

JC-97-09 Cruise Report
15 July 1997

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 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 June 1997. This cruise was the second in a series of six monthly cruises scheduled to sample the inside and coastal marine waters of this region.

Primary objectives for the cruise 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 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 Nordic¹ 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.

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

Oceanographic sampling:

The physical and biological environment was monitored and sampled prior to each trawl. 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. The vertical plankton tows were made with a 50 cm frame and 353 micron mesh net. Flow meters were placed inside each bongo net and the deep conical net.

Results:

Twenty stations were sampled with 19 trawl hauls, 20 bongo tows, 20 CTD casts, and 24 vertical plankton hauls during the cruise (Table 1). Favorable weather conditions, particularly in the coastal ocean transects of Icy Point and Cross Sound, enabled sampling to be completed at all stations except trawling at the Auke Bay Monitor (ABM) station. Trawl sampling at the ABM station was not feasible because of shallow irregular bottom depths; therefore an additional station was sampled in nearby lower Favorite Channel.

All five species of juvenile Pacific salmon and steelhead trout (*O. mykiss*) were captured during the cruise, including eight immature age-1 chinook salmon and two adult pink salmon (Table 2). Of the juvenile salmon captured, seven coho salmon and three chinook salmon contained coded-wire tags (CWTs). All CWT coho salmon and two of the three CWT chinook were recovered in inside waters and originated from southeastern Alaska release localities; the one CWT chinook salmon recovered in offshore waters originated from the Umatilla River in Oregon (Table 3).

In total, 19 fish species were captured with the rope trawl (Table 2). The numbers of each fish species captured in order of decreasing abundance were: 783 chum salmon, 157 Pacific herring (*Clupea harengus*), 126 pink salmon, 123 coho salmon (*O. kisutch*), 116 sockeye salmon (*O. nerka*), 95 capelin (*Mallotus villosus*), 53 Pacific sandlance (*Ammodytes hexapterus*), 36 chinook salmon (*O. tshawytscha*), 17 walleye pollock (*Theragra chalcogramma*), 10 spiny dogfish (*Squalus acanthias*), 8 crested sculpin (*Blepsias bilobus*), 3 soft sculpin (*Gilbertidia sigalutes*), 3 lingcod (*Ophiodon elongatus*), 3 Pacific spiny lump sucker (*Eumicrotremus orbis*), 3 bigmouth sculpin (*Hemitripterus bolini*), 2 arrowtooth flounder (*Atheresthes stomias*), 1 Pacific sandfish (*Trichodon trichodon*), 1 steelhead trout (*O. mykiss*), and 1 poacher (Agonidae) (Tables 4-5). In addition to the fish catch, 4 squid (Gonatidae) were caught. Catches of fish or squid occurred in all 19 trawl hauls and juvenile salmon had the highest frequency of occurrence of all other species (Table 2). Two ancient murrelets (*Synthliboramphus antiquus*) were incidentally drowned in the trawl haul in the furthest station offshore on the Icy Point transect.

Onboard stomach analysis was done on 41 potential predators of juvenile salmon, namely: adult Pacific herring (12), adult spiny dogfish (10), immature chinook salmon (8), adult walleye pollock (8), adult pink salmon (2), and adult Pacific sandfish (1). No juvenile salmonids were

found in the stomachs of any of the potential predators examined. Only three of the 12 Pacific herring stomachs contained food items consisting primarily of small copepods. Of the spiny dogfish stomachs examined, only one contained prey items consisting of the remains of a large octopus: it is interesting to note that one of the dogfish was a gravid female and contained 11 viable yolk sac juveniles. The principal prey items of the 8 chinook salmon were juvenile capelin and sandlance, only one chinook stomach was empty. Diets of the 8 walleye pollock examined consisted predominately of euphausiid species, large copepods, crab zoea, and fish remains and only one stomach was empty. Only one of the two adult pink salmon stomachs contained food which consisted of Pacific sandlance and pteropods.

Oceanographic features, such as the 2-m temperature and salinity readings, differed somewhat between localities. In general, warmer temperatures and lower salinities were found at the inside stations, whereas colder, more saline conditions were found at the coastal stations (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:

Catches of juvenile salmonids during this June cruise are in contrast to the absence of juveniles during the previous May cruise in which the same localities were sampled. The only salmonids encountered in May were 18 immature age -.1 chinook salmon. In June, however, all five species of Pacific salmon were encountered as well as immature age -.1 chinook salmon and adult pink salmon. Distribution of juvenile salmon in June was primarily in inside localities, with only small numbers of juveniles present in coastal and offshore waters. The relatively low numbers of juvenile pink salmon compared to chum salmon on this cruise may suggest a low return of pink salmon adults in 1998. The juvenile CWT chinook salmon captured off Icy Point that originated from the Umatilla River, Oregon is a remarkable recovery. This 23 cm chinook in 91 days traveled a straight-line distance over water of over 1,800 km (19.7 km/day).

Acknowledgments:

Special thanks to Adrain Celewycz of the Auke Bay Laboratory and Jim Murphy of TAG-Data/Flow Alaska, Inc. who participated on the entire cruise. Their invaluable assistance onboard the vessel was greatly appreciated. Steve Ignell of the Auke Bay Laboratory is also to be recognized for participating on the first three days of the cruise. Finally, I 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 June 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 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 |
| 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 |

²Added 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*, 22-28 June 1997.

| history Common name | Species | n | Fork length (mm) | | | Frequency Life ³ of | |
|------------------------|------------------------------|------------------|------------------|------|-------|-----------------------------------|------------|
| | | | min | max | x | occurrence | stage |
| Chum salmon | <i>Oncorhynchus keta</i> | 536 ⁴ | 65 | 147 | 96.7 | 9 | J |
| Pink salmon | <i>O. gorbuscha</i> | 124 | 73 | 136 | 95.8 | 8 | J |
| Coho salmon | <i>O. kisutch</i> | 123 | 100 | 220 | 147.5 | 11 | J |
| Sockeye salmon | <i>O. nerka</i> | 116 | 78 | 193 | 109.6 | 9 | J |
| Chinook salmon | <i>O. tshawytscha</i> | 28 | 93 | 231 | 143.0 | 9 | J |
| Chinook salmon | <i>O. tshawytscha</i> | 8 | 308 | 444 | 364.4 | 9 | I |
| Pink salmon | <i>O. gorbuscha</i> | 2 | 515 | 519 | 517.0 | 1 | A |
| Steelhead trout | <i>O. mykiss</i> | 1 | - | - | 177.0 | 1 | J |
| Pacific herring | <i>Clupea harengus</i> | 53 ⁴ | 146 | 210 | 175.5 | 4 | L, I, A |
| Capelin | <i>Mallotus villosus</i> | 95 | 27 | 89 | 48.4 | 5 | L, A |
| Pacific sandlance | <i>Ammodytes hexapterus</i> | 53 | 38 | 143 | 58.3 | 7 | J, I, A |
| Walleye pollock | <i>Theragra chalcogramma</i> | 17 | 21 | 450 | 207.6 | 6 | J, I, A |
| Spiny dogfish | <i>Squalus acanthias</i> | 10 | 660 | 1080 | 817.0 | 1 | A |
| Crested sculpin | <i>Blepsias bilobus</i> | 8 | 31 | 195 | 108.0 | 6 | J, I, A |
| Lingcod | <i>Ophiodon elongatus</i> | 3 | 69 | 77 | 74.0 | 3 | J |
| Soft sculpin | <i>Gilbertidia sigalutes</i> | 3 | 22 | 43 | 32.0 | 2 | J, A |
| Bigmouth sculpin | <i>Hemitripterus bolini</i> | 3 | 55 | 65 | 58.3 | 2 | J |
| Pac. spiny lumpsucker | <i>Eumicrotremus orbis</i> | 3 | 60 | 95 | 77.5 | 2 | J |
| Arrowtooth flounder | <i>Atheresthes stomias</i> | 2 | 33 | 41 | 37.0 | 1 | J |
| Poacher | Agonidae | 1 | - | - | 32.0 | 1 | J |
| Pacific sandfish | <i>Trichodon trichodon</i> | 1 | - | - | 171.0 | 1 | A |

³L=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.

⁴Additional fish were captured and not measured, total numbers caught in tables 4-5.

⁵Mantle lengths

| | | | | | | | |
|--------------------|-----------|---|----|----|------|---|---|
| Squid ⁵ | Gonatidae | 4 | 15 | 77 | 36.2 | 3 | J |
|--------------------|-----------|---|----|----|------|---|---|

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 June 1997.

| Species | Release information | | | | | Recovery information | | | | | Days since release | Distance traveled (km) | | |
|---------|---------------------|------------|---------------------|-------------------------|----------|----------------------|----------|-------------------------|-------|-----------|--------------------|------------------------|----------|-----|
| | Coded-wire tag | Brood code | Agency ⁶ | Locality | Date | Size (mm) | Size (g) | Locality (station code) | Date | Size (mm) | | | Size (g) | |
| Chinook | 09:17/501,800 | 1995 | ODFW | Umatilla River, OR | 03/26/97 | - | 48.8 | Icy Point | (IPB) | 06/25/97 | 231 | 160.9 | 91 | |
| Chinook | 50:04/22 | 1995 | DIPAC | Gastineau Hatchery, AK | 1997 | - | - | Favorite Channel (LFC) | | 06/26/97 | 104 | 13.6 | - | 20 |
| Chinook | 50:04/26 | 1995 | DIPAC | Gastineau Hatchery, AK | 1997 | - | - | Favorite Channel (LFC) | | 06/26/97 | 127 | 22.1 | - | 20 |
| Coho | 50:04/12 | 1995 | DIPAC | Gastineau Hatchery, AK | 1997 | - | - | Upper Chatham (UCA) | | 06/23/97 | 139 | 32.2 | - | 75 |
| Coho | 50:04/1395 | 1995 | DIPAC | Gastineau Hatchery, AK | 1997 | - | - | Icy Strait | (ISA) | 06/26/97 | 144 | 30.7 | - | - |
| Coho | 50:04/13 | 1995 | DIPAC | Gastineau Hatchery, AK | 1997 | - | - | Upper Chatham (UCA) | | 06/23/97 | 125 | 18.9 | - | 75 |
| Coho | 50:04/15 | 1995 | DIPAC | Gastineau Hatchery, AK | 1997 | - | - | Upper Chatham (UCA) | | 06/23/97 | 140 | 29.8 | - | 75 |
| Coho | 04:47/02 | 1995 | HDFAL | Hidden Falls Hatch., AK | 1997 | - | - | Upper Chatham (UCD) | | 06/23/97 | 156 | 44.3 | - | 110 |
| Coho | 04:49/3785 | 1995 | NMFS | Duck Creek, AK | 05/--/97 | - | - | Icy Strait | (ISA) | 06/26/97 | 182 | 67.2 | - | - |

⁶ DIPAC = Douglas Island Pink and Chum
 ODFW = Oregon Department of Fish and Wildlife
 HDFAL = Hidden Falls Hatchery
 NMFS = National Marine Fisheries Service

Coho 04:07/181995 NMFS Auke Creek, AK 1997 - - Upper Chatham (UCA) 06/23/97 121 20.1 - 65

Table 4.--Temperatures and salinities at stations sampled in the northern region of southeastern Alaska and catches of salmonids by rope trawl haul, NOAA ship *John N. Cobb*, 22-28 June 1997.

| Date | Haul# | Station | temp (°C) | salinity (o/oo) | Two meter depth | | Juvenile salmonids | | | | Immature salmon | Adult salmon |
|---------|-------|------------------|--------------|--------------------|-----------------|------|--------------------|---------|---------|-----------|-----------------|--------------|
| | | | | | Chum | Pink | Coho | Sockeye | Chinook | Steelhead | Chinook | Pink |
| 22 June | 1021 | TKI | 10.2 | 16.6 | - | - | - | - | 1 | - | 1 | - |
| 22 June | 1022 | ABM ⁷ | 12.0 | 21.3 | | | | | | | | |
| 22 June | 1023 | FPR | 13.9 | 23.1 | - | 1 | 4 | - | 7 | - | - | - |
| 23 June | 1024 | UCD | 13.2 | 22.1 | - | - | 7 | 3 | 1 | - | - | - |
| 23 June | 1025 | UCC | 12.9 | 22.5 | - | 3 | 16 | - | 1 | - | - | - |
| 23 June | 1026 | UCB | 12.9 | 22.5 | 101 | 59 | 6 | 2 | - | - | 1 | - |
| 23 June | 1027 | UCA | 14.3 | 22.4 | 23 | 6 | 37 | 40 | 1 | - | 2 | - |
| 24 June | 1028 | CSA | 9.8 | 31.1 | - | - | - | 6 | - | - | - | - |
| 24 June | 1029 | CSB | 8.2 | 31.6 | - | - | - | - | - | - | - | - |
| 24 June | 1030 | CSC | 7.4 | 31.8 | - | - | - | - | - | - | - | - |
| 24 June | 1031 | CSD | 7.3 | 31.8 | 1 | - | - | 1 | - | 1 | - | - |
| 25 June | 1032 | IPA | 11.2 | 30.9 | 1 | - | 1 | - | - | - | - | - |
| 25 June | 1033 | IPB | 12.4 | 31.4 | 1 | - | - | - | 1 | - | - | 2 |
| 25 June | 1034 | IPC | 13.4 | 31.5 | - | - | 2 | - | - | - | - | - |
| 25 June | 1035 | IPD | 13.3 | 31.5 | - | - | - | - | - | - | - | - |
| 26 June | 1036 | ISA | 12.2 | 27.6 | 49 | 1 | 5 | 7 | - | - | - | - |
| 26 June | 1037 | ISB | 12.9 | 27.4 | 18 | 1 | 2 | 8 | - | - | - | - |
| 26 June | 1038 | ISC | 12.4 | 27.7 | 524 | 33 | 42 | 43 | - | - | 3 | - |
| 26 June | 1039 | ISD | 13.0 | 27.9 | 65 | 20 | 1 | 6 | - | - | 1 | - |
| 27 June | 1040 | LFC | 12.8 | 22.3 | - | - | - | - | 16 | - | - | - |

⁷Not sampled with rope trawl due to shallow irregular bottom depths.

| | | | | | | | | |
|-------------|-----|-----|-----|-----|----|---|---|---|
| Total catch | 783 | 124 | 123 | 116 | 28 | 1 | 8 | 2 |
|-------------|-----|-----|-----|-----|----|---|---|---|

Table 5.--Catches of non-salmoid 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*, 22-28 June 1997.

| Date | Haul# | Station | Pacific herring | Pacific Capelin | Pacific sandlance | Walleye pollock | Spiny dogfish | Crested sculpin | Lingcod | Soft sculpin | Bigmouth sculpin | Arrowtooth PSL | flounder | Poacher | Pacific sandfish | Squid |
|-------------|-------|---------|-----------------|-----------------|-------------------|-----------------|---------------|-----------------|---------|--------------|------------------|----------------|----------|---------|------------------|-------|
| 22 June | 1021 | TKU | 154 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 22 June | 1022 | ABM | | | | | | | | | | | | | | |
| 22 June | 1023 | FPR | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 23 June | 1024 | UCD | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| 23 June | 1025 | UCC | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 23 June | 1026 | UCB | - | - | - | 2 | - | - | - | - | - | - | - | - | - | 1 |
| 23 June | 1027 | UCA | 1 | - | - | - | - | 1 | - | - | 1 | - | - | - | - | - |
| 24 June | 1028 | CSA | - | 12 | 1 | - | - | - | 1 | - | - | - | - | - | - | - |
| 24 June | 1029 | CSB | - | 15 | 2 | 3 | - | - | - | 1 | - | - | - | - | - | - |
| 24 June | 1030 | CSC | - | 61 | 33 | 7 | - | 1 | - | 2 | - | 2 | - | - | - | - |
| 24 June | 1031 | CSD | - | 6 | 4 | 1 | - | - | - | - | - | - | - | - | - | - |
| 25 June | 1032 | IPA | - | 1 | 11 | 3 | 10 | - | 1 | - | - | - | 2 | - | - | - |
| 25 June | 1033 | IPB | - | - | 1 | - | - | - | 1 | - | - | - | - | - | - | - |
| 25 June | 1034 | IPC | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 25 June | 1035 | IPD | - | - | - | 1 | - | - | - | - | - | - | - | - | - | 2 |
| 26 June | 1036 | ISA | - | - | 1 | - | - | - | - | - | - | - | - | 1 | - | - |
| 26 June | 1037 | ISB | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 |
| 26 June | 1038 | ISC | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - |
| 26 June | 1039 | ISD | - | - | - | - | - | 1 | - | - | 2 | - | - | - | 1 | - |
| 27 June | 1040 | LFC | 1 | - | - | - | - | 3 | - | - | - | 1 | - | - | - | - |
| Total catch | | | 157 | 95 | 53 | 17 | 10 | 8 | 3 | 3 | 3 | 3 | 2 | 1 | 1 | 4 |