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Survey of Juvenile Salmon in the Marine Waters of Southeastern Alaska, May–August 1997

by

Joseph A. Orsi, James M. Murphy, and Audra L. J. Brase

Auke Bay Laboratory
Alaska Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
United States Department of Commerce
11305 Glacier Highway
Juneau, AK 99801-8626 USA

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Abstract

Twenty stations were sampled monthly along a primary marine migration corridor in the northern region of southeastern Alaska to assess the distribution, growth, mortality, and diet of wild and hatchery stocks of juvenile (age -.0) Pacific salmon (*Oncorhynchus* spp.). Stations were stratified into three different habitats—inshore (Taku Inlet and near Auke Bay), strait (Chatham Strait and Icy Strait), and coastal (Cross Sound and Icy Point)—and sampled aboard the NOAA ship *John N. Cobb* from May to August 1997. At each station, fish, zooplankton, temperature, and salinity data were collected during daylight with a surface rope trawl, conical nets, bongo nets, and a CTD (conductivity, temperature, and depth profiler). A total of 6,252 fish and squid were captured with the rope trawl, representing 31 taxa. All five species of juvenile Pacific salmon and steelhead (*O. mykiss*) were captured and made up 80% of the total catch. Of the 5,000 salmonids caught, over 99% were juveniles, and less than 1% were immatures or adults. Non-salmonid species making up >1% of the catch included Pacific herring (*Clupea harengus*), squid (Gonatidae), capelin (*Mallotus villosus*), walleye pollock (*Theragra chalcogramma*), and sablefish (*Anoplopoma fimbria*). Chum (*O. keta*), coho (*O. kisutch*), pink (*O. gorbuscha*), sockeye (*O. nerka*), and chinook (*O. tshawytscha*) salmon and crested sculpin (*Blepsias bilobus*) occurred most frequently (≥30%) in the trawl catches. Overall catches of juvenile salmon were highest in July and zero in May. Catch rates of coho and sockeye salmon were highest in June, whereas catch rates of chum, pink, and chinook salmon were highest in July. Catch rates of juvenile salmon except chinook salmon were highest in strait habitat and lowest in inshore habitat; chinook salmon catch rates were highest in inshore habitat. Overall catch rates for juvenile salmon along the offshore transect declined with distance offshore: most juveniles were within 25 km of shore, and no juvenile salmon was found beyond 40 km. Mean fork lengths of juvenile salmon in June–July–August were: chum (97–137–162 mm), pink (96–136–156 mm), sockeye (110–146–154 mm), coho (148–207–247 mm), and chinook salmon (143–172–222 mm). Twenty-three juvenile and immature salmon containing internally planted coded-wire tags (CWTs) were recovered; 21 originated in Alaska and two in Oregon (one chinook and one coho salmon). The Oregon chinook salmon is the earliest recorded recovery of a stream-type chinook salmon of the Columbia River stock in Alaska during its first summer at sea. Onboard stomach analysis of potential predators of juvenile salmon did not indicate a high level of salmon predation; however, few predators were present during high levels of juvenile salmon abundance, and fish remains in stomachs were often too far digested to identify. Results from this study and further laboratory analysis of otolith-marked fish will be used to assess competitive interactions between wild and hatchery stocks and stock-specific life history characteristics.

Introduction

Increasing evidence for relationships between Pacific salmon (*Oncorhynchus* spp.) production and shifts in climate conditions has renewed interest in processes governing year-class strength in salmon (Beamish 1995). However, actual links tying salmon production to climate variability are understood poorly due to a lack of adequate time-series data (Pearcy 1997). In addition, mixed stocks with different life history characteristics confound attempts to accurately assess growth, survival, distribution, and migratory rates of specific stocks. Synoptic time series of ocean conditions and stock-specific life history characteristics of salmon are needed to adequately identify mechanisms linking salmon production to climate change. Until recently, stock-specific information relied on labor-intensive methods such as coded-wire tagging (CWT; Jefferts 1963). However, advances in mass-marking methods using otolith thermal marks (Hagen and Munk 1996) now offer an opportunity to examine growth, survival, distribution, and migratory rates of specific stocks.

Approximately 123 million thermally-marked juvenile chum salmon (*O. keta*) were released in the spring of 1997 from two major enhancement facilities in the northern region of southeastern Alaska. Samples of these fish were collected along a seaward migration corridor to determine whether competitive interactions between hatchery and wild stocks exist and to obtain stock-specific life history characteristics such as growth, migration, diet, condition, and size-selective mortality. Oceanographic data were also collected to expand existing time series.

Methods

Twenty stations were sampled each month in inside and coastal marine waters of the northern region of southeastern Alaska aboard the NOAA ship *John N. Cobb* (Table 1). Stations were located along a seaward migration corridor used by juvenile salmon, extending from inshore waters within the Alexander Archipelago along Chatham Strait and Icy Strait, through Cross Sound, and out into offshore waters in the Gulf of Alaska (Figure 1). At each station, the physical environment was sampled with a CTD (conductivity, temperature, and depth profiler), zooplankton were sampled with oblique bongo and vertical conical nets, and fish were sampled with a rope trawl. All sampling occurred during daylight, between 0700 and 2000 hours.

The selection of sampling stations was determined by 1) the presence of historical time series of biological or oceanographic data in the region, 2) the proximity of stations to the migration corridor used by juvenile otolith-marked chum salmon, and 3) restrictions in vessel operations. Historical data exist for Auke Bay Monitor, False Point Retreat, Lower Favorite Channel, and Icy Strait stations (Mattson and Wing 1972; Bruce et al. 1977; Orsi unpublished data); therefore, these stations were selected initially. The Chatham Strait transect was selected because juvenile otolith-marked chum salmon from both the south (Hidden Falls Hatchery) and north (Douglas Island Pink and Chum Hatchery) enter Icy Strait there. Cross Sound and Icy Point transects were added to monitor conditions adjacent to and in the Gulf of

Alaska where juveniles enter the coastal habitat. Taku Inlet was selected to characterize physical and biological conditions near a large glacial, transboundary river system along the mainland coast. Vessel and sampling gear constraints limited operations to onshore distances of ≥1.5 km, offshore distances of ≤65 km, and bottom depths of ≥75 m; therefore, trawling did not occur at Auke Bay Monitor (Table 1). Sea conditions of <2.5 m and winds <12.5 m/sec were usually necessary to operate the sampling gear safely; this influenced sampling opportunities, particularly in coastal waters.

Oceanography

Oceanographic data were collected at each station before or immediately after the trawl haul. Oceanographic data collected at each station consisted of one CTD cast, one or more vertical plankton hauls with conical nets, and one double oblique plankton haul with a bongo net. The CTD data were collected with a Sea-Bird[1] SBE 19 Seacat profiler to 200 m or within 10 m of the bottom. Surface (2-m) temperature and salinity data were also collected at 1-minute intervals with a thermosalinograph. Conical plankton nets were used to perform at least one shallow (20-m) vertical haul at each station and two deep (200 m or within 20 m of bottom) vertical hauls at the Icy Point stations and Auke Bay Monitor (Table 2). A conical NORPAC net (50 cm, 243 micron mesh), which had been used in previous zooplankton sampling programs in the region, was used for the shallow vertical hauls; a conical WP-2 net (57 cm, 202 micron mesh) is the standard recommended by GLOBEC (U.S. Globec 1996) and was used for the deep vertical hauls. In order to calibrate the two conical net types, both nets were used at the Icy Point and Auke Bay Monitor stations. A double oblique bongo haul was taken at each station to a depth of 200 m or within 20 m of the bottom using a 60-cm diameter frame with 505 and 333 micron mesh nets. A Bendix time and depth recorder was used with the oblique bongo hauls to determine the maximum sampling depths. General Oceanics or Roshiga flow meters were placed inside the bongo and deep conical nets to determine filtered volumes. Ambient light intensities (W/m^2) were recorded at each station with a Li-Cor Model 189 radiometer.

Fish sampling

Fish sampling was accomplished using a Nordic 264 rope trawl modified to fish the surface water directly astern of the ship. The trawl was 184 m long and had a mouth opening of 24 m × 30 m (depth × width). A pair of 3-m foam-filled Lite trawl doors, each weighing 544 kg (91 kg submerged), were used to spread the trawl open. The NOAA ship *John N. Cobb* is a 29-m research vessel built in 1950 with a main engine of 325 horsepower and a cruising speed of 10 knots. Earlier gear trials with this vessel and trawl indicated the actual

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

fishing dimensions of the trawl to be 18 m vertical (head rope to foot rope) and 24 m horizontal (wingtip to wingtip), with a spread between the trawl doors ranging from 52 to 60 m (unpubl. cruise report). 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 portion of the rope trawl. A 6.1 m long, 0.8-cm knotless liner was sewn into the cod end. To keep the trawl headrope at the surface, a cluster of three meshed A-4 Polyform buoys were tethered to each wingtip of the headrope and one A-3 Polyform float was clipped onto the center of the headrope. Two similar trawls were used on the survey: the first trawl (fished in May and June) had a small mesh panel of 10.2 cm mesh sewn along the jib lines on the top panel of the trawl between the head rope and 162.6 cm mesh to reduce loss of small fish, and the second trawl (fished in July and August) did not have the small-meshed panel. Each trawl was fished with 137 m of 1.6-cm wire main warp attached to each door with three 55-m, two 1.0-cm, and one 1.3-cm wire bridles.

Each trawl was fished 20 min at 1.5 m/sec (3 knots), covering approximately 1.9 km (1.0 nautical miles) across a station. Over-water trawl speed was monitored from the vessel using an electromagnetic current meter (Marsh McBirney, Inc., Model 2000-21). Station coordinates were targeted as the midpoint of the trawl haul; however, current, swell, and wind conditions dictated the direction the trawl was set.

After each haul, the fish were anesthetized, identified, enumerated, measured, labeled, bagged, and frozen. Tricaine methanesulfonate (MS-222) was used to anesthetize the fish. After the catch was sorted, fish and squid were measured to the nearest mm fork length (FL) (squid: mantle length) with a Limnotera FMB IV electronic measuring board (Chaput et al. 1992). All fish and squid were measured except those in the few large catches of juvenile chum salmon and herring, which were subsampled for lengths. Most juvenile salmon were bagged individually and placed in a freezer immediately. For large catches of juvenile salmon, blue-ice packs were used to minimize tissue decomposition and gastric activity in the stomachs. All but the largest juvenile salmon were poured through a portable CWT detector onboard the vessel. Larger salmon were examined for missing adipose fins, indicating the presence of CWTs. The snouts of all adipose fin-clipped juvenile salmon were dissected later in the laboratory to recover CWTs.

After the juvenile salmon in each haul were processed, potential predators were identified, measured, and weighed. Stomachs were excised, weighed, and classified by fullness. Stomach contents were removed and generally identified to the family level and quantified to the nearest 10% of total volume. Empty stomachs were weighed, and content weight was determined by subtraction.

Results

During the 4-month survey, data were collected from 91 conical net (20-m) hauls, 83 CTD casts, 83 bongo net hauls, 76 rope trawl hauls, and 40 conical net (200-m) hauls (Table 2). Each month, the 20 primary stations were sampled for oceanographic data, and 19 of

those were trawl sampled. Ambient light intensities during the sampling ranged from 14 to 844 W/m^2.

Temperature and salinity data recorded by the thermosalinograph differed monthly and between inside and outside waters. Temperatures and salinities in the survey ranged from 6.5 to 16.3°C and 14.7 to 31.9‰ (Table 3). In general, temperatures increased and salinities decreased in inside waters, whereas temperatures increased and salinities remained stable in outside waters from May through August. However, salinities were lowest in July in the inside waters, due to the record July rainfall in the region (National Weather Service, Juneau, Alaska). Salinities were typically lower in inside waters. Temperatures increased with distance from shore along the Icy Point transect, and the highest temperatures were found at the offshore stations in August. Temperatures were consistently low and salinities were consistently high at Cross Sound, due the to extensive tidal mixing.

Plankton abundance was diverse and differed among habitats. Cursory examination of samples indicated a wide diversity of zooplankton and ichthyoplankton species. Samples from the coastal and offshore stations contained limited amounts of phytoplankton and zooplankton, whereas samples from the inside stations had dense, patchy concentrations of phytoplankton and zooplankton.

A total of 6,252 fish and squid representing 31 taxa were sampled with the rope trawl (Table 4). All five species of juvenile Pacific salmon and steelhead (*O. mykiss*) were captured, making up 80% of the catch. Of the 5,000 salmonids sampled, over 99% were juveniles: 3,532 chum salmon, 907 pink salmon (*O. gorbuscha*), 216 sockeye salmon (*O. nerka*), 206 coho salmon (*O. kisutch*), 99 chinook salmon (*O. tshawytscha*), and 1 steelhead; only 29 were immatures (chinook salmon) and 10 adults (5 coho and 5 pink salmon). Principal non-salmonid species making up more than 1% of the catch were 572 Pacific herring (*Clupea harengus*), 142 capelin (*Mallotus villosus*), 134 squid (Gonatidae), 99 walleye pollock (*Theragra chalcogramma*), and 85 sablefish (*Anoplopoma fimbria*). Abundances of important non-salmon species and their life history stages varied by month (Appendix 1). Adult Pacific herring and walleye pollock were caught in May, adult Pacific herring and juvenile and adult walleye pollock in June, adult herring and juvenile walleye pollock in July, and juvenile sablefish, juvenile and adult Pacific herring, and adult walleye pollock in August. Frequency of occurrence was highest (>30%) for chum, coho, pink, sockeye, and chinook salmon and crested sculpin (*Blepsias bilobus*) (Table 5).

Distribution of juvenile salmon differed among months sampled, species, and habitats. Overall catch rates for juvenile salmon were lowest in May (none caught) and highest in July. Chum, pink, and chinook salmon were most abundant in July, whereas sockeye and coho salmon were most abundant in June (Figure 2). Catch rates of all juvenile salmon, except chinook salmon, were highest in strait habitat; chinook salmon were caught primarily in inshore habitat. Relatively few salmon were caught in coastal habitat. In coastal habitat along the offshore transect, catch rates of juvenile salmon declined with distance offshore; most juveniles were within 25 km of shore and no juvenile was found beyond 40 km (Figure 3).

Mean fork lengths of juvenile salmon differed markedly among species and sampling periods. Juvenile coho and chinook salmon were consistently 25–90 mm longer than sockeye,

chum, and pink salmon each sampling period (Figure 4). Mean fork lengths for each species of juvenile salmon in June–July–August were: chum (97–137–162 mm), pink (96–136–156 mm), sockeye (110–146–154 mm), coho (148–207–247 mm), and chinook (143–172–222 mm) (Table 6).

Twenty-three juvenile and immature salmon containing CWTs were recovered: 13 chinook, 9 coho, and 1 chum salmon—21 originated in Alaska and two in Oregon (1 chinook and 1 coho) (Table 7). Migrations of all CWT juvenile coho salmon were rapid: seven juveniles recovered in inside waters in June had migrated 65–110 km in 13–30 days, and the two recovered in outside waters in July had migrated 620 and 1,600 km in 54 and 56 days. Conversely, CWT chinook salmon had both slow and rapid migration rates. The CWT juvenile chinook salmon from Oregon was the only CWT chinook salmon recovered in outside waters and had traveled a remarkable 1,800 km in 91 days, whereas the 12 juvenile and immature CWT chinook salmon from Alaska were all recovered in inside waters and had traveled 20–135 km in 16–794 days.

Stomachs of 119 potential predators of juvenile salmon were examined aboard the vessel: 42 adult walleye pollock, 29 immature chinook salmon, 14 adult Pacific herring, 10 adult spiny dogfish (*Squalus acanthias*), 7 Pacific sandfish (*Trichodon trichodon*), 5 adult pink salmon, 4 adult coho salmon, 1 pomfret (*Brama japonica*), 1 jack mackerel (*Trachurus symmetricus*), and 6 juvenile sablefish (Figure 5). Of the stomachs examined, 20% were empty; the remainder had a mean stomach fullness of 50%. Piscivory was most common in pomfret, adult Pacific sandfish, immature chinook salmon, and adult coho salmon. Identifiable fish in the stomachs consisted of juvenile Pacific sand lance (*Ammodytes hexapterus*) and capelin; however, most fish prey were highly digested and, therefore, unidentifiable. Stomachs of Pacific sandfish, Pacific herring, and spiny dogfish contained no fish.

Discussion

We found the offshore distribution of juvenile salmon to be similar to distributions found in other studies conducted off southeastern Alaska. Hartt and Dell (1986) characterized the coastal migration band of juvenile pink, chum, and sockeye salmon as 37 km wide off the coast of southeastern Alaska, where the continental shelf is narrow. Jaenicke and Celewycz (1994) found juvenile salmon to at least 74 km in offshore waters of southeastern Alaska in August. Most of our juvenile salmon were within 25 km of shore, and none was found beyond 40 km; however, this station had the warmest monthly water temperatures in July and August, which may have influenced the extent of offshore migration.

Juvenile salmon were not caught in May, perhaps because of their distribution pattern and the habitats sampled. As juveniles enter the marine environment in spring, they initially distribute along shallow, nearshore habitats and move progressively into deeper waters. We did not catch juvenile salmon in May, only immature age -.1 and older chinook salmon. Another survey also did not catch juvenile salmon in May, only immature chinook salmon (Cruise report JC-84-01). Gear and vessel operation constraints in our study limited our

station selections to localities deeper than 75 m and onshore distances ≥1.5 km. Therefore, if juveniles were present in relatively shallow, nearshore marine habitat in May, they may not have been available to our sampling gear.

Recoveries of CWT juvenile chinook and coho salmon from this study suggest rapid migrations of some stocks through the region. Previous studies found juvenile stream-type chinook salmon from the Columbia River drainage off the coast of southeastern Alaska in August and September (Hartt and Dell 1986; Orsi and Jaenicke 1996). Our June recovery off Alaska of a juvenile stream-type chinook salmon originating in the Columbia River drainage extends the coastal migration arrival window of this stock by about two months. Conversely, CWTs recovered from Alaska stocks of stream-type chinook salmon indicated a high degree of residency of these juveniles, as well as immatures, in the study area. Juvenile coho salmon of Alaska origin and the one of Oregon origin migrated rapidly through the study area. Juvenile coho salmon recovered in the study area in June originated in the northern region of southeastern Alaska, whereas coho salmon recovered in the study area in July originated in southern southeastern Alaska and Oregon. These data suggest that stocks of coho salmon of Alaska origin and some stocks of coho and stream-type chinook salmon from Oregon migrate actively through the northern region of southeastern Alaska in June and July.

Although juvenile salmon were not a majority prey item in the predators we examined, predation on juvenile salmon could still be high. Most predators were caught in May and June, when few juvenile salmon were caught. Later, when juvenile salmon were more abundant, the predators may have moved nearer to shore to feed on smaller juvenile salmon and have become inaccessible to our sampling gear.

Further analysis from these data requires separation of hatchery and wild salmon stocks by examination of otoliths for thermal marking. After stock separation is complete, various analyses will be conducted to determine what differences exist between the hatchery and wild salmon stocks of the northern region of southeastern Alaska. Stock-specific growth rates, migration rates, lipid levels, condition factors, prey fields, and size-selective mortality will be among the interactions examined.

Additional surveys of these same stations in the northern region of southeastern Alaska are planned for mid-September and early October of 1997. The September survey will be brief and allow only for oceanographic sampling, at about half of the standard stations; the October survey will sample both fish and oceanographic data at all 20 standard sampling stations (weather permitting).

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Literature Cited

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

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

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

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

Hartt, A. C., and M. B. Dell. 1986. Early oceanic migrations and growth of juvenile Pacific salmon and steelhead trout. Int. North Pacific Fish Comm. Bull. 46: 1–105.

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

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

Mattson C. R., and B. L. Wing. 1978. Ichthyoplankton volumes from inland coastal waters of southeastern Alaska, April–November 1972. NOAA Tech. Rep. NMFS SSRF-723. 11 p.

Orsi, J. A. and H. W. Jaenicke. 1996. Marine distribution and origin of prerecruit chinook salmon Oncorhynchus tshawytscha, in southeastern Alaska. Fish. Bull. 94: 482–497.

Pearcy, W. G. 1977. What have we learned in the last decade? What are research priorities? Pp. 271–277 *in* R. L. Emmett and M. H. Schiewe (eds.), Estuarine and ocean survival of northeastern Pacific salmon: Proceedings of the workshop. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-NWFSC-29.

U.S. Globec. 1996. U.S. GLOBEC northeast Pacific implementation plan. U.S. Global Ocean Ecosystems Dynamics Report No. 17. University of California, Davis. 60 p.

Table 1.—Localities and coordinates of stations sampled monthly in marine waters of the northern region of southeastern Alaska, May–August 1997.

Locality	Station	Latitude	Longitude	Offshore distance (km)	Bottom depth (m)
		Inside waters			
Inshore					
Auke Bay Monitor	ABM	58°22.00′N	134°40.00′W	1.5	60
Taku Inlet	TKI	58°11.19′N	134°11.71′W	2.2	175
False Point Retreat	FPR	58°22.00′N	135°00.00′W	1.8	680
Lower Favorite Channel	LFC	58°20.98′N	134°43.73′W	1.5	75
Strait					
Upper Chatham Strait	UCA	58°04.57′N	135°00.08′W	3.2	400
Upper Chatham Strait	UCB	58°06.22′N	135°00.91′W	6.4	100
Upper Chatham Strait	UCC	58°07.95′N	135°04.00′W	6.4	100
Upper Chatham Strait	UCD	58°09.64′N	135°02.52′W	3.2	200
Icy Strait	ISA	58°13.25′N	135°31.76′W	3.2	128
Icy Strait	ISB	58°14.22′N	135°29.26′W	6.4	200
Icy Strait	ISC	58°15.28′N	135°26.65′W	6.4	200
Icy Strait	ISD	58°16.38′N	135°23.98′W	3.2	234
		Outside waters			
Coastal					
Cross Sound	CSA	58°09.53′N	136°26.96′W	3.2	300
Cross Sound	CSB	58°10.91′N	136°28.68′W	6.4	60
Cross Sound	CSC	58°12.39′N	136°30.46′W	6.4	200
Cross Sound	CSD	58°13.84′N	136°32.23′W	3.2	200
Icy Point	IPA	58°20.12′N	137°07.16′W	6.9	160
Icy Point	IPB	58°12.71′N	137°16.96′W	23.4	130
Icy Point	IPC	58°05.28′N	137°26.75′W	40.2	150
Icy Point	IPD	57°53.50′N	137°42.60′W	65.0	1300

Table 2.—Numbers and types of data collected at different habitat types sampled monthly in marine waters of the northern region of southeastern Alaska, May–August 1997.

		Data collection type*					
Dates	Habitat	Rope trawl	CTD cast	Bongo tow	20-m vertical	WP-2 vertical	COMP vertical
20–26 May	Inshore	3	4	4	6	1	1
	Strait	8	8	8	8	0	0
	Coastal	8	8	8	8	4	4
	All May	19	20	20	22	5	5
22–26 June	Inshore	3	4	4	6	1	1
	Strait	8	8	8	8	0	0
	Coastal	8	8	8	8	4	4
	All June	19	20	20	22	5	5
17–27 July	Inshore	3	5	5	5	1	1
	Strait	8	9	9	9	0	0
	Coastal	8	8	8	8	4	4
	All July	19	22	22	24	5	5
22–28 August	Inshore	3	4	4	6	1	1
	Strait	8	9	9	9	0	0
	Coastal	8	8	8	8	4	4
	All August	19	21	21	23	5	5
Total		76	83	83	91	20	20

*Rope trawl = 20-min hauls; CTD casts = to 200 m or within 10 m of the bottom; Bongo haul = 60-cm diameter frame, 505 and 333 micron meshes, double oblique haul to 200 m or within 20 m of the bottom; 20-m vertical = 50-cm diameter frame, 243 micron conical net hauled vertically from 20 m; WP-2 vertical = 57-cm diameter frame, 202 micron conical net hauled vertically from 200 m or within 20 m of the bottom, COMP vertical = 50-cm diameter frame, 243 micron conical net hauled vertically from 200 m or within 20 m of the bottom.

Table 3.—Surface (2-m) temperature and salinity data sampled monthly in marine waters of the northern region of southeastern Alaska, May–August 1997. Station code acronyms are defined in Table 1.

Locality	Month	Temp. (°C)	(Salin.) (‰)	Temp. (°C)	(Salin.) (‰)	Temp. (°C)	(Salin.) (‰)	Temp. (°C)	(Salin.) (‰)
Inside waters									
Inshore		TKI		ABM		LFC		FPR	
	May	10.0	(17.9)	8.7	(26.7)	11.2	(25.4)	7.9	(29.5)
	June	10.2	(16.6)	12.0	(21.3)	12.8	(22.3)	13.9	(23.1)
	July	10.5	(15.3)	11.9	(14.7)	11.0	(15.2)	13.4	(15.2)
	August	11.5	(17.5)	12.6	(18.0)	12.6	(20.1)	12.9	(19.8)
Upper Chatham Strait		UCA		UCB		UCC		UCD	
	May	9.4	(28.6)	8.7	(28.0)	7.8	(28.7)	7.9	(28.8)
	June	14.3	(22.4)	12.9	(22.5)	12.9	(22.5)	13.2	(22.1)
	July	13.6	(23.1)	13.7	(23.3)	13.1	(17.1)	13.2	(16.1)
	August	11.2	(28.5)	11.3	(28.2)	12.5	(26.3)	12.0	(28.1)
Icy Strait		ISA		ISB		ISC		ISD	
	May	8.1	(30.8)	8.5	(29.9)	8.6	(29.9)	9.0	(29.4)
	June	12.2	(27.6)	12.9	(27.4)	12.4	(27.7)	13.0	(27.9)
	July	12.0	(24.1)	13.2	(20.3)	13.5	(20.2)	13.9	(20.4)
	August	11.2	(27.0)	11.5	(26.1)	12.3	(24.5)	12.8	(23.7)
Outside waters									
Cross Sound		CSA		CSB		CSC		CSD	
	May	6.9	(31.4)	6.6	(31.4)	6.6	(31.7)	6.5	(31.8)
	June	9.8	(31.1)	8.2	(31.6)	7.4	(31.8)	7.3	(31.8)
	July	11.3	(30.9)	8.2	(31.7)	8.3	(31.6)	8.0	(30.9)
	August	15.2	(30.8)	10.7	(30.9)	10.2	(30.5)	9.4	(30.1)
Icy Point		IPA		IPB		IPC		IPD	
	May	8.2	(30.8)	8.7	(31.2)	9.1	(31.3)	9.4	(31.3)
	June	11.2	(30.9)	12.4	(31.4)	13.4	(31.5)	13.3	(31.5)
	July	13.9	(30.9)	14.5	(31.2)	14.4	(31.4)	14.6	(31.9)
	August	15.0	(31.0)	14.1	(30.7)	15.0	(31.1)	16.3	(31.1)

Table 4.—Monthly catches of fishes and squid sampled with a rope trawl in marine waters of the northern region of southeastern Alaska, May–August 1997.

Common name	Scientific name	Number caught				
		May	June	July	August	Total
Chum salmon (juvenile)	*Oncorhynchus keta*	—	783	2,499	250	3,532
Pink salmon (juvenile)	*O. gorbuscha*	—	124	499	284	907
(adult)	*O. gorbuscha*	—	2	2	1	5
Sockeye salmon (juvenile)	*O. nerka*	—	116	73	27	216
Coho salmon (juvenile)	*O. kisutch*	—	123	47	36	206
(adult)	*O. kisutch*	—	—	—	5	5
Chinook salmon (juvenile)	*O. tshawytscha*	—	28	52	19	99
(immature)	*O. tshawytscha*	18	8	—	3	29
Steelhead (juvenile)	*O. mykiss*	—	1	—	—	1
Pacific herring	*Clupea harengus*	237	157	43	135	572
Capelin	*Mallotus villosus*	10	96	4	32	142
Squid	Gonatidae	128	4	2	—	134
Walleye pollock	*Theragra chalcogramma*	77	17	3	2	99
Sablefish	*Anoplopoma fimbria*	—	—	—	85	85
Pacific sand lance	*Ammodytes hexapterus*	—	53	—	—	53
Crested sculpin	*Blepsias bilobus*	—	8	26	12	46
Pacific spiny lumpsucker	*Eumicrotremus orbis*	3	3	17	13	36
Soft sculpin	*Psychrolutes sigalutes*	14	3	—	—	17
Rockfish	*Sebastes* spp.	—	—	12	1	13
Pacific sandfish	*Trichodon trichodon*	6	1	2	2	11
Spiny dogfish	*Squalus acanthias*	—	10	—	—	10
Prowfish	*Zaprora silenus*	—	—	5	4	9
Bigmouth sculpin	*Hemitripterus bolini*	3	3	—	—	6
Starry flounder	*Platichthys stellatus*	5	—	—	—	5
Lingcod	*Ophiodon elongatus*	—	3	—	—	3
Arrowtooth flounder	*Atheresthes stomias*	—	2	—	—	2
Smooth lumpsucker	*Aptocyclus ventricosus*	—	—	1	1	2
Three-spined stickleback	*Gasterosteus aculeatus*	1	—	—	—	1
Wolf-eel	*Anarrhichthys ocellatus*	1	—	—	—	1
Salmon shark	*Lamna ditropis*	1	—	—	—	1
Poacher	Agonidae	—	1	—	—	1
Quillfish	*Ptilichthys goodei*	—	—	1	—	1
Pomfret	*Brama japonica*	—	—	1	—	1
Jack mackerel	*Trachurus symmetricus*	—	—	—	1	1
Total		504	1,546	3,289	913	6,252

Table 5.—Frequency of occurrence for fishes and squid sampled with a rope trawl in marine waters of the northern region of southeastern Alaska, May–August 1997. Percentage occurrence per 76 hauls shown in parentheses.

Common name		Scientific name	Frequency of occurrence					
			May	June	July	August	Total	(%)
Chum salmon	(juvenile)	*Oncorhynchus keta*	—	9	15	10	34	(45)
Pink salmon	(juvenile)	*O. gorbuscha*	—	8	10	10	28	(37)
	(adult)	*O. gorbuscha*	—	1	2	1	4	(5)
Sockeye salmon	(juvenile)	*O. nerka*	—	9	9	6	24	(32)
Coho salmon	(juvenile)	*O. kisutch*	—	11	11	10	32	(42)
	(adult)	*O. kisutch*	—	—	—	4	4	(5)
Chinook salmon	(juvenile)	*O. tshawytscha*	—	7	3	8	18	(24)
	(immature)	*O. tshawytscha*	9	5	—	2	16	(21)
Steelhead	(juvenile)	*O. mykiss*	—	1	—	—	1	(1)
Pacific herring		*Clupea harengus*	3	4	3	7	17	(22)
Capelin		*Mallotus villosus*	4	6	2	6	18	(24)
Squid		Gonatidae	4	3	2	—	9	(12)
Walleye pollock		*Theragra chalcogramma*	5	6	3	2	16	(21)
Sablefish		*Anoplopoma fimbria*	—	—	—	4	4	(5)
Pacific sand lance		*Ammodytes hexapterus*	—	7	—	—	7	(9)
Crested sculpin		*Blepsias bilobus*	—	6	10	7	23	(30)
Pacific spiny lumpsucker		*Eumicrotremus orbis*	2	3	5	2	12	(16)
Soft sculpin		*Psychrolutes sigalutes*	8	2	—	—	10	(13)
Rockfish		*Sebastes* spp.	—	—	2	1	3	(4)
Pacific sandfish		*Trichodon trichodon*	1	1	1	1	4	(5)
Spiny dogfish		*Squalus acanthias*	—	1	—	—	1	(1)
Prowfish		*Zaprora silenus*	—	—	5	4	9	(12)
Bigmouth sculpin		*Hemitripterus bolini*	3	2	—	—	5	(7)
Starry flounder		*Platichthys stellatus*	1	—	—	—	1	(1)
Lingcod		*Ophiodon elongatus*	—	3	—	—	3	(4)
Arrowtooth flounder		*Atheresthes stomias*	—	1	—	—	1	(1)
Smooth lumpsucker		*Aptocyclus ventricosus*	—	—	1	1	2	(3)
Three-spined stickleback		*Gasterosteus aculeatus*	1	—	—	—	1	(1)
Wolf-eel		*Anarrhichthys ocellatus*	1	—	—	—	1	(1)
Salmon shark		*Lamna ditropis*	1	—	—	—	1	(1)
Poacher		Agonidae	—	1	—	—	1	(1)
Quillfish		*Ptilichthys goodei*	—	—	1	—	1	(1)
Pomfret		*Brama japonica*	—	—	1	—	1	(1)
Jack mackerel		*Trachurus symmetricus*	—	—	—	1	1	(1)

Table 6.—Fork lengths of juvenile salmon captured in different marine habitats of the northern region of southeastern Alaska by rope trawl, May–August 1997. No juvenile salmon was captured in May.

	June				July				August			
Locality	*n*	range	$\bar{x}$	sd	*n*	range	$\bar{x}$	sd	*n*	range	$\bar{x}$	sd
Chum salmon												
Inshore	0	—	—	—	4	103–140	116.5	16.6	0	—	—	—
Upper Chatham	124	71–136	94.5	12.2	612	88–175	133.4	12.4	53	116–210	168.9	22.2
Icy Strait	408	65–147	97.1	10.8	678	115–175	137.5	8.4	181	107–196	161.8	18.9
Cross Sound	1	97	97.0	—	7	115–145	126.0	11.4	14	131–159	143.7	9.5
Icy Point	3	132–135	133.0	1.7	146	104–207	148.7	26.1	2	140–154	147.0	9.9
Chum total	536	65–147	96.7	11.5	1,447	88–207	136.8	13.7	250	107–210	162.2	20.0
Pink salmon												
Inshore	1	119	119.0	—	0	—	—	—	1	150	150.0	—
Upper Chatham	68	78–127	97.5	13.9	150	82–173	135.4	13.7	39	123–218	163.7	22.5
Icy Strait	55	73–136	93.4	12.8	269	112–175	136.1	10.9	211	129–207	155.8	15.5
Cross Sound	0	—	—	—	2	117–130	123.5	9.2	28	131–171	144.5	9.1
Icy Point	0	—	—	—	73	109–179	136.6	17.3	5	133–162	145.6	10.6
Pink total	124	73–136	95.8	13.6	494	82–179	135.9	12.9	284	123–218	155.5	16.7

Table 6.—(cont.)

Locality	June				July				August			
	n	range	$\bar{x}$	sd	*n*	range	$\bar{x}$	sd	*n*	range	$\bar{x}$	sd
Sockeye salmon												
Inshore	3	129–144	134.3	8.4	3	101–161	127.7	30.6	1	129	129.0	—
Upper Chatham	48	78–137	103.3	16.5	21	113–175	141.0	16.7	3	147–210	172.3	33.3
Icy Strait	64	84–193	112.6	20.2	22	125–167	138.7	9.7	23	96–195	152.8	26.4
Cross Sound	1	141	141.0	—	0	—	—	—	0	—	—	—
Icy Point	0	—	—	—	27	119–175	156.7	13.4	0	—	—	—
Sockeye total	116	78–193	109.6	19.5	73	101–175	145.6	16.6	27	96–210	154.1	27.1
Coho salmon												
Inshore	4	116–140	131.0	11.5	17	162–230	200.8	18.5	0	—	—	—
Upper Chatham	66	107–220	137.7	18.4	9	169–236	203.2	19.7	21	219–286	245.4	19.4
Icy Strait	50	100–205	159.4	20.4	11	199–241	216.7	14.4	6	205–259	236.0	20.8
Cross Sound	0	—	—	—	3	175–190	181.7	7.6	8	225–273	246.6	16.4
Icy Point	3	183–202	189.3	11.0	7	203–238	223.6	12.2	1	349	349.0	—
Coho total	123	100–220	147.5	22.7	47	162–241	207.1	19.4	36	205–349	247.0	25.5
Chinook salmon												
Inshore	24	93–187	135.7	25.6	52	131–230	172.0	19.1	7	161–205	193.0	15.2
Upper Chatham	3	167–177	172.3	5.0	0	—	—	—	4	201–256	226.8	27.8
Icy Strait	0	—	—	—	0	—	—	—	8	217–314	245.9	28.9
Cross Sound	0	—	—	—	0	—	—	—	0	—	—	—
Icy Point	1	231	231.0	—	0	—	—	—	0	—	—	—
Chinook total	28	93–231	143.0	31.5	52	131–230	172.0	19.1	19	161–314	222.4	33.4

Table 7.—Release and recovery information for coded-wire tagged juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, May—August 1997.

			Release information					Recovery information						
Species	Coded-wire tag code	year	Brood Agency*	Locality	Date	Size (mm)	(g)	Locality (station code)	Date	Size (mm)	(g)	Age	Days since release	Distance traveled (km)
						May								
Chinook	04:45/21	1994	HDFAL	Hidden Falls, AK	06/05/96	—	28.4	Icy Strait (ICC)	05/24/97	326	505.0	1.1	352	135
Chinook	50:04/04	1994	DIPAC	Gastineau Channel, AK	06/12/96	147	23.5	Upper Chatham (UCD)	05/21/97	310	410.0	1.1	344	70
						June								
Chinook	09:17/50	1995	ODFW	Umatilla River, OR	03/26/97	—	48.8	Icy Point (IPB)	06/25/97	231	160.9	1.0	91	1,800
Chinook	50:04/22	1995	DIPAC	Gastineau Channel, AK	06/10/97	—	18.7	Favorite Channel (LFC)	06/26/97	104	13.6	1.0	16	20
Chinook	50:04/26	1995	DIPAC	Fish Creek, AK	06/10/97	—	24.9	Favorite Channel (LFC)	06/26/97	127	22.1	1.0	16	20
Chinook	No tag	—	—	—	—	—	—	Favorite Channel (LFC)	06/26/97	139	—	1.0	—	—
Coho	50:04/12	1995	DIPAC	Gastineau Channel, AK	06/10/97	—	16.2	Upper Chatham (UCA)	06/23/97	139	32.2	1.0	13	75
Coho	50:04/13	1995	DIPAC	Gastineau Channel, AK	06/10/97	—	16.2	Icy Strait (ISA)	06/26/97	144	30.7	1.0	16	95
Coho	50:04/13	1995	DIPAC	Gastineau Channel, AK	06/10/97	—	16.2	Upper Chatham (UCA)	06/23/97	125	18.9	1.0	13	75
Coho	50:04/15	1995	DIPAC	Gastineau Channel, AK	06/10/97	—	16.2	Upper Chatham (UCA)	06/23/97	140	29.8	1.0	13	75
Coho	04:47/02	1995	HDFAL	Hidden Falls, AK	06/02/97	—	18.0	Upper Chatham (UCD)	06/23/97	156	44.3	1.0	21	110
Coho	04:49/37	1995	NMFS	Duck Creek, AK	~05/15/97	—	—	Icy Strait (ISC)	06/26/97	182	67.2	1.0	~42	85
Coho	04:07/18	1995	NMFS	Auke Creek, AK	05/24/97	~90	—	Upper Chatham (UCA)	06/23/97	121	20.1	1.0	30	65
						July								
Chinook	50:04/25	1995	DIPAC	Auke Bay, AK	06/10/97	—	26.6	Favorite Channel (LFC)	07/22/97	165	58.7	1.0	42	20
Chinook	50:04/25	1995	DIPAC	Auke Bay, AK	06/10/97	—	26.6	Favorite Channel (LFC)	07/22/97	193	95.0	1.0	42	20
Chinook	50:04/26	1995	DIPAC	Fish Creek, AK	06/10/97	—	24.9	Favorite Channel (LFC)	07/22/97	184	89.3	1.0	42	20
Chinook	50:04/26	1995	DIPAC	Fish Creek, AK	06/10/97	—	24.9	Favorite Channel (LFC)	07/22/97	165	56.0	1.0	42	20
Chinook	50:04/27	1995	DIPAC	Fish Creek, AK	06/10/97	—	24.9	Favorite Channel (LFC)	07/22/97	158	45.9	1.0	42	20
Chinook	50:04/27	1995	DIPAC	Fish Creek, AK	06/10/97	—	24.9	Favorite Channel (LFC)	07/22/97	157	47.4	1.0	42	20
Chinook	04:47/11	1995	HDFAL	Hidden Falls, AK	05/27/97	—	38.3	False Pt. Retreat (FPR)	07/22/97	224	156.5	1.0	56	130
Coho	04:47/50	1995	SSRAA	Neets Bay, AK	06/01/97	—	20.9	Icy Point (IPB)	07/25/97	234	156.1	1.0	54	620

Table 7.—(cont.)

Species	Coded-wire tag code	year	Release information: Brood Agency*	Locality	Date	Size (mm)	Size (g)	Recovery information: Locality (station code)	Date	Size (mm)	Size (g)	Age	Days since release	Distance traveled (km)
Coho	07:09/46	1995	ODFW	Columbia River, OR (Big Creek)	05/30/97	—	37.5	Icy Point (IPA)	07/25/97	227	177.9	1.0	56	1,600
Chum**	04:48/02	1995	BUROC	Burro Creek, AK	06/21/97	—	12.3	Icy Strait (ISC)	07/21/97	162	42.3	1.0	30	150
					August									
Chinook	04:40/51	1992	ADFG	Fish Creek, AK	06/20/94	110	18.8	Upper Chatham (UCA)	08/23/97	685	4400.0	1.3	794	65
Coho	No tag	—	—	—	—	—	—	Cross Sound (CSB)	08/26/97	247	299.0	—	—	—

*ADFG = Alaska Department of Fish and Game; BUROC = Burro Creek; DIPAC = Douglas Island Pink and Chum; HDFAL = Hidden Falls Hatchery; NMFS = National Marine Fisheries Service; ODFW = Oregon Department of Fish and Wildlife; SSRAA = Southern Southeast Regional Aquaculture Association.

**Tag code on this fish identified it as a chinook salmon; however, it was identified in the field as a chum and verified as such in the laboratory using starch-gel electrophoresis. Further correspondence with a mark coordinator revealed that chums may accidentally overwinter with chinook at this facility.

Appendix 1.—Catches and life history stage of salmonids and commercially* important non-salmonids in marine waters of the northern region of southeastern Alaska by rope trawl, May–August 1997.

			Juvenile									Immature	Adult			
Date	Haul#	Station	Chum	Pink	Sockeye	Coho	Chinook	Steelhead	Sablefish	Herring	Pollock	Chinook	Herring	Pollock	Coho	Pink
20 May	1001	TKI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20 May	1002	ABM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20 May	1003	FPR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21 May	1004	UCD	—	—	—	—	—	—	—	—	—	4	—	—	—	—
21 May	1005	UCC	—	—	—	—	—	—	—	—	—	1	—	—	—	—
21 May	1006	UCB	—	—	—	—	—	—	—	—	—	—	—	3	—	—
21 May	1007	UCA	—	—	—	—	—	—	—	—	—	2	—	56	—	—
22 May	1008	IPA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22 May	1009	IPB	—	—	—	—	—	—	—	—	—	3	1	—	—	—
22 May	1010	IPC	—	—	—	—	—	—	—	—	—	1	—	—	—	—
22 May	1011	IPD	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23 May	1012	CSA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23 May	1013	CSB	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23 May	1014	CSC	—	—	—	—	—	—	—	—	—	—	1	—	—	—
23 May	1015	CSD	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24 May	1016	ISA	—	—	—	—	—	—	—	—	—	1	—	2	—	—
24 May	1017	ISB	—	—	—	—	—	—	—	—	—	4	—	10	—	—
24 May	1018	ISC	—	—	—	—	—	—	—	—	—	1	—	6	—	—
24 May	1019	ISD	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25 May	1020	LFC	—	—	—	—	—	—	—	—	—	1	235	—	—	—
22 June	1021	TKI	—	—	—	—	1	—	—	—	—	1	154	—	—	—
22 June	1022	ABM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22 June	1023	FPR	—	1	3	4	7	—	—	—	—	—	1	—	—	—
23 June	1024	UCD	—	—	—	7	1	—	—	—	—	—	—	—	—	—
23 June	1025	UCC	—	3	2	16	1	—	—	—	—	—	—	—	—	—
23 June	1026	UCB	101	59	40	6	—	—	—	—	2	1	—	—	—	—
23 June	1027	UCA	23	6	6	37	1	—	—	—	—	2	1	—	—	—
24 June	1028	CSA	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24 June	1029	CSB	—	—	—	—	—	—	—	—	3	—	—	—	—	—

Appendix 1.—Continued.

Date	Haul#	Station	Juvenile									Immature	Adult			
			Chum	Pink	Sockeye	Coho	Chinook	Steelhead	Sablefish	Herring	Pollock	Chinook	Herring	Pollock	Coho	Pink
24 June	1030	CSC	—	—	—	—	—	—	—	—	—	—	—	7	—	—
24 June	1031	CSD	1	—	1	—	—	1	—	—	1	—	—	—	—	—
25 June	1032	IPA	1	—	—	1	—	—	—	—	1	—	—	2	—	—
25 June	1033	IPB	1	—	—	—	1	—	—	—	—	—	—	—	—	2
25 June	1034	IPC	—	—	—	2	—	—	—	—	—	—	—	—	—	—
25 June	1035	IPD	—	—	—	—	—	—	—	—	1	—	—	—	—	—
26 June	1036	ISA	49	1	7	5	—	—	—	—	—	—	—	—	—	—
26 June	1037	ISB	18	1	8	2	—	—	—	—	—	—	—	—	—	—
26 June	1038	ISC	524	33	43	42	—	—	—	—	—	3	—	—	—	—
26 June	1039	ISD	65	20	6	1	—	—	—	—	—	1	—	—	—	—
26 June	1040	LFC	—	—	—	—	16	—	—	—	—	—	1	—	—	—
19 July	1041	UCA	227	45	11	4	—	—	—	—	1	—	—	—	—	—
19 July	1042	UCD	3	2	—	—	—	—	—	—	1	—	—	—	—	—
19 July	1043	UCC	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20 July	1044	UCB	378	102	10	4	—	—	—	—	—	—	—	—	—	—
21 July	1045	ISA	4	—	—	—	—	—	—	—	—	—	—	—	—	—
21 July	1046	ISB	4	—	1	3	—	—	—	—	—	—	—	—	—	—
21 July	1047	ISC	491	68	9	6	—	—	—	—	—	—	—	—	—	—
21 July	1048	ISD	1231	206	12	2	—	—	—	—	—	—	—	—	—	—
22 July	1049	UCC	4	1	—	1	—	—	—	—	—	—	—	—	—	—
22 July	1050	FPR	3	—	2	17	1	—	—	—	—	—	—	—	—	—
22 July	1051	LFC	1	—	1	—	48	—	—	—	—	—	12	—	—	—
23 July	1052	ABM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23 July	1053	TKI	—	—	—	—	—	—	—	—	—	—	—	—	—	—
24 July	1054	CSA	1	—	—	1	—	—	—	—	—	—	—	—	—	—
24 July	1055	CSB	—	—	—	2	—	—	—	—	—	—	—	—	—	1
24 July	1056	CSC	—	—	—	—	—	—	—	—	—	—	—	—	—	—
25 July	1057	IPA	98	42	20	3	—	—	—	—	—	—	—	—	—	—
25 July	1058	IPB	43	30	7	4	—	—	—	—	—	—	—	—	—	1
25 July	1059	IPC	5	1	—	—	—	—	—	—	—	—	—	—	—	—
25 July	1060	IPD	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26 July	1061	CSD	6	2	—	—	—	—	—	—	—	—	1	—	—	—
27 July	1062	TKI	—	—	—	—	3	—	—	—	1	—	30	—	—	—

Appendix 1.—Continued.

			Juvenile									Immature	Adult			
Date	Haul#	Station	Chum	Pink	Sockeye	Coho	Chinook	Steelhead	Sablefish	Herring	Pollock	Chinook	Herring	Pollock	Coho	Pink
22 Aug	1063	ISA	—	—	—	2	—	—	—	—	—	—	—	—	—	—
22 Aug	1064	ISB	115	161	12	3	2	—	—	—	—	—	6	—	—	—
22 Aug	1065	ISC	45	41	5	—	—	—	—	—	—	—	—	—	1	1
22 Aug	1066	ISD	21	9	6	1	6	—	—	—	—	—	—	—	2	—
23 Aug	1067	UCD	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23 Aug	1068	UCC	10	5	2	—	—	—	—	—	—	—	1	—	1	—
23 Aug	1069	UCB	10	12	1	9	1	—	—	—	—	2	—	1	1	—
23 Aug	1070	UCA	—	—	5	11	1	—	—	—	—	1	—	1	—	—
24 Aug	1071	UCD	28	22	—	1	2	—	—	—	—	—	—	—	—	—
25 Aug	1072	IPA	2	5	—	—	—	—	—	—	—	—	—	—	—	—
25 Aug	1073	IPB	—	—	—	—	—	—	2	—	—	—	—	—	—	—
25 Aug	1074	IPC	—	—	—	1	—	—	20	—	—	—	—	—	—	—
25 Aug	1075	IPD	—	—	—	—	—	—	26	—	—	—	—	—	—	—
26 Aug	1076	CSA	—	—	—	2	—	—	—	—	—	—	—	—	—	—
26 Aug	1077	CSB	5	6	—	3	—	—	—	45	—	—	—	—	—	—
26 Aug	1078	CSC	—	—	—	3	—	—	37	3	—	—	—	—	—	—
26 Aug	1079	CSD	9	22	—	—	—	—	—	—	—	—	1	—	—	—
27 Aug	1080	FPR	—	1	—	—	1	—	—	—	—	—	—	—	—	—
27 Aug	1081	LFC	—	—	—	—	3	—	—	—	—	—	9	—	—	—
27 Aug	1082	ABM	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27 Aug	1083	TKI	—	—	1	—	3	—	—	—	—	—	70	—	—	—
		Total	3,532	907	216	206	99	1	85	48	11	29	524	88	5	5

*Additional commercially important species captured included 3 juvenile lingcod and 13 juvenile rockfish. The lingcod were caught in June in outside waters (stations CSA, IPA, and IPB). The rockfish were captured in July (12) and August (1) in outside waters (stations IPC, and IPD in July and CSB in August).

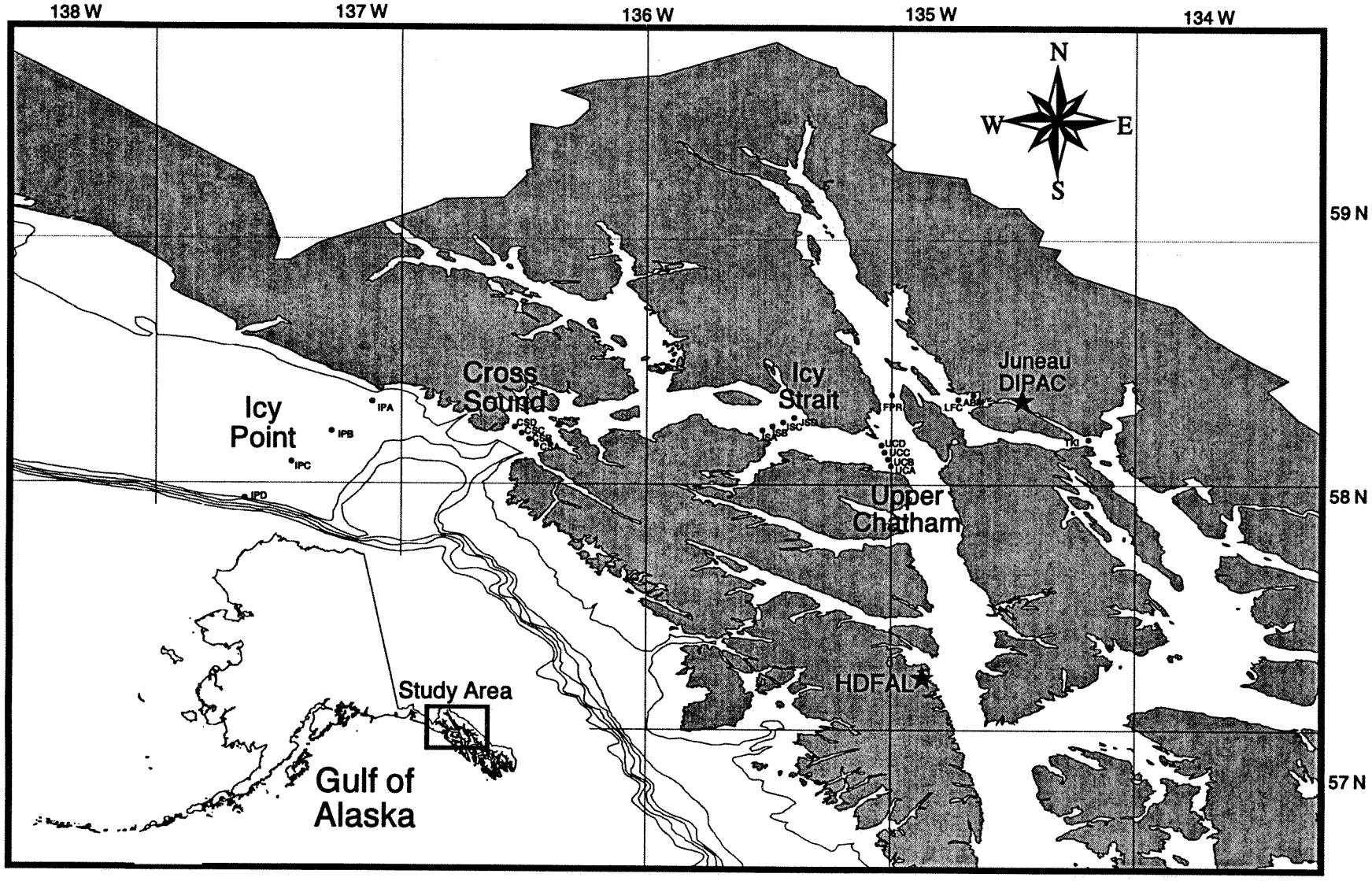

Figure 1.—Stations sampled monthly in marine waters of the northern region of southeastern Alaska, May–August 1997. Stars mark the location of two major enhancement facilities: DIPAC (Douglas Island Pink and Chum Hatchery) and HDFAL (Hidden Falls Hatchery).

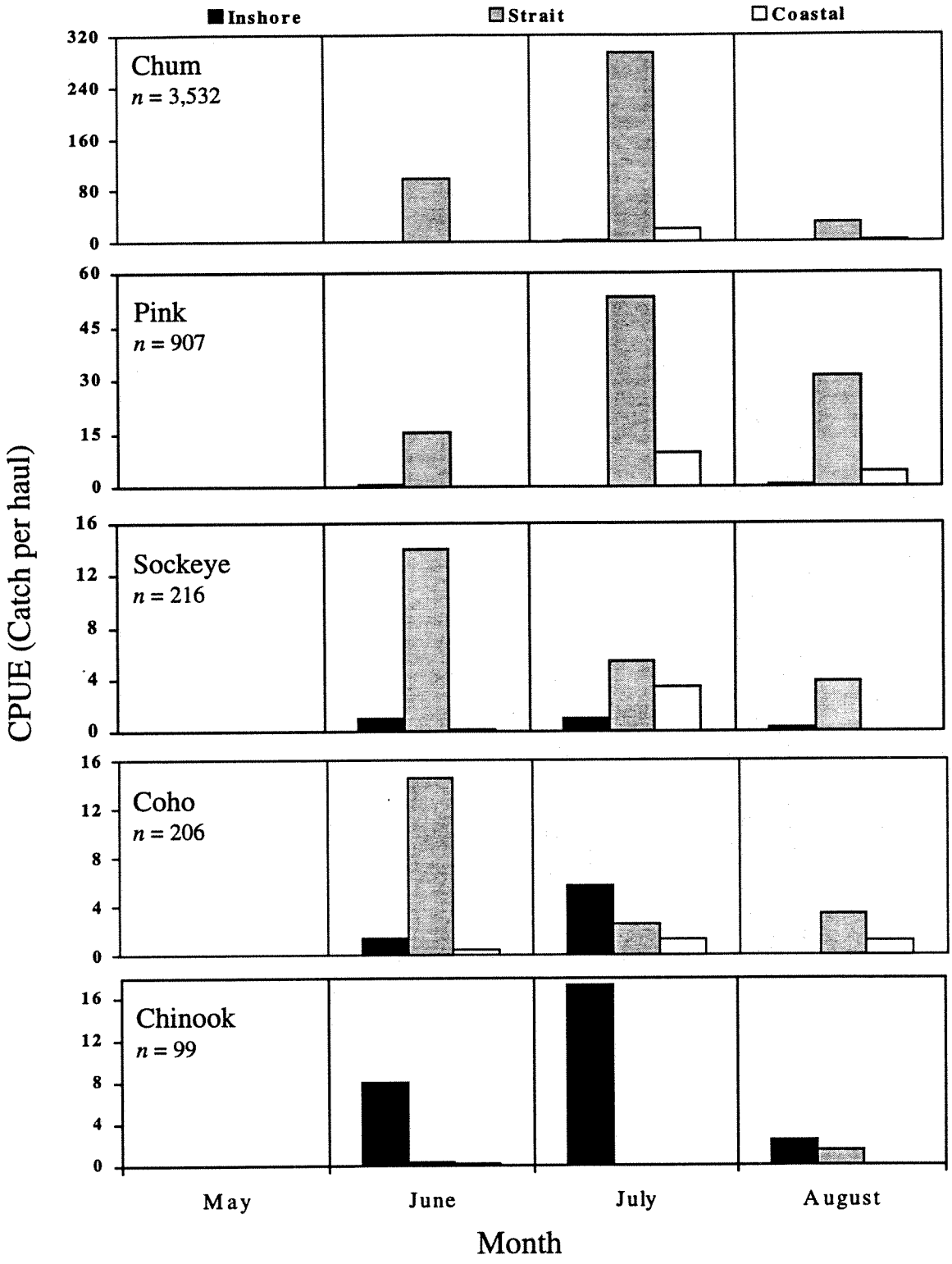

Figure 2.—Catch per rope trawl haul of juvenile salmon in inshore, strait, and coastal marine habitats of the northern region of southeastern Alaska, May–August 1997.

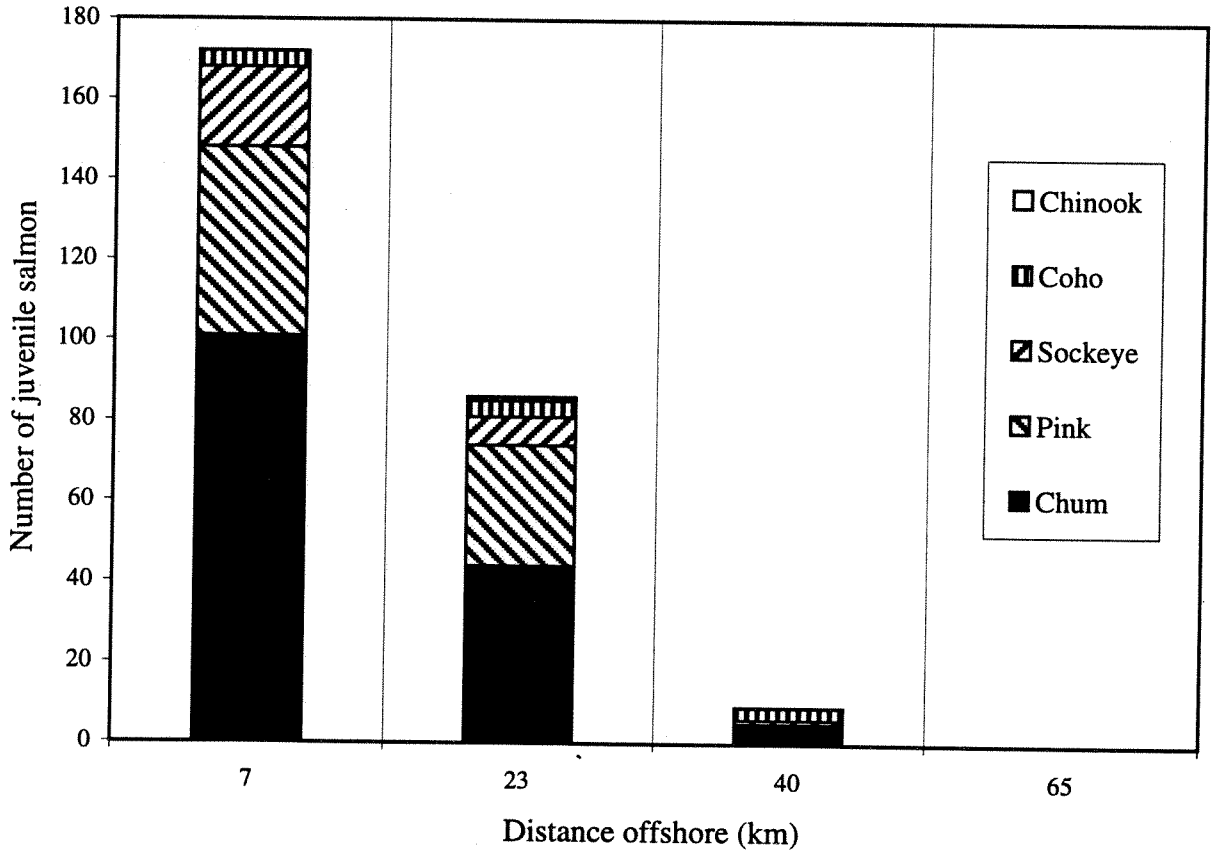

Figure 3.—Number of juvenile salmon captured by rope trawl along the Icy Point transect in marine waters of the northern region of southeastern Alaska, May–August 1997.

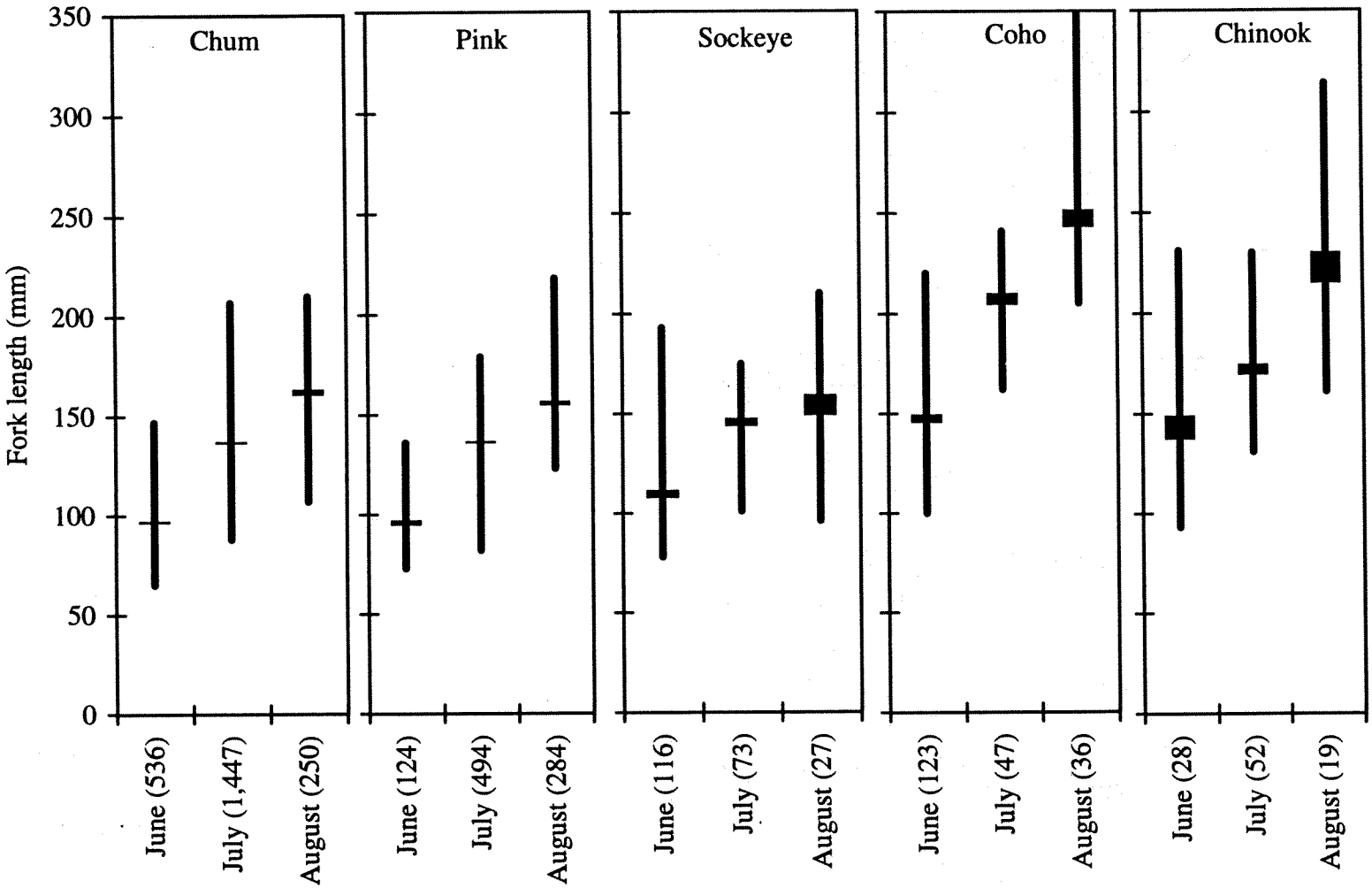

Figure 4.—Fork lengths of juvenile salmon captured in marine waters of the northern region of southeastern Alaska by rope trawl, May–August 1997. No juvenile salmon was captured in May. Length of vertical bars is the size range for each sample, and the boxes within the size range are one standard error on either side of the mean. Sample sizes are shown in parentheses.

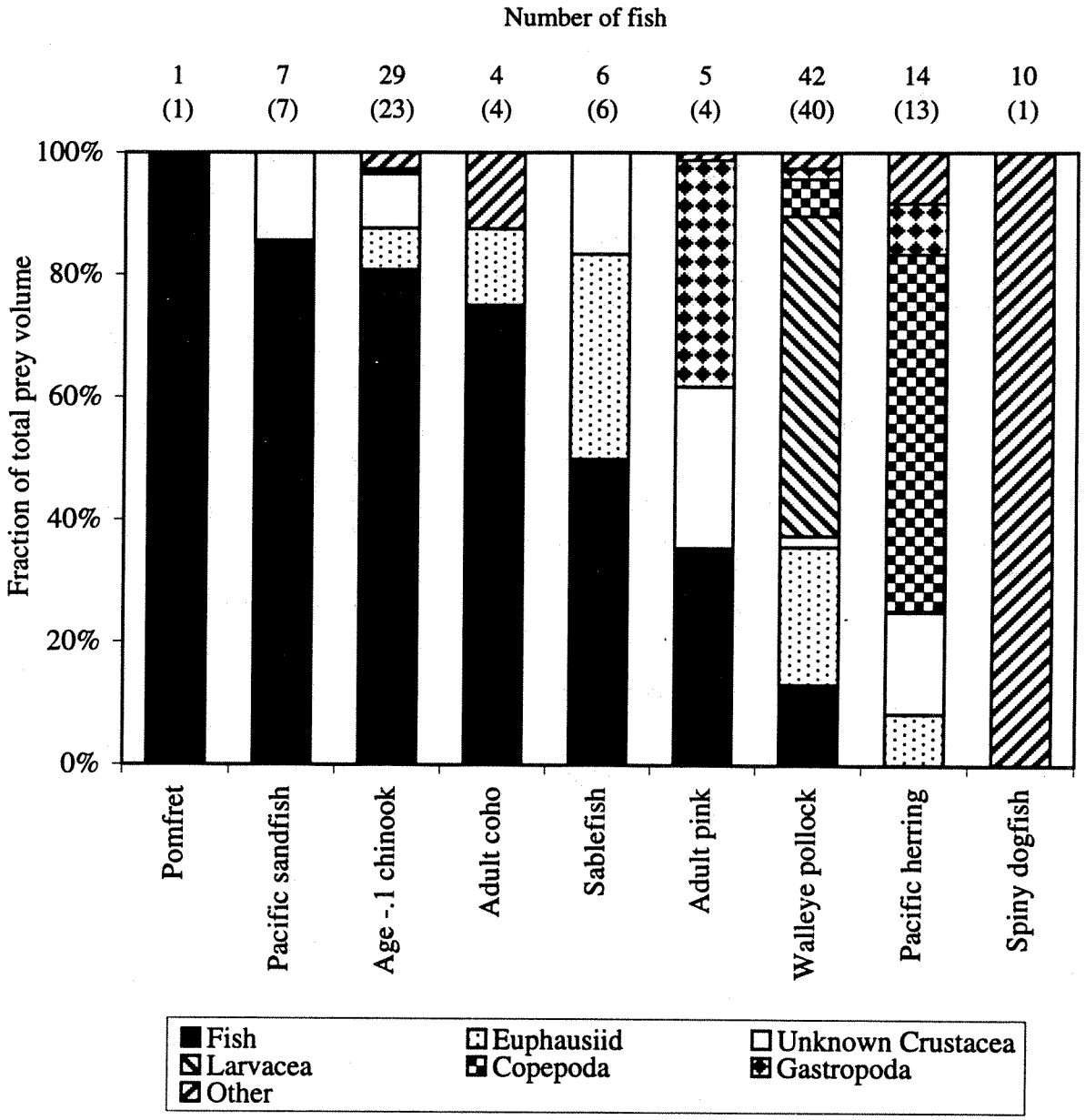

Figure 5.—Feeding by potential predators of juvenile salmon, examined from rope trawl hauls in marine waters of the northern region of southeastern Alaska, May–August 1997. Sample sizes are shown above stacked bars; values in parentheses are fish containing at least one prey item.