JC-97-11 Cruise Report
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Prepared by Joseph A. Orsi
Auke Bay Laboratory, 11305 Glacier Highway
Juneau, Alaska 99801-8626
TEL (907) 789-6034 FAX (907) 789-6094 E-mail joe.orsi@noaa.gov

Scientists from the Auke Bay Laboratory of the National Marine Fisheries Service, Alaska Fisheries Science Center, conducted a 10-d cruise aboard the NOAA ship *John N. Cobb* in the marine waters of the northern region of southeastern Alaska from 18 to 27 July 1997. This cruise was the third in a series of five monthly cruises scheduled to sample the inside and costal 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, 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.

Trawl gear:

Fish were sampled with a Nordic[1] 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. To minimize the loss of fish behind the headrope, a small mesh panel of 10.2 cm mesh was sewn in along the jib lines on the top panel of the trawl between the head rope and the first 162.6 cm mesh.

[1]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 to 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 diameter frame with 505 and 333 micron mesh nets. Vertical plankton tows were made with a 50-cm diameter frame and 243 micron mesh net to 20 m at each station, and in coastal transects only, a 57-cm diameter 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, 22 bongo tows, 22 CTD casts, and 34 vertical plankton hauls during the cruise (Table 1). Three additional coastal transects were planned for this cruise, but inclement weather prevented sampling. However, stations sampled on this cruise were the same sampled during the two previous cruises. Several unforseen mechnical and trawl gear problems prevented all trawling stations to be sampled along two transects (Upper Chatham and Cross Sound) within the same day, but the missed stations were revisited at later dates in the cruise. As in the previous two cruises, trawling at the Auke Bay Monitor (ABM) station was not feasible because of shallow irregular bottom depths, therefore nearby lower Favorite Channel was sampled.

In total, 17 fish species were captured with the rope trawl, including all five species of juvenile Pacific salmon (Table 2). The numbers of each fish species captured in order of decreasing abundance were: 2,499 chum salmon, 499 pink salmon, 73 sockeye salmon (*O. nerka*), 53 Pacific herring (*Clupea harengus*), 52 chinook salmon (*O. tshawytscha),* 47 coho salmon (*O. kisutch*), 26 crested sculpin (*Blepsias bilobus*), 17 Pacific spiny lumpsucker (*Eumicrotremus orbis*), 12 rockfish (*Sebastes* spp.), 5 prowfish (*Zaprora silenus),* 4 capelin (*Mallotus villosus*), 3 walleye pollock (*Theragra chalcogramma*), 2 Pacific sandfish (*Trichodon trichodon*), 1 quillfish (*Ptilichthys goodei),* 1 smooth lumpsucker (*Aptocyclus ventricosus*), and 1 pomfret (*Brama japonica*) (Tables 3-4). In addition to the fish catch, 2 squid (Gonatidae) were sampled. Catches of fish or squid occurred in all 19 trawl hauls and juvenile chum salmon had the highest frequency of occurrence of all other species (Tables 2-4).

Nearly all of the salmon sampled during the cruise were juveniles with the exception of two adult pink salmon (Table 2). Of the 3,170 juvenile salmon captured, seven chinook salmon, two coho salmon, and one chum salmon contained coded-wire tags (CWTs) (Table 5). All CWT chinook and chum salmon were recovered in inside waters and originated from southeastern Alaska release localities. The two CWT coho salmon were both recovered in offshore waters; one originated from Oregon and the other originated from the southern region of southeastern Alaska.

Few potential predators of juvenile salmon were captured with the trawl: two adult pink salmon and one Pomfret. Onboard stomach analysis of these fish did not reveal any evidence of

predation on juvenile salmon.

Oceanographic features, such as the 2-m temperature and salinity readings, differed somewhat between localities. In general, warmer temperatures (8.7-14.3°C) and lower salinities (12.0-24.1 ppt) were found at the inside stations, whereas colder (8.0-14.6°C), more saline (30.9-31.9 ppt) conditions were found at the coastal stations (Table 3). However, the warmest temperatures (14.4-14.6°C) occurred along the three coastal stations situated the furthest offshore (20-60 km).

Cursory examination of plankton samples indicated a wide diversity of zooplankton (e.g., amphipods, euphausiids, copepods, isopods, etc.) and icthyoplankton (e.g., walleye pollock, myctophids, 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 such as euphausiids.

Discussion:

Catches of juvenile salmon increased in the sampling localities over the course of the last three months. In May, juvenile salmon were not captured at any locality. In June, 1,175 juvenile salmon were sampled, predominately in inside waters, with only 15 (1%) caught in coastal waters. In July, 3,170 juvenile salmon were sampled, again predominately in inside waters with 253 (8%) caught in coastal waters. Along the coastal transect off Icy Point, 98% of the 247 juveniles were caught in July at the two inshore stations situated within 25 km of shore. This seasonal pattern suggests that juvenile salmon are entering the ocean proper but have not migrated extensively out of inside waters or far offshore. However, catches of juvenile coho and sockeye were 38 and 60% lower from June to July respectively, indicating an offshore movement pattern of these species. The seven CWT coho recovered in inside waters in June and the two CWT coho recovered in coastal waters in July support this movement pattern.

The overall ratio of juvenile chum to pink salmon in June and July was 6.3 to 1 and 5.0 to 1, respectively. Relatively low abundances of juvenile pink to chum salmon is a departure from prior years where pink salmon are typically dominant. A relatively low abundance of juvenile pink salmon in 1997 suggests that the 1996 brood year in the northern region of southeastern Alaska had low overwinter survival or encountered poor early marine conditions.

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Table 1.--Localities and coordinates of stations sampled in marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 18-27 July 1997.

Locality	Station	Latitude	Longitude	Offshore distance	Inter-transect distance	Depth
Inside waters						
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[2]	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
Coastal waters						
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° 56.37' N	135°38.31' W	60.0 km	16.8 km	200 m

[2]Added this station because Auke Bay could not be trawled

Table 2.--Length, frequency of occurrence, and life history stage of measured fish and squid captured with a rope trawl in the marine waters of the northern region of southeastern Alaska off the NOAA ship *John N. Cobb*, 18-27 July 1997.

Common name	Species	n	Fork length (mm) min	max	x̄	Frequency of occurrence	Life[3] history stage
Chum salmon	*Oncorhynchus keta*	1,447[4]	88	207	136.8	15	J
Pink salmon	*O. gorbuscha*	494[4]	82	179	135.9	10	J
Sockeye salmon	*O. nerka*	73	101	175	145.6	9	J
Chinook salmon	*O. tshawytscha*	52	131	230	172.0	3	J
Coho salmon	*O. kisutch*	47	162	241	207.1	11	J
Pink salmon	*O. gorbuscha*	2	481	492	486.5	2	A
Pacific herring	*Clupea harengus*	53	131	217	167.6	3	I, A
Crested sculpin	*Blepsias bilobus*	26	71	123	93.4	10	J, I, A
Pac. spiny lumpsucker	*Eumicrotremus orbis*	17	43	74	57.7	5	J, I
Rockfish	*Sebastes* spp.	12	19	27	23.0	2	J
Prowfish	*Zaprora silenus*	5	55	94	73.2	5	J
Capelin	*Mallotus villosus*	4	42	49	44.8	2	L
Walleye pollock	*Theragra chalcogramma*	3	40	60	50.3	3	J
Squid[5]	Gonatidae	2	19	27	23.0	2	J
Pacific sandfish	*Trichodon trichodon*	2	71	89	80.0	1	J
Smooth lumpsucker	*Aptocyclus ventricosus*	1	-	-	154.0	1	A
Pomfret	*Brama japonica*	1	-	-	395.0	1	A

[3]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.

[4]Additional fish were captured and not measured, total numbers caught in Table 3.

[5]Mantle lengths

Quillfish	*Ptilichthys goodei*	1	-	-	133.0	1	L	

Table 3.--Temperatures and salinities at stations sampled in the northern region of southeastern Alaska and catches of salmonids by rope trawl, NOAA ship *John N. Cobb*, 18-27 July 1997. No trawling associated with trawl haul numbers 1043, 1052, and 1053.

					Two meter depth					
			temp	salinity	Juvenile salmonids					Adult
Date	Haull#	Station	(°C)	(o/oo)	Chum	Pink	Sockeye	Chinook	Coho	pink
19 July	1041	UCA	14.3	22.4	227	45	11	-	4	-
19 July	1042	UCD	13.2	16.1	3	2	-	-	-	-
19 July	1043	UCC	13.1	17.3						
20 July	1044	UCB	13.7	23.3	378	102	10	-	4	-
21 July	1045	ISA	12.0	24.1	4	-	-	-	-	-
21 July	1046	ISB	13.2	20.3	4	-	1	-	3	-
21 July	1047	ISC	13.5	20.2	491	68	9	-	6	-
21 July	1048	ISD	13.9	20.4	1,231	206	12	-	2	-
22 July	1049	UCC	12.9	21.9	4	1	-	-	1	-
22 July	1050	FPR	13.9	23.1	3	-	2	1	17	-
22 July	1051	LFC	12.8	22.3	1	-	1	48	-	-
23 July	1052	ABM	12.0	21.3						
23 July	1053	TKI	10.2	16.6						
24 July	1054	CSA	11.3	30.9	1	-	-	-	1	-
24 July	1055	CSB	8.2	31.7	-	-	-	-	2	1
24 July	1056	CSC	8.3	31.6	-	-	-	-	-	-
25 July	1057	IPA	13.9	30.9	98	42	20	-	3	-
25 July	1058	IPB	14.5	31.2	43	30	7	-	4	1
25 July	1059	IPC	14.4	31.4	5	1	-	-	-	-
25 July	1060	IPD	14.6	31.9	-	-	-	-	-	-
26 July	1061	CSD	8.0	30.9	6	2	-	-	-	-
27 July	1062	TKI	8.7	12.0	-	-	-	3	-	-
				Total catch	2,499	499	73	52	47	2

Table 4.--Catches of non-salmoid fish and squid at stations sampled in the northern region of southeastern Alaska by rope trawl, NOAA ship John N. Cobb, 18-27 July 1997. No trawling associated with trawl haul numbers 1043, 1052, and 1053.

Date	Haul#	Station	Pacific herring	Crested sculpin	Pacific spiny lumpsucker	Sebastes spp	Prowfish	Capelin	Walleye pollock	Pacific sandfish	Squid	Smooth lumpsucker	Pomfret	Quillfish	Non-salmonid total
19 July	1041	UCA	-	4	-	-	-	-	1	-	-	-	-	-	5
19 July	1042	UCD	-	4	-	-	1	-	1	-	-	-	-	-	6
19 July	1043	UCC													
20 July	1044	UCB	-	6	-	-	1	-	-	-	-	-	-	-	7
21 July	1045	ISA	-	1	1	-	-	1	-	-	-	1	-	-	4
21 July	1046	ISB	-	-	-	-	1	-	-	-	-	-	-	-	1
21 July	1047	ISC	-	-	-	-	-	-	-	-	-	-	-	-	-
21 July	1048	ISD	-	1	1	-	-	-	-	-	-	-	-	1	3
22 Juy	1049	UCC	-	3	-	-	-	-	-	-	-	-	-	-	3
22 July	1050	FPR	-	2	-	-	-	-	-	-	-	-	-	-	2
22 July	1051	LFC	12	2	12	-	1	-	-	-	-	-	-	-	27
23 July	1052	ABM													
23 July	1053	TKI													
24 July	1054	CSA	-	1	-	-	-	-	-	-	-	-	-	-	1
24 July	1055	CSB	-	-	1	-	-	-	-	-	-	-	-	-	1
24 July	1056	CSC	-	-	-	-	-	-	-	2	-	-	-	-	2
25 July	1057	IPA	-	-	-	-	1	-	-	-	-	-	-	-	1
25 July	1058	IPB	-	-	-	-	-	-	-	-	-	-	-	-	-
25 July	1059	IPC	-	-	-	3	-	-	-	-	1	-	-	-	4
25 July	1060	IPD	-	-	-	9	-	-	-	-	1	-	1	-	11
26 July	1061	CSD	1	-	-	-	-	3	-	-	-	-	-	-	4
26 July	1062	TKI	40	2	2	-	-	-	1	-	-	-	-	-	45
Total catch			53	26	17	12	5	4	3	2	2	1	1	1	127

Table 5.--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*, 18-27 July 1997.

	Release information						Recovery information					
					Size				Size		Days	Distance
Species	Coded-wire tag code	Brood year	Agency[6]	Locality	Date	(mm) (g)	Locality (station code)	Date	(mm)	(g)	since release	traveled (km)
Chinook	50:04/25	1995	DIPAC	Auke Bay, AK	06/10/97	- 26.6	Favorite Channel (LFC)	07/22/97	165	58.7	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	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	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	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	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	42	20
Chinook	04:47/11	1995	HDFAL	Hidden Falls, AK	06/--/97	- -	False Pt. Retreat (FPR)	07/22/97	224	156.5	-	130
Coho	04:47/50 620	1995	SSRAA	Neets Bay, AK	06/01/97	- 20.9	Icy Point (IPB)	07/25/97	234	156.1		54
Coho	07:09/46 1,600	1995	ODFW	Columbia River, OR (Big Creek)	06/--/97	- -	Icy Point (IPA)	07/25/97	227	177.9		-
Chum	50:04/13 150	1996	BUROC	Burro Creek, AK	06/21/97	- 12.3	Icy Strait (ISC)	07/21/97	162	42.3		30

[6] BUROC = Burro Creek; DIPAC = Douglas Island Pink and Chum; HDFAL = Hidden Falls Hatchery; ODFW = Oregon Department of Fish and Wildlife; SSRAA = Southern Southeast Regional Aquaculture Association