

JC-97-14 Cruise Report  
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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 22 to 28 August 1997. This cruise was the fourth in a series of five monthly cruises scheduled to sample the inside and coastal marine waters of this region.

Primary objectives for the cruises included: 1) sampling juvenile salmon (*Oncorhynchus* spp.) and ecologically related species with a rope trawl, 2) collecting associated physical and biological data with each trawl haul, and 3) examining the spatial and temporal occurrence of juvenile chum salmon (*O. keta*) and pink salmon (*O. gorbuscha*) and their diets and prey. One major focus of these cruises is to use otolith marked juvenile salmon to assess potential interactions between hatchery and wild stocks in the region.

Sampling was conducted at twenty stations throughout the inside and coastal offshore waters of the northern region of southeastern Alaska (Table 1). At each station, except Auke Bay, sampling involved: one 20-min trawl haul, one CTD cast, one double oblique bongo tow, one 20-m vertical plankton tow, and in coastal waters only, one deep vertical plankton tow. No trawl sampling was done in Auke Bay because of shallow bottom depths.

Trawl gear:

Fish were sampled with a Nordic<sup>1</sup> 264 rope trawl fished directly astern the NOAA ship *John N. Cobb* at the surface. The mouth opening of the trawl was 20 m deep and 35 m wide and it was spread apart by a pair of 3.0 m Lite trawl doors. The trawl was fished fully open with 75 fathoms of main warp out for a duration of 20 min at a speed of 1.5 m/sec (3 knots). Trawl speed was monitored from the vessel using a flowmeter with an electromagnetic sensor (Marsh McBirney, Inc., Model 2000-21). To fish the headrope of the trawl at the surface, a cluster of three meshed A-4 Polyform buoys were 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.

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<sup>1</sup>Reference to trade names does not imply endorsement by the National Marine Fisheries Service.

### Oceanographic sampling:

At each station the physical and biological environment was monitored and sampled immediately prior or after each trawl haul. One CTD cast was made with a Sea-Bird SBE 19 Seacat profiler to 200 m or within 10 m of the bottom. 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.

Vertical plankton tows were made with a 50-cm frame and 243 micron mesh net to 20 m at each station, and at the Icy Point and Auke Bay stations only, a 57-cm frame and a 202 micron mesh net was deployed to 200 m or within 20 m of the bottom. General Oceanics flow meters were placed inside the bongo and deep conical nets.

### Results:

Twenty stations were sampled with 19 trawl hauls, 21 bongo tows, 21 CTD casts, and 33 vertical plankton hauls during the cruise (Table 1). As in the previous three cruises, trawling at the Auke Bay station was not feasible because of shallow irregular bottom depths; therefore nearby lower Favorite Channel was sampled.

All five species of juvenile Pacific salmon were captured during the cruise, including three immature chinook salmon, five adult coho salmon, and one adult pink salmon (Table 2). Of the salmon captured, one immature chinook salmon contained a coded-wire tag (CWT) and one juvenile coho salmon was missing an adipose fin but did not contain a CWT. The CWT chinook salmon originated from southeastern Alaska (Table 3).

In total, 16 fish species were captured with the rope trawl (Table 2). The numbers of each fish species captured in order of decreasing abundance were: 285 pink salmon, 245 chum salmon, 135 Pacific herring (*Clupea harengus*), 85 sablefish (*Anoplopoma fimbria*), 41 coho salmon (*O. kisutch*), 33 capelin (*Mallotus villosus*), 32 sockeye salmon (*O. nerka*), 22 chinook salmon (*O. tshawytscha*), 13 Pacific spiny lump sucker (*Eumicrotremus orbis*), 12 crested sculpin (*Blepsias bilobus*), 4 prowfish (*Zaprora silenus*), 2 walleye pollock (*Theragra chalcogramma*), 2 Pacific sandfish (*Trichodon trichodon*), 1 rockfish (*Sebastes* spp.), 1 smooth lump sucker (*Aptocyclus ventricosus*), and 1 jack mackerel (*Trachurus symmetricus*) (Tables 4-5). Catches of fish occurred in all 19 trawl hauls and juvenile pink and coho salmon had the highest frequency of occurrence of all other species (Table 2). Of the 625 salmon captured, 99% were juveniles and the remainder were adults (5 coho and 1 pink salmon) or immature (3 chinook salmon).

Few potential salmon predators were captured with the trawl; five adult coho salmon, one adult pink salmon, and one jack mackerel. The stomachs from this fish were examined and no evidence of salmonid predation was observed.

Oceanographic features, such as the 2-m water temperature and salinity readings, differed

somewhat between localities. In general, lower water temperatures and salinities were found at inside stations; whereas the warmest water temperatures were recorded at stations progressively further offshore along the Icy Point transect (14.1 to 16.3°C; Table 4).

Cursory examination of plankton samples indicated a wide diversity of zooplankton (e.g., amphipods, euphausiids, copepods, isopods, etc.) and ichthyoplankton (e.g., walleye pollock, myctophids, eelpouts, etc.). Plankton abundance also differed between habitats. The coastal and offshore samples contained limited amounts of phytoplankton and relatively small amounts of large copepods and euphausiids, whereas the inside stations had some concentrations of phytoplankton and relatively high numbers of small zooplankters.

#### Discussion:

Over the course of monthly sampling from May to August, overall catch rates of juvenile salmon have increased from May to July and declined from July to August. In May, no juvenile salmon were captured at any locality. In June, 1,175 juvenile salmon were sampled, predominately in inside waters with only 15 caught in coastal waters. In July, 3,166 juvenile salmon were sampled, again predominately in inside waters with 253 caught in coastal waters. In August, 619 juvenile salmon were sampled, again predominately in inside waters with 58 caught in coastal waters. This pattern suggests that juvenile salmon utilize the marine waters sampled at a maximum level in July and then may disperse or move progressively further away from the study area (i.e., the Gulf of Alaska) from July to August.

Collective information from monthly cruises conducted from May to August are reported in Document 277 submitted to the North Pacific Anadromous Fish Commission in October of 1997.

The 27 p document is titled: "Survey of juvenile salmon in the marine waters of southeastern Alaska, May-August 1997", and is authored by Orsi, J. A., J. M. Murphy, and A. L. J. Brase.

#### Acknowledgments:

Special thanks to Dean Courtney and Don Mortensen of the Auke Bay Laboratory who participated on the cruise. Their invaluable assistance onboard the vessel was greatly appreciated. Finally, we would like to acknowledge the command and crew of the NOAA ship *John N. Cobb* for their superb cooperation and performance for the duration of the cruise.

Table 1.--Localities and coordinates of stations sampled in the marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 22-28 August 1997.

Locality	Station	Latitude	Longitude	Offshore	Inter-	transect
distance	Depth				distance	
Auke Bay	ABM	58° 22.00' N	134° 40.00' W	1.5 km	-----	60 m
Taku Inlet	TKI	58° 11.19' N	134° 11.71' W	2.2 km	-----	175 m
False Point Retreat	FPR	58° 22.00' N	135° 00.00' W	1.8 km	-----	680 m
Lower Favorite Channel <sup>2</sup>	LFC	58° 20.98' N	134° 43.73' W	1.5 km	-----	75 m
Upper Chatham Strait	UCA	58° 04.57' N	135° 00.08' W	3.2 km	3.2 km	400 m
	UCB	58° 06.22' N	135° 00.91' W	6.4 km	3.2 km	100 m
	UCC	58° 07.95' N	135° 01.69' W	6.4 km	3.2 km	100 m
	UCD	58° 09.64' N	135° 02.52' W	3.2 km	3.2 km	200 m
Icy Strait	ISA	58° 13.25' N	135° 31.76' W	3.2 km	3.2 km	128 m
	ISB	58° 14.22' N	135° 29.26' W	6.4 km	3.2 km	200 m
	ISC	58° 15.28' N	135° 26.65' W	6.4 km	3.2 km	200 m
	ISD	58° 16.38' N	135° 23.98' W	3.2 km	3.2 km	234 m
Cross Sound	CSA	58° 09.53' N	136° 26.96' W	3.2 km	3.2 km	300 m
	CSB	58° 10.91' N	136° 28.68' W	6.4 km	3.2 km	60 m
	CSC	58° 12.39' N	136° 30.46' W	6.4 km	3.2 km	200 m
	CSD	58° 13.84' N	136° 32.23' W	3.2 km	3.2 km	200 m
Icy Point	IPA	58° 20.12' N	137°07.16' W	6.9 km	16.8 km	160 m
	IPB	58° 12.71' N	137°16.96' W	23.4 km	16.8 km	130 m
	IPC	58° 05.28' N	137°26.75' W	40.2 km	16.8 km	150 m
	IPD	57° 53.50' N	137°42.60' W	65.0 km	24.8 km	1,300 m

<sup>2</sup>Added this station because Auke Bay could not be trawled

Table 2.--Length, frequency of occurrence, and life history stage of measured fish captured with a rope trawl in the marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 22-27 August 1997.

history Common name	Species	n	Fork length (mm)			Frequency Life <sup>3</sup> of occurrence stage	
			min	max	x	occurrence	stage
Pink salmon	<i>Oncorhynchus gorbuscha</i>	284	123	218	155.5	10	J
Pink salmon	<i>O. gorbuscha</i>	1	535	535	535.0	1	A
Chum salmon	<i>O. keta</i>	245	107	210	161.7	9	J
Coho salmon	<i>O. kisutch</i>	36	205	349	247.0	10	J
Coho salmon	<i>O. kisutch</i>	5	552	742	656.4	4	A
Sockeye salmon	<i>O. nerka</i>	32	96	210	158.8	7	J
Chinook salmon	<i>O. tshawytscha</i>	19	161	314	222.4	8	J
Chinook salmon	<i>O. tshawytscha</i>	3	554	685	615.7	2	I
Salmonid catch 625							
Pacific herring	<i>Clupea harengus</i>	135	53	213	139.1	7	J, I, A
Sablefish	<i>Anoplopoma fimbria</i>	85	141	211	183.2	4	J
Capelin	<i>Mallotus villosus</i>	33	30	103	64.9	6	L, I, A
Pac. spiny lump sucker	<i>Eumicrotremus orbis</i>	13	41	81	57.1	2	J, I, A
Crested sculpin	<i>Blepsias bilobus</i>	12	101	154	133.1	7	I, A
Prowfish	<i>Zaprora silenus</i>	4	55	125	93.8	4	J, I
Walleye pollock	<i>Theragra chalcogramma</i>	2	513	525	519.0	2	A
Pacific sandfish	<i>Trichodon trichodon</i>	2	177	226	201.5	1	A
Rockfish	<i>Sebastes</i> spp.	1	57	57	57.0	1	J
Smooth lump sucker	<i>Aptocyclus ventricosus</i>	1	290	290	290.0	1	A
Jack mackerel	<i>Trachurus symmetricus</i>	1	574	574	574.0	1	A
Non-salmonid catch		289					
Total catch		914					

<sup>3</sup>L=larvae, J=juvenile or post larvae in first year at sea (i.e., age -.0), I=immature age -.1 or older in pre-spawn condition, and A=adult near age of maturity.

Table 3.--Release and recovery information for coded-wire tagged juvenile salmon captured in the northern region of southeastern Alaska by rope trawl haul, NOAA Ship *John N. Cobb*, 22-28 August 1997.

Species	Release information					Recovery information					Days since release	Distance traveled (km)	
	Coded-wire tag	Brood code	Agency <sup>4</sup>	Locality	Date	Size (mm)	Size (g)	Locality (station code)	Date	Size (mm)			Size (g)
Chinook	04:40/51	1992	ADFG	Fish Creek, AK	06/20/97	110	18.8	Upper Chatham (UCA)	08/23/97	685	4440.0	794	65
	-	20											
Coho	Not tag	-	-	-	-	-	-	Cross Sound (CSB)	08/26/97	247	299.0	299.0	-
	-												

<sup>4</sup> ADFG = Alaska Department of Fish and Game

Table 4.--Temperatures and salinities at stations sampled in the northn region of southeastern Alaska and catches of salmonids by rope trawl haul, NOAA Ship *John N. Cobb*, 22-27 August 1997. No trawling for haul numbers 1067 and 1082.

Date	Haul#	Station	temp (°C)	salinity (o/oo)	<u>Two meter depth</u>					Immature salmon Chinook	Adult salmon	
					Juvenile salmon						Coho	Pink
					Pink	Chum	Coho	Sockeye	Chinook			
22 August	1063	ISA	11.2	27.0	-	-	2	-	-	-	-	-
22 August	1064	ISB	11.5	26.1	161	115	3	12	2	-	-	-
22 August	1065	ISC	12.3	24.5	41	45	-	5	-	-	1	1
22 August	1066	ISD	12.8	23.7	9	21	1	6	6	-	2	-
23 August	1067	UCD	12.0	28.1								
-----												
23 August	1068	UCC	12.5	26.3	5	10	-	2	-	-	1	-
23 August	1069	UCB	11.3	28.2	12	10	9	1	1	2	1	-
23 August	1070	UCA	11.2	28.5	-	-	11	5	1	1	-	-
24 August	1071	UCD	12.6	25.8	22	28	1	-	2	-	-	-
25 August	1072	IPA	15.0	31.0	5	2	-	-	-	-	-	-
25 August	1073	IPB	14.1	30.7	-	-	-	-	-	-	-	-
25 August	1074	IPC	15.0	31.1	-	-	1	-	-	-	-	-
25 August	1075	IPD	16.3	31.1	-	-	-	-	-	-	-	-
26 August	1076	CSA	15.2	30.8	-	-	2	-	-	-	-	-
26 August	1077	CSB	10.7	30.9	6	5	3	-	-	-	-	-
26 August	1078	CSC	10.2	30.5	-	-	3	-	-	-	-	-
26 August	1079	CSD	9.4	30.1	22	9	-	-	-	-	-	-
27 August	1080	FPR	12.9	19.8	1	-	-	-	1	-	-	-
27 August	1081	LFC	12.6	20.1	-	-	-	-	3	-	-	-
27 August	1082	ABM	12.6	18.0								
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<del>27 August</del>	<del>1083</del>	<del>TKI</del>	<del>11.5</del>	<del>17.5</del>	<del>-</del>	<del>-</del>	<del>-</del>	<del>1</del>	<del>3</del>	<del>-</del>	<del>-</del>	<del>-</del>
Total catch					284	245	36	32	19	3	5	1





Table 5.--Catches of non-salmonid fish and squid at stations sampled in the northern region of southeastern Alaska and catches of fish and squid by rope trawl haul, NOAA Ship *John N. Cobb*, 22-27 August 1997. No trawling for haul numbers 1067 and 1082.

Date	Haul#	Station	Pacific herring	Sablefish	Capelin	Pacific spiny lumpsucker	Crested sculpin	Prowfish	Walleye pollock	Pacific sandfish	Rockfish	Smooth lumpsucker	Jack mackerel
22 August	1063	ISA	-	-	8	-	-	1	-	-	-	-	-
22 August	1064	ISB	6	-	-	-	-	-	-	-	-	-	-
22 August	1065	ISC	-	-	5	-	-	-	-	-	-	-	-
22 August	1066	ISD	-	-	-	-	1	-	-	-	-	-	-
23 August	1067	UCD					----						
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22 August	1068	UCC	1	-	-	-	1	1	-	-	-	-	1
23 August	1069	UCB	-	-	-	-	2	1	1	-	-	-	-
23 August	1070	UCA	-	-	-	-	1	-	1	-	-	-	-
24 August	1071	UCD	-	-	-	-	1	-	-	-	-	-	-
25 August	1072	IPA	-	-	-	-	-	-	-	-	-	1	-
25 August	1073	IPB	-	2	-	-	-	-	-	-	-	-	-
25 August	1074	IPC	-	20	-	-	-	-	-	-	-	-	-
25 August	1075	IPD	-	26	-	-	-	-	-	-	-	-	-
26 August	1076	CSA	-	-	1	-	-	-	-	-	-	-	-
26 August	1077	CSB	45	-	2	-	-	-	-	-	1	-	-
26 August	1078	CSC	3	37	1	-	-	-	-	-	-	-	-
26 August	1079	CSD	1	-	-	-	-	-	-	-	-	-	-
27 August	1080	FPR	-	-	-	-	-	-	-	-	-	-	-
27 August	1081	LFC	9	-	-	4	4	-	-	2	-	-	-
27 August	1082	ABM		----					-----				
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27 August	1083	TKI	70	-	16	9	2	1	-	-	-	-	-
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Total catch			135	85	33	13	12	4	2	2	1	1	1

