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Annual Survey of Juvenile Salmon, Ecologically-Related Species, and Biophysical Factors in the Marine Waters of Southeastern Alaska, May–August 2015

by

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Keywords: marine trophic ecology, juvenile salmon, biophysical coastal monitoring, juvenile salmon, ecosystem, Southeast Alaska

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 2015. This annual survey, conducted by the Southeast Coastal Monitoring (SECM) project, marks 19 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. Up to 13 stations were sampled monthly in epipelagic waters from May to August (total of 23 sampling days). Fish, zooplankton, surface water samples, and physical profile data were collected during daylight at each station using a surface rope trawl, bongo nets, a water sampler, and a conductivity-temperature-depth profiler. Surface (3-m) temperatures and salinities ranged from approximately 8 to 15 ºC and 15 to 32 PSU across inshore, strait, and coastal habitats for the four months. A total of 17,228 fish and squid, representing 25 taxa, were captured in 92 rope trawl hauls fished from June to August. Juvenile salmon comprised approximately 89% of the catch. Over all months and habitats, juvenile pink (*O. gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), and coho (*O. kisutch*) salmon occurred in 51-92% of the hauls, while juvenile Chinook salmon (*O. tshawytscha*) occurred in about 22% of the hauls. Abundance of juvenile salmon was low in 2015; peak CPUE occurred in June strait and coastal habitats. Coded-wire tags were recovered from 51 juvenile coho salmon and 5 juvenile and immature Chinook salmon, that primarily originated from hatchery and wild stocks in SEAK sampled in the strait habitat; an additional 18 adipose-clipped juvenile salmon without tags were present. The only non-Alaskan stocks were recovered off Icy Point, a juvenile Chinook salmon from the Willamette River, OR and a juvenile coho salmon from the Satsop River, Washington. Of the juvenile salmon examined for otolith marks, Alaska enhanced stocks comprised 56% of the juvenile chum (373 of 663) and 38% of the juvenile sockeye salmon (202 of 532). Of the 380 potential predators of juvenile salmon, predation on juvenile salmon was not observed in the six fish species examined. The long term seasonal time series of SECM juvenile salmon stock assessment and biophysical data is used in conjunction with basin-scale ecosystem metrics to annually forecast pink salmon harvest in SEAK. Long term 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 in marine ecosystems during a period of rapid climate change.

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 socio-economic 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 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 trophic linkages and lead 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 has elevated the need to understand the consequences of population changes and potential interactions on the growth, distribution, migratory rates, timing, and survival of all salmon species and stock groups (Rand et al. 2012). 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 ocean conditions and salmon, 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 states. 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, 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 and papers in Special Volume).

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 (Miller et al. 2013). 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 (*Gadus chalcogrammus*) 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; Sturdevant et al. 2013a; Fergusson et al. 2014). In contrast, "top-down" predation events can also affect salmon year-class strength (Sturdevant et al. 2009, 2012b, 2013b). 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 to compare ecological processes, community structure, and life history strategies among salmon production areas (Brodeur et al. 2007; Orsi et al. 2007, 2013a).

In 2015, SECM sampling was conducted in the northern region of SEAK for the 19th 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 collected by the SECM project in 2015 on juvenile salmon, ecologically-related species, and associated biophysical parameters. Subsets of the long term time series are examined in several recent documents (e.g., Fergusson et al. 2014, 2015; Orsi et al. 2014, 2015).

METHODS

Sampling was conducted in the northern region of SEAK monthly from May to August 2015 (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 sampled during daylight hours. Oceanographic sampling was conducted in May, while both oceanographic and trawl sampling were conducted June through August. The 12 m NOAA vessel R/V *Sashin* 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. 2013b). 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 plankton tow. 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. A CTD cast was typically taken for each haul unless hauls occurred less than two hours apart at the same station. 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 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 a double oblique bongo haul 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. General Oceanics Model 2031 flow meters were placed inside the bongo nets for calculation of water volumes filtered.

Zooplankton samples were immediately preserved in a 5% formalin-seawater solution. In the laboratory, displacement volumes (DV, ml), standing stock (DV/m^3), and density (number/m^3) were determined for various 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 water volumes filtered. 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 (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), were 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

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

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 acoustic 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. A marine mammal exclusion device (Dotson et al. 2010) was used inside the trawl when the coastal Icy Point transect was trawled.

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) with the exception of the offshore Icy Point stations which were fished for 30 min at approximately 1.5m/sec. 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.

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 measured to the nearest 0.1 liter (L) as a proxy for biomass. 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. Additionally, in the laboratory, all juvenile Chinook and coho salmon were screened with a magnetic detector and any CWTs detected were excised from the snouts. All tags were decoded and verified to determine the stock of origin.

Potential predators of juvenile salmon from each haul were identified, measured (FL, mm), 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). Overall diets of each species were summarized by %W of major prey taxa. Whenever possible, fish prey was identified to species and FLs were measured.

Juvenile salmon catch data were adjusted using calibration coefficients between vessels to allow comparisons with the long term 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 previous 17 years of the SECM time series.

In the laboratory, frozen individual juvenile salmon were weighed (0.1 g) and otoliths were removed from the chum and sockeye salmon. Mean lengths, weights, 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 et al. 2010, 2013).

RESULTS AND DISCUSSION

In 2015, 13 stations were sampled from Auke Bay to Icy Strait monthly from May to August, and four additional stations were sampled from Icy Point to 65 km offshore in the Gulf of Alaska monthly from June to August (Figure 1). In total, data were collected from 92 rope trawl hauls, 104 CTD casts, 32 tandem bongo net samples, 48 surface water samples, 67 Secchi readings, and 92 ambient light measures during 23 days at-sea (Table 2, Appendix 1).

Oceanography

Overall, station mean sea surface (3-m) temperature (SST) values ranged from 7.6 to 14.6 ºC from May to August and averaged 12.1 ºC (Table 3; Figure 2; Appendix 1). Seasonal SST patterns were similar among habitats, with a peak in June or July. Monthly mean SSTs were lowest in the inshore and strait habitats and highest in the coastal habitat, differing by as much as ~3 ºC among localities.

Surface (3-m) salinities ranged from 15.1 to 31.7 PSU from May to August and averaged 26.4 PSU (Table 3; Figure 2; Appendix 1). Salinities were lowest in inshore habitat and highest in coastal habitat. Seasonal PSU values generally trended downward from May to August in inshore and strait habitats, whereas minimal seasonal variation occurred in coastal PSU values.

Water clarity depths ranged from 2 to 11 m and averaged 5.5 m (Appendix 1). The MLD ranged from 6 to 34 m and averaged 9.5 m. Thus, trawl sampling depths (~ 20 m) usually spanned a range of habitat conditions, including the active surface layer and the stable waters below the MLD. Ambient light measurements at each station ranged from 9 to 740 W/m^2, and averaged 207 W/m^2.

Chlorophyll concentrations ranged from 0.4 to 16.7 µg/L, while phaeopigment concentrations ranged from 0.0 to 1.5 µg/L (Table 4; Figure 3). Generally, chlorophyll was highest in Strait habitats in June and was highest in Inshore and Coastal habitats in August.

Zooplankton standing stock from bongo net hauls ranged from 0.1 to 0.7 DV ml/m^3 for 333-µm mesh from May to August (Table 5; Figure 4). Mean standing stock was highest in strait and inshore habitats and lowest in coastal habitats. Seasonal patterns varied little between habitats. Seasonal total density of zooplankton prey fields (333-µm mesh) at stations in Icy Strait ranged from 255 to 1,977 organisms/m^3 (Figure 5). Mean density was generally lowest in August and station variability was highest in August.

Catch composition

Jellyfish catches included five species (*Aequorea* sp., *Aurelia labiata*, *Chrysaora melanaster*, *Cyanea capillata*,, and *Staurophora* sp.) and an "other" category (Table 6; Figure 6). Total biomass (volume) of jellyfish ranged from 0 to 79 L per haul from June to August. Jellyfish biomass and species composition varied by month and habitat. In coastal habitat, the dominant species were *Chrysaora melanaster*, *Aequorea* sp., and *Cyanea capillata* In strait habitat, small numbers of all five species were present, however, the highest catches were of *Aurelia labiate* in July and August.

In total, 19,234 fish and squid, representing 25 taxa, were captured in 92 rope trawl hauls in strait and coastal habitats (Table 7; Figures 7-8). Juvenile salmon comprised approximately 75% of the total fish catch and occurred more frequently in strait habitat than in coastal habitat. In general, adult salmon were most abundant in June and July compared to August. In the strait habitat, juvenile pink, chum, sockeye, and coho salmon occurred in 66-98% of the trawls, while juvenile Chinook salmon occurred in 25% of the hauls (Table 8). In contrast, in the coastal habitat, juvenile pink, chum, sockeye, and coho salmon occurred in 33-58% of the trawls, while juvenile Chinook salmon occurred in 8% of the hauls. In the strait habitat, catches of all five species of juvenile salmon catches peaked in June. In the coastal habitat, catches of all species of juvenile salmon except Chinook peaked in June, which peaked in July. Catches of non-salmonids were relatively minor in strait and coastal habitats, with the exception of a large catches of walleye pollock (1,630 fish) in the strait habitat (Table 7). 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); this data was used for forecast models (Table 9).

Length, weight, and condition of juvenile salmon differed among species and months (Tables 10–14; Figures 9-11). Most species generally 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 118 to 208 mm for pink; 125 to 190 mm for chum; 135-130 mm for sockeye; 189 to 282 mm for coho; and 240-259 mm for Chinook salmon. Mean weights of juvenile salmon increased monthly from 16 to 100 g for pink; 20 to 79 g for chum; 27 to 27 g for sockeye; 85 to 290 g for coho; and 195 to 239 for Chinook salmon. FLs and weights of sockeye were stable in August on account of the influx of newly emergent zero-check fish. Overall for the other species of juvenile salmon besides sockeye salmon--particularly pink and coho salmon—FLs in 2015 were about bout 25% greater than the average over the time series. Juvenile salmon were typically larger in the coastal compared to the strait habitat. Mean conditions of juvenile salmon were fairly consistent in both strait and coastal habitats. In the strait and coastal habitat, the CRs for all species of juvenile salmon were above 0.0., with the exception of Chinook salmon that were below 0.0.

All juvenile coho (*n* = 2,108) and juvenile and immature Chinook (*n* = 38) salmon were scanned (either visually onboard the vessel or electronically in the laboratory) for the presence of CWTs. Stock-specific information was obtained from 56 CWT recoveries from a total of 74 salmon lacking the adipose fin and one with the adipose fin intact. For coho salmon, a total of 51 CWTs were recovered from juveniles. For Chinook salmon, a total of 5 CWTs were recovered from 3 juveniles and 2 immatures (Table 15). All but one of the 35 CWT coho salmon originated from hatchery and wild stocks in the northern region of SEAK: the one exception was one that originated from Satsop River, Washington. Of the five CWT Chinook salmon recovered, four originated from SEAK: Port Armstrong, Kasnyku Bay, Crystal Lake, and Fish Creek; whereas one was from the Willamette River, OR. The two non-Alaska stocks were recovered in the coastal habitat along the Icy Point transect, where there were six additional adipose-clipped juvenile salmon untagged which may have originated from Pacific Northwest (PNW) hatcheries that are mandated to adipose-clip but not necessarily tag all fish released, a practice not used in Alaska. Migration rates of the 39 CWT juvenile and immature salmon ranged from 0.2 to 30.6 km/day and averaged 2.4 km/day.

Stock-specific information was also obtained from recoveries of otolith-marked hatchery chum and sockeye 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), and Armstrong Keta Incorporated (AKI). A total of 1,189 juvenile salmon were examined for thermal marks: 663 chum salmon and 526 sockeye salmon (Tables 16-17; Figures 12-13).

For juvenile chum salmon, stock-specific information was derived from a subsample of 663 from the 6,810 fish caught, representing 10% of the catch (Tables 7 and 16). Of all the chum salmon otoliths examined, 373 (56%) were marked by hatcheries in SEAK and 290 (44%) were not marked. Of the marked fish, 192 (51%) were from DIPAC, 156 (42%) were from NSRAA, 17 (3%) were from SSRAA, and 2 (1%) were from AKI. Hatchery chum salmon catch composition shifted monthly through Icy Strait, with northern stocks such as DIPAC peaking in June, central stocks such as NSRAA peaking in July, and southern stocks such as SSRAA peaking in August (Table 16).

For juvenile sockeye salmon, stock-specific information was derived from t a subsample of 526 from the 1,340 fish caught, representing 39% of the catch (Tables 7 and 12). Of all the sockeye salmon otoliths examined, 196 (37%) were marked and 330 (63%) were not marked. Of the marked fish, 187 (95%) were from Speel Arm, SEAK, 5 (<1%) were from Sweetheart Lake, 2 (<1%) were from Tahltan Lake/Stikine River, British Columbia, and 1 (<1%) was from Tuya Lake/Stikine River, British Columbia (Table 17).

Monthly growth rates of marked and unmarked juvenile chum salmon and sockeye salmon indicated positive increases in weight (Figure 14). The only exception was the presence of small juvenile sockeye salmon in August which was potentially indicative of age-0 sockeye salmon smolts, commonly referred to as “zero checks”.

Stomachs of 380 potential predators of juvenile salmon were examined onboard from a suite of six fish species (Table 18). Of the fish examined, 88% were feeding and no juvenile salmon were identified as prey in any of the stomachs (Table 19).

Summary

This document summarizes SECM data collected on juvenile salmon, ecologically-related species, and associated biophysical parameters collected from May to August in 2015 in the northern region of SEAK. These data continue to be used in conjunction with basin-scale data to develop forecast models and predictive tools for pink salmon and Chinook salmon production in SEAK (e.g., Orsi et al. 2012, Orsi In Press$_a$; Wertheimer et al. 2014, 2015) and to explore year-class strength relationships for other species such as Chinook salmon (Orsi et al. 2013a; Orsi In Press$_b$) and sablefish (*Anoplopoma fimbria*; Martinson et al. 2013; Yasumiishi et al. 2015). Subsets of the 19-year long-term time series are also examined in recent ecosystem documents (Fergusson et al. 2014; Fergusson and Orsi 2015, 2016; Orsi et al. 2014, 2015, 2016; Yasumiishi et al. 2014, 2015a, 2015b). Comparing annual effects of biophysical parameters to long term mean values permits climate-related changes in marine conditions to be detected. Long term 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.

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Table 1.—Localities and coordinates of thirteen stations sampled by the Southeast Coastal Monitoring (SECM) project in the marine waters of the northern region of southeastern Alaska, May–August 2015. Transect and station positions are shown in Figure 1.

Station	Latitude N	Longitude W	Distance		Bottom depth (m)
			Offshore (km)	Between adjacent station (km)	
			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 2015.

			Data collection type[1]			
Dates (days)	Vessel	Habitat	Rope trawl	CTD cast	Oblique bongo	Chlorophyll & nutrients
22-23 May (2 days)	R/V *Sashin*	Inshore	0	1	1	1
		Strait	0	8	4	8
		Coastal	0	0	0	0
27 June-03 July (7 days)	F/V *Northwest Explorer*	Inshore	0	1	1	1
		Strait	28	28	4	8
		Coastal	4	4	4	4
27 July-02 August (7 days)	F/V *Northwest Explorer*	Inshore	0	1	1	1
		Strait	28	28	4	8
		Coastal	4	4	4	4
29 August-03 September (7 days)	F/V *Northwest Explorer*	Inshore	0	1	1	1
		Strait	24	24	4	8
		Coastal	4	4	4	4
Total			**92**	**104**	**32**	**48**

[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; chlorophyll and nutrients are from surface seawater samples.

Table 3.—Mean surface (3-m) temperature (°C) and salinity (PSU) data collected monthly at stations in the marine waters of the northern region of southeastern Alaska, May–August 2015. *n* = number of station visits. 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	10.8	28.5									
June	1	12.3	19.9									
July	1	12.7	15.1									
August	1	10.8	22.9									
Upper Chatham Strait transect												
	UCA			UCB			UCC			UCD		
May	1	8.4	31.0	1	8.5	31.0	1	8.1	31.0	1	8.5	30.7
June	3	13.3	25.8	3	13.1	27.0	3	11.9	28.0	3	12.3	27.4
July	3	12.2	25.3	3	11.2	28.6	3	11.6	27.3	3	12.5	24.2
August	1	10.7	24.7	3	10.7	24.4	2	11.1	23.7	2	11.2	22.0
Icy Strait transect												
	ISA			ISB			ISC			ISD		
May	1	8.2	30.8	1	8.1	30.8	1	8.1	30.8	1	7.6	30.9
June	4	12.6	26.9	4	12.8	26.7	3	13.8	25.9	4	13.2	26.3
July	4	12.1	27.1	4	12.6	26.0	4	13.5	24.0	4	13.2	24.4
August	4	10.8	26.8	4	11.4	25.0	4	11.5	25.0	4	11.8	23.0

Table 3.—cont.

Month	*n*	Temp (ºC)	Salinity (PSU)	*n*	Temp (ºC)	Salinity (PSU)	*n*	Temp (ºC)	Salinity (PSU)	*n*	Temp (ºC)	Salinity (PSU)
						Icy Point transect						
	IPA			IPB			IPC			IPD		
May	—	—	—	—	—	—	—	—	—	—	—	—
June	1	12.1	31.0	1	14.4	31.4	1	13.4	31.5	1	14.1	31.7
July	1	14.6	31.1	1	14.5	30.5	1	14.5	30.7	1	14.6	31.4
August	1	13.0	30.5	1	13.7	31.3	1	13.5	31.3	—	—	—

Table 4.—Chlorophyll and phaeopigment (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 2015. Station code acronyms are listed in Table 1.

Month	Chloro (µg/L)	Phaeo (µg/L)	Chloro (µg/L)	Phaeo (µg/L)	Chloro (µg/L)	Phaeo (µg/L)	Chloro (µg/L)	Phaeo (µg/L)
Auke Bay Monitor								
	ABM							
May	0.65	0.38						
June	4.43	0.17						
July	3.40	0.00						
August	6.82	0.00						
Upper Chatham Strait transect								
	UCA		UCB		UCC		UCD	
May	19.43	0.00	14.34	0.15	16.66	0.21	9.62	0.00
June	2.05	0.13	1.29	0.25	1.87	0.31	2.19	0.46
July	1.31	0.47	1.38	0.52	1.55	0.37	1.31	0.46
August	1.72	0.18	1.41	0.22	2.80	1.02	3.19	0.18
Icy Strait transect								
	ISA		ISB		ISC		ISD	
May	11.17	0.05	13.48	0.10	12.75	0.00	8.39	0.00
June	1.60	0.03	1.99	0.29	2.18	0.19	2.63	0.42
July	1.63	0.98	1.51	1.47	1.05	0.49	1.52	0.49
August	0.79	0.35	1.07	0.28	1.12	0.17	0.71	0.10
Icy Point transect								
	IPA		IPB		IPC		IPD	
May	—	—	—	—	—	—	—	—
June	1.91	0.19	0.34	0.07	0.86	0.20	0.48	0.00
July	0.45	0.05	0.68	0.14	0.44	0.00	0.39	0.07
August	1.80	0.41	1.73	0.35	1.59	0.49	1.45	0.40

Table 5.—Zooplankton displacement volumes (DV, ml), standing stock (DV/m^3), and total density (number/m^3) from double oblique bongo (0.6 m diameter, 333-µm mesh) hauls collected monthly at stations in the marine waters of the northern region of southeastern Alaska, May–August 2015. Standing stock (ml/m^3) is computed using flowmeter readings to determine water volume filtered. A 1 ml zooplankton volume approximates 1 g biomass. 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
Auke Bay Monitor (ABM)																
	333-µm mesh															
May	38	45	0.6	—												
June	29	40	0.7	—												
July	35	10	0.1	—												
August	—	—	—	—												
Icy Strait																
	ISA				ISB				ISC				ISD			
May	66	75	0.7	1167.4	163	135	0.6	988.6	173	120	0.4	670.3	185	140	0.5	898.8
June	81	80	0.6	1976.8	161	140	0.6	1052.4	201	155	0.6	1396.8	205	135	0.5	1085.3
July	75	35	0.3	445.6	159	145	0.5	942.1	203	130	0.4	757.6	197	150	0.5	882.6
August	67	100	0.7	1084.0	169	120	0.5	255.2	201	180	0.5	665.0	203	190	0.6	875.5
Icy Point																
	IPA				IPB				IPC				IPD			
May	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	142	55	0.3	—	99	40	0.2	—	110	45	0.3	—	202	45	0.2	—
July	137	30	0.2	—	100	35	0.2	—	105	20	0.1	—	137	25	0.1	—
August	134	95	0.4	—	96	15	0.1	—	109	25	0.1	—	201	25	0.1	—

Table 6.—Mean volume (L) of jellyfish captured in rope trawl hauls monthly at stations in the marine waters of the northern region of southeastern Alaska, June–August 2015.

	Icy Strait				Upper Chatham Strait				Icy Point			
Aequorea sp.												
	ISA	ISB	ISC	ISD	UCA	UCB	UCC	UCD	IPA	IPB	IPC	IPD
June	1.0	1.1	0.2	0.2	5.4	2.9	1.4	1.2	0.4	0.4	2.8	11.5
July	7.1	6.5	6.1	7.4	8.9	11.9	15.8	7.6	30.5	79.0	10.0	15.0
August	2.7	2.2	2.1	1.0	0.2	0.1	0.8	0.7	28.5	4.5	75.0	5.6
Aurelia labiata												
	ISA	ISB	ISC	ISD	UCA	UCB	UCC	UCD	IPA	IPB	IPC	IPD
June	0.0	0.1	0.0	0.1	11.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0
July	1.9	2.5	2.4	0.5	0.9	71.8	0.7	0.5	0.0	4.6	0.0	0.0
August	0.1	28.9	6.7	1.4	0.0	0.0	0.1	0.3	1.1	1.9	2.4	0.1
Chrysaora melanaster												
	ISA	ISB	ISC	ISD	UCA	UCB	UCC	UCD	IPA	IPB	IPC	IPD
June	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
July	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0.0	0.0
Cyanea capillata												
	ISA	ISB	ISC	ISD	UCA	UCB	UCC	UCD	IPA	IPB	IPC	IPD
June	0.2	0.4	0.6	0.5	0.4	0.2	0.4	0.4	0.2	0.7	5.1	0.3
July	0.7	0.8	0.4	0.6	0.8	1.5	1.7	2.8	3.1	22.0	0.4	0.5
August	3.1	2.3	5.1	2.4	0.1	2.0	5.3	3.5	1.0	0.0	0.4	0.3

Table 6.—cont.

	Icy Strait				Upper Chatham Strait				Icy Point			
	Staurophora sp.											
	ISA	ISB	ISC	ISD	UCA	UCB	UCC	UCD	IPA	IPB	IPC	IPD
June	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
July	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Other[1]											
	ISA	ISB	ISC	ISD	UCA	UCB	UCC	UCD	IPA	IPB	IPC	IPD
June	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.7	1.5	0.5	0.5
July	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
August	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

[1] Other: Ctenophores, *Phacellophora* sp., *Neoturris brevicornis*, and unknown species

Table 7.—Salmonid and non-salmonid catches from rope trawl hauls in strait (n = 80) and coastal (n = 12) marine habitats of the northern region of southeastern Alaska, June–August 2015. Dash indicates no samples. See Table 2 for sampling effort by month and habitat. Catches were not adjusted for standard 20-min trawl durations or vessel calibrations; see Appendix 2 and Table 10.

		Strait			Coastal		
Common Name	Scientific name	June	July	August	June	July	August
		Salmonids					
Chum salmon[1]	*Oncorhynchus keta*	6209	227	274	83	12	5
Pink salmon[1]	*O. gorbuscha*	3392	432	311	68	11	2
Coho salmon[1]	*O. kisutch*	998	593	479	18	11	9
Sockeye salmon[1]	*O. nerka*	1221	19	46	48	6	—
Pink salmon[3]	*O. gorbuscha*	67	546	57	9	12	6
Chum salmon[3]	*O. keta*	17	15	1	2	2	1
Chinook salmon[1]	*O. tshawytscha*	21	6	4	4	—	—
Sockeye salmon[3]	*O. nerka*	1	15	—	1	—	1
Chinook salmon[2]	*O. tshawytscha*	5	10	—	2	—	—
Coho salmon[3]	*O. kisutch*	—	6	3	—	5	—
Chum salmon[2]	*O. keta*	—	—	—	12	—	—
Chinook salmon[3]	*O. tshawytscha*	1	—	2	—	—	—
Sockeye salmon[2]	*O. nerka*	—	1	—	—	—	—
Dolly Varden	*Salvelinus malma*	4	—	—	—	—	—
Salmonid subtotals		11936	1870	1177	246	59	24
		Non-salmonids					
Walleye pollock[3]	*Gadus chalcogrammus*	1010	234	386	—	—	—
Unknown larvae		47	—	2	8	—	—
Pacific herring	*Clupea pallasi*	8	33	—	—	—	—

Table 7.—cont.

Common Name	Scientific name	Strait			Coastal		
		June	July	August	June	July	August
Pomfret	*Brama japonica*	—	—	—	—	38	—
Crested sculpin	*Blepsias bilobus*	9	24	2	—	—	—
Sablefish	*Anoplopoma fimbria*	—	—	—	2	31	—
Squid	Gonatidae	—	—	—	—	20	10
Pacific saury	*Cololabis saira*	—	—	—	—	—	30
Hexagrammidae	Hexagrammos spp.	—	—	—	16	—	—
3-spine stickleback	*Gasterosteus aculeatus*	—	13	—	—	—	—
Market squid	*Loligo* sp.	—	—	—	10	—	—
Spiny dogfish	*Squalus acanthias*	—	—	—	6	3	—
Walleye pollock[4]	*Gadus chalcogrammus*	2	1	1	1	—	—
Wolf-eel	*Anarrhichthys ocellatus*	4	—	—	1	—	—
Soft sculpin	*Gilbertidia sigalutes*	—	2	—	—	—	—
Smooth Lumpsucker	*Aptocyclus ventricosus*	2	—	—	—	—	—
Ocean sunfish	*Mola*	2	—	—	1	1	—
Prowfish	*Zaprora silenus*	—	—	—	—	—	—
Pacific sandfish	*Trichodon*	—	1	—	—	—	—
Lingcod	*Ophiodon elongatus*	1	—	—	1	—	—
Arrowtooth flounder	*Reinhardtius stomias*	—	—	—	1	—	—
Salmon shark	*Lamna ditropis*	—	1	—	—	—	—
Non-salmonid subtotals		1081	309	391	47	93	40

[1]Juvenile
[2]Immature
[3]Adult
[4]Larvae or young-of-the-year

Table 8.—Frequency of occurrence of monthly salmonid and non-salmonid catches from rope trawl hauls in strait (n = 80) and coastal (n = 12) marine habitats of the northern region of southeastern Alaska, June–August 2015. 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					
Chum salmon[1]	*Oncorhynchus keta*	26	15	14	(69)	3	3	1	(58)
Pink salmon[1]	*O. gorbuscha*	24	14	15	(66)	3	2	1	(50)
Coho salmon[1]	*O. kisutch*	28	28	22	(98)	2	3	2	(58)
Sockeye salmon[1]	*O. nerka*	22	9	12	(54)	2	2	—	(33)
Pink salmon[3]	*O. gorbuscha*	17	25	16	(73)	4	3	3	(83)
Chum salmon[3]	*O. keta*	10	8	1	(24)	2	2	1	(42)
Chinook salmon[1]	*O. tshawytscha*	13	4	3	(25)	1	—	—	(8)
Sockeye salmon[3]	*O. nerka*	1	8	—	(11)	1	—	1	(17)
Chinook salmon[2]	*O. tshawytscha*	4	5	—	(11)	1	—	—	(8)
Coho salmon[3]	*O. kisutch*	—	6	2	(10)	—	1	—	(8)
Chum salmon[2]	*O. keta*	—	—	—	—	2	—	—	(17)
Chinook salmon[3]	*O. tshawytscha*	1	—	2	(4)	—	—	—	—
Sockeye salmon[2]	*O. nerka*	—	—	—	—	—	—	—	—
Dolly Varden	*Salvelinus malma*	—	—	—	—	—	—	—	—
				Non-salmonids					
Walleye pollock[3]	*Gadus chalcogrammus*	18	11	7	(45)	—	—	—	—
Unknown larvae		4	—	1	(6)	1	—	—	(8)
Pacific herring	*Clupea pallasi*	5	4	—	(11)	—	—	—	—
Pomfret	*Brama japonica*	—	—	—	—	—	1	—	(8)
Crested sculpin	*Blepsias bilobus*	7	16	2	(31)	—	—	—	—
Sablefish	*Anoplopoma fimbria*	—	—	—	—	1	2	—	(25)

Table 8.—cont.

Common name	Scientific name	Strait June	Strait July	Strait August	Strait (%)	Coastal June	Coastal July	Coastal August	Coastal (%)
Squid	Gonatidae	—	—	—	—	—	1	1	(17)
Pacific saury	*Cololabis saira*	—	—	—	—	—	—	1	(8)
Hexagrammidae	Hexagrammos spp.	—	—	—	—	3	—	—	(25)
3-spine stickleback	*Gasterosteus aculeatus*	—	1	—	(1)	—	—	—	—
Market squid	*Loligo* sp.	—	—	—	—	2	—	—	(17)
Spiny dogfish	*Squalus acanthias*	—	—	—	—	1	3	—	(33)
Walleye pollock[4]	*Gadus chalcogrammus*	1	1	1	(4)	1	—	—	(8)
Wolf-eel	*Anarrhichthys ocellatus*	—	2	—	(3)	1	—	—	(8)
Soft sculpin	*Gilbertidia sigalutes*	2	—	—	(3)	—	—	—	—
Smooth Lumpsucker	*Aptocyclus ventricosus*	2	—	—	(3)	—	—	—	—
Ocean sunfish	*Mola mola*	—	—	—	—	1	1	—	(17)
Prowfish	*Zaprora silenus*	—	1	—	(1)	—	—	—	—
Pacific sandfish	*Trichodon trichodon*	1	—	—	(1)	—	—	—	—
Lingcod	*Ophiodon elongatus*	—	—	—	—	1	—	—	(8)
Arrowtooth flounder	*Reinhardtius stomias*	—	—	—	—	1	—	—	(8)
Salmon shark	*Lamna ditropis*	—	1	—	(1)	—	—	—	—

[1]Juvenile
[2]Immature
[3]Adult
[4]Larvae or young-of-the-year (YOY)

Table 9.—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 2015: 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).

		NWE		Calibration	“Cobb units”	
Species	Month	CPUE	Ln(CPUE+1)	Factor	Ln(CPUE+1)	CPUE
Pink	June	121.1	3.33	0.659	2.19	17.4
	July	15.4	1.25		0.82	3.5
	August	13.0	1.37		0.90	3.3
Chum	June	221.8	3.83	0.705	2.70	33.9
	July	8.1	1.18		0.83	2.9
	August	11.4	1.25		0.88	3.5
Sockeye	June	43.6	2.34	0.848	1.98	20.3
	July	0.7	0.33		0.28	0.5
	August	1.9	0.65		0.55	1.3
Coho	June	35.6	3.01	0.803	2.41	15.5
	July	21.2	2.60		2.09	10.0
	August	20.0	2.38		1.91	9.5

Table 10.—Length (mm, fork), weight (g), Fulton's condition [(g/mm^3)·(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 2015. Dashes indicate no samples.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	220	90-162	124	1	118	124-200	159	1	94	172-250	209	2
Chatham	Weight	220	5.1-45.6	19.1	0.5	118	18.4-88.7	41.4	1.2	94	45.2-185.4	99.9	2.7
Strait	CR	220	-0.23-0.19	0.03	0.00	118	-0.10-0.34	0.04	0.01	94	-0.11-0.17	0.06	0.01
Icy	Length	505	80-161	114	1	199	123-202	166	1	173	170-280	207	1
Strait	Weight	504	3.9-42.7	14.8	0.3	179	17.7-84.3	48.1	1.0	173	49.9-283.2	100.7	2.7
	CR	504	-0.13-0.28	0.04	0.00	179	-0.17-0.18	0.05	0.00	173	-0.13-0.28	0.09	0.00
Icy	Length	68	95-162	125.6	2.1	11	135-211	186	7	2	188-218	203	15
Point	Weight	47	7.3-44.4	19.9	1.4	11	22.0-97.0	64.8	7.4	2	61.3-109.0	85.2	23.9
	CR	47	-0.11-0.12	0.00	0.01	11	-0.12-0.06	-0.03	0.02	2	-0.06-0.04	-0.01	0.05
Total	Length	793	80-162	118	1	328	123-211	164	1	269	170-280	208	1
	Weight	771	3.9-45.6	16.3	0.3	308	17.7-97.0	46.2	0.8	269	45.2-283.2	100.3	2.0
	CR	771	-0.23-0.28	0.03	0.00	308	-0.17-0.34	0.04	0.00	269	-0.13-0.28	0.08	0.00

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 chum salmon captured in the marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2015.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	293	98-180	128	1	87	119-214	156	2	115	125-245	183	2
Chatham	Weight	291	8.0-58.1	21.2	0.5	87	16.3-91.6	40.1	1.4	115	19.1-147.5	69.4	2.9
Strait	CR	291	-0.22-0.77	0.00	0.00	87	-0.27-0.26	0.03	0.01	115	-0.20-0.16	0.04	0.01
Icy	Length	501	83-159	121	1	140	120-208	161	2	119	102-250	196	2
Strait	Weight	501	5.0-43.4	18.4	0.3	140	17.0-91.7	43.4	1.3	119	9.0-184.0	88.0	2.9
	CR	501	-0.15-0.22	0.03	0.00	140	-0.16-0.20	0.01	0.01	119	-0.12-0.26	0.09	0.01
Icy	Length	83	110-156	134.8	1.1	12	177-231	207	4	5	149-221	190	12
Point	Weight	33	11.8-34.1	23.4	1.0	12	50.9-128.7	92.9	5.8	5	29.3-110.6	68.0	13.1
	CR	33	-0.12-0.21	0.01	0.01	12	-0.09-0.06	0.00	0.01	5	-0.14--0.01	-0.08	0.03
Total	Length	877	83-180	125	0	239	119-231	161	1	239	102-250	190	2
	Weight	825	5.0-58.1	19.6	0.3	239	16.3-128.7	44.7	1.2	239	9.0-184.0	78.7	2.1
	CR	825	-0.22-0.77	0.02	0.00	239	-0.27-0.26	0.01	0.00	239	-0.20-0.26	0.06	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 sockeye salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2015.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	76	93-194	134	2	4	86-182	142	23	29	89-171	129	4
Chatham	Weight	76	7.1-74.9	26.7	1.5	4	6.2-68.5	37.0	15.0	29	6.0-55.3	23.6	2.3
Strait	CR	76	-0.12-0.13	0.02	0.01	4	-0.05-0.08	0.01	0.03	29	-0.12-0.07	0.00	0.01
Icy	Length	356	86-176	129	1	15	120-215	149	6	17	80-236	132	11
Strait	Weight	356	6.0-58.7	24.1	0.5	15	16.6-120.1	36.7	6.3	17	4.5-142.4	32.3	9.2
	CR	356	-0.14-0.27	0.04	0.00	15	-0.22-0.12	0.00	0.02	17	-0.14-0.06	-0.03	0.01
Icy	Length	48	134-227	179.4	2.4	6	139-191	178	8	—	—	—	—
Point	Weight	27	42.8-131.3	68.8	3.2	6	24.8-68.2	55.9	6.8	—	—	—	—
	CR	27	-0.17-0.11	0.01	0.01	6	-0.10--0.03	-0.08	0.01	—	—	—	—
Total	Length	480	86-227	135	1	25	86-215	154	6	46	80-236	130	5
	Weight	459	6.0-131.3	27.1	0.7	25	6.2-120.1	41.3	4.9	46	4.5-142.4	26.8	3.7
	CR	459	-0.17-0.27	0.04	0.00	25	-0.22-0.12	-0.02	0.01	46	-0.14-0.07	-0.01	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 coho salmon captured in the marine habitat of the northern region of southeastern Alaska by rope trawl, June–August 2015.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper	Length	350	129-255	192	1	121	165-290	235	2	33	228-305	272	4
Chatham	Weight	350	23.5-199.2	87.2	1.5	121	50.6-287.6	156.6	4.4	33	140.0-365.7	256.9	10.7
Strait	CR	350	-0.17-0.31	0.03	0.00	121	-0.16-0.12	-0.02	0.01	33	-0.06-0.18	0.03	0.01
Icy	Length	339	115-260	184	1	314	170-286	217	1	341	222-330	283	1
Strait	Weight	339	15.8-204.4	78.5	1.7	314	57.1-291.1	126.2	1.9	322	130.6-425	294.3	3.2
	CR	339	-0.34-0.22	0.04	0.00	314	-0.18-0.2	0.02	0.00	322	-0.19-0.23	0.05	0.00
Icy	Length	18	205-260	228.7	3.3	11	242-360	290	9	9	264-298	284	4
Point	Weight	18	99.6-215.2	145.3	7.1	10	170.1-405.4	298.7	21.9	9	235-310	274.6	9.6
	CR	18	-0.07-0.12	0.01	0.01	10	-0.07-0.14	0.05	0.02	9	-0.10-0.14	-0.02	0.02
Total	Length	707	115-260	189	1	446	165-360	224	1	383	222-330	282	1
	Weight	707	15.8-215.2	84.5	1.2	445	50.6-405.4	138.3	2.3	364	130.6-425	290.4	3.1
	CR	707	-0.34-0.31	0.03	0.00	445	-0.18-0.20	0.01	0.00	364	-0.19-0.23	0.05	0.00

Table 14.—Length (mm, fork), weight (g), Fulton's condition [(g/mm^3)·(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 2015. Dash indicates no samples.

		June				July				August			
Locality	Factor	*n*	range	mean	se	*n*	range	mean	se	*n*	range	mean	se
Upper Chatham Strait	Length	14	165-302	243	10	—	—	—	—	—	—	—	—
	Weight	14	50.9-352.4	197.7	22.1	—	—	—	—	—	—	—	—
	CR	14	-0.11-0.30	-0.03	0.03	—	—	—	—	—	—	—	—
Icy Strait	Length	7	136-280	224	21	6	240-320	278	11	4	229-302	259	18
	Weight	7	28.8-311.6	167.4	38.3	6	163.6-369.0	267.4	29.2	4	148.6-340.0	239.4	49.4
	CR	7	-0.15-0.11	-0.01	0.03	6	-0.24--0.04	-0.12	0.03	4	-0.13-0.07	-0.02	0.04
Icy Point	Length	4	234-277	256	11	—	—	—	—	—	—	—	—
	Weight	4	161.1-298.2	232.5	29.6	—	—	—	—	—	—	—	—
	CR	4	-0.08-0.16	0.01	0.05	—	—	—	—	—	—	—	—
Total	Length	25	136-302	240	8	6	240-320	278	11	4	229-302	259	18
	Weight	25	28.8-352.4	194.8	16.9	6	163.6-369	267.4	29.2	4	148.6-340.0	239.4	49.4
	CR	25	-0.15-0.30	-0.01	0.02	6	-0.24--0.04	-0.12	0.03	4	-0.13-0.07	-0.02	0.04

Table 15.—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 2015. 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	2015 Date	FL (mm)	W (g)	Age	Days[2] since release	Distance traveled (km)
							June								
Chinook	043496	2013	AKI	Port Armstrong, AK	5/17/15		45.0	Chatham Str.	UCD	7/1	228	152.6	1.0	45	210
Chinook	090728	2013	ODFW	Willamette R., OR	3/16/15		59.7	Icy Point	IPC	6/29	274	258.8	1.0	105	1650
Chinook	No tag							Icy Point	IPC	6/29	239	211.9			
Chinook	No tag							Icy Point	IPC	6/29	234	161.1			
Chinook	No tag							Icy Strait	ISD	6/30	280	311.6			
Chinook	No tag							Chatham Str.	UCD	7/1	256	205.2			
Chinook	No tag							Chatham Str.	UCB	7/1	302	352.4			
Chinook	No tag							Chatham Str.	UCA	7/1	241	177.7			
Chinook	No tag							Chatham Str.	UCA	7/1	291	337.0			
Chinook	No tag							Chatham Str.	UCB	7/2	266	239.2			
Coho	043297	2013	ADFG	Auke Creek, AK (Wild)	5/14/15		14.1	Icy Strait	ISA	6/28	190	79.9	1.0	45	65
Coho	043297	2013	ADFG	Auke Creek, AK (Wild)	5/14/15		14.1	Icy Strait	ISD	6/30	195	101.5	1.0	47	75
Coho	043574	2013	ADFG	Chilkat R., AK (Wild)	5/14/15	81	5.5	Icy Strait	ISC	6/28	144	34.9	1.0	45	145
Coho	043574	2013	ADFG	Chilkat R., AK (Wild)	5/14/15	6	81.0	Chatham Str.	UCA	7/1	175	69.9	1.0	48	130
Coho	043575	2013	ADFG	Chilkat R., AK (Wild)	5/5/15	94	8.5	Chatham Str.	UCD	7/2	171	56.7	1.0	58	120
Coho	043597	2013	NSRAA	Kasnyku Bay, AK	5/28/15	132	23.1	Chatham Str.	UCB	7/1	190	81.5	1.0	34	110
Coho	043597	2013	NSRAA	Kasnyku Bay, AK	5/28/15	132	23.1	Chatham Str.	UCB	7/1	199	92.8	1.0	34	110
Coho	043597	2013	NSRAA	Kasnyku Bay, AK	5/28/15	132	23.1	Chatham Str.	UCB	7/2	188	76.4	1.0	35	100
Coho	043673	2013	NSRAA	Kasnyku Bay, AK	5/14/15	132	25.0	Chatham Str.	UCA	7/1	210	113.5	1.0	48	100
Coho	043673	2013	NSRAA	Kasnyku Bay, AK	5/14/15	132	23.0	Chatham Str.	UCA	7/2	223	123.5	1.0	49	100
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Icy Strait	ISD	6/30	207	10.6	1.0	51	87
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Icy Strait	ISD	6/30	205	102.1	1.0	51	87
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Chatham Str.	UCB	7/1	185	96.8	1.0	52	73
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Chatham Str.	UCB	7/1	203	97.9	1.0	52	73
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Chatham Str.	UCB	7/1	212	108.8	1.0	52	73
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Chatham Str.	UCB	7/1	200	106.2	1.0	52	73
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Chatham Str.	UCA	7/1	240	168.0	1.0	52	73

Table 15.—cont.

Species	CWT Code	Release information: Brood year	Agency[1]	Locality	Date	FL (mm)	W (g)	Recovery information: Locality	Station code	2015 Date	FL (mm)	W (g)	Age	Days[2] since release	Distance traveled (km)
Coho	043875	2013	DIPAC	Thane net pens, AK	5/15/15		27.5	Chatham Str.	UCB	7/1	198	92.5	1.0	47	73
Coho	043875	2013	DIPAC	Gastineau Channel, AK	5/15/15		27.5	Chatham Str.	UCA	7/1	208	114.4	1.0	47	73
Coho	043875	2013	DIPAC	Gastineau Channel, AK	5/15/15		27.5	Chatham Str.	UCA	7/1	188	80.3	1.0	47	73
Coho	043877	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Icy Strait	ISB	6/30	219	122.6	1.0	51	90
Coho	043877	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Chatham Str.	UCD	7/2	211	113.7	1.0	53	67
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9 /15	100		Icy Strait	ISB	6/28	176	68.1	1.0	50	95
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9 /15	100		Chatham Str.	UCB	7/1	187	77.6	1.0	56	80
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9 /15	100		Chatham Str.	UCB	7/1	200	97.3	1.0	56	80
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9 /15	100		Chatham Str.	UCB	7/1	190	89.8	1.0	56	80
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9 /15	100		Chatham Str.	UCB	7/1	198	96.1	1.0	56	80
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9 /15	100		Chatham Str.	UCC	7/2	195	90.6	1.0	56	80
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9 /15	100		Chatham Str.	UCD	7/2	194	94.4	1.0	57	80
Coho	636716	2013	WDFW	Satsop R., WA	5/6 /15	140	33.1	Icy Point	IPC	6/29	253	197.1	1.0	54	1650
Coho	No tag							Icy Strait	ISD	6/30	188	87.0			
Coho	No tag							Chatham Str.	UCD	7/2	171	56.5			
							July								
Coho	043297	2013	ADFG	Auke Creek, AK (Wild)	5/14/15		14.1	Icy Strait	ISA	7/28	221	140.4	1.0	75	65
Coho	043297	2013	ADFG	Auke Creek, AK (Wild)	5/14/15		14.1	Icy Strait	ISA	7/28	240	173.2	1.0	75	65
Coho	043365	2013	ADFG	Berners R., AK (Wild)	5/10/15	100		Icy Strait	ISC	7/27	263	222.5	1.0	78	90
Coho	043494	2013	AKI	Port Armstrong, AK	5/21/15		23.4	Chatham Str.	UCA	8/1	248	176.5	1.0	72	200
Coho	043575	2013	ADFG	Chilkat R., AK (Wild)	5/5/15	94	8.4	Icy Strait	ISC	7/28	202	103.3	1.0	84	145
Coho	043597	2013	NSRAA	Kasnyku Bay, AK	5/28/15	132	23.1	Icy Strait	ISA	7/29	226	128.8	1.0	62	135
Coho	043673	2013	NSRAA	Kasnyku Bay, AK	5/14/15	132	25.0	Icy Strait	ISC	7/27	225	137.0	1.0	74	130
Coho	043673	2013	NSRAA	Kasnyku Bay, AK	5/14/15	132	25.0	Icy Strait	ISA	7/28	225	125.2	1.0	75	135
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Icy Strait	ISA	7/28	243	168.4	1.0	79	93
Coho	043875	2013	DIPAC	Gastineau Channel, AK	5/15/15		27.5	Icy Strait	ISA	7/28	246	172.1	1.0	74	93
Coho	043875	2013	DIPAC	Gastineau Channel, AK	5/15/15		27.5	Icy Strait	ISB	7/28	230	142.5	1.0	74	90
Coho	No tag							Chatham Str.	UCC	7/30	263	217.4			
Coho	No tag							Icy Point	IPD	7/31	284	296.9			
Coho	No tag							Icy Point	IPD	7/31	306	405.4			
Coho	No tag							Icy Point	IPC	7/31	266	248.6			

Table 15.—cont.

		Release information						Recovery information							
Species	CWT Code	Brood year	Agency[1]	Locality	Date	FL (mm)	W (g)	Locality	Station code	2015 Date	FL (mm)	W (g)	Age	Days[2] since release	Distance traveled (km)
							August								
Chinook	043280	2012	NSRAA	Kasnyku Bay, AK	5/3/14		66.8	Chatham Str.	UCD	9/2	530	2000	1.1	487	110
Chinook	043386	2012	SSRAA	Crystal Lake, AK	5/22/14		28.6	Chatham Str.	UCB	9/2	490	1600	1.1	468	320
Chinook	043874	2013	DIPAC	Fish Creek, AK	6/10/15		35.5	Icy Strait	ISC	8/31	229	160.6	1.0	82	80
Chinook	No tag							Icy Strait	ISA	8/29	302	340.0			
Chinook	No tag							Icy Strait	ISC	8/31	229	148.6			
Coho	041380	2013	ADFG	Taku River, AK (Wild)	5/1/15	79	4.9	Icy Strait	ISC	8/29	276	265.7	1.0	112	120
Coho	043297	2013	ADFG	Auke Creek, AK (Wild)	5/14/15		14.1	Icy Strait	ISC	8/31	258	230.0	1.0	107	65
Coho	043495	2013	AKI	Port Armstrong, AK	5/21/15		25.5	Icy Strait	ISB	8/30	312	393.3	1.0	101	240
Coho	043574	2013	ADFG	Chilkat R., AK (Wild)	5/5/15	81	5.5	Icy Strait	ISC	8/30	273	269.1	1.0	117	145
Coho	043597	2013	NSRAA	Kasnyku Bay, AK	5/28/15	132	23.1	Icy Strait	ISC	8/30	273	265.0	1.0	94	130
Coho	043872	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Icy Strait	ISC	8/30	302	340.3	1.0	112	89
Coho	043875	2013	DIPAC	Gastineau Channel, AK	5/15/15		27.5	Icy Strait	ISB	8/30	261	248.2	1.0	107	90
Coho	043877	2013	DIPAC	Thane net pens, AK	5/10/15		22.2	Icy Strait	ISC	8/30	308	362.0	1.0	112	89
Coho	043976	2013	ADFG	Stikine River, AK	4/22/15			Icy Strait	ISB	8/31	296	337.1	1.0	131	250
Coho	045010	2013	ADFG	Berners R., AK (Wild)	5/9/15	100		Icy Strait	ISB	8/31	298	302.0	1.0	114	90
Coho	No tag							Icy Strait	ISB	8/30	304	344.2			
Coho	No tag							Icy Point	IPA	9/1	269	269.3			

[1] ADFG = Alaska Department of Fish and Game; AKI = Armstrong Keta Inc.; DIPAC = Douglas Island Pink and Chum Inc.; NSRAA = Northern Southeast Regional Aquaculture Association; ODFW = Oregon Department of Fish and Wildlife; SSRAA = Southern Southeast Regional Aquaculture Association; WDFG = Washington Department of Fish and Game.

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

Table 16.—Stock-specific information on 663 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 2015. 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. L/L = late large fish releases. See Table 15 for agency acronyms.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
						DIPAC							
Upper	Length	42	104-150	134	2	10	154-188	169	4	20	165-245	207	4
Chatham	Weight	42	10.9-38.6	24.8	0.9	10	34.6-75.5	50.3	3.9	20	43.1-147.5	98.0	5.9
Strait	CR	42	-0.04-0.77	0.06	0.02	10	-0.04-0.12	0.03	0.01	20	-0.19-0.16	0.05	0.02
Icy	Length	68	104-153	126	1	31	136-208	171	3	19	171-236	207	4
Strait	Weight	68	10.9-34.0	19.8	0.6	31	23.0-80.9	52.8	2.9	19	51.1-149.7	101.3	6.4
	CR	68	-0.12-0.13	0.02	0.01	31	-0.13-0.14	0.02	0.01	19	-0.04-0.18	0.09	0.02
Icy	Length	2	127-140	134	7	—	—	—	—	—	—	—	—
Point	Weight	2	19.1-33.0	26.1	6.9	—	—	—	—	—	—	—	—
	CR	2	-0.03-0.21	0.09	0.12	—	—	—	—	—	—	—	—
Total	Length	112	104-153	129	1	41	136-208	171	3	39	165-245	207	3
	Weight	112	10.9-38.6	21.8	0.5	41	23.0-80.9	52.2	2.3	39	43.1-149.7	99.6	4.3
	CR	112	-0.12-0.77	0.03	0.01	41	-0.13-0.14	0.02	0.01	39	-0.19-0.18	0.07	0.01
						NSRAA							
						Bear Cove							
Icy	Length	3	125-129	127.4	1.3	—	—	—	—	—	—	—	—
Point	Weight	3	19.3-21.5	20.2	0.7	—	—	—	—	—	—	—	—
(Total)	CR	3	-0.07-0.07	0.02	0.05	—	—	—	—	—	—	—	—

Table 16.—cont.

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
						Crawfish Inlet							
Icy	Length	13	130-153	139.9	2.0	—	—	—	—	—	—	—	—
Point	Weight	13	22.4-34.1	27.1	1.1	—	—	—	—	—	—	—	—
(Total)	CR	13	-0.04-0.11	0.02	0.02	—	—	—	—	—	—	—	—
						Deep Inlet							
Upper	Length	—	—	—	—	—	—	—	—	—	—	—	—
Chatham	Weight	—	—	—	—	—	—	—	—	—	—	—	—
Strait	CR	—	—	—	—	—	—	—	—	—	—	—	—
Icy	Length	—	—	—	—	1		140.0		—	—	—	—
Strait	Weight	—	—	—	—	1		26.0		—	—	—	—
	CR	—	—	—	—	1		-0.03		—	—	—	—
Icy	Length	8	121-136	129.5	2.2	—	—	—	—	—	—	—	—
Point	Weight	8	15.1-25.1	21.3	1.3	—	—	—	—	—	—	—	—
	CR	8	-0.12-0.08	0.01	0.03	—	—	—	—	—	—	—	—
Total	Length	8	121-136	129.5	2.2	1		140.0		—	—	—	—
	Weight	8	15.1-25.1	21.3	1.3	1		26.0		—	—	—	—
	CR	8	-0.12-0.08	0.01	0.03	1		-0.03		—	—	—	—
						Deep Inlet L/L							
Icy	Length	4	120-138	128.3	3.8	—	—	—	—	—	—	—	—
Point	Weight	4	16.5-24.6	20.8	1.9	—	—	—	—	—	—	—	—
(Total)	CR	4	-0.04-0.13	0.02	0.04	—	—	—	—	—	—	—	—

Table 16.—cont.

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
						Hidden Falls							
Upper	Length	10	111-134	121	3	7	123-158	145	5	1		211	
Chatham	Weight	10	12.3-24	17.2	1.4	7	21.4-38.8	31.8	2.5	1		102.2	
Strait	CR	10	-0.09-0.09	-0.01	0.02	7	-0.06-0.18	0.05	0.03	1		0.07	
Icy	Length	1		128		8	128-176	152	5	4	184-209	195	5
Strait	Weight	1		20.9		8	19.5-52.2	34.8	3.5	4	72.2-110.2	86.9	8.2
	CR	1		0.04		8	-0.07-0.03	-0.02	0.01	4	0.11-0.17	0.15	0.01
Icy	Length	—	—	—	—	—	—	—	—	1		195	
Point	Weight	—	—	—	—	—	—	—	—	1		73.0	
	CR	—	—	—	—	—	—	—	—	1		0.00	
Total	Length	11	111-134	122	3	15	123-176	149	4	6	184-211	197	4
	Weight	11	12.3-24	17.5	1.3	15	19.5-52.2	33.4	2.2	6	72.2-110.2	87.1	6.4
	CR	11	-0.09-0.09	-0.01	0.02	15	-0.07-0.18	0.01	0.02	6	-0.03-0.17	0.11	0.03
						Hidden Falls L/L							
Upper	Length	3	122-142	133	6	2	157-165	161	4	—	—	—	—
Chatham	Weight	3	16.2-28.1	22.3	3.4	2	29.2-46.7	38.0	8.7	—	—	—	—
Strait	CR	3	-0.07-0.01	-0.03	0.02	2	-0.27-0.05	-0.11	0.16	—	—	—	—
Icy	Length	1		131		—	—	—	—	1		195	
Strait	Weight	1		20.5		—	—	—	—	1		75.1	
	CR	1		-0.06		—	—	—	—	1		0.00	
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—

Table 16.—cont.

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
Total	Length	4	122-142	132	4	2	157-165	161	4	1		195	
	Weight	4	16.2-28.1	21.9	2.5	2	29.2-46.7	38.0	8.7	1		75.1	
	CR	4	-0.07-0.01	-0.04	0.02	2	-0.27-0.05	-0.11	0.16	1		0.00	
Southeast Cove													
Upper Chatham Strait	Length	4	125-136	131.3	2.4	13	140-189	162	4	8	143-213	182	9
	Weight	4	19.4-25.3	22.0	1.4	13	24.9-64.1	42.3	2.8	8	28.0-104.8	65.0	9.3
	CR	4	-0.06-0.08	0.00	0.03	13	-0.07-0.07	0.00	0.01	8	-0.17-0.12	0.01	0.03
Icy Strait	Length	—	—	—	—	23	132-168	153	2	11	145-209	181	5
	Weight	—	—	—	—	23	20.5-44.7	34.3	1.3	11	26.6-105.2	66.1	6.7
	CR	—	—	—	—	23	-0.14-0.1	-0.03	0.01	11	-0.11-0.21	0.07	0.03
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	4	125-136	131.3	2.4	36	132-189	156	2	19	143-213	181	5
	Weight	4	19.4-25.3	22.0	1.4	36	20.5-64.1	37.2	1.4	19	26.6-105.2	65.6	5.4
	CR	4	-0.06-0.08	0.00	0.03	36	-0.14-0.1	-0.02	0.01	19	-0.17-0.21	0.05	0.02
Takatz Bay													
Upper Chatham Strait	Length	8	115-129	122	2	9	132-156	145	2	—	—	—	—
	Weight	8	13.9-18.8	16.9	0.7	9	20.2-38.9	29.4	2.0	—	—	—	—
	CR	8	-0.09-0.01	-0.03	0.01	9	-0.11-0.06	-0.02	0.02	—	—	—	—
Icy Strait	Length	—	—	—	—	8	130-178	144	6	3	191-204	198	4
	Weight	—	—	—	—	8	22.8-56.1	30.1	3.9	3	76.4-91.9	85.4	4.7
	CR	—	—	—	—	8	-0.15-0.11	0.00	0.04	3	0.06-0.08	0.08	0.01

Table 16.—cont.

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	8	115-129	122	2	17	130-178	145	3	3	191-204	198	4
	Weight	8	13.9-18.8	16.9	0.7	17	20.2-56.1	29.7	2.0	3	76.4-91.9	85.4	4.7
	CR	8	-0.09-0.01	-0.03	0.01	17	-0.15-0.11	-0.01	0.02	3	0.06-0.08	0.08	0.01
Takatz Bay L/L													
Icy Strait (Total)	Length	—	—	—	—	1		138		—	—	—	—
	Weight	—	—	—	—	1		25.1		—	—	—	—
	CR	—	—	—	—	1		-0.02		—	—	—	—
AKI													
Port Armstrong													
Upper Chatham Strait	Length	3	152-163	159.0	3.5	1		214.0		—	—	—	—
	Weight	3	32.8-42.8	39.4	3.3	1		91.6		—	—	—	—
	CR	3	-0.05-0.01	-0.01	0.02	1		-0.09		—	—	—	—
Icy Strait	Length	1		150.0		1		190		2	211-220	216	5
	Weight	1		32.1		1		65.0		2	116.7-118.8	117.8	1.1
	CR	1		-0.03		1		-0.06		2	0.09-0.2	0.14	0.06
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—

Table 16.—cont.

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
Total	Length	4	150-163	156.8	3.4	2	190-214	202.0	12.0	2	211-220	215.5	4.5
	Weight	4	32.1-42.8	37.6	3.0	2	65-91.6	78.3	13.3	2	116.7-118.8	117.8	1.1
	CR	4	-0.05-0.01	-0.02	0.01	2	-0.09--0.06	-0.07	0.01	2	0.09-0.20	0.14	0.06
SSRAA													
Anita Bay													
Upper Chatham Strait	Length	2	150-160	155	5	—	—	—	—	1		230	
	Weight	2	34.0-42.2	38.1	4.1	—	—	—	—	1		144.2	
	CR	2	0.03-0.04	0.04	0.01	—	—	—	—	1		0.14	
Icy Strait	Length	—	—	—	—	4	175-187	180	3	3	211-236	220	8
	Weight	—	—	—	—	4	54.1-63.2	59.2	2.3	3	103.9-163.5	125.5	19.0
	CR	—	—	—	—	4	-0.04-0.05	0.01	0.02	3	0.07-0.19	0.13	0.03
Icy Point	Length	—	—	—	—	—	—	—	—	1		195	
	Weight	—	—	—	—	—	—	—	—	1		67.7	
	CR	—	—	—	—	—	—	—	—	1		-0.10	
Total	Length	2	150-160	155	5	4	175-187	180	3	5	195-236	217	7
	Weight	2	34.0-42.2	38.1	4.1	4	54.1-63.2	59.2	2.3	5	67.7-163.5	117.7	16.7
	CR	2	0.03-0.04	0.04	0.01	4	-0.04-0.05	0.01	0.02	5	-0.10-0.19	0.08	0.05
Burnett Lake													
Icy Strait (Total)	Length	—	—	—	—	1		200		—	—	—	—
	Weight	—	—	—	—	1		91.7		—	—	—	—
	CR	—	—	—	—	1		0.12		—	—	—	—

Table 16.—cont.

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
							Nakat Bay (summer)						
Upper	Length	—	—	—	—	—	—	—	—	1		218	
Chatham	Weight	—	—	—	—	—	—	—	—	1		116.7	
(Total)	CR	—	—	—	—	—	—	—	—	1		0.10	
							Neets Bay (summer)						
Upper	Length	1		180.0		—	—	—	—	1		240.0	
Chatham	Weight	1		58.1		—	—	—	—	1		141.0	
Strait	CR	1		0.00		—	—	—	—	1		-0.01	
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Strait	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Icy	Length	—	—	—	—	2	177-200	188.5	11.5	—	—	—	—
Point	Weight	—	—	—	—	2	50.9-82.6	66.8	15.9	—	—	—	—
	CR	—	—	—	—	2	-0.08-0.02	0.0	0.1	—	—	—	—
Total	Length	1		180.0		2	177-200	188.5	11.5	1		240.0	
	Weight	1		58.1		2	50.9-82.6	66.8	15.9	1		141.0	
	CR	1		0.00		2	-0.08-0.02	-0.03	0.05	1		-0.01	
							Unmarked stocks						
Upper	Length	22	111-157	130	2	45	119-192	154	2	65	125-230	171	3
Chatham	Weight	22	13.5-40.6	22.4	1.5	45	16.3-75.5	39.5	1.7	65	19.1-128.6	55.1	2.8
Strait	CR	22	-0.1-0.1	0.03	0.01	45	-0.19-0.26	0.06	0.01	65	-0.09-0.16	0.05	0.01

Table 16.—cont.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
Icy Strait	Length	29	90-138	111	3	60	120-197	161	2	55	102-250	195	3
	Weight	29	6.4-26.0	14.2	1.1	60	17.0-89.2	43.7	2.0	55	9.0-184.0	87.3	4.5
	CR	29	-0.05-0.11	0.03	0.01	60	-0.11-0.2	0.03	0.01	55	-0.10-0.26	0.10	0.01
Icy Point	Length	1		110		10	189-231	211	4	3	149-221	186	21
	Weight	1		11.8		10	65.7-128.7	98.1	5.1	3	29.3-110.6	66.4	23.7
	CR	1		-0.06		10	-0.03-0.07	0.02	0.01	3	-0.13-0.00	-0.08	0.00
Total	Length	52	90-157	119	2	115	119-231	163	2	123	102-250	182	2
	Weight	52	6.4-40.6	17.6	1.0	115	16.3-128.7	46.8	2.0	123	9.0-184.0	69.8	2.9
	CR	52	-0.10-0.11	0.03	0.01	115	-0.19-0.26	0.04	0.01	123	-0.13-0.26	0.07	0.01

Table 17.—Stock-specific information on 526 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 2015. 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 15 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	21	115-161	138	3	—	—	—	—	—	—	—	—
Chatham	Weight	21	16.2-46.5	29.1	2.0	—	—	—	—	—	—	—	—
Strait	CR	21	-0.05-0.13	0.05	0.01	—	—	—	—	—	—	—	—
Icy	Length	164	102-167	138	1	2	142-156	149	7	—	—	—	—
Strait	Weight	164	10.3-49.7	28.7	0.5	2	29.8-39.0	34.4	4.6	—	—	—	—
	CR	164	-0.05-0.21	0.06	0.00	2	0.00-0.03	0.01	0.01	—	—	—	—
Icy	Length	—	—	—	—	—	—	—	—	—	—	—	—
Point	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	185	102-167	138	1	2	142-156	149	7	—	—	—	—
	Weight	185	10.3-49.7	28.8	0.5	2	29.8-39.0	34.4	4.6	—	—	—	—
	CR	185	-0.05-0.21	0.06	0.00	2	0.00-0.03	0.01	0.01	—	—	—	—
						Sweetheart Lake							
Upper	Length	2	143-154	149	6	—	—	—	—	—	—	—	—
Chatham	Weight	2	28.9-39.0	34.0	5.0	—	—	—	—	—	—	—	—
Strait	CR	2	-0.03-0.04	0.01	0.03	—	—	—	—	—	—	—	—

Table 17.—cont.

		June				July				August			
Locality	Factor	n	range	mean	se	n	range	mean	se	n	range	mean	se
Icy Strait	Length	3	130-144	137	4	—	—	—	—	—	—	—	—
	Weight	3	22.2-33.9	28.9	3.5	—	—	—	—	—	—	—	—
	CR	3	0.01-0.16	0.09	0.05	—	—	—	—	—	—	—	—
Icy Point	Length	—	—	—	—	—	—	—	—	—	—	—	—
	Weight	—	—	—	—	—	—	—	—	—	—	—	—
	CR	—	—	—	—	—	—	—	—	—	—	—	—
Total	Length	5	130-154	142	4	—	—	—	—	—	—	—	—
	Weight	5	22.2-39.0	30.9	2.8	—	—	—	—	—	—	—	—
	CR	5	-0.03-0.16	0.06	0.03	—	—	—	—	—	—	—	—
						Tahltan Lake							
Upper Chatham Strait	Length	2	141-150	146	5	—	—	—	—	—	—	—	—
	Weight	2	27.2-37.0	32.1	4.9	—	—	—	—	—	—	—	—
	CR	2	-0.04-0.07	0.01	0.06	—	—	—	—	—	—	—	—
						Tuya Lake							
Icy Point	Length	1		227		—	—	—	—	—	—	—	—
	Weight	1		131.3		—	—	—	—	—	—	—	—
	CR	1		0.04		—	—	—	—	—	—	—	—
						Unmarked stocks							
Upper Chatham Strait	Length	51	93-194	131	3	4	86-182	142	23	27	89-171	130	4
	Weight	51	7.1-74.9	25.1	2.1	4	6.2-68.5	37.0	15.0	27	6.0-55.3	24.1	2.4
	CR	51	-0.12-0.13	0.01	0.01	4	-0.04-0.08	0.01	0.03	27	-0.12-0.07	0.00	0.01

Table 17.—cont.

Locality	Factor	June n	June range	June mean	June se	July n	July range	July mean	July se	August n	August range	August mean	August se
Icy	Length	188	87-176	122	1	12	120-215	150	7	16	80-236	134	11
Strait	Weight	188	6.0-58.7	20.0	0.8	12	16.6-120.1	38.4	7.8	16	4.5-142.4	33.7	9.7
	CR	188	-0.14-0.27	0.03	0.00	12	-0.03-0.12	0.01	0.01	16	-0.10-0.06	-0.02	0.01
Icy	Length	26	159-201	183	2	6	139-191	178	8	—	—	—	—
Point	Weight	26	42.8-93.4	66.4	2.2	6	24.8-68.2	55.9	6.8	—	—	—	—
	CR	26	-0.16-0.11	0.01	0.01	6	-0.09--0.03	-0.08	0.01	—	—	—	—
Total	Length	265	87-201	129	2	22	86-215	156	6	43	80-236	131	5
	Weight	265	6.0-93.4	25.6	1.1	22	6.2-120.1	42.9	5.4	43	4.5-142.4	27.7	3.9
	CR	265	-0.16-0.27	0.02	0.00	22	-0.09-0.12	-0.01	0.01	43	-0.12-0.07	-0.01	0.01

Table 18.—Number examined, length (mm, fork), wet weight (g), stomach content as percent body weight (%BW), and feeding intensity (0-100% volume fullness) of 379 potential predators of juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, June–August 2015. Dash indicates no samples. For scientific names, see Table 8. For additional feeding data, see Table 19.

		June				July				August			
Species	Factor	*n*	range	mean	sd	*n*	range	mean	sd	*n*	range	mean	sd
Chum salmon[1]	Length	12	371-448	396	7	—	—	—	—	—	—	—	—
	Weight	12	600-1,100	742	45	—	—	—	—	—	—	—	—
	%BW	12	0.3-1.9	1.1	0.1	—	—	—	—	—	—	—	—
	Fullness	12	25-100	65	6	—	—	—	—	—	—	—	—
Sockeye salmon[1]	Length	—	—	—	—	1	371-371	371	0	—	—	—	—
	Weight	—	—	—	—	1	600-600	600	0	—	—	—	—
	%BW	—	—	—	—	1	0.0-0.0	0.0	0.0	—	—	—	—
	Fullness	—	—	—	—	1	0-0	0	0	—	—	—	—
Chinook salmon[1]	Length	7	345-457	381	15	5	339-435	395	21	—	—	—	—
	Weight	7	500-1,200	700	90	5	550-1,100	910	105	—	—	—	—
	%BW	7	0.0-3.1	1.0	0.5	5	1.3-3.8	2.4	0.4	—	—	—	—
	Fullness	7	0-100	46	17	5	110-110	110	0	—	—	—	—
Pink Salmon[2]	Length	76	455-598	532	4	139	341-611	499	4	59	101-580	481	8
	Weight	76	220-2,900	1,884	52	139	100-3,050	1,474	37	59	110-2,100	1,328	40
	%BW	76	0.0-5.5	0.6	0.1	139	0.0-3.9	0.3	0.0	59	0.0-5.6	1.0	0.1
	Fullness	76	0-100	57	4	139	0-110	36	3	59	5-100	76	3
Chum salmon[2]	Length	19	568-758	622	10	17	414-696	612	17	2	630-640	635	5
	Weight	19	2,300-4,900	2,900	148	17	900-4,750	2,928	222	2	2,900-3,500	3,200	300
	%BW	19	0.0-1.3	0.5	0.1	17	0.0-1.6	0.5	0.1	2	0.1-0.3	0.2	0.1
	Fullness	19	0-100	43	7	17	0-100	30	7	2	25-25	25	0

Table 18.—cont.

Species	Factor	June *n*	June range	June mean	June sd	July *n*	July range	July mean	July sd	August *n*	August range	August mean	August sd
Sockeye salmon[2]	Length	3	478-588	517	36	13	202-624	535	32	1	499-499	499	0
	Weight	3	1,350-2,400	1,783	317	13	1,150-4,850	2,304	270	1	1,450-1,450	1,450	0
	%BW	3	0.0-1.6	0.6	0.5	13	0.0-0.4	0.1	0.0	1	0.1-0.1	0.1	0.0
	Fullness	3	10-100	62	27	13	0-100	37	9	1	25-25	25	0
Coho salmon[2]	Length	—	—	—	—	10	381-735	624	32	3	666-695	677	9
	Weight	—	—	—	—	10	650-5,800	3,145	491	3	3,400-4,050	3,817	209
	%BW	—	—	—	—	10	0.0-4.3	1.4	0.5	3	0.0-0.1	0.0	0.0
	Fullness	—	—	—	—	10	0-110	61	16	3	0-10	7	3
Chinook salmon[2]	Length	1	629-629	629	0	—	—	—	—	2	490-530	510	20
	Weight	1	2,700-2,700	2,700	0	—	—	—	—	2	1,600-2,000	1,800	200
	%BW	1	0.0-0.0	0.0	0.0	—	—	—	—	2	0.0-2.5	1.3	1.3
	Fullness	1	0-0	0	0	—	—	—	—	2	0-110	55	55
Pomfret[2]	Length	—	—	—	—	10	295-655	394	30	—	—	—	—
	Weight	—	—	—	—	10	850-1,150	945	35	—	—	—	—
	%BW	—	—	—	—	10	0.0-5.5	2.0	0.7	—	—	—	—
	Fullness	—	—	—	—	10	0-110	73	14	—	—	—	—

[1] Immature
[2] Adult

Table 19.—Feeding intensity of 380 potential predators of juvenile salmon captured in rope trawl hauls in the marine waters of the northern region of southeastern Alaska, June–August 2015. Fish were captured in both strait and coastal habitats. For scientific names, see Table 8. See also Table 18.

Predator species	Life history stage	Number examined	Number empty	Percent feeding	Number with salmon	Percent feeders with salmon
Chum salmon	Immature	12	0	100	0	0
Sockeye salmon	Immature	1	1	0	0	0
Chinook salmon	Immature	17	1	94	0	0
Pink salmon	Adult	269	32	88	0	0
Chum salmon	Adult	38	6	84	0	0
Sockeye salmon	Adult	17	1	94	0	0
Coho salmon	Adult	13	3	77	0	0
Chinook salmon	Adult	3	2	33	0	0
Pomfret	Adult	10	1	90	0	0

Appendix 1.—Temperature (°C), salinity (PSU), ambient light (W/m^3), Secchi depth (m), and mixed layer depth (MLD, m; see text for definition) by haul number and station sampled in the marine waters of the northern region of southeastern Alaska, May–August 2015. Station code acronyms are listed in Table 1.

Date	Haul #	Station	Temperature (°C)	Salinity (PSU)	Light level (W/m^3)	Secchi (m)	MLD (m)
22 May	19001	ABM	10.8	28.5	—	6.0	6
23 May	19002	ISD	7.6	30.9	—	4.0	13
23 May	19003	ISC	8.1	30.8	—	3.0	15
23 May	19004	ISB	8.1	30.8	—	3.0	10
23 May	19005	ISA	8.2	30.8	—	3.0	10
23 May	19006	UCA	8.4	31.0	—	3.0	13
23 May	19007	UCB	8.5	31.0	—	4.0	6
23 May	19008	UCC	8.1	31.0	—	3.0	11
23 May	19009	UCD	8.5	30.7	—	3.0	6
27 June	19010	ISA	13.1	21.1	166	—	6
27 June	19011	ISB	13.1	20.7	711	—	6
27 June	19012	ISC	14.3	24.5	597	—	6
27 June	19013	ISD	14.5	24.7	140	—	6
28 June	19014	ISA	14.2	24.8	95	—	6
28 June	19015	ISB	14.0	25.1	—	—	6
28 June	19016	ISC	14.4	24.7	337	4.0	6
28 June	19017	ISD	11.9	27.9	335	3.5	6
28 June	19018	ISC	13.9	26.7	476	—	6
28 June	19019	ISD	12.6	27.1	377	—	6
29 June	19020	IPD	14.1	31.7	28	6.0	8
29 June	19021	IPC	13.4	31.5	675	—	9
29 June	19022	IPB	14.4	31.4	700	11.0	6
29 June	19023	IPA	12.1	30.4	375	8.0	8
30 June	19024	ISD	13.7	25.5	373	6.0	6
30 June	19025	ISC	13.2	27.6	194	5.0	6
30 June	19026	ISB	9.5	29.8	523	4.0	6
30 June	19027	ISA	11.1	28.7	144	2.0	6
30 June	19028	ISB	13.3	27.4	296	—	6
30 June	19029	ISA	11.9	28.0	278	—	6
01 July	19030	UCD	13.1	25.2	170	5.0	12
01 July	19031	UCC	13.3	25.5	403	6.0	8
01 July	19032	UCB	13.4	26.8	150	6.0	7
01 July	19033	UCA	13.7	24.3	149	5.0	11
01 July	19034	UCB	13.4	25.6	167	4.0	7
01 July	19035	UCA	13.8	24.2	317	4.0	7
02 July	19036	UCA	12.4	28.8	71	—	8

Appendix 1.—cont.

Date	Haul #	Station	Temperature (°C)	Salinity (PSU)	Light level (W/m^3)	Secchi (m)	MLD (m)
02 July	19037	UCB	12.4	28.5	43	—	11
02 July	19038	UCC	11.3	28.7	48	—	17
02 July	19039	UCD	12.2	28.0	83	—	19
02 July	19040	UCC	10.6	29.7	145	—	14
02 July	19041	UCD	11.6	29.0	178	—	16
03 July	19042	ABM	12.3	19.9	30	—	8
27 July	19043	ISA	13.0	26.2	26	—	6
27 July	19044	ISB	14.0	23.9	53	—	6
27 July	19045	ISC	13.6	23.8	80	—	6
27 July	19046	ISD	14.2	21.3	137	—	9
27 July	19047	ISC	13.8	24.0	128	5.0	6
28 July	19048	ISD	14.0	21.6	15	5.0	6
28 July	19049	ISC	13.6	23.0	370	5.0	6
28 July	19050	ISB	12.1	26.0	136	5.0	6
28 July	19051	ISA	11.3	28.3	121	6.0	7
28 July	19052	ISB	12.0	27.4	202	6.0	6
28 July	19053	ISA	12.1	27.3	370	5.0	7
29 July	19054	ISA	12.0	26.8	19	5.0	7
29 July	19055	ISB	12.2	26.7	96	4.7	6
29 July	19056	ISC	13.1	25.2	123	5.0	6
29 July	19057	ISD	11.9	28.1	198	5.5	7
29 July	19058	ISD	12.6	26.4	131	5.0	6
30 July	19059	UCD	11.3	29.2	51	6.0	9
30 July	19060	UCC	10.3	30.0	10	6.0	10
30 July	19061	UCB	10.6	29.7	192	6.0	8
30 July	19062	UCA	11.3	29.0	260	6.0	6
30 July	19063	UCB	10.7	29.7	235	6.0	7
30 July	19064	UCC	11.8	27.9	197	6.0	6
31 July	19065	IPD	14.6	31.1	61	—	13
31 July	19066	IPC	14.5	30.7	211	—	11
31 July	19067	IPB	14.5	30.5	257	—	7
31 July	19068	IPA	14.6	31.1	376	—	12
01 August	19069	UCA	12.4	25.7	69	7.0	9
01 August	19070	UCB	12.3	26.4	66	7.0	12
01 August	19071	UCA	12.9	21.2	126	8.0	6
01 August	19072	UCD	13.0	21.8	132	7.5	9
01 August	19073	UCC	12.7	24.0	326	7.5	8
01 August	19074	UCD	13.1	21.4	740	8.0	7
02 August	19075	ABM	12.7	15.1	161	—	8

Appendix 1.—cont.

Date	Haul #	Station	Temperature (°C)	Salinity (PSU)	Light level (W/m^3)	Secchi (m)	MLD (m)
29 August	19076	ISA	12.0	24.4	32	—	6
29 August	19077	ISB	11.5	27.0	61	—	7
29 August	19078	ISC	11.7	26.4	109	—	7
29 August	19079	ISD	11.9	24.6	83	—	10
29 August	19080	ISC	11.4	27.3	75	7.5	7
29 August	19081	ISD	11.8	23.0	181	6.3	16
30 August	19082	ISD	11.7	22.1	9	6.0	19
30 August	19083	ISC	11.5	22.9	122	6.0	15
30 August	19084	ISB	11.2	24.8	83	6.0	10
30 August	19085	ISA	10.6	27.4	110	6.5	7
30 August	19086	ISB	11.2	25.1	88	6.0	10
30 August	19087	ISA	10.2	27.9	52	7.5	10
31 August	19092	UCC	13.0	30.5	140	—	10
31 August	19093	UCD	13.7	31.3	228	—	7
31 August	19094	ISD	13.5	31.3	386	—	7
31 August	19095	ISC			467	—	8
31 August	19096	ISB	11.3	24.0	16	6.5	7
31 August	19097	ISA	11.4	21.9	48	6.5	7
01 September	19088	IPA	11.7	22.3	241	7.2	27
01 September	19089	IPB	11.6	23.3	179	6.8	34
01 September	19090	IPC	11.7	22.9	119	—	12
01 September	19091	IPD	10.4	27.4	440	6.5	10
02 September	19098	UCD	11.0	22.2	460	4.7	18
02 September	19099	UCC	10.9	23.4		5.5	17
02 September	19100	UCB	10.7	24.2	272	5.0	19
02 September	19101	UCA	10.7	24.7	42	5.0	20
02 September	19102	UCB	10.8	24.3	524	4.7	16
02 September	19103	UCB	10.7	24.7	173	5.0	19
03 September	19104	ABM	10.8	22.9	83	—	14

Appendix 2.—Catch and life history stage of salmonids captured in 92 surface rope trawl hauls from the marine waters of the northern region of southeastern Alaska, June–August 2015. 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
27 June	19010	ISA	20	0	3	0	3	0	1	0	0	0	0
27 June	19011	ISB	20	791	1413	321	4	0	0	0	0	0	0
27 June	19012	ISC	20	50	49	35	7	0	0	0	0	0	0
27 June	19013	ISD	20	4	32	4	14	0	2	1	0	0	1
28 June	19014	ISA	20	11	0	4	99	1	0	0	0	0	0
28 June	19015	ISB	20	352	685	206	9	2	0	0	0	0	0
28 June	19016	ISC	20	25	26	40	8	0	0	0	0	0	0
28 June	19017	ISD	20	8	37	7	23	0	3	2	0	0	0
28 June	19018	ISC	20	26	10	16	41	1	4	0	0	0	0
28 June	19019	ISD	20	24	36	15	8	0	0	0	0	0	0
29 June	19020	IPD	30	0	0	0	0	0	1	11	0	0	0
29 June	19021	IPC	30	46	77	44	13	4	2	1	0	0	0
29 June	19022	IPB	30	1	1	4	5	0	3	0	1	0	0
29 June	19023	IPA	30	21	5	0	0	0	3	2	0	0	2
30 June	19024	ISD	20	149	495	74	83	2	3	0	0	0	0
30 June	19025	ISC	20	828	1862	350	25	0	0	0	0	0	0
30 June	19026	ISB	20	48	25	10	3	0	0	0	0	0	0
30 June	19027	ISA	20	63	58	6	2	0	0	0	0	0	2
30 June	19028	ISB	20	139	166	22	8	0	1	0	0	0	0
30 June	19029	ISA	20	202	180	14	9	1	0	0	0	0	0
01 July	19030	UCD	20	3	7	0	57	3	6	2	0	0	0
01 July	19031	UCC	20	62	33	6	14	0	5	0	1	0	0
01 July	19032	UCB	20	34	151	24	212	1	0	0	0	0	1
01 July	19033	UCA	20	1	5	0	52	2	2	1	0	0	0
01 July	19034	UCB	20	308	364	9	53	0	1	4	0	0	0

Appendix 2.—cont.

Date	Haul #	Station	Trawl time	Juvenile salmon Pink	Juvenile salmon Chum	Juvenile salmon Sockeye	Juvenile salmon Coho	Juvenile salmon Chinook	Immature and adult salmon Pink	Immature and adult salmon Chum	Immature and adult salmon Sockeye	Immature and adult salmon Coho	Immature and adult salmon Chinook
01 July	19035	UCA	20	22	99	4	102	1	1	1	0	0	0
02 July	19036	UCA	20	0	0	0	25	2	6	0	0	0	1
02 July	19037	UCB	20	19	25	1	20	2	6	3	0	0	0
02 July	19038	UCC	20	41	181	8	65	1	10	1	0	0	0
02 July	19039	UCD	20	182	258	45	32	0	4	0	0	0	1
02 July	19040	UCC	20	0	6	0	11	2	4	1	0	0	0
02 July	19041	UCD	20	0	3	0	9	0	8	1	0	0	0
27 July	19043	ISA	20	0	0	0	8	2	10	1	0	0	2
27 July	19044	ISB	20	2	5	0	18	0	10	2	0	1	0
27 July	19045	ISC	20	4	4	0	22	0	17	3	0	0	0
27 July	19046	ISD	20	9	5	1	5	0	3	0	0	0	0
27 July	19047	ISC	20	0	2	0	21	0	4	2	0	0	0
28 July	19048	ISD	20	83	46	3	23	1	0	0	0	0	0
28 July	19049	ISC	20	53	18	6	22	2	6	0	0	0	0
28 July	19050	ISB	20	0	1	0	11	0	10	0	0	0	0
28 July	19051	ISA	20	0	0	1	146	0	69	3	4	0	2
28 July	19052	ISB	20	0	0	0	20	0	23	0	2	0	0
28 July	19053	ISA	20	1	0	0	113	0	61	2	0	0	1
29 July	19054	ISA	20	0	0	0	6	0	16	0	1	1	2
29 July	19055	ISB	20	45	29	3	24	0	23	0	0	0	0
29 July	19056	ISC	20	19	23	1	14	0	16	0	0	0	3
29 July	19057	ISD	20	0	1	0	15	0	2	0	0	0	0
29 July	19058	ISD	20	0	6	0	10	1	1	0	0	0	0
30 July	19059	UCD	20	0	0	0	25	0	25	0	1	1	0
30 July	19060	UCC	20	0	0	0	6	0	21	1	0	0	0
30 July	19061	UCB	20	0	0	0	4	0	12	0	2	0	0
30 July	19062	UCA	20	0	0	0	16	0	74	0	0	0	0
30 July	19063	UCB	20	0	0	0	1	0	0	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
30 July	19064	UCC	20	0	0	0	4	0	26	0	2	1	0
31 July	19065	IPD	30	0	0	0	7	0	1	1	0	0	0
31 July	19066	IPC	30	4	8	2	2	0	0	0	0	0	0
31 July	19067	IPB	30	7	3	4	2	0	6	0	0	5	0
31 July	19068	IPA	30	0	1	0	0	0	5	1	0	0	0
01 August	19069	UCA	20	6	13	0	10	0	3	0	0	0	0
01 August	19070	UCB	20	1	0	0	6	0	3	0	0	0	0
01 August	19071	UCA	20	1	0	0	2	0	82	1	1	0	0
01 August	19072	UCD	20	22	8	2	20	0	23	0	0	1	0
01 August	19073	UCC	20	10	2	1	16	0	0	0	3	1	0
01 August	19074	UCD	20	176	64	1	5	0	6	0	0	0	0
29 August	19076	ISA	20	3	0	0	12	1	2	0	0	0	0
29 August	19077	ISB	20	0	0	0	7	0	0	0	0	0	0
29 August	19078	ISC	20	0	0	0	10	0	0	0	0	0	0
29 August	19079	ISD	20	1	7	6	20	0	6	0	0	0	0
29 August	19080	ISC	20	0	0	1	49	0	1	0	0	0	0
29 August	19081	ISD	20	0	0	1	14	0	2	0	0	0	0
30 August	19082	ISD	20	138	133	6	19	0	1	0	0	0	0
30 August	19083	ISC	20	47	15	1	83	0	3	1	0	0	0
30 August	19084	ISB	20	1	0	0	67	0	1	0	0	0	0
30 August	19085	ISA	20	0	0	0	10	1	2	0	0	0	0
30 August	19086	ISB	20	0	0	0	36	0	4	0	0	0	0
30 August	19087	ISA	20	0	0	0	4	0	0	0	0	0	0
01 September	19088	IPA	30	2	5	0	7	0	0	0	1	0	0
01 September	19089	IPB	30	0	0	0	2	0	1	0	0	0	0
01 September	19090	IPC	30	0	0	0	0	0	1	0	0	0	0
01 September	19091	IPD	30	0	0	0	0	0	4	1	0	0	0
31 August	19092	UCC	20	55	44	7	7	0	2	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
31 August	19093	UCD	20	9	40	16	6	0	0	0	0	0	0
31 August	19094	ISD	20	2	1	0	10	0	4	0	0	0	0
31 August	19095	ISC	20	20	1	2	16	2	2	0	0	2	0
31 August	19096	ISB	20	0	2	0	87	0	14	0	0	0	0
31 August	19097	ISA	20	0	0	0	2	0	0	0	0	0	0
02 September	19098	UCD	20	3	3	1	10	0	1	0	0	0	1
02 September	19099	UCC	20	6	3	0	7	0	6	0	0	0	0
02 September	19100	UCB	20	5	5	0	1	0	0	0	0	0	0
02 September	19101	UCA	20	6	11	1	2	0	0	0	0	0	0
02 September	19102	UCB	20	13	7	2	0	0	6	0	0	0	1
02 September	19103	UCB	20	2	2	2	0	0	0	0	0	1	0

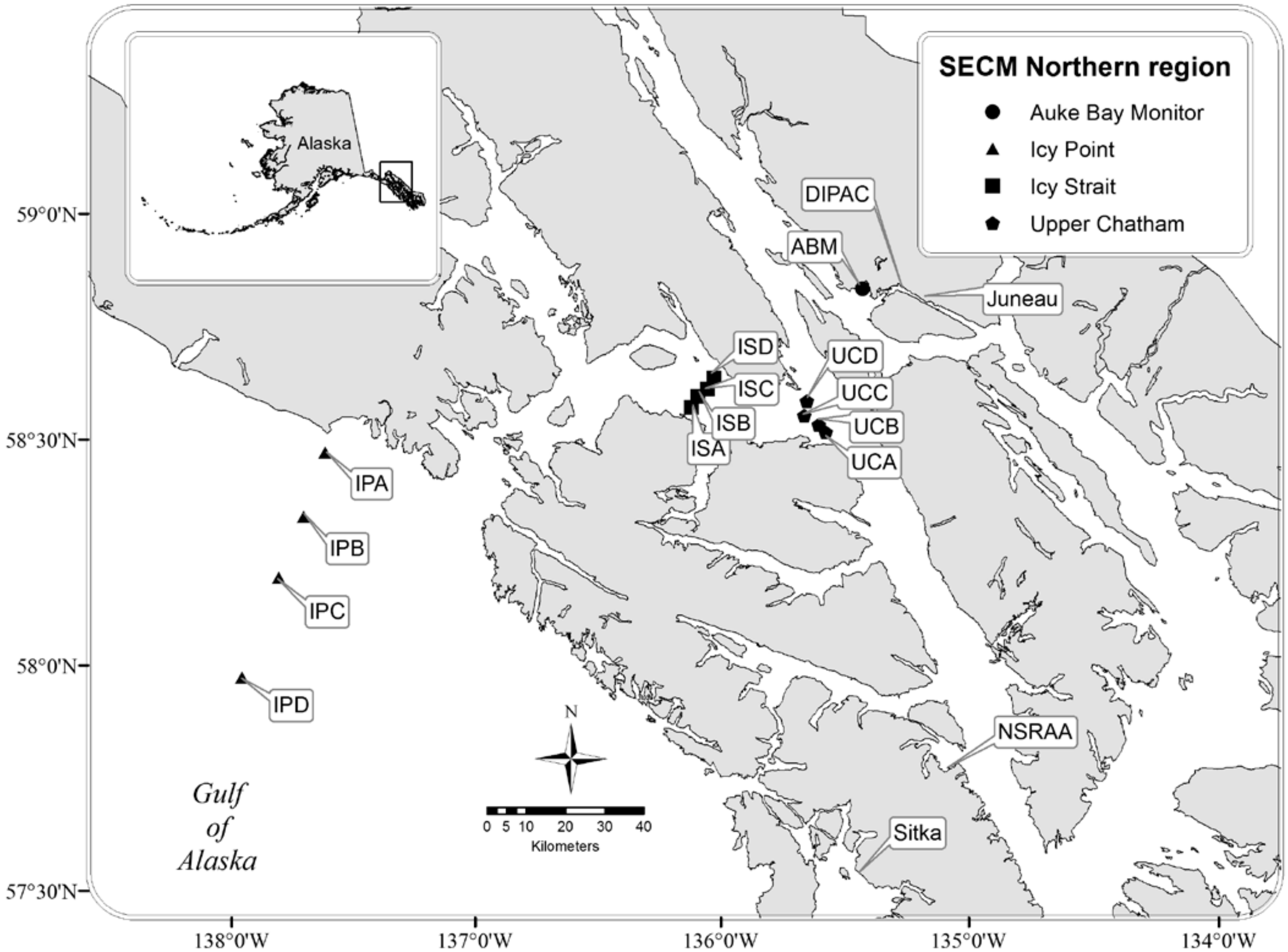

Figure 1.—Stations sampled at inshore, strait, and coastal habitats in the marine waters of the northern region of southeastern Alaska, May–August 2015 by the Southeast Coastal Monitoring (SECM) project. Transect and station coordinates and station code acronyms are shown in Table 1.

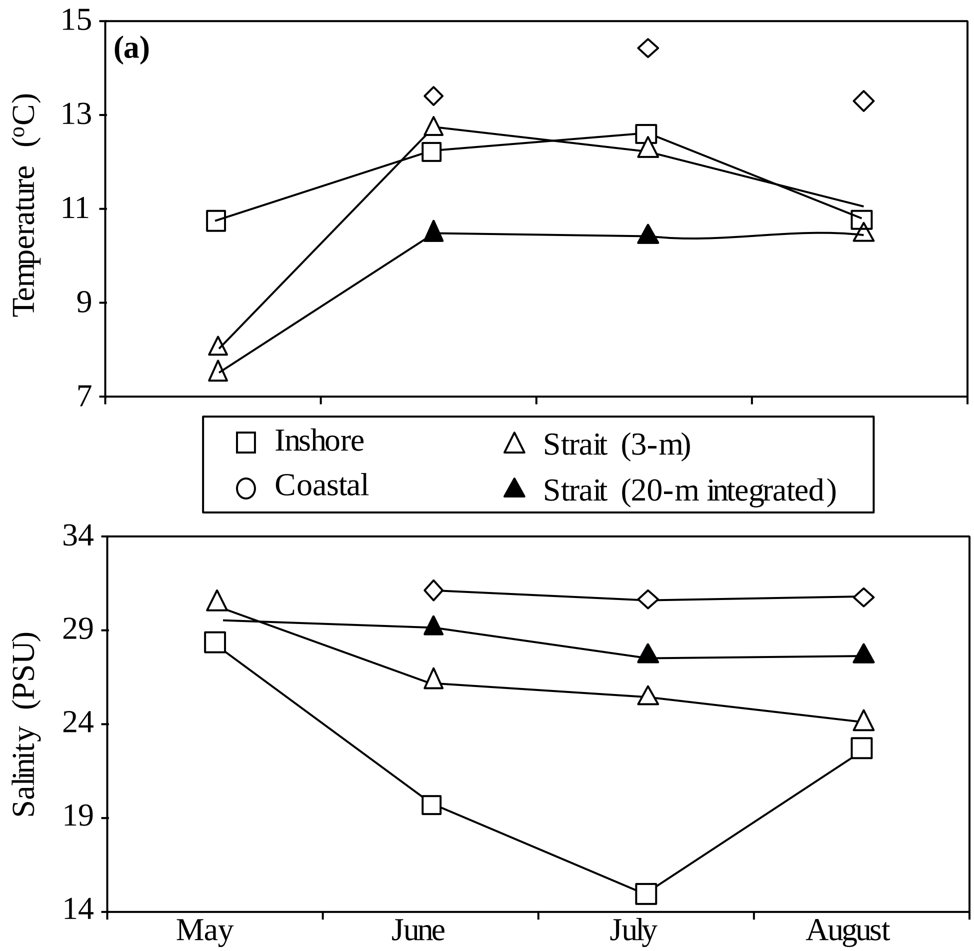

Figure 2.—Mean surface (3-m) and 20-m integrated temperature (a; ˚C) and salinity (b; PSU) for the marine waters of the northern region of southeastern Alaska, May–August 2015. The 3-m measures represent the most active segment of the water column, while the 20-m integrated measures represent more stable waters also sampled by the trawl (see also Figure 3). See Table 2 for monthly sample sizes and Appendix 1 for data values.

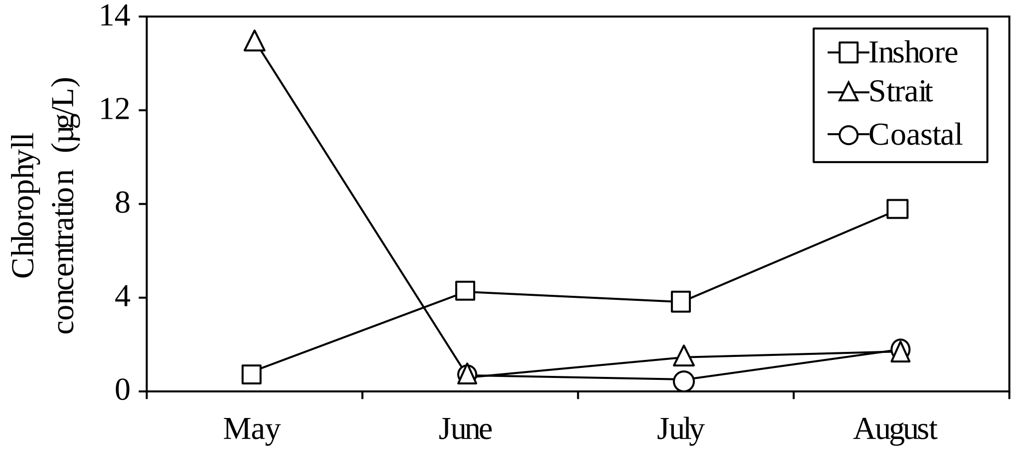

Figure 3.—Mean chlorophyll-a concentration (µg/L) from surface water samples in the marine waters of the northern region of southeastern Alaska, May–August 2015. Chlorophyll was estimated from single monthly samples per station.

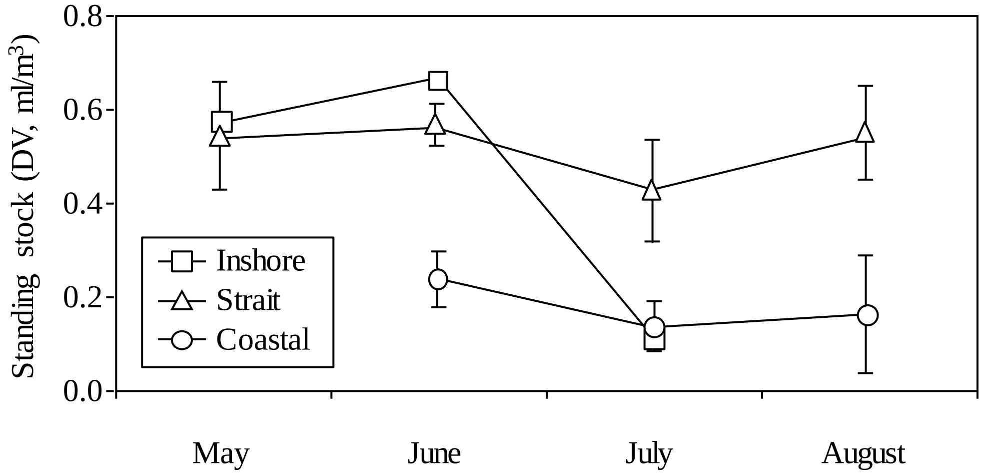

Figure 4.—Monthly zooplankton standing stock (mean ml/m3, ± 1 standard error) from 333-µm mesh double oblique bongo net samples hauled from ≤ 200 m depths during daylight in the marine waters of the northern region of southeastern Alaska, May–August 2015.

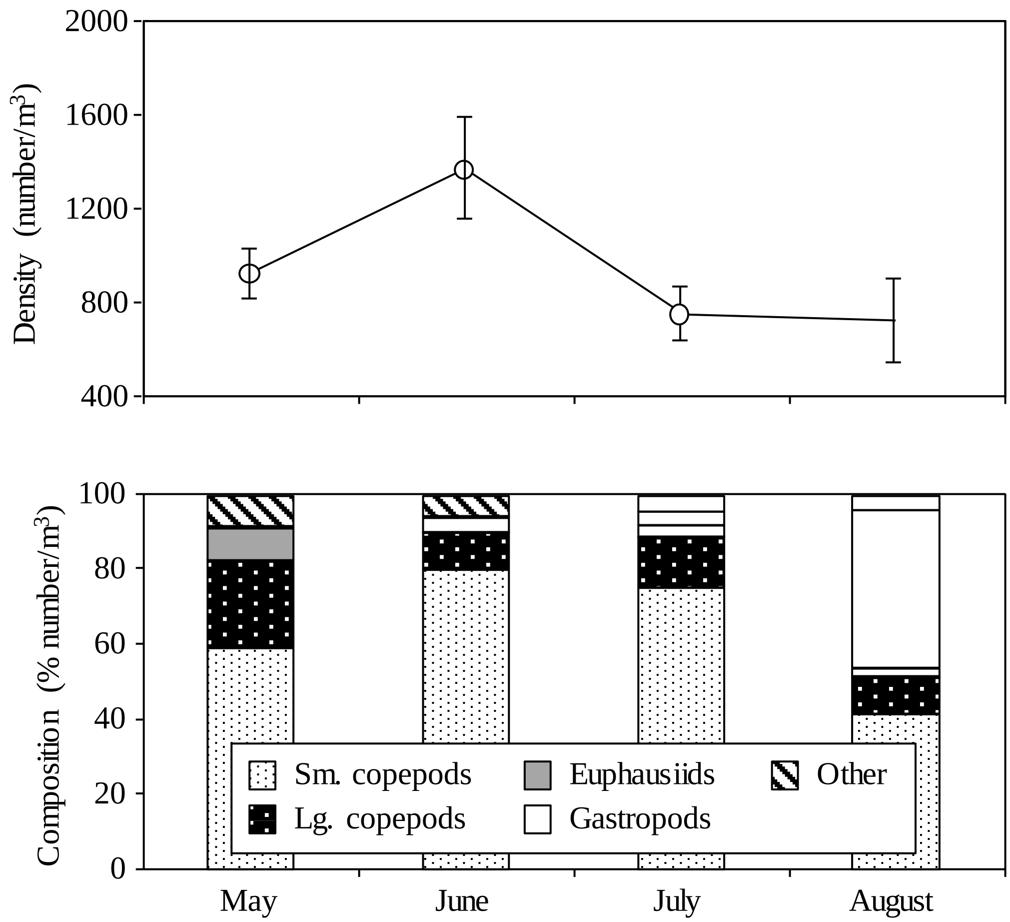

Figure 5.—Monthly zooplankton density (mean number/m^3 with standard error; top panel) and taxonomic composition (mean percent/m^3; bottom panel) from 333-µm mesh double oblique bongo net samples hauled from ≤ 200 m depths during daylight in the marine waters of the northern region of southeastern Alaska, May–August 2015.

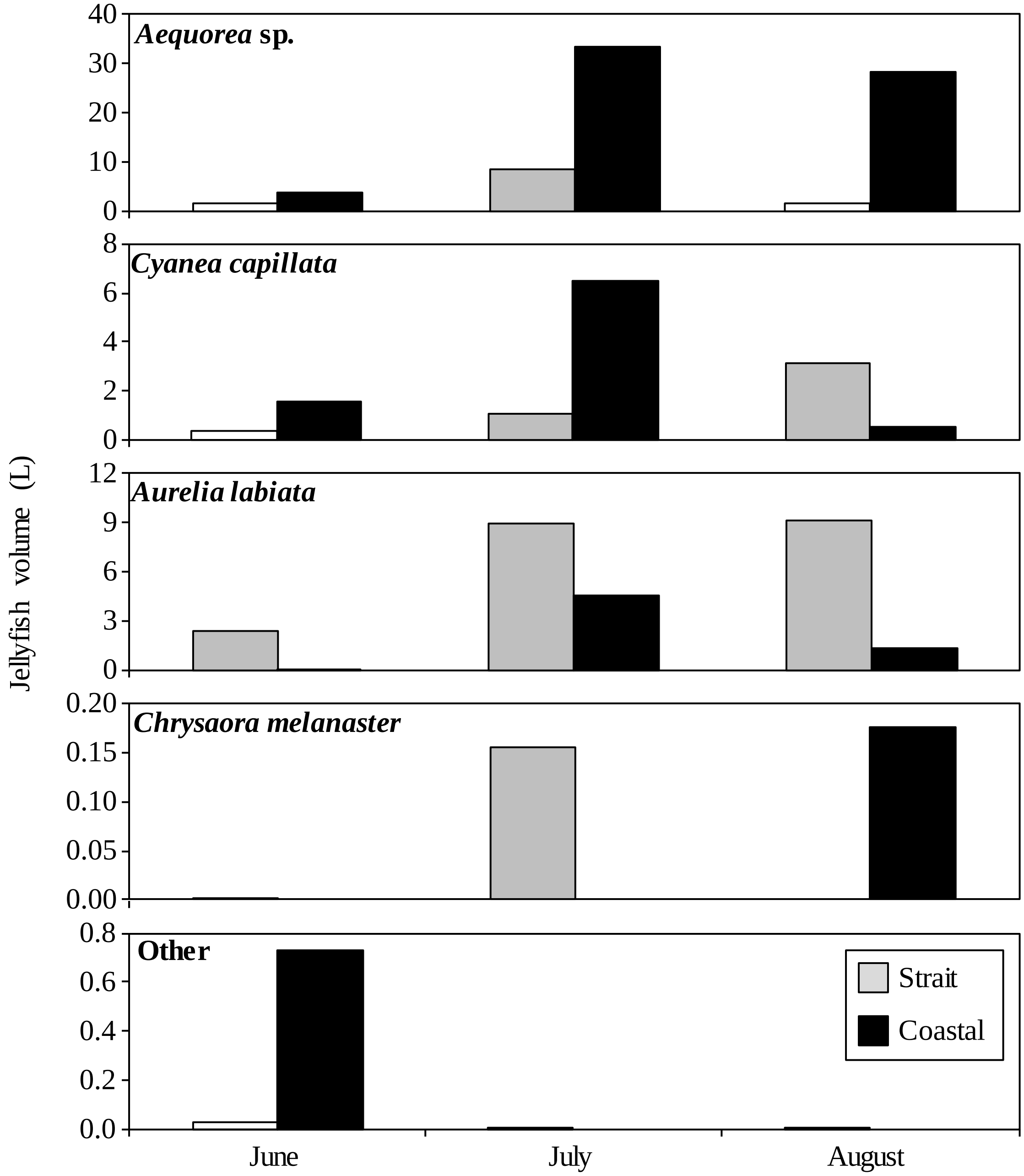

Figure 6.—Mean volume (L) of jellyfish captured in the strait and coastal marine habitats of the northern region of southeastern Alaska by rope trawl, June–August 2015. See Table 2 for monthly sample sizes. Note difference in y-axis scales.

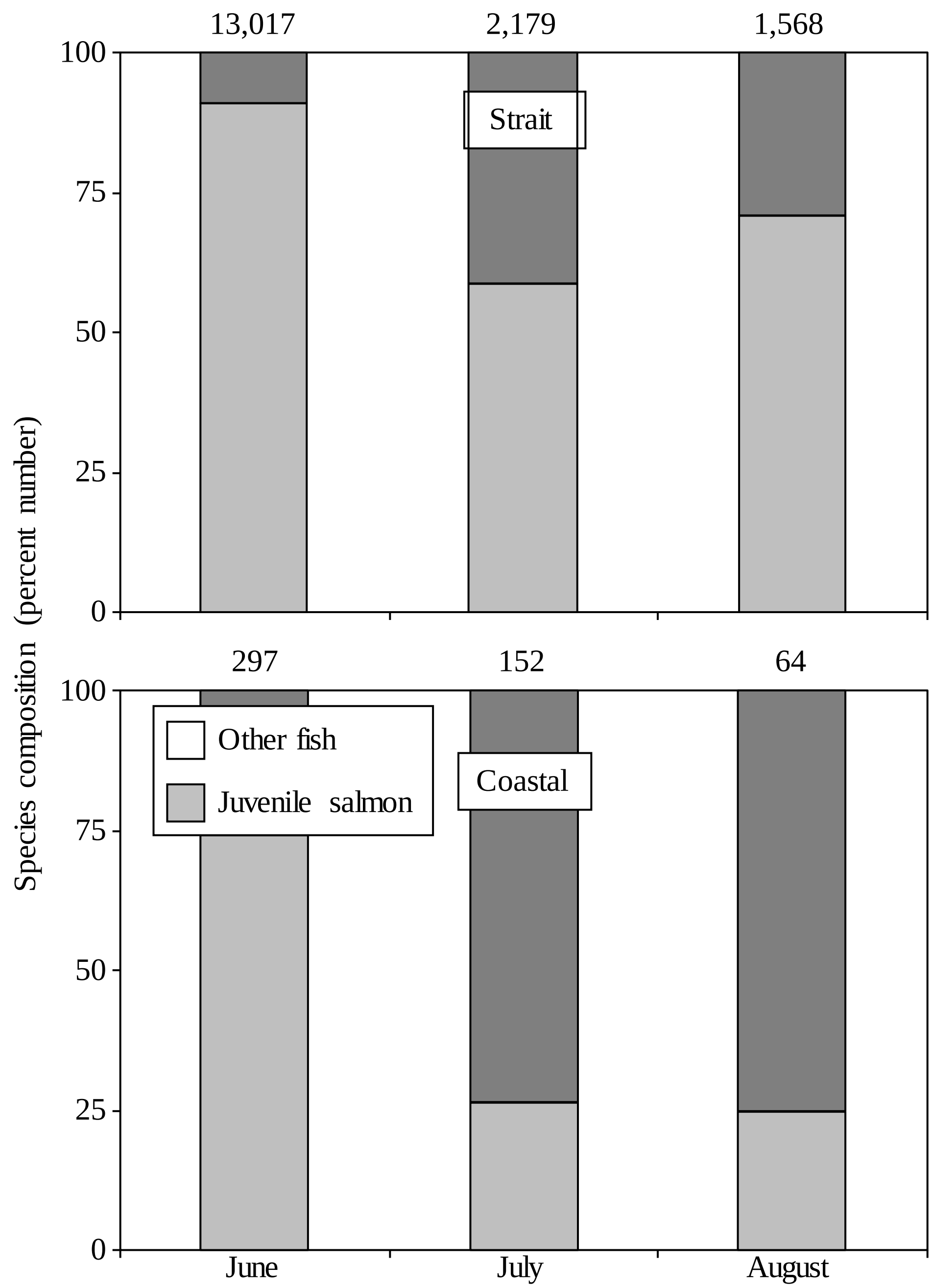

Figure 7.—Fish composition from rope trawl catches in the strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2015. Total number of fish is indicated above each bar. See Table 2 and 7 for monthly sample sizes by species.

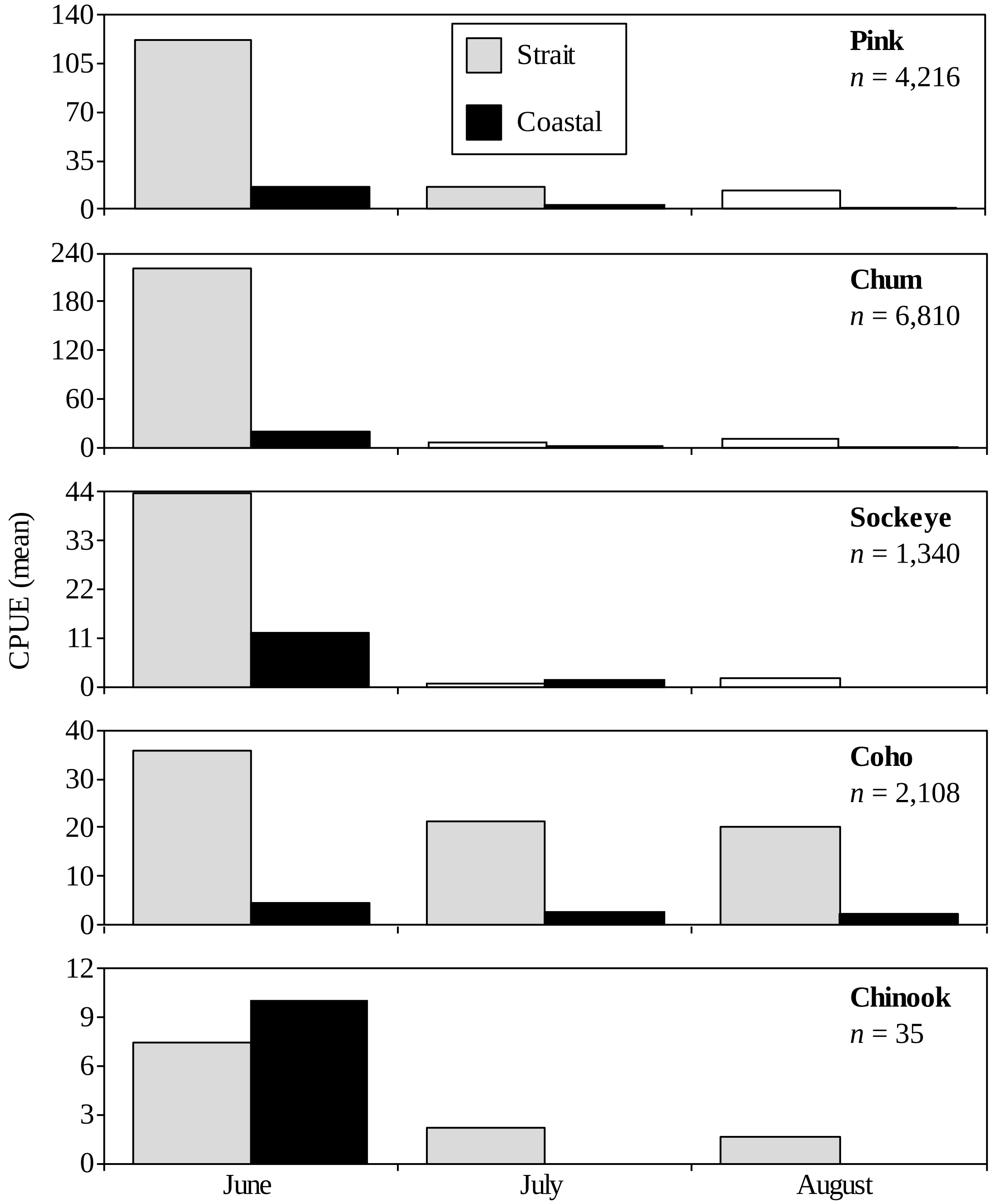

Figure 8.—Catch-per-unit-effort (CPUE, mean catch per trawl haul) of juvenile salmon from rope trawl catches in the strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2015. Total seasonal catch is indicated for each species. See Table 2 for the number of trawl samples per month. Note differences in y-axis scales.

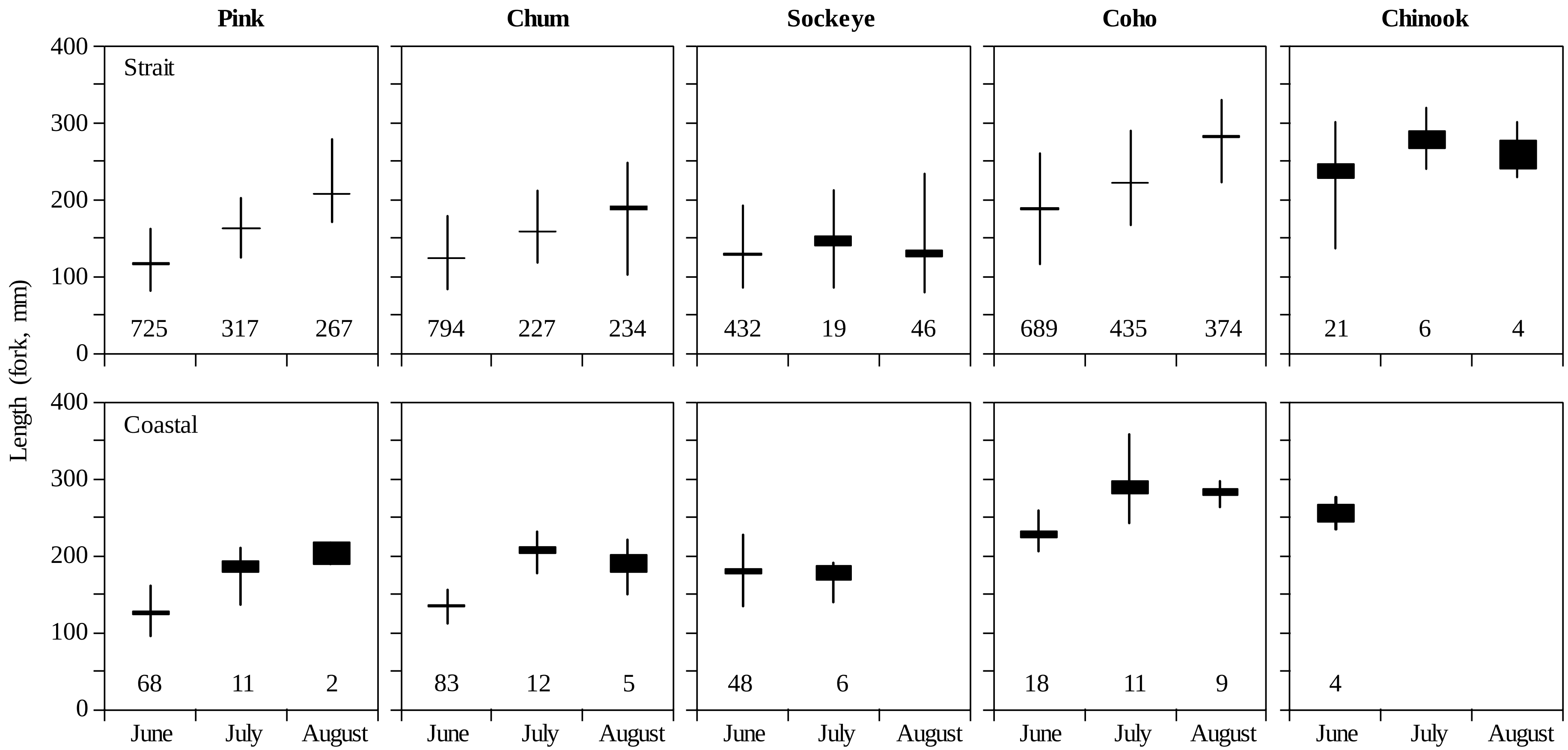

Figure 9.—Length (mm, fork) of juvenile salmon captured by rope trawl in the marine waters of the northern region of southeastern Alaska, June–August 2015. Length of vertical bars is the length range for each sample and the boxes within the range are one standard error on either side of the mean. Sample sizes are indicated for each month.

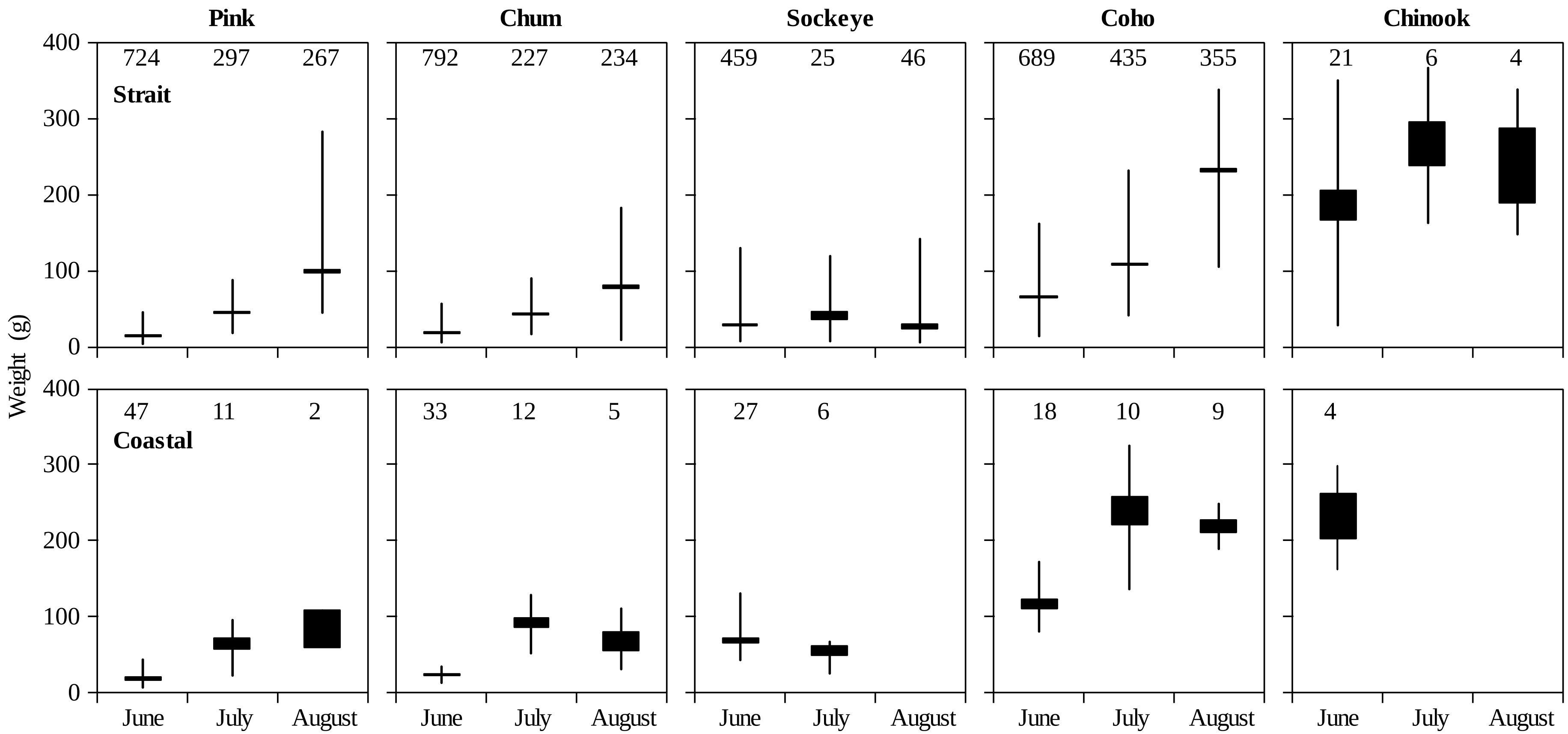

Figure 10.—Weight (g) of juvenile salmon captured by rope trawl in the strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2015. Length of vertical bar is the weight range for each sample and the bars within the range are one standard error on either side of the mean. Sample sizes are indicated for each month.

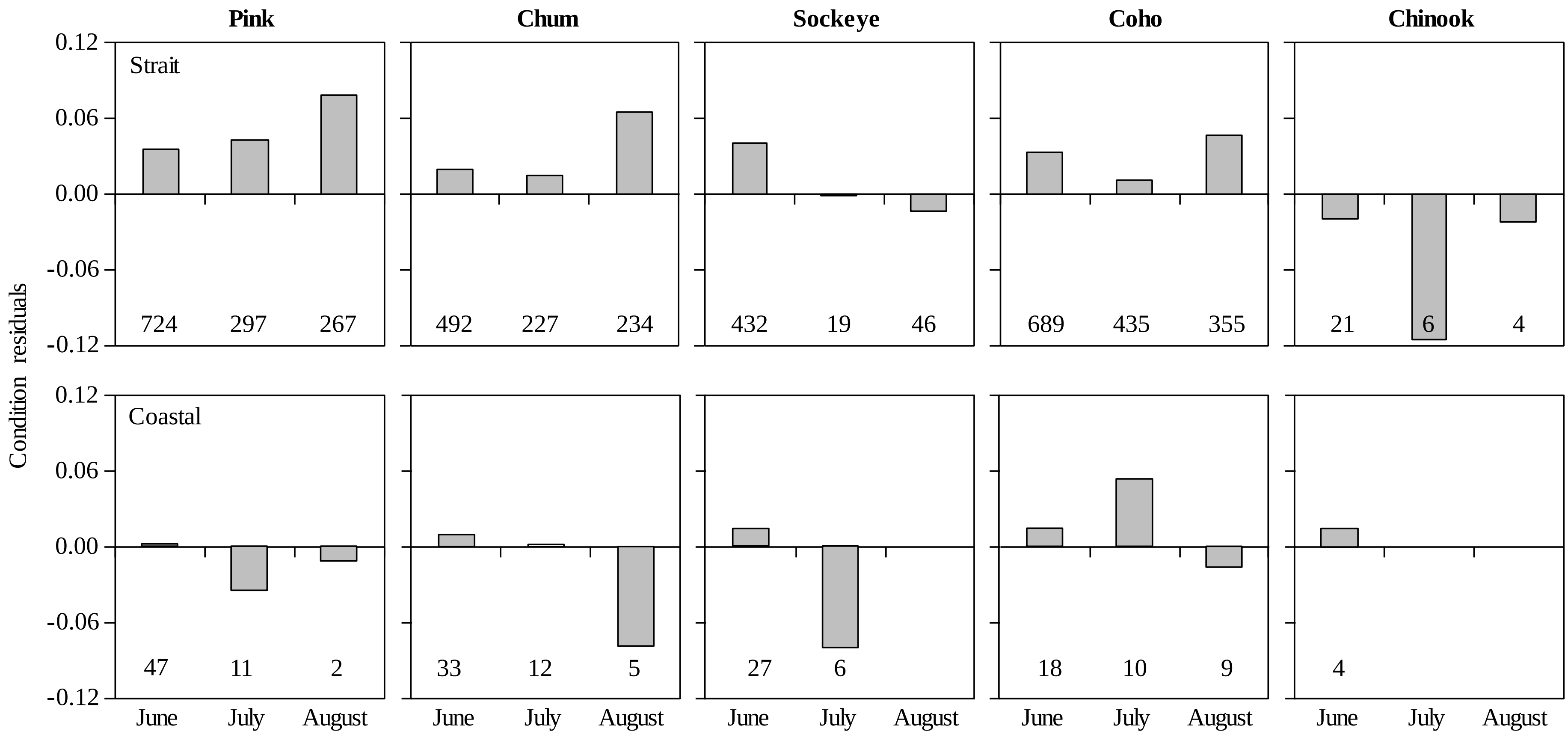

Figure 11.—Condition residuals from length-weight regression analysis of juvenile salmon captured by rope trawl in the strait and coastal marine habitats of the northern region of southeastern Alaska, June–August 2015. Sample sizes are indicated for each month.

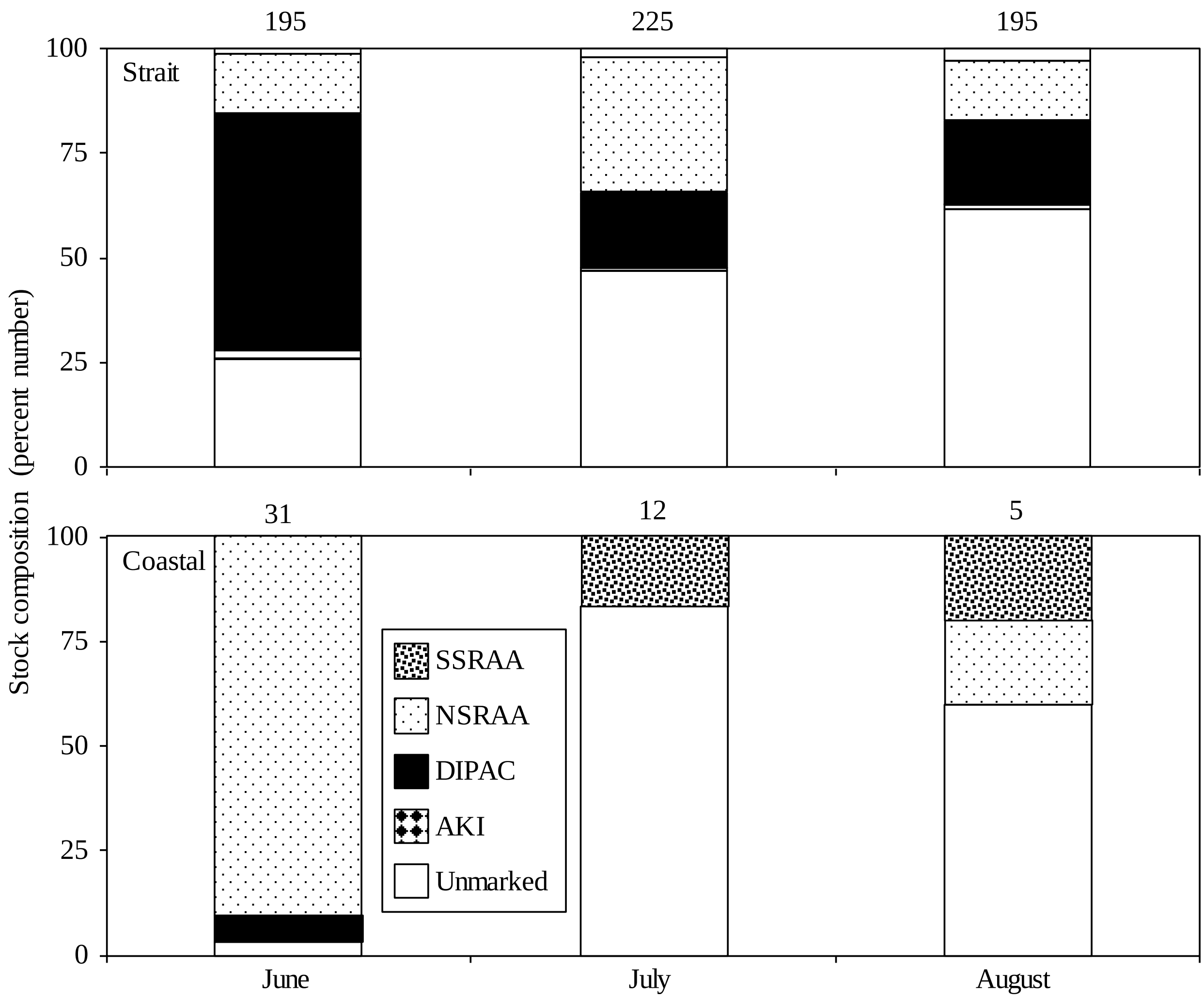

Figure 12.—Monthly stock composition (based on otolith marks) of juvenile chum salmon captured by rope trawl in the strati and coastal marine habitats of the northern region of southeastern Alaska, June–August 2015. Number of salmon sampled per month is indicated above each bar.

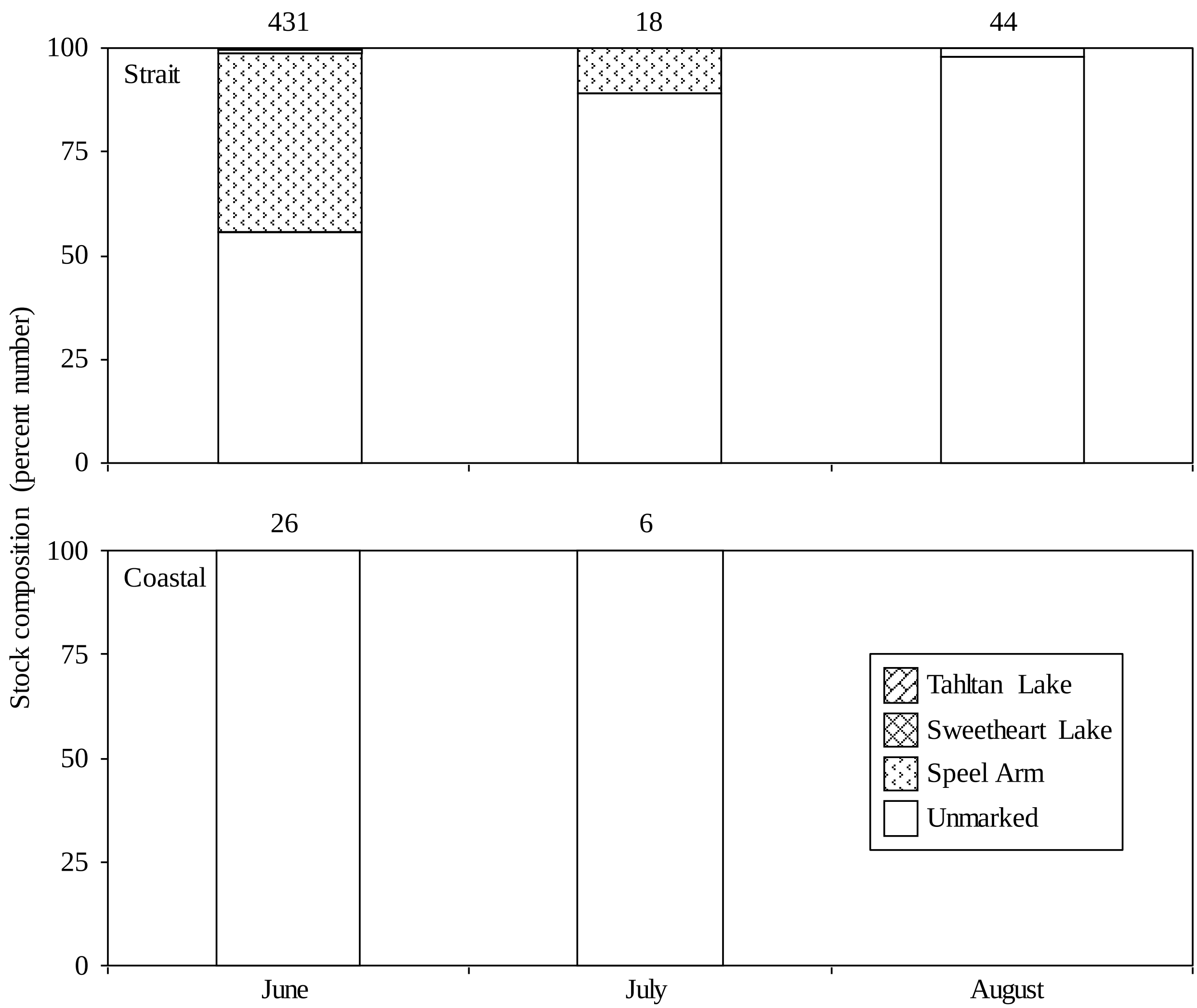

Figure 13.—Monthly stock composition (based on otolith marks) of juvenile sockeye salmon captured by rope trawl in the strati and coastal marine habitats of the northern region of southeastern Alaska, June–August 2015. Number of salmon sampled per month is indicated above each bar.

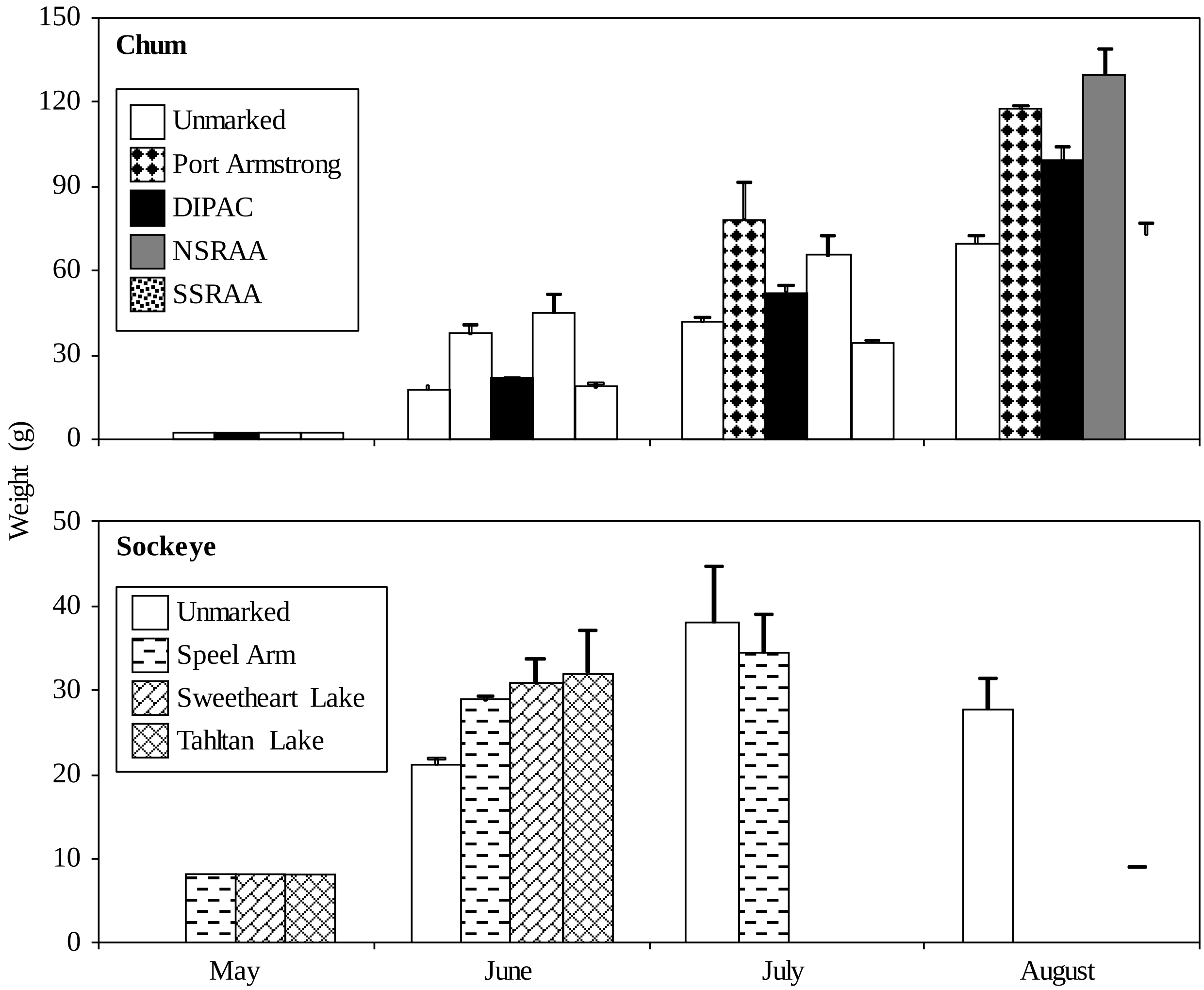

Figure 14.—Stock-specific growth trajectories of juvenile chum and sockeye salmon captured by rope trawl in the strait marine habitat of the northern region of southeastern Alaska, June–August 2015. Weights of May fish are mean values at time of hatchery release. Not difference in y-axis. See tables 16 and 17 for sample sizes.