NPAFC
Doc. 1428
Rev. 1
Rev. Date: Sep. 21, 2012

Annual Survey of Juvenile Salmon, Ecologically-Related Species, and Biophysical Factors in the Marine Waters of Southeastern Alaska, May–August 2011

by

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Submitted to the

NORTH PACIFIC ANADROMOUS FISH COMMISSION

by

the United States of America

September 2012

THIS PAPER MAY BE CITED IN THE FOLLOWING MANNER:
Orsi, J. A., E. A. Fergusson, M. V. Sturdevant, W. R. Heard, and E. V. Farley, Jr.. 2012. Annual survey of juvenile salmon, ecologically-related species, and biophysical factors in the marine waters of southeastern Alaska, May–August 2011. NPAFC Doc.1428, Rev. 1. 102 pp. Auke Bay Lab., Alaska Fish. Sci. Cent., Natl. Mar. Fish., NOAA, NMFS, 17109 Point Lena Loop Road, Juneau, 99801, USA. (Available at http://www.npafc.org).

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ABSTRACT

Juvenile Pacific salmon (*Oncorhynchus* spp.), ecologically-related species, and associated biophysical data were collected from the marine waters of the northern region of southeastern Alaska (SEAK) in 2011. This annual survey, conducted by the Southeast Coastal Monitoring (SECM) project, marks 15 consecutive years of systematically monitoring how juvenile salmon utilize marine ecosystems during a period of climate change. The survey was implemented to identify the relationships between year-class strength of juvenile salmon and biophysical parameters that influence their habitat use, marine growth, prey fields, predation, and stock interactions. This report also contrasts the 2011 findings with selected biophysical factors from the prior 14 sampling years. Thirteen stations were sampled monthly in epipelagic waters from May to August (total of 21 sampling days). Fish, zooplankton, surface water samples, and physical profile data were typically collected during daylight at each station using a surface rope trawl, Norpac and bongo nets, a water sampler, and a conductivity-temperature-depth profiler. Surface (3-m) temperatures and salinities ranged from approximately 6 to 14 ºC and 15 to 32 PSU, respectively, from May to August across inshore, strait, and coastal habitats. A total of 6,640 fish and squid, representing 27 taxa, were captured in 96 rope trawl hauls fished from June to August. Juvenile salmon comprised approximately 78% of the total fish catch. Juvenile pink (*O. gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), and coho (*O. kisutch*) salmon occurred in 42-80% of the hauls by month and habitat, while juvenile Chinook salmon (*O. tshawytscha*) occurred in ≤ 17% of the hauls. Abundance of juvenile salmon was relatively low in 2011; peak catch-per-unit-effort (CPUE) in strait habitat occurred in August for all species except chum salmon (June). Coded-wire tags were recovered from 10 coho salmon and 6 Chinook salmon from hatchery and wild stocks originating in SEAK and Washington. Alaska enhanced stocks were also identified by thermal otolith marks from 60%, 21%, and 5% of chum, sockeye, and coho salmon examined, respectively. Predation on juvenile salmon was observed in 3 of 9 species examined. Biophysical measures from 2011 differed from prior years, in many respects. Compared to the 15-yr longterm mean values, temperature anomalies were negative, salinity anomalies were positive, zooplankton density was low, and condition residuals were negative for juvenile pink, chum, and sockeye salmon. The SECM juvenile salmon stock assessment and biophysical data are used in conjunction with basin-scale biophysical data to forecast pink salmon harvest in SEAK. Longterm seasonal monitoring of key stocks of juvenile salmon and associated ecologically-related species, including fish predators and prey, permits researchers to understand how growth, abundance, and interactions affect year-class strength of salmon during climate change in marine ecosystems.

INTRODUCTION

The Southeast Coastal Monitoring (SECM) project, an ecosystem study in the northern region of southeastern Alaska (SEAK), was initiated in 1997 to annually study the early marine ecology of Pacific salmon (*Oncorhynchus* spp.) and associated epipelagic ichthyofauna and to better understand effects of climate change on salmon production. Salmon are a keystone species in SEAK whose role in marine ecosystems remains poorly understood. Fluctuations in the survival of this important living marine resource have broad ecological and socioeconomic implications for coastal localities throughout the Pacific Rim.

Relationships between climate shifts and production have impacted year-class strength of Pacific salmon throughout their distribution (Beamish et al. 2010a, b). In particular, climate variables such as temperature have been associated with both freshwater production (Bryant 2009; Taylor 2008) and ocean production, and survival of both wild and hatchery salmon (Wertheimer et al. 2001; Beauchamp et al. 2007). Biophysical attributes of climate may influence the trophic links leading to variable growth and survival of salmon (Francis et al. 1998; Brodeur et al. 2007; Coyle et al. 2011). However, research is lacking on the links between salmon production and climate variability, intra- and interspecific competition and carrying capacity, and biological interactions among stock groups (Beamish et al. 2010a). In addition, past research has not provided adequate time series data to explain these links (Pearcy 1997; Beamish et al. 2008). Increases in salmon production throughout the Pacific Rim in recent decades have elevated the importance of understanding the consequences of population changes and potential interactions on the growth, distribution, migratory rates, and survival of all salmon species and stock groups. Furthermore, region-scale spatial effects that are important to salmon production (Pyper et al. 2005) may be linked to local dynamics in complex marine ecosystems like SEAK (Weingartner et al. 2008).

A goal of the SECM project is to identify mechanisms linking salmon production to climate change using a time series of synoptic data related to salmon and the ocean conditions they experience, including stock-specific life history characteristics. The SECM project obtains stock information from coded-wire tags (CWT; Jefferts et al. 1963) or otolith thermal marks (Hagen and Munk 1994; Courtney et al. 2000) from all five Pacific salmon species: pink (*O. gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), coho (*O. kisutch*), and Chinook (*O. tshawytscha*). Portions of wild and hatchery salmon stocks are tagged or marked prior to ocean entry by enhancement facilities or state and federal agencies in SEAK, Canada, and the Pacific Northwest. Catches of these marked fish by the SECM project in the northern, southern, and coastal regions of SEAK have provided information on habitat use, migration rates, and timing (e.g., Orsi et al. 2004, 2006, 2007, 2008); in addition, interceptions in the regional common property fisheries have documented substantial contributions of enhanced fish to commercial harvests (White 2011). Therefore, examining trends in early marine ecology and potential interactions of these marked stock groups provides an opportunity to link increasing wild and hatchery salmon production to climate change (Ruggerone and Nielsen 2009; Rand et al. 2012).

An ecosystem approach to examining the extent of interactions between salmon stock groups and co-occurring species in marine ecosystems is also important with regard to carrying capacity, and should examine both “bottom-up” and “top-down” production controls. For example, increased hatchery production of juvenile chum salmon coincided with declines of some wild chum salmon stocks, suggesting the potential for negative stock interactions in the marine environment (Seeb et al. 2004; Reese et al. 2009). In SEAK, however, SECM and other studies have indicated that growth is not food limited and that stocks interact extensively with little negative impact (Bailey et al. 1975; Orsi et al. 2004; Sturdevant et al. 2004, 2012a). Zooplankton prey fields are more likely to be cropped by the more abundant planktivorous forage fish, including walleye pollock (*Theragra chalcogramma*) and Pacific herring (*Clupea pallasi*) (Orsi et al. 2004; Sigler and Csepp 2007), than by juvenile salmon. Seasonal and interannual changes in abundance of planktivorous jellyfish, another potential competitor with juvenile salmon, have been reported by SECM (Orsi et al. 2009). Therefore, monitoring abundance of jellyfish may be an important indicator of potential "bottom-up" trophic interactions (Purcell and Sturdevant 2001), particularly during periods of environmental change (Brodeur et al. 2008; Cieciel et al. 2009). Companion studies in Icy Strait also indicated that food quantity can be more important than food quality for growth and survival of juvenile salmon (Weitkamp and Sturdevant 2008). As a result, monitoring the composition, abundance, and timing of zooplankton taxa with different life history strategies may permit the detection of climate-related changes in the seasonality and interannual abundance of prey fields (Coyle and Paul 1990; Park et al. 2004; Coyle et al. 2011). In contrast, "top-down" predation events can also affect salmon year-class strength (Sturdevant et al. 2009, 2012b). Highly abundant smaller juvenile salmon species, such as wild pink salmon, may be a predation buffer for less abundant, larger species, such as juvenile coho salmon (LaCroix et al. 2009; Weitkamp et al. 2011). These findings also stress the need to examine the entire epipelagic community in the context of trophic interactions (Cooney et al. 2001; Sturdevant et al. 2012b) and the importance of comparing ecological communities and processes among salmon production areas (Brodeur et al. 2007; Orsi et al. 2007).

In 2011, SECM sampling was conducted in the northern region of SEAK for the 15th consecutive year to continue annual ecosystem and climate monitoring, to document juvenile salmon abundance in relation to biophysical parameters, and to support models to forecast adult pink salmon returns. This document summarizes data on juvenile salmon, ecologically-related species, and associated biophysical parameters collected by the SECM project in 2011, and contrasts key parameters to the prior 14-yr time series.

METHODS

Sampling was conducted in the northern region of SEAK monthly from May to August 2011 (Table 1). Spatially, sampling stations extended 250 km from inshore waters of the Alexander Archipelago along Chatham and Icy Straits to coastal waters 65 km offshore from Icy Point into the Gulf of Alaska (GOA), over the continental shelf break (Figure 1). At each station, the physical environment, zooplankton, and fish were typically sampled during daylight hours. Oceanographic sampling was conducted in May, while both oceanographic and trawl sampling were conducted June through August. The Alaska Department of Fish and Game (ADFG) research vessel RV *Medeia*, a 34 m stern trawler, was used for sampling in May. The chartered fishing vessel, FV *Northwest Explorer* (*NWE*), a 52 m stern trawler with twin engines producing 1,800 HP, was used for sampling June through August.

Sampling stations (Table 1; Figure 1) were chosen to: 1) continue historical time series of biophysical data, 2) sample primary seaward migration corridors used by juvenile salmon, and 3) accommodate vessel logistics. Historical data existed for the inshore station and the four Icy

Strait stations (e.g., Bruce et al. 1977; Jaenicke and Celewycz 1994; Orsi et al. 1997). The four Upper Chatham Strait stations were selected to intercept juvenile salmon entering Icy Strait from both the north and the south. Hatchery and wild salmon captured in Icy Strait have included stocks released from throughout SEAK (Orsi et al. 2011a). To meet vessel sampling constraints, stations in strait habitat were approximately 3 or 6 km offshore, whereas stations in coastal habitat were approximately 7, 23, 40, and 65 km offshore (Figure 1). Sampling operations in the different localities were also constrained to bottom depths > 75 m, sea wave height < 2.5 m, and winds < 12.5 m/sec. Bottom depth at ABM was too shallow to permit trawling (Table 1).

Oceanographic sampling

The oceanographic data collected at each station consisted of one conductivity-temperature-depth profiler (CTD) cast, one Secchi depth, one surface water sample, one light reading, and one or two plankton tows. The CTD data were collected with a Sea-Bird[1] SBE 19 plus Seacat profiler deployed to 200 m or within 10 m of the bottom. The CTD profiles were used to determine the 3-m sea surface temperature (SST, °C) and salinity (PSU), the average 20-m integrated water column temperature and salinity, and the mixed layer depth (MLD, m). The 20-m water column depth bracketed typical seasonal pycnoclines, MLD, and the stratum fished by the surface trawl. The MLD established the active mixing layer and was defined as the depth where temperature was ≥ 0.2 °C colder than the water at 5 m (Kara et al. 2000). Secchi depths (m) were estimated as the disappearance depth of the white CTD top during deployment. Surface water samples for nutrient (µM) and chlorophyll (µg/L) concentrations were taken once at each station per month. Ambient light levels (W/m^2) were measured with a Li-Cor Model LI-250A light meter.

Zooplankton was sampled monthly with two net types. One shallow (20-m) vertical Norpac haul was made with a 50-cm, single ring frame with 243-µm mesh net. One double oblique bongo haul was made at stations along the Icy Strait and Icy Point transects and at ABM (≤ 200 m or within 20 m of bottom) using a 60-cm diameter tandem frame with 333- and 505-µm meshes. A VEMCO ML-08-TDR time-depth recorder was attached to the bongo frame to record the maximum sampling depth of each haul. General Oceanics Model 2031 flow meters were placed inside the bongo nets for calculation of filtered water volumes.

Zooplankton samples were immediately preserved in a 5% formalin-seawater solution. In the laboratory, zooplankton settled volumes (ZSV, ml), total settled volumes (TSV, ml), displacement volumes (DV, ml), standing stock (DV/m^3), and density (number/m^3) were determined for various samples (Omori and Ikeda 1984). For Norpac samples, ZSV and TSV were measured after a 24-hr period in Imhof cones. Mean SVs were determined for stations pooled by habitat and month. For bongo samples, standing stock was calculated using DV and filtered water volumes. Detailed zooplankton species composition from the 333-µm samples was determined microscopically from subsamples obtained using a Folsom splitter. Densities were then estimated using the subsample counts, split fractions, and filtered water volumes. Percent total composition was summarized across species by major taxa, including small calanoid copepods (≤ 2.5 mm total length, TL), large calanoid copepods (> 2.5 mm TL), euphausiids

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

(principally larval and juvenile stages), oikopleurans (Larvacea), decapod larvae, amphipods, chaetognaths, pteropods, and combined minor taxa.

Fish sampling

Fish sampling was accomplished with a Nordic 264 rope trawl modified to fish the surface water directly astern of the trawl vessel. The trawl was 184 m long and had a mouth opening of approximately 24 m wide by 30 m deep, with actual fishing dimensions of 18 m wide by 24 m deep (Sturdevant et al. 2012b). A pair of 3-m foam-filled Lite trawl doors, each weighing 544 kg (91 kg submerged), was used to spread the trawl open. 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. Two 50-kg chain-link weights were added to the corners of the foot rope as the trawl was deployed to maximize fishing depth. To keep the trawl head rope fishing at the surface, two clusters of three A-4 Polyform buoys (inflated to 0.75 m diameter and encased in knotted mesh bags) were clipped on the opposing corner wingtips of the head rope and one A-3 Polyform float (inflated to 0.5 m diameter) was clipped into a mesh kite pocket in the center of the head rope with a third-wire unit to monitor the net spread. Two AQUAmark 300 pingers (10 kHz, 132 dB) were attached to the corners of the head rope to deter porpoise interactions. The trawl was fished with approximately 150 m of 1.6-cm wire main warp attached to each door, a 9.1 m length of 1.6-cm TS-II Dyneema line trailing off the top and bottom of each trawl door (back strap). Each back strap was connected with a “G” hook and flat link to an 80-m parallel rigging system constructed of 1.6-cm TS-II Dyneema bridles.

For each haul, the trawl was fished across a station for 20 min at approximately 1.5 m/sec (3 knots) to cover 1.9 km (1.0 nautical mile). Station coordinates were targeted as the midpoint of the trawl haul, and current, swell, and wind conditions usually dictated the setting direction. Twenty-eight hauls were scheduled in the strait habitat to meet sampling requirements for the forecasting model and to ensure that sufficient samples of marked juvenile salmon were obtained for interannual comparisons. Trawl haul durations were sometimes varied if catches were high, marine mammals were sighted, or if a live box was fished attached to the cod end (coastal habitat only). In these instances, salmon catches (but not jellyfish catches) were adjusted to a standard 20 minute haul.

After each trawl haul, the fish were separated from the jellyfish, identified, enumerated, measured, labeled, bagged, and frozen. Jellyfish were identified to species when possible, counted, and total volume (including fragments) was estimated to the nearest 0.1 liter (L). After the catch was sorted, all fish and squid were typically measured to the nearest mm fork length (FL) or mantle length. In instances of very large catches, all fish were counted, a subsample of each species (≤ 100) was processed, and excess fish were discarded. All Chinook and coho salmon were examined for missing adipose fins that could indicate the presence of implanted CWTs. However, in the laboratory, all specimens were screened with a magnetic detector and any CWTs were excised from the snouts. All tags were decoded and verified to determine the origin of fish.

Potential predators of juvenile salmon from each haul were identified, measured (FL, mm), and weighed (g), and stomach contents were examined onboard the vessel. Stomachs were excised, weighed (0.1 g), and visually classified by percent fullness (0, 10, 25, 50, 75, 100, and distended). Stomach content weight was determined by subtracting the empty stomach weight from the full stomach weight. Feeding intensity was reported as percentage of fish with food in their guts. General prey composition was determined by visually estimating the contribution of major taxa to the nearest 10% of total volume, and the wet-weight contribution to the diets was calculated by multiplying the % by the total content weight (%W). Whenever possible, fish prey were identified to species and FLs were measured. Overall diets of each species were summarized by %W of major prey taxa.

Juvenile salmon catch data were adjusted using calibration coefficients between vessels to allow comparisons with the longterm data collected using the NOAA ship *John N. Cobb* (1997-2007). No direct calibration of the *NWE* with a previously-used vessel was possible. The *NWE* was assumed to be comparable to the similarly-sized and -powered chartered vessel FV *Chellissa* that was calibrated to the RV *Medeia*, which was previously calibrated to the NOAA ship *John N. Cobb* (Wertheimer et al. 2010). These paired comparisons permitted the computation of species-specific calibration factors which were applied to the Ln(CPUE+1) for each trawl haul of the *NWE* to convert the data into "Cobb units" directly comparable to the first 14 years of the SECM time series.

In the laboratory, frozen individual juvenile salmon were weighed (0.1 g). Mean lengths, weights, Fulton condition factor ($g/mm^3 \cdot 10^5$; Cone 1989), and residuals from a length-weight linear regression (condition residuals, CR) were computed for each species by locality or habitat and sampling month. To determine stock of origin, sagittal otoliths were extracted from the crania and preserved in 95% ethyl alcohol, then later mounted on slides, ground down to the primordia, and examined for potential thermal marks (Secor et al. 1992). Stock composition and growth trajectories of thermally marked fish were determined for each month and habitat. An index of seasonal condition was obtained via calorimetry, using a 1425 Parr micro-bomb calorimeter. Whole body energy content (cal/g wet weight) was determined from ten fish of each species captured in July (Fergusson 2010).

In order to compare biophysical conditions observed in 2011 to the prior 14-yr time series, a set of key parameters was examined, including: average 20-m integrated temperature and salinity, MLD, zooplankton density and composition, catch-per-unit-effort (average catch per haul, CPUE), size-at-time (length on July 24), and CRs and July energy density for the principal juvenile salmon species (pink, chum, sockeye, and coho). Graphical plots were used to compare annual means of these values from the core SECM sampling area in Icy Strait and to portray anomalies as deviations from the longterm grand means.

RESULTS AND DISCUSSION

Thirteen stations were sampled near the end of each month from May to August 2011(Figure 1). In total, data were collected from 96 rope trawl hauls, 107 CTD casts, 36 bongo net samples, 105 Norpac net samples, 52 surface water samples, 104 Secchi readings, and 104 ambient light measures during 21 days at-sea for the four monthly surveys (Table 2, Appendix 1).

Oceanography

Overall, SST values ranged from 6.3 to 14.2 ºC from May to August, and averaged 11.1 ºC (Table 3; Appendix 1). Seasonal SST patterns differed among habitats (Figure 2a), with peaks occurring in inshore and strait habitats in June and in coastal habitat in July. Monthly mean SSTs differed by as much as ~ 2 ºC among habitats. The monthly means for 20-m integrated temperatures were colder than the SSTs; however, after a cold May, the 20-m temperature increased about 3 ºC and stabilized during June, July, and August.

Surface salinities ranged from 15.2 to 32.0 PSU during May to August, and averaged 27.4 PSU (Table 3; Appendix 1). Surface salinities followed similar patterns of seasonal decline in strait and coastal habitats (Figure 2b); salinities were lowest in inshore habitat and highest in coastal habitat. Mean salinities for the 20-m integrated water column were higher than the 3-m values, particularly from June to August, as a consequence of freshwater runoff from glacial and terrestrial sources.

Water clarity depths ranged from 1 to 16 m (average 6 m; Appendix 1). Water clarity decreased seasonally for all habitats and was lowest in inshore habitat (Figure 3a). The MLD ranged from 6 to 48 m (average 8 m; Appendix 1). The MLD increased seasonally for all habitats and was deepest in coastal habitat (Figure 3b). Thus, trawl sampling depths (~20 m) usually spanned a range of habitat conditions that varied with depth, including the active surface layer and the stable waters below the MLD.

Other physical data also showed seasonal and spatial differences. Ambient light measurements ranged from 5 to 683 W/m^2, with a mean of 198 W/m^2 (Appendix 1). Light intensity was highest in May but coincided with anomalously cold surface water. Chlorophyll concentration ranged from 0.9 to 8.6 µg/L, with a mean of 0.9 µg/L, and phaeopigment concentrations ranged from 0.2 to 3.5 µg/L, with a mean of 0.7 µg/L (Table 4). Chlorophyll was highest in the inshore habitat in May, and was lower and relatively stable in the strait and coastal habitats from May to August (Figure 4a). Nutrient concentrations (range and mean) were 0.0–5.3 and 1.3 µM for PO_4, 2.5–23.6 and 10.9 µM for $Si(OH)_4$, 0.1–9.1 and 2.4 µM for NO_3, 0.0–0.4 and 0.1 µM for NO_2, and 0.1–3.3 and 1.4 µM for NH_4 (Table 4).

Zooplankton SVs from the Norpac net ranged from 0.1 to 53.0 ml and averaged 5.9 ml from May to August (Table 5). Seasonal patterns for ZSV differed by habitat. Values decreased from May to August in inshore and strait habitats, but showed a seasonal peak in July in coastal habitat (Figure 4b).

Zooplankton standing stock was greater for the 333- than for the 505-µm bongo samples. Standing stock ranged from 0.2 to 0.8 ml/m^3 for 333-µm mesh (mean of 0.6 ml/m^3), and from 0.2 to 0.7 ml/m^3 for the 505-µm mesh (mean of 0.5 ml/m^3; Table 6). Patterns differed among habitats and months (Figure 5). Standing stock was highest in inshore habitat and lowest in coastal habitat. Peak mean values for both mesh sizes occurred in June in inshore habitat and were lower and relatively stable from month-to-month in strait and coastal habitats.

Seasonal density of zooplankton (333-µm mesh) prey fields at stations in Icy Strait ranged approximately 4-fold, from 517 to 2,239 organisms/m^3 (Table 6). Seasonal mean density exhibited bimodal peaks in May and July and low values in June and August (Figure 6a). Zooplankton taxa were increasingly dominated by small calanoid copepods (47-71%; principally *Pseudocalanus* spp.) over the season. For other principal taxa, seasonal peaks in the percentage composition of large calanoids (45%; principally *Metridia* spp.) occurred in May, of euphausiid larvae (8%) in June, and of larvaceans (5%) in June and July (Figure 6b). Zooplankton taxa such as euphausiid and decapod larvae, larvaceans, pteropods, and pelagic amphipods are seasonally prominent in diets of juvenile salmon and other planktivores (Coyle and Paul 1992; Landingham et al. 1998; Sturdevant et al. 2004, 2012b) despite their low percentage composition.

Catch composition

Jellyfish catches included four species (*Aequorea* sp., *Aurelia labiata*, *Chrysaora melanaster*, *Cyanea capillata*) and an "other" category (Table 7). The monthly mean total volume of jellyfish ranged from < 0.1 to 4.7 L per haul. Overall, monthly biomass of *C. capillata* was greatest. Jellyfish monthly biomass increased after June, and species composition varied by habitat (Figure 7). In particular, *Aequorea* sp. and "other" were most abundant in coastal habitat, whereas the other three species were most abundant in strait habitat.

In total, 6,640 fish and squid, representing 27 taxa, were captured in 96 rope trawl hauls in strait and coastal habitats (Table 8). Juvenile salmon comprised approximately 78% of the total fish catch (Figure 8). Non-salmonids comprised a high proportion of the fish in coastal habitat in June and August, and were primarily represented by Pacific saury (*Cololabis saira*), juvenile Hexagrammidae, and spiny dogfish (*Squalus acanthias*). Adult salmon were generally most abundant in July, whereas immature Chinook salmon were most abundant in June. Juvenile pink, chum, sockeye, and coho salmon occurred in 42%-67% of the trawls, while juvenile Chinook salmon occurred in ≤ 17% of the hauls (Table 9). In general, seasonal CPUE of juvenile salmon peaked in strait habitat in August and in coastal habitat in July (Table 10, Figure 9).

Size and condition of juvenile salmon differed among the species and months (Tables 11–15, Figures 10–13). Most species increased monthly in both length and weight, indicating growth despite the influx of additional stocks with varied times of saltwater entry. From June to August, mean FLs of juvenile salmon increased from approximately 87 to 157 mm for pink; 99 to 164 mm for chum; 132 to 178 mm for sockeye; 177 to 239 mm for coho; and 241 to 251 mm for Chinook salmon (Tables 11–15, Figure 10). Mean weights of juvenile salmon increased monthly from 6 to 37 g for pink; 9 to 46 g for chum; 24 to 62 g for sockeye; 65 to 169 g for coho; and 181 to 205 for Chinook salmon (Tables 11–15, Figure 11). Juvenile coho and Chinook salmon were consistently larger than the other three species, and fish captured in coastal habitat were generally larger than those captured in strait habitat. Mean conditions of juvenile salmon varied in both strait and coastal habitats. However, the CRs were usually negative for most species, habitats, and months (Figure 13), suggesting unfavorable marine conditions for juvenile salmon growth in 2011.

Stock-specific information was obtained from 16 CWT recoveries from 25 adipose fin-clipped juvenile coho salmon and juvenile and immature Chinook salmon, primarily from strait habitat. Ten of the CWTs were from coho salmon and six were from Chinook salmon (Table 16). All but one of these fish originated from hatchery and wild stocks in the northern region of SEAK; the other CWT fish was a Washington coho salmon. Most adipose-clipped juvenile Chinook salmon caught in the coastal habitat were not tagged and probably originated from Pacific Northwest hatcheries. These facilities are mandated to adipose-clip but not necessarily tag all fish released, a practice not used in Alaska. Migration rates of the 11 CWT juvenile salmon ranged from 1.1 to 19.8 km/day and averaged 3.1 km/day.

Stock-specific information was also obtained from recoveries of otolith-marked hatchery chum, sockeye, and coho salmon, using the same individuals that were subsampled for weight and condition. Releases of these species from SEAK enhancement facilities are commonly mass-marked and not tagged. These facilities include Douglas Island Pink and Chum Hatchery

(DIPAC), Northern Southeast Regional Aquaculture Association (NSRAA), Southern Southeast Regional Aquaculture Association (SSRAA), Armstrong Keta Incorporated (AKI), and Gunnuk Creek. A total of 1,992 juvenile chum, sockeye, and coho salmon otoliths were examined for thermal marks (Tables 17-19; Figures 14-17). In addition, 300 juvenile pink salmon otoliths were examined, but no thermal marks were detected from AKI, the single facility that releases marked pink salmon in SEAK.

For juvenile chum salmon, stock-specific information was derived from a subsample of 992 fish, representing 82% of those caught (Tables 8 and 17; Figure 14). Of all chum salmon otoliths examined, 599 (60%) were marked by hatcheries in SEAK: 477 (48%) were from DIPAC, 85 (9%) were from NSRAA, 31 (3%) were from SSRAA, and 6 (<1%) were from Gunnuk Creek. The remaining 393 (40%) were unmarked and presumed to be wild. Hatchery chum salmon composition declined seasonally from 66% in June to 47% in August, consistent with the pattern observed in previous years. Unusually high catches of SSRAA hatchery chum salmon indicated a pattern of northward movement by these stocks, particularly during August (Table 17).

For juvenile sockeye salmon, stock-specific information was derived from the otoliths of a subsample of 423 fish, representing 99% of those caught (Tables 8 and 18; Figure 15). Of all the sockeye salmon otoliths examined, 89 (21%) were marked and originated from four stock groups: 80 (19%) were from Speel Arm, SEAK, 5 (2%) were from Tahltan Lake/Stikine River, British Columbia, 3 (<1%) were from Sweetheart Lake, SEAK, and 1 was from Tuya Lake/Stikine River, British Columbia. The remaining 334 (79%) were unmarked and presumably from wild stocks. The two stocks that migrated through the Stikine River drainage to marine waters in central SEAK were sampled in Icy Strait in August, suggesting a protracted migration to the north.

For juvenile coho salmon, stock-specific information was derived from the otoliths of a subsample of 577 fish (with adipose fins intact), representing 95% of those caught (Tables 8 and 19; Figure 16). Of all the coho salmon otoliths examined, 30 (5%) were marked and originated from DIPAC. The remaining 547 (95%) were unmarked and presumably from wild stocks.

Stock-specific sizes of otolith-marked juvenile chum and sockeye salmon increased monthly for all stock groups. Average weights of these fish were used to plot monthly growth trajectories (Figure 17). In 2011, chum salmon were released in April–May at 1–4 g and sockeye salmon were released in April–June at 5–10 g. Weights of chum salmon that outmigrated as fry generally doubled from June to July and from July to August; weights of sockeye salmon that outmigrated as smolts increased later and approximately tripled from July to August. The limited recovery of marked coho salmon prevented stock-specific size analysis.

Stomachs of 340 potential predators of juvenile salmon examined onboard included nine species (Table 20). Almost 93% of these were immature and adult salmon representing all five species. Pacific sandfish (*Trichodon trichodon*), Walleye pollock (*Theragra chalcogramma*), Dolly Varden (*Salvelinus malma*), and spiny dogfish (*Squalus acanthias*) were also examined. We observed predation on juvenile salmon by adult pink salmon (n = 2 of 162; 2% of fish that were feeding) for the second time in the 15 years of the SECM project (Table 21; Figure 18). These events occurred in both strait and coastal habitat in July, under conditions of low juvenile salmon abundance and high adult pink salmon abundance, the opposite of similar events in 2010 (high juvenile abundance and low adult abundance; Orsi et al. 2011a). In August, we observed predation by adult coho salmon (n = 2 of 13; 22% of fish that were feeding) in strait habitat and a

Pacific sandfish (*n* = 1 of 2; 50% of fish that were feeding) in coastal habitat. Longterm data indicate that coho salmon are common predators of juvenile salmon in strait habitat in late summer, with an overall 18% incidence of predation, whereas Pacific sandfish have previously been associated with nearshore predation earlier in the year (Sturdevant et al. 2012b). Most of the potential predators had been feeding, except spiny dogfish and sockeye salmon; however, pink salmon had a high percentage (~39%) of empty guts, particularly in June (Tables 20 and 21). Diet composition varied considerably among predator species. Five taxa were principally piscivorous, including immature Chinook salmon (larval capelin), adult Chinook salmon (herring), coho salmon (unidentified fish, juvenile salmon, pollock, and capelin), Dolly Varden (unidentified fish), and Pacific sandfish (juvenile salmon). Other species were principally planktivorous. Pink salmon diet was the most diverse, whereas chum salmon diet was clearly dominated by gelatinous taxa (Figure 18). Diet of immature pollock overlapped with pink salmon and spiny dogfish through consumption of euphausiids and cephalopods, respectively.

Longterm trends

Our research in SEAK over the past 15 years indicates annual trends in biophysical factors, seasonal patterns of habitat use, and species- and stock-specific migration patterns for juvenile salmon. Biophysical measures from 2011 in Icy Strait were compared to the longterm time series to examine trends and identify anomalies. Among the 2011 biophysical factors, monthly anomalies were negative for temperatures except in June, positive for salinity except in August, and MLD values were near average (Table 22, Figures 19-22). Monthly total zooplankton densities were also near average, and similar to 2010; both years were substantially lower than the previous 4 years (Table 23, Figures 23 and 24). Interannual shifts in composition of large and small calanoids (Figure 24) could be related to coinciding interannual temperature anomaly shifts (Figure 19; Sturdevant et al., in press). Composition of euphausiid larvae and larvaceans was also reduced to near average, a shift from recent trends (Figure 25). These changes indicate the potential for mismatched timing of zooplankton prey fields that are seasonally prominent in diets of juvenile salmon and other planktivores (Coyle and Paul 1992; Coyle et al. 2011; Sturdevant et al. 2004, 2012b).

Catches of juvenile salmon were low in 2011 and peak migration was late for most species (August). Monthly CPUE anomalies were negative except for sockeye and coho salmon in August (Table 24, Figure 27). Size, CR, and energy density anomalies were also typically negative, except for coho salmon (Table 24, Figure 28-31). These low juvenile salmon abundance and growth metrics reflected the unfavorable biophysical environment and contributed to the late migration timing through strait habitat.

Juvenile salmon stock composition also reflected late migration timing in 2011. Chum salmon stock composition generally followed longterm trends, with proportionally high abundances of DIPAC, NSRAA, and wild stocks occurring in June, July, and August, respectively. However, the SSRAA chum salmon stocks from southern SEAK and sockeye salmon stocks from both northern and central SEAK comprised a large percentage of the August catches, indicating delayed movement through northern SEAK. The presence of southern and central SEAK marked stocks in the northern region also suggests the potential for movement of wild and hatchery pink salmon stocks through Icy Strait, an important consideration for use of SECM data to forecast adult returns to the entire region.

The SECM juvenile pink salmon CPUE and biophysical time series data are used in conjunction with basin-scale data to develop forecast models and predictive tools for adult pink salmon harvest in SEAK (e.g., Orsi et al. 2011b; Wertheimer et al. 2012). May temperature is one significant biophysical parameter that consistently enters the model. Low temperature in May 2011 along with the seasonally atypical, late August peak CPUE in strait habitat indicated poor year-class strength; this pattern was corroborated by a low pink salmon forecast and subsequent low adult returns to SEAK for 2012 (ADFG 2012). The calibrated peak CPUE for juvenile pink salmon in strait habitat in 2011 was reduced to 2.05 “Cobb units”, one of the lowest recorded in the time series (Table 10).

Comparing annual effects of biophysical parameters to longterm mean values permits climate-related changes in marine conditions to be detected. Longterm monitoring of key stocks of juvenile salmon, on seasonal and interannual time scales, will permit researchers to understand how growth, abundance, and ecological interactions affect year-class strength of salmon in SEAK and to better understand their role in North Pacific marine ecosystems.

ACKNOWLEDGMENTS

We thank the people working onboard the ADFG RV *Medeia* (Skipper Russell Sandstrom, Jim DeLabruere, Thomas Bruckman, and Rix Gottwald) and chartered fishing vessel FV *Northwest Explorer* for their superb cooperation and performance (Skipper Ray Haddon, Alex Ceribelli, Andy Martin, Luke Paranto, Manuel Tiexeira, Edgar Tubero, and Adam White). We are also grateful for survey participation and laboratory support from Sarah Ballard, Liz Cote, Lia Heifetz, Bekah Olson, and Libby Parker (ABL contractors), Louisa Harding (NWFSC), Andy Piston and Ted Jewell (ADFG), Kathy Krogslund (Marine Chemistry Laboratory, UW), and Mike Wunderlich (DIPAC Hatchery). 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. Partial funding for these surveys was provided by the Northern Fund of the Pacific Salmon Commission (project NF-2011-I-3).

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occurrence is shown in parentheses. See Table 2 for sampling effort by month and habitat. Dash indicates no samples.

Table 10.—Juvenile salmon catch conversions for the FV *Northwest Explorer* (*NWE*) from rope trawl hauls in strait habitat of the marine waters of the northern region of southeastern Alaska, June-August 2011: mean catch-per-unit-effort (CPUE); mean Ln(CPUE+1); calibration factors; mean calibrated Ln(CPUE+1); and back-calculated mean nominal CPUE. Calibration factors were developed from paired comparisons between commercial and research vessels, and were used to standardize catches to the NOAA ship *John N. Cobb* ("Cobb units"; Wertheimer et al. 2010). All catches were adjusted to a 20-min trawl haul duration.

Table 11.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile pink salmon captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011.

Table 12.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile chum salmon captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011.

Table 13.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile sockeye salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2011. Dash indicates no samples.

Table 14.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile coho salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2011.

Table 15.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile Chinook salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2011. Dash indicates no samples.

Table 16.—Release and recovery information decoded from coded-wire tags (CWT) recovered from coho and Chinook salmon lacking an adipose fin. Fish were captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011. Station code acronyms and coordinates are shown in Table 1.

Table 17.—Stock-specific information on 992 juvenile chum salmon released from regional enhancement facility sites and captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June-August 2011. Length (mm, fork), weight (g),

Fulton's condition [$(g/mm^3) \cdot (10^5)$], and condition residuals (CR) from length-weight regression analysis are reported for each stock group. Dash indicates no samples.See Table 16 for agency acronyms.

Table 18.—Stock-specific information on 423 juvenile sockeye salmon released from regional enhancement facility sites and captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June-August 2011. Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3) \cdot (10^5)$], and condition residuals (CR) from length-weight regression analysis are reported for each stock group. Dash indicates no samples. See Table 16 for agency acronyms.

Table 19.—Stock-specific information on 577 juvenile coho salmon released from regional enhancement facility sites and captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June-August 2011. Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3) \cdot (10^5)$], and condition residuals (CR) from length-weight regression analysis are reported for each stock group. Dash indicates no samples. See Table 16 for agency acronyms.

Table 20.—Number examined, length (mm, fork), wet weight (g), stomach content as percent body weight (%BW), and feeding intensity (0-100% volume fullness) of 340 potential predators of juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011. Dash indicates no samples. For scientific names, see Table 8. For additional feeding data, see Table 21 and Figure 18.

Table 21.—Feeding intensity of 340 potential predators of juvenile salmon examined from rope trawl hauls in the marine waters of the northern region of southeastern Alaska, June–August 2011. Fish were captured in both strait and coastal habitats. For scientific names, see Table 8. See also Table 20 and Figure 18.

Table 22.—Monthly longterm means of temperature (20-m integrated, °C), salinity (20-m integrated, PSU), and mixed layer depth (MLD, m) over the 15-yr time series in strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Values are references for the 0-lines shown in Figures 19-21.

Table 23.—Zooplankton monthly longterm means and standard errors (in parentheses) for total density (numbers per m^3) and percent composition of taxa important in fish diets over the 15-yr time series in strait habitat in the marine waters of the northern region of southeastern Alaska, 1997-2011. Data represent four stations sampled annually across the strait (≤ 200 m depth) with a 0.6 m diameter, 333-µm mesh Bongo net (double-oblique trajectory) from 1997-2011. Values are references for the 0-lines shown in Figures 24 and 25.

Table 24.—Long term monthly means of catch-per-unit-effort (CPUE, catch per trawl haul), size-at-time (fork length, mm, on July 24), condition residuals (CR), and energy density (cal/g wet weight,WW) for juvenile pink, chum, sockeye, and coho salmon

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Figure 5.—Monthly zooplankton standing stock (mean ml/m^3, ± 1 standard error) from (a) 333-µm, and (b) 505-µm mesh double oblique bongo net samples hauled from ≤ 200 m depths during daylight in strait habitat in marine waters of the northern region of southeastern Alaska, May–August 2011.

Figure 6.—Monthly "deep" (≤ 200 m depth) zooplankton collected in strait habitat in marine waters of the northern region of southeastern Alaska, May–August 2011. Data include (a) mean total density of organisms (thousands/m^3) ± 1 standard error, and (b) taxonomic composition (mean percent/m^3). Samples were collected in daylight using a 333-µm mesh bongo net (double oblique tow) at 4 stations in Icy Strait each month.

Figure 7.—Mean volume (L) of jellyfish captured in strait and coastal habitats in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011. See Table 2 for monthly sample sizes. Other = ctenophores, *Staurophora* sp., and unknown species. Note difference in y-axis scales.

Figure 8.—Fish categories (percent number) in catch from rope trawls by month in strait and coastal marine habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Total number of fish is indicated above each bar. See Tables 2 and 8 for monthly sample sizes by species.

Figure 9.—Catch-per-unit-effort (CPUE, mean catch per trawl haul) of juvenile salmon captured in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Total seasonal catch is indicated for each species. See Table 2 for the number of trawl samples per month. Values are converted to "Cobb units" (see Table 10 for vessel conversion factors). Note difference in y-axis scales.

Figure 10.—Length (mm, fork) of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Length of vertical bars is the length range for each sample, and the boxes within the range are one standard error on either side of the mean. Sample sizes are indicated for each month.

Figure 11.—Weight (g) of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Length of vertical bars is the weight range for each sample, and the bars within the range are one standard error on either side of the mean. Sample sizes are indicated for each month.

Figure 12.—Fulton's condition (g/$mm^3 \cdot 10^5$) of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Length of vertical bars is the range of condition for each sample, and the bars within the range are one standard error on either side of the mean. Sample sizes are indicated for each month. Note difference in y-axis scales.

Figure 13.—Condition residuals from length-weight regression analysis of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Sample sizes are indicated for each month. Note difference in y-axis scales.

Figure 14.—Monthly stock composition (based on otolith thermal marks) of juvenile chum salmon captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Number of salmon sampled per month is indicated above each bar.

Figure 15.—Monthly stock composition (based on otolith thermal marks) of juvenile sockeye salmon captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Number of salmon sampled per month is indicated above each bar. No sockeye salmon were caught in June in the coastal habitat.

Figure 16.—Monthly stock composition (based on otolith thermal marks) of juvenile coho salmon captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Number of salmon sampled per month is indicated above each bar.

Figure 17.—Stock-specific growth trajectories of juvenile chum and sockeye salmon (mean weight, g, ± 1 standard error) captured by rope trawl in strait habitat in marine waters of the northern region of southeastern Alaska, June–August 2011. Weights of May fish are mean values at time of hatchery release. The sample sizes are indicated above each bar.

Figure 18.—Prey composition of 340 potential predators of juvenile salmon captured in 96 rope trawl hauls in strait and coastal habitats in marine waters of the northern region of Southeast Alaska, June–August 2011. The numbers of fish examined per species are shown above the bars. See Tables 20-21 for additional feeding attributes.

Figure 19.—Monthly anomalies for temperature (20-m integrated, °C) across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from monthly mean values (0-lines; values in Table 22) by year. See also Figure 2.

Figure 20.—Monthly anomalies for salinity (20-m integrated, PSU) across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-20011. Data (shaded bars) are deviations from monthly mean values (0-lines; values in Table 22) by year. See also Figure 2.

Figure 21.—Monthly anomalies for mixed layer depth (MLD, m) across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska,

1997-2011. Data (shaded bars) are deviations from monthly mean values (0-lines; values in Table 22) by year. See also Figure 3.

Figure 22.—Temperature (20-m integrated; ºC), salinity (20-m integrated, PSU), and mixed layer depth (MLD, m) across a 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data compare the 2011 means for (a) temperature, (b) salinity, and (c) MLD (thick solid lines) to the grand mean values (thin solid lines) within observed ranges (minimum and maximum, dashed lines), by month. See also Figures 2 and 3.

Figure 23.—Monthly zooplankton total density (thousands/m^3) for 2011 compared to the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data are mean densities for 2011 (thick solid line) compared to grand mean densities (thin solid line) within the observed density range (minimum and maximum, dashed lines) by month, from 333-µm mesh bongo net samples as described in Figure 6.

Figure 24.—Monthly anomalies for zooplankton total density and taxonomic composition across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from longterm monthly mean density (numbers/m^3) and percent density (0-lines; values in Table 23). See Figure 6 for sampling details and Figure 25 for additional taxa. Asterisks indicate no samples collected in August 2006 or May 2007.

Figure 25. —Monthly anomalies for zooplankton composition across the 15-yr time series in strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Longterm monthly mean values (0-lines) are given in Table 23. Data (shaded bars) are deviations for percent numerical composition of taxa important in fish diets. See Figure 6 for sampling details and Figure 24 for additional taxa. Asterisks indicate no samples collected in August 2006 or May 2007.

Figure 26.—Monthly catch-per-unit-effort (CPUE, mean catch per trawl haul) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Asterisks indicate a zero catch. Note differences in scale of y-axes by species. No trawling was conducted in June, 2009. See also Figure 9. Values are converted to "Cobb units" (see Table 10 for vessel conversion factors).

Figure 27.—Monthly anomalies for catch-per-unit-effort (CPUE, mean catch per trawl haul) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm monthly mean CPUE (0-lines; values in Table 24). No trawling was conducted in June 2009 (asterisks). Note

differences in scale of y-axes by species. See also Figure 9. Values are converted to "Cobb units" (see Table 10 for vessel conversion factors).

Figure 28.—Anomalies for annual size-at-time (fork length, mm, on July 24) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm monthly mean size-at-time (0-line; values in Table 24). See also Figure 10.

Figure 29.—Monthly anomalies for condition residuals (CR) from length-weight linear regressions for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm monthly mean CR (0-lines; values in Table 24). No trawling was conducted in June of 2009. Asterisks indicate insufficient samples available for processing in June 2008. Note difference in y-axis scales by species. See also Tables 10-13 and Figure 13.

Figure 30.—Annual July energy density (cal/g WW) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Coho samples were insufficient for energy density determination in 1999. Note difference in y-axis scales by species.

Figure 31.—Annual July anomalies for energy density (cal/g WW) of juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm July mean energy density (0-lines; values in Table 24). Coho samples were insufficient for energy density determination in 1999. Note difference in y-axis scales by species. See also Figure 30.

Table 1.—Localities and coordinates of stations sampled in the marine waters of the northern region of southeastern Alaska, May–August 2011. Transect and station positions are shown in Figure 1.

			Distance		
Station	Latitude N	Longitude W	Offshore (km)	Between adjacent station (km)	Bottom depth (m)
			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

Table 2.—Numbers and types of samples collected in inshore, strait, and coastal habitats by month in the marine waters of the northern region of southeastern Alaska, May–August 2011.

			Data collection type[1]				
Dates (days)	Vessel	Habitat	Rope trawl	CTD cast	Oblique bongo	20-m Norpac	Chlorophyll & nutrients
20-22 May	R/V *Medeia*	Inshore	0	1	1	1	1
(3 days)		Strait	0	8	4	8	8
		Coastal	0	4	4	4	4
24-29 June	F/V *Northwest*	Inshore	0	1	1	1	1
(6 days)	*Explorer*	Strait	28	28	4	26	8
		Coastal	4	4	4	4	4
25-30 July	F/V *Northwest*	Inshore	0	1	1	1	1
(6 days)	*Explorer*	Strait	28	25	4	25	8
		Coastal	4	4	4	4	4
28 August-	F/V *Northwest*	Inshore	0	1	1	1	1
2 September	*Explorer*	Strait	28	26	4	26	8
(6 days)		Coastal	4	4	4	4	4
Total			**96**	**107**	**36**	**105**	**52**

[1]Rope trawl = 20-min hauls with Nordic 264 surface trawl 18 m wide by 24 m deep; 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 Norpac = 50-cm diameter frame, 243-µm conical net towed vertically from 20 m; chlorophyll and nutrients are from surface seawater samples.

Table 3.—Surface (3-m, mean) temperature (°C) and salinity (PSU) data collected monthly at stations in the marine waters of the northern region of southeastern Alaska, May–August 2011. Station code acronyms are listed in Table 1.

Month	*n*	Temp (°C)	Salinity (PSU)	*n*	Temp (°C)	Salinity (PSU)	*n*	Temp (°C)	Salinity (PSU)	*n*	Temp (°C)	Salinity (PSU)
Auke Bay Monitor												
	ABM											
May	1	8.3	30.0									
June	1	14.0	15.8									
July	1	11.8	15.2									
August	1	9.8	19.2									
Upper Chatham Strait transect												
	UCA			UCB			UCC			UCD		
May	1	7.2	31.3	1	7.0	31.3	1	7.1	31.3	1	6.3	31.5
June	3	12.2	28.2	3	11.6	27.9	3	11.3	28.3	3	11.0	26.4
July	3	9.5	30.6	3	10.1	30.2	3	11.4	28.0	3	12.3	26.8
August	3	10.4	24.9	3	10.4	24.9	3	10.7	21.8	3	10.7	21.5
Icy Strait transect												
	ISA			ISB			ISC			ISD		
May	1	6.9	31.6	1	6.5	31.6	1	7.2	31.5	1	7.2	31.4
June	4	12.5	27.2	4	12.4	28.3	4	12.1	28.7	4	11.7	28.9
July	4	11.8	27.9	4	11.8	27.4	4	13.0	26.9	4	12.6	27.5
August	4	9.5	26.9	4	10.6	23.1	4	11.3	20.6	4	11.2	20.8

Table 3.—cont.

Month	*n*	Temp (°C)	Salinity (PSU)	*n*	Temp (°C)	Salinity (PSU)	*n*	Temp (°C)	Salinity (PSU)	*n*	Temp (°C)	Salinity (PSU)
Icy Point transect												
	IPA			IPB			IPC			IPD		
May	1	7.3	31.9	1	7.7	31.9	1	8.3	31.8	1	8.0	31.9
June	1	12.7	31.5	1	12.5	31.7	1	12.8	31.8	1	14.0	32.0
July	1	13.1	31.6	1	13.8	31.6	1	14.0	31.7	1	14.2	31.7
August	1	13.1	30.4	1	12.6	31.1	1	13.1	31.5	1	13.2	31.6

Table 4.—Nutrient (µM) and chlorophyll (µg/L) concentrations from 200-ml surface water samples collected monthly at stations in the marine waters of the northern region of southeastern Alaska, May–August 2011. Station code acronyms are listed in Table 1.

		Nutrients [µM]						
Station	Date	[PO_4]	[$Si(OH)_4$]	[NO_3]	[NO_2]	[NH_4]	Chlorophyll (µg/L)	Phaeopigment (µg/L)
ABM	20 May	0.36	3.95	1.12	0.00	0.99	7.43	1.54
	29 June	0.01	17.45	0.05	0.01	0.95	1.21	0.24
	30 July	0.00	7.75	0.91	0.01	3.06	3.29	0.42
	02 Sept	0.75	14.20	2.84	0.11	3.29	2.30	0.57
IPA	22 May	0.83	18.37	6.08	0.07	0.28	5.55	1.88
	28 June	0.20	10.39	0.22	0.03	1.86	3.79	0.83
	25 July	0.53	14.03	0.27	0.03	1.95	1.84	0.53
	30 August	0.84	16.48	1.19	0.13	1.03	2.96	1.49
IPB	22 May	0.99	23.64	7.82	0.10	0.06	5.05	1.12
	28 June	0.34	17.12	0.25	0.00	0.25	4.50	1.03
	25 July	0.15	6.96	0.17	0.00	2.82	1.59	0.42
	30 August	0.71	18.50	3.44	0.17	1.44	5.45	1.13
IPC	22 May	0.75	18.22	4.40	0.05	0.14	5.77	3.50
	28 June	0.29	17.50	0.34	0.01	0.68	1.09	0.16
	25 July	0.71	10.43	0.23	0.00	0.95	1.27	0.33
	30 August	0.94	17.24	0.07	0.16	1.02	3.40	1.40
IPD	22 May	1.11	20.96	9.11	0.08	0.47	0.94	0.16
	28 June	0.31	10.98	0.50	0.13	0.80	2.89	0.28
	25 July	0.36	6.81	0.21	0.00	1.02	4.98	1.39
	30 August	0.57	17.44	0.13	0.17	2.34	3.72	0.98
ISA	21 May	0.96	10.31	5.88	0.02	1.77	3.48	0.84
	24 June	0.18	6.41	0.26	0.00	0.55	3.89	0.36
	26 July	0.01	6.68	0.36	0.01	1.32	3.31	1.16
	28 August	0.63	12.94	5.84	0.38	1.27	2.59	0.78
ISB	21 May	0.96	11.59	6.66	0.05	1.75	3.09	1.29
	24 June	0.26	7.88	0.25	0.01	0.54	4.61	0.46
	26 July	0.05	3.61	0.10	0.00	0.99	2.68	0.32
	28 August	0.37	8.97	3.22	0.14	2.06	2.63	0.44
ISC	21 May	0.88	9.80	5.53	0.03	1.52	3.03	0.73
	24 June	0.23	6.62	0.25	0.01	0.72	2.91	0.38
	26 July	0.20	5.26	0.23	0.00	1.29	2.62	0.32
	28 August	0.16	5.17	1.16	0.08	1.96	2.02	0.28

Table 4.—cont.

Station	Date	Nutrients [µM] $[PO_4]$	$[Si(OH)_4]$	$[NO_3]$	$[NO_2]$	$[NH_4]$	Chlorophyll (µg/L)	Phaeopigment (µg/L)
ISD	21 May	0.74	7.28	3.55	0.01	1.35	3.88	1.10
	24 June	0.37	5.01	0.29	0.11	1.91	2.31	0.37
	26 July	0.25	6.55	0.26	0.01	1.29	3.17	0.49
	28 August	1.02	8.09	1.30	0.12	2.72	3.06	0.34
UCA	21 May	0.89	10.11	5.48	0.06	1.23	3.43	0.41
	26 June	0.18	7.58	0.43	0.03	0.97	2.12	0.23
	28 July	0.99	22.10	8.47	0.18	2.75	3.87	0.48
	31 August	1.16	11.85	1.96	0.08	1.91	3.23	0.67
UCB	21 May	1.04	11.40	6.69	0.06	1.79	1.78	0.28
	26 June	0.27	7.78	0.34	0.02	1.56	3.67	0.46
	28 July	0.40	6.87	2.25	0.03	1.36	5.19	0.56
	31 August	0.69	12.41	3.13	0.11	1.70	3.17	0.76
UCC	21 May	0.96	8.88	4.71	0.04	1.25	3.99	0.71
	26 June	0.25	6.89	0.98	0.00	0.99	3.11	0.57
	28 July	0.20	3.43	0.63	0.01	1.30	4.61	0.28
	31 August	0.60	12.61	4.41	0.13	1.92	3.11	0.71
UCD	21 May	1.32	17.24	9.11	0.11	2.70	3.39	1.00
	26 June	0.10	5.45	0.36	0.00	0.74	8.58	0.94
	28 July	0.00	2.54	0.18	0.01	2.25	2.91	0.46
	31 August	0.65	8.44	3.07	0.10	1.84	3.02	0.93

Table 5.—Mean zooplankton settled volumes (ZSV, ml) and total plankton settled volumes (TSV, ml) from vertical 20-m Norpac hauls (0.5 m diameter, 243-µm mesh) collected monthly at stations in the marine waters of the northern region of southeastern Alaska, May–August 2011. Station code acronyms are listed in Table 1. Volume differences between ZSV and TSV are caused by presence of phytoplankton or slub in the sample. Standing stock (ml/m^3) can be computed by dividing by the water volume filtered, a constant factor of 3.9 m^3 for these samples.

Month	*n*	ZSV	TSV	*n*	ZSV	TSV	*n*	ZSV	TSV	*n*	ZSV	TSV
Auke Bay Monitor												
	ABM											
May	1	8.5	8.5									
June	1	8.5	15.0									
July	1	6.0	8.0									
August	1	2.0	2.0									
Upper Chatham Strait transect												
	UCA			UCB			UCC			UCD		
May	1	4.5	4.5	1	53.0	53.0	1	30.0	30.0	1	18.0	18.0
June	3	7.5	23.7	4	9.8	29.3	3	9.8	24.3	2	8.8	32.5
July	3	3.3	5.7	4	3.3	6.8	3	20.2	43.7	2	27.5	72.5
August	3	0.9	0.9	4	1.2	1.2	3	1.8	1.8	2	2.1	2.1
Icy Strait transect												
	ISA			ISB			ISC			ISD		
May	1	16.0	16.0	1	20.0	20.0	1	24.0	24.0	1	25.0	25.0
June	4	12.0	35.0	4	15.8	31.3	4	11.0	28.8	3	11.0	22.0
July	4	17.1	24.0	4	12.8	16.5	4	17.5	17.5	2	15.0	15.0
August	3	2.2	2.5	4	3.9	4.9	4	6.0	7.9	4	5.5	6.9
Icy Point transect												
	IPA			IPB			IPC			IPD		
May	1	0.1	0.1	1	3.0	3.0	1	3.0	3.0	1	6.0	6.0
June	1	14.0	14.0	1	13.0	13.0	1	8.0	8.0	1	0.5	0.5
July	1	32.0	32.0	1	12.0	12.0	1	8.0	8.0	1	35.0	35.0
August	1	16.0	16.0	1	11.0	11.0	1	13.0	13.0	1	19.0	19.0

Table 6.—Zooplankton displacement volumes (DV, ml), standing stock (DV/m^3), and total density (number/m^3, 333-µm mesh only) from double oblique bongo (0.6 m diameter, 333- and 505-µm mesh) hauls collected monthly at the Icy Strait stations (*n* = 4) in the marine waters of the northern region of southeastern Alaska, May–August 2011. Standing stock (ml/m^3) is computed using flowmeter readings to determine water volume filtered. Dash indicates no data. Station code acronyms are listed in Table 1.

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
333-µm mesh																
	ISA				ISB				ISC				ISD			
May	78	70	0.6	1592.0	185	150	0.7	2040.5	211	140	0.6	1254.3	219	165	0.8	1442.2
June	76	50	0.4	1532.6	185	180	0.2	516.7	197	200	0.7	1090.6	211	225	0.8	1696.8
July	104	40	0.4	944.7	175	155	0.8	2238.8	233	195	0.8	2203.9	217	170	0.6	1511.4
August	71	45	0.4	573.6	170	185	0.7	1800.0	208	185	0.6	1245.3	220	135	0.4	890.1
505-µm mesh																
	ISA				ISB				ISC				ISD			
May	78	40	0.5	—	185	110	0.5	—	211	95	0.4	—	219	110	0.5	—
June	76	40	0.3	—	185	140	0.5	—	197	140	0.5	—	211	180	0.7	—
July	104	25	0.2	—	175	100	0.5	—	233	140	0.5	—	217	115	0.4	—
August	71	40	0.3	—	170	140	0.5	—	208	145	0.4	—	220	105	0.3	—

Table 7.—Mean volume (L) of jellyfish captured in rope trawl hauls in the marine waters of the northern region of southeastern Alaska, June-August 2011.

Genus	Volume (L)		
	June	July	August
Cyanea capillata	0.04	2.49	4.68
Aurelia labiata	0.01	1.36	1.02
Aequorea sp.	0.02	0.35	0.87
Chrysaora melanaster	0.02	0.12	0.95
Other[1]	0.16	0.34	0.10
Total	0.06	1.35	2.19

[1]Other: Ctenophores, S*taurophora* sp., and unknown species

Table 8.—Salmonid and non-salmonid catches from rope trawl hauls in strait (n = 84) and coastal (n = 12) marine habitats of the northern region of southeastern Alaska, June–August 2011. Dash indicates no samples. Dash indicates no samples. See Table 2 for sampling effort by month and habitat. Catches were not adjusted to standard 20-min trawl durations; see Appendix 2.

		Strait			Coastal		
Common Name	Scientific name	June	July	August	June	July	August
		Salmonids					
Pink salmon[1]	*Oncorhynchus gorbuscha*	180	986	1,300	4	284	175
Chum salmon[1]	*O. keta*	496	309	114	19	240	33
Coho salmon[1]	*O. kisutch*	144	119	318	3	19	3
Sockeye salmon[1]	*O. nerka*	104	27	241	—	53	3
Pink salmon[3]	*O. gorbuscha*	38	84	26	5	4	5
Chinook salmon[2]	*O. tshawytscha*	55	28	1	16	1	—
Chum salmon[3]	*O. keta*	7	13	4	3	—	1
Coho salmon[3]	*O. kisutch*	1	1	8	3	—	—
Sockeye salmon[3]	*O. nerka*	1	4	—	—	—	—
Chinook salmon[3]	*O. tshawytscha*	4	—	—	—	—	—
Chinook salmon[1]	*O. tshawytscha*	—	1	2	7	1	—
Chum salmon[2]	*O. keta*	—	2	—	—	—	—
Sockeye salmon[2]	*O. nerka*	—	1	—	—	—	—
Steelhead	*O. mykiss*	1	—	—	—	—	—
Salmonid subtotals		1,031	1,575	2,014	60	602	220
		Non-salmonids					
Pacific saury	*Cololabis saira*	—	—	—	—	—	996
Crested sculpin	*Blepsias bilobus*	8	8	11	—	—	—
Hexagrammidae	*Hexagrammos* sp.	—	—	—	16	—	—
Spiny dogfish	*Squalus acanthias*	—	—	—	15	—	—
Pacific herring	*Clupea pallasi*	13	—	—	—	—	1
Squid	Gonatidae	—	—	—	9	—	1
Prowfish	*Zaprora silenus*	1	1	6	—	—	—

Table 8.—cont.

Common Name	Scientific name	Strait			Coastal		
		June	July	August	June	July	August
Smooth Lumpsucker	*Aptocyclus ventricosus*	2	4	2	—	—	1
Walleye pollock[4]	*Theragra chalcogramma*	—	4	3	—	—	—
Arrowtooth flounder	*Atheresthes stomias*	—	—	—	2	4	—
Walleye pollock[3]	*Theragra chalcogramma*	5	—	—	2	—	—
Dolly Varden	*Salvelinus malma*	4	—	—	—	—	—
Unknown larvae		2	—	2	—	—	—
Spiny Lumpsucker	*Eumicrotremus orbis*	2	1	—	—	—	—
Surf Smelt	*Hypomesus pretiosus*	—	—	—	—	—	3
Pacific sandfish	*Trichodon trichodon*	—	—	—	—	—	2
Wolf-eel	*Anarrhichthys ocellatus*	—	—	—	2	—	—
Capelin	*Mallotus villosus*	1	—	—	—	—	—
Soft sculpin	*Psychrolutes sigalutes*	—	—	1	—	—	—
Big mouth sculpin	*Hemitripterus bolini*	1	—	—	—	—	—
Sailfin sculpin	*Nautichthys ocuylofasciatus*	—	—	1	—	—	—
Lingcod	*Ophiodon elongates*	—	—	—	—	1	—
Non-salmonid subtotals		39	18	26	46	5	1,004

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

Table 9.—Frequency of occurrence of monthly salmonid and non-salmonid catches from rope trawl hauls in strait (n = 84) and coastal (n = 12) marine habitats of the northern region of southeastern Alaska, June–August 2011. The percent frequency of occurrence is shown in parentheses. Dash indicates no samples. See Table 2 for sampling effort by month and habitat.

		Strait				Coastal			
Common name	Scientific name	June	July	August	(%)	June	July	August	(%)
				Salmonids					
Pink salmon[1]	*Oncorhynchus gorbuscha*	9	18	20	(56)	3	3	2	(67)
Chum salmon[1]	*O. keta*	14	18	18	(60)	2	3	2	(58)
Coho salmon[1]	*O. kisutch*	19	23	25	(80)	1	3	2	(50)
Sockeye salmon[1]	*O. nerka*	20	12	16	(57)		3	2	(42)
Pink salmon[3]	*O. gorbuscha*	12	18	9	(46)	2	1	2	(42)
Chinook salmon[2]	*O. tshawytscha*	19	11	1	(37)	2	1	—	(25)
Chum salmon[3]	*O. keta*	4	7	3	(17)	1	—	1	(17)
Coho salmon[3]	*O. kisutch*	1	1	5	(8)	2	—	—	(17)
Sockeye salmon[3]	*O. nerka*	1	2	—	(4)	—	—	—	(0)
Chinook salmon[3]	*O. tshawytscha*	4	—	—	(5)	—	—	—	(0)
Chinook salmon[1]	*O. tshawytscha*	—	1	2	(4)	1	1	—	(17)
Chum salmon[2]	*O. keta*	—	1	—	(1)	—	—	—	(0)
Sockeye salmon[2]	*O. nerka*	—	1	—	(1)	—	—	—	(0)
Steelhead	*O. mykiss*	1	—	—	(1)	—	—	—	(0)
				Non-salmonids					
Pacific saury	*Cololabis saira*	—	—	—	(0)	—	—	2	(17)
Crested sculpin	*Blepsias bilobus*	6	7	9	(26)	—	—	—	(0)
Hexagrammidae	*Hexagrammos* sp.	—	—	—	(0)	3	—	—	(25)
Spiny dogfish	*Squalus acanthias*	—	—	—	(0)	3	—	—	(25)
Pacific herring	*Clupea pallasi*	7	—	—	(8)	—	—	1	(8)
Squid	Gonatidae	—	—	—	(0)	3	—	1	(33)

Table 9.—cont.

Common name	Scientific name	Strait				Coastal			
		June	July	August	(%)	June	July	August	(%)
Prowfish	*Zaprora silenus*	1	1	6	(10)	—	—	—	(0)
Smooth Lumpsucker	*Aptocyclus ventricosus*	2	2	2	(7)	—	—	1	(8)
Walleye pollock[4]	*Theragra chalcogramma*	—	4	3	(8)	—	—	—	(0)
Arrowtooth flounder	*Atheresthes stomias*	—	—	—	(0)	1	1	—	(17)
Walleye pollock[3]	*Theragra chalcogramma*	—	1	—	(1)	1	—	—	(8)
Dolly Varden	*Salvelinus malma*	4	—	—	(5)	—	—	—	(0)
Unknown larvae		2	—	2	(5)	—	—	—	(0)
Spiny Lumpsucker	*Eumicrotremus orbis*	2	1	—	(4)	—	—	—	(0)
Surf Smelt	*Hypomesus pretiosus*	—	—	—	(0)	—	—	1	(0)
Pacific sandfish	*Trichodon trichodon*	—	—	—	(0)	—	—	1	(8)
Wolf-eel	*Anarrhichthys ocellatus*	—	—	—	(0)	1	—	—	(8)
Capelin	*Mallotus villosus*	1	—	—	(1)	—	—	—	(0)
Soft sculpin	*Psychrolutes sigalutes*	—	—	1	(1)	—	—	—	(0)
Big mouth sculpin	*Hemitripterus bolini*	1	—	—	(1)	—	—	—	(0)
Sailfin sculpin	*Nautichthys ocuylofasciatus*	—	—	1	(1)	—	—	—	(0)
Lingcod	*Ophiodon elongates*	—	—	—	(0)	—	1	—	(8)

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

Table 10.—Juvenile salmon catch conversions for the FV *Northwest Explorer* (*NWE*) from rope trawl hauls in strait habitat of the marine waters of the northern region of southeastern Alaska, June-August 2011: mean catch-per-unit-effort (CPUE); mean Ln(CPUE+1); calibration factors; mean calibrated Ln(CPUE+1); and back-calculated mean nominal CPUE. Calibration factors were developed from paired comparisons between commercial and research vessels, and were used to standardize catches to the NOAA ship *John N. Cobb* ("Cobb units"; Wertheimer et al. 2010). All catches were adjusted to a 20-min trawl haul duration.

		NWE		Calibration	"Cobb units"	
Species	Month	CPUE	Ln(CPUE+1)	Factor	Ln(CPUE+1)	CPUE
Pink	June	6.5	0.78	0.659	0.51	1.8
	July	35.5	2.05		1.35	7.1
	August	50.3	2.20		1.45	8.9
Chum	June	17.6	1.41	0.705	1.00	5.0
	July	11.1	1.50		1.06	3.9
	August	4.0	0.96		0.68	1.7
Sockeye	June	3.8	1.12	0.848	0.95	2.5
	July	1.0	0.43		0.36	0.7
	August	10.0	1.33		1.13	5.8
Coho	June	5.3	1.27	0.803	1.02	3.0
	July	4.4	1.34		1.08	2.7
	August	13.0	2.21		1.77	6.9

Table 11.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile pink salmon captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper Chatham Strait	Length	3	85-99	92.3	4.1	557	90-164	122.5	0.5	53	138-196	164.4	2.0
	Weight	3	4.7-8.4	6.8	1.1	457	6.2-42.9	17.5	0.2	52	21.7-75.7	41.8	1.8
	Condition	3	0.8-0.9	0.8	0.0	457	0.6-1.5	0.9	0.0	52	0.8-1.1	0.9	0.0
	CR	3	-0.09-0.05	-0.02	0.04	457	-0.47-0.51	-0.02	0.00	52	-0.17-0.1	-0.06	0.01
Icy Strait	Length	176	69-109	86.2	0.6	367	75-151	110.8	0.6	714	113-208	158.9	0.7
	Weight	176	2.9-11.7	5.5	0.1	258	3.7-30.0	13.6	0.3	348	12.2-88.5	40.6	0.9
	Condition	176	0.7-1.0	0.8	0.0	258	0.6-1.1	0.9	0.0	348	0.7-1.8	0.9	0.0
	CR	176	-0.19-0.16	-0.01	0.01	258	-0.31-0.18	0.04	0.00	348	-0.26-0.64	-0.02	0.00
Icy Point	Length	4	95-105	100.0	2.0	200	85-157	119.8	0.8	153	112-198	148.5	1.0
	Weight	4	7.4-10.2	8.8	0.6	150	5.1-36.4	15.5	0.4	103	13.2-73.6	30.4	1.1
	Condition	4	0.9-0.9	0.9	0.0	150	0.8-1.0	0.9	0.0	103	0.7-1.1	0.9	0.0
	CR	4	0.00-0.04	0.01	0.01	150	-0.16-0.13	0.00	0.00	103	-0.23-0.18	-0.08	0.01
Total	Length	183	69-109	86.6	0.6	1124	75-164	118.2	0.4	920	112-208	157.5	0.6
	Weight	183	2.9-11.7	5.6	0.1	865	3.7-42.9	16.0	0.2	503	12.2-88.5	38.6	0.7
	Condition	183	0.7-1.0	0.8	0.0	865	0.6-1.5	0.9	0.0	503	0.7-1.8	0.9	0.0
	CR	183	-0.19-0.16	-0.01	0.00	865	-0.47-0.51	0.00	0.00	503	-0.26-0.64	-0.04	0.00

Table 12.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile chum salmon captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper Chatham Strait	Length	93	81-118	99.9	0.7	181	96-215	134.4	1.0	12	141-225	192.3	6.3
	Weight	93	4.9-15.0	9.2	0.2	181	7.2-40.5	22.7	0.5	12	22.1-114.6	73.3	7.0
	Condition	93	0.7-1.0	0.9	0.0	181	0.2-1.3	0.9	0.0	12	0.8-1.1	1.0	0.0
	CR	93	-0.35-0.11	-0.03	0.01	181	-1.81-0.34	-0.06	0.01	12	-0.21-0.08	-0.02	0.02
Icy Strait	Length	397	75-124	98.7	0.4	126	90-150	122.0	1.1	102	108-239	162.5	2.7
	Weight	351	4.5-18.7	9.2	0.1	126	7.0-32.7	18.0	0.5	102	10.7-139.4	45.9	2.4
	Condition	351	0.4-1.6	0.9	0.0	126	0.8-1.1	1.0	0.0	102	0.8-1.1	1.0	0.0
	CR	351	-0.89-0.52	-0.01	0.01	126	-0.20-0.13	0.01	0.01	102	-0.24-0.11	-0.01	0.01
Icy Point	Length	19	97-123	110.5	1.9	147	100-160	129.5	0.8	33	115-202	157.5	3.1
	Weight	19	8.2-15.2	11.6	0.5	96	8.1-34.6	20.6	0.5	33	12.3-77.1	36.9	2.4
	Condition	19	0.8-0.9	0.9	0.0	96	0.4-1.2	0.9	0.0	33	0.8-1.0	0.9	0.0
	CR	19	-0.18--0.02	-0.11	0.01	96	-1.02-0.18	-0.02	0.01	33	-0.19-0.03	-0.08	0.01
Total	Length	509	75-124	99.3	0.4	454	90-215	129.4	0.6	147	108-239	163.8	2.2
	Weight	463	4.5-18.7	9.3	0.1	403	7.0-40.5	20.8	0.3	147	10.7-139.4	46.1	2.0
	Condition	463	0.4-1.6	0.9	0.0	403	0.2-1.3	0.9	0.0	147	0.8-1.1	1.0	0.0
	CR	463	-0.89-0.52	-0.02	0.00	403	-1.81-0.34	-0.03	0.01	147	-0.24-0.11	-0.03	0.01

Table 13.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile sockeye salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2011. Dash indicates no samples.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	70	86-186	135.3	2.6	19	105-196	147.9	5.6	12	126-228	181.7	6.7
Chatham	Weight	70	5.8-61.2	25.1	1.5	19	11.2-76.2	34.0	3.9	12	8.6-129.0	58.1	8.5
Strait	Condition	70	0.8-1.1	0.9	0.0	19	0.9-1.0	1.0	0.0	12	0.1-1.1	0.9	0.1
	CR	70	-0.22-0.1	-0.07	0.01	19	-0.09-0.04	-0.03	0.01	12	-2.20-0.09	-0.20	0.18
Icy	Length	34	94-185	126.0	4.3	8	103-194	142.6	14.2	229	100-235	178.1	1.8
Strait	Weight	34	8.0-58.9	21.2	2.6	8	11.2-70.0	34.8	9.6	229	9.2-139.3	63.0	1.7
	Condition	34	0.7-1.1	0.9	0.0	8	0.9-1.0	1.0	0.0	229	0.1-1.2	1.0	0.0
	CR	34	-0.33-0.08	-0.06	0.01	8	-0.07-0.07	-0.01	0.02	229	-2.13-0.16	0.00	0.01
Icy	Length	—	—	—	—	53	112-215	152.4	3.4	3	144-157	151.3	3.8
Point	Weight	—	—	—	—	53	13.0-119.0	38.7	2.9	3	29.0-33.0	31.1	1.2
	Condition	—	—	—	—	53	0.5-1.6	1.0	0.0	3	0.9-1.0	0.9	0.0
	CR	—	—	—	—	53	-0.69-0.48	-0.02	0.02	3	-0.17--0.03	-0.11	0.04
Total	Length	104	86-186	132.3	2.3	80	103-215	150.3	3.0	244	100-235	178.0	1.7
	Weight	104	5.8-61.2	23.8	1.3	80	11.2-119.0	37.2	2.3	244	8.6-139.3	62.4	1.7
	Condition	104	0.7-1.1	0.9	0.0	80	0.5-1.6	1.0	0.0	244	0.1-1.2	1.0	0.0
	CR	104	-0.33-0.10	-0.07	0.01	80	-0.69-0.48	-0.02	0.01	244	-2.20-0.16	-0.01	0.01

Table 14.—Length (mm, fork), weight (g), Fulton's condition $[(g/mm^3) \cdot (10^5)]$, and condition residuals (CR) from length-weight regression analysis of juvenile coho salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2011.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper Chatham Strait	Length	24	129-215	172.6	4.2	80	125-254	198.5	2.8	129	186-302	238.4	1.9
	Weight	24	22.6-100.3	57.3	3.7	79	35.5-185.0	90.9	3.7	116	74.3-341.8	165.4	4.7
	Condition	24	0.7-1.8	1.1	0.1	79	0.9-1.4	1.1	0.0	116	0.7-2.0	1.2	0.0
	CR	24	-0.55-0.50	-0.05	0.05	79	-0.21-0.19	-0.05	0.01	116	-0.53-0.55	-0.02	0.01
Icy Strait	Length	120	124-249	177.0	1.9	39	153-276	208.2	4.1	189	154-298	239.3	1.8
	Weight	120	21.0-169.4	65.1	2.1	39	13.9-255.8	102.4	7.2	184	39.2-317.9	170.4	4.0
	Condition	120	0.9-1.4	1.1	0.0	39	0.2-1.3	1.1	0.0	184	1.0-1.5	1.2	0.0
	CR	120	-0.27-0.23	0.00	0.01	39	-1.73-0.11	-0.10	0.04	184	-0.20-0.21	0.01	0.00
Icy Point	Length	3	195-228	212.00	9.54	19	154-254	219.7	6.3	3	246-304	272.0	17.0
	Weight	3	83.8-148.2	117.97	18.69	19	38.9-210.7	132.5	11.7	3	173.3-343.4	248.0	50.2
	Condition	3	1.1-1.3	1.21	0.04	19	0.8-1.3	1.2	0.0	3	1.2-1.2	1.2	0.0
	CR	3	-0.01-0.08	0.04	0.03	19	-0.42-0.13	0.00	0.03	3	-0.02-0.00	-0.01	0.01
Total	Length	147	124-249	177.0	1.7	138	125-276	204.2	2.3	321	154-304	239.2	1.3
	Weight	147	21.0-169.4	64.9	1.9	137	13.9-255.8	99.9	3.5	303	39.2-343.4	169.2	3.1
	Condition	147	0.7-1.8	1.1	0.0	137	0.2-1.4	1.1	0.0	303	0.7-2.0	1.2	0.0
	CR	147	-0.55-0.50	-0.01	0.01	137	-1.73-0.19	-0.06	0.01	303	-0.53-0.55	0.00	0.00

Table 15.—Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3)\cdot(10^5)$], and condition residuals (CR) from length-weight regression analysis of juvenile Chinook salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2011. Dash indicates no samples.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	—	—	—	—	—	—	—	—	1	238	238.0	—
Chatham	Weight	—	—	—	—	—	—	—	—	1	168.8	168.8	—
Strait	Condition	—	—	—	—	—	—	—	—	1	1.3	1.3	—
	CR	—	—	—	—	—	—	—	—	1	-0.05	-0.05	—
Icy	Length	—	—	—	—	1	223	223.0	—	1	265	265.5	—
Strait	Weight	—	—	—	—	1	144.2	144.2	—	1	240.5	240.5	—
	Condition	—	—	—	—	1	1.3	1.3	—	1	1.3	1.3	—
	CR	—	—	—	—	1	0.01	0.01	—	1	-0.05	-0.05	—
Icy	Length	7	215-266	241.3	6.6	1	233	233.0	—	—	—	—	—
Point	Weight	7	119.7-246.6	181.4	16.2	1	180.0	180.0	—	—	—	—	—
	Condition	7	1.2-1.3	1.3	0.0	1	1.4	1.4	—	—	—	—	—
	CR	7	-0.06--0.02	-0.04	0.01	1	0.08	0.08	—	—	—	—	—
Total	Length	7	215-266	241.3	6.6	2	223-233	228.0	5.0	2	238-265	251.5	13.5
	Weight	7	119.7-246.6	181.4	16.2	2	144.2-180.0	162.1	17.9	2	168.8-240.5	204.7	35.9
	Condition	7	1.2-1.3	1.3	0.0	2	1.3-1.4	1.4	0.1	2	1.3-1.3	1.3	0.0
	CR	7	-0.06--0.02	-0.04	0.01	2	0.01-0.08	0.04	0.04	2	-0.05--0.05	-0.05	0.00

Table 16.—Release and recovery information decoded from coded-wire tags (CWT) recovered from coho and Chinook salmon lacking an adipose fin. Fish were captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011. Station code acronyms and coordinates are shown in Table 1.

		Release information						Recovery information							
Species	CWT code	Brood year	Agency[1]	Locality	Date	FL (mm)	W (g)	Locality	Station code	2011 date	FL (mm)	W (g)	Age	Days[2] since release	Distance traveled (km)
							June								
Chinook	030281	2008	NMFS	Little Port Walter, AK	5 /18/10		19.7	Chatham Str.	UCB	6/26	349	500	1.1	404	205
Chinook	041977	2007	DIPAC	Auke Bay, AK	6 /17/09		29.9	Chatham Str.	UCA	6/27	474	1400	1.2	740	60
Chinook	042284	2008	DIPAC	Fish Creek, AK	6 /2 /10		27.3	Chatham Str.	UCA	6/26	371	550	1.1	389	65
Chinook	042295	2009	NSRAA	Bear Cove, AK	4 /21/11		69.5	Icy Point	IPA	6/28	225	140	1.0	67	200
Chinook	No tag							Icy Point	IPB	6/28	294	250			
Chinook	No tag							Icy Point	IPA	6/28	329	400			
Chinook	No tag							Icy Point	IPA	6/28	382	650			
Chinook	No tag							Icy Point	IPA	6/28	386	650			
							July								
Chinook	041789	2008	ADFG	Chilkat R., AK (Wild)	10/30/09			Icy Strait	ISA	7/27	375	600	1.2	635	150
Chinook	042284	2008	DIPAC	Fish Creek, AK	6 /2 /10		27.3	Icy Strait	ISB	7/26	372	700	1.1	419	80
Chinook	No tag							Icy Point	IPA	7/25	415	950			
Chinook	No tag							Icy Strait	ISA	7/28	523	750			
Coho	041970	2009	ADFG	Berners R., AK (Wild)	6 /2 /11	100		Chatham Str.	UCC	7/29	221	111	1.0	57	75
Coho	042068	2009	NSRAA	Kasnyku Bay, AK	5 /12/11		21.7	Chatham Str.	UCD	7/28	214	112	1.0	77	110
Coho	635391	2009	WDFW	Naselle R., WA	5 /1 /11			Icy Point	IPB	7/25	239	176	1.0	85	1600
Coho	No tag							Chatham Str.	UCD	7/28	207	97			
Coho	No tag							Chatham Str.	UCD	7/29	167	51			
							August								
Coho	041521	2009	ADFG	Taku River, AK (Wild)	5 /27/11			Chatham Str.	UCD	8/31	231	159	1.0	96	100
Coho	041530	2009	ADFG	Chilkat R., AK (Wild)	5 /17/11			Icy Strait	ISB	8/29	225	130	1.0	104	145
Coho	041530	2009	ADFG	Chilkat R., AK (Wild)	5 /17/11			Chatham Str.	UCA	8/31	207	101	1.0	106	130
Coho	041531	2009	ADFG	Chilkat R., AK (Wild)	5 /17/11			Chatham Str.	UCC	8/31	238	170	1.0	106	120

Table 16.—cont.

		Release information						Recovery information							
Species	CWT code	Brood year	Agency[1]	Locality	Date	FL (mm)	W (g)	Locality	Station code	2011 date	FL (mm)	W (g)	Age	Days[2] since release	Distance traveled (km)
Coho	041785	2009	ADFG	Berners R., AK (Wild)	6 /13/11	100		Icy Strait	ISB	8/29	234	157	1.0	77	90
Coho	042665	2009	DIPAC	Gastineau Channel, AK	6 /15/11		32.2	Icy Strait	ISD	8/28	270	244	1.0	74	87
Coho	042665	2009	DIPAC	Gastineau Channel, AK	6 /15/11		32.2	Icy Strait	ISD	8/28	245	183	1.0	74	87
Coho	No tag							Icy Strait	ISD	8/29	249	189			

[1] ADFG = Alaska Department of Fish and Game; DIPAC = Douglas Island Pink and Chum Inc.; NMFS = National Marine Fisheries Service; NSRAA = Northern Southeast Regional Aquaculture Association; SSRAA = Southern Southeast Regional Aquaculture Association; WDFW = Washington Department of Fish and Wildlife.

[2] Days since release may potentially include freshwater residence periods, such as for salmon fry marked and released in fall that over-wintered in freshwater and smolted the subsequent year.

Table 17.—Stock-specific information on 992 juvenile chum salmon released from regional enhancement facility sites and captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June-August 2011. Length (mm, fork), weight (g), Fulton's condition [$(g/mm^3) \cdot (10^5)$], and condition residuals (CR) from length-weight regression analysis are reported for each stock group. Dash indicates no samples. See Table 16 for agency acronyms.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
						DIPAC							
Upper Chatham Strait	Length	83	81-118	100.1	0.8	81	106-160	135.9	1.3	—	—	—	—
	Weight	83	4.9-15.0	9.3	0.2	81	9.8-39.0	23.7	0.7	—	—	—	—
	Condition	83	0.7-1.0	0.9	0.0	81	0.6-1.3	0.9	0.0	—	—	—	—
	CR	83	-0.35-0.09	-0.03	0.01	81	-0.43-0.34	-0.04	0.01	—	—	—	—
Icy Strait	Length	187	84-124	102.5	0.5	44	101-150	126.6	1.6	23	109-200	164.3	4.4
	Weight	187	5.1-14.8	10.0	0.1	44	10.3-32.7	19.9	0.7	23	10.7-72.4	44.1	3.2
	Condition	187	0.4-1.6	0.9	0.0	44	0.8-1.1	1.0	0.0	23	0.8-1.1	0.9	0.0
	CR	187	-0.89-0.52	-0.02	0.01	44	-0.15-0.10	0.00	0.01	23	-0.23-0.12	-0.03	0.02
Icy Point	Length	—	—	—	—	48	115-155	131.4	1.1	11	115-159	148.5	3.8
	Weight	—	—	—	—	48	15.3-34.6	22.1	0.6	11	12.3-38.7	30.6	2.3
	Condition	—	—	—	—	48	0.8-1.2	1.0	0.0	11	0.8-1.0	0.9	0.0
	CR	—	—	—	—	48	-0.22-0.19	0.0	0.0	11	-0.20-0.00	-0.10	0.00
Total	Length	270	81-124	101.8	0.4	173	101-160	132.3	0.8	34	109-200	159.2	3.4
	Weight	270	4.9-15.0	9.8	0.1	173	9.8-39.0	22.3	0.4	34	10.7-72.4	39.7	2.5
	Condition	270	0.4-1.6	0.9	0.0	173	0.6-1.3	0.9	0.0	34	0.8-1.1	0.9	0.0
	CR	270	-0.89-0.52	-0.02	0.01	173	-0.43-0.34	-0.02	0.01	34	-0.23-0.12	-0.04	0.01

Table 17.—cont.

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
						NSRAA							
						Bear Cove							
Icy	Length	5	97-117	111.6	3.7	—	—	—	—	—	—	—	—
Point	Weight	5	8.2-14.5	12.3	1.1	—	—	—	—	—	—	—	—
(Total)	Condition	5	0.8-0.9	0.9	0.0	—	—	—	—	—	—	—	—
	CR	5	-0.12--0.04	-0.08	0.02	—	—	—	—	—	—	—	—
						Deep Inlet							
Icy	Length	9	99-119	108.6	2.7	2	120-142	131.0	11.0	—	—	—	—
Point	Weight	9	8.5-14.3	11.1	0.8	2	14.8-26.0	20.4	5.6	—	—	—	—
(Total)	Condition	9	0.8-1.0	0.9	0.1	2	0.9-1.0	0.9	0.1	—	—	—	—
	CR	9	-0.19--0.02	-0.10	0.02	2	-0.11--0.06	-0.09	0.03	—	—	—	—
						Kasnyku Bay							
Upper	Length	—	—	—	—	12	111-152	136.0	3.5	—	—	—	—
Chatham	Weight	—	—	—	—	12	12.0-30.0	23.3	1.5	—	—	—	—
Strait	Condition	—	—	—	—	12	0.8-1.1	0.9	0.0	—	—	—	—
	CR	—	—	—	—	12	-0.15-0.18	-0.05	0.03	—	—	—	—
Icy	Length	8	86-104	94.8	2.5	7	95-134	118.1	5.0	2	160-171	165.5	5.5
Strait	Weight	8	5.2-10.6	7.8	0.7	7	8.0-21.2	15.5	1.8	2	40.7-49.8	45.3	4.5
	Condition	8	0.8-1.0	0.9	0.0	7	0.8-1.0	0.9	0.0	2	1.0-1.0	1.0	0.0
	CR	8	-0.13-0.08	-0.05	0.03	7	-0.11-0.04	-0.04	0.02	2	0.02-0.02	0.02	0.00
Icy	Length	—	—	—	—	2	126-127	126.5	0.5	—	—	—	—
Point	Weight	—	—	—	—	2	16.7-19.2	18.0	1.3	—	—	—	—
	Condition	—	—	—	—	2	0.82-0.96	0.89	0.07	—	—	—	—
	CR	—	—	—	—	2	-0.16-0.01	-0.08	0.08	—	—	—	—

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
Total	Length	8	86-104	94.8	2.5	21	95-152	129.1	3.1	2	160-171	165.5	5.5
	Weight	8	5.2-10.6	7.8	0.7	21	8.0-30.0	20.2	1.3	2	40.7-49.8	45.3	4.5
	Condition	8	0.8-1.0	0.9	0.0	21	0.8-1.1	0.9	0.0	2	1.0-1.0	1.0	0.0
	CR	8	-0.13-0.08	-0.05	0.03	21	-0.16-0.18	-0.05	0.02	2	0.02-0.02	0.02	0.00
Takatz Bay													
Upper Chatham Strait	Length	—	—	—	—	3	117-123	121.0	2.0	—	—	—	—
	Weight	—	—	—	—	3	14.6-17.5	16.2	0.8	—	—	—	—
	Condition	—	—	—	—	3	0.9-0.9	0.9	0.0	—	—	—	—
	CR	—	—	—	—	3	-0.08--0.01	-0.04	0.02	—	—	—	—
Icy Strait	Length	15	81-104	91.0	1.9	10	97-139	123.6	3.8	—	—	—	—
	Weight	15	4.8-10.7	6.8	0.5	10	8.5-27.6	18.5	1.8	—	—	—	—
	Condition	15	0.8-1.0	0.9	0.0	10	0.9-1.0	1.0	0.0	—	—	—	—
	CR	15	-0.19-0.08	-0.05	0.02	10	-0.07-0.07	0.00	0.02	—	—	—	—
Icy Point	Length	—	—	—	—	7	111-134	123.9	3.0	3	160-165	163.0	1.5
	Weight	—	—	—	—	7	13.7-22.5	17.2	1.1	3	34.3-42.2	38.0	2.3
	Condition	—	—	—	—	7	0.8-1.0	0.9	0.0	3	0.8-1.0	0.9	0.0
	CR	—	—	—	—	7	-0.17-0.06	-0.1	0.0	3	-0.15--0.02	-0.11	0.04
Total	Length	15	81-104	91.0	1.9	20	97-139	123.3	2.1	3	160-165	163.0	1.5
	Weight	15	4.8-10.7	6.8	0.5	20	8.5-27.6	17.7	1.0	3	34.3-42.2	38.0	2.3
	Condition	15	0.8-1.0	0.9	0.0	20	0.8-1.0	0.9	0.0	3	0.8-1	0.9	0.0
	CR	15	-0.19-0.08	-0.05	0.02	20	-0.17-0.07	-0.03	0.01	3	-0.15--0.02	-0.11	0.04

Table 17.—cont.

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
Gunnuk Creek Hatchery													
Kake Sha													
Upper	Length	—	—	—	—	3	96-106	99.7	3.2	1	141	141.0	
Chatham	Weight	—	—	—	—	3	7.2-10.1	8.3	0.9	1	22.1	22.1	
Strait	Condition	—	—	—	—	3	0.8-0.8	0.8	0.0	1	0.8	0.8	
	CR	—	—	—	—	3	-0.14--0.10	-0.12	0.01	1	-0.20	-0.20	
Icy	Length	—	—	—	—	—	—	—	—	2	191-193	192.0	1.0
Strait	Weight	—	—	—	—	—	—	—	—	2	72.5-75.9	74.2	1.7
	Condition	—	—	—	—	—	—	—	—	2	10-1.1	1.0	0.0
	CR	—	—	—	—	—	—	—	—	2	0.02-0.10	0.06	0.04
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	—	—	—	—	3	96-106	99.7	3.2	3	141-193	175.0	17.0
	Weight	—	—	—	—	3	7.2-10.1	8.3	0.9	3	22.1-75.9	56.8	17.4
	Condition	—	—	—	—	3	0.8-0.8	0.8	0.0	3	0.8-1.1	1.0	0.1
	CR	—	—	—	—	3	-0.14--0.10	-0.12	0.01	3	-0.20-0.10	-0.03	0.09
SSRAA													
Anita Bay													
Upper	Length	—	—	—	—	5	130-168	149.0	6.4	0	0-0	0.0	0.0
Chatham	Weight	—	—	—	—	5	18.5-38	29.8	3.6	0	0-0	0.0	0.0
Strait	Condition	—	—	—	—	5	0.8-1	0.9	0.0	0	0-0	0.0	0.0
	CR	—	—	—	—	5	-0.23-0.03	-0.09	0.04	0	0-0	0.00	0.00

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 Strait	Length	—	—	—	—	1	126	126.0	0.0	5	168-186	177.8	3.1
	Weight	—	—	—	—	1	20.2	20.2	0.0	5	43.5-65.1	55.8	4.1
	Condition	—	—	—	—	1	1.0	1.0	0.0	5	0.8-1.1	1.0	0.0
	CR	—	—	—	—	1	0.06	0.06	0.00	5	-0.17-0.09	0.00	0.05
Icy Point	Length	—	—	—	—	—	—	—	—	2	163-165	164.0	1.0
	Weight	—	—	—	—	—	—	—	—	2	36.7-40.1	38.4	1.7
	Condition	—	—	—	—	—	—	—	—	2	0.8-0.9	0.9	0.1
	CR	—	—	—	—	—	—	—	—	2	-0.18--0.05	-0.11	0.06
Total	Length	—	—	—	—	6	126-168	145.2	6.5	7	163-186	173.9	3.3
	Weight	—	—	—	—	6	18.5-38.0	28.2	3.3	7	36.7-65.1	50.8	4.3
	Condition	—	—	—	—	6	0.8-1.0	0.9	0.0	7	0.8-1.1	1.0	0.0
	CR	—	—	—	—	6	-0.23-0.06	-0.07	0.04	7	-0.18-0.09	-0.03	0.04
Kendrick Bay													
Icy Strait (Total)	Length	—	—	—	—	—	—	—	—	2	185-190	187.5	2.5
	Weight	—	—	—	—	—	—	—	—	2	59.6-70.1	64.9	5.3
	Condition	—	—	—	—	—	—	—	—	2	0.9-1.0	1.0	0.0
	CR	—	—	—	—	—	—	—	—	2	-0.04-0.04	0.00	0.04
Nakat Inlet													
Upper Chatham Strait	Length	—	—	—	—	—	—	—	—	1	192	192.0	0.0
	Weight	—	—	—	—	—	—	—	—	1	71.9	71.9	0.0
	Condition	—	—	—	—	—	—	—	—	1	1.0	1.0	0.0
	CR	—	—	—	—	—	—	—	—	1	0.03	0.03	0.00

Table 17.—cont.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
Icy Strait	Length	—	—	—	—	—	—	—	—	1	199	199.0	0.0
	Weight	—	—	—	—	—	—	—	—	1	83.8	83.8	0.0
	Condition	—	—	—	—	—	—	—	—	1	1.1	1.1	0.0
	CR	—	—	—	—	—	—	—	—	1	0.07	0.07	0.00
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	—	—	—	—	—	—	—	—	2	192-199	195.5	3.5
	Weight	—	—	—	—	—	—	—	—	2	71.9-83.8	77.9	6.0
	Condition	—	—	—	—	—	—	—	—	2	1.0-1.1	1.0	0.0
	CR	—	—	—	—	—	—	—	—	2	0.03-0.07	0.05	0.02
						Neets Bay							
Upper Chatham Strait	Length	—	—	—	—	—	—	—	—	7	167-225	197.3	7.3
	Weight	—	—	—	—	—	—	—	—	7	43.5-114.6	78.2	9.0
	Condition	—	—	—	—	—	—	—	—	7	0.9-1.0	1.0	0.0
	CR	—	—	—	—	—	—	—	—	7	-0.04-0.05	0.00	0.01
Icy Strait	Length	—	—	—	—	—	—	—	—	7	166-211	187.7	5.1
	Weight	—	—	—	—	—	—	—	—	7	44.0-91.1	66.7	5.5
	Condition	—	—	—	—	—	—	—	—	7	0.9-1.1	1.0	0.0
	CR	—	—	—	—	—	—	—	—	7	-0.05-0.09	0.01	0.02
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—

Table 17.—cont.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
Total	Length	—	—	—	—	—	—	—	—	14	166-225	192.5	4.5
	Weight	—	—	—	—	—	—	—	—	14	43.5-114.6	72.5	5.3
	Condition	—	—	—	—	—	—	—	—	14	0.9-1.1	1.0	0.0
	CR	—	—	—	—	—	—	—	—	14	-0.05-0.09	0.01	0.01
Unmarked stocks													
Upper Chatham Strait	Length	10	90-105	97.5	1.4	70	104-215	133.2	1.7	3	189-204	197.7	4.5
	Weight	10	7.6-10.4	8.9	0.3	70	11.4-40.5	21.8	0.6	3	67.2-86.4	79.5	6.2
	Condition	10	0.9-1.0	1.0	0.0	70	0.2-1.1	0.9	0.0	3	1.0-1.1	1.0	0.0
	CR	10	-0.06-0.11	0.02	0.02	70	-1.80-0.11	-0.05	0.03	3	0.01-0.09	0.04	0.03
Icy Strait	Length	139	75-124	95.5	0.8	60	90-145	118.9	1.7	58	108-239	154.6	3.9
	Weight	139	4.5-18.7	8.4	0.2	60	7.0-32.0	17.0	0.7	58	10.9-139.4	40.8	3.6
	Condition	139	0.7-1.5	0.9	0.0	60	0.8-1.1	1.0	0.0	58	0.8-1.1	1.0	0.0
	CR	139	-0.24-0.44	0.00	0.01	60	-0.17-0.13	0.02	0.01	58	-0.14-0.10	0.00	0.01
Icy Point	Length	1	108	108.0	0.0	36	100-160	127.3	1.9	16	134-202	163.8	4.9
	Weight	1	10.1	10.1	0.0	36	8.1-29.6	19.6	0.9	16	20.6-77.1	42.0	4.2
	Condition	1	0.8	0.8	0.0	36	0.4-1.1	0.9	0.0	16	0.8-1.0	0.9	0.0
	CR	1	-0.16	-0.16	0.00	36	-1.01-0.16	-0.03	0.03	16	-0.16-0.04	-0.07	0.00
Total	Length	150	75-124	95.7	0.7	166	90-215	126.7	1.1	77	108-239	158.2	3.3
	Weight	150	4.5-18.7	8.4	0.2	166	7.0-40.5	19.6	0.5	77	10.9-139.4	42.5	3.0
	Condition	150	0.7-1.5	0.9	0.0	166	0.2-1.1	0.9	0.0	77	0.8-1.1	1.0	0.0
	CR	150	-0.24-0.44	0.00	0.01	166	-1.80-0.16	-0.02	0.01	77	-0.16-0.10	-0.01	0.01

Table 18.—Stock-specific information on 423 juvenile sockeye salmon released from regional enhancement facility sites and captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June-August 2011. Length (mm, fork), weight (g), Fulton's condition [(g/mm^3) · (10^5)], and condition residuals (CR) from length-weight regression analysis are reported for each stock group. Dash indicates no samples. See Table 16 for agency acronyms.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
DIPAC													
Speel Arm													
Upper	Length	4	105-114	109.3	1.8	6	138-153	145.8	2.6	3	185-191	187.3	1.9
Chatham	Weight	4	11.5-15.1	12.8	0.8	6	25.3-34.2	30.4	1.6	3	67.1-71.0	69.5	1.2
Strait	Condition	4	0.9-1.0	1.0	0.0	6	0.9-1.0	1.0	0.0	3	1.0-1.1	1.1	0.0
	CR	4	-0.04-0.04	0.00	0.02	6	-0.06-0.01	-0.03	0.01	3	-0.02-0.09	0.03	0.03
Icy	Length	3	112.0-125.0	117.7	3.8	—	—	—	—	57	159-225	188.4	1.8
Strait	Weight	3	13.8-18.6	16.3	1.4	—	—	—	—	57	39.8-123.5	71.7	2.3
	Condition	3	1.0-1.1	1.0	0.0	—	—	—	—	57	0.9-1.1	1.1	0.0
	CR	3	-0.04-0.08	0.01	0.03	—	—	—	—	57	-0.09-0.10	0.02	0.01
Icy	Length	—	—	—	—	7	124.0-146.0	135.0	3.4	—	—	—	—
Point	Weight	—	—	—	—	7	17.8-29.9	23.9	2.0	—	—	—	—
	Condition	—	—	—	—	7	0.9-1.0	1.0	0.0	—	—	—	—
	CR	—	—	—	—	7	-0.09-0.02	-0.04	0.02	—	—	—	—
Total	Length	7	105.0-125.0	112.9	2.4	13	124.0-153.0	140.0	2.6	60	159-225	188.4	1.8
	Weight	7	11.5-18.6	14.3	1.0	13	17.8-34.2	26.9	1.6	60	39.8-123.5	71.5	2.1
	Condition	7	0.9-1.1	1.0	0.0	13	0.9-1.0	1.0	0.0	60	0.9-1.1	1.1	0.0
	CR	7	-0.04-0.08	0.01	0.02	13	-0.09-0.02	-0.04	0.01	60	-0.09-0.10	0.02	0.01

Table 18.—cont.

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
						Sweetheart Lake							
Upper	Length	—	—	—	—	—	—	—	—	—	—	—	—
Chatham	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Icy	Length	1	122	122.0	0.0	—	—	—	—	1	186	186.0	0.0
Strait	Weight	1	16.3	16.3	0.0	—	—	—	—	1	65.3	65.3	0.0
	Condition	1	0.9	0.9	0.0	—	—	—	—	1	1.0	1.0	0.0
	CR	1	-0.09	-0.09	0.00	—	—	—	—	1	-0.01	-0.01	0.00
Icy	Length	—	—	—	—	1	141	141.0	0.0	—	—	—	—
Point	Weight	—	—	—	—	1	28.6	28.6	0.0	—	—	—	—
	Condition	—	—	—	—	1	1.0	1.0	0.0	—	—	—	—
	CR	—	—	—	—	1	0.02	0.02	0.00	—	—	—	—
Total	Length	1	122	122.0	0.0	1	141	141.0	0.0	1	186	186.0	0.0
	Weight	1	16.3	16.3	0.0	1	28.6	28.6	0.0	1	65.3	65.3	0.0
	Condition	1	0.9	0.9	0.0	1	1.0	1.0	0.0	1	1.0	1.0	0.0
	CR	1	-0.09	-0.09	0.00	1	0.02	0.02	0.00	1	-0.01	-0.01	0.00
						Tahltan Lake							
Icy	Length	—	—	—	—	—	—	—	—	5	176-218	194.2	6.9
Strait	Weight	—	—	—	—	—	—	—	—	5	54.0-114.5	76.6	10.1
(Total)	Condition	—	—	—	—	—	—	—	—	5	1.0-1.1	1.0	0.0
	CR	—	—	—	—	—	—	—	—	5	-0.05-0.06	-0.01	0.02

Table 18.—cont.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
							Tuya Lake						
Icy	Length	—	—	—	—	—	—	—	—	1	198	198.0	0.0
Strait	Weight	—	—	—	—	—	—	—	—	1	82.1	82.1	0.0
(Total)	Condition	—	—	—	—	—	—	—	—	1	1.1	1.1	0.0
	CR	—	—	—	—	—	—	—	—	1	0.02	0.02	0.00
							Unmarked stocks						
Upper	Length	64	86-186	137.2	2.7	12	112-196	152.5	8.0	9	126-228	179.8	9.0
Chatham	Weight	64	5.8-61.2	26.0	1.6	12	13.0-76.2	37.6	5.8	9	8.6-129.0	54.4	11.3
Strait	Condition	64	0.8-1.1	0.9	0.0	12	0.9-1.0	1.0	0.0	9	0.1-1.1	0.9	0.1
	CR	64	-0.22-0.05	-0.08	0.01	12	-0.09-0.04	-0.04	0.01	9	-2.20-0.04	-0.28	0.24
Icy	Length	30	94.0-185.0	127.0	4.9	8	103.0-194.0	142.6	14.2	164	100-235	175.0	2.3
Strait	Weight	30	8.0-58.9	21.8	2.9	8	11.2-70.0	34.8	9.6	164	9.2-139.3	59.4	2.2
	Condition	30	0.7-1.0	0.9	0.0	8	0.9-1.0	1.0	0.0	164	0.1-1.2	1.0	0.0
	CR	30	-0.33-0.03	-0.07	0.01	8	-0.07-0.07	-0.01	0.02	164	-2.13-0.16	-0.01	0.01
Icy	Length	—	—	—	—	44	112.0-215.0	156.3	3.8	3	144-157	151.3	3.8
Point	Weight	—	—	—	—	44	13.0-119.0	41.9	3.3	3	29.0-33.0	31.1	1.2
	Condition	—	—	—	—	44	0.5-1.6	1.0	0.0	3	0.9-1.0	0.9	0.0
	CR	—	—	—	—	44	-0.69-0.48	-0.01	0.02	3	-0.17--0.03	-0.11	0.04
Total	Length	94	86.0-186.0	134.0	2.5	64	103.0-215.0	153.8	3.5	176	100-235	174.9	2.2
	Weight	94	5.8-61.2	24.6	1.4	64	11.2-119.0	40.2	2.8	176	8.6-139.3	58.7	2.1
	Condition	94	0.7-1.1	0.9	0.0	64	0.5-1.6	1.0	0.0	176	0.1-1.2	1.0	0.0
	CR	94	-0.33-0.05	-0.07	0.01	64	-0.69-0.48	-0.02	0.02	176	-2.20-0.158	-0.03	0.02

Table 19.—Stock-specific information on 577 juvenile coho salmon released from regional enhancement facility sites and captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June-August 2011. Length (mm, fork), weight (g), Fulton's condition [(g/mm^3) · (10^5)], and condition residuals (CR) from length-weight regression analysis are reported for each stock group. Dash indicates no samples. See Table 16 for agency acronyms.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
						DIPAC							
						Gastineau Channel							
Upper	Length	1	152	152.0	—	2	190-197	193.5	3.5	7	222-244	233.4	3.1
Chatham	Weight	1	34.2	34.2	—	2	65.5-79.4	72.5	6.9	7	116.5-175.3	151.0	10.0
Strait	Condition	1	1.0	1.0	—	2	1.0-1.0	1.0	0.0	7	1.0-1.4	1.2	0.0
	CR	1	-0.13	-0.13	—	2	-0.18--0.10	-0.14	0.04	7	-0.11-0.14	0.00	0.03
Icy	Length	—	—	—	—	3	179-200	192.7	6.8	17	210-268	244.1	4.2
Strait	Weight	—	—	—	—	3	59.5-79.4	72.2	6.4	17	103.9-251.9	180.0	10.3
	Condition	—	—	—	—	3	1.0-1.0	1.0	0.0	17	1.1-1.4	1.2	0.0
	CR	—	—	—	—	3	-0.15--0.09	-0.13	0.02	17	-0.03-0.15	0.03	0.01
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	Condition	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	1	152	152.0	—	5	179-200	193.0	3.9	24	210-268	240.9	3.1
	Weight	1	34.2	34.2	—	5	59.5-79.4	72.3	4.1	24	103.9-251.9	171.6	8.2
	Condition	1	1.0	1.0	—	5	1.0-1.0	1.0	0.0	24	1.0-1.4	1.2	0.0
	CR	1	-0.13	-0.13	—	5	-0.18--0.09	-0.13	0.02	24	-0.11-0.15	0.02	0.01

Table 19.—cont.

Locality	Factor	June				July				August			
		n	range	mean	se	n	range	mean	se	n	range	mean	se
Unmarked stocks													
Upper	Length	23	129-215	173.5	4.2	73	151-254	199.4	2.8	107	186-302	239.8	2.2
Chatham	Weight	23	22.6-100.3	58.3	3.8	73	35.5-185.0	91.3	3.9	107	74.3-341.8	165.6	5.0
Strait	Condition	23	0.7-1.8	1.1	0.1	73	0.9-1.4	1.1	0.0	107	0.7-2.0	1.2	0.0
	CR	23	-0.55-0.50	-0.04	0.05	73	-0.21-0.19	-0.04	0.01	107	-0.52-0.56	-0.01	0.01
Icy	Length	119	124-249	177.0	1.9	36	153-276	209.5	4.4	165	154-298	238.4	2.0
Strait	Weight	119	21.0-169.4	65.2	2.1	36	13.9-255.8	104.9	7.7	165	39.2-317.9	168.9	4.3
	Condition	119	0.9-1.4	1.1	0.0	36	0.2-1.3	1.1	0.0	165	1.0-1.5	1.2	0.0
	CR	119	-0.27-0.23	0.00	0.01	36	-1.73-0.12	-0.10	0.05	165	-0.20-0.22	0.02	0.00
Icy	Length	3	195-228	212.0	9.5	18	154-254	218.7	6.6	3	246-304	272.0	17.0
Point	Weight	3	83.8-148.2	118.0	18.7	18	38.9-210.7	130.1	12.1	3	173.3-343.4	248.0	50.2
	Condition	3	1.1-1.3	1.2	0.0	18	0.8-1.3	1.2	0.0	3	1.2-1.2	1.2	0.0
	CR	3	-0.01-0.09	0.05	0.03	18	-0.41-0.14	0.00	0.03	3	-0.01-0.01	0.00	0.00
Total	Length	145	124-249	177.2	1.7	127	151-276	205.0	2.3	275	154-304	239.3	1.5
	Weight	145	21.0-169.4	65.2	1.9	127	13.9-255.8	100.7	3.7	275	39.2-343.4	168.5	3.3
	Condition	145	0.7-1.8	1.1	0.0	127	0.2-1.4	1.1	0.0	275	0.7-2.0	1.2	0.0
	CR	145	-0.55-0.50	0.00	0.01	127	-1.73-0.19	-0.05	0.02	275	-0.52-0.56	0.01	0.00

Table 20.—Number examined, length (mm, fork), wet weight (g), stomach content as percent body weight (%BW), and feeding intensity (0-100% volume fullness) of 340 potential predators of juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011. Dash indicates no samples. For scientific names, see Table 8. For additional feeding data, see Table 21 and Figure 18.

		June				July				August			
Species	Factor	*n*	range	mean	sd	*n*	range	mean	sd	*n*	range	mean	sd
Pink salmon[1]	Length	43	445-593	525	35	90	445-622	519	35	29	465-630	516	33
	Weight		800-2350	1607	318		700-2500	1597	337		1150-2800	1597	343
	%BW		0-0.6	0.0	0.1		0-3.1	0.2	0.5		0-1.2	0.2	0.3
	Fullness		0-110	12	25		0-110	29	33		0-100	36	35
Chum salmon[1]	Length	10	545-653	603	29	13	584-754	632	46	5	630-670	657	16
	Weight		1850-2900	2440	313		1900-3250	2508	375		2650-7900	4170	2129
	%BW		0-1.6	0.4	0.4		0.0-1.0	0.5	0.3		0.2-0.6	0.4	0.2
	Fullness		0-100	49	31		10-110	59	34		25-50	45	11
Coho salmon[1]	Length	4	285-692	514	177	1	599-599	599		8	540-735	647	63
	Weight		250-4550	2000	1844		2600-2600	2600			1800-5300	3431	1168
	%BW		0-3.6	0.9	1.8		0-0	0.0			0-2.8	1.1	1.2
	Fullness		0-110	34	52			0			0-110	73	41
Chinook salmon[2]	Length	72	244-525	362	58	30	350-525	425	49	1	420-420	420	—
	Weight		150-1950	646	384		500-1950	1017	390		800-800	800	—
	%BW		0-5.2	1.1	1.4		0-4	1.6	1.3		0.1	0.1	—
	Fullness		0-110	72	46		0-110	77	43		10	10	—
Chinook salmon[1]	Length	3	613-634	624	11	—	—	—	—	—	—	—	—
	Weight		3100-3500	3333	208	—	—	—	—	—	—	—	—
	%BW		0-5.2	2.1	2.8	—	—	—	—	—	—	—	—
	Fullness		0-110	73	64	—	—	—	—	—	—	—	—

Table 20.—cont.

Species	Factor	June				July				August			
		n	range	mean	sd	*n*	range	mean	sd	*n*	range	mean	sd
Sockeye salmon [1]	Length	1	500-500	500		5	480-712	614	86	—	—	—	—
	Weight		1600-1600	1600			1350-4300	2790	1077	—	—	—	—
	%BW			0.0			0-0	0.0	0.0	—	—	—	—
	Fullness		0-0	0.0			0-0	0.0	0.0	—	—	—	—
Walleye pollock[2]	Length	7	273-499	379	72	—	—	—	—	—	—	—	—
	Weight		100-400	286	111	—	—	—	—	—	—	—	—
	%BW		0-2.6	0.4	1.0	—	—	—	—	—	—	—	—
	Fullness		0-100	33.6	46.3	—	—	—	—	—	—	—	—
Pacific sandfish[1]	Length	—	—	—	—	—	—	—	—	2	175-190	183	11
	Weight	—	—	—	—	—	—	—	—		65-74	70	6
	%BW	—	—	—	—	—	—	—	—		0-23.4	11.7	16.5
	Fullness	—	—	—	—	—	—	—	—		0-110	55.0	77.8
Dolly Varden[1]	Length	1	308-308	308		—	—	—	—	—	—	—	—
	Weight		300-300	300		—	—	—	—	—	—	—	—
	%BW		0.5	0.5		—	—	—	—	—	—	—	—
	Fullness		75-75	75.0		—	—	—	—	—	—	—	—
Spiny dogfish[1]	Length	15	600-958	777	109								
	Weight		800-3700	1927	1073	—	—	—	—	—	—	—	—
	%BW		0-1.5	0.2	0.5	—	—	—	—	—	—	—	—
	Fullness		0-75	9.0	22.4	—	—	—	—	—	—	—	—

[1] Adult
[2] Immature

Table 21.—Feeding intensity of 340 potential predators of juvenile salmon examined from rope trawl hauls in the marine waters of the northern region of southeastern Alaska, June–August 2011. Fish were captured in both strait and coastal habitats. For scientific names, see Table 8. See also Table 20 and Figure 18.

Predator species	Life history stage	Number examined	Number empty	Percent feeding	Number with salmon	Percent feeders with salmon
Pink salmon	Adult	162	64	61	2	2
Chum salmon	Adult	28	1	96	0	0
Coho salmon	Adult	13	4	69	2	22
Chinook salmon	Immature	103	18	83	0	0
Chinook salmon	Adult	3	1	67	0	0
Sockeye salmon	Adult	6	6	0	0	—
Walleye pollock	Immature	7	3	57	0	0
Pacific sandfish	Adult	2	1	50	1	100
Dolly Varden	Adult	1	0	100	0	0
Spiny dogfish	Adult	15	12	20	0	0

Table 22.—Monthly longterm means of temperature (20-m integrated, °C), salinity (20-m integrated, PSU), and mixed layer depth (MLD, m) over the 15-yr time series in strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Values are references for the 0-lines shown in Figures 19-21.

	May	June	July	August
Temperature	7.12	9.55	10.35	10.15
Salinity	30.95	29.49	28.49	28.51
MLD	8.94	7.03	7.13	7.82

Table 23.—Zooplankton monthly longterm means and standard errors (in parentheses) for total density (numbers per m^3) and percent composition of taxa important in fish diets over the 15-yr time series in strait habitat in the marine waters of the northern region of southeastern Alaska, 1997-2011. Data represent four stations sampled annually across the strait (≤ 200 m depth) with a 0.6 m diameter, 333-µm mesh bongo net (double-oblique trajectory) from 1997-2011. Values are references for the 0-lines shown in Figures 24 and 25.

	May		June		July		August	
Total organisms	1682	(156)	1711	(206)	1223	(119)	853	(52)
% Large calanoids	35	(3)	25	(2)	15	(2)	16	(2)
% Small calanoids	47	(3)	58	(2)	73	(2)	74	(2)
% Euphausiid larvae	5	(2)	6	(2)	1	<1	1	<1
% Larvaceans	6	(2)	4	(1)	3	(1)	2	<1
% Pteropods	<1		2	(1)	<1		<1	
% Amphipods	<1		<1		3	(1)	3	(1)
% Decapod larvae	<1		<1		<1		<1	
% Other	6	(1)	4	(1)	4	<1	4	(1)

Table 24.—Long term monthly means of catch-per-unit-effort (CPUE, catch per trawl haul), size-at-time (fork length, mm, on July 24), condition residuals (CR), and energy density (cal/g wet weight, WW) for juvenile pink, chum, sockeye, and coho salmon over the 15-yr time series in strait habitat in the marine waters of the northern region of southeastern Alaska, 1997-2011. Values are converted to "Cobb units" (see Table 10). Values are references for the 0-lines shown in Figures 26-28 and 30.

Salmon	June	July	August
		CPUE	
Pink	67.8	52.6	16.6
Chum	61.5	61.2	7.2
Sockeye	11.6	6.6	3.2
Coho	9.6	8.0	4.7
		Size at time	
Pink		122.3	
Chum		199.9	
Sockeye		127.0	
Coho		133.0	
		CR	
Pink	0.00	-0.01	0.01
Chum	-0.01	-0.01	0.04
Sockeye	-0.28	0.00	0.04
Coho	-0.01	0.00	0.01
		Energy density	
Pink		1101.75	
Chum		1033.90	
Sockeye		1134.89	
Coho		1108.59	

Appendix 1.—Temperature (°C), salinity (PSU), ambient light (W/m^3), Secchi depth (m), mixed layer depth (MLD, m; see text for definition), zooplankton settled volume (ZSV, ml), and total plankton settled volumes (TSV, ml) by haul number and station sampled in the marine waters of the northern region of southeastern Alaska, May–August 2011. Station code acronyms are listed in Table 1.

Date	Haul #	Station	Temperature (°C)	Salinity (PSU)	Light level (W/m^3)	Secchi (m)	MLD (m)	ZSV (ml)	TSV (ml)
21 May	15001	ISA	6.9	31.6	238	6	8	16.0	16.0
21 May	15002	ISB	6.5	31.6	567	6	9	20.0	20.0
21 May	15003	ISC	7.2	31.5	638	5	11	24.0	24.0
21 May	15004	ISD	7.2	31.4	300	6	10	25.0	25.0
22 May	15005	IPA	7.3	31.9	256	3	9	0.1	0.1
22 May	15006	IPB	7.7	31.9	389	5	8	3.0	3.0
22 May	15007	IPC	8.3	31.8	484	5	13	3.0	3.0
22 May	15008	IPD	8.0	31.9	683	16	13	6.0	6.0
21 May	15009	UCA	7.2	31.3	250	6	9	4.5	4.5
21 May	15010	UCB	7.0	31.3	193	7	11	53.0	53.0
21 May	15011	UCC	7.1	31.3	123	7	8	30.0	30.0
21 May	15012	UCD	6.3	31.5	121	8	6	18.0	18.0
20 May	15013	ABM	8.3	30.0	318	5	8	8.5	8.5
24 June	15014	ISD	12.1	28.6	50	8	6	18.0	18.0
24 June	15015	ISC	11.8	28.8	141	6	7	10.0	20.0
24 June	15016	ISB	12.5	28.3	214	5	6	25.0	30.0
24 June	15017	ISA	12.4	27.0	174	6	8	20.0	40.0
24 June	15018	ISB	12.7	28.0	41	6	7	17.0	35.0
24 June	15019	ISA	12.4	27.0	22	5	7	10.0	45.0
25 June	15020	ISA	12.4	27.3	84	5	10	12.0	35.0
25 June	15021	ISB	12.1	28.4	77	6	7	12.0	30.0
25 June	15022	ISC	12.2	28.3	139	6	7	15.0	45.0
25 June	15023	ISD	11.4	29.1	598	6	6	7.0	18.0
25 June	15025	ISC	12.3	28.3	369	7	6	8.0	30.0

Appendix 1.—cont.

Date	Haul #	Station	Temperature (°C)	Salinity (PSU)	Light level (W/m^3)	Secchi (m)	MLD (m)	ZSV (ml)	TSV (ml)
25 June	15026	ISB	12.1	28.5	412	5	7	9.0	30.0
25 June	15027	ISA	12.8	28.1	156	5	8	6.0	20.0
26 June	15028	UCA	11.9	28.3	122	8	8	6.5	25.0
26 June	15029	UCB	11.6	28.2	192	7	7	5.0	22.0
26 June	15030	UCC	11.2	28.5	381	6	7	9.0	23.0
26 June	15031	UCD	10.3	28.1	338	4	8	5.0	25.0
26 June	15033	UCC	10.3	29.3	327	5	12	5.5	20.0
26 June	15034	UCB	11.1	29.0	254	6	6	12.0	28.0
26 June	15035	UCA	12.4	28.0	199	7	7	8.0	16.0
27 June	15036	UCA	12.2	28.3	76	6	6	8.0	30.0
27 June	15037	UCB	12.2	26.5	358	5	6	12.5	38.0
27 June	15038	UCC	12.5	27.0	220	6	10	15.0	30.0
27 June	15039	UCD	12.4	24.8	340	5	10	12.5	40.0
27 June	15040	ISD	11.9	29.4	286	5	6	8.0	30.0
27 June	15041	ISC	12.2	29.2	230	6	6	11.0	20.0
28 June	15042	IPD	14.0	32.0	44	6	7	0.5	0.5
28 June	15043	IPC	12.8	31.8	240	3	6	8.0	8.0
28 June	15044	IPB	12.5	31.7	163	5	6	13.0	13.0
28 June	15045	IPA	12.7	31.5	115	5	6	14.0	14.0
29 June	15046	ABM	14.0	15.8	44	2	6	8.5	15.0
25 July	15047	IPD	14.2	31.7	219	5	8	35.0	35.0
25 July	15048	IPC	14.0	31.7	243	4	13	8.0	8.0
25 July	15049	IPB	13.8	31.6	286	5	13	12.0	12.0
25 July	15050	IPA	13.1	31.6	19	3	14	32.0	32.0
26 July	15051	ISA	13.3	26.9	66	4	6	32.5	60.0
26 July	15052	ISB	13.3	25.7	17	6	6	15.0	30.0
26 July	15053	ISC	12.5	27.7	151	8	7	15.0	15.0
26 July	15054	ISD	12.6	27.5	123	7	6	15.0	15.0

Appendix 1.—cont.

Date	Haul #	Station	Temperature (°C)	Salinity (PSU)	Light level (W/m^3)	Secchi (m)	MLD (m)	ZSV (ml)	TSV (ml)
26 July	15056	ISC	13.6	24.8	145	6	6	10.0	10.0
27 July	15057	ISA	12.4	27.4	46	6	6	10.0	10.0
27 July	15058	ISB	11.2	28.9	47	8	6	14.0	14.0
27 July	15059	ISC	13.2	25.9	11	8	6	25.0	25.0
27 July	15060	ISD	12.6	27.4	41	7	6	15.0	15.0
27 July	15062	ISC	12.5	27.6	24	7	6	20.0	20.0
27 July	15063	ISB	11.3	29.0	14	7	6	12.0	12.0
27 July	15064	ISA	10.4	29.7	19	7	7	22.0	22.0
28 July	15065	ISA	11.0	29.4	73	7	6	4.0	4.0
28 July	15066	ISB	11.5	29.1	165	8	6	10.0	10.0
28 July	15067	UCD	11.8	28.4	35	6	12	30.0	90.0
28 July	15068	UCC	11.0	29.0	562	6	8	12.5	25.0
28 July	15069	UCB	9.8	30.4	314	7	6	6.0	13.0
28 July	15070	UCA	9.3	30.7	114	8	6	2.0	5.0
29 July	15071	UCA	9.5	30.7	5	7	7	6.0	8.0
29 July	15072	UCB	10.3	30.2	63	7	8	1.3	2.5
29 July	15073	UCC	11.1	28.8	57	6	7	8.0	16.0
29 July	15074	UCD	12.5	25.3	404	7	9	25.0	55.0
29 July	15076	UCC	12.0	26.2	237	6	6	40.0	90.0
29 July	15077	UCB	10.1	30.1	104	7	6	2.5	5.0
29 July	15078	UCA	9.6	30.5	81	7	7	2.0	4.0
30 July	15079	ABM	11.8	15.2	14	1	9	6.0	8.0
28 August	15080	ISA	10.3	26.1	31	6	8	2.0	3.0
28 August	15081	ISB	10.6	22.3	121	7	8	6.0	6.0
28 August	15082	ISC	11.1	20.7	338	7	8	6.0	6.0
28 August	15083	ISD	11.2	20.4	284	6	10	5.0	7.0
28 August	15084	ISC	11.4	20.3	99	6	7	10.0	13.0
28 August	15085	ISD	11.2	20.6	60	6	10	5.0	7.0

Appendix 1.—cont.

Date	Haul #	Station	Temperature (°C)	Salinity (PSU)	Light level (W/m^3)	Secchi (m)	MLD (m)	ZSV (ml)	TSV (ml)
29 August	15086	ISD	11.1	21.4	19	7	8	4.0	5.5
29 August	15087	ISC	11.1	20.5	53	7	6	4.0	7.5
29 August	15088	ISB	10.3	25.1	295	6	7	2.5	4.5
29 August	15089	ISA	9.5	27.9	369	5	6	2.0	2.0
29 August	15091	ISB	11.1	21.3	515	8	7	5.0	7.0
29 August	15092	ISC	11.4	20.5	587	8	7	4.0	5.0
30 August	15094	IPD	13.2	31.6	12	4	12	19.0	19.0
30 August	15095	IPC	13.1	31.5	112	4	18	13.0	13.0
30 August	15096	IPB	12.6	31.1	204	3	48	11.0	11.0
30 August	15097	IPA	13.1	30.4	668	2	10	16.0	16.0
31 August	15098	ISB	10.4	25.4	162	5	7	2.0	2.0
31 August	15099	ISA	8.7	28.1	133	4	12	2.5	2.5
31 August	15100	UCD	10.7	22.8	189	5	9	1.8	1.8
31 August	15101	UCC	10.5	23.3	112	6	7	1.5	1.5
31 August	15102	UCB	10.8	22.2	58	7	10	1.5	1.5
31 August	15103	UCA	11.2	20.4	24	6	8	1.5	1.5
01 Sept	15104	UCA	10.3	26.0	8	5	8	0.8	0.8
01 Sept	15105	UCB	10.2	26.2	18	5	8	1.5	1.5
01 Sept	15106	UCC	10.5	23.0	123	5	9	2.3	2.3
01 Sept	15107	UCD	10.7	20.3	173	5	6	2.5	2.5
01 Sept	15109	UCC	11.0	19.2	266	5	8	1.5	1.5
01 Sept	15110	UCB	10.3	26.2	479	5	7	0.6	0.6
01 Sept	15111	UCA	9.6	28.2	358	6	8	0.5	0.5
02 Sept	15112	ABM	9.8	19.2	10	3	14	2.0	2.0

Appendix 2.—Catch and life history stage of salmonids captured in the marine waters of the northern region of southeastern Alaska, June–August 2011. Trawl duration (minutes) is indicated for each haul. Station code acronyms are listed in Table 1.

			Trawl	Juvenile salmon					Immature and adult salmon				
Date	Haul #	Station	time	Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
24 June	15014	ISD	20	10	30	0	0	0	2	0	0	0	0
24 June	15015	ISC	20	0	0	0	2	0	1	0	0	0	0
24 June	15016	ISB	20	0	0	0	2	0	1	1	0	1	1
24 June	15017	ISA	20	0	1	0	21	0	0	0	0	0	2
24 June	15018	ISB	20	0	6	1	5	0	0	0	0	0	0
24 June	15019	ISA	20	2	31	3	10	0	0	2	0	0	1
25 June	15020	ISA	20	0	0	2	9	0	0	0	0	0	1
25 June	15021	ISB	20	0	0	1	22	0	2	0	0	0	1
25 June	15022	ISC	20	1	17	3	0	0	0	0	0	0	1
25 June	15023	ISD	20	24	83	10	23	0	0	0	0	0	1
25 June	15024	ISD	20	63	146	7	0	0	0	0	0	0	1
25 June	15025	ISC	20	0	1	0	2	0	0	0	0	0	1
25 June	15026	ISB	20	7	32	3	0	0	0	0	0	0	0
25 June	15027	ISA	20	13	40	1	13	0	0	0	0	0	2
26 June	15028	UCA	20	0	0	0	2	0	6	0	0	0	6
26 June	15029	UCB	20	0	0	0	0	0	1	0	1	0	4
26 June	15030	UCC	20	0	0	3	2	0	0	0	0	0	1
26 June	15031	UCD	20	0	0	5	7	0	9	0	0	0	9
26 June	15032	UCD	20	0	0	3	0	0	6	1	0	0	9
26 June	15033	UCC	20	0	0	0	0	0	0	0	0	0	4
26 June	15034	UCB	18	0	0	2	6	0	3	3	0	0	2
26 June	15035	UCA	14	0	0	2	4	0	0	0	0	0	2
27 June	15036	UCA	20	3	87	9	1	0	4	0	0	0	5
27 June	15037	UCB	20	0	6	20	0	0	0	0	0	0	1
27 June	15038	UCC	20	0	0	12	0	0	0	0	0	0	0
27 June	15039	UCD	20	0	0	14	2	0	2	0	0	0	4
27 June	15040	ISD	20	57	15	2	5	0	1	0	0	0	0

Appendix 2.—cont.

Date	Haul #	Station	Trawl time	Juvenile salmon					Immature and adult salmon				
				Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
27 June	15041	ISC	20	0	1	1	6	0	0	0	0	0	0
28 June	15042	IPD	30	2	18	0	0	0	0	0	0	0	0
28 June	15043	IPC	30	1	0	0	0	0	0	3	0	0	0
28 June	15044	IPB	30	0	0	0	3	0	1	0	0	1	6
28 June	15045	IPA	30	1	1	0	0	7	4	0	0	2	10
25 July	15048	IPC	20	66	12	1	4	0	0	0	0	0	0
25 July	15049	IPB	20	24	25	34	13	0	0	0	0	0	0
25 July	15050	IPA	20	194	203	18	2	1	4	0	0	0	1
26 July	15051	ISA	20	0	0	0	0	0	0	1	0	0	1
26 July	15052	ISB	20	110	29	1	1	0	0	0	0	0	3
26 July	15053	ISC	20	101	42	3	1	0	4	1	0	0	2
26 July	15054	ISD	20	61	17	1	0	0	1	0	0	0	2
26 July	15055	ISD	20	12	7	0	1	0	0	1	1	1	0
26 July	15056	ISC	20	74	20	0	4	1	2	0	0	0	2
27 July	15057	ISA	20	3	2	1	3	0	0	0	0	0	5
27 July	15058	ISB	20	0	2	1	2	0	0	0	0	0	0
27 July	15059	ISC	20	0	1	0	3	0	2	0	0	0	1
27 July	15060	ISD	20	0	0	1	5	0	0	0	0	0	0
27 July	15061	ISD	20	0	0	0	7	0	2	0	0	0	0
27 July	15062	ISC	20	0	0	0	2	0	2	0	0	0	0
27 July	15063	ISB	20	0	0	0	1	0	1	0	0	0	1
27 July	15064	ISA	20	1	3	0	3	0	1	0	0	0	2
28 July	15065	ISA	20	2	2	0	4	0	2	0	0	0	7
28 July	15066	ISB	20	7	3	0	2	0	0	2	0	0	2
28 July	15067	UCD	20	300	52	3	19	0	3	1	0	0	0
28 July	15068	UCC	20	8	10	2	14	0	6	1	0	0	0
28 July	15069	UCB	20	0	0	0	0	0	7	0	0	0	0
29 July	15071	UCA	20	7	1	0	3	0	8	0	0	0	0
29 July	15072	UCB	20	6	0	0	5	0	10	0	0	0	0

Appendix 2.—cont.

Date	Haul #	Station	Trawl time	Juvenile salmon					Immature and adult salmon				
				Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
29 July	15073	UCC	20	85	46	11	13	0	1	0	0	0	0
29 July	15074	UCD	20	21	3	1	11	0	14	3	1	0	0
29 July	15075	UCD	20	94	38	1	10	0	14	5	3	0	0
29 July	15076	UCC	20	92	31	1	2	0	0	0	0	0	0
29 July	15077	UCB	20	2	0	0	3	0	4	0	0	0	0
28 August	15080	ISA	20	9	1	0	0	0	0	0	0	0	0
28 August	15081	ISB	20	37	7	10	20	0	0	0	0	0	0
28 August	15082	ISC	20	159	13	18	11	0	0	0	0	0	0
28 August	15083	ISD	20	494	41	46	35	0	0	1	0	0	0
28 August	15084	ISC	20	0	0	0	6	0	0	0	0	0	0
28 August	15085	ISD	20	125	8	26	40	0	0	0	0	0	1
29 August	15086	ISD	20	35	10	4	9	0	4	0	0	0	0
29 August	15087	ISC	20	134	8	32	19	0	3	2	0	2	0
29 August	15088	ISB	20	80	7	52	5	0	0	0	0	0	0
29 August	15089	ISA	20	67	0	6	6	0	4	0	0	2	0
29 August	15090	ISA	10	0	1	1	1	0	2	0	0	0	0
29 August	15091	ISB	10	2	0	0	14	0	0	0	0	2	0
29 August	15092	ISC	10	25	4	14	3	0	0	0	0	0	0
29 August	15093	ISD	10	79	2	20	12	1	0	0	0	0	0
30 August	15094	IPD	30	0	0	0	0	0	0	1	0	0	0
30 August	15095	IPC	30	0	0	0	1	0	1	0	0	0	0
30 August	15096	IPB	30	52	5	1	0	0	4	0	0	0	0
30 August	15097	IPA	30	123	28	2	2	0	0	0	0	0	0
31 August	15098	ISB	10	0	0	0	6	0	0	0	0	0	0
31 August	15099	ISA	10	0	0	0	2	0	0	0	0	0	0
31 August	15100	UCD	20	1	1	1	12	0	0	0	0	0	0
31 August	15101	UCC	20	1	0	2	13	0	0	0	0	0	0
31 August	15102	UCB	20	1	0	1	21	0	0	0	0	0	0
31 August	15103	UCA	20	1	1	1	22	0	5	0	0	0	0

Appendix 2.—cont.

Date	Haul #	Station	Trawl time	Juvenile salmon					Immature and adult salmon				
				Pink	Chum	Sockeye	Coho	Chinook	Pink	Chum	Sockeye	Coho	Chinook
01 Sept	15104	UCA	20	0	0	0	7	0	1	0	0	0	0
01 Sept	15105	UCB	20	8	1	7	35	0	0	0	0	0	0
01 Sept	15106	UCC	20	1	5	0	5	1	0	0	0	0	0
01 Sept	15107	UCD	20	26	1	0	0	0	0	1	0	0	0
01 Sept	15108	UCD	19	15	2	0	3	0	0	0	0	0	0
01 Sept	15109	UCC	20	0	1	0	5	0	1	0	0	0	0
01 Sept	15110	UCB	20	0	0	0	6	0	4	0	0	1	0
01 Sept	15111	UCA	20	0	0	0	0	0	2	0	0	1	0

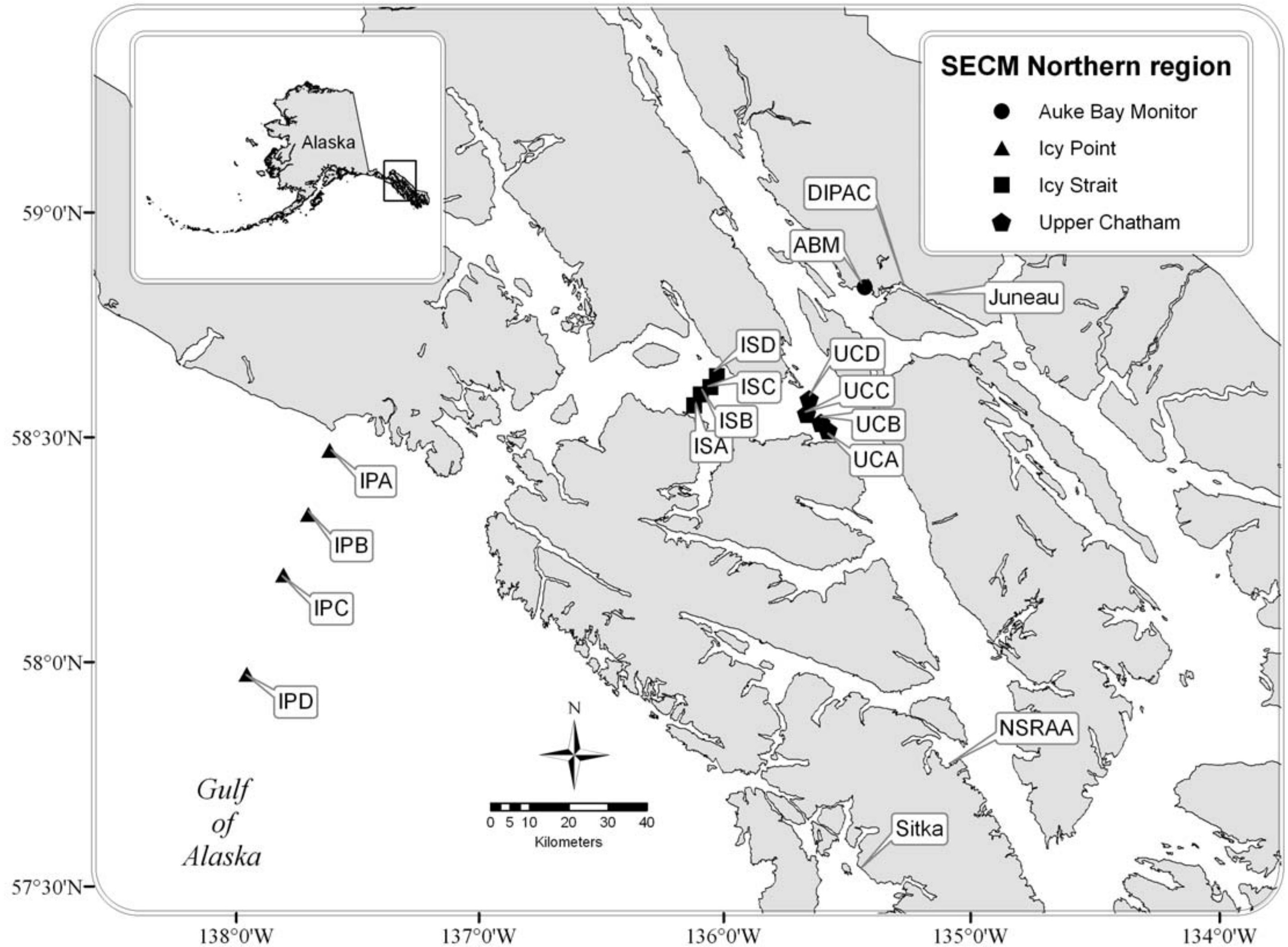

Figure 1.—Stations sampled at inshore, strait, and coastal habitats in the marine waters of the northern region of southeastern Alaska, May–August 2011. Transect and station coordinates and station code acronyms are shown in Table 1.

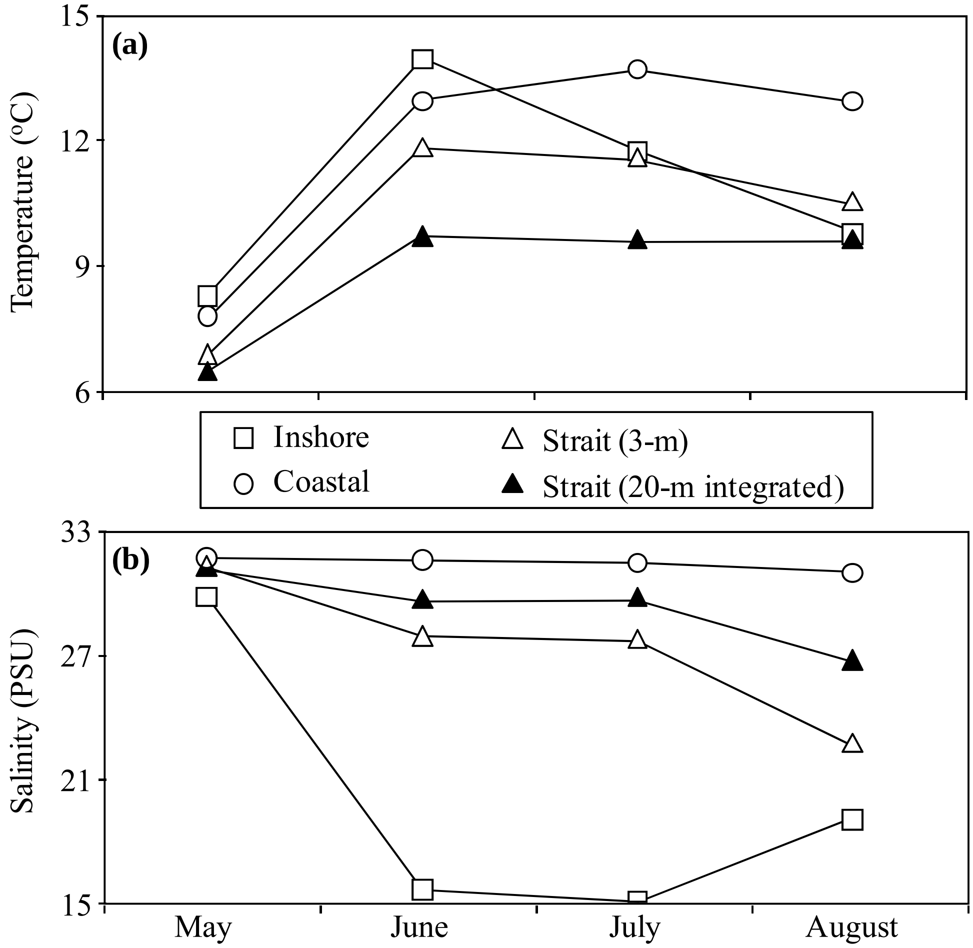

Figure 2.—Mean surface (3-m) and 20-m integrated temperature (a; ˚C) and salinity (b; PSU) for the marine waters of the northern region of southeastern Alaska, May–August 2011. The 3-m measures represent the most active segment of the water column, while the 20-m integrated measures represent more stable waters also sampled by the trawl (see also Figure 3). See Table 2 for monthly sample sizes and Appendix 1 for data values.

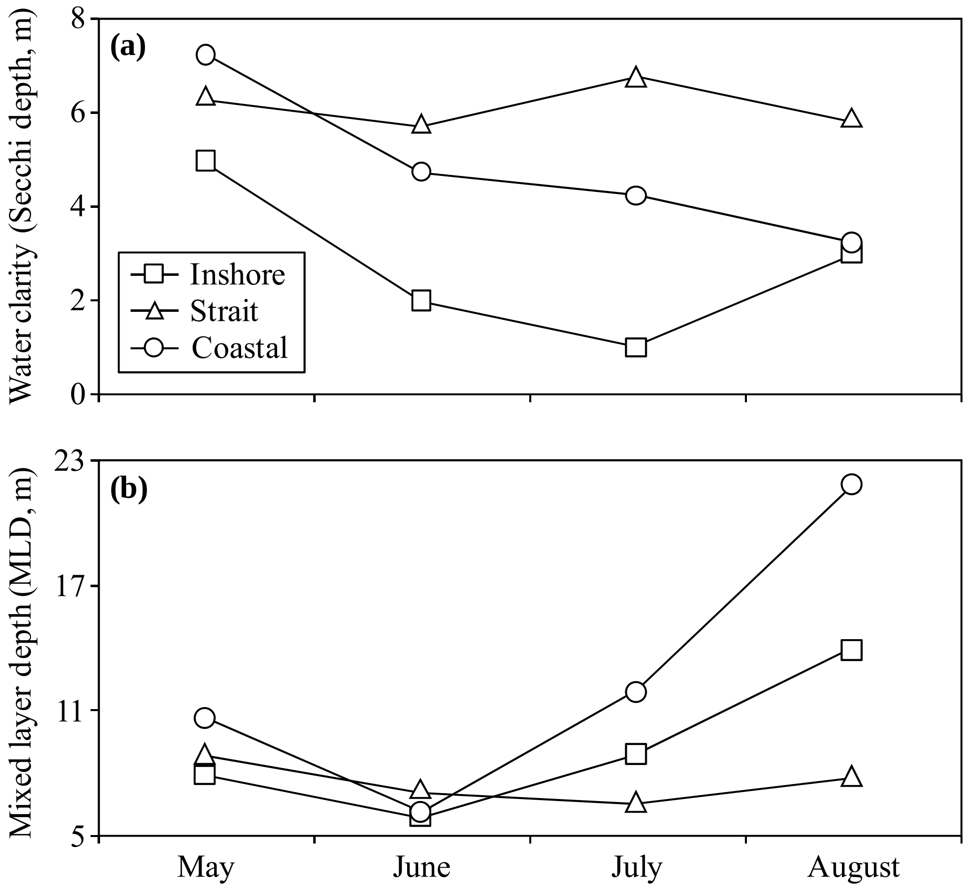

Figure 3.—Water clarity as mean depth (a; m) of Secchi disappearance and mixed layer depth (b; MLD, m) calculated from CTD profiles of the marine water column in the northern region of southeastern Alaska, May–August 2011. See Table 2 for monthly sample sizes and Appendix 1 for data values.

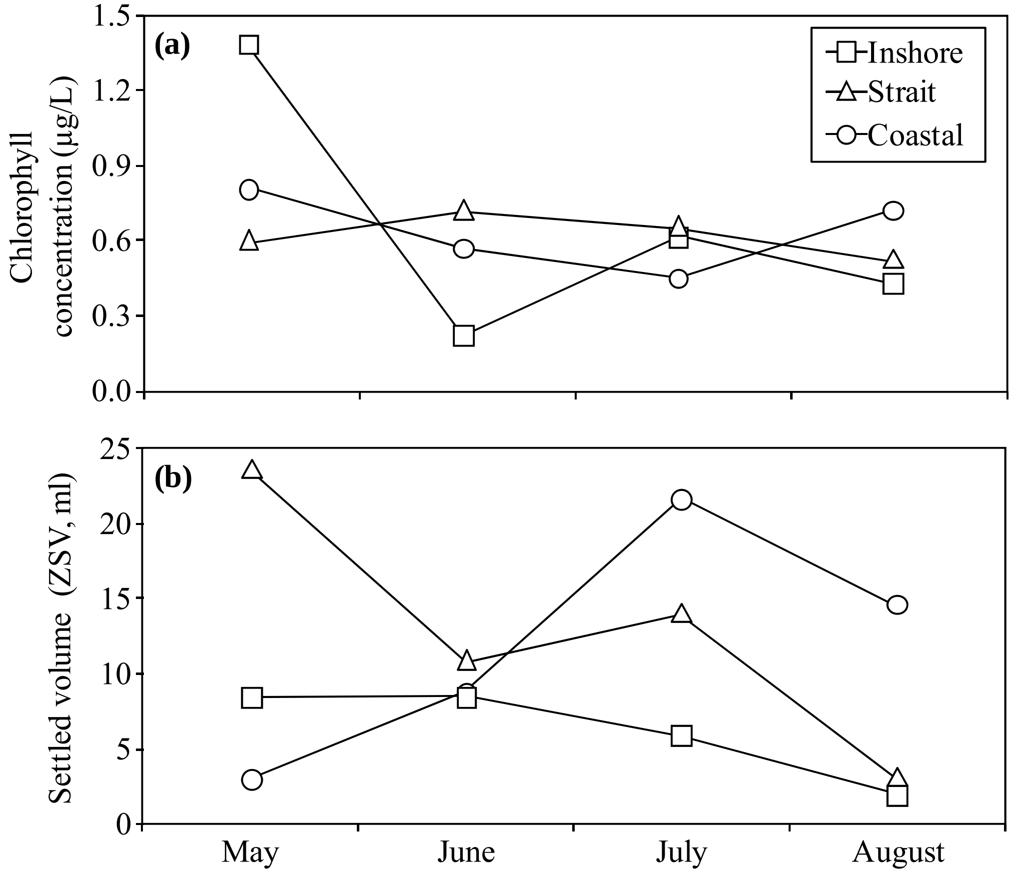

Figure 4.—Mean chlorophyll-a concentration (a; µg/L) from surface water samples and zooplankton settled volumes (b; ZSV, ml) from 20-m Norpac net hauls in the marine waters of the northern region of southeastern Alaska, May–August 2011. Chlorophyll was estimated from single monthly samples per station, while mean ZSV was estimated from all replicate hauls at each station. A phytoplankton bloom in May prevented determination of ZSV. See Table 2 for monthly sample sizes and Appendix 1 for data values. Zooplankton standing stock (ml/m^3) can be computed by dividing by the water volume filtered, a constant factor of 3.9 m^3 for these samples.

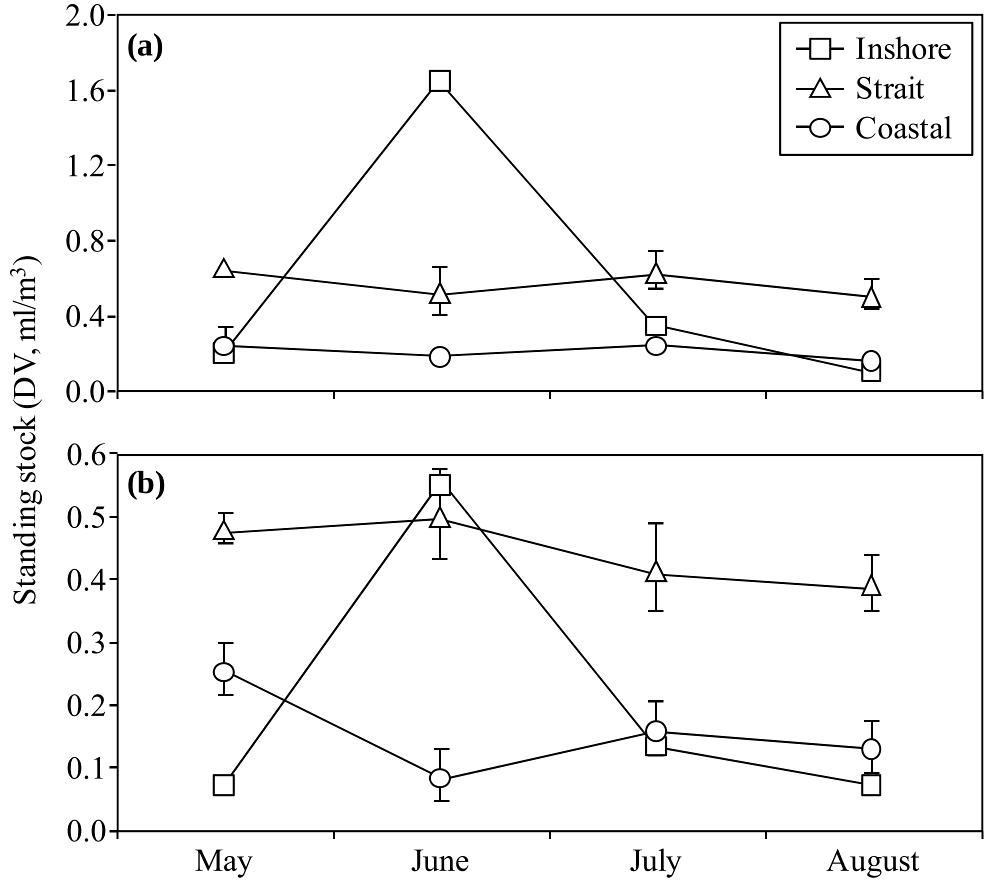

Figure 5.—Monthly zooplankton standing stock (mean ml/m^3, ± 1 standard error) from (a) 333-µm, and (b) 505-µm mesh double oblique bongo net samples hauled from ≤ 200 m depths during daylight in strait habitat in marine waters of the northern region of southeastern Alaska, May–August 2011.

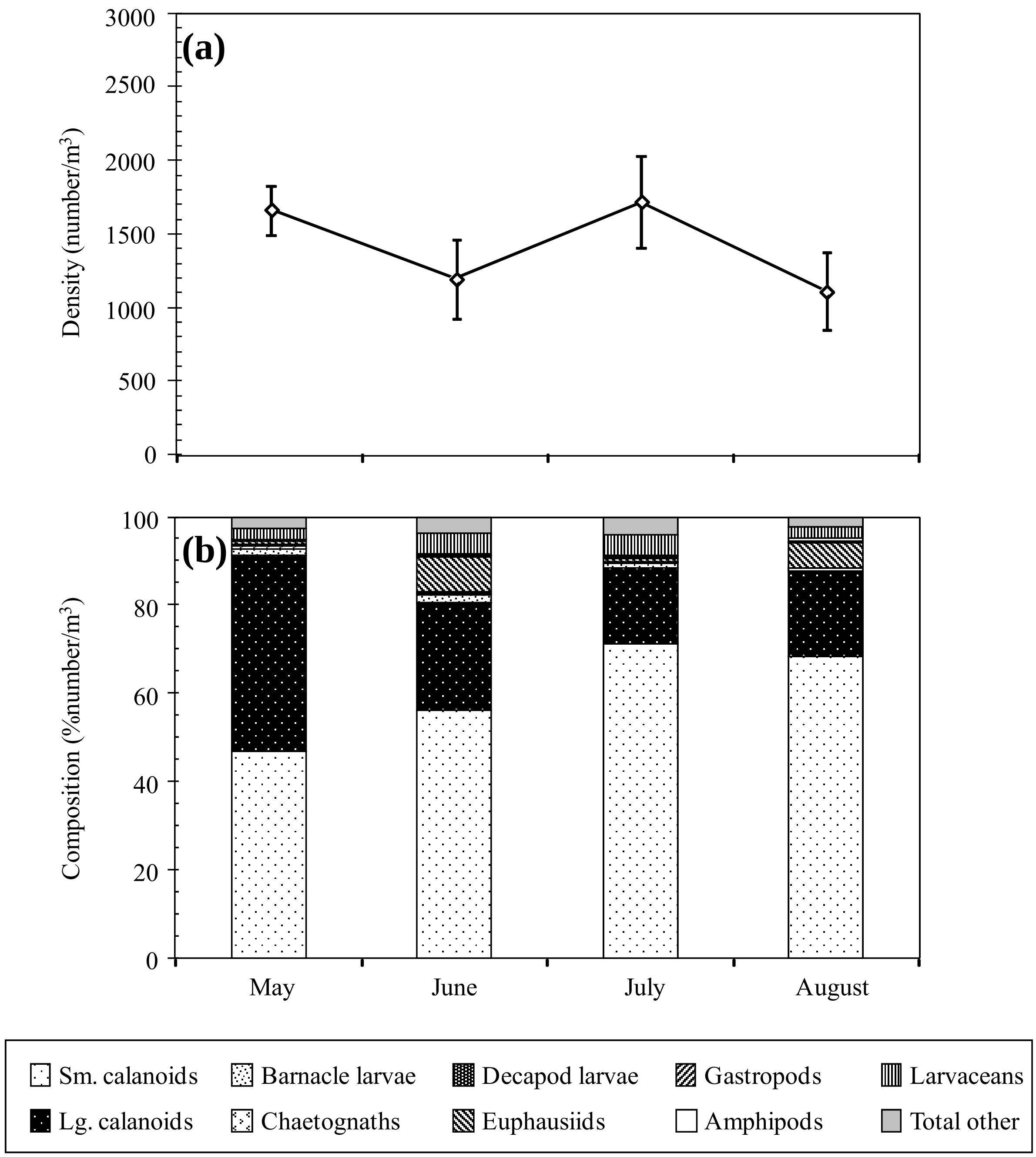

Figure 6.—Monthly "deep" (≤ 200 m depth) zooplankton collected in strait habitat in marine waters of the northern region of southeastern Alaska, May–August 2011. Data include (a) mean total density of organisms (thousands/m^3) ± 1 standard error, and (b) taxonomic composition (mean percent/m^3). Samples were collected in daylight using a 333-μm mesh bongo net (double oblique tow) at 4 stations in Icy Strait each month.

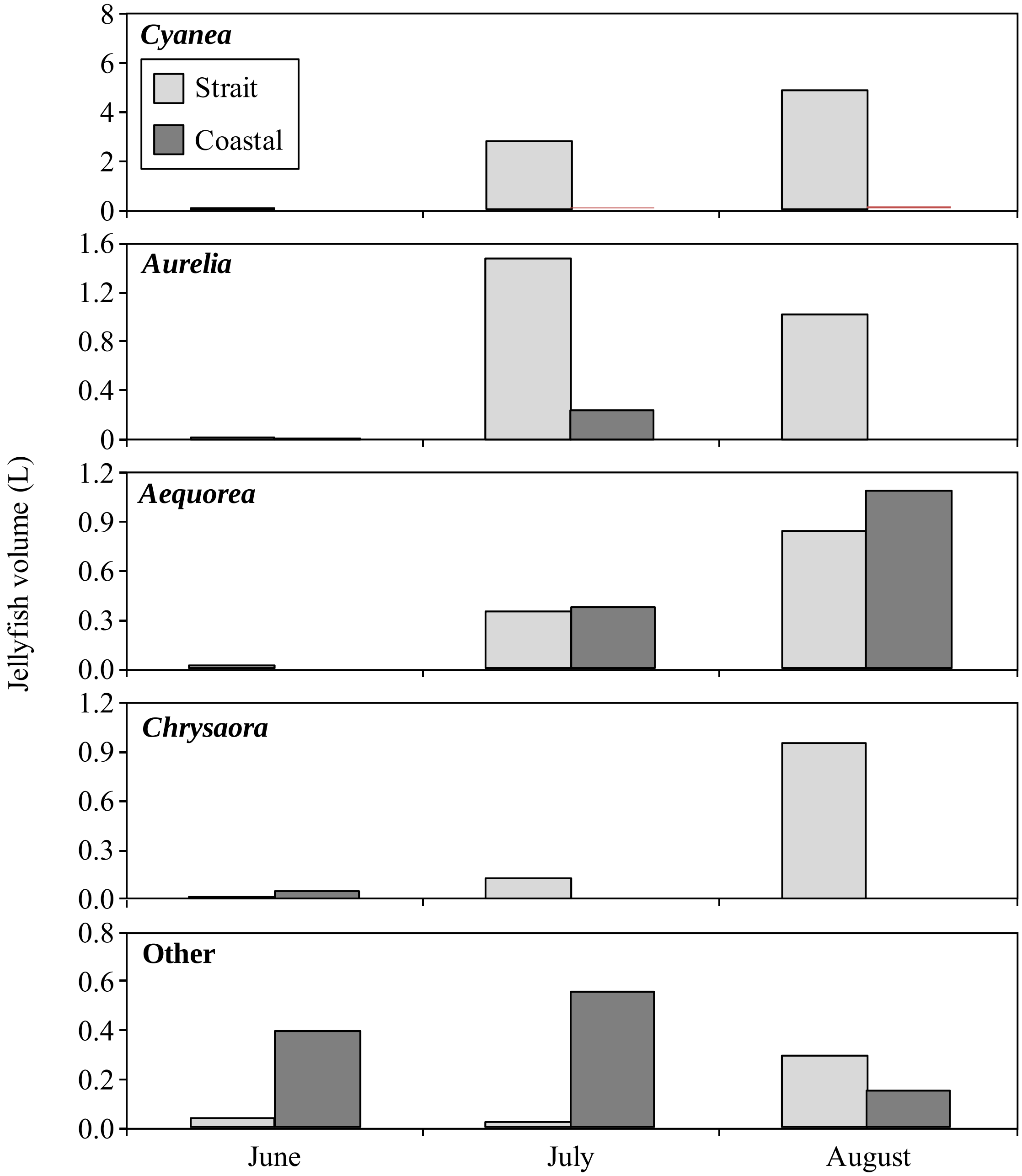

Figure 7.—Mean volume (L) of jellyfish captured in strait and coastal habitats in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2011. See Table 2 for monthly sample sizes. Other = ctenophores, *Staurophora* sp., and unknown species. Note difference in y-axis scales.

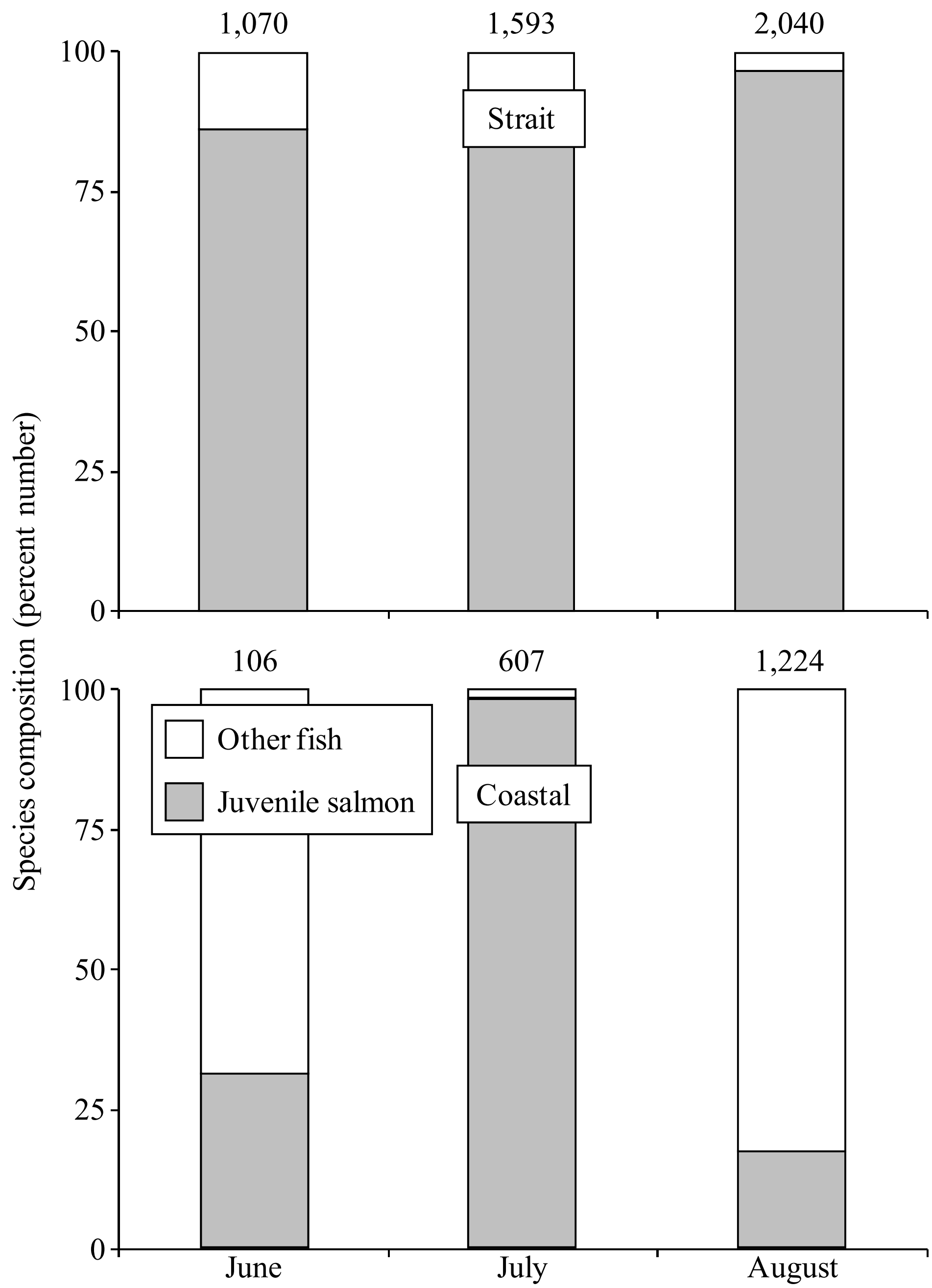

Figure 8.—Fish categories (percent number) in catch from rope trawls by month in strait and coastal marine habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Total number of fish is indicated above each bar. See Tables 2 and 8 for monthly sample sizes by species.

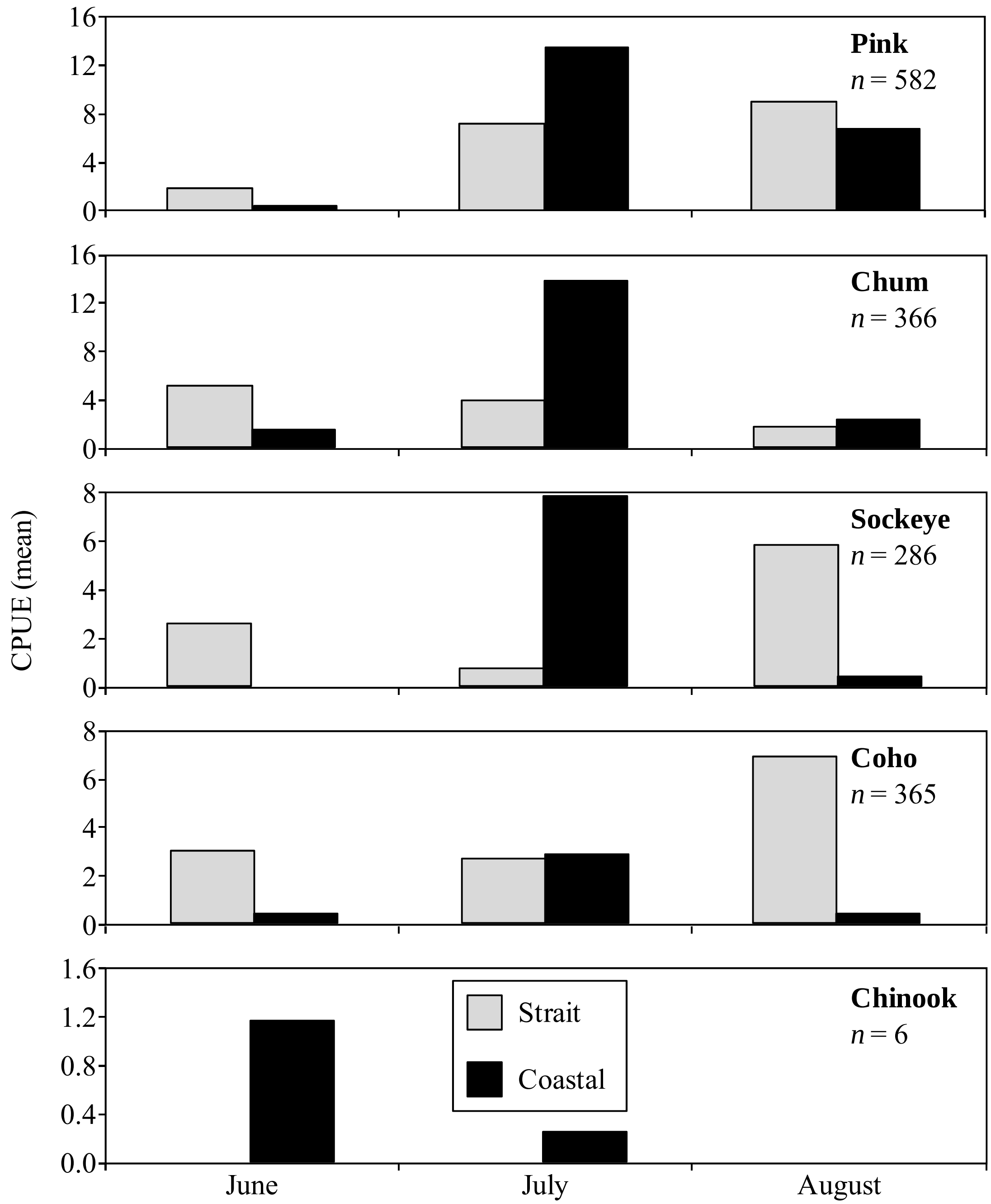

Figure 9.—Catch-per-unit-effort (CPUE, mean catch per trawl haul) of juvenile salmon captured in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Total seasonal catch is indicated for each species. See Table 2 for the number of trawl samples per month. Values are converted to “Cobb units” (see Table 10 for vessel conversion factors). Note difference in y-axis scales.

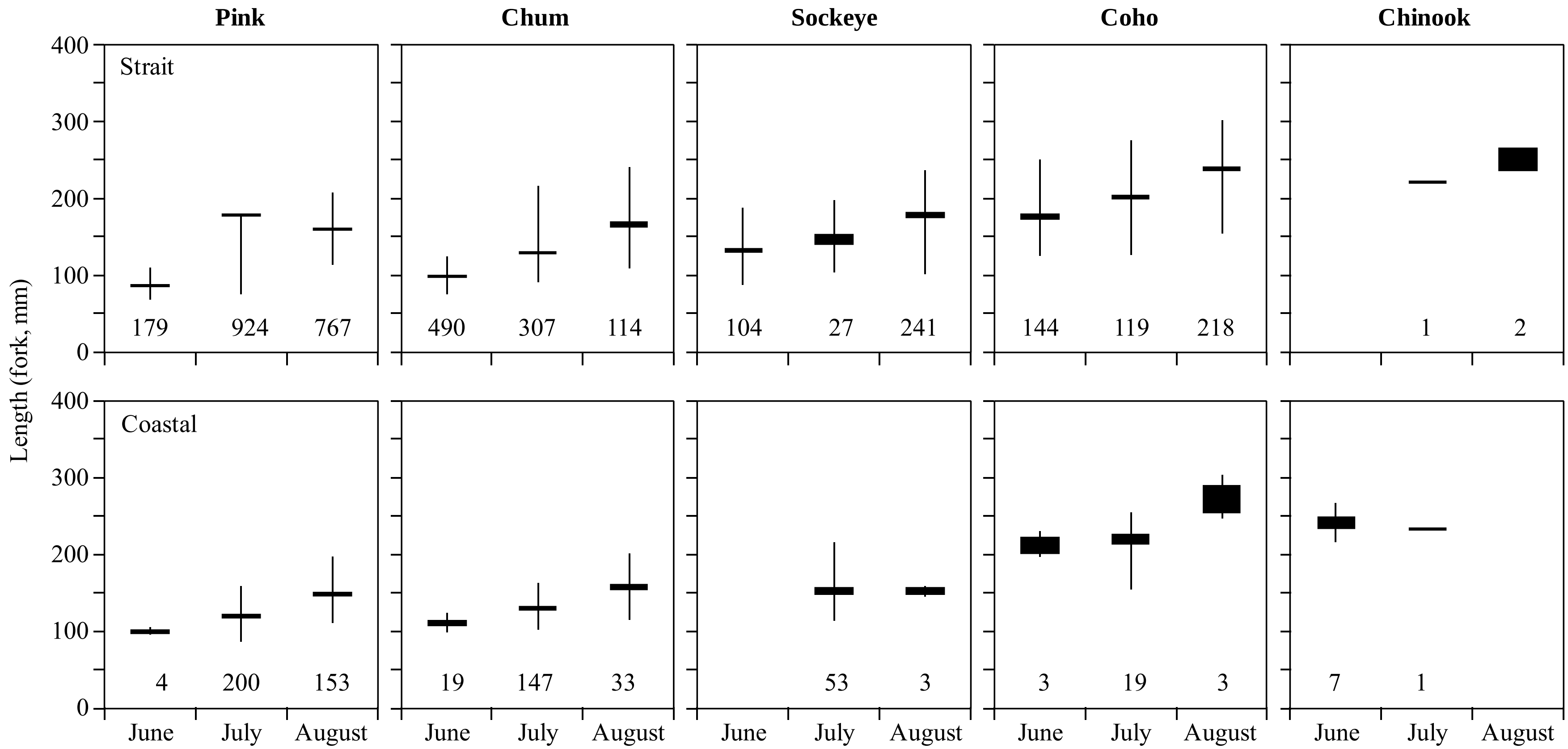

Figure 10.—Length (mm, fork) of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Length of vertical bars is the length range for each sample, and the boxes within the range are one standard error on either side of the mean. Sample sizes are indicated for each month.

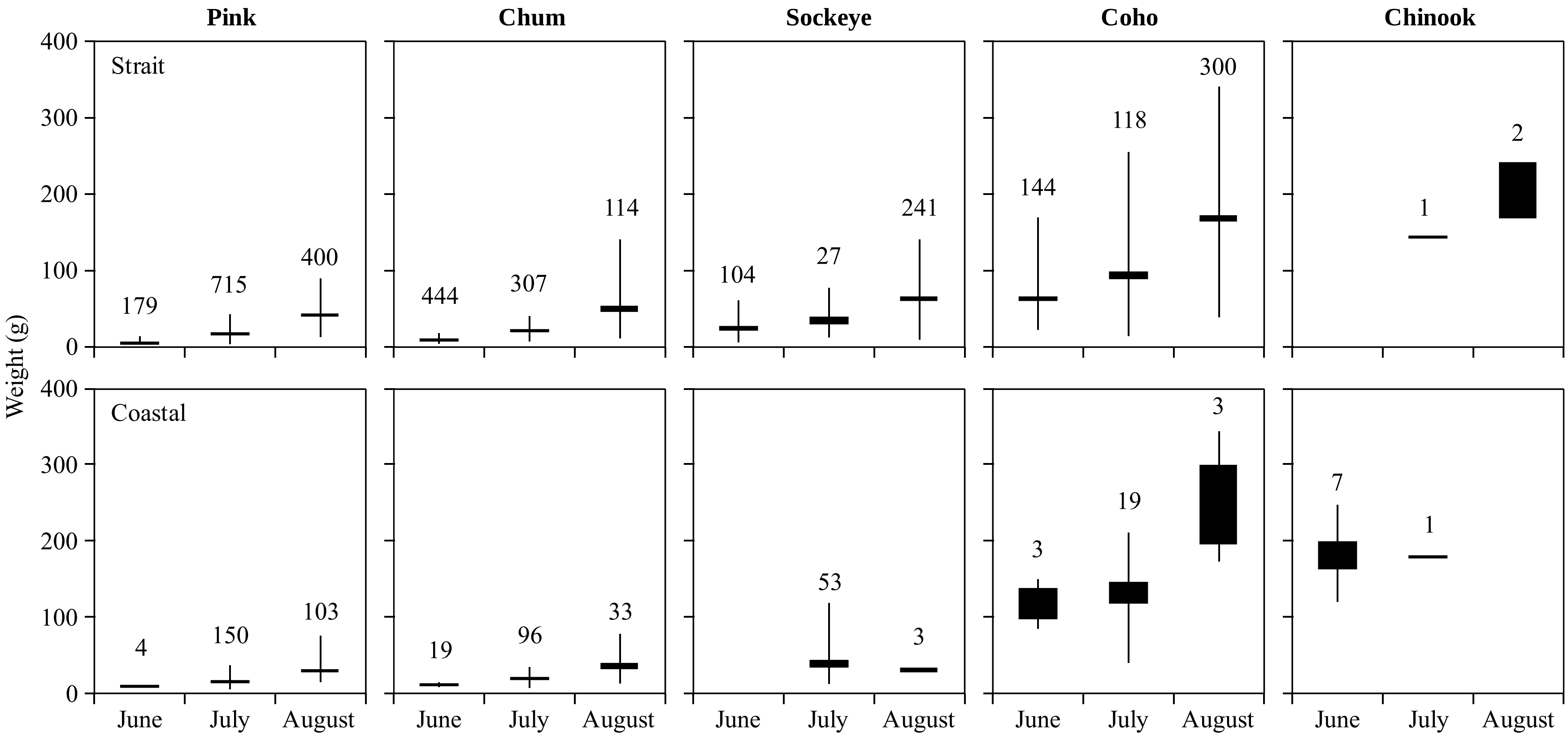

Figure 11.—Weight (g) of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Length of vertical bars is the weight range for each sample, and the bars within the range are one standard error on either side of the mean. Sample sizes are indicated for each month.

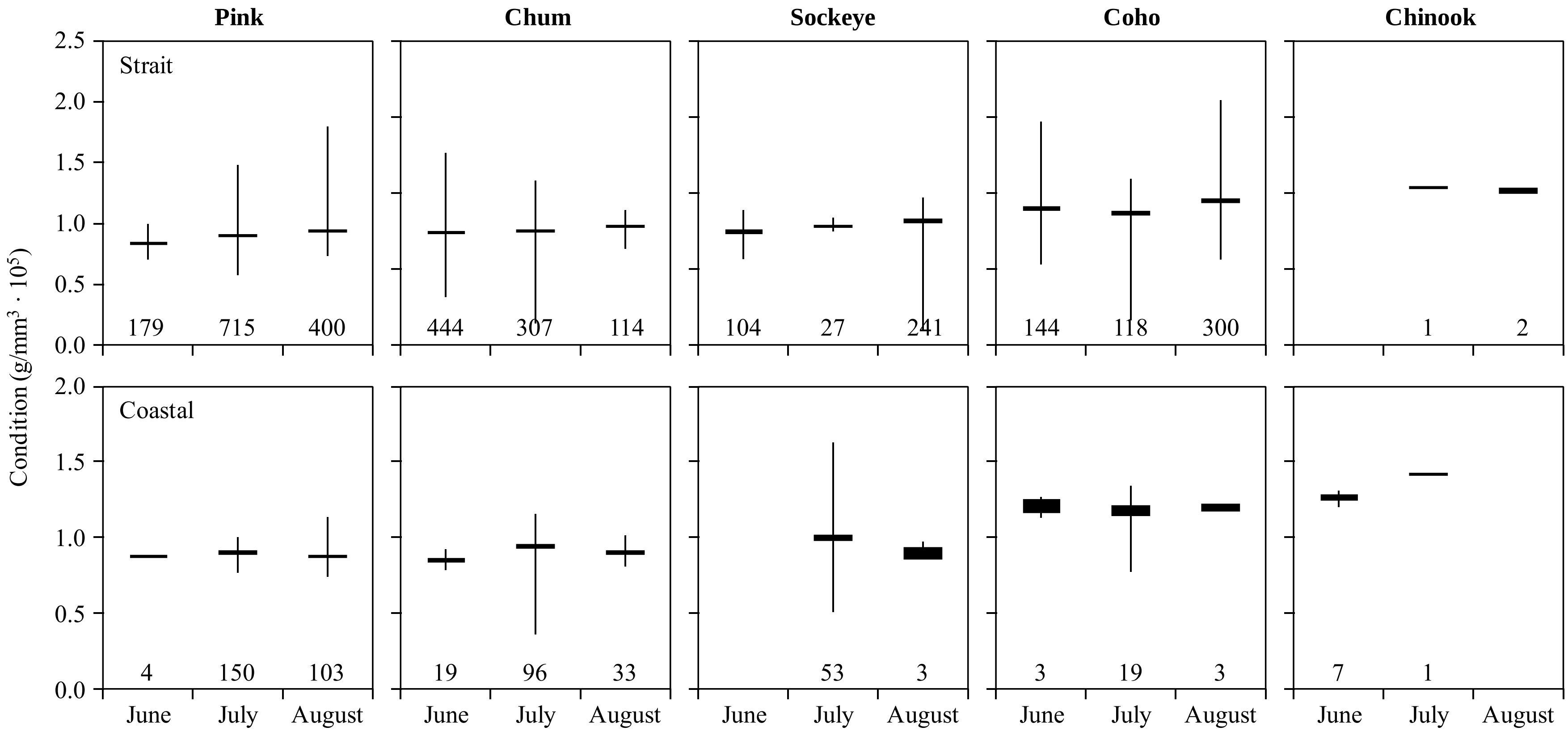

Figure 12.—Fulton's condition (g/mm^3 · 10^5) of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Length of vertical bars is the range of condition for each sample, and the bars within the range are one standard error on either side of the mean. Sample sizes are indicated for each month. Note difference in y-axis scales.

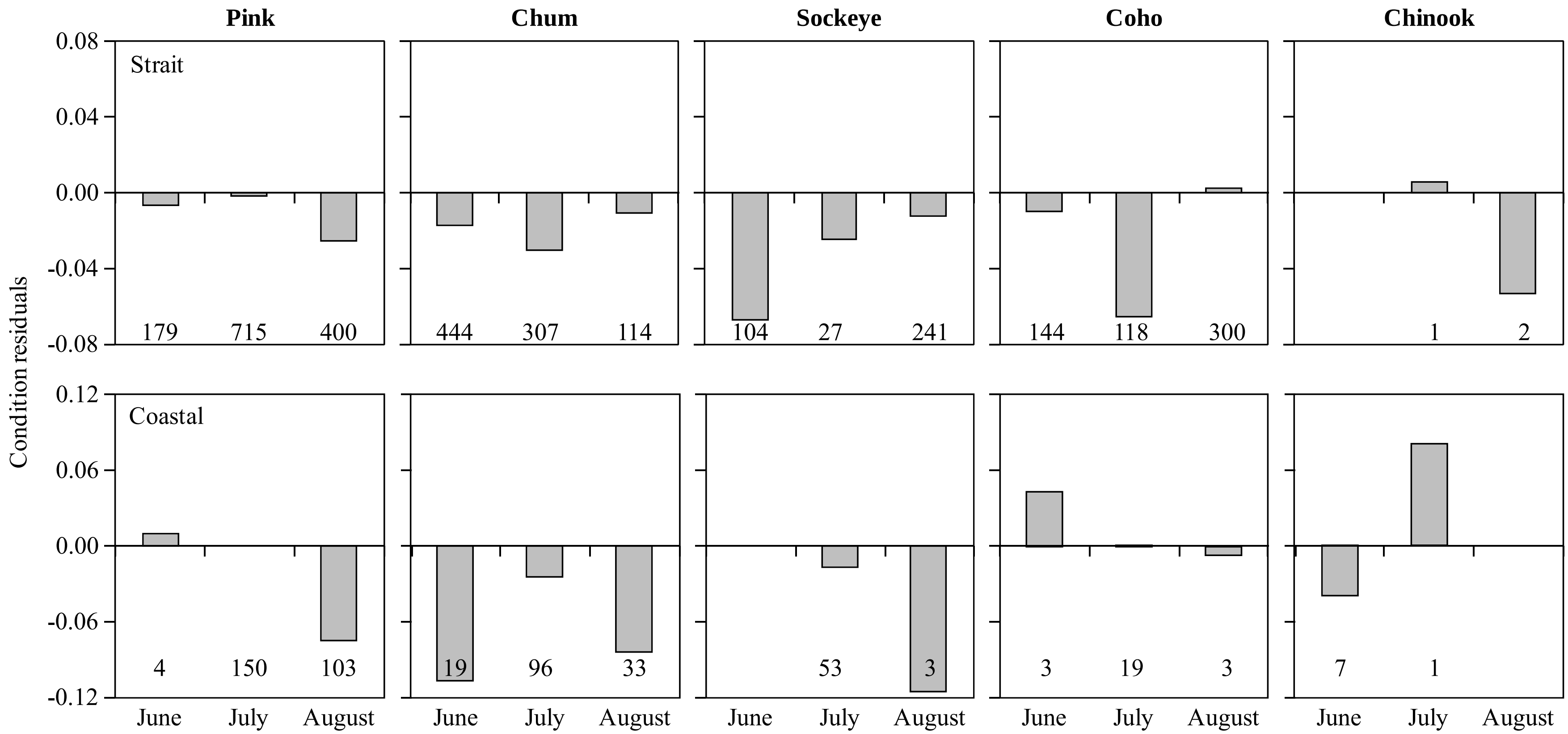

Figure 13.—Condition residuals from length-weight regression analysis of juvenile salmon species captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Sample sizes are indicated for each month. Note difference in y-axis scales.

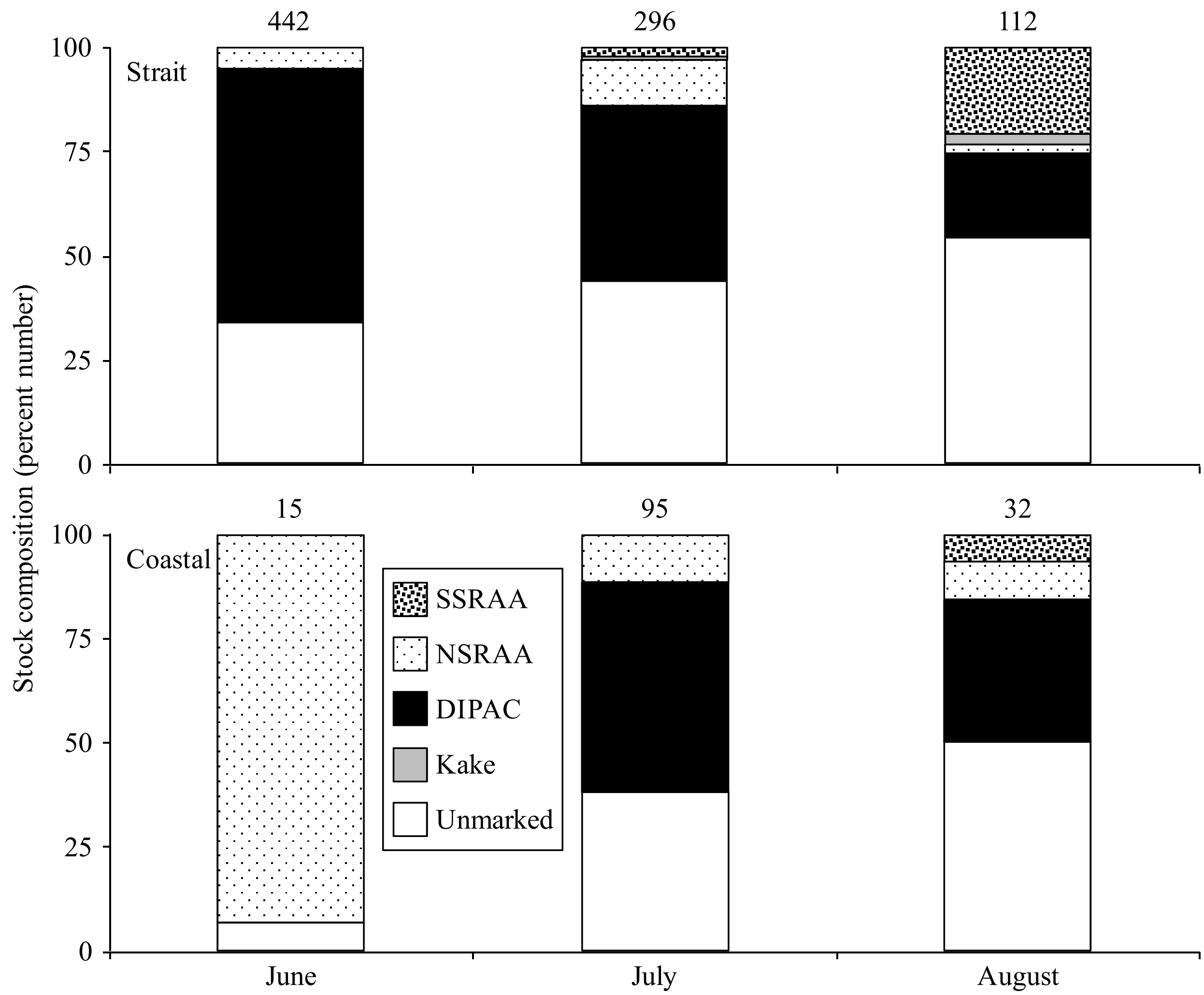

Figure 14.—Monthly stock composition (based on otolith thermal marks) of juvenile chum salmon captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Number of salmon sampled per month is indicated above each bar.

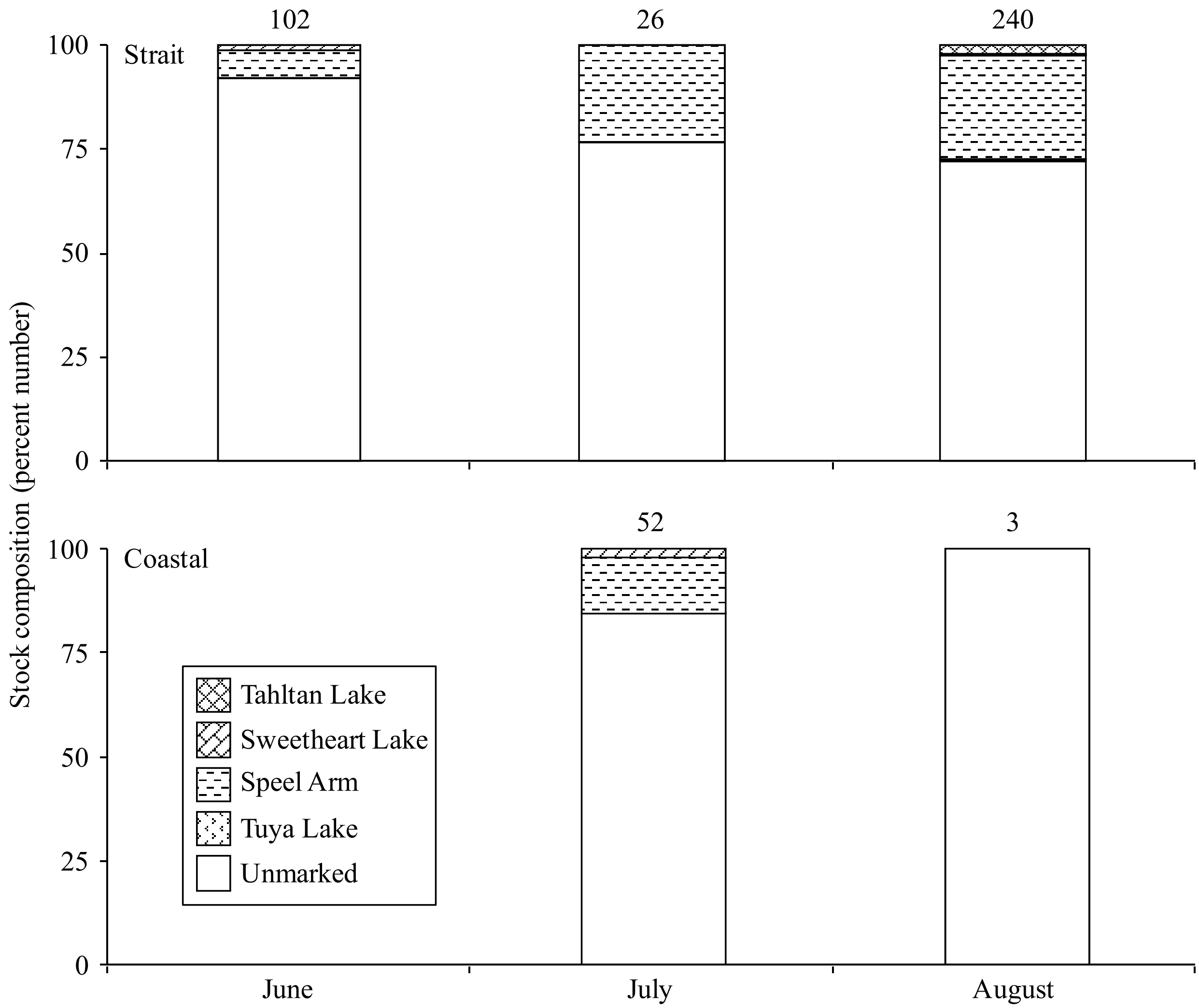

Figure 15.—Monthly stock composition (based on otolith thermal marks) of juvenile sockeye salmon captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Number of salmon sampled per month is indicated above each bar. No sockeye salmon were caught in June in the coastal habitat.

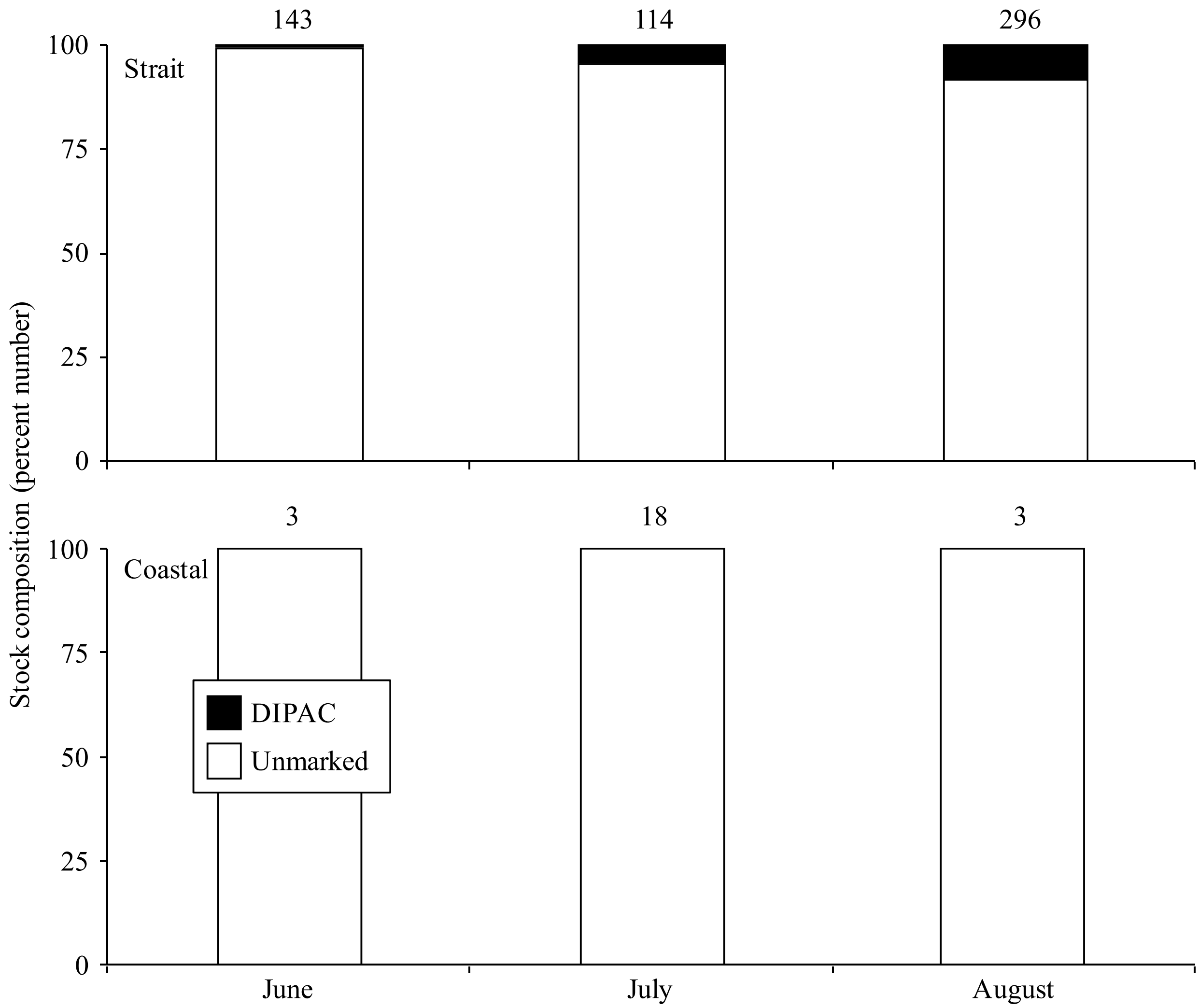

Figure 16.—Monthly stock composition (based on otolith thermal marks) of juvenile coho salmon captured by rope trawl in strait and coastal habitats in marine waters of the northern region of southeastern Alaska, June–August 2011. Number of salmon sampled per month is indicated above each bar.

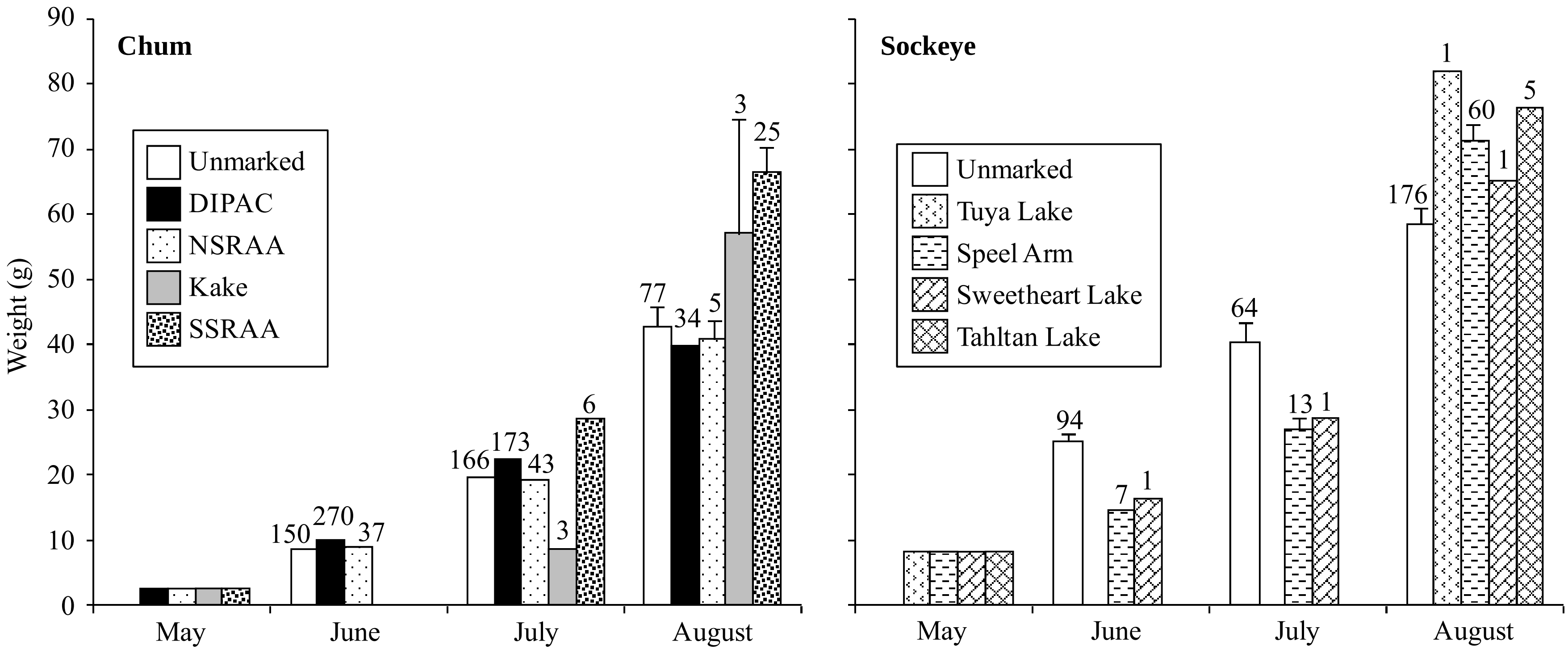

Figure 17.—Stock-specific growth trajectories of juvenile chum and sockeye salmon (mean weight, g, ± 1 standard error) captured by rope trawl in strait habitat in marine waters of the northern region of southeastern Alaska, June–August 2011. Weights of May fish are mean values at time of hatchery release. The sample sizes are indicated above each bar.

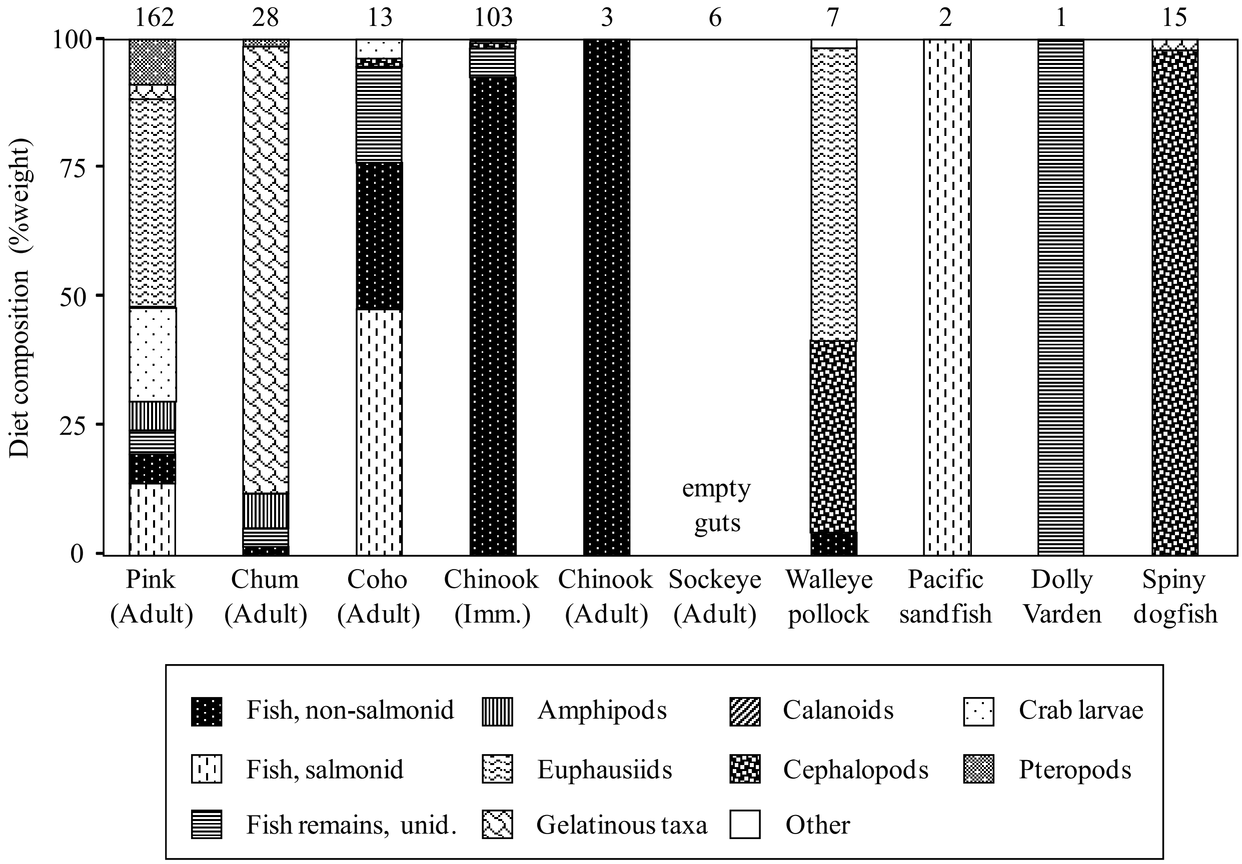

Figure 18.—Prey composition of 340 potential predators of juvenile salmon captured in 96 rope trawl hauls in strait and coastal habitats in marine waters of the northern region of Southeast Alaska, June–August 2011. The numbers of fish examined per species are shown above the bars. See Tables 20-21 for additional feeding attributes.

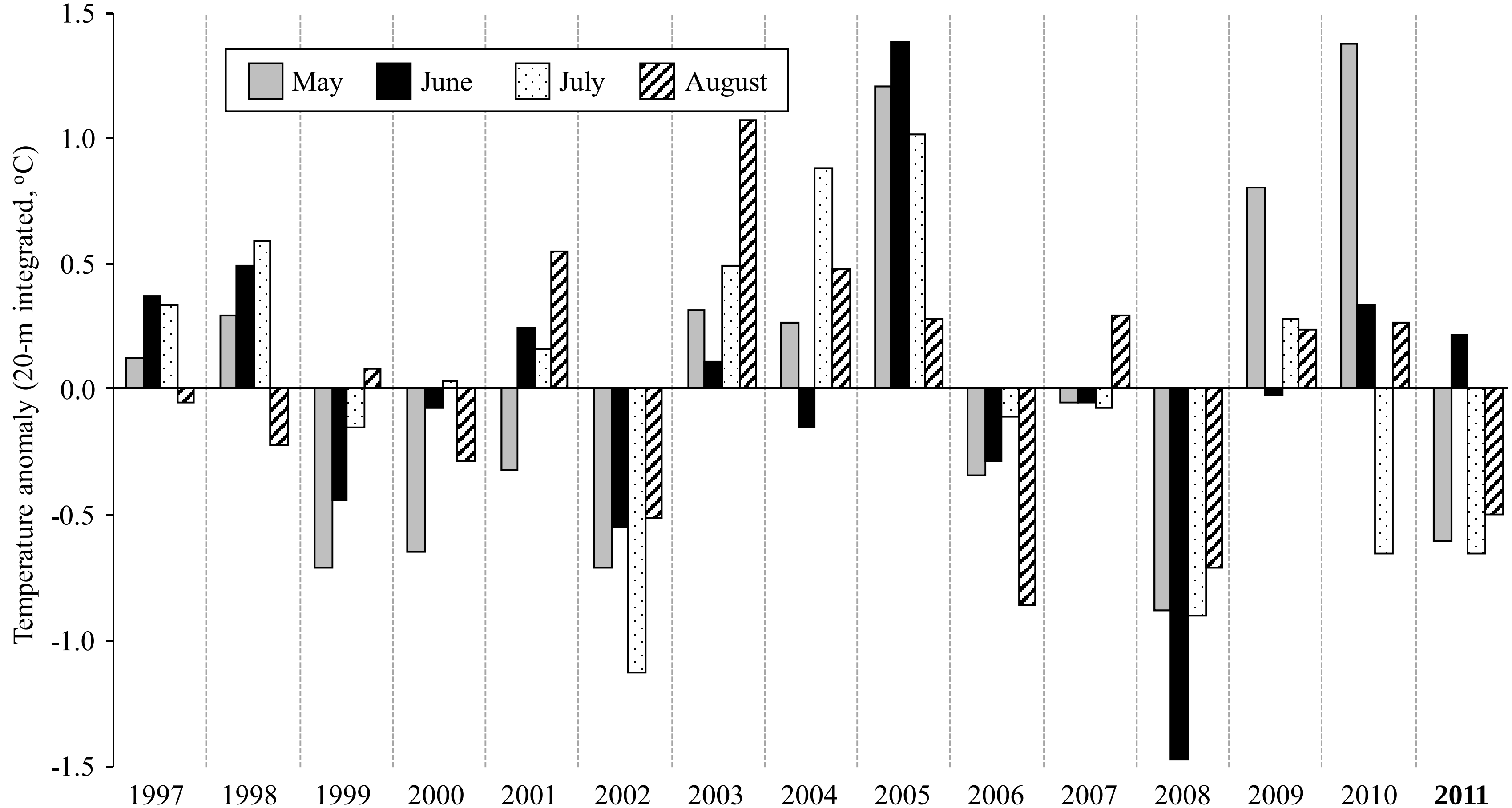

Figure 19.—Monthly anomalies for temperature (20-m integrated, °C) across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from monthly mean values (0-lines; values in Table 22) by year. See also Figure 2.

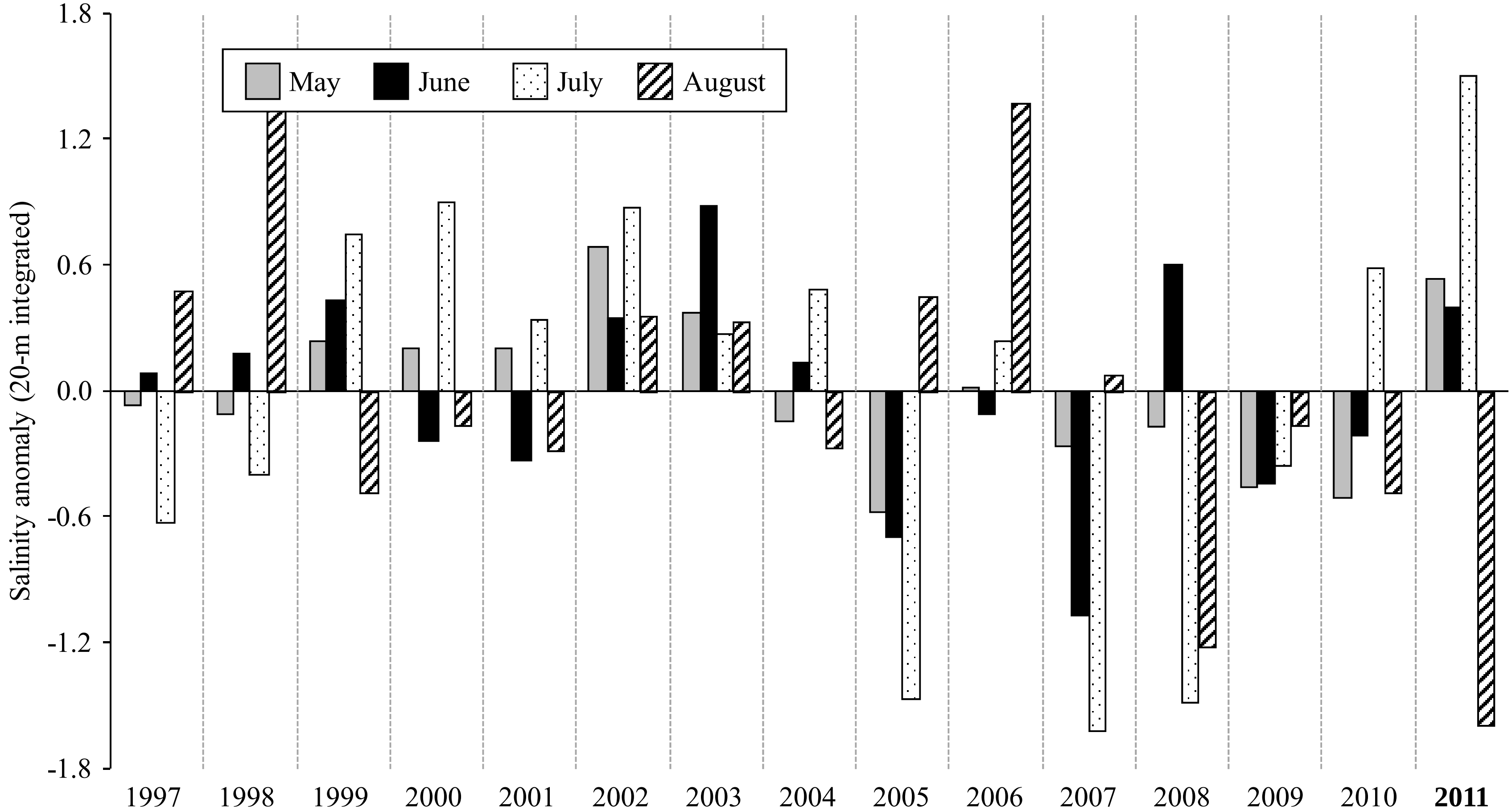

Figure 20.—Monthly anomalies for salinity (20-m integrated, PSU) across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-20011. Data (shaded bars) are deviations from monthly mean values (0-lines; values in Table 22) by year. See also Figure 2.

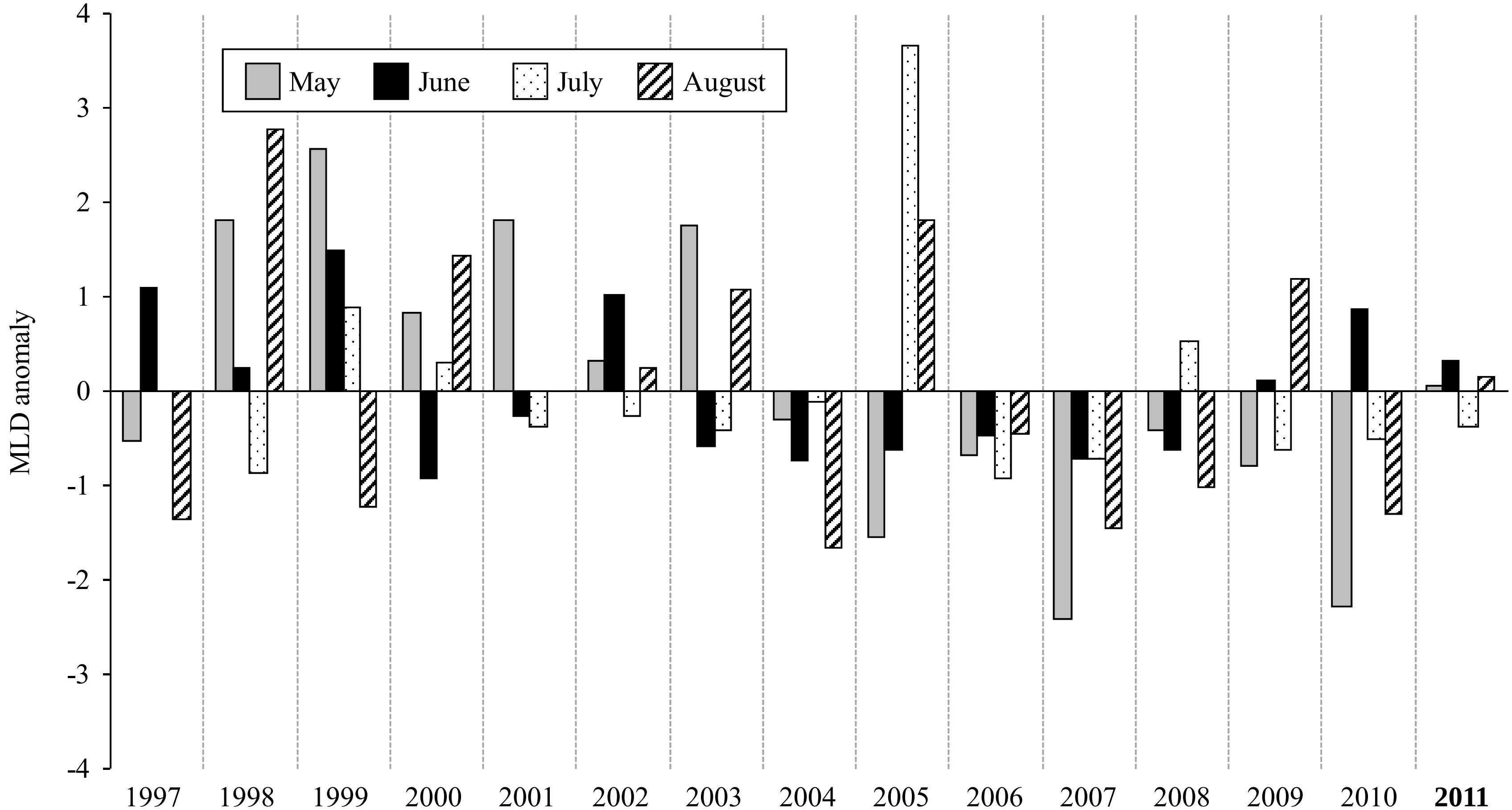

Figure 21.—Monthly anomalies for mixed layer depth (MLD, m) across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from monthly mean values (0-lines; values in Table 22) by year. See also Figure 3.

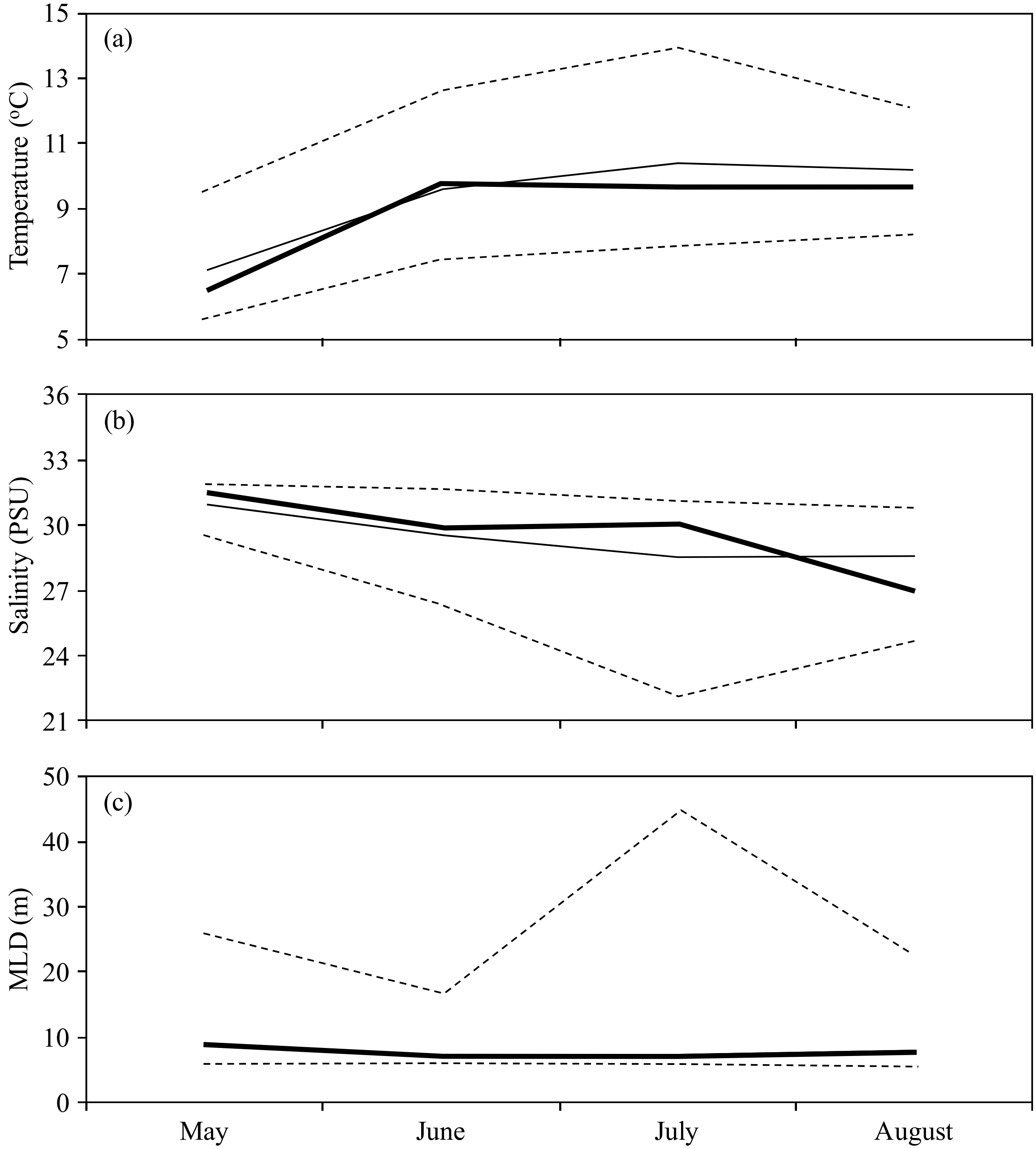

Figure 22.—Temperature (20-m integrated; ºC), salinity (20-m integrated, PSU), and mixed layer depth (MLD, m) across a 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data compare the 2011 means for (a) temperature, (b) salinity, and (c) MLD (thick solid lines) to the grand mean values (thin solid lines) within observed ranges (minimum and maximum, dashed lines), by month. See also Figures 2 and 3.

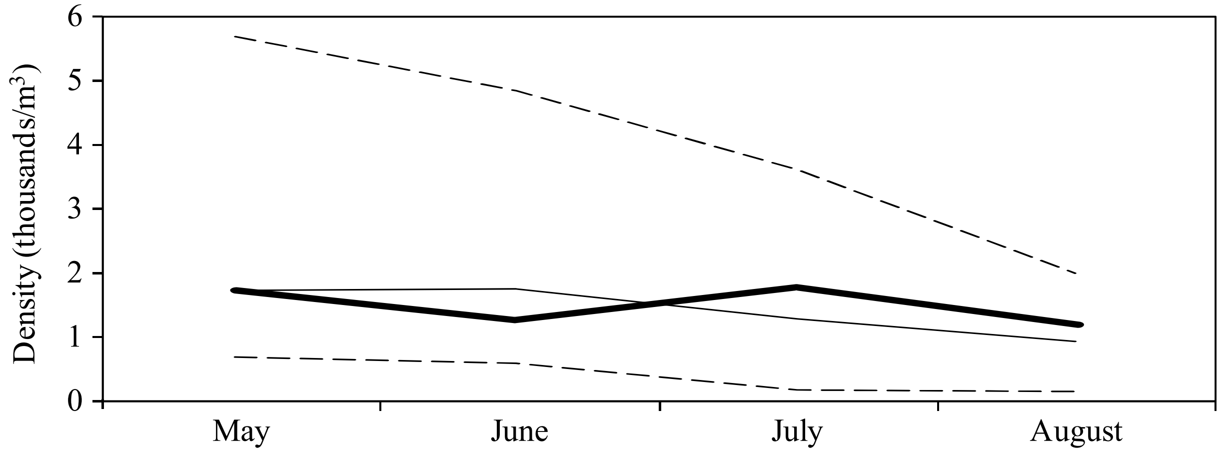

Figure 23.—Monthly zooplankton total density (thousands/m^3) for 2011 compared to the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data are mean densities for 2011 (thick solid line) compared to grand mean densities (thin solid line) within the observed density range (minimum and maximum, dashed lines) by month, from 333-µm mesh bongo net samples as described in Figure 6.

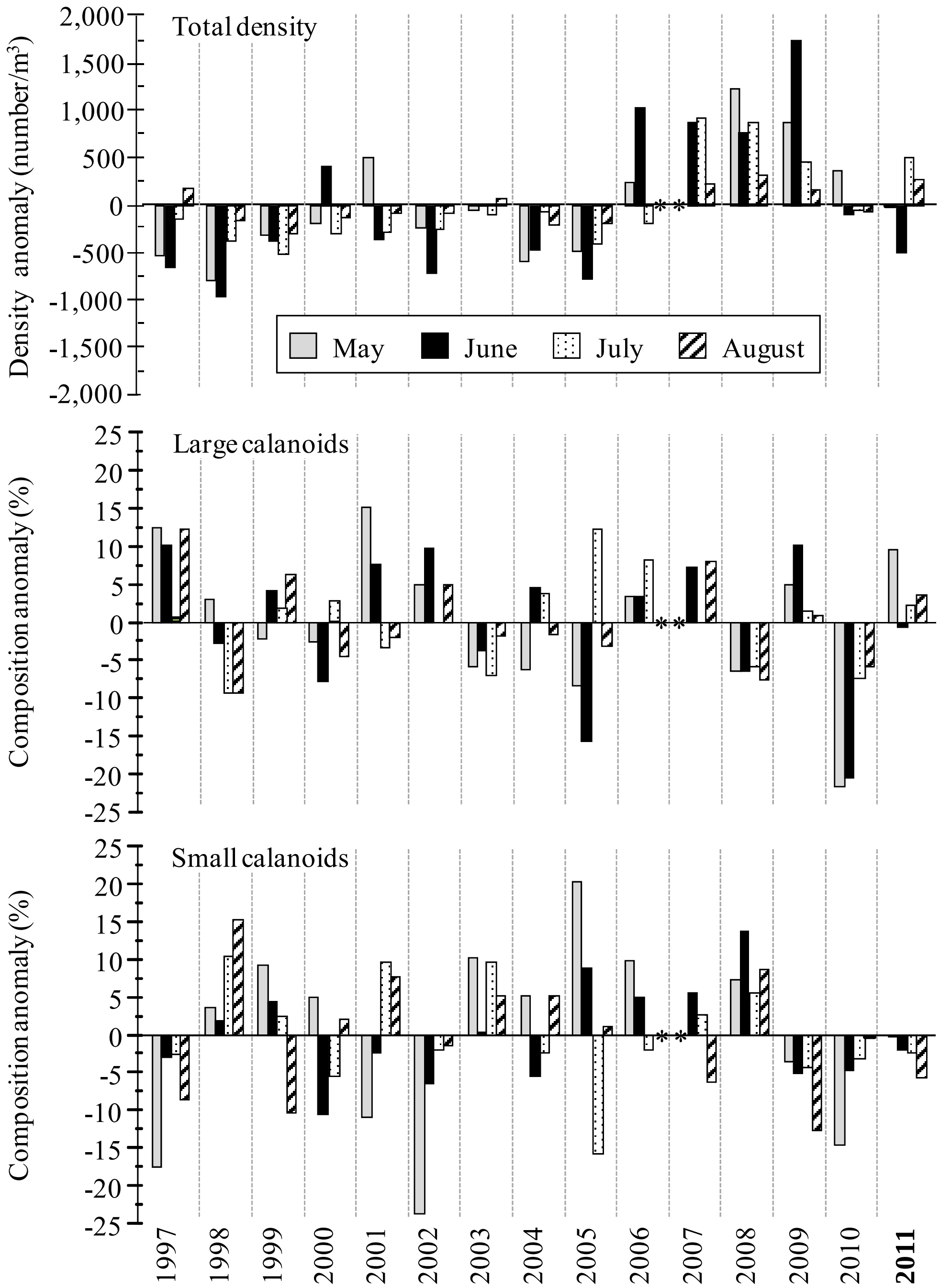

Figure 24.—Monthly anomalies for zooplankton total density and taxonomic composition across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from longterm monthly mean density (numbers/m^3) and percent density (0-lines; values in Table 23). See Figure 6 for sampling details and Figure 25 for additional taxa. Asterisks indicate no samples collected in August 2006 or May 2007.

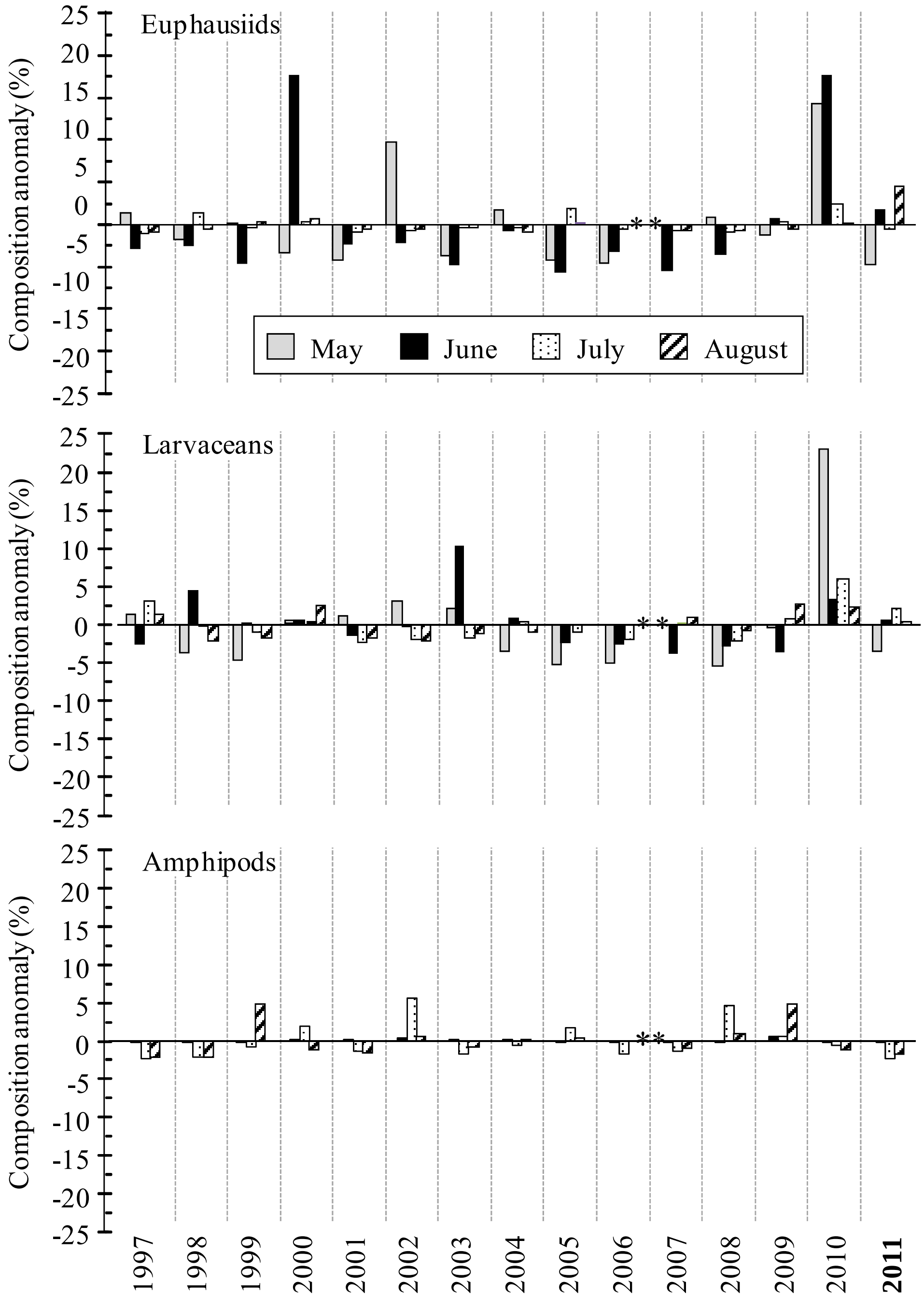

Figure 25.—Monthly anomalies for zooplankton composition across the 15-yr time series in strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Longterm monthly mean values (0-lines) are given in Table 23. Data (shaded bars) are deviations for percent numerical composition of taxa important in fish diets. See Figure 6 for sampling details and Figure 24 for additional taxa. Asterisks indicate no samples collected in August 2006 or May 2007.

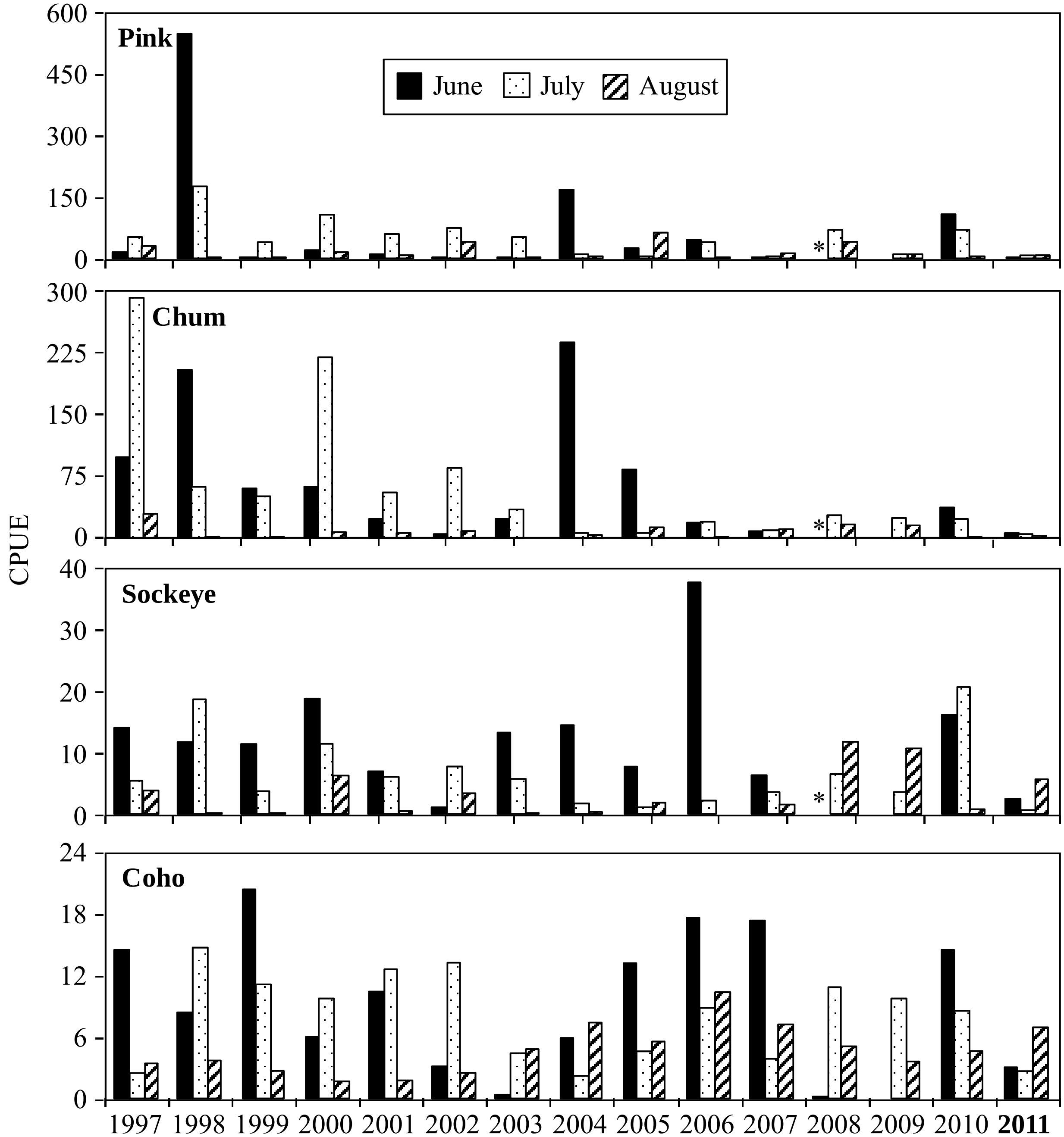

Figure 26.—Monthly catch-per-unit-effort (CPUE, mean catch per trawl haul) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Asterisks indicate a zero catch. Note differences in scale of y-axes by species. No trawling was conducted in June, 2009. See also Figure 9. Values are converted to "Cobb units" (see Table 10 for vessel conversion factors).

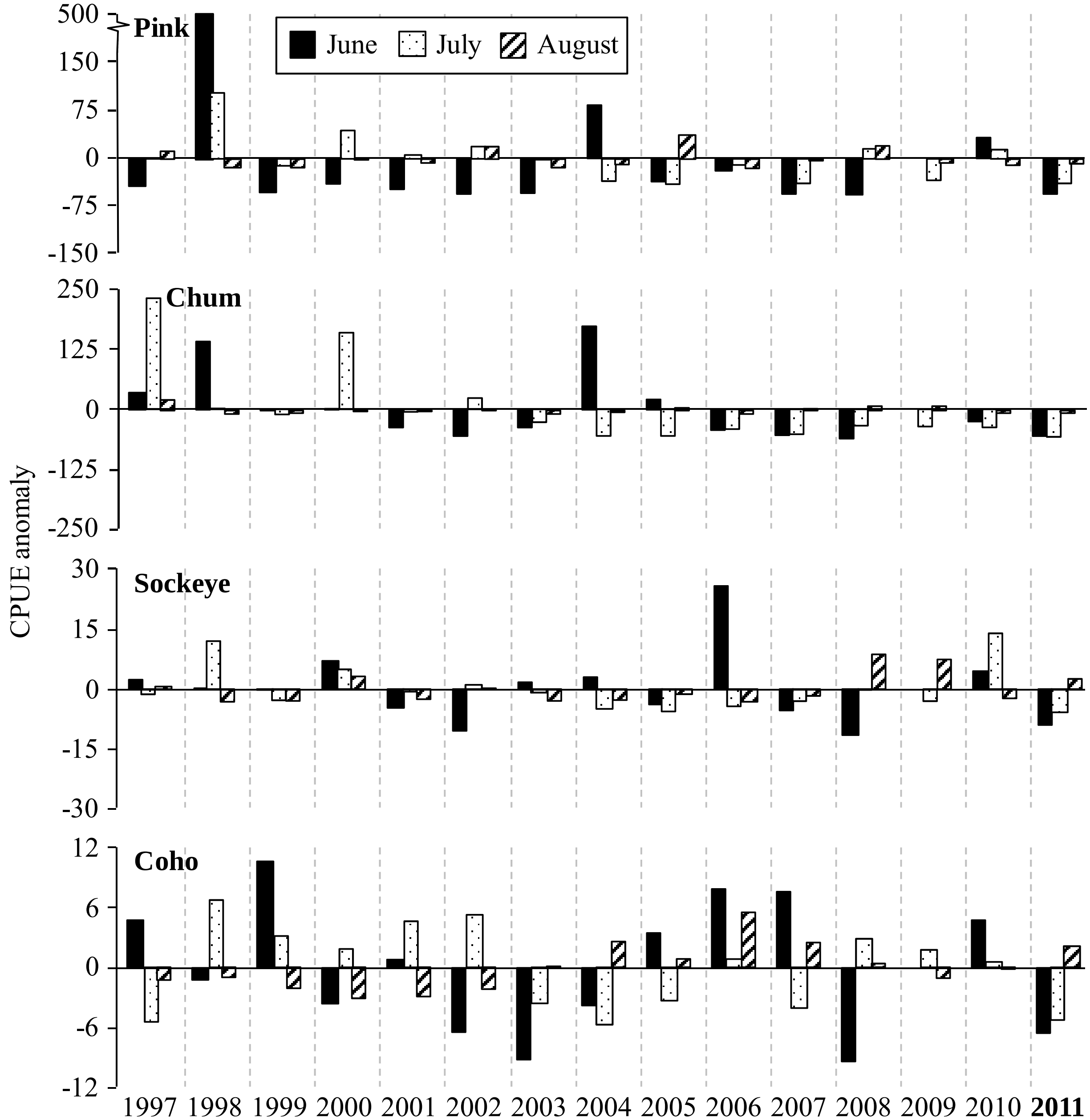

Figure 27.—Monthly anomalies for catch-per-unit-effort (CPUE, mean catch per trawl haul) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm monthly mean CPUE (0-lines; values in Table 24). No trawling was conducted in June 2009 (asterisks). Note differences in scale of y-axes by species. See also Figure 9. Values are converted to "Cobb units" (see Table 10 for vessel conversion factors).

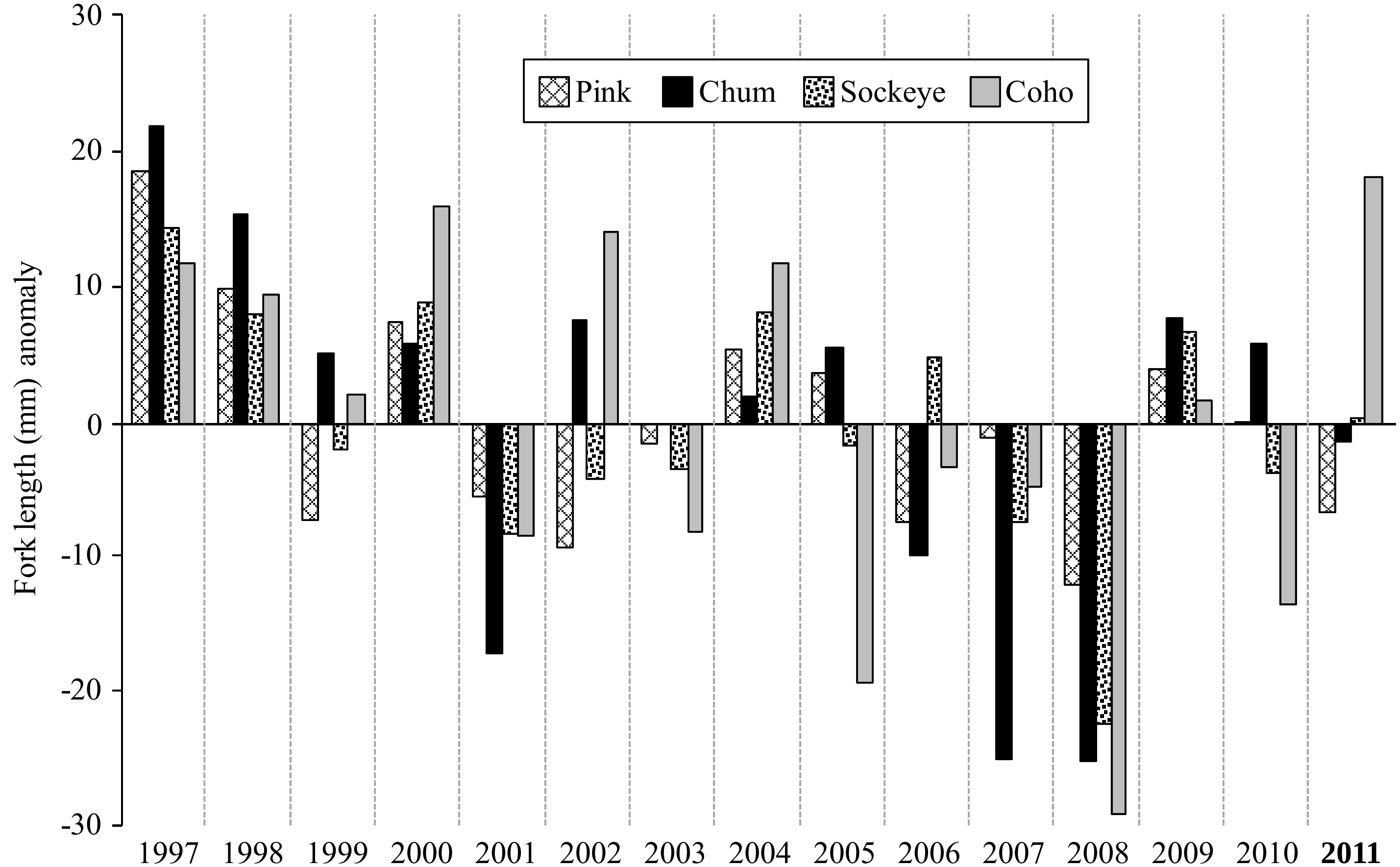

Figure 28.—Anomalies for annual size-at-time (fork length, mm, on July 24) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm monthly mean size-at-time (0-line; values in Table 24). See also Figure 10.

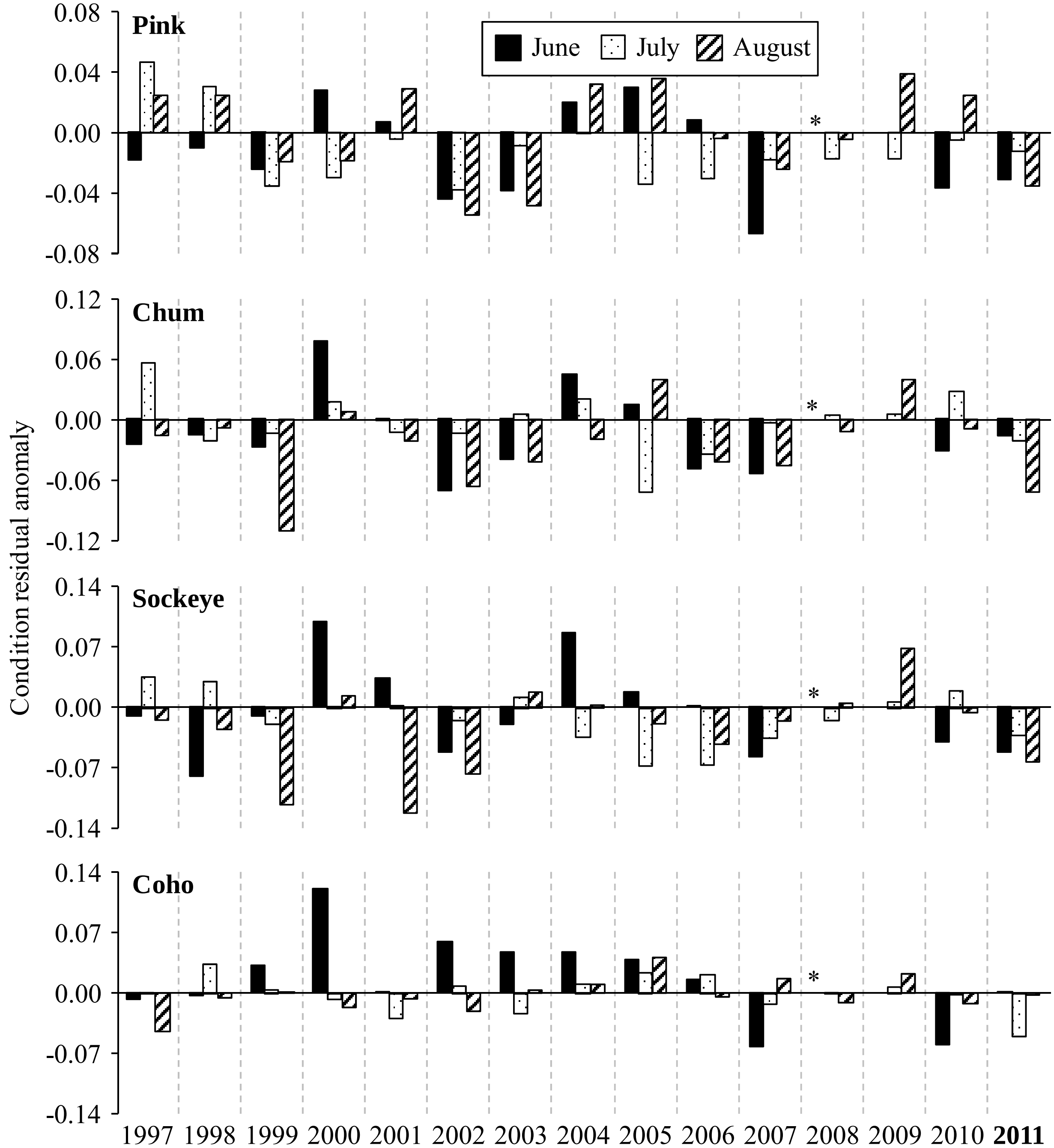

Figure 29.—Monthly anomalies for condition residuals (CR) from length-weight linear regressions for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm monthly mean CR (0-lines; values in Table 24). No trawling was conducted in June of 2009. Asterisks indicate insufficient samples available for processing in June 2008. Note difference in y-axis scales by species. See also Tables 10-13 and Figure 13.

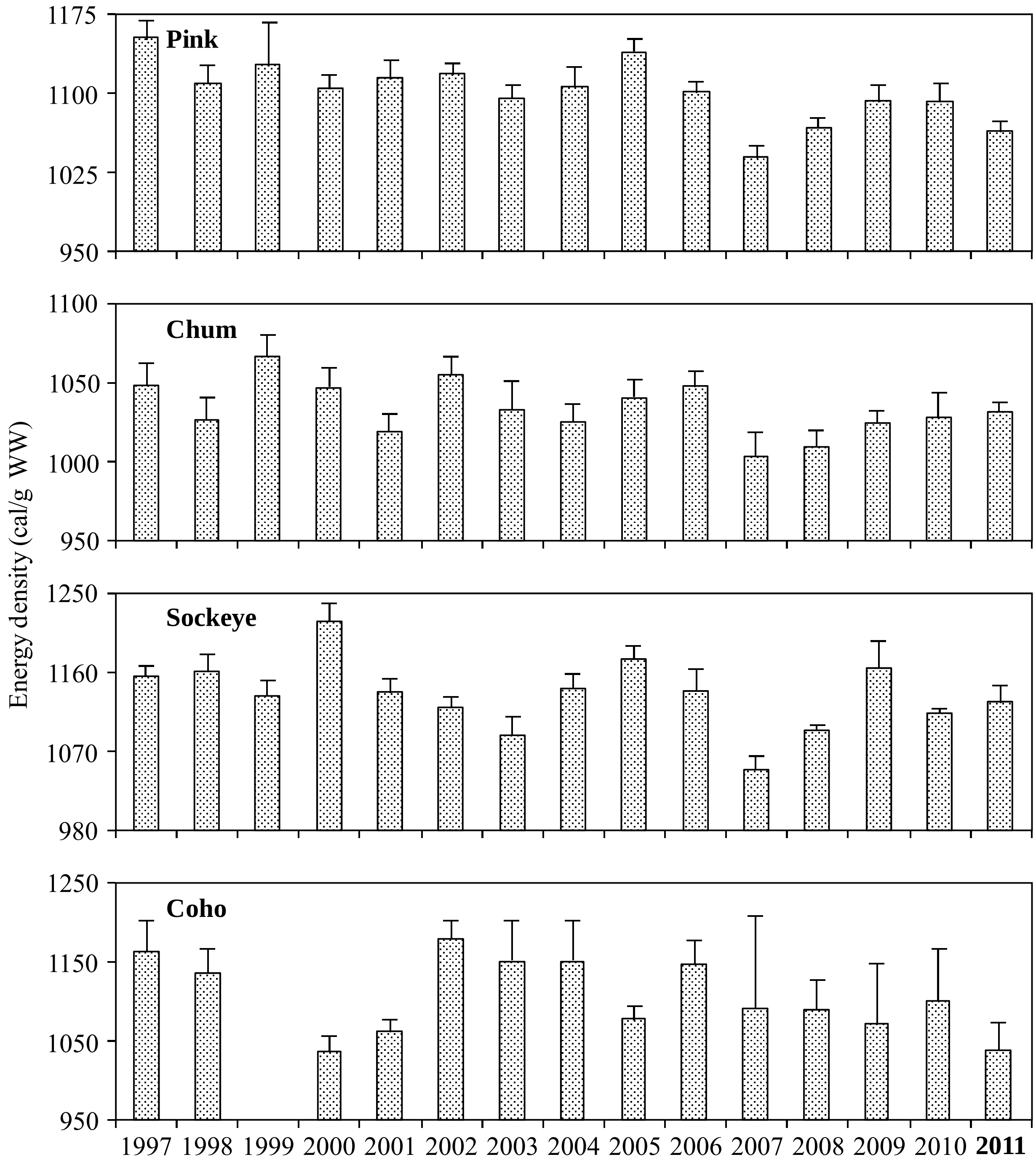

Figure 30.—Annual July energy density (cal/g WW) for juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Coho samples were insufficient for energy density determination in 1999. Note difference in y-axis scales by species.

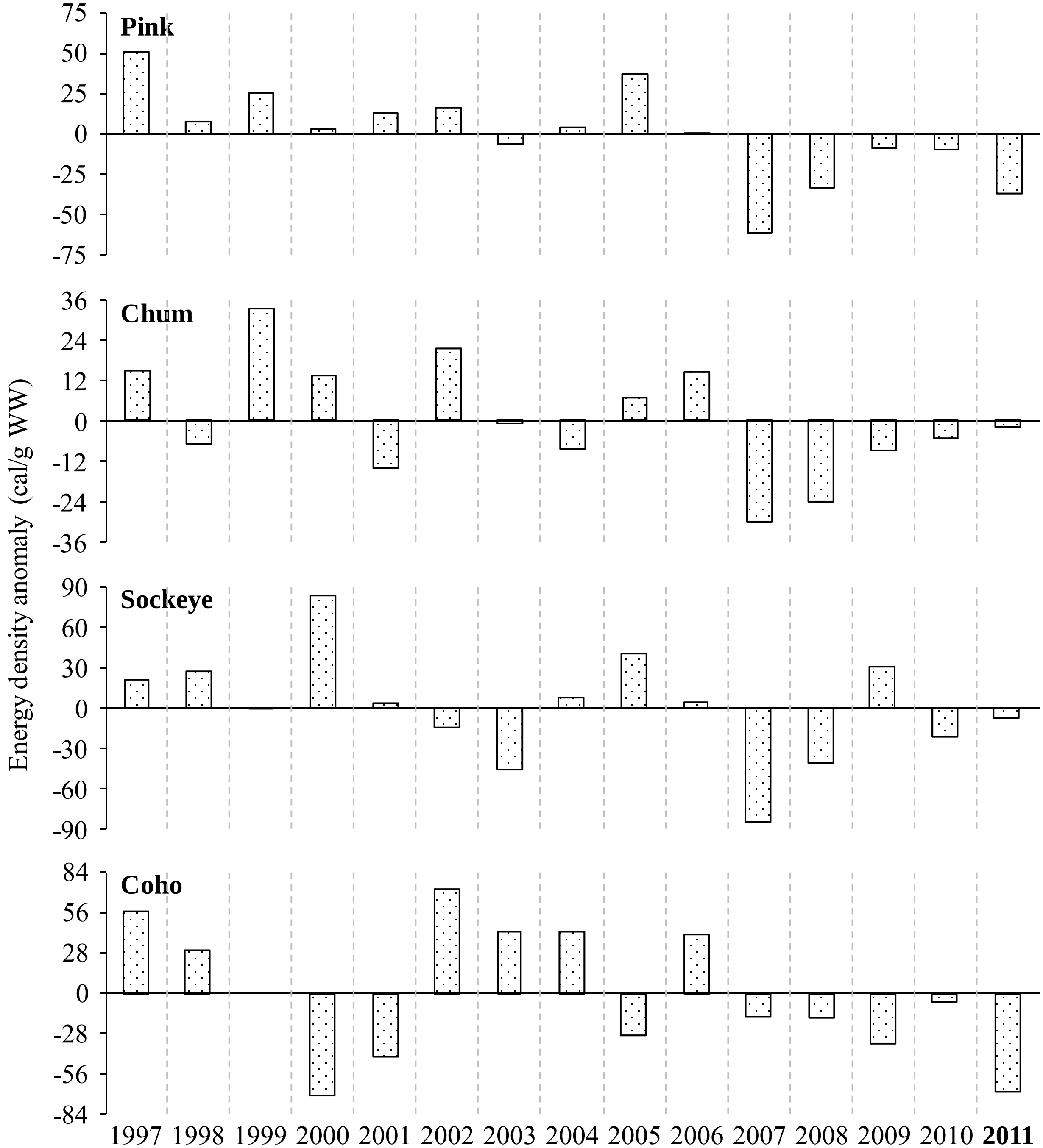

Figure 31.—Annual July anomalies for energy density (cal/g WW) of juvenile pink, chum, sockeye, and coho salmon across the 15-yr time series from strait habitat in marine waters of the northern region of southeastern Alaska, 1997-2011. Data (shaded bars) are deviations from the longterm July mean energy density (0-lines; values in Table 24). Coho samples were insufficient for energy density determination in 1999. Note difference in y-axis scales by species. See also Figure 30.