

**Eastern Bering Sea (BASIS) Coastal Research (August - October 2004)
on Juvenile Salmon**

by

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Abstract

An eastern Bering Sea research cruise was conducted by National Marine Fisheries Service scientists from the Auke Bay Laboratory, Ocean Carrying Capacity program during August - October 2004 to study early marine distribution, migration, and growth of juvenile salmon (*Oncorhynchus* spp.) salmon on the eastern Bering Sea shelf. A total of 8,977 salmon were captured including juvenile pink (*O. gorbuscha*; 20.9%), chum (*O. keta*; 19.4%), sockeye (*O. nerka*; 42.6%), coho (*O. kisutch*; 3.9%), and chinook (*O. tshawytscha*; 5.4%) salmon; less than 8% of the catch consisted of immature and mature chum, sockeye, and chinook salmon. Juvenile pink and chum salmon generally distributed north of 58°N with large catches occurring near Nunivak Island. Juvenile sockeye salmon were widely distributed north of 56°N from within Bristol Bay (159°W) to as far east as 172°W with the largest catches occurring within Bristol Bay and south of Nunivak Island. Juvenile coho and chinook salmon were distributed within nearshore waters less than 50-m depth from Bristol Bay to Norton Sound with the largest catches occurring within Bristol Bay. Greater than 80% (percent body weight) of the prey items found in juvenile salmon stomachs consisted of larval and juvenile fish with the exception of juvenile chum (approximately 70% larval and juvenile fish and roughly 30% Mysidacea, Coelenterata, or megalopa brachyura) and juvenile sockeye salmon less than 200 mm in length (approximately 52% larval and juvenile fish and 40% *Thysanoessa raschii* and megalopa brachyura). Juvenile pink, chum, sockeye, and chinook salmon were smallest within the area sampled during Leg 1 (southeastern Bering Sea; Bristol Bay) and largest within the area sampled during Leg 2 (northeastern Bering Sea). Analyses of plankton, and of salmon age, size, growth data, and genetic stock identification, will be done to gain additional information on the early marine ecology of salmon along the eastern Bering Sea shelf.

Introduction

Pacific salmon (*Oncorhynchus* spp.) from rivers that flow into the eastern Bering Sea have been inconsistent and at times very weak. Low returns of chinook (*O. tshawytscha*) and chum (*O. keta*) salmon to the Yukon River, Kuskokwim River, and Norton Sound areas of Alaska prompted the state of Alaska to restrict commercial and subsistence fisheries during 2000 and declare the region a fisheries disaster area. Weak salmon returns to these river systems followed several years of low sockeye (*O. nerka*) salmon returns to Bristol Bay, which was declared a fisheries disaster region during 1998 by both the State of Alaska and the U.S. Department of Commerce. Causes of the poor salmon returns to these river systems are not known however, the regional-scale decline of these stocks indicates that the marine environment may play a critical role. Ocean conditions, particularly in the first few months after the salmon leave fresh water, are known to significantly affect salmon survival (Holtby et al. 1990; Friedland et al. 1996; Beamish and Mahnken 2001). Mechanisms affecting marine survival of the eastern Bering Sea salmon stocks are unknown, principally due to the lack of marine life history information on western Alaska salmon. To improve understanding of the marine life-history stage of salmon in the Bering Sea, the North Pacific Anadromous Fish Commission (NPAFC)

began an internationally coordinated research program on salmon in the Bering Sea called the Bering-Aleutian Salmon International Survey (BASIS) (NPAFC 2001).

As part of BASIS, scientists from the National Marine Fisheries Service (NMFS), Ocean Carrying Capacity (OCC) program have conducted fall surveys on the eastern Bering Sea shelf to provide key ecological data for eastern Bering Sea salmon stocks during their juvenile life-history stage. The goal of the OCC/BASIS salmon research cruise was to understand mechanisms underlying the effects of environment on distribution, migration, and growth of juvenile salmon on the eastern Bering Sea shelf. Primary objectives of BASIS include: 1) to determine the extent of offshore migrations of juvenile salmon from rivers draining into the eastern Bering Sea, 2) to describe the physical environment of the eastern and northeastern Bering Sea shelf occupied by juvenile salmon, and 3) to collect biological information on other ecologically important species. Summaries of previous Bering Sea juvenile salmon research cruises can be found in Farley et al. (1999, 2000, 2001, 2002, 2003).

Methods

The OCC survey of the eastern Bering Sea was conducted during fall 2004 (August 11 - October 4). The cruise itinerary and participating scientists are listed in Tables 1 and 2. Transects sampled during the survey were along longitudinal (159°W to 174°W) and latitudinal lines (55°N to 65°N; Figure 1). Sampling stations and locations along each transect are listed in Table 3.

The survey was conducted aboard the contracted fishing vessel (F/V) *Sea Storm* (38 m long). Fish samples were collected using two midwater rope trawls, models 400 and 300, made by Cantrawl Pacific Limited¹ of Richmond, B.C. Stations were sampled using a midwater trawl model 400 that is 198 m long, has hexagonal mesh in wings and body, and a 1.2-cm mesh liner in the codend. The 400 rope trawl was towed at 3.5 to 5 kts, at or near the surface, and had typical spreads of 41 m horizontally and 14 m vertically, and 56 m horizontally and 12 m vertically, respectively. All tows lasted 30 minutes and covered 2.8 to 4.6 km. All sampling was done during daylight hours.

Salmon and other fishes were sorted by species and counted. Standard biological measurements including fork length, body weight, and sex were recorded. Scale samples were collected from the preferred area (Clutter and Whitesel 1956) to document age and growth for all salmon species. Caudal fins from juvenile sockeye and chum salmon were collected for DNA genetic analyses and whole pink salmon were collected for allozyme genetic analysis. Prevalence and intensity of sea lice (*Lepeophtheirus salmonis*) infection on juvenile pink (*O. gorbuscha*) salmon was also examined during the survey (see Trudel et al. 2002 for details). Tissue samples (axillary process) from immature and maturing chum salmon were also collected to document distribution of Pacific Rim salmon stocks within the survey area. Stomachs of all fish species were removed and analyzed on board to document feeding behavior. All other fish species collected were counted and

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

measured (fork length and body weight). Jellyfish were sorted by species and weighed. A subset of each species were counted, weighed and measured (bell diameters) to determine size distributions.

Oceanographic data were collected at each trawl station immediately prior to deploying the trawl. Vertical profiles of temperature, salinity, chlorophyll a fluorescence, light transmission, photosynthetic available radiation (PAR) and dissolved oxygen were measured with a Sea-Bird Electronics Inc.¹ SBE 25 Sealoger Conductivity-Temperature-Depth profiler (CTD). Water samples for nutrients, size-fractionated chlorophyll a (chl a) determinations (>0.7, >2, and >10 µm and total chl a), and phytoplankton and microzooplankton species were collected with Niskin bottles mounted on a carousel with the CTD. Samples collected at two to six depths throughout the water column (including samples from the surface and below the pycnocline). Along-transect surface temperature and salinity data were measured continuously with a thermosalinograph mounted aboard ship.

Results and Discussion

During the survey, 143 trawl stations were sampled along the eastern Bering Sea shelf (Figure 1; Table 3). A total of 8,977 salmon were captured including juvenile pink (*O. gorbuscha*; 20.9%), chum (*O. keta*; 19.4%), sockeye (*O. nerka*; 42.6%), coho (*O. kisutch*; 3.9%), and chinook (*O. tshawytscha*; 5.4%) salmon; less than 8% of the catch consisted of immature and mature chum, sockeye, and chinook salmon (Table 4). Other marine fish species captured during the survey included (see Table 5) walleye pollock (*Theragra chalcogramma*), crested sculpin (*Blepsias bilobus*), sturgeon poacher (*Podothecus acipenserinus*), Pacific herring (*Clupea pallasii*), Bering wolffish (*Anarhichas orientalis*), Pacific sandfish (*Trichodon trichodon*), capelin (*Mallotus villosus*), Pacific cod (*Gadus macrocephalus*), prowlfish (*Zaprora silenus*), Pacific sandlance (*Ammodytes hexapterus*), northern rock sole (*Lepidopsetta peracuated*), Arctic lamprey (*Lethenteron camtschaticum*), sablefish (*Anoplopoma fimbria*), Atka mackerel (*Pleurogrammus monopterygius*), starry flounder (*Platichthys stellatus*), rainbow smelt (*Osmerus mordax*), kelp greenling (*Hexagrammos decagrammus*), salmon shark (*Lamna ditropis*), antlered sculpin (*Enophrys diceraus*), saffron cod (*Eleginus gracilis*), 9-spine stickleback (*Pungitius pungitius*), 3-spine stickleback (*Gasterosteus aculeatus*), arrowtooth flounder (*Atheresthes stomias*), snake prickleback (*Lumpenus sagitta*), yellowfin sole (*Limanda aspera*), plain sculpin (*Myoxocephalus jaok*), Greenland halibut (*Reinhardtius hippoglossoides*), Bering poacher (*Occella dodecahedron*), ribbed sculpin (*Triglops pingelii*), and unidentified rockfish (Scorpaenidae).

The distribution of juvenile salmon within the survey varied by species (Figures 2a-e). Juvenile pink and chum salmon generally distributed north of 58°N with large catches occurring near Nunivak Island. Juvenile sockeye salmon were widely distributed north of 56°N from within Bristol Bay (159°W) to as far east as 172°W with the largest catches occurring within Bristol Bay and south of Nunivak Island. Juvenile coho and chinook salmon were distributed within nearshore waters less than 50-m depth from Bristol Bay

to Norton Sound with the largest catches occurring within Bristol Bay. The size (length and weight) of juvenile, immature, and maturing salmon is listed in Table 6. Fish was an important component of the diet items for juvenile salmon during leg 1, with age 0 pollock dominating the stomach contents (Table 7). Fish and crab megalopa were important components of the diet of juvenile salmon during leg 2, with Pacific sand lance dominating the stomach contents for juvenile pink, coho, and chinook salmon and age 0 pollock dominating the stomach contents for juvenile sockeye salmon (Table 7).

A comparison of oceanographic characteristics with juvenile salmon distribution in the eastern Bering Sea indicate that some juvenile salmon species distributions co-varied with the location of fronts. The Inner Front (located at ~ 50 m) separates the well-mixed coastal waters from the two-layer system farther offshore. Juvenile sockeye salmon were most abundant on the offshore side of the Inner Front and demonstrated partial overlap with age-0 pollock distributions, the primary prey item of the salmon (Figure 3 b, c). In contrast, juvenile chinook salmon were generally most abundant in the coastal low salinity waters along northern Bristol Bay and further north; Figures 3a, d).

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Table 1. Cruise itinerary for the NMFS OCC/BASIS August 12 - October 3, 2004
OCC/BASIS research cruise.

Date	Location/Activity
Leg 1	
11-Aug	Scientists arrive in Dutch Harbor, AK
12-Aug	Load scientists and gear
14-Aug	Begin survey (survey stations south of 60°N)
8-Sept	Enroute Nome, AK
9-Sept	Arrive Nome, AK; Unload Leg 1 scientists and gear
10-Sept	Leg 1 scientists depart Nome, AK
Leg 2	
8-Sept	Scientists arrive Nome, AK
9-Sept	Load Leg 2 scientists and gear
10-Sept	Begin survey (survey stations north of 60°N)
1-Oct	Enroute Dutch Harbor, AK
3-Oct	Arrive Dutch Harbor, AK, unload Leg 2 scientists and gear, end survey
4-Oct	Scientists depart Dutch Harbor, AK

Table 2. Participating Scientists during the August 11 - October 3, 2004 OCC/BASIS research cruise.

	Scientists	Affiliation
Leg 1 (Aug 11 – Sept 10)		
FPC	Ed Farley	NMFS/ABL
	Lisa Eisner	NMFS/ABL
	Angela Middleton	NMFS/ABL
	Kris Cieciel	PSMFC
	Oleg Ivanov	TINRO
	Natalia Kuznetsova	TINRO
Leg 2 (Sept 10 – Oct 3)		
FPC	Jim Murphy	NMFS/ABL
	Jamal Moss	NMFS/ABL
	John Pohl	NMFS/ABL
	Harry George	YRDFA
	Oleg Ivanov	TINRO
	Natalia Kuznetsova	TINRO

FPC	-	Field Party Chief
NMFS	-	National Marine Fisheries Service
ABL	-	Auke Bay Laboratory
PSMFC	-	Pacific States Marine Fisheries Commission
YRDFA	-	Yukon River Drainage Fisheries Association
TINRO	-	TINRO-Centre, Vladivostok, Russia

Table 3. Haul information for the August 11 - October 3, 2004 OCC/BASIS juvenile salmon survey in the eastern Bering Sea. Missing values indicate data not collected. Note that the SST values shown are raw data and are $\sim 0.5^{\circ}\text{C}$ higher than corrected temperatures.

Dat	Transec	Hau ID	La $^{\circ}\text{N}$	Lon $^{\circ}\text{W}$	Cours (degrees)	Star Time	Spee	Net Opening			SST ($^{\circ}\text{C}$)
								Vertica (fathoms)	Horizonta (fathoms)	War (fathoms)	
8/14/2004	165	2004001	55.02	165.00	0	9:38	4.9	8.0	33.0	190	7.0
8/15/2004	161	2004002	56.51	161.01	338	8:49	4.6	8.2	32.0	200	10.5
8/15/2004	160	2004003	56.67	160.00	351	13:36	4.0	7.0	33.0	218	13.0
8/15/2004	159	2004004	57.00	159.16	11	18:18	4.0	7.3	33.0	218	11.2
8/15/2004	159	2004005	57.51	158.99	332	22:14	4.5	8.8	32.0	235	10.7
8/16/2004	159	2004006	58.00	159.00	59	7:36	3.5	9.0	26.8	250	11.2
8/16/2004	160	2004007	57.99	160.01	200	11:58	3.9	8.0	35.0	219	10.8
8/16/2004	160	2004008	57.50	159.97	90	15:53	3.6	7.5	32.5	218	11.8
8/16/2004	160	2004009	57.00	160.01	223	20:06	4.5	7.8	32.4	210	13.2
8/17/2004	161	2004010	57.01	161.00	0	7:39	4.3	8.0	33.5	210	12.2
8/17/2004	161	2004011	57.52	161.00	0	11:27	4.2	8.4	33.0	218	12.9
8/17/2004	161	2004012	58.00	160.97	70	15:08	4.6	8.0	33.0	210	11.6
8/17/2004	162	2004013	58.50	162.02	300	20:34	4.3	8.3	33.4	209	13.5
8/18/2004	162	2004014	58.00	162.03	270	7:25	5.0	8.6	32.5	209	10.8
8/18/2004	162	2004015	57.50	162.02	280	11:44	4.3	7.9	33.0	209	12.0
8/18/2004	162	2004016	57.00	162.03	270	16:01	4.5	8.2	32.5	209	11.9
8/18/2004	162	2004017	56.50	162.03	257	20:14	4.0	8.2	32.8	215	11.9
8/19/2004	163	2004018	55.52	162.99	10	7:29	4.0	9.4	29.0	210	11.4
8/19/2004	163	2004019	56.02	162.99	12	11:23	4.2	9.3	31.0	209	10.6
8/19/2004	163	2004020	56.51	163.00	3	15:20	3.5	8.5	31.5	200	12.3
8/19/2004	163	2004021	56.98	162.98	135	19:23	4.0	7.0	32.5	209	12.1
8/20/2004	163	2004022	57.52	162.99	25	7:26	3.9	8.0	33.1	209	11.7
8/20/2004	163	2004023	58.01	163.03	290	11:12	4.3	8.0	32.0	219	11.6
8/20/2004	163	2004024	58.51	163.02	301	15:10	3.5	7.7	33.0	209	12.5
8/20/2004	164	2004025	58.99	164.01	219	20:29	4.3	8.1	33.5	209	11.9
8/21/2004	164	2004026	59.00	165.02	268	7:30	4.9	8.2	33.0	209	11.2
8/21/2004	164	2004027	58.51	165.01	286	11:56	4.2	7.2	33.0	209	10.3
8/21/2004	164	2004028	58.00	165.02	261	16:30	4.2	8.1	33.8	209	10.8
8/23/2004	164	2004029	58.49	164.06	265	20:06	4.8	8.0	32.5	209	11.1
8/24/2004	164	2004030	57.99	164.04	245	7:41	4.9	8.7	33.8	209	11.5
8/24/2004	164	2004031	57.50	164.04	265	11:46	4.7	7.8	33.8	209	12.1
8/24/2004	164	2004032	56.99	164.01	230	16:04	3.6	8.3	34.0	209	11.9
8/24/2004	164	2004033	56.47	164.00	180	20:03	4.4	7.9	33.0	209	11.4
8/25/2004	164	2004034	55.98	164.06	224	7:40	5.1	8.2	32.5	181	10.4
8/25/2004	164	2004035	55.51	163.99	50	11:39	3.9	8.0	34.0	209	9.4
8/25/2004	165	2004036	55.51	164.96	60	16:53	4.6	8.0	33.0	192	8.2
8/25/2004	165	2004037	56.01	164.97	52	20:57	4	7.8	33.5	192	9.5
8/26/2004	165	2004038	56.51	164.97	60	7:48	3.7	8.0	34.0	209	11.6
8/26/2004	165	2004039	57.00	164.98	70	11:59	3.4	7.8	33.8	209	11.5
8/26/2004	165	2004040	57.50	164.96	90	16:02	4.4	8.0	34.0	209	11.9
8/26/2004	166	2004041	57.48	165.97	140	21:39	4.6	7.8	33.6	209	10.8
8/27/2004	166	2004042	58.00	166.00	150	7:32	4.1	7.8	34.4	209	11.8

Table 3 (Cont'd). Haul information for the August 11 - October 3, 2004 OCC/BASIS juvenile salmon survey in the eastern Bering Sea. Missing values indicate data not collected.

Dat	Transec	Hau I	La °N	Lon °W	Cours (degrees)	Star Time	Spee	Net Opening			SST (°C)
								Vertica (fathoms)	Horizonta (fathoms)	War (fathoms)	
8/27/2004	166	2004043	58.49	166.00	140	12:15	3.7	7.1	32.4	209	10.2
8/27/2004	166	2004044	59.00	165.98	125	16:30	3.8	7.8	35.0	209	10.7
8/27/2004	166	2004045	59.52	166.04	130	21:03	5.0	8.2	32.0	191	11.1
8/28/2004	167	2004046	59.49	166.97	125	7:21	4.6	7.8	34.0	209	10.9
8/28/2004	167	2004047	58.98	166.98	123	11:08	3.8	8.0	33.0	209	10.0
8/28/2004	167	2004048	58.49	166.99	116	14:55	3.1	8.1	33.0	209	11.3
8/28/2004	167	2004049	57.99	166.97	125	19:04	4.4	7.8	33.4	206	11.4
8/29/2004	167	2004050	57.49	166.97	115	7:37	4.4	7.6	33.0	209	11.0
8/29/2004	167	2004051	56.99	166.98	117	11:35	4.1	7.6	33.5	209	11.4
8/29/2004	166	2004052	56.98	166.00	150	15:54	3.2	7.2	32.5	209	11.4
8/29/2004	166	2004053	56.49	165.96	100	19:55	4.8	8.3	33.5	209	11.6
8/30/2004	166	2004054	55.99	166.01	210	7:37	3.6	7.8	34.6	209	9.2
8/30/2004	166	2004055	55.48	165.99	158	11:36	4.0	7.5	32.0	209	8.3
8/30/2004	166	2004056	55.02	166.04	300	15:32	4.3	7.8	34.0	209	8.0
8/30/2004	166	2004057	54.53	166.04	296	20:35	4.5	8.0	32.0	209	7.8
8/31/2004	167	2004058	55.52	166.97	50	18:00	4.5	7.8	34.0	209	9.4
8/31/2004	167	2004059	56.02	166.95	40	21:57	4.6	7.9	34.0	209	
9/1/2004	167	2004060	56.53	167.00	3	7:35	4.5	8.1	34.0	209	10.0
9/1/2004	167	2004061	56.52	167.99	0	12:19	4.0	7.2	35.0	209	10.4
9/1/2004	168	2004062	57.01	168.01	0	16:16	3.7	8.2	33.8	209	11.2
9/1/2004	168	2004063	57.52	168.00	5	20:04	4.5	7.6	33.7	209	10.8
9/2/2004	168	2004064	58.03	168.00	0	7:28	4.5	7.7	33.0	209	10.5
9/2/2004	168	2004065	58.52	168.01	350	11:36	4.4	7.6	33.0	209	11.3
9/2/2004	168	2004066	58.97	168.00	158	15:38	4.7	8.2	34.0	209	9.5
9/2/2004	168	2004067	59.48	168.00	165	20:28	3.7	8.2	35.4	209	9.9
9/3/2004	169	2004068	59.48	168.98	120	7:25	3.5	8.0	33.2	209	10.2
9/3/2004	169	2004069	59.00	168.95	100	11:37	4.5	8.2	33.8	209	10.5
9/3/2004	169	2004070	58.49	168.96	110	16:11	4.4	8.0	34.5	209	10.9
9/3/2004	169	2004071	58.00	168.97	65	20:03	3.8	8.0	33.0	209	10.9
9/4/2004	169	2004072	57.47	169.01	177	7:32	4.0	8.2	32.0	209	10.2
9/4/2004	169	2004073	57.07	168.98	15	12:28	4.9	7.7	33.0	209	11.0
9/4/2004	170	2004074	57.02	169.98	22	17:19	3.9	7.7	33.0	209	9.4
9/4/2004	170	2004075	57.52	169.99	0	21:28	4.3	7.9	33.0	209	10.2
9/6/2004	170	2004076	58.02	170.03	325	10:10	4.9	8.2	34.0	209	10.6
9/6/2004	170	2004077	58.52	170.01	325	13:59	4.5	8.2	33.7	209	10.5
9/6/2004	170	2004078	59.02	170.02	320	18:15	3.9	8.2	33.5	209	10.8
9/7/2004	171	2004079	58.51	171.02	300	9:01	4.5	8.3	35.0	209	10.8
9/7/2004	171	2004080	59.02	171.03	287	13:00	4.4	8.6	34.5	209	10.6
9/7/2004	171	2004081	59.51	171.03	287	17:13	3.8	8.6	33.5	209	10.7
9/10/2004	64	2004082	64.08	164.52	267	14:33	5.0	7.5	33.5	190	14.0
9/10/2004	64	2004083	64.11	163.05	265	20:04	4.0	7.2	34.5	209	14.0
9/11/2004	64	2004084	64.02	166.02	148	7:26		7.6	34.0	209	12.9

Table 3 (Cont'd). Haul information for the August 11 - October 3, 2004 OCC/BASIS juvenile salmon survey in the eastern Bering Sea. Missing values indicate data not collected.

Date	Transect	Haul ID	Lat °N	Long °W	Course (degrees)	Start Time	Speed (knots)	Net Opening		Warp (fathoms)	SST (°C)
								Vertical (fathoms)	Horizontal (fathoms)		
9/11/2004	64N	2004085	64.00	167.01	160	10:25	4.1	8.3	34.0	209	12.5
9/11/2004	64N	2004086	63.98	167.99	156	16:56	4.1	7.7	34.5	209	11.0
9/12/2004	64N	2004087	64.01	168.99	144	7:38	4.2	7.8	33.7	209	9.5
9/12/2004	64N	2004088	64.01	170.00	155	12:46	4.4	8.0	34.5	209	8.7
9/12/2004	64N	2004089	64.02	171.02	160	17:57	4.3	7.7	34.0	209	10.5
9/12/2004	64N	2004090	63.99	172.00	220	22:07	2.5	8.2	34.0	209	10.7
9/13/2004	63N	2004091	63.00	173.94	90	7:29	4.3	7.6	31.5	209	10.7
9/13/2004	63N	2004092	63.00	172.94	90	11:03	4.1	7.8	34.0	209	11.1
9/13/2004	63N	2004093	63.00	171.95	85	14:25	4.3	7.7	33.8	209	11.7
9/13/2004	63N	2004094	62.99	170.98	124	17:50	4.0	7.4	34.0	209	11.4
9/14/2004	63N	2004095	62.98	168.98	140	7:23	4.0	8.2	34.3	209	8.3
9/14/2004	63N	2004096	63.03	168.02	165	11:23	4.3	7.8	35.0	209	10.6
9/14/2004	63N	2004097	63.02	167.02	168	15:33	4.4	7.7	34.0	209	12.6
9/14/2004	63N	2004098	63.06	165.84	163	20:51	3.8	7.9	33.3	209	12.8
9/15/2004	63.5N	2004099	63.51	166.01	171	7:32	3.9	7.7	34.0	209	11.7
9/15/2004	63.5N	2004100	63.48	166.98	150	11:28	4.3	7.8	34.5	209	11.6
9/15/2004	63.5N	2004101	63.48	167.98	145	15:43	4.8	8.0	34.0	209	9.8
9/15/2004	63.5N	2004102	63.55	168.96	166	20:13	4.2	8.1	33.8	209	9.9
9/16/2004	62.5N	2004103	62.51	167.02	145	7:37	4.3	8.3		209	11.3
9/16/2004	62.5N	2004104	62.49	167.98	146	11:52	4.4	7.9	35.0	209	10.9
9/16/2004	62.5N	2004105	62.49	169.04	209	16:08	4.3	7.8	34.5	209	9.0
9/16/2004	62.5N	2004106	62.51	170.05	290	19:44	4.6	7.7	33.5	209	10.6
9/17/2004	62.5N	2004107	62.51	171.07	290	7:30	4.3	8.3	35.0	209	10.7
9/17/2004	62.5N	2004108	62.51	172.04	290	10:54	4.3	8.0	35.3	209	11.0
9/17/2004	62.5N	2004109	62.51	173.04	276	14:43	4.0	7.7	36.1	209	11.0
9/17/2004	62.5N	2004110	62.51	174.05	280	18:37	4.4	7.8	34.0	209	11.0
9/19/2004	62.5N	2004111	62.00	174.01	213	7:44	4.3	8.3	34.5	209	10.6
9/19/2004	62N	2004112	61.99	173.01	189	12:20	3.7	7.9	34.0	209	10.3
9/19/2004	62N	2004113	61.97	172.00	180	16:36	4.4	7.7	34.0	209	10.6
9/19/2004	62N	2004114	61.98	171.01	180	20:52	4.4	8.0	34.2	209	10.8
9/20/2004	62N	2004115	62.00	169.97	90	7:29	3.8	8.4	35.5	209	10.4
9/20/2004	62N	2004116	62.01	168.82	90	12:13	4.3	8.0	34.0	209	10.0
9/20/2004	62N	2004117	62.00	167.94	78	15:14	5.0	7.0	35.0	209	11.6
9/20/2004	62N	2004118	61.99	167.05	65	18:50	4.4	8.2	34.0	209	11.7
9/21/2004	61.5N	2004119	61.49	167.11	64	7:39	4.1	8.3	34.5	209	12.2
9/21/2004	61.5N	2004120	61.52	168.04	124	11:42	3.9	8.2	34.0	209	11.9
9/23/2004	61.5N	2004121	61.48	169.01	180	7:30	4.6	8.1	34.0	209	8.8
9/23/2004	61.5N	2004122	61.50	170.05	255	11:21	4.8	7.8	35.0	209	9.6
9/23/2004	61.5N	2004123	61.49	171.03	212	14:52	3.9	8.3	36.2	209	9.5
9/23/2004	61.5N	2004124	61.49	172.03	220	18:48	4.2	8.1	34.0	209	9.8
9/24/2004	61.5N	2004125	61.49	173.03	200	7:37	4.3	7.7	34.8	209	9.4
9/24/2004	61N	2004126	60.99	173.03	195	11:34	4.4	8.0	34.5	209	9.2

Table 3 (Cont'd). Haul information for the August 11 - October 3, 2004 OCC/BASIS juvenile salmon survey in the eastern Bering Sea. Missing values indicate data not collected.

Date	Transect	Haul ID	Lat °N	Long °W	Course (degrees)	Start Time	Speed (knots)	Net Opening			SST (°C)
								Vertical (fathoms)	Horizontal (fathoms)	Warp (fathoms)	
9/24/2004	61N	2004127	60.99	172.02	193	16:23	4.0	7.4	36.3	209	9.4
9/24/2004	61N	2004128	60.99	171.01	195	20:47	4.3	7.7	34.6	209	9.5
9/25/2004	61N	2004129	60.99	170.00	182	7:32	4.3	7.9	35.0	209	9.2
9/25/2004	61N	2004130	60.98	169.01	170	11:42	4.3	8.1	35.0	209	10.4
9/25/2004	61N	2004131	60.98	167.99	159	15:56	3.9	7.4	34.1	209	11.6
9/25/2004	61N	2004132	61.05	167.00	165	20:11	4.5	8.6	37.7	192	11.6
9/26/2004	60.5N	2004133	60.51	167.99	110	7:25	5.0	7.3	34.0	209	10.9
9/26/2004	60.5N	2004134	60.49	168.96	110	12:48	4.0	8.5	34.0	209	10.3
9/26/2004	60.5N	2004135	60.49	169.98	125	17:10	3.9	8.4	34.2	209	9.5
9/26/2004	60.5N	2004136	60.49	170.97	142	22:02	4.4	8.7	34.8	209	9.3
9/28/2004	60N	2004137	60.00	168.02	214	8:11	3.0	8.6	37.0	209	11.1
9/28/2004	60N	2004138	59.99	169.03	218	12:10	4.4	8.1	35.0	209	9.8
9/28/2004	60N	2004139	59.99	170.05	227	16:01	4.9	7.5	33.2	209	9.6
9/28/2004	60N	2004140	59.98	171.03	208	19:55	4.0	8.4	32.8	209	9.6
9/30/2004	60N	2004141	60.01	171.96	70	9:35	4.8	8.8	34.0	209	7.8
9/30/2004	60N	2004142	60.00	172.96	87	14:38	4.1	8.1	33.0	209	8.5
9/30/2004	59.5N	2004143	59.50	171.97	100	20:00	4.0	8.7	35.0	209	9.0

Table 4. Catch per unit effort (CPUE) of juvenile (J), immature (I), and mature (M) salmon by the F/V *Sea Storm* in the eastern Bering Sea, OCC/BASIS research cruise, August 11 - October 3, 2004. Dash (-) indicates no salmon caught.

Date	Haul ID	Pink		Chum			Sockeye			Coho		Chinook		
		J	M	J	I	M	J	I	M	J	M	J	I	M
8/14	2004001	-	4	-	7	-	-	-	-	-	-	1	1	-
8/15	2004002	-	1	1	-	-	17	-	-	-	-	-	-	-
8/15	2004003	-	2	11	-	-	12	-	-	-	-	-	-	-
8/15	2004004	-	-	14	-	-	88	-	-	69	-	3	-	-
8/15	2004005	-	-	-	-	-	-	-	-	-	-	32	-	-
8/16	2004006	-	-	10	-	-	34	-	-	98	-	108	-	-
8/16	2004007	-	-	35	-	-	152	-	-	-	-	20	-	-
8/16	2004008	-	-	9	-	-	85	-	-	-	-	-	-	-
8/16	2004009	-	-	15	-	-	83	-	-	-	-	-	-	-
8/17	2004010	4	2	76	-	-	126	-	-	-	-	-	-	-
8/17	2004011	1	-	2	4	-	220	-	-	1	1	5	-	-
8/17	2004012	-	1	25	-	-	79	-	-	1	2	14	-	-
8/17	2004013	-	-	11	-	-	-	-	-	23	-	38	-	-
8/18	2004014	-	-	7	2	-	25	-	-	-	-	5	-	-
8/18	2004015	-	-	1	-	-	97	-	-	1	-	-	1	-
8/18	2004016	-	-	44	4	-	73	-	3	-	3	-	-	-
8/18	2004017	1	-	3	1	-	38	-	1	-	-	-	-	-
8/19	2004018	-	1	-	-	-	1	-	6	8	-	-	-	-
8/19	2004019	-	4	2	13	-	6	-	1	1	4	-	-	-
8/19	2004020	-	-	-	8	-	-	-	1	6	2	-	-	-
8/19	2004021	-	-	4	3	-	16	-	-	1	-	-	-	-
8/20	2004022	-	-	2	-	-	6	-	-	-	-	5	-	-
8/20	2004023	-	-	9	-	-	9	-	-	8	-	16	-	-
8/20	2004024	-	-	16	-	-	13	-	-	1	-	13	-	-
8/20	2004025	-	-	12	-	-	-	-	-	13	-	12	-	-
8/21	2004026	3	-	137	-	-	-	-	-	4	-	10	-	-
8/21	2004027	-	1	1	-	-	30	-	1	2	-	2	-	-
8/21	2004028	1	2	-	-	-	144	-	1	-	2	1	-	-
8/23	2004029	1	-	39	-	-	41	-	-	1	-	-	-	-
8/24	2004030	1	-	1	-	-	52	-	1	-	-	3	3	-
8/24	2003031	1	-	4	6	-	38	1	1	-	1	-	-	-
8/24	2003032	-	-	-	-	-	32	-	-	-	-	-	-	-
8/24	2003033	-	-	-	4	-	-	-	-	-	1	-	-	-
8/25	2003034	-	-	-	4	-	1	1	1	-	-	-	2	-

Table 4 (Cont'd). Catch per unit effort (CPUE) of juvenile (J), immature (I), and mature (M) salmon by the F/V *Sea Storm* in the eastern Bering Sea, OCC/BASIS research cruise, August 11 - October 3, 2004. Dash (-) indicates no salmon caught.

Date	Haul ID	Pink		Chum			Sockeye			Coho		Chinook		
		J	M	J	I	M	J	I	M	J	M	J	I	M
8/25	2004035	-	3	-	1	-	-	-	-	-	-	-	-	-
8/25	2004036	-	1	-	1	-	-	-	-	-	-	-	-	-
8/25	2004037	-	-	-	6	-	-	1	-	-	-	-	1	-
8/26	2004038	-	-	-	-	-	1	-	-	-	-	-	-	-
8/26	2004039	-	-	-	3	-	3	-	-	-	-	-	-	-
8/26	2004040	-	-	4	-	-	38	-	-	1	-	-	-	-
8/26	2004041	-	-	-	2	-	-	-	-	-	-	-	1	-
8/27	2004042	2	-	4	1	-	60	2	-	1	-	-	-	-
8/27	2004043	14	-	13	1	-	65	-	-	-	-	1	-	-
8/27	2004044	21	-	92	-	-	30	-	-	3	-	5	-	-
8/27	2004045	29	-	12	-	-	1	-	-	1	-	2	-	-
8/28	2004046	-	1	4	-	-	1	-	-	-	-	2	1	-
8/28	2004047	12	-	7	2	-	8	-	-	-	-	1	-	-
8/28	2004048	15	-	16	3	-	148	-	-	1	-	-	-	-
8/28	2004049	1	-	-	-	-	9	1	-	-	-	-	-	-
8/29	2004050	-	-	-	2	-	9	-	-	-	-	-	-	-
8/29	2004051	4	1	1	4	-	49	-	-	-	-	-	-	-
8/29	2004052	-	-	-	7	-	55	-	-	-	-	-	-	-
8/29	2004053	-	-	-	20	-	-	1	-	-	-	-	-	-
8/30	2004054	-	-	-	12	-	5	-	-	-	-	-	-	-
8/30	2004055	-	-	-	40	-	-	-	-	-	-	-	1	-
8/30	2004056	-	-	-	19	-	-	2	-	-	-	-	1	-
8/30	2004057	-	3	-	29	-	-	3	-	-	1	-	1	-
8/31	2004058	4	-	-	40	-	62	6	-	-	-	-	-	-
8/31	2004059	-	-	-	77	-	2	2	-	-	-	-	-	-
9/1	2004060	-	-	5	-	-	54	-	-	-	-	-	-	-
9/1	2004061	21	-	-	73	-	10	4	-	-	-	-	-	-
9/1	2004062	20	-	2	1	-	162	4	-	-	-	-	-	-
9/1	2004063	23	-	8	18	-	2	-	-	-	-	-	-	-
9/2	2004064	-	-	1	1	-	-	-	-	-	-	-	-	-
9/2	2004065	55	-	46	2	-	164	-	-	-	-	-	-	-
9/2	2004066	204	-	12	-	-	54	-	-	-	-	1	-	-
9/2	2004067	189	-	158	-	-	2	-	-	-	-	1	-	-
9/3	2004068	-	-	3	1	-	-	-	-	-	-	-	-	-

Table 4 (Cont'd). Catch per unit effort (CPUE) of juvenile (J), immature (I), and mature (M) salmon by the F/V *Sea Storm* in the eastern Bering Sea, OCC/BASIS research cruise, August 11 - October 3, 2004. Dash (-) indicates no salmon caught.

Date	Haul ID	Pink		Chum			Sockeye			Coho		Chinook		
		J	M	J	I	M	J	I	M	J	M	J	I	M
9/3	2004069	176	-	54	2	-	131	-	-	-	-	1	-	-
9/3	2004070	91	-	58	4	-	103	-	1	1	-	1	-	-
9/3	2004071	4	-	2	-	-	1	-	-	-	-	-	-	-
9/4	2004072	-	-	1	6	-	-	-	-	-	-	-	-	-
9/4	2004073	-	-	-	19	-	1	3	-	-	-	-	-	-
9/4	2004074	-	-	-	3	-	-	-	1	-	-	-	-	-
9/4	2004075	-	-	-	5	-	1	-	-	-	-	-	-	-
9/6	2004076	3	-	1	-	-	-	-	-	-	-	-	-	-
9/6	2004077	44	-	21	4	-	21	-	-	-	-	-	-	-
9/6	2004078	51	-	43	7	-	56	-	-	1	-	-	-	-
9/7	2004079	10	-	-	-	-	1	-	-	-	-	-	-	-
9/7	2004080	80	-	25	13	-	358	-	1	-	-	-	-	-
9/7	2004081	25	-	27	2	-	51	1	-	-	-	-	-	-
9/10	2004082	-	-	-	-	-	-	-	-	3	-	2	-	-
9/10	2004083	-	-	-	-	-	-	-	-	-	-	6	-	-
9/11	2004084	-	-	-	-	-	-	-	-	-	-	6	-	-
9/11	2004085	23	-	18	-	-	-	-	-	8	-	19	-	-
9/11	2004086	36	-	20	1	-	-	-	1	1	-	6	2	-
9/12	2004087	1	-	-	1	-	-	-	1	-	-	13	-	-
9/12	2004088	38	-	73	4	-	11	-	1	-	-	-	2	-
9/12	2004089	1	-	7	1	-	-	-	3	-	1	-	-	-
9/12	2004090	-	-	-	-	-	-	-	-	-	-	-	1	-
9/13	2004091	-	-	-	-	-	-	-	-	-	-	-	-	-
9/13	2004092	3	-	29	-	-	-	-	-	-	-	-	-	-
9/13	2004093	1	-	12	1	-	-	-	-	-	-	-	-	-
9/13	2004094	1	-	-	2	-	-	-	-	-	-	-	-	-
9/13	2004095	-	-	-	-	-	-	-	-	-	-	-	-	-
9/14	2004096	9	-	-	-	-	-	-	-	1	-	8	-	-
9/14	2004097	-	-	9	-	-	-	-	-	1	-	1	-	-
9/14	2004098	-	-	2	-	-	-	-	-	-	-	2	-	-
9/15	2004099	-	-	-	-	-	-	-	-	-	-	11	-	-
9/15	2004100	13	-	6	-	-	-	-	-	4	-	20	-	-
9/15	2004101	9	-	3	-	-	-	-	-	6	-	-	3	-
9/15	2004102	12	-	1	1	-	-	-	-	-	-	15	2	-

Table 4 (Cont'd). Catch per unit effort (CPUE) of juvenile (J), immature (I), and mature (M) salmon by the F/V *Sea Storm* in the eastern Bering Sea, OCC/BASIS research cruise, August 11 - October 3, 2004. Dash (-) indicates no salmon caught.

Date	Haul ID	Pink		Chum			Sockeye			Coho		Chinook		
		J	M	J	I	M	J	I	M	J	M	J	I	M
9/16	2004103	-	-	1	-	-	-	-	-	1	-	2	-	-
9/16	2004104	6	-	5	-	-	-	-	-	3	-	6	-	-
9/16	2004105	65	-	8	-	-	6	-	-	2	-	19	-	-
9/16	2004106	69	-	3	-	-	6	-	-	1	-	1	1	-
9/17	2004107	13	-	1	-	-	1	-	-	-	-	5	3	-
9/17	2004108	11	-	2	-	-	2	-	-	-	-	3	-	-
9/17	2004109	4	-	-	1	-	11	-	-	-	-	-	1	-
9/17	2004110	2	-	-	3	-	7	-	-	-	-	-	1	-
9/19	2004111	1	1	-	1	-	3	-	-	5	-	-	2	-
9/19	2004112	17	-	5	-	-	10	-	-	-	-	2	1	-
9/19	2004113	9	-	2	-	-	10	-	-	-	-	3	1	-
9/19	2004114	9	-	7	-	-	4	-	-	12	-	1	-	-
9/20	2004115	3	-	2	-	-	-	-	-	-	-	2	1	-
9/20	2004116	10	-	8	-	-	-	-	-	2	-	3	-	-
9/20	2004117	10	-	1	-	-	7	-	-	1	-	-	-	-
9/20	2004118	31	-	55	-	-	-	-	-	3	1	1	-	-
9/21	2004119	-	-	3	-	-	-	-	-	2	-	1	-	-
9/21	2004120	29	-	13	-	-	-	-	-	10	-	-	-	-
9/23	2004121	-	-	-	-	-	-	-	-	-	-	-	1	-
9/23	2004122	5	-	19	-	-	65	-	-	2	-	-	-	-
9/23	2004123	2	-	1	2	-	13	-	-	-	-	2	2	-
9/23	2004124	1	-	-	-	-	2	-	-	-	-	-	2	-
9/24	2004125	1	-	-	-	-	1	1	-	-	-	-	1	-
9/24	2004126	15	-	1	1	-	16	1	-	-	-	-	1	-
9/24	2004127	1	-	5	-	-	13	-	-	-	-	-	-	-
9/24	2004128	3	-	5	3	-	5	-	-	-	-	-	-	-
9/25	2004129	2	-	20	2	-	6	-	-	1	-	1	1	-
9/25	2004130	26	-	5	-	-	-	-	-	4	-	9	-	-
9/25	2004131	2	-	22	-	-	-	-	-	7	-	1	-	-
9/25	2004132	-	-	1	-	-	-	-	-	1	-	1	-	-
9/26	2004133	1	-	10	-	-	-	-	-	3	-	-	-	-
9/26	2004134	129	-	6	-	-	6	-	-	6	-	1	-	-
9/26	2004135	34	-	13	-	-	3	-	-	1	-	2	-	-
9/26	2004136	-	-	18	-	-	-	-	-	-	-	1	3	-

Table 4 (Cont'd). Catch per unit effort (CPUE) of juvenile (J), immature (I), and mature (M) salmon by the F/V *Sea Storm* in the eastern Bering Sea, OCC/BASIS research cruise, August 11 - October 3, 2004. Dash (-) indicates no salmon caught.

Date	Haul ID	Pink		Chum			Sockeye			Coho		Chinook		
		J	M	J	I	M	J	I	M	J	M	J	I	M
9/28	2004137	-	-	27	-	-	-	-	-	-	-	1	-	-
9/28	2004138	17	-	9	-	-	12	-	-	6	-	1	-	-
9/28	2004139	32	-	60	-	-	156	-	-	-	-	-	-	-
9/28	2004140	14	1	37	-	-	93	-	-	3	-	1	3	-
9/30	2004141	7	-	1	-	-	9	-	-	-	-	1	1	-
9/30	2004142	7	-	5	-	-	7	1	-	-	-	-	-	-
9/30	2004143	32	-	67	25	-	107	-	-	-	-	-	-	-

Table 5. Total number of marine fishes caught by the F/V *Sea Storm* in the eastern Bering Sea, OCC/BASIS research cruise, August 11 - October 3, 2004. (Leg 1: August 11 - September 10; Leg 2: September 10 - October 3) Dash (-) indicates no marine fishes caught. Life history stages include young of the year (YOY) and adult (A).

Scientific Name	Life-history stage	Leg 1	Leg 2
<i>Theragra chalcogramma</i>	YOY	2,342,471	257,611
<i>Theragra chalcogramma</i>	A	101	463
<i>Gonatus kamtschaticus</i>	A	6	13
<i>Blepsias bilobus</i>	A	29	7
<i>Podothecus acipenserinus</i>	A	4	28
<i>Clupea pallasii</i>	A	2,136	195,250
<i>Anarhichas orientalis</i>	Juvenile	8	2
<i>Trichodon trichodon</i>	A	961	1
<i>Mallotus villosus</i>	A	87	1,837
<i>Gadus macrocephalus</i>	YOY	954	13
<i>Zaprora silenus</i>	YOY	55	2
<i>Ammodytes hexapterus</i>	A	2,815	1
<i>Lepidopsetta polyxystra</i>	A	6	3
<i>Lethenteron camtschaticum</i>	A	20	41
<i>Anoplopoma fimbria</i>	YOY	290	4
<i>Pleurogrammus monopterygius</i>	YOY	276	76
<i>Platichthys stellatus</i>	A	4	13
<i>Osmerus mordax</i>	A	27	6,253
<i>Hexagrammos decagrammus</i>	YOY	817	3
<i>Lamna ditropis</i>	A	2	3
<i>Enophrys diceraus</i>	A	-	4
<i>Eleginus gracilis</i>	A	-	16
<i>Pungitius pungitius</i>	A	-	23,209
<i>Gasterosteus aculeatus</i>	A	22	1,137
<i>Atheresthes stomias</i>	Juvenile	5	-
<i>Lumpenus sagitta</i>	A	-	1
<i>Sebastes</i> spp.	A	6	5
<i>Limanda aspera</i>	A	385	2
<i>Myoxocephalus joak</i>	A	1	9
<i>Eumicrotremus orbis</i>	A	-	1
<i>Reinhardtius hippoglossoides</i>	A	1	1
<i>Occella dodecaedron</i>	A	-	5
<i>Triglops pingeli</i>	A	-	1

Table 6. Number sampled (*n*), length, and weight for juvenile, immature, and maturing pink, chum, sockeye, coho, and chinook salmon captured by the F/V *Sea Storm* during the OCC/BASIS cruise in the eastern Bering Sea, August 11 - October 3, 2004. (Leg 1: August 11 - September 10; Leg 2: September 10 - October 3) Dash (-) indicates either no salmon caught or sample too small to summarize. Avg = Average; SD = Standard deviation.

Stage/ Species	Leg 1					Leg 2				
	<i>n</i>	Length (mm)		Weight (g)		<i>n</i>	Length (mm)		Weight (g)	
		Avg	SD	Avg	SD		Avg	SD	Avg	SD
<u>Juvenile</u>										
Pink	621	176.5	16.9	53.5	16.9	657	193.2	22.8	71.3	26.9
Chum	836	177.1	20.7	62.1	22.3	535	207.1	20.9	98.4	30.0
Sockeye	1802	182.1	31.8	69.7	37.5	399	216.1	18.0	105.2	31.8
Coho	87	277.5	27.1	287.9	91.6	106	311.5	20.4	397.8	91.7
Chinook	259	190.9	24.0	93.7	61.9	178	223.7	39.7	151.8	210.9
<u>Immature</u>										
Chum	468	512.8	66.8	1791.6	750.1	51	585.8	66.4	2733.9	729.2
Sockeye	29	444.7	73.0	1252.5	647.5	2	349.0	25.5	500.0	69.3
Chinook	13	502.0	203.1	2488.5	2954.0	47	464.8	154.0	1817.5	2046.1
<u>Mature</u>										
Pink	32	501.9	51.1	1665.4	490.7	-	-	-	-	-
Chum	42	645.8	93.2	4170.7	2080.7	5	709.2	56.3	5246.4	1594.5
Sockeye	1	551.0	-	2130.0	-	-	-	-	-	-
Coho	27	636.2	48.1	3696.3	1006.2	2	654.5	34.7	3932.0	345.1
Chinook	-	-	-	-	-	-	-	-	-	-

Table 7. Prey items (% composition by prey weight) for juvenile pink, chum, sockeye, coho, and chinook salmon caught during the August -October 2004 OCC/BASIS juvenile salmon survey during legs 1 (August 11 - September 10) and 2 (September 10 - October 3).

Prey	Pink		Chum		Sockeye		Coho		Chinook	
	Leg		Leg		Leg		Leg		Leg	
	1	2	1	2	1	2	1	2	1	2
<i>n</i>	222	295	583	296	481	196	106	100	91	183
<i>Thysanoessa raschii</i>	1.5	7.9	0.0	3.2	5.3	3.4	0.0	0.0	0.0	0.0
<i>Thysanoessa longipes</i>	0.0	0.0	0.0	0.0	0.0	1.2	0.0	0.0	0.0	0.0
<i>Themisto pacifica</i>	0.0	2.4	0.0	3.2	0.0	2.9	0.0	0.0	0.0	0.0
<i>Hyperia sp.</i>	0.0	1.6	0.0	3.4	0.0	1.1	0.0	1.2	0.0	0.0
Mysidacea	1.4	0.0	1.7	0.0	5.6	0.0	0.0	0.0	3.8	0.0
<i>Epilabidocera amphitrites</i>	0.0	6.9	0.0	0.0	0.0	3.3	0.0	0.0	0.0	0.0
Coelenterata	0.0	0.0	8.6	33.4	0.0	0.0	0.0	0.0	0.0	0.0
Megalopa Brachyura	2.3	31.5	0.0	13.2	0.0	13.1	1.1	14.1	0.0	7.9
<i>Ammodytes hexapterus</i>	16.3	22.1	3.5	5.8	17.1	1.5	18.1	15.2	38.5	22.1
<i>Mallotus villosus</i>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	0.0	28.2
<i>Theragra chalcogramma</i>	66.5	13.6	68.2	20.2	58.8	69.9	80.0	0.0	38.3	18.8
<i>Clupea pallasii</i>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	14.5	12.8	20.2
Larval Fish	3.5	4.7	9.4	12.9	8.1	1.6	0.0	12.5	2.6	0.0
Other	8.5	9.3	8.6	4.7	5.1	2.0	0.8	40.2	4.0	2.8

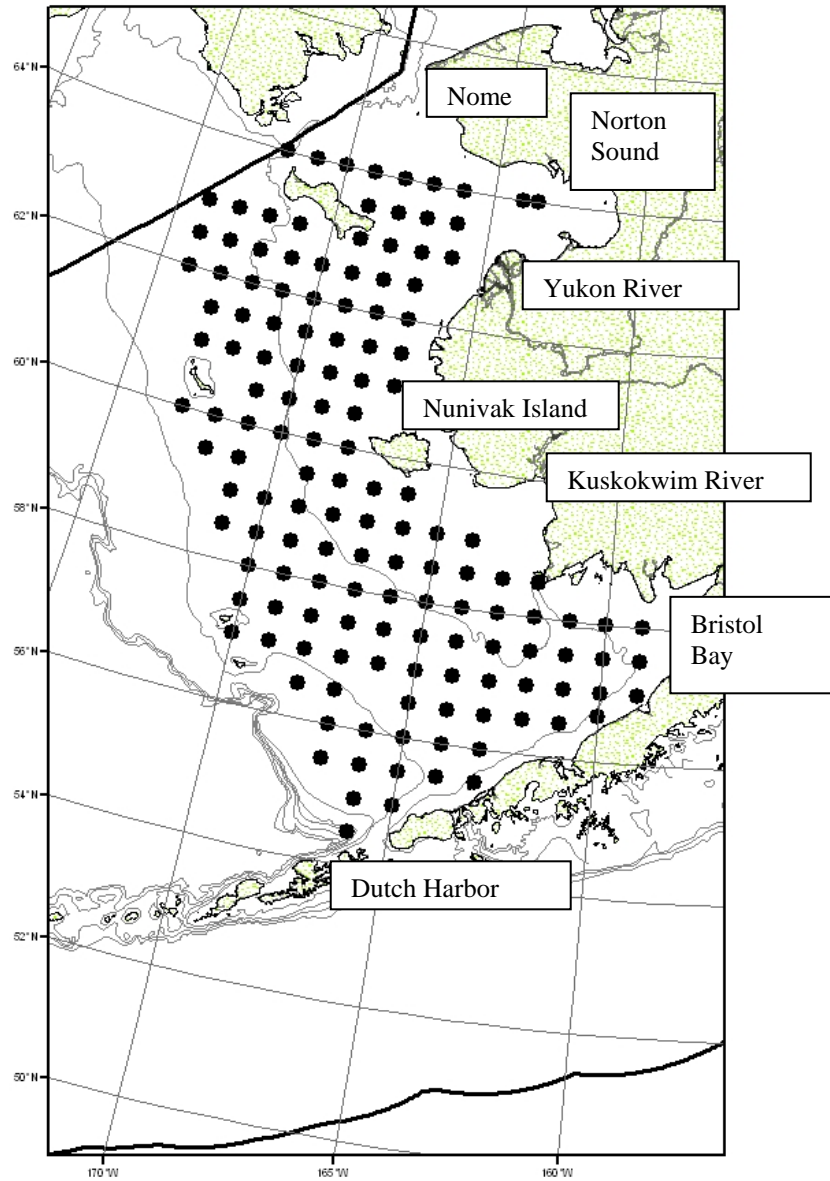


Figure 1. Stations (dots) sampled by the NMFS, OCC/BASIS cruise in the eastern Bering Sea, August 11 - October 3, 2004. Leg 1 stations include those along longitudinal transects 159°W to 172°W; Leg 2 stations include those along latitudinal transects 60°N to 64°N.

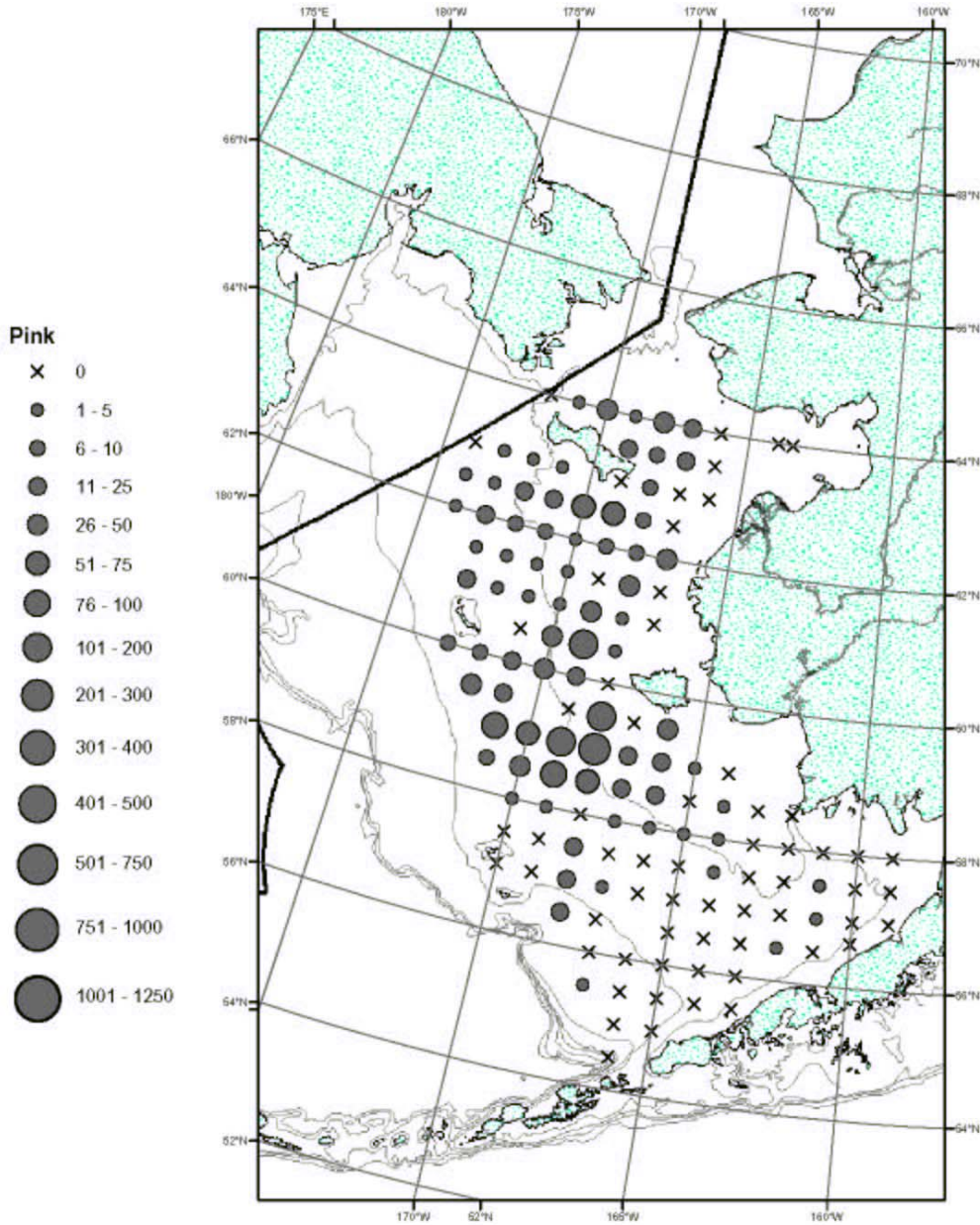


Figure 2a. Distribution (shown by graduated symbol of catch per unit effort - see Table 4) of juvenile pink salmon captured by during the August 11 - October 3, 2004 OCC/BASIS research cruise in the eastern Bering Sea. (X indicates location sampled, but no juvenile salmon of a particular species were caught).

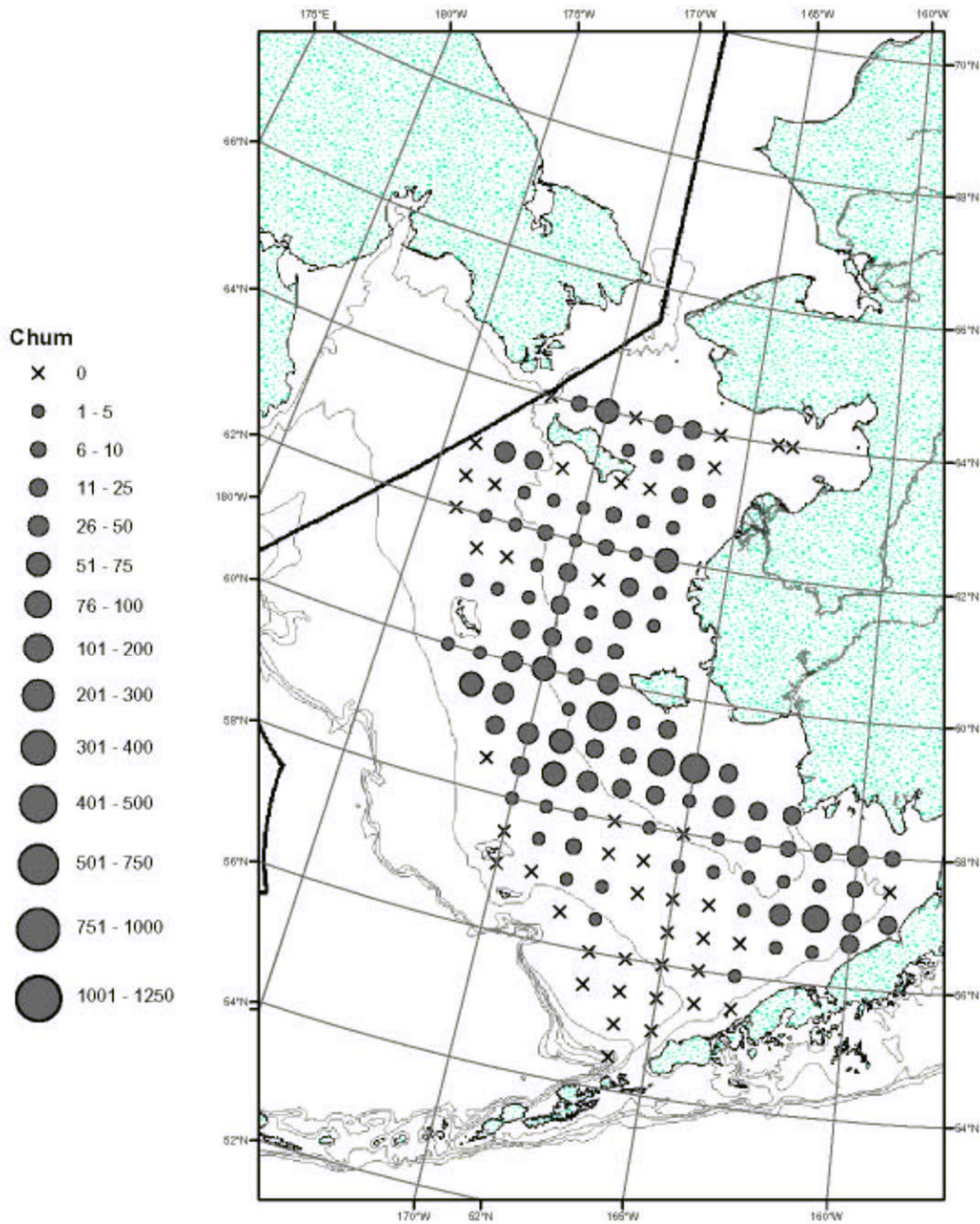


Figure 2b. Distribution (shown by graduated symbol of catch per unit effort - see Table 4) of juvenile chum salmon captured during the August 11 - October 3, 2004 BASIS research cruise in the eastern Bering Sea. (X indicates location sampled, but no juvenile salmon of a particular species were caught).

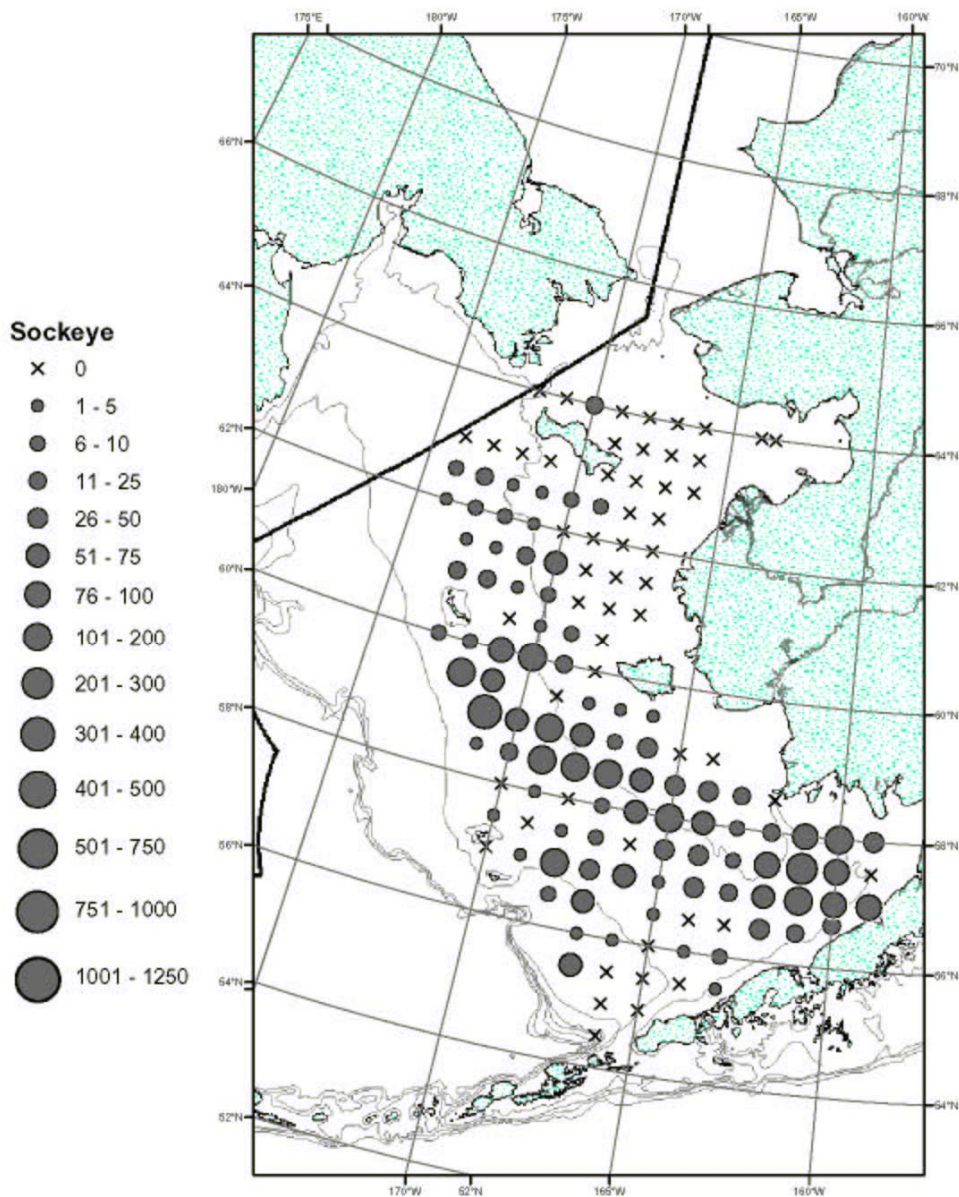


Figure 2c. Distribution (shown by graduated symbol of catch per unit effort - see Table 4) of juvenile sockeye salmon captured during the August 11 - October 3, 2004 BASIS research cruise in the eastern Bering Sea. (X indicates location sampled, but no juvenile salmon of a particular species were caught).

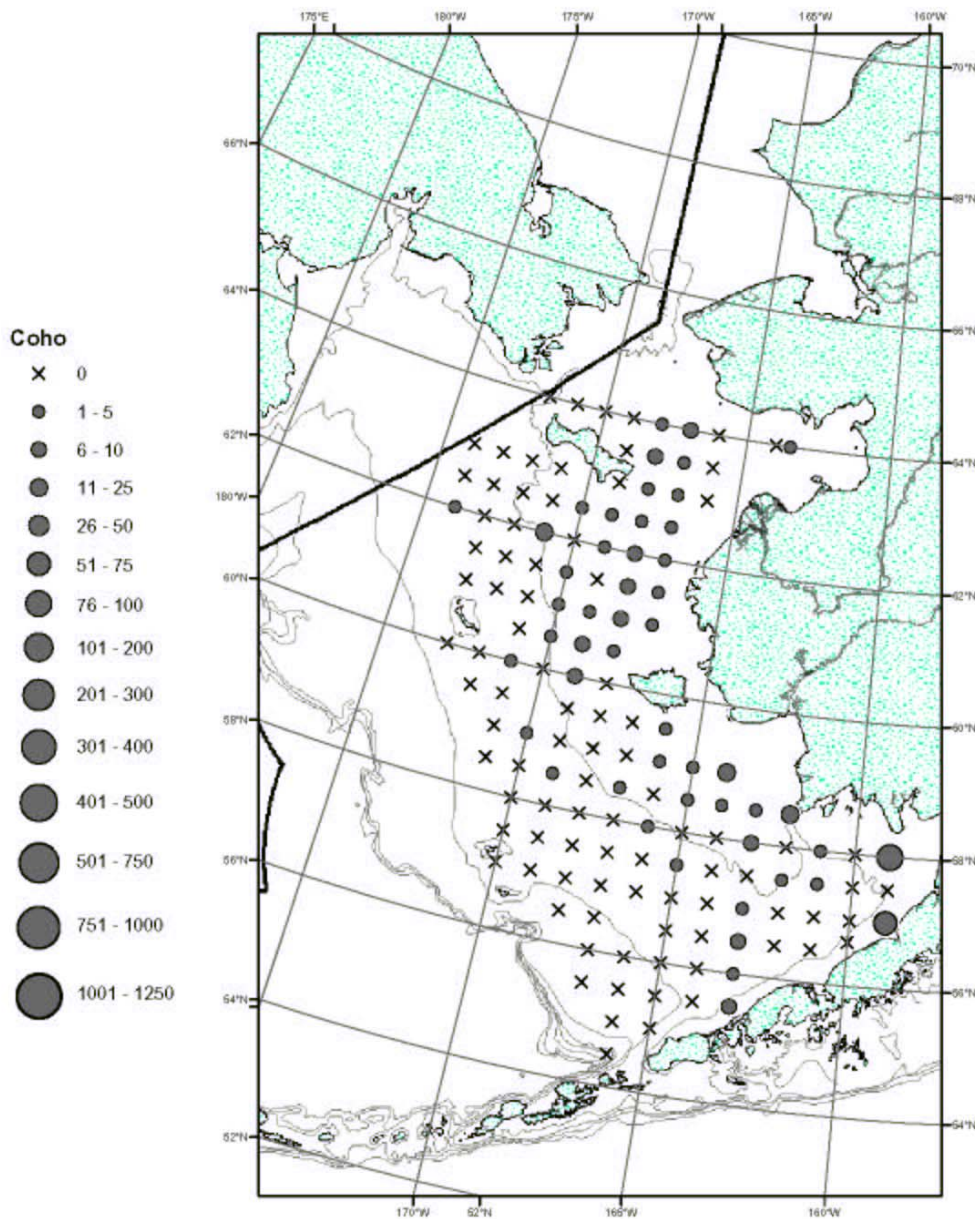


Figure 2d. Distribution (shown by graduated symbol of catch per unit effort - see Table 4) of juvenile coho salmon captured during the August 11 - October 3, 2004 BASIS research cruise in the eastern Bering Sea. (X indicates location sampled, but no juvenile salmon of a particular species were caught.

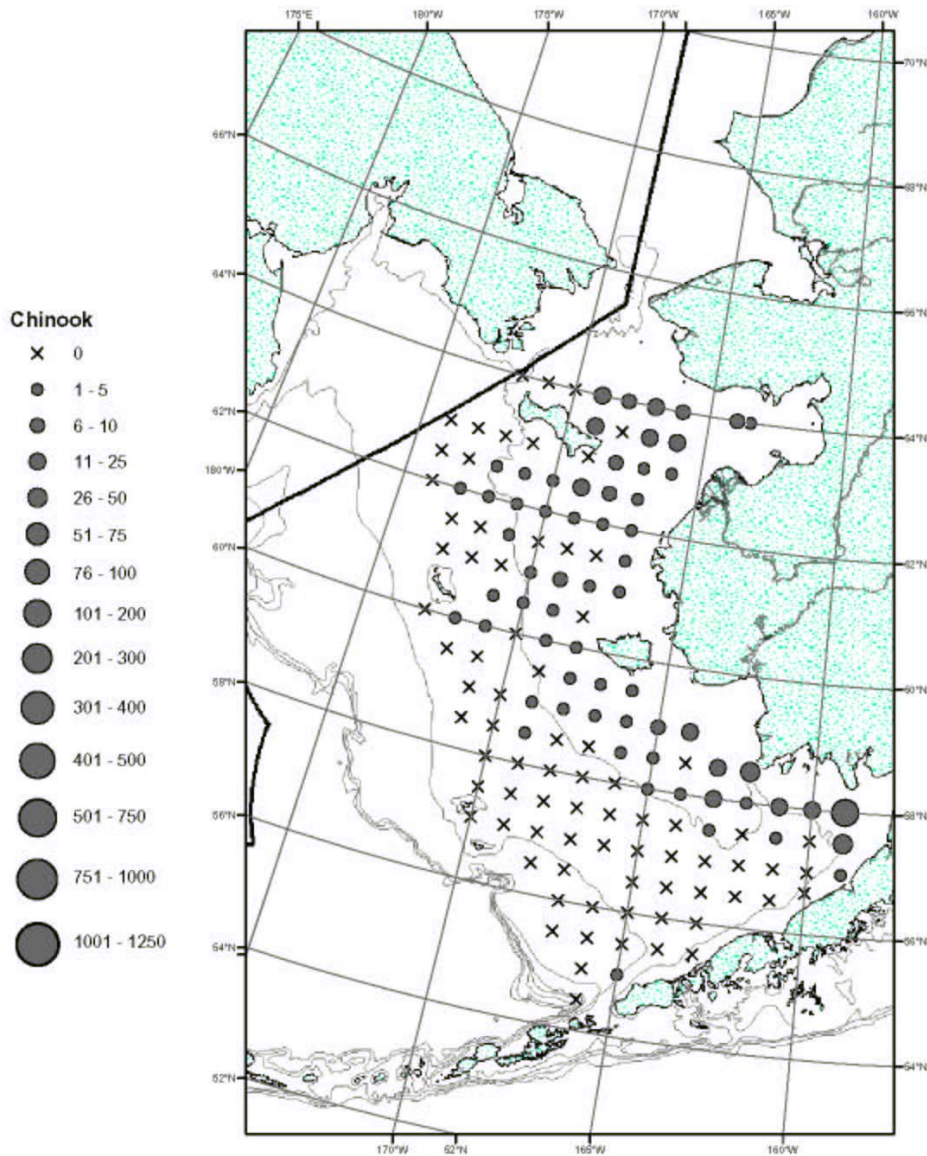


Figure 2e. Distribution (shown by graduated symbol of catch per unit effort - see Table 4) of juvenile chinook salmon captured during the August 11 - October 3, 2004 BASIS research cruise in the eastern Bering Sea. (X indicates location sampled, but no juvenile salmon of a particular species were caught).

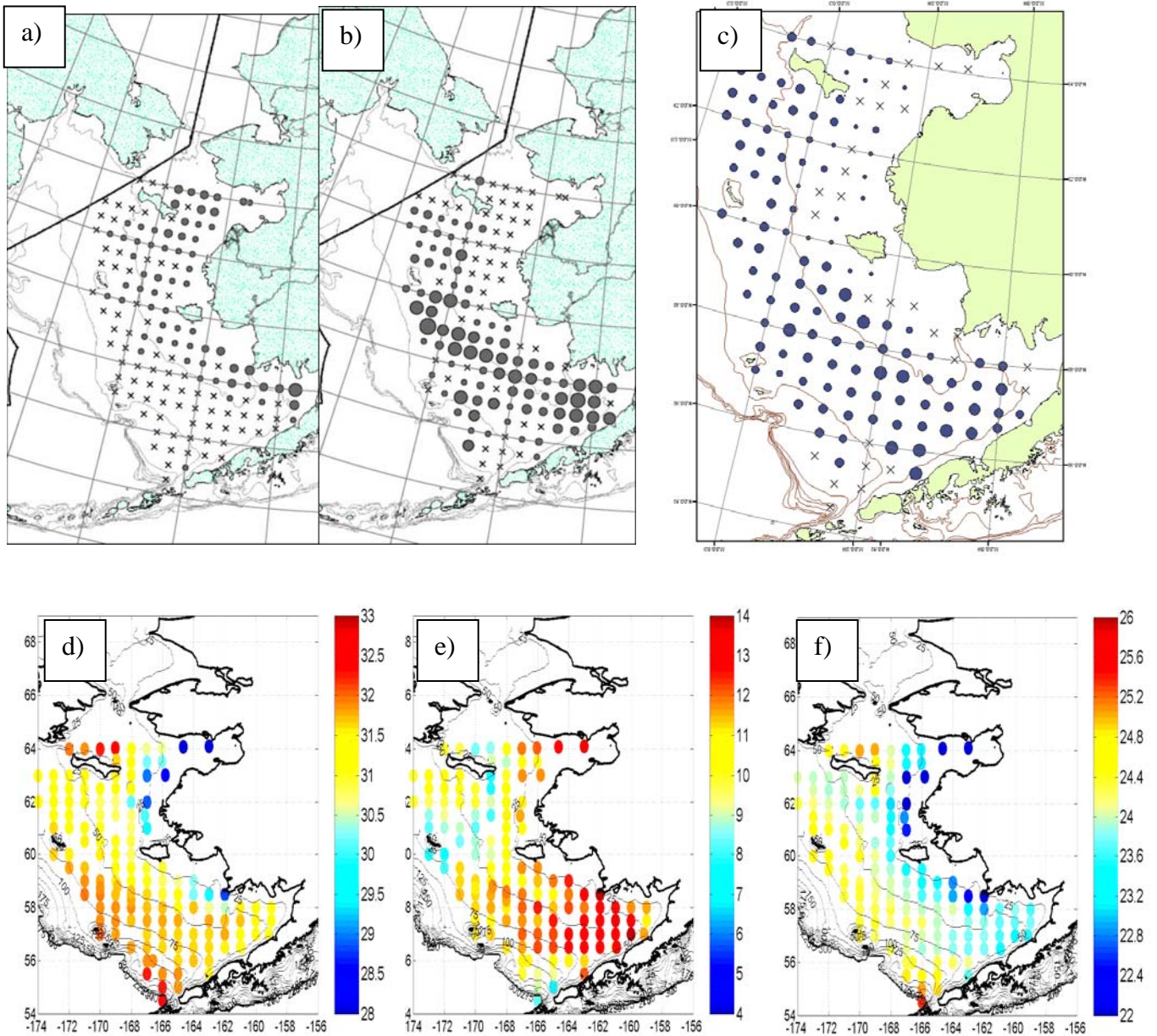


Figure 3. Maps of a) juvenile chinook salmon counts, b) juvenile sockeye salmon counts, c) age-0 pollock counts, d) surface (5 m) salinity, e) surface temperature ($^{\circ}\text{C}$) and f) surface sigma-t (density, kg m^{-3}) in the eastern Bering Sea. The Inner Front (~ location where the vertical structure changes from mixed to two-layered) is indicated by an increase in surface salinity (from below to above ~ 31.5 psu) near the 50 m bathymetry contour.