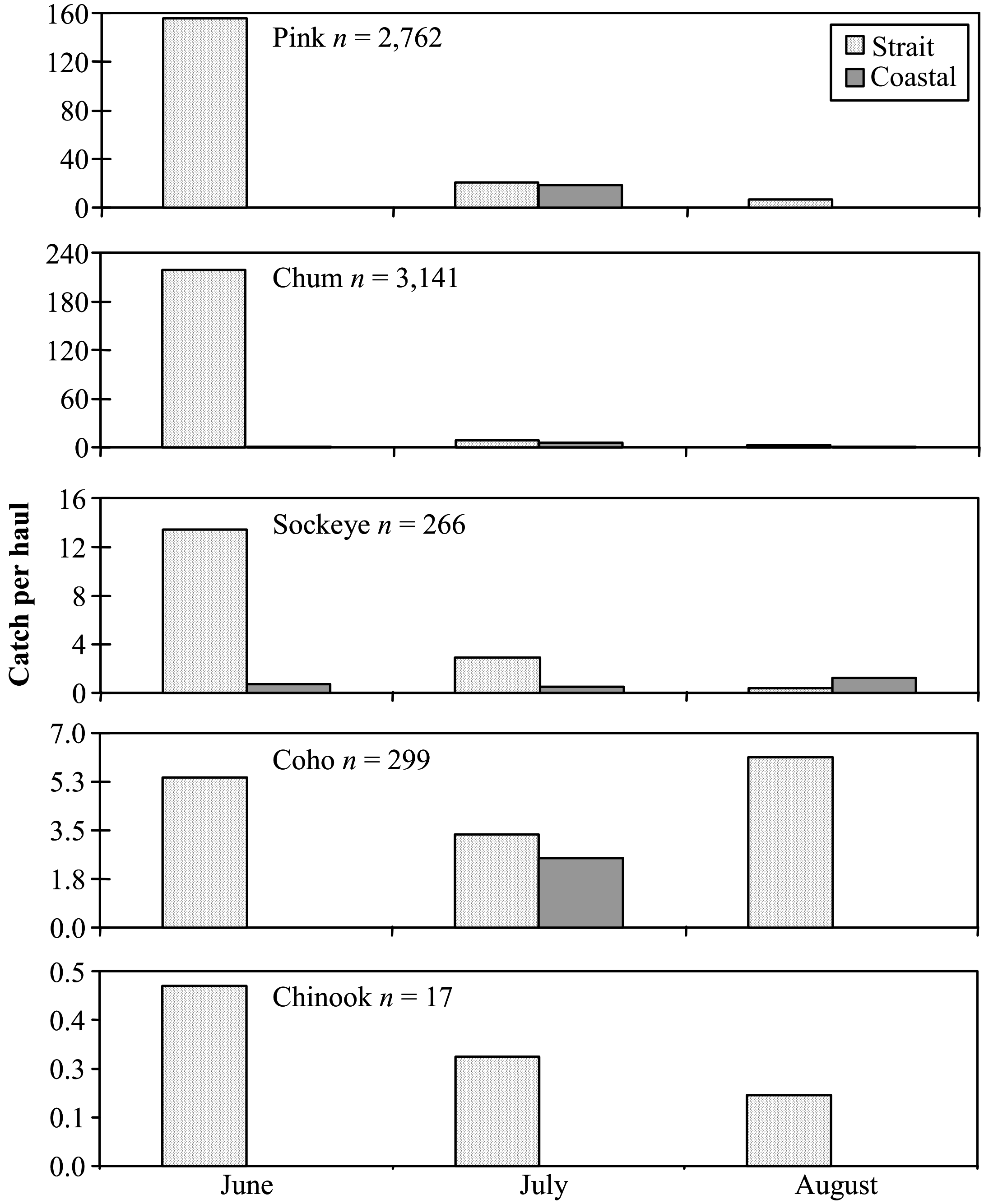

Figure 5.—Mean catch per rope trawl haul of juvenile salmon in strait and coastal marine habitats of the northern region of southeastern Alaska, June–August, 2004.

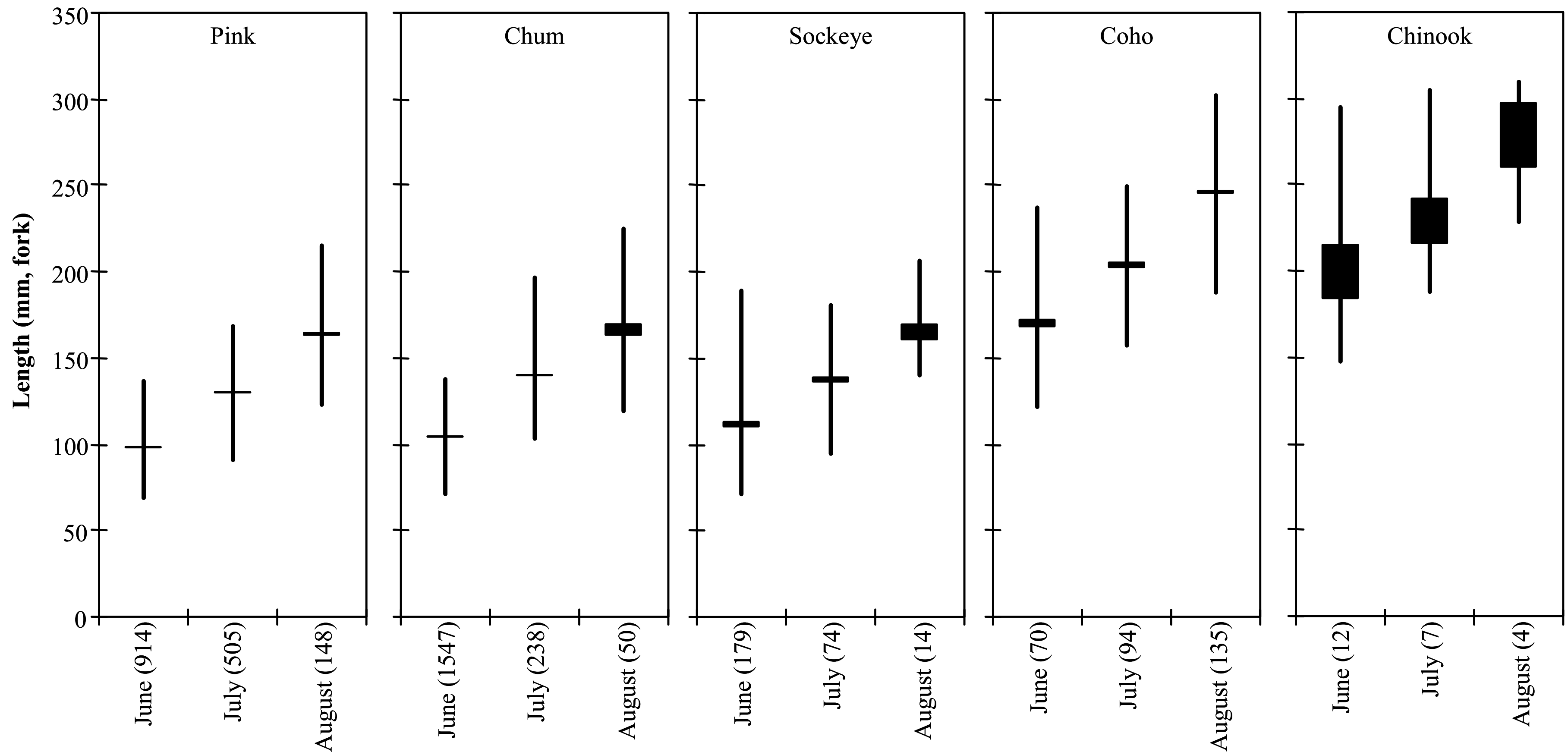

Figure 6.—Length (mm, fork) of juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004. Length of vertical bars is the size range for each sample, and the boxes within the size range are one standard error on either side of the mean. Sample sizes are shown in parentheses.

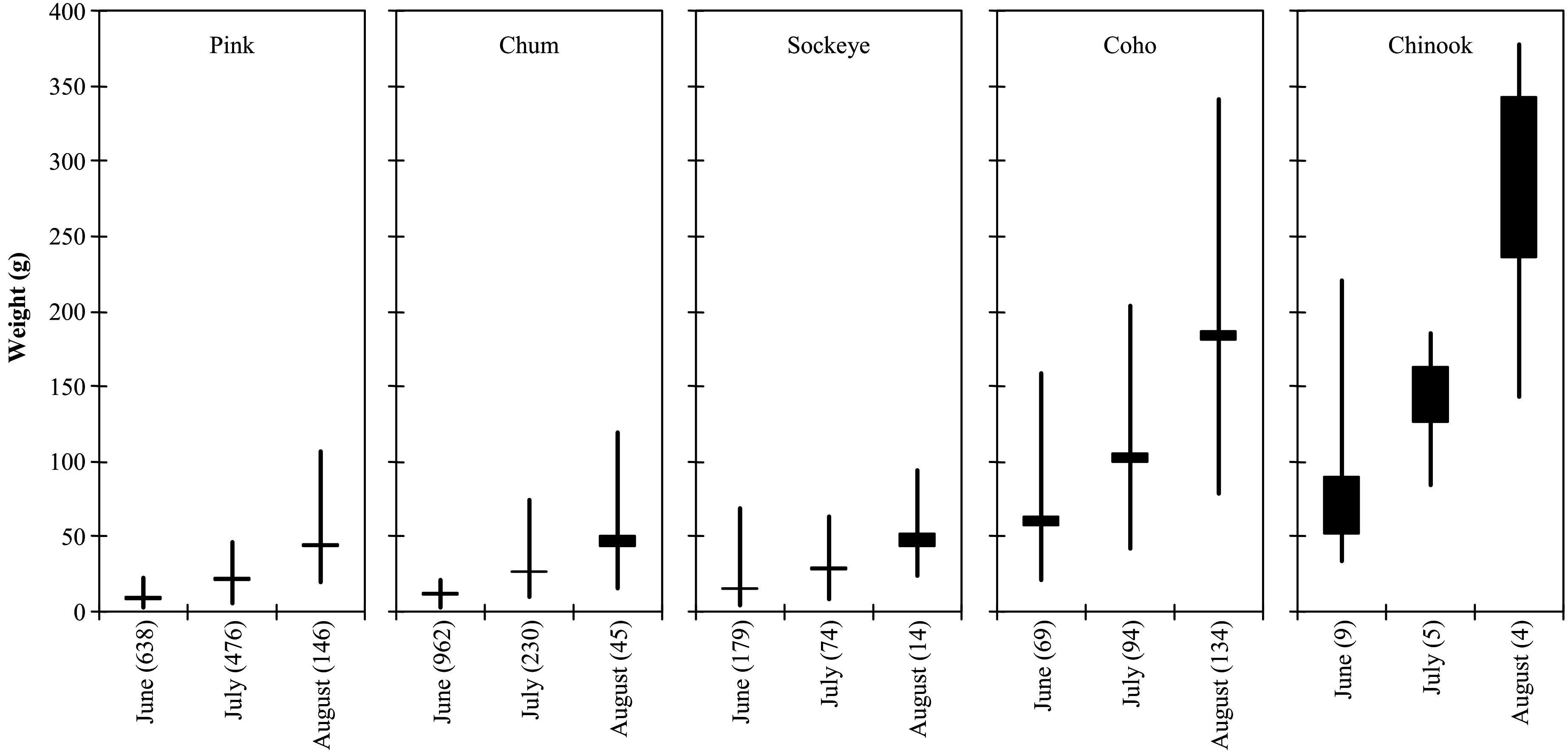

Figure 7.—Weight (g) of juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004. Length of vertical bars is the size range for each sample, and the bars within the size range are one standard error on either side of the mean. Sample sizes are shown in parentheses.

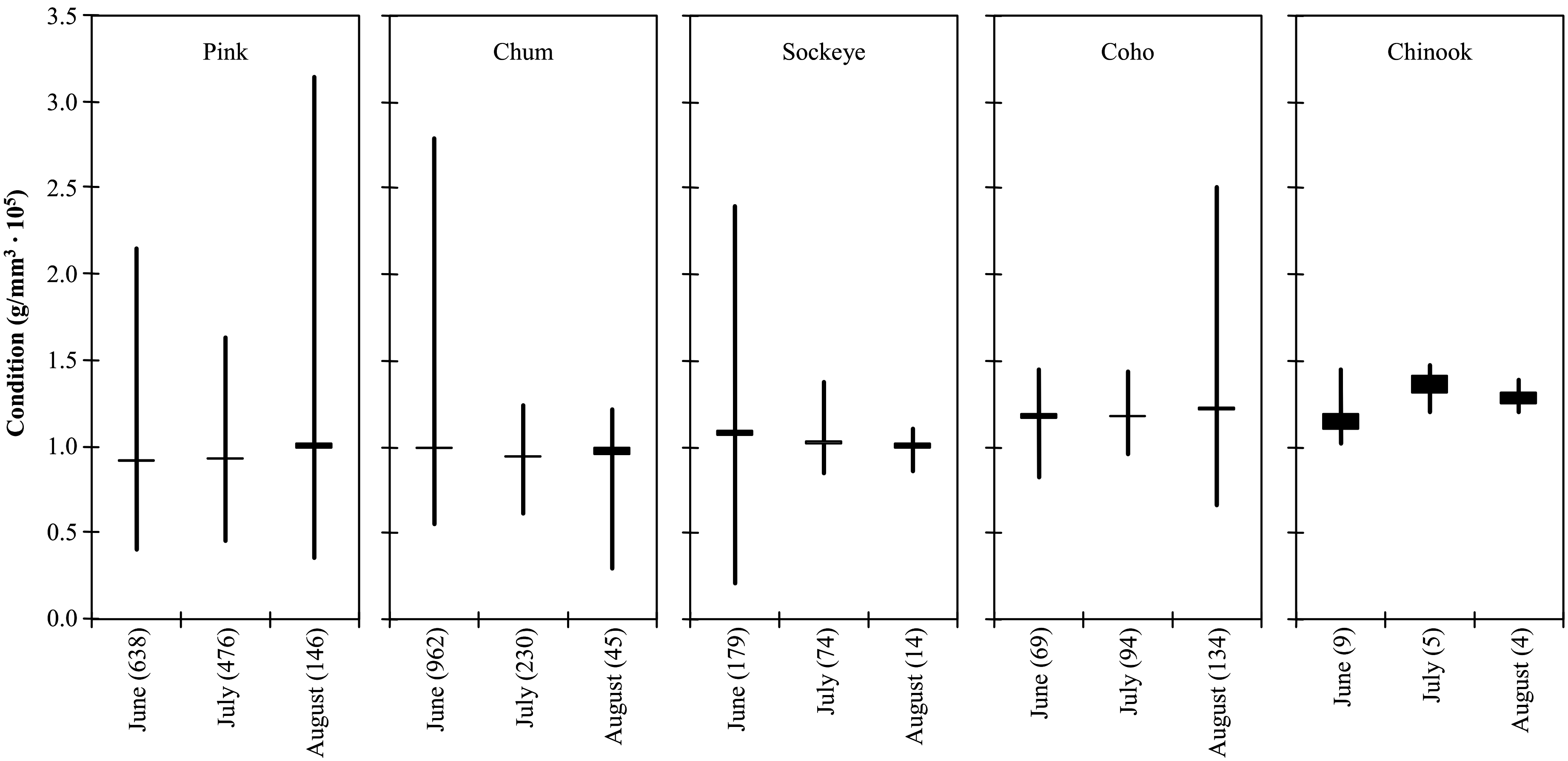

Figure 8.—Fulton's condition (g/mm^3 · 10^5) of juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004. Length of vertical bars is the size range for each sample, and the boxes within the size range are one standard error on either side of the mean. Sample sizes are shown in parentheses.

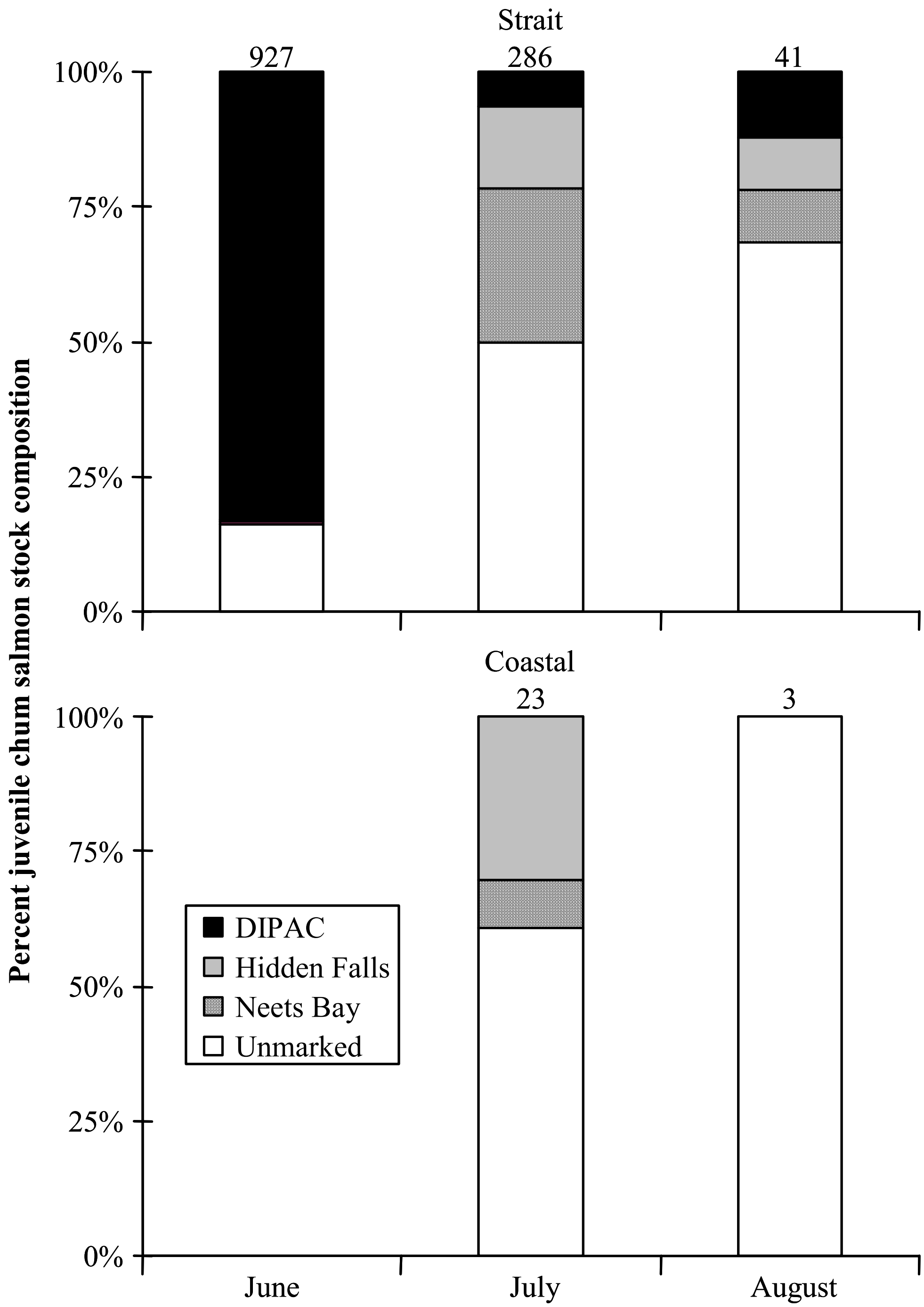

Figure 9.—Monthly stock composition of juvenile chum salmon based on otolith thermal marks in strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2004. Number of salmon sampled per month and habitat is indicated above each bar.

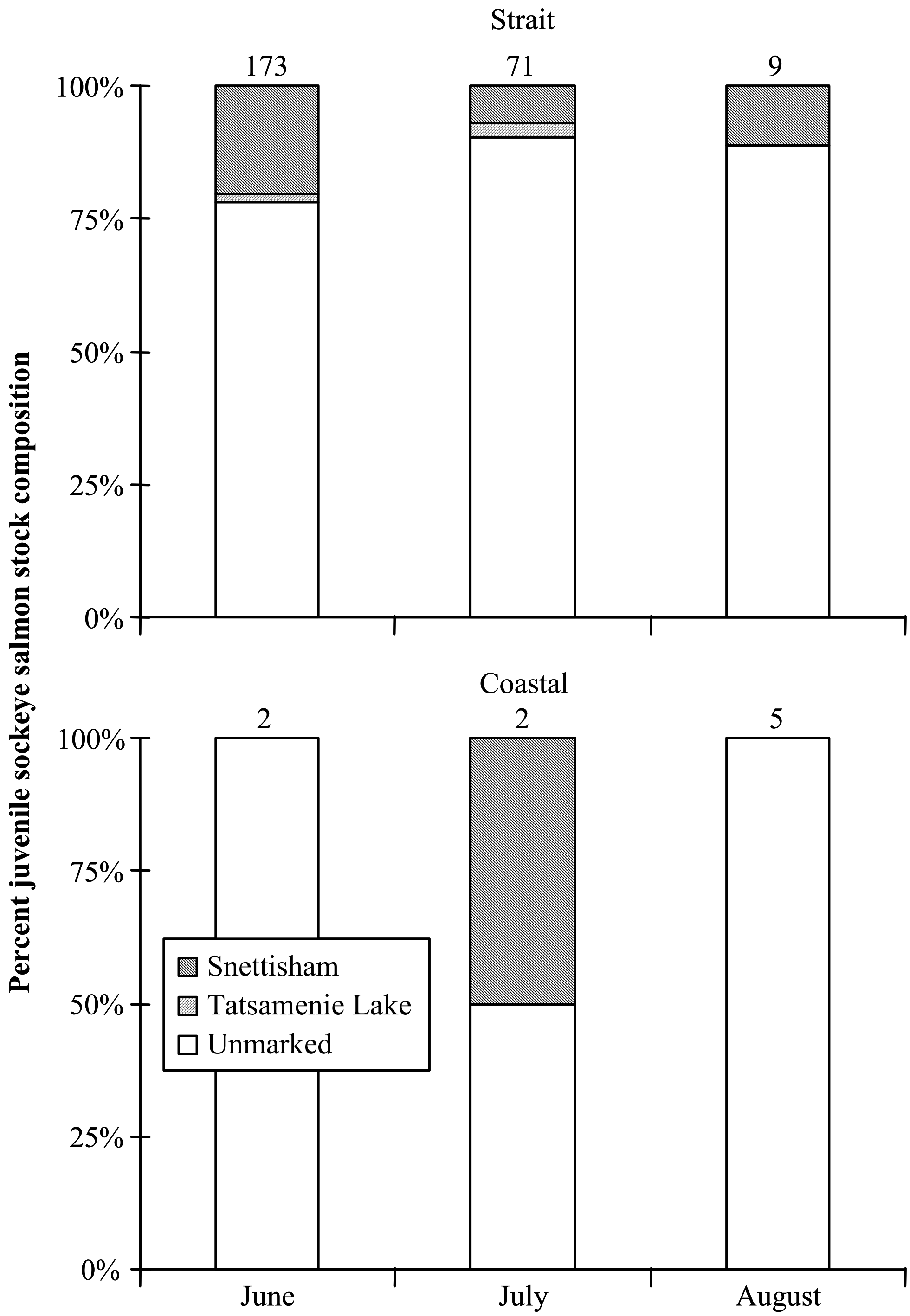

Figure 10.—Monthly stock composition of juvenile sockeye salmon based on otolith thermal marks in strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2004. Number of salmon sampled per month and habitat is indicated above each bar.

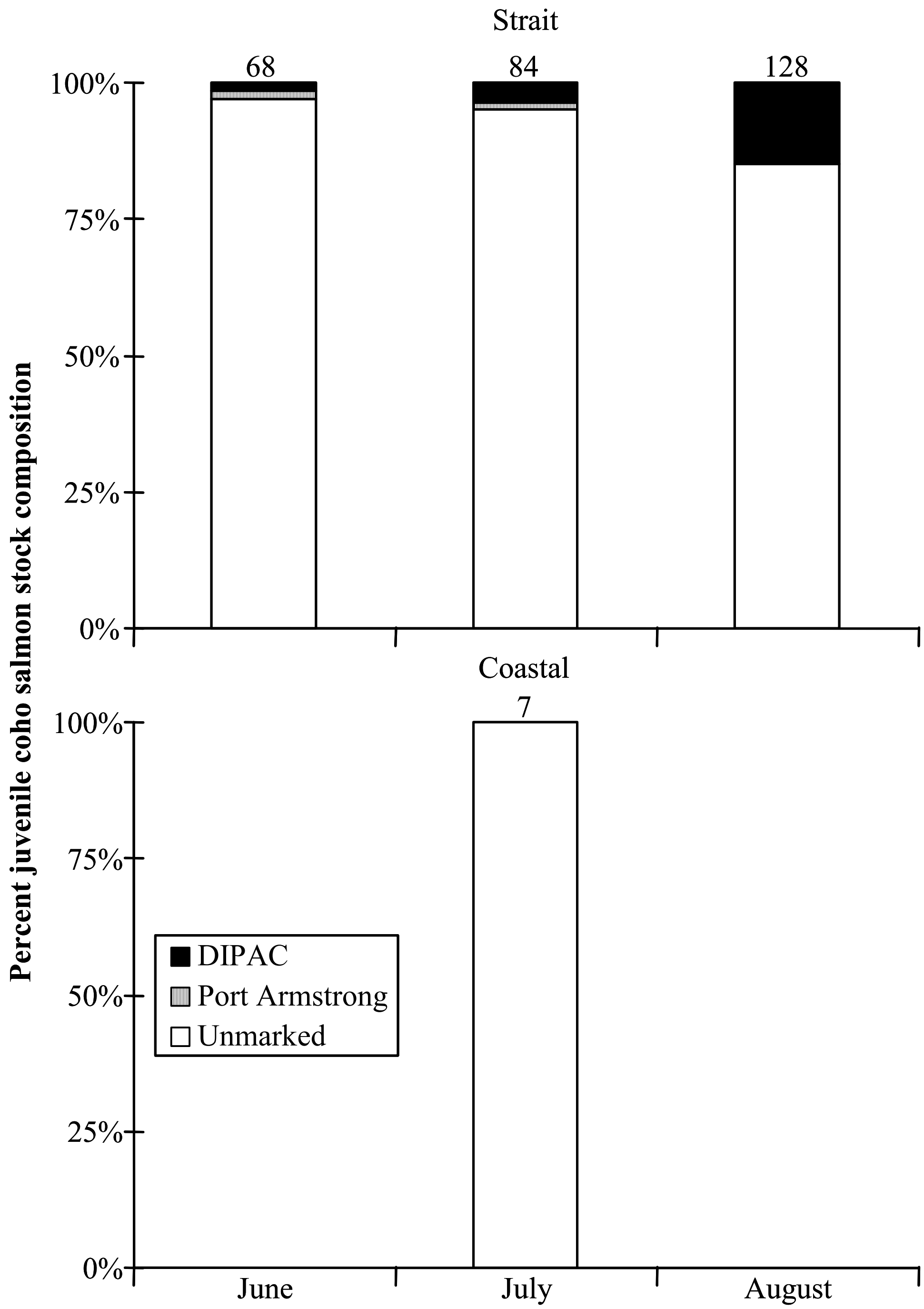

Figure 11.—Monthly stock composition of juvenile coho salmon based on otolith thermal marks in strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2004. Number of salmon per month and habitat is indicated above each bar.

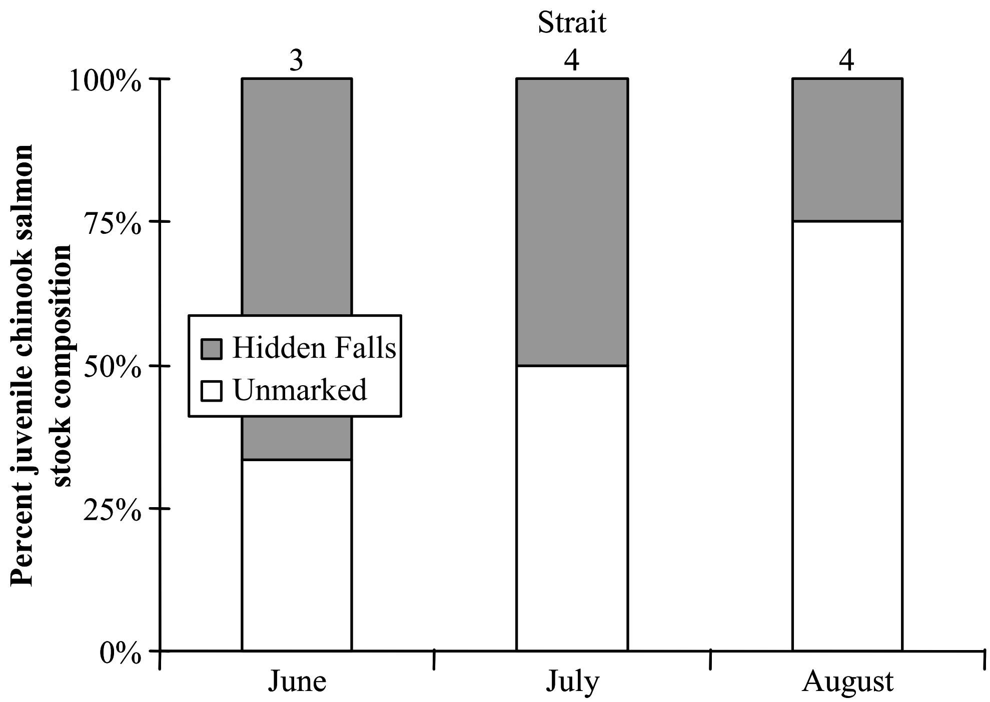

Figure 12.—Monthly stock composition of juvenile chinook salmon based on otolith thermal marks in the strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2004. Number of salmon per month and habitat is indicated above each bar.

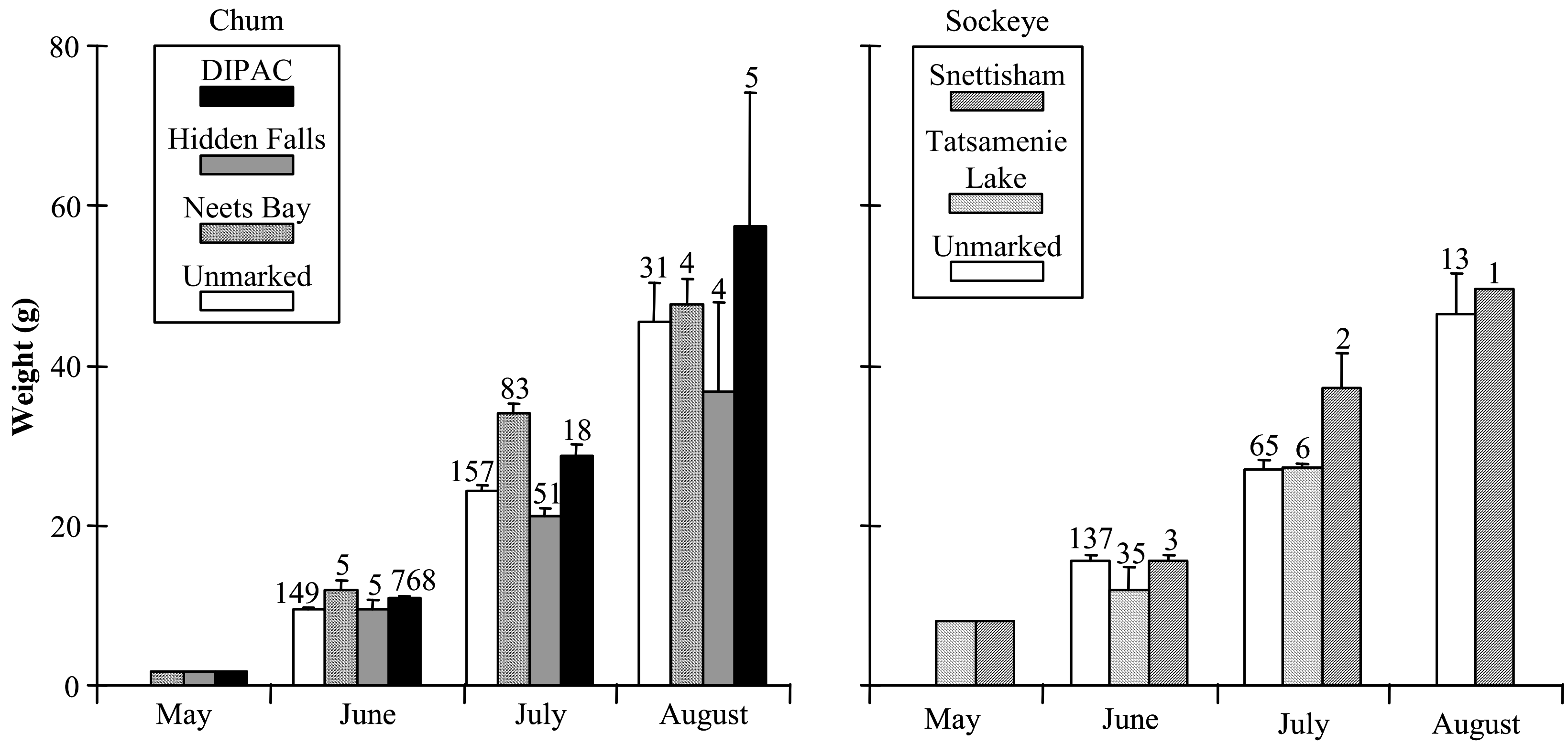

Figure 13.—Stock-specific growth trajectories of juvenile chum and sockeye salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004. Weights of May fish are mean values at time of hatchery release. The sample sizes and the standard error of the mean are indicated above each bar.

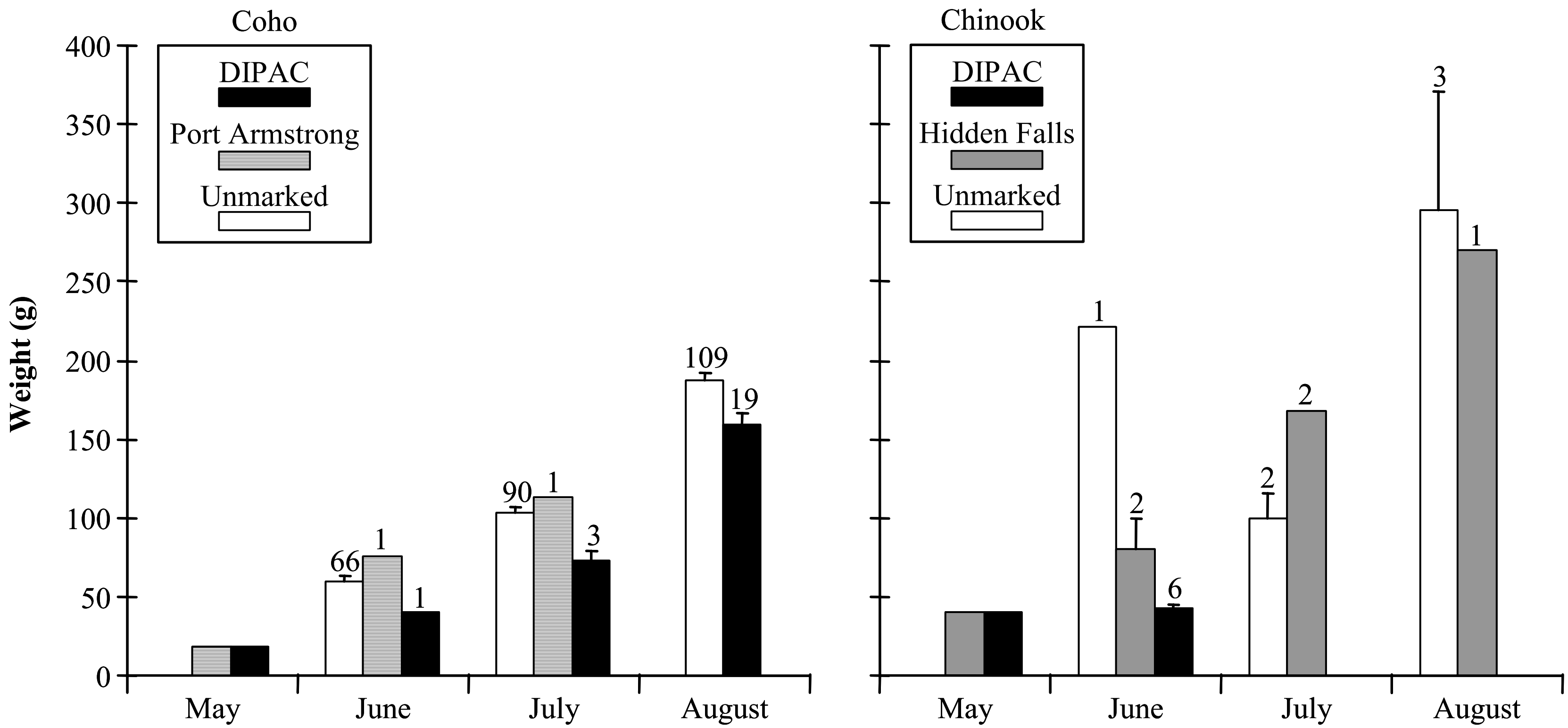

Figure 14.—Stock-specific growth trajectories of juvenile coho and chinook salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2004. Weights of May fish are mean values at time of hatchery release. The sample sizes and the standard error of the mean are indicated above each bar.

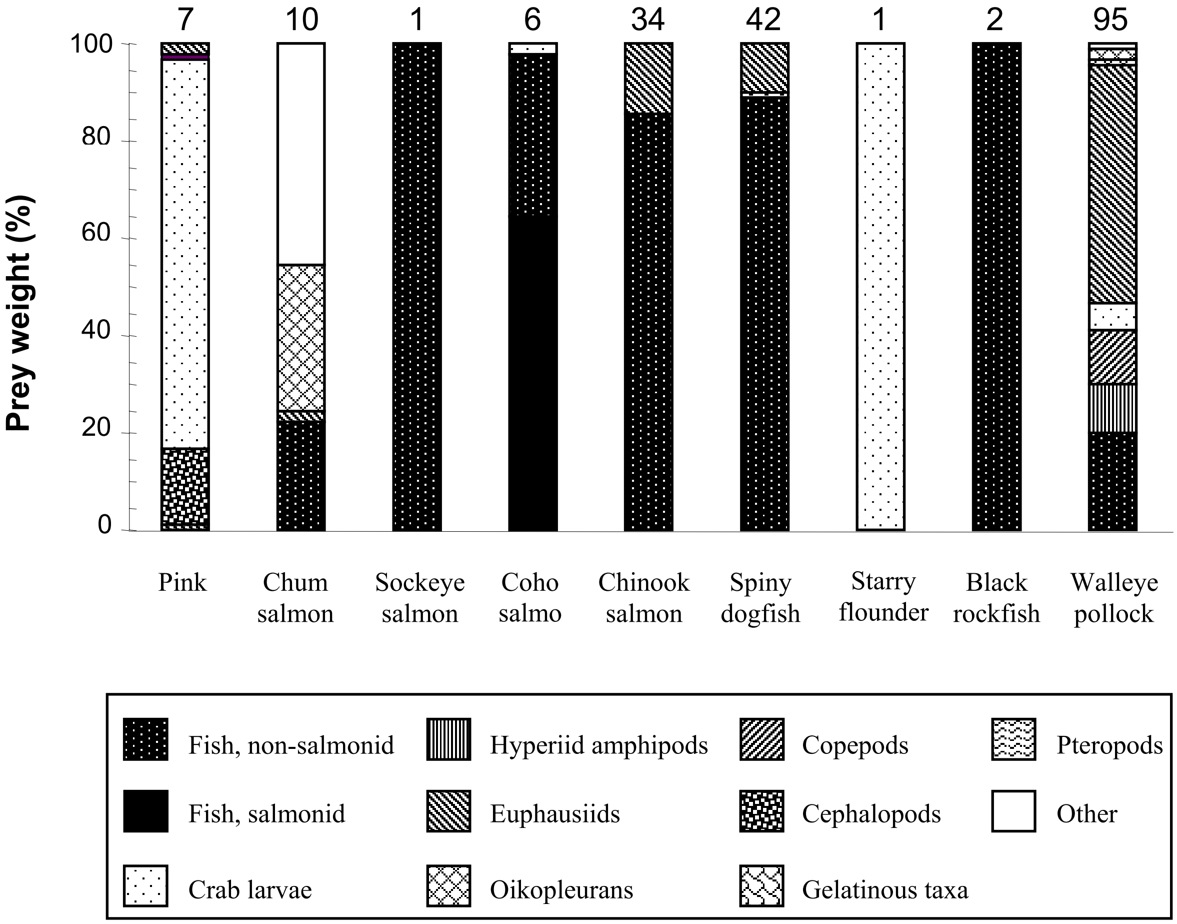

Figure 15.—Prey composition of potential salmon predator species captured in marine habitats of the northern region of southeastern Alaska by rope trawl, May–August 2004. See also Table 19 for feeding rates. The numbers of fish examined are shown above the bars.