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CHIGNIK LAKES RESEARCH

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ANNUAL REPORT—1996

TO

**CHIGNIK REGIONAL AQUACULTURE ASSOCIATION
AND
NATIONAL MARINE FISHERIES SERVICE**

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Key Words

beach seine, Black Lake, Chignik Lake, fry emergence, isopods, limnology, sockeye salmon, townet

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INTRODUCTION

The purpose of this work is to annually measure the relative abundance and size of juvenile sockeye salmon (*Oncorhynchus nerka*), relative abundance and size of potential competitor and predator species, the biological and physical environment for sockeye in the lakes, and abundance, size and age of seaward migrants, which is conducted by Alaska Department of Fish and Game (ADFG). A long-term database resulting from these measurements provides a basis from which to evaluate changes in the production of adult sockeye salmon from the Chignik Lakes and perhaps a means of stabilizing or increasing production.

The choice of measurements depends on the likely impact on sockeye salmon, cost of the measurement, and the availability of past data. An annual smolt program was undertaken by ADFG in 1993 while our main research effort was conducted in the lakes. Our 1996 field work began June 6 and continued to September 5.

The following work was done:

- Water temperature and lake level recorders were set during September 1995. However, the gauges were lost in Chignik Lake during the winter and could not be found in the spring.
- Water transparency (Secchi depth), and phytoplankton (chlorophyll *a*) and zooplankton densities were measured on 17 June, 3 dates in July, and on August 8 to assess the summer standing crop of primary producers and zooplankton (the main source of food for sockeye salmon in Chignik Lake).
- Minnow traps were fished at 5 depths and 4 locations in Chignik Lake to assess the relative abundance of potential predators on salmon eggs.
- Emergent fry traps were employed along the Hatchery and Delta beaches. The traps were set in early June and checked about every 5 days to assess the relative abundance and timing of emergent sockeye fry.
- Beaches were seined weekly at seven established stations on Chignik Lake from June to August to assess the relative abundance of juvenile sockeye salmon and associated species nearshore.

- Towing was conducted in both Black and Chignik lakes during early September to assess the relative abundance and lengths of juvenile sockeye salmon in the pelagic region.

This report presents statistics from limnological sampling and catch statistics from minnow traps, emergent fry traps, townetting, and beach seining in 1996, with comparisons to past years where available.

LIMNOLOGY

Methods

Water temperature, water transparency, phytoplankton, and zooplankton samples were collected five times (two stations, Fig. 1) on Chignik Lake. Black Lake was sampled only on July 23 (Fig. 2) because equipment failures precluded other planned sampling trips. Water clarity was estimated with a Secchi disk. Water temperatures were taken with a pocket thermometer on the lake's surface at Black Lake and from water taken with a van Dorn bottle at Chignik Lake. Water samples were taken immediately below the surface for Black Lake, which is shallow and well mixed, and at 0, 1, 5, 10 and 20 m below the surface in Chignik Lake. Chlorophyll *a* analysis was conducted on water that was filtered through Millipore filters; the amount filtered depended on how much algae was in the water (i.e., denser samples clogged the filter faster). The filters were then processed with a Spectronic® 20 spectrophotometer. Zooplankton samples were taken with a 153- μ m mesh, .5-m diameter net in Chignik Lake by hauling the net 40 m vertically through the water.

Results

Black Lake is shallow and turbid; Secchi readings are not very deep. Measurements ranged from 1.5 to 2.1 m in 1996. Near the outlet, a reading of 1.3 m was made to the bottom (Table 1). Chignik Lake, which is deeper and not as well mixed, had deeper Secchi readings. The Clark Bay site averaged 3.4 m during the summer and the Delta site

2.4 m (Table 2). The Delta site was more turbid because of the influence of the Black River.

Surface temperatures were taken from Black Lake whereas a depth profile was taken in Chignik Lake (down to 20 m). An average surface temperature of 13.8°C was recorded on July 23 in Black Lake and at about the same time the surface temperature was 13.0°C at Chignik Lake. Black Lake warms rapidly in the spring because of its shallow depth; however, by mid-July the two lakes have similar surface temperatures.

Chlorophyll *a* at the Hydro and Outlet (Black Lake) sites were again higher (2.97 and 2.86 mg/m³, respectively) than the chlorophyll *a* concentration in Alec Bay (0.96 mg/m³). The lower concentration of phytoplankton in Alec Bay is likely caused by the inflow from the Alec River. The average 1996 concentrations over all stations were similar to averages in past years (Table 3).

Clark Bay and Delta (Chignik Lake) sites did not exhibit constant differences in chlorophyll *a* densities during 1996 (Table 2). Average chlorophyll *a* densities started out high on June 17 (3.22 mg/m³), decreased greatly on July 4, and then remained at about 2 mg/m³ through early August (Table 4).

Total zooplankton densities generally increased in Chignik Lake at the end of the summer at both the Clark Bay and Delta sites; however, there was an unusually high density of zooplankton at the Delta site on July 12 (Table 5). The 1996 total zooplankton counts were otherwise typical of observations from past years (Table 6). Zooplankton sampling was not conducted in Black Lake in 1996 because we have concluded that insects rather than zooplankton are likely the main source of food for juvenile sockeye salmon in Black Lake (Rogers et al. 1996).

Calanoid copepods, *Daphnia*, and *Bosmina* all bloomed towards the end of summer 1996, whereas the density of cyclopoid copepods remained fairly constant throughout the summer (Table 6). This change in species composition during the summer is typical of past years. Unusual in 1996 was the relatively high counts of *Chydoris* and the rotifer *Asplanchna*.

EGG PREDATION

The behavior and distribution of isopods, char (Dolly Varden, *Salvelinus malma*) and sculpins (*Cottus* sp.), and their effect on beach spawning salmon, is poorly understood in the Chignik Lakes system. In the 1996 field season, we began collecting data on the distribution of these organisms in Chignik Lake in an effort to better understand their significance as egg predators. The goal of this

study was to determine if these potential egg predators are present and/or abundant in areas that overlap with spawning sockeye salmon. To accomplish this, we collected isopods, char, and sculpins with baited minnow traps at different locations with high and low spawner densities, both before and during beach spawning. The data presented show the distribution of each species over the months of July and August, at four transects, and across five depths (Table 7).

Methods

Minnow traps were deployed at four different transects during July and August of the 1996 field season. The transects were located at the outlet of Chignik Lake (Fisheries Research Institute [FRI]), Clark Bay, Hatchery Beach, and the Delta. The Hatchery Beach and Delta transects were chosen for their high beach spawner densities while the FRI and Clark Bay transects were chosen because spawner densities are very low. At each transect, five traps were deployed at depths of 2, 5, 10, 20, and 50 m. Traps were baited with 15 g of frozen salmon eggs and allowed to fish for 24 hours. At the end of each 24-h period, the traps were checked and their contents counted.

Results

Several preliminary conclusions can be made from the data collected for this study: isopods are not significant egg predators, char and sculpin spatially overlap with beach spawning salmon, and sculpin numbers increase at the location and time of beach spawning.

The paucity of isopods at depths of 2 and 5 m during the periods prior to beach spawning (July to middle of August) and during beach spawning (middle to late August), at all transects, virtually excluded them from being egg predators. Our observations indicate that isopod abundance was greatest at depths of 20–50 m, while beach spawning sockeye were found at depths less than 5 meters (Table 7).

During beach spawning, sculpins and char were both relatively abundant at depths of 2 and 5 meters at the Hatchery transect. Char abundance was highest at the Hatchery transect at depths of 5–20 m throughout the summer while sculpin abundance was highest at the FRI and Delta transects at depths of 2–20 m. The presence of char and sculpin at the same time and depth as beach spawning salmon indicates that they may be egg predators, particularly at the Hatchery Beach location (Table 7). Our estimates of char abundance are extremely conservative because the minnow traps we used limited the size of char

captured to less than 30 cm.

Although sculpin numbers were highest at the FRI and Delta transects over the entire summer, their numbers increased at the Hatchery transect when beach spawning was underway. This suggests that sculpins migrate to beach spawning locations. Further studies are planned to examine the spatial and temporal changes in sculpin and char distributions as they pertain to salmon egg predation.

EMERGENT FRY

Numbers of emergent fry have been estimated on two beach spawning areas of Chignik Lake since 1986. There was no field work in 1994, but our sampling resumed in 1995 on the Hatchery and Delta beaches. The averages for stations during 1986–90 were used to estimate emergence rates for South Hatchery south and the North Hatchery locations since 1991 (Table 8). In 1996, we sampled each of the 4 stations and the average emergence rate (41.4 m²) was the highest we have observed; however, the Delta location still had a relatively low rate in 1996. The overall average for 1996 reverses a trend of low emergence rates that began in 1989 and may indicate an increase in smolt production by 1998.

TOWNETTING

Townet hauls were made annually in the Chignik Lakes from 1960 to 1973 (Rogers et al. 1996). Although tows were sometimes made at various lengths of time, all catches were standardized to 10 min (Parr 1972). Arithmetic and geometric means have been calculated in the past; however, arithmetic means are presented here. Since 1973, townetting has been sporadic; however, we did tow in both lakes in September 1996 (Table 9). Catches of juvenile sockeye salmon were small in both lakes and it was noteworthy that only sockeye salmon fry were caught in Black Lake. Sockeye fry averaged 68.8 mm in Black Lake and 41.7 mm in Chignik Lake. The sockeye yearlings caught

in Chignik Lake averaged 71 mm. The relatively poor growth in Chignik Lake caused the fry to spend a second summer in the lake prior to smoltification.

BEACH SEINING

Beach seining was also conducted in Chignik Lake in several years prior to 1973 (Rogers et al. 1996). Catches of juvenile sockeye salmon were usually recorded as larger or smaller than 45 mm. The small fish were likely to be fry (age 0) whereas the larger fish were likely a mixture of small yearlings from Chignik Lake and large fry from Black Lake. Beach seining has been done intermittently since 1980 in Chignik Lake (Table 10). Coho salmon juveniles are usually more abundant in beach seine catches than in townet catches, which reflects their preference for the nearshore habitat. About 70% of the coho caught in 1996 were yearlings over 70 mm in length. Catches of juvenile sockeye salmon were generally low in 1996, especially for fry that presumably originated in Chignik Lake. This is in contrast to the high emergence rate observed on Hatchery beach but in agreement with the relatively low townet catches of sockeye salmon fry in 1996.

REFERENCES

- Parr, W. H., Jr. 1972. Interactions between sockeye salmon and lake resident fish in the Chignik Lakes, Alaska. M.S. thesis. Univ. Washington, Seattle.
- Rogers, D., B. Rogers, J. Miller, D. Peterson, and G. Ruggerone. 1996. Chignik Lakes Research. Univ. Washington, Fisheries Research Institute, FRI-UW-9608. Seattle.
- Ruggerone, G.T. 1994. Investigations of salmon populations, hydrology and limnology of the Chignik Lakes, Alaska, during 1993. Prepared for the Chignik Regional Aquaculture Association by Natural Resources Consultants, Seattle, Washington.
- Ruggerone, G.T., C. Harvey, J. Bumgarner, and D.E. Rogers. 1993. Chignik salmon studies. Investigations of salmon populations, hydrology and limnology of the Chignik Lakes, Alaska, during 1992. Univ. Washington, Fisheries Research Institute, FRI-UW-9302. Seattle.

Figures

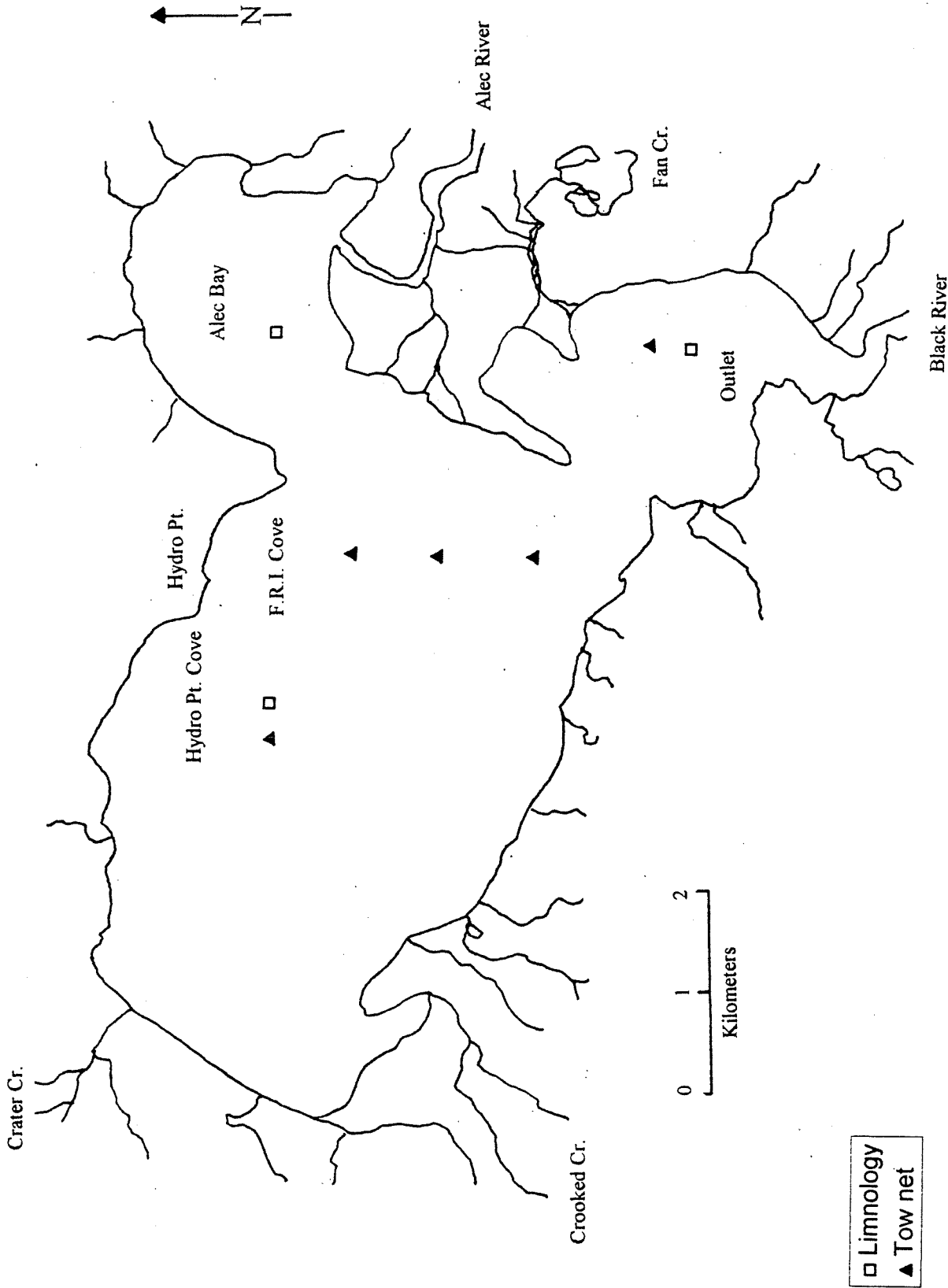


Figure 1. Black Lake sampling sites.

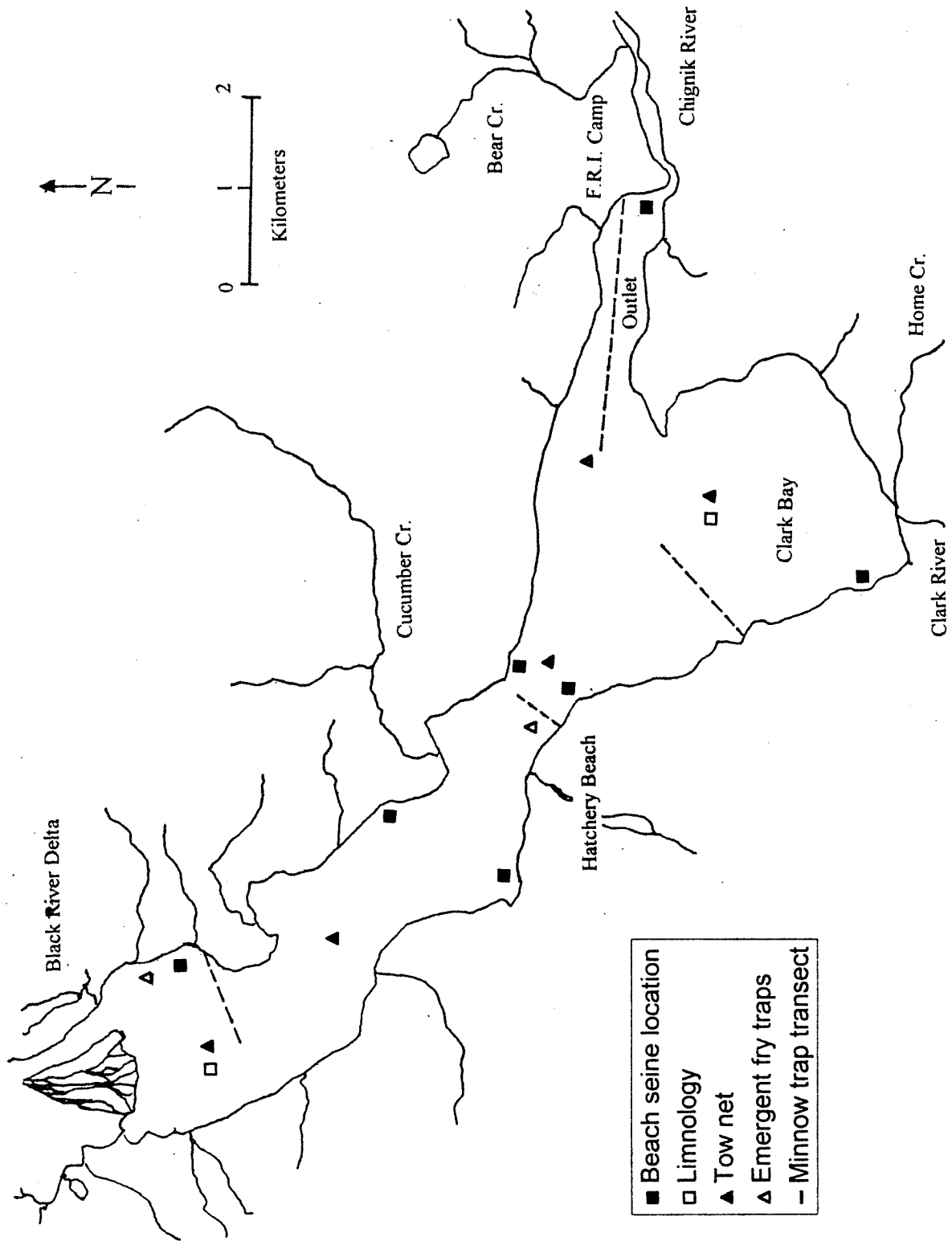


Figure 2. Chignik lake sampling sites.

Tables

Table 1. Limnological data from Black Lake in 1996.

Date	Location	Secchi depth (m)	Surface temp. (°C)	Chlorophyll a mg/m ³
7/23	Hydro Pt.	1.5	15.0	2.97
	Hydro Pt. Cove	2.0	14.0	
	FRI Cove	2.1	14.0	
	Alec Bay	2.0	13.0	
	Outlet	1.3	13.0	
1996 means		1.8	13.8	2.26

Table 2. Limnological data from Chignik Lake in 1996.

Date	Clark Bay				Delta			
	Secchi depth (m)	Depth (m)	Water temp. (°C)	Chlorophyll a mg/m ³	Secchi depth (m)	Depth (m)	Water temp. (°C)	Chlorophyll a mg/m ³
6/ 17	2.2	0	9.0	3.34	1.9	0	9.0	3.02
		1	9.0			1	9.0	
		5	9.0			5	9.0	
		10	9.0			10	9.0	
		20	9.0			20	9.0	
7/ 4	3.0	1	9.0	1.84	2.5	1	9.0	1.48
		5	9.0			5	9.0	
		10	9.0			10	9.0	
		20	9.0			20	9.0	
7/ 12	3.2	0	9.5	1.36	2.0	0	10.0	3.23
		1	9.5			1	10.0	
		5	9.0			5	10.0	
		10	9.0			10	10.0	
		20	9.0			20	10.0	
7/ 26	3.5	0	13.0	1.27	2.0	0	13.0	2.34
		1	13.0			1	13.0	
		5	13.0			5	13.0	
		10	12.0			10	13.0	
		20	11.0			20	11.0	
8/ 8	5.0	0	11.5	2.73	3.5	0	11.0	1.05
		1	11.5			1	11.0	
		5	11.5			5	11.0	
		10	11.5			10	11.0	
		20	11.0			20	11.0	

Table 3. Averages of limnological data from Black Lake, 1992-96.

Date			Secchi depth (m)	Surface water temp. (C)	Chloro- phyll a mg/m ³
Mo	Day	Year			
6	20	92	n/a	n/a	3.24
7	8	92	n/a	n/a	2.28
9	3	92	n/a	n/a	4.59
5	18	93	1.6	8.8	1.26
6	16	93	1.7	9.7	0.98
7	16	93	1.8	15.5	0.60
8	15	93	0.9	12.7	4.33
9	9	93	0.7	12.5	3.32
6	9	95	1.4	11.2	3.67
6	20	95	1.4	10.7	1.34
7	11	95	1.5	12.3	1.15
7	23	96	1.8	13.8	2.26

Source: Ruggerone et al (1993) and Ruggerone (1994).
1992 was north end plus Alec Bay and outlet; 1993 and 1995 were Hydro Pt.,
Alec Bay, and outlet.

Table 4. Averages of limnological data from Chignik Lake, 1992-96.

Date			Secchi depth (m)	Averages over 1-20 m	
Mo	Day	Year		Temp. (C)	Chlorophyll a (mg/m ³)
6	23	92	1.8	9.6	3.27
7	11	92	2.6	9.9	2.68
9	3	92	n/a	10.8	5.42
5	10	93	2.2	4.3	7.96
6	17	93	1.4	9.1	0.88
7	26	93	0.6	12.4	0.81
8	18	93	0.8	11.7	1.49
9	10	93	0.8	11.6	1.71
6	8	95	1.7	7.5	4.89
6	17	95	1.6	9.0	3.23
6	29	95	2.5	9.1	2.61
7	7	95	2.4	10.1	1.85
7	17	95	2.7	11.1	2.91
6	17	96	2.0	9.0	3.22
7	4	96	2.7	n/a	1.50
7	12	96	2.6	9.6	2.03
7	30	96	2.8	12.3	1.94
8	8	96	4.2	11.2	1.92

Table 5. Zooplankton densities (thousands/m²) in Chignik Lake in 1996.

Location	Date		Category							Total
	Mo	Day	Calanoids	<i>Cyclops</i>	<i>Daphnia</i>	<i>Bosmina</i>	<i>Chydoris</i>	Nauplii	<i>Asplanchna</i>	
Clark Bay	6	17	33	85	6	15	10	22	69	240
	7	4	34	132	4	22	24	43	129	388
	7	12	36	95	9	26	41	32	184	423
	7	27	82	92	16	50	21	4	210	475
	8	8	197	137	21	93	6	78	61	593
Delta	6	17	33	53	2	22	12	18	48	188
	7	4	68	129	4	32	24	113	103	473
	7	12	536	421	10	167	26	398	119	1677
	7	30	134	99	4	73	47	22	141	520
	8	8	167	97	50	224	27	45	256	866
Combined average	6	17	33	69	4	19	11	20	59	214
	7	4	51	131	4	27	24	78	116	431
	7	12	286	258	10	97	34	215	152	1050
	7	29	108	96	10	62	34	13	176	498
	8	8	182	117	36	159	17	62	159	730
1996 means			132	134	13	72	24	78	132	584

From 40-m vertical hauls with a .5-m net of 153- μ m mesh. Two hauls per date and station.

Table 6. Zooplankton densities (thousands/m²) in Chignik Lake, 1992–96.

Mo	Date		No. of sites	Haul depth (m)	Category							Total
	Day	Year			Calanoids	<i>Cyclops</i>	<i>Daphnia</i>	<i>Bosmina</i>	<i>Chydoris</i>	Nauplii	<i>Asplanchna</i>	
5	19	92	5	40	1	488	29	1	0	11	7	537
6	6	92	3	40	2	292	12	1	0	6	19	332
6	23	92	5	40	17	251	18	4	0	11	66	367
7	11	92	5	40	22	199	34	16	0	9	231	511
8	31	92	5	40	285	177	206	338	0	133	37	1176
5	9	93	2	40	74	144	2	4	0	0	0	224
6	19	93	2	40	48	77	0	22	0	0	0	147
7	26	93	2	40	380	239	16	423	0	0	0	1058
8	16	93	2	40	82	67	35	120	0	0	0	304
9	9	93	2	40	17	26	82	109	0	0	0	234
6	8	95	2	40	9	115	7	7	2	24	6	170
6	17	95	2	40	5	124	6	7	3	20	10	175
6	29	95	2	40	7	155	16	20	4	16	38	256
7	7	95	2	40	15	205	25	56	7	44	68	420
7	16	95	2	40	39	258	32	107	3	52	78	569
9	5	95	2	40	356	224	537	498	18	108	43	1784
6	17	96	2	40	33	69	4	19	11	20	59	215
7	4	96	2	40	51	131	4	27	24	78	116	431
7	12	96	2	40	286	258	10	97	34	215	152	1052
7	29	96	2	40	108	96	10	62	34	13	176	499
8	8	96	2	40	182	117	36	159	17	62	159	732

Mesh size from 1968-1991 was 247 microns and since 1992 it has been 153 microns.

Table 7. Averages of minnow trap catches by location and depth, 1996.

Species	Depth (m)	Location				Average
		FRI	Clark Bay	Hatchery	Delta	
Isopods	2	0.0	0.2	0.3	0.3	0.2
	5	0.0	3.1	2.1	14.1	4.8
	10	0.0	122.0	20.4	94.7	59.3
	20	248.9	242.8	96.8	98.2	171.7
	50	154.4	166.3	208.6	30.2	139.9
		80.7	106.9	65.6	47.5	75.2
Sculpin	2	69.1	5.3	3.8	15.0	23.3
	5	25.0	23.5	3.4	28.2	20.0
	10	62.7	12.4	22.8	44.4	35.6
	20	6.7	12.5	27.7	96.9	36.0
	50	2.7	0.6	3.4	10.4	4.3
		33.2	10.9	12.2	39.0	23.8
Char	2	6.1	6.9	11.9	1.9	6.7
	5	0.8	2.6	29.3	2.2	8.7
	10	1.2	2.6	45.9	3.6	13.3
	20	0.8	4.1	36.9	4.4	11.6
	50	0.0	0.0	0.8	0.2	0.3
		1.8	3.2	25.0	2.5	8.1

Table 8. Sockeye fry emergence rates during June in Chignik Lake beaches.

Year	South Hatchery south	South Hatchery north	North Hatchery	Delta	Average	Area weighted averages
1986	6.3	26.3	17.5	12.8	15.7	18.0
87	9.5	40.3	28.3	25.1	25.8	29.2
88	18.4	43.5	32.7	40.4	33.8	36.4
89	6.6	2.9	8.4	15.8	8.4	7.8
90	2.8	6.2	8.0	12.3	7.3	7.5
91	3.0	13.4	6.5	2.7	6.4	7.7
92	2.2	5.0	4.8	6.3	4.6	4.8
93	0.9	2.6	2.0	2.1	1.9	2.1
94					n/a	n/a
95	5.5	7.5	12.0	20.3	11.3	11.3
96	36.6	70.4	36.6	2.9	36.6	41.4
86-90 averages	8.7	23.8	19.0	21.3		

Source: Ruggerone (1994) and Ruggerone et al (1993).

Numbers are geometric means of fry per m² for 30 days.

Area weights: South Hatchery South, .149; South Hatchery north, .372; North Hatchery, .248; and Delta, .231.

Italics= estimates of missing data.

Table 9. Average townet catches for Chignik and Black Lake, 1980-96.

Date		No. of tows	Species						
			Sockeye salmon		Juvenile coho	Juvenile king	Pond smelt	Stickleback	
			Fry	Yearling				3-spine	9-spine
Chignik Lake									
7	80	20	52	50	0	0	20	2	8
7	82	5	8	1	2	0	0	1	1
6	83	5	33	87	0	0	0	0	1
7	83	10	173	101	0	0	1	0	1
9	92	9	65	9	0	0	5	2	3
8	93	7	61	23	0	0	39	47	11
9	93	8	44	18	0	0	108	19	16
9	95	5	38	17	0	0	17	8	3
9	96	6	16	24	0	0	4	58	4
Black Lake									
9	92	7	347	0	1	0	110	70	78
6	93	2	3260	0	0	0	148	10	30
7	93	1	478	0	0	0	13	0	0
8	93	9	143	0	11	0	729	910	1148
7	93	4	126	0	23	0	1914	565	269
6	95	6	28	4	0	0	19	4	2
9	95	5	176	1	0	0	49	15	12
9	96	3	82	0	0	0	0	0	0

1992 values are geometric means.

Table 10. Average beach seine catches for Chignik Lake, 1980-96.

Date		No. of sets	Species								
Mo	Year		Sockeye salmon		Juvenile coho	Juvenile king	Char	Stickleback		Sculpin	Pygmy whitefish
			< 45mm	> 45mm				3-spine	9-spine		
6	80	5	47	0	2	0	7	16	1	28	0
7	80	12	52	9	3	1	2	22	1	16	1
5	85	10	113	189	103	2	6	3317	53	12	2
6	85	18	15	71	112	3	36	1031	136	18	28
7	85	17	9	217	30	4	104	399	28	11	6
8	85	6	20	183	9						
9	85	6	0	2	7	0	18	943	18	25	6
5	86	33	33	85	48	8	10	499	33	22	7
6	86	49	49	3	31	8	17	111	15	14	7
7	86	46	46	4	12	2	12	162	9	13	5
8	86	12	2	15	6	2	24	154	5	14	11
5	87	12	1048	714	136	7	25	639	54	13	19
6	87	54	6	230	113	9	65	260	6	13	15
7	87	58	16	51	17	0	8	44	5	14	3
6	92	15	10	15	13	0	7	123	22	13	2
7	92	6	9	2	20	2	23	192	16	7	7
5	93	6	1	173	57	0	13	224	7	9	41
6	93	6	1	20	6	0	15	24	0	8	13
6	95	21	27	9	11	1	13	244	26	18	8
7	95	21	16	13	13	1	10	49	6	17	6
6	96	7	12	121	39	1	15	117	3	22	<1
7	96	21	9	47	30	0	24	215	9	7	19
8	96	7	3	16	41	0	22	82	7	1	9