

Southeast Alaska Coastal Monitoring Project

JC-03-04b June Cruise Report

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Prepared by
Molly V. Sturdevant, Joseph A. Orsi, and Rhys Smoker*
Auke Bay Laboratory, 11305 Glacier Highway
Juneau, Alaska 99801-8626
TEL (907) 789-6034 FAX (907) 789-6094
E-mail: molly.sturdevant@noaa.gov

* volunteer

Scientists from the Marine Salmon Investigations Program at Auke Bay Laboratory, Alaska Fisheries Science Center, National Marine Fisheries Service, NOAA Fisheries conducted a 4-day cruise aboard the NOAA ship *John N. Cobb* in the marine waters of the northern region of southeastern Alaska, 12-15 June 2003. JC-03-04b was an opportunistic sampling cruise added to the Southeast Alaska Coastal Monitoring (SECM) project when a NMML trip was cancelled; it fortunately replaces a short cruise requested for this time period which was denied due to the limited Cobb schedule. The data collected will provide improved temporal resolution on the abundance of juvenile salmon in Icy Strait and on size selectivity of two gear types for juvenile salmon during the period of transition from nearshore to offshore habitats.

Sampling in 2003 marks the seventh year of the SECM project, initiated in 1997 to study the habitat use and early marine ecology of juvenile Pacific salmon (*Oncorhynchus* spp.) in inshore, strait, and coastal habitats along a primary seaward migration corridor used by juvenile salmon. These habitats span 250 km from near Juneau westward through Icy Strait, the SECM index area, to 64 km offshore in the Gulf of Alaska. General objectives for the monitoring cruises are to: 1) collect biological data and stock-specific information on juvenile Pacific salmon (*Oncorhynchus* spp.) and other pelagic fish species from surface rope trawl samples; 2) monitor physical and biological oceanographic indices seasonally at sampling stations in inside, strait, and offshore habitats of juvenile salmon; and 3) conduct process studies focusing on bioenergetics of juvenile salmon.

METHODS

Four stations along the Icy Strait transect were sampled on cruise JC-03-04b during mid-June 2003 (Table 1, Figure 1). Oceanographic measurements and rope trawl samples and replicates were collected at all four stations; a nocturnal trawl was conducted at ISD and nocturnal townetting was conducted at stations ISD, ISB and off-transect near Pleasant Island.

Oceanographic sampling:

The biophysical environment was monitored at each station and throughout the cruise.

To examine horizontal water structure, temperature and salinity readings were continuously logged at one-minute intervals from 2-m depth using a SeaBird SBE-21¹ thermosalinograph. To examine vertical water structure, a Seabird SBE-19 conductivity-temperature-depth (CTD) profiler was deployed at each station to 200 m or within 10 m of the bottom, dependent on depth. Surface water samples were taken at each station for later determination of chlorophyll and nutrient content.

Zooplankton was sampled at each station with conical nets hauled vertically and a bongo net system towed obliquely. At each station, vertical plankton hauls were retrieved from a depth of 20 m using a 50-cm frame and 243 micron mesh (Norpac) net. A Roshiga flow meter was used inside the vertical net frames to determine the amount of water volume sampled. Also at each station, one “deep” 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, and one “shallow” bongo tow was done to 20 m depth. 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. During replicate trawls, only the Norpac sample and a 50 m CTD cast were collected.

Trawl Sampling:

Sampling for fish was accomplished with two research nets. The project standard gear, a Nordic 264 rope trawl, was fished directly astern the NOAA ship *John N. Cobb* at the surface. 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 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. Along the jib lines on the top panel of the trawl, between the head rope and the first 162.6 cm mesh, a small mesh panel of 10.2 cm mesh was incorporated to minimize the loss of fish aft of the headrope.

Secondary fishing operations were accomplished using a two-boat trawl (townet) deployed and retrieved by the *John N. Cobb*, with assistance from by the Auke Bay lab vessel *R/V Quest* at its port side. This trawl has a mouth opening of 3 m deep x 6 m wide and is held open by a pair of steel spreader bars having bottom weights and top floats. The net is fished for ten minutes with one towing bridle hooked to each vessel at a speed of 1.0 m/s (2 knots). The trawl mesh tapers to approximately 1.5 mm at the cod end.

After each haul, the fish caught were anaesthetized with tricaine methanesulfonate, identified, enumerated, measured, and stomachs sampled (if appropriate). Fish were measured to the nearest mm fork length (FL) with a Limnotera FMB IV electronic measuring board or metric ruler. All salmon were examined for missing adipose fins indicating the presence of a coded-wire tag (CWT) in the snout. Stomachs from potential predators of juvenile salmon were excised, weighed, and classified by fullness. The weight of the stomach contents was determined

¹Reference to trade names does not imply endorsement by the NOAA Fisheries.

as the difference between the weight of the stomach and contents minus the weight of the empty stomach. Stomach contents were removed and prey were generally identified to the family level and estimated to the nearest 10% of total volume.

Laboratory processing:

Laboratory processing in progress includes 1) settled volumes (SVs) of zooplankton in the 20-m NORPAC vertical hauls, 2) measurement of weight and condition of juvenile salmon; 3) determination of energetic content from frozen samples of juvenile pink, chum, and coho salmon; 4) examination for otolith thermal marks in frozen samples of juvenile chum, sockeye, coho, and chinook salmon; 5) scale samples of each species of juvenile salmon; 6) measurement of plankton displacement volumes of all Bongo net samples; 7) zooplankton species composition and abundance from all Norpac hauls and from Bongo net samples taken in Icy Strait stations; and 8) determination of energy density of zooplankton taxa from frozen samples using bomb calorimetry.

RESULTS and DISCUSSION

Standard oceanographic sampling and surface trawling were conducted according to the following schedule at the four stations in Icy Strait (Table 1):

Day 1: Daylight rope trawling at Icy Strait transect (4 stations) with short oceanographic sampling.

Day 2: Daylight rope trawling at Icy Strait transect (4 stations) with complete oceanographic sampling.

Day 3: Nocturnal two-boat trawling at Icy Strait transect (2 stations).

Day 4: Nocturnal rope trawling (with short oceanographic sampling) and two-boat trawling at Icy Strait transect (2 stations).

Oceanographic sampling was accomplished at each transect station. A total of 9 CTD casts, 4 water samples, 9 Norpac tows, and 8 bongo tows (two nets each) were made during the cruise (Table 2).

Surface (2-m) temperatures and salinities ranged from 9.4 to 10.5°C and from 30.5 to 31.0 PSU. Average temperature was approximately 2 degrees higher and salinities were approximately 0.5 PSU lower in the mid-June cruise JC-03-04b compared to values from the same stations in late May during cruise JC-03-02.

No juvenile salmon were captured in either the rope trawl or the two-boat trawl. Prior years of research have consistently established that juvenile salmon are absent in the earliest offshore trawling period, late May, but are abundant by the next trawling period, late June. The 2003 season is the first in which the SECM project has sampled with the rope trawl in mid-June. These findings confirm that juvenile salmon are not avoiding the surface trawl due to its

relatively large mesh size, and suggest that juvenile salmon rapidly transit from nearshore to offshore habitats in the latter half of June. However, the timing of this transition from onshore to offshore in Icy Strait cannot be characterized without fishing the townet closer to shore. This will require more sampling with the townet inshore of the existing rope trawl monitoring stations (Table 1).

A total of nine immature and adult salmon were captured with the rope trawl (6 chinook, two chum, and one sockeye salmon), representing all stations except ISA on the southern end of the transect. All three species were captured in both diurnal and nocturnal rope trawl hauls. No coded-wire tags were indicated by absence of salmon adipose fins. Juvenile pollock were the only other prominent species caught in rope trawls (Table 3); ten juvenile pollock were caught at ISB during daylight and an estimated 4,032 juvenile pollock were caught at ISD in the middle of the night. At an average size of 272 g mean wet weight and 316 mm mean total length, this catch equates to 1.1 metric tons of juvenile pollock biomass per 20-minute trawl haul (0.11 pollock per square meter). Stomach analysis was completed on all nine salmon, a sandfish, and twenty juvenile pollock. The two-boat trawls caught a variety of larval fish, crab zoeae and euphausiids, which were retained for identification in the laboratory. The catch in the single tow made near Pleasant Island was estimated at nearly 12,000 larval fish, which were predominantly comprised of the elongate type tentatively identified as capelin (average TL 23 mm). These larval fish, crab zoeae and euphausiids were common in the fish guts we examined.

ACKNOWLEDGMENTS

We acknowledge and compliment the command and crew of the NOAA ship *John N. Cobb* for their cooperation and performance during the cruise.

Table 1.--Localities and coordinates of stations scheduled for oceanographic sampling in the marine waters of the northern region of southeastern Alaska using the NOAA ship *John N. Cobb*, 12-15 June 2003. Distance between stations within a transect is indicated in the "between km" column.

Locality	Station	Latitude North	Longitude West	Distance		Depth m
				offshore km	between km	
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

Table 2.--Oceanographic and biological samples collected in the marine waters of the northern region of southeastern Alaska using the NOAA ship *John N. Cobb*, 12-15 June 2003. Abbreviations: R = rope trawl, TN = townet.

Date	Time	Haul#	Station	Plankton net samples				Chlorophyll & nutrients	Trawl type
				CTD	Norpac	Bongo	WP-2		
12 June	1255	7023	ISD	1	1	0	0	0	R
12 June	1430	7024	ISC	1	1	0	0	0	R
12 June	1510	7025	ISB	1	1	0	0	0	R
12 June	1800	7026	ISA	1	1	0	0	0	R
13 June	0715	7027	ISA	1	1	2	0	1	R
13 June	0913	7028	ISB	1	1	2	0	1	R
13 June	1110	7029	ISC	1	1	2	0	1	R
13 June	1400	7030	ISD	1	1	2	0	1	R
14 June	2055	7032	ISD	0	0	0	0	0	TN
14 June	2210	7033	ISD	0	0	0	0	0	TN
14 June	2245	7034	ISD	0	0	0	0	0	TN
14 June	2330	7035	ISD	0	0	0	0	0	TN
15 June	0240	7031	ISD	1	1	0	0	0	R
15 June	0110	7036	ISB	0	0	0	0	0	TN
15 June	0135	7037	ISB	0	0	0	0	0	TN
Total				9	9	8	0	4	15

Table 3.—Rope trawl and two-boat trawl catches at stations sampled in the marine waters of the northern region of southeastern Alaska using the NOAA ship *John N. Cobb* and Auke Bay Lab's *RV Quest*, 12-15 June 2003.

Date	Station	Haul number, gear type	Chinook (imm.)	Chum (adult)	Sock- eye (adult)	Capelin larvae (?)	Crested sculpin	Grunt sculpin	Ling- cod juv.	Pac. sand- fish	Paci. sand lance	Poacher larvae	Soft sculpin	Flatfish larvae	Unident. larvae	Walleye pollock
Jun 12	ISD	7023 R	3													
Jun 12	ISC	7024 R		1		1										
Jun 12	ISB	7025 R														10
Jun 12	ISA	7026 R								1			1			
Jun 13	ISA	7027 R														
Jun 13	ISB	7028 R	2													
Jun 13	ISC	7029 R														
Jun 13	ISD	7030 R														2
Jun 14	ISD	7032 TN				11,763					38	25		150	13	125*
Jun 14	ISD	7033 TN					3		5							18*
Jun 14	ISD	7034 TN						1			1			1	2	13*
Jun 14	ISD	7035 TN									1			1	3	17*
Jun 15	ISD	7031 R	1	1	1											4,032
Jun 15	ISB	7036 TN					1							1	1	7*
Jun 15	ISB	7037 TN				1										2*

*larvae

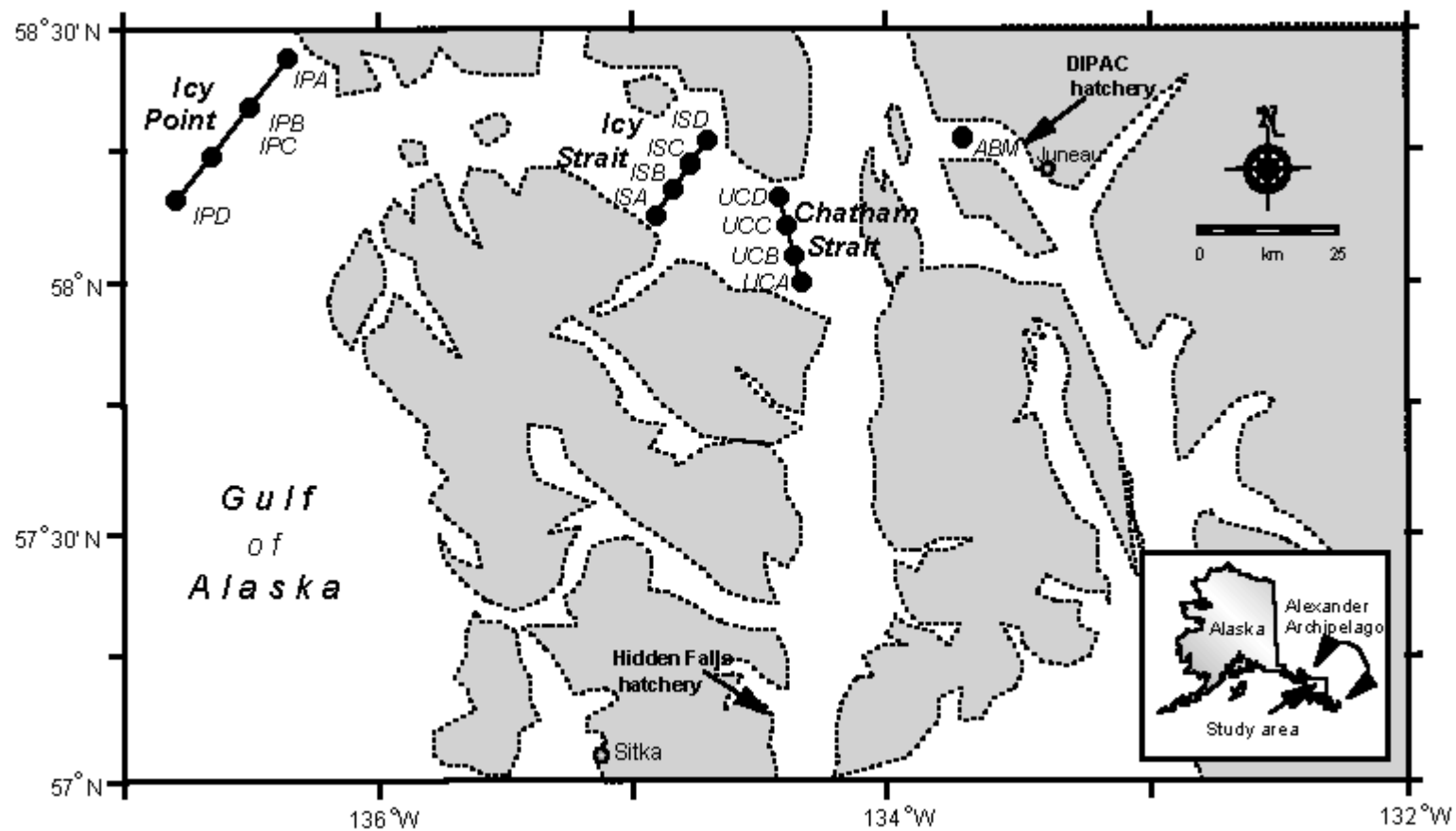


Figure 1.—Locations of Icy Strait stations sampled from the NOAA ship *John N. Cobb* and RV *Quest*, 12-15 June 2003.