Southeast Alaska Coastal Monitoring (SECM)

JC-01-09 Cruise Report **14 August, 2001**

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Scientists from the Auke Bay Laboratory of the National Marine Fisheries Service, Alaska Fisheries Science Center conducted a 7-d cruise aboard the NOAA ship *John N. Cobb* in the marine waters of the northern region of southeastern Alaska from 26 June to 2 July, 2001. In addition to Auke Bay Laboratory scientists, Laurie A. Weitkamp, a collaborating scientist from the Northwest Fisheries Science Center, and Won Park, a collaborating doctoral student at University of Alaska Juneau Center for Fisheries and Ocean Science, accompanied us on the cruise. This cruise is the second in a series of five cruises scheduled to monitor the inside and coastal marine waters of the region monthly in spring, summer, and fall of 2001. Objectives for these monitoring cruises are to: 1) collect biological data on juvenile Pacific salmon (*Oncorhynchus* spp.) and other pelagic fish species from rope trawl samples and 2) monitor physical and biological oceanographic indices seasonally at 13 stations.

Sampling in 2001 marks the fifth year of a long-term study on how the intra- and interannual variability of physical and biological oceanographic indices relate to the distribution, abundance, growth, and survival of salmon and other fish populations at the same localities. It is also the first year in which process studies were planned for monthly cruises to generate additional details about the biology of juvenile salmon species. The information will also provide insight into potential effects of climate change on stock-specific growth and recruitment of salmonids and the utilization of marine habitat by key fish species.

METHODS

Thirteen stations were scheduled for sampling during this cruise, spanning inside waters near Juneau along a 200 km westerly migration corridor within southeastern Alaska to 65 km offshore

in the Gulf of Alaska (Fig. 1, Table 1). The Cross Sound coastal transect and the single inshore stations TKI, LFC and FPR sampled in the past were omitted from the current year's sampling to free up time to conduct shipboard process experiments needed for bioenergetic studies and to collect replicate samples in key strait habitats. Surface trawling and oceanographic sampling were planned for all stations, as time and weather permitted.

Oceanographic sampling:

The physical and biological environment of the water column was monitored at each station and the 2-m surface conditions were monitored constantly throughout the cruise. To examine vertical water column structure, a SeaBird SBE-19[1] conductivity-temperature-depth (CTD) profiler was deployed at each station to 200 m or within 10 m of the bottom. To examine horizontal water structure, temperature and salinity readings from a 2-m depth were logged by the minute with a SeaBird SBE-21 thermosalinograph. Surface water samples were taken at all stations; 200 ml water was filtered with a Millipore[1] system to separate phytoplankton cells from liquid and the two components were frozen for later determination of chlorophyll and nutrient content.

Plankton was sampled at each station with conical and bongo nets. The conical nets were towed vertically and the bongo net system was towed obliquely. At each station, vertical plankton tows were made from a depth of 20 m with a 50-cm frame and 243 micron mesh (Norpac) net. In Auke Bay and in coastal transects only, a 57-cm frame and a 202 micron mesh (WP2) net was deployed to 200 m or within 20 m of the bottom. A Roshiga flow meter was used inside the 57-cm frame deep conical net to determine the amount of water volume sampled. Also at each station, one double oblique bongo tow was done to 200 m or within 20 m of the bottom using a 60-cm frame with 505 and 333 micron mesh nets. General Oceanics flow meters were placed inside each of the bongo nets to determine the amount of water volume sampled. A Bendix/Marine Advisors Model T-1 Bathykymograph time depth recorder was used with the bongo nets to validate the maximum deployment depth of each tow. In addition, a stationary electric pump with 50 mm diameter flexible hose and a flow rate of 1.7 cu m*sec^{-1} was tested for collecting decapod larvae from plankton; the pump was operated at different times of day at 1-m and 10-m depths for 10 minutes, with and without an attached light to attract organisms.

Trawl gear:

Fish sampling was conducted with a Nordic 264 rope trawl fished directly astern the NOAA ship *John N. Cobb* at the surface. Trawl sampling was planned for each station with the exception of Auke Bay Monitor, which was not attempted on account of shallow depths in the vicinity. The mouth opening of the trawl was approximately 20 m deep and 26 m wide, spread by a pair of 3.0 m Lite trawl doors. The trawl was fished fully open with 150 m of main warp out for a duration of 20 min at a speed of about 1.0-1.5 m/sec (2-3 knots). To fish the headrope of the trawl at the surface, a cluster of three meshed A-4 Polyform buoys was tethered to each wing tip of the headrope and one A-3 Polyform float was clipped onto the center of the headrope. Mesh sizes

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

ranged from 162.6 cm in the throat of the trawl near the jib lines to 8.9 cm in the cod end. A 6.1 m long, 0.8 cm knotless liner was sewn into the codend. A small mesh panel of 10.2 cm mesh was incorporated along the jib lines on the top panel of the trawl, between the head rope and the first 162.6 cm mesh, to minimize the loss of fish aft of the headrope.

Juvenile salmon and associated fishes were sampled by rope trawl for two shipboard experiments, diel feeding periodicity and gastric evacuation rate of juvenile chum and pink salmon. The ISC station in Icy Strait was selected as the study site based on long-term catch data and on the abundance of catch the previous day. For the diel feeding periodicity studies, trawling was conducted at seven, approximately 3-hour intervals over a two day period, June 29-30. As the *John N. Cobb* is not a 24-hour endurance vessel, the time periods were spread over two days to compromise between scientific objectives and vessel crew working conditions. Trawls were initiated at 0400, 0700, 1000, and 1300 on the first day and at 1300, 1600, 1900, and 2200 on the second day. The diel trawl hauls were fished for the 20 minute standard time, as catches were not excessive. Processing of other catch, such as potential predators, was maintained as usual during diel samplings.

The gastric evacuation experiment was intended to be conducted simultaneously with the diel feeding periodicity, with an early morning (0400 or 0700) diel sample to serve as the 0-hour fullness sample at the beginning of stomach evacuation. Initiation of these process studies required approximately 200 specimens each of juvenile pink and chum salmon. We tested our ability to conduct the experiment on the ship by sorting the catch from the largest haul to species as quickly as possible into two live tanks to minimize stress from handling and lack of oxygen. The live tanks were approximately 2.5 m^3 in volume, filled with flow-through seawater drawn from 2 m depth to maintain ambient temperatures and filtered through 63 µm mesh to eliminate potential prey. We maintained samples of these live fish to test the feasibility of drawing serial subsamples of 10-15 specimens for the gastric evacuation experiment from the "stock" at timed intervals after capture. As in the May experiment on salmon fry, the serial sacrifice intervals planned were approximately the 0, 1, 2, 4, 6, 8, 12, 16, 20, 24 and 32 hour times after the capture. At each interval, samples were to be removed from the live tank stocks, killed with anaesthetic and preserved in 10% formalin solution in a liter sample jar. As during the May cruise shipboard experiment, rates of gastric evacuation would be calculated from the decline in fish stomach content mass from the time of catch through successive intervals of starvation. Ontogenetic changes in rates of gastric evacuation would then be analyzed by comparing evacuation rates in different months. Evacuation rates will be combined with data on diel feeding periodicity to calculate daily ration for juvenile pink and chum salmon, an important parameter used in bioenergetic modeling.

Fish Processing:

After each haul, the fish were anaesthetized, identified, enumerated, measured, and the stomachs sampled (if appropriate). Tricaine methanesulfonate was used to anesthetize the fish. Fish were measured to the nearest mm fork length (FL) with a Limnotera FMB IV electronic measuring board. All captured salmon were electronically scanned or visually examined for a missing adipose fin, indicating the potential presence of an internal planted coded-wire tag (CWT).

Stomachs from potential predators of juvenile salmon 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. The weight of the stomach contents was determined as the difference between the weight of the stomach and contents minus the weight of the empty stomach.

Laboratory processing:

Data from biological samples readily processed in the laboratory are included in this cruise report. These data include: 1) settled volumes of zooplankton from the 20-m vertical hauls, and 2) CWTs from the heads of salmon lacking the adipose fin. Each sample of plankton was settled for a 24 hr period in an Imhof 1000 ml cone to determine the volume of zooplankton at each station. Volumes of settled zooplankton and phytoplankton were recorded to the nearest ml, when possible. CWTs were removed from heads of salmon lacking the adipose fin and decoded to determine the lot, location, and date the fish were released. CWT codes were verified by an independent tag reader. Release data for the CWT codes were obtained from regional mark coordinators, the Pacific States Marine Fisheries Commission (http://www.psmfc.org/rmpc/cwt_reports.html), the Alaska Department of Fish and Game (http://tagotoweb.adfg.state.ak.us), or the National Marine Fisheries Service, Auke Bay Laboratory.

RESULTS and DISCUSSION

Sampling was accomplished at all 13 of the core stations in June (Table 1). In addition, the Icy Strait transect and the two northern stations in Upper Chatham Strait were sampled a second time to improve abundance estimation and increase sample sizes of juvenile salmon. A diel series of samples was also collected at a single Icy Strait station (ISC) in seven time periods over two days. Therefore, oceanographic and trawl data were collected on 26 occasions (Table 2). A total of 26 CTD casts, 28 vertical 20-m tows, 50 bongo tows, 5 deep vertical tows (WP2), and 25 rope trawl hauls were made during the June cruise, JC-01-09. Additionally, twelve water samples were processed for later laboratory analysis of chlorophyll and nutrient composition.

Physical oceanography:

Surface (2-m) temperatures and salinities during the cruise ranged from 10.9-13.7°C (mean 12.5°C) and 18.0-32.1 Practical Salinity Units (PSU, mean 26.1 PSU; Table 3). Although not monitored synchronously, temperatures varied between stations on a transect by 1.1°C to 2.3°C . Peak temperatures were measured at ABM and at Icy Strait stations, whereas the lowest temperatures occurred in Upper Chatham and Icy Straits. Overall, the temperature range was similar at all transects during routine daily sampling. The salinity pattern, however, was noticeably lowest at the inshore station (ABM) and highest at the offshore coastal stations (i.e., IPA, IPB, IPC, and IPD). Temperatures and salinities in 2001 were generally within the ranges found for the same month of the previous four years of study.

Diel sampling at ISC in Icy Strait revealed temperature variation of more than a degree and one

PSU over a 24-hr period (Table 3). The 2-m temperature at ISC was lowest (12.3 °C) at 0700, gradually increased to a diel peak at 1520, and stayed above 13 °C until at least 2130. This pattern occurred on a day when afternoon light conditions were among the highest observed for the cruise, indicating heat absorption in the water column. Light conditions were generally high during the June cruise, averaging nearly 400 $W*m^{-2}$. Light conditions during trawling times ranged from a low of 2 $W*m^{-2}$ during the latest diel period (2130) to a peak of 821 $W*m^{-2}$ one midday.

Plankton:
Zooplankton biomass, as determined from the settled volumes of the 20-m vertical tows, ranged ten-fold at the stations, from 7-72 ml (mean of 34 ml). Virtually no phytoplankton was present in the June samples. Similar peak zooplankton levels of 42-48 ml were observed on each transect, but the overall highest levels of zooplankton were encountered at night on the Icy Strait transect (ISC, 2130, 72 ml). The single zooplankton sample taken to represent inshore stations, at ABM, had one of the lowest volumes recorded for the study area, coincident with one of the highest temperatures and lowest salinities observed. Zooplankton spatial patchiness was evident in the broad range of volumes measured at stations across each transect and between transects. Zooplankton volumes at Icy Point were generally lower than on other transects. The mean plankton volume for the Icy Point transect was 21 ml, at least ten ml lower than any other transect mean. Pump sampling of zooplankton for larval decapods were generally not very successful, probably because of the small hose diameter.

Temporal differences in zooplankton biomass in the upper 20 m water column were also evident from diel sampling at ISC. Plankton volumes were lowest at midday (21-24 ml), with peaks at approximately 0700 and 1900. The evening peak was greater than the morning peak, however (55 and 72 ml).

Fish catches:

A total of 1,253 fish from 19 taxa were captured in the 25 rope trawl hauls, including all five species of Pacific salmon (Tables 4-6). All fish caught were measured, with the exception of one smooth lumpsucker (*Aptocyclus ventricosus*) held live. The primary catch component was juvenile salmon, particularly chum (*O. keta*, n = 485) and coho salmon (*O. kisutch*, n = 278). The catches of juvenile pink (*O. gorbuscha*) and sockeye (*O. nerka*) salmon were lower (n = 164 and 148), and only 14 juvenile chinook (*O. tshawytscha*) salmon were caught (Table 4). Among the maturing salmon, immature chinook were caught in the greatest numbers (17). By frequency of occurrence, three salmon species were caught equally commonly: chum (*O. keta*), sockeye (*O. nerka*), and coho salmon (*O. kisutch*) were each caught in 20/25 hauls (Table 6). Juvenile pink salmon (*O. gorbuscha*) were captured at approximately half the frequency as these species (in 11/25 hauls). Furthermore, while chum (*O. keta*), sockeye (*O. nerka*) and coho (*O. kisutch*) salmon were caught relatively consistently along the strait habitats, our initial finding of highest pink salmon abundance at UCC was confirmed by the replicate trawl sample collected at this station. Few salmon were caught on the Icy Point coastal transect, and primarily at the station closest to shore, IPA (Table 4).

CWT's:

Seven juvenile coho (*O. kisutch*) and three juvenile chinook (*O. tshawytscha*) salmon lacking adipose fins were examined for the presence of previously implanted coded-wire tags (CWTs; Table 4). All ten salmon contained CWTs and were recovered in Icy or Upper Chatham Straits. Five coho released between mid-April and late May of this year in the Chilkat, Berners and Taku Rivers (northern region of southeastern Alaska) were recovered after 43-78 days at sea. Two tagged coho were released in prior years, an individual released on 13 June, 2000 in Taiya Inlet (northern Lynn Canal) which was recovered more than one year later, on July 1, 2001, and an individual released in mid-May of 1999 in Berners River which was recovered more than two years later, on 28 June 2001. A tagged chinook released in Fish Creek near Juneau in June 2000 was recovered approximately thirteen months later in Upper Chatham Strait. Two tagged chinook released at Hidden Falls Hatchery on Baranof Island on 5 May 2001 were recovered nearly two months later, in late June 2001. Data documenting the occurrence of CWT coho and chinook juveniles in the study area in June is consistent with results from the prior four years of study.

Fish diets:

Onboard stomach analysis was performed on 46 immature and adult fish (Tables 5 and 6), the most common of which were chinook salmon (*O. tshawytscha*; n = 17) and walleye pollock *(T. chalcogramma*; n = 9). Others included three chum (*O. keta*), one coho (*O. kisutch*) , two sockeye (*O. nerka*) and five pink *(O. gorbuscha*) salmon, one black rockfish (*Sebastes* sp.), five sablefish (*Anoplopoma fimbria*), and three spiny dogfish (*Squalus acanthias*). No remains of juvenile salmon were identified from the guts of these potential predators. Piscivory was observed principally in chinook *(O. tshawytscha*) and coho (*O. kisutch*) salmon, secondarily in a pink salmon (*O. gorbuscha*) and four pollock (*T. chalcogramma*). Prey fish in their guts included lanternfish (Myctophidae), pollock (*T. chalcogramma*), sandlance (*Ammodytes hexapterus*), and unidentified larval and older fish. Other common prey included hyperiid amphipods (11/44 fish), pteropods (7/44 fish), decapod zoeae (7/44 fish), and cephalopods (4/44 fish). Coho (*O. keta*) and chinook (*O. tshawytscha*) were the only species without any empty stomachs, for an overall rate of 12/44 empty stomachs (26%).

Diel and evacuation samples:

Diel samples of pink, chum and coho salmon were collected by trawling at seven, three-hour time intervals at ISC on June 29 and 30 (Table 7). Feeding periodicity will be determined from analysis of their stomach contents. Time of day of peak stomach fullness will be examined as well as diel differences in prey consumed. Diel samples collected in May for younger salmon (see Cruise Report for JC-01-05) and anticipated for July, older fish (JC-01-13) will be compared to the June samples for an analysis of ontogenetic changes in feeding periodicity and changes in prey composition. These samples will also allow studies of feeding interactions between the species from single hauls at different times of day. In June, samples of pink salmon were the most limited of all species, both in general and for the diel series. Sufficient samples of juvenile pink salmon were collected at only two time intervals in the diel study. A complete diel series was obtained for juvenile chum and coho salmon, although sample sizes were $\leq$ 5 fish in three of

16 cases (Table 7).

The evacuation experiments could not be conducted on this cruise because the fish were in poor condition after trawling and catches were too low to make up for high mortalities. No catches of pink salmon exceeded 21 individuals during the diel trawling (Table 4). Chum salmon were held from haul 5028, the largest trawl catch of the cruise (n = 81 chum), but the badly de-scaled fish survived less than one hour in the live tank. The evacuation experiments will be attempted during the July SECM cruise scheduled for July 27-August 2. The fish should survive the trawl in better condition because of their larger size and because of anticipated higher abundance of jellyfish, which "cushion" them in the cod end of the trawl.

Concluding remarks:

The JC-01-09 cruise for SECM in June 2001 was entirely successful despite our inability to collect data on evacuation rates of juvenile salmon, a primary objective. All other objectives were met in an efficient manner, and replicate trawl sampling of key stations provided highly useful information. The vessel was able to return to port at least half a day early, the evening of July 1.

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Table 1.–Localities and coordinates of stations scheduled for sampling in the marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 26 June-2 July 2001.

Locality	Station	Latitude north	Longitude west	Distance offshore km	Distance between km	Depth m
Auke Bay	ABM	58° 22.00'	134° 40.00'	1.5	—	60
Upper Chatham Strait	UCA	58° 04.57'	135° 00.08'	3.2	—	400
	UCB	58° 06.22'	135° 00.91'	6.4	3.2	100
	UCC	58° 07.95'	135° 01.69'	6.4	3.2	100
	UCD	58° 09.64'	135° 02.52'	3.2	3.2	200
Icy Strait	ISA	58° 13.25'	135° 31.76'	3.2	—	128
	ISB	58° 14.22'	135° 29.26'	6.4	3.2	200
	ISC	58° 15.28'	135° 26.65'	6.4	3.2	200
	ISD	58° 16.38'	135° 23.98'	3.2	3.2	234
Icy Point	IPA	58° 20.12'	137°07.16'	6.9	—	160
	IPB	58° 12.71'	137°16.96'	23.4	16.8	130
	IPC	58° 05.28'	137°26.75'	40.2	16.8	150
	IPD	57° 53.50'	137°42.60'	65.0	24.8	1,300

Table 2.–Oceanographic and biological samples collected in the marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 26 June-2 July 2001.

				Plankton net samples				
Date	Station	Haul Number	CTD	Norpac	Bongo[1]	WP2	Chlorophyll & nutrients	Rope trawl
26 June	ABM	5014	1	3	2	1	1	0
26 June	UCD	5015	1	1	2	0	1	1
26 June	UCC	5016	1	1	2	0	1	1
26 June	UCB	5017	1	1	2	0	1	1
26 June	UCA	5018	1	1	2	0	--	1
26 June	IPD	5019	1	1	2	1	1	1
27 June	IPC	5020	1	1	2	1	1	1
27 June	IPB	5021	1	1	2	1	1	1
27 June	IPA	5022	1	1	2	1	1	1
28 June	ISD[1]	5023	1	1	4	0	1	1
28 June	ISC	5024	1	1	4	0	1	1
28 June	ISB	5025	1	1	4	0	1	1
28 June	ISA	5026	1	1	4	0	1	1
29 June	ISC[2]	5027	1	1	2	0	0	1
29 June	ISC	5028	1	1	2	0	0	1
29 June	ISC	5029	1	1	2	0	0	1
29 June	ISC	5030	1	1	2	0	0	1
30 June	ISC	5031	1	1	2	0	0	1
30 June	ISC	5032	1	1	2	0	0	1
30 June	ISC	5033	1	1	2	0	0	1
30 June	ISC	5034	1	1	2	0	0	1
01 July	ISA[3]	5035	1	1	0	0	0	1
01 July	ISB	5036	1	1	0	0	0	1
01 July	ISD	5037	1	1	0	0	0	1
01 July	UCC	5038	1	1	0	0	0	1
01 July	UCD	5039	1	1	0	0	0	1
Total samples			26	28	50	5	12	25

[1]A pair of shallow (20 m) and a pair of deep bongo samples were taken at routine Icy Strait stations only; only shallow bongo and Norpac samples were collected during diel trawling.
[2]Diel trawling was conducted June 29-30 (hauls 5027-5034); no water samples were taken.
[3]Replicate trawl samples, limited oceanographic samples were collected.

Table 3.– Two meter depth temperatures and salinities and settled volumes of plankton in 20-m vertical Norpac hauls at stations sampled by the NOAA ship *John N. Cobb* in marine waters of northern southeastern Alaska, 26 June-2 July 2001.

							Plankton Settled Volume (ml)		
Date	Station	Haul Number	Time	Temperature (°C)	Salinity (PSU)	Light ($W*m^{-2}$)	Zooplankton	Phytoplankton	Total Plankton
26 Jun	ABM	5014	1017	13.4	18.0	589	19	0	19
26 Jun	UCD	5015	1400	10.9	28.1	759	19	0	19
26 Jun	UCC	5016	1600	12.9	26.3	509	48	0	48
26 Jun	UCB	5017	1830	12.3	26.1	205	26	0	26
26 Jun	UCA	5018	1950	11.9	26.4	135	20	0	20
27 Jun	IPD	5019	830	11.7	32.0	340	43	0	43
27 Jun	IPC	5020	1235	12.1	32.1	647	12	0	12
27 Jun	IPB	5021	1420	11.5	31.9	767	7	0	7
27 Jun	IPA	5022	1653	12.6	32.0	499	22	0	22
28 Jun	ISD	5023	930	12.2	24.1	33	42	0	42
28 Jun	ISC	5024	1214	12.3	23.6	149	38	0	38
28 Jun	ISB	5025	1421	11.0	26.9	217	19	0	19
28 Jun	ISA	5026	1520	12.2	28.2	255	24	0	24
29 Jun	ISC	5027	400	12.5	23.7	150	39	0	39
29 Jun	ISC	5028	700	12.3	24.1	631	55	0	55
29 Jun	ISC	5029	920	12.4	24.3	255	40	0	40
29 Jun	ISC	5030	1300	12.6	24.6	287	30	0	30
30 Jun	ISC	5031	1300	13.4	24.8	568	38	0	38
30 Jun	ISC	5032	1520	13.7	24.6	799	44	0	44
30 Jun	ISC	5033	1830	13.5	24.5	396	72	0	72
30 Jun	ISC	5034	2130	13.2	24.3	2	60	0	60
01 Jul	ISA	5035	700	13.3	24.6	52	21	0	21
01 Jul	ISB	5036	900	13.3	24.7	152	45	0	45
01 Jul	ISD	5037	1000	12.9	25.6	753	15	0	15
01 Jul	UCC	5038	1345	11.6	27.3	702	30	0	30
01 Jul	UCD	5039	1215	12.0	26.1	821	43	0	43

Table 4.–Numbers of salmon caught with a rope trawl at stations sampled by the NOAA ship *John N. Cobb* in marine waters of the northern region of southeastern Alaska, 26 June-2 July 2001.

			Juvenile Salmon					Immature Salmon	Adult Salmon			
Date	Station	Haul Number	Chum	Pink	Coho	Chinook	Sockeye	Chinook	Chum	Pink	Coho	Sockeye
26 June	ABM	5014	--	--	--	--	--	--	--	--	--	--
26 June	UCD	5015	0	1	5	2	0	0	0	0	0	0
26 June	UCC	5016	22	25	0	2	3	0	0	0	0	0
26 June	UCB	5017	6	0	1	0	2	0	0	0	0	0
26 June	UCA	5018	0	4	13	0	2	0	0	0	0	0
27 June	IPD	5019	0	0	0	0	0	0	0	0	0	0
27 June	IPC	5020	0	0	0	0	0	0	0	0	1	0
27 June	IPB	5021	1	0	0	0	0	0	0	0	0	0
27 June	IPA	5022	11	0	0	0	7	1	0	2	0	0
28 June	ISD	5023	23	7	7	1[1]	2	0	0	0	0	0
28 June	ISC	5024	34	19	6[1]	0	4	0	0	0	0	0
28 June	ISB	5025	41	21	8	1	2	1	0	1	0	0
28 June	ISA	5026	29	0	2	1	1	1	1	0	0	0
29 June	ISC	5027	7	1	28	0	7	0	0	0	0	0
29 June	ISC	5028	81	9	31[1]	0	9	1	0	0	0	0
29 June	ISC	5029	16	0	3	0	0	0	0	0	0	0
29 June	ISC	5030	23	13	5	0	2	0	0	1	0	0
30 June	ISC	5031	8	0	21	2	5	2	0	1	0	0
30 June	ISC	5032	9	0	29	1[1]	10	2	0	0	0	0
30 June	ISC	5033	41	1	20	1	39	3	0	0	0	1
30 June	ISC	5034	5	0	15[1]	0	10	3	0	0	0	1
1 July	ISA	5035	29	0	21	0	5	0	0	0	0	0
1 July	ISB	5036	30	0	17[1]	0	22	0	0	0	0	0
1 July	ISD	5037	10	0	29	1	3	0	1	0	0	0
1 July	UCC	5038	59	63	5	2	11	1	0	0	0	0
1 July	UCD	5039	0	0	12[1]	0	2	2	0	0	0	0
Total Catch			485	164	278	14	148	17	3	5	1	2

[1]coded-wire tag present

Table 5.–Length, frequency of occurrence[1], and life history stage of fish captured with 26 rope trawl hauls in the marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 26 June-2 July 2001.

Common name	Species name	Number caught (n)	Fork length (mm) Min.	Max.	Mean	Frequency of occurrence	Life history stage
Pink (humpy)	*Oncorhynchus gorbuscha*	164	65	117	93.1	11	J
Chum (dog)	*O. keta*	485	63	136	96.2	20	J
Sockeye (red)	*O. nerka*	148	70	179	118.5	20	J
Coho (silver)	*O. kisutch*	278	104	236	163.9	20	J
Chinook (king)	*O. tshawytscha*	14	121	436	212.6	10	J
Total juvenile salmon measured		1089					
Chinook	*O. tshawytscha*	17	271	415	342.5	10	I
Pink	*O. gorbuscha*	5	423	558	482.8	4	A
Coho	*O. kisutch*	1	641	641	641.0	1	A
Chum	*O. keta*	3	595	705	639.7	3	A
Sockeye	*O. nerka*	2	639	673	656.0	2	A
Total maturing salmon measured		28					
Capelin	*Mallotus villosus*	1	53	53	53.0	1	J
Crested sculpin	*Blepsias bilobus*	4	41	58	45.8	4	J
Prowfish	*Zaprora silenus*	12	35	58	43.5	2	J
Pacific sandlance	*Ammodytes hexapterus*	1	60	60	60.0	1	J
Sablefish	*Anoplopoma fimbria*	5	322	367	337.2	1	J
Walleye pollock	*Theragra chalcogramma*	18	23	594	258.1	10	J
Rockfish	*Sebastes* sp.	1	320	320	320.0	1	A
Lingcod	*Ophiodon elongatus*	8	64	74	66.5	3	J
Squid	Gonatidae	76	29	67	42.9	1	J
Smooth lumpsucker	*Aptocyclus ventricosus*	1	--	--	--	1	J
Spiny dogfish	*Squalus acanthias*	3	571	887	703.7	2	A
Pacific Saury	*Cololabis saira*	1	36	36	36.0	1	J
Unidentified larvae		5	19	36	27.8	3	J
Total non-salmonids measured		136					
Total fish measured		1253					

[1]J = juvenile or post larvae in first year at sea (i.e., age -.0), I = immature age -.1 or older, and A = mature (-ing) adult.

Table 6.–Catches of fish other than salmon at stations sampled with a rope trawl from the NOAA ship *John N. Cobb* in marine waters of the northern region of southeastern Alaska, 26 June-2 July 2001.

Haul Num.	Station	capelin	crested sculpin	lingcod	P. sandlance	P. saury	prowfish	sablefish	*Sebastes* sp.	sm. lumpsucker	spiny dogfish	squid	unid. larvae	walleye pollock	Total per Haul
5015	UCD	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5016	UCC	0	1	0	0	0	0	0	0	0	0	0	0	0	1
5017	UCB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5018	UCA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5019	IPD	0	0	2	1	1	10	0	0	0	0	76	0	0	90
5020	IPC	0	1	2	0	0	2	0	0	0	1	0	0	0	6
5021	IPB	0	0	0	0	0	0	0	0	0	2	0	0	0	2
5022	IPA	0	0	4	0	0	0	5	0	0	0	0	0	0	9
5023	ISD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5024	ISC	0	1	0	0	0	0	0	0	0	0	0	0	0	1
5025	ISB	0	0	0	0	0	0	0	0	0	0	0	3	1	4
5026	ISA	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5027	ISC	0	0	0	0	0	0	0	0	0	0	0	0	2	2
5028	ISC	1	0	0	0	0	0	0	0	1	0	0	0	6	8
5029	ISC	0	0	0	0	0	0	0	0	0	0	0	1	0	1
5030	ISC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5031	ISC	0	0	0	0	0	0	0	0	0	0	0	0	2	2
5032	ISC	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5033	ISC	0	0	0	0	0	0	0	0	0	0	0	1	1	2
5034	ISC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5035	ISA	0	1	0	0	0	0	0	1	0	0	0	0	1	3
5036	ISB	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5037	ISD	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5038	UCC	0	0	0	0	0	0	0	0	0	0	0	0	1	1
5039	UCD	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Total per Species		1	4	8	1	1	12	5	1	1	3	76	5	18	136

Table 7.–Samples of juvenile pink and chum salmon preserved in formalin for diel feeding periodicity study in Icy Strait, 29-30 June 2001, during *John N. Cobb* cruise JC-01-09.

Diel Time Period	Haul Number	Time of Catch	Date	Hour of Feeding	Juvenile salmon species		
					Pinks (n)	Chums (n)	Coho (n)
D1	5027	0400	29-Jun	0	1	7	10
D2	5028	0700	29-Jun	3	9	13	10
D3	5029	1000	29-Jun	6	0	14	3
D4-1	5030	1300	29-Jun	9	13	23	5
D4-2	5031	1300	30-Jun	9	0	8	12
D5	5032	1600	30-Jun	12	0	8	12
D6	5033	1900	30-Jun	15	1	12	12
D7	5034	2200	30-Jun	18	0	5	13
Total					24	90	77

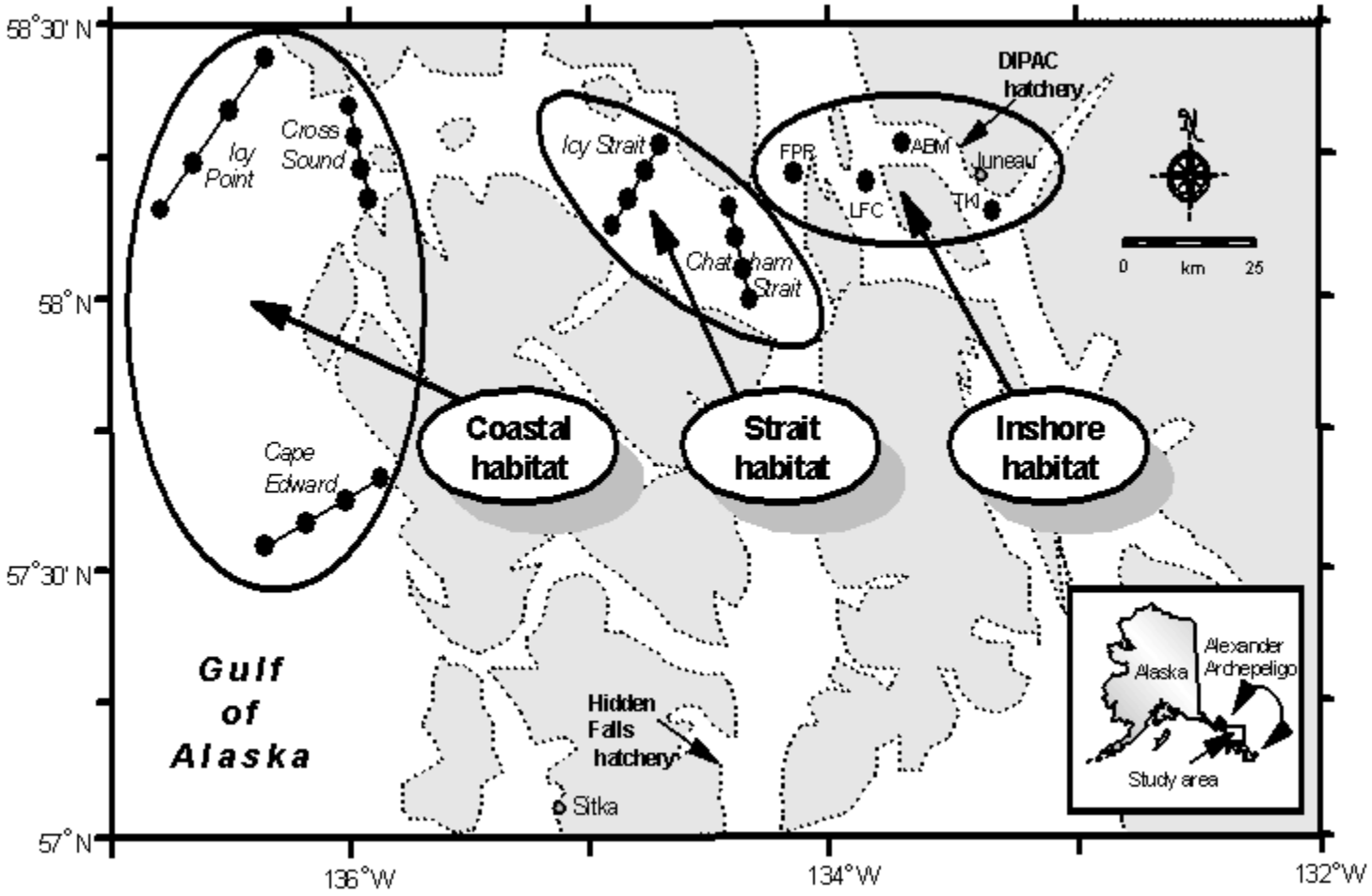

Figure 1.—Stations sampled monthly in marine waters of the northern region of southeastern Alaska, May–October 1997-2001. Arrows indicate principal enhancement facilities, DIPAC (Douglas Island Pink and Chum) and Hidden Falls hatchery.