

**Larson Lake  
Progress Report  
2005**

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**This year's operation of the Larson Lake Project was made possible through enhancement taxes paid by the commercial fishermen in Area H, Cook Inlet and associated waters and a grant administered through the National Oceanic and Atmospheric Administration and the Alaska Department of Fish and Game provided by Senator Ted Stevens .**

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## **DISCLAIMER**

The Cook Inlet Aquaculture Association conducts salmon enhancement and restoration projects in area H, Cook Inlet and associated waters. As an integral part of these projects a variety of monitoring and evaluation studies are conducted. The following progress report is a synopsis of the monitoring and evaluation studies conducted for the Larson Lake project.

The purpose of the progress report is to provide a vehicle to distribute the information produced by the monitoring and evaluation studies. Data collected each year are presented with a summary of the information previously collected for comparative purposes. These reports are intended to provide a general description of project activity and are not an exhaustive evaluation of any restoration or enhancement project. The information presented in this report has not undergone an extensive review. As reviews are completed, the information may be updated and presented in later progress reports.

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## **ACKNOWLEDGEMENTS**

Many individuals and agencies contributed to the success of the Larson Lake Project in 2005. Appreciation is extended to Cook Inlet Aquaculture Association field assistants, Kesha Dove, Kasey Swanson; and all full time staff who endured many long hours in the field. Special thanks go to the Alaska Department of Fish and Game for the support they provided during this project.

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## ABSTRACT

The enumeration of adult sockeye salmon, *Oncorhynchus nerka*, was undertaken for the first time since 2000. The escapement into Larson Lake was 9,955 and was comparable to the last count in 2000. Adult sockeye salmon averaged 537 mm (standard fork length); however male length average (551 mm) was greater than female average length (522 mm). Age 2.3 dominated the age composition with 40.3%. Age 1.3 and age 2.2 were 24.1% and 22.5% respectively. Age 1.2 made up 13.1% of the escapement. Male to female ratio was virtually 1:1.

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## INTRODUCTION AND PURPOSE

Cook Inlet Aquaculture Association, CIAA, was asked to monitor salmon escapement and smolt emigration in Larson Lake in 1984. The Alaska Department of Fish and Game undertook the project in 1982 as a fisheries phase of the pre-fertilization assessment. A cooperative effort between ADF&G and CIAA was formulated to pool budgets necessary to accumulate base conditions necessary to determine suitability for artificial enrichment.

Larson Lake was identified in the *Cook Inlet Regional Salmon Enhancement Plan, 1981 – 2000* (Cook Inlet Regional Planning Team, 1981) as having potential for an additional production of 64,000 sockeye salmon through the technique of artificial enrichment.

Fertilizer was applied in 1986 and 1987. However, fertilizer applications ceased in 1988 when many Larson Lake residents complained about the activities. CIAA terminated the project and only conducted smolt monitoring in 1988. ADF&G picked up adult escapement monitoring activities from 1997 to 2000.

In 2005 CIAA acquired a grant through the Southeast Sustainable Salmon Fund to monitor adult salmon populations. CIAA approached ADF&G Area Management Biologists and requested identification of the systems which they most wanted escapement information. Larson Lake was one of the sites the CIAA Board of Directors chose from list.

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## PROJECT AREA

Larson Lake is located in the foothills of the Talkeetna Mountains approximately 10.5 km east of Talkeetna, Alaska (Figure 1). The Lake is located in T26N, R3W Section 8. The lake covers 176.9 ha, has a maximum depth of 42.6 m, a mean depth of 16.4 m, a 10.3 km shoreline, and is located at an elevation of 186 m above sea level (Figure 2).

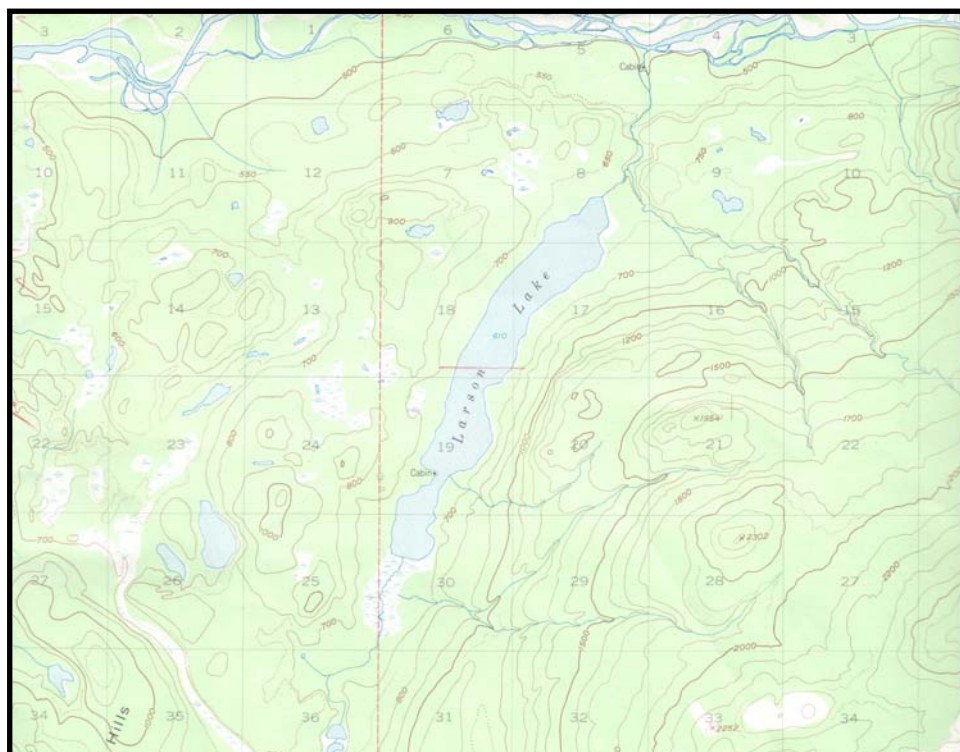


Figure 1. Excerpt from U.S. Geological Survey Iliamna A- 4; Scale 1:63,360

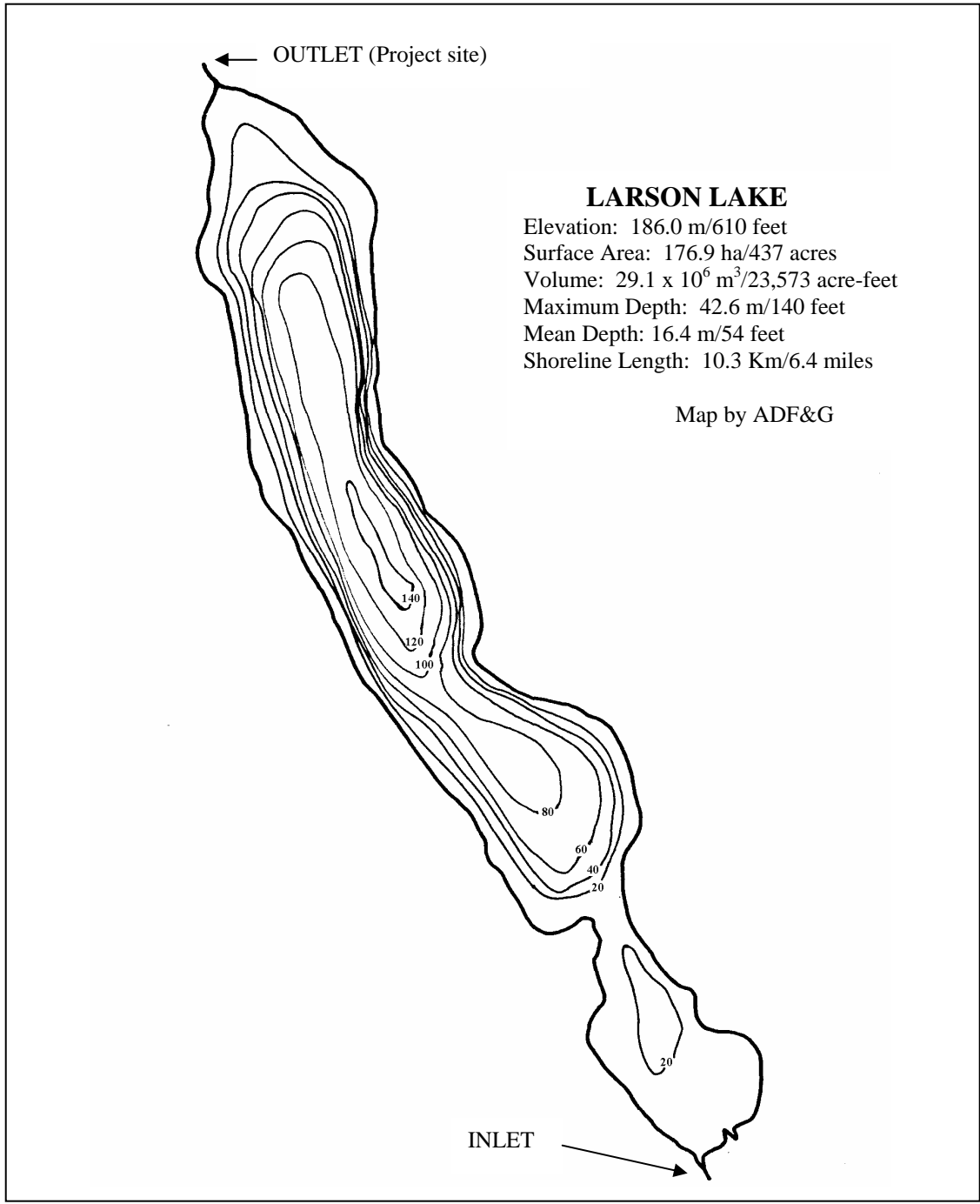


Figure 2. Hydrographic map of Larson Lake

## METHODS

### Environmental Conditions

Percent Cloud Cover was estimated, precipitation measured to the nearest millimeter, and Larson Creek water and air temperatures were recorded at 5:00 PM each day by CIAA as part of the escapement enumeration activities. Standard CIAA procedures were followed for collecting these measurements.

### Adult Escapement

The escapement enumeration of adult sockeye salmon to Larson Lake includes the assessment of sex, age, and standard fork length<sup>1</sup> of the returning population of fish.

To enumerate returning salmon, sample and collect sex, age, and length information, an adult counting weir was temporarily installed in Larson. The weir was constructed of 1.9 cm galvanized pipe and 7.6 cm aluminum channel. The galvanized pipe was picketed through 1.9 cm holes in the aluminum channel spaced 2.54 cm apart.

By removing one or two pickets fish were permitted to pass through the weir. Field personnel counted the adult fish as they ascended Larson Creek. Initially counts were made at least twice a day. As the number of fish ascending Larson Creek increased, counts were made more frequently to prevent fish from accumulating behind the weir.

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<sup>1</sup> Standard fork length is defined as the measurement from mid-eye to the fork of the tail

An average return based on the counts done by ADF&G from 1997 to 2000, assumed that approximately 33,000 sockeye salmon would return to Larson Lake during the enumeration period of 15 July 2005 to 25 August, 2005. Based on this assumption and the goal to obtain an adequate sample size for determining, age, sex, and sized, approximately every 52<sup>nd</sup> fish counted upstream was temporarily held, measure, and released upstream. The adult return, however, was less than projected and fewer fish than expected were collected and measured.

## RESULTS AND DISCUSSION

### Environmental Conditions

Environmental conditions during the Larson Lake adult sockeye migration were monitored from 14 July to 22 August 2005. Stream stage measurements averaged 1.67 feet and ranged from 1.60 to 1.74 feet. Stream temperatures averaged 19.9°C and ranged from 16.0 to 25.0°C and air temperatures averaged 19.9°C and ranged from 12.5 to 26.5°C. Twenty-three percent of the days were clear, 41% were partly cloudy, and 38% were completely overcast. Rain was recorded on 13 of the days during the adult migration. A total of 92 mm of rain fell during this period (Appendix 1).

### Adult Escapement

Adult sockeye salmon return was monitored from 16 July to 22 August 2005 (Appendix 2). During this time a total of 9,959 adult sockeye salmon returned to the weir at Larson Lake. Four of the fish returning died before being passed into the lake. Therefore the actual escapement to Larson Lake was 9,955 adult sockeye salmon

The percentage of adult male and adult female sockeye salmon returning to Larson Lake in 2005 was 50.3% and 49.7%, respectively. Male fish averaged 551 mm (21.7 in) in length and the females averaged 522 mm (20.6 in). An estimated 40.3% of the fish were age 2.3, 24.1% were age 1.3, 22.5% were 2.2, and 13.1% were 1.2 (Table 1).

Table 1. Summary of Larson Lake salmon escapement, age distribution and fish length - 2005.

Year	Number	Escapement		Major Age Classes							
		Sex		1.2		1.3		2.2		2.3	
		% male	% female	(%)	Lth(mm)	(%)	Lth(mm)	(%)	Lth(mm)	(%)	Lth(mm)
2005	9,955	50.3	49.7	13.1	496	24.1	552	22.5	499	40.3	537

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## **RECOMMENDATIONS**

There are no recommendations for operations of future weir counts at Larson Lake.

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## LITERATURE CITED

*Cook Inlet Regional Salmon Enhancement Plan, 1981 – 2000.* Cook Inlet Regional Planning Team, 1981. 79 pages.

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## **APPENDICES**

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Appendix 1. Larson Lake 2005 – Environmental Conditions.

Date	Sky	Precip. (mm)	Stage (ft)	Flow	Water Temp. (°C)	Air Temp. (°C)
14-Jul	2	ND	ND	ND	ND	ND
15-Jul	3	ND	ND	ND	19.0	23.0
16-Jul	4	ND	1.73	ND	19.0	15.5
17-Jul	3	1	1.74	ND	17.5	19.5
18-Jul	3	3	1.74	ND	19.5	18.0
19-Jul	4	0	1.74	ND	17.5	16.5
20-Jul	1	3	1.72	ND	21.0	25.0
21-Jul	1	0	1.71	ND	21.0	24.5
22-Jul	2	0	1.71	ND	20.0	25.5
23-Jul	2	0	1.68	ND	21.5	20.5
24-Jul	2	ND	1.68	ND	22.0	22.0
25-Jul	5	0	1.66	ND	18.5	15.5
26-Jul	5	2	1.64	ND	20.0	18.0
27-Jul	4	0	1.66	ND	18.5	16.5
28-Jul	4	4	1.67	ND	18.5	17.5
29-Jul	3	2	1.65	ND	18.5	16.5
30-Jul	4	1	1.65	ND	16.0	12.5
31-Jul	2	30	1.69	ND	19.0	20.5
1-Aug	4	0	1.68	ND	19.5	19.5
2-Aug	3	5	1.68	ND	18.5	17.5
3-Aug	4	4	1.71	ND	20.0	20.0
4-Aug	5	0	1.69	ND	16.5	16.5
5-Aug	3	0	1.69	ND	20.5	21.5
6-Aug	2	0	1.68	ND	19.5	20.5
7-Aug	4	0	1.67	ND	19.0	19.0
8-Aug	2	0	1.67	ND	20.0	22.5
9-Aug	1	0	1.65	ND	22.5	24.5
10-Aug	1	0	1.66	ND	23.5	26.5
11-Aug	1	0	1.65	ND	23.5	25.5
12-Aug	1	0	1.65	ND	24.5	26.5
13-Aug	1	0	1.64	ND	25.0	26.5
14-Aug	1	0	1.65	ND	22.4	19.5
15-Aug	4	0	1.63	ND	19.5	16.5
16-Aug	4	0	1.62	ND	19.5	18.0
17-Aug	4	0	1.61	ND	18.5	17.0
18-Aug	3	10	1.60	ND	19.5	18.5
19-Aug	1	0	1.60	ND	20.5	20.0
20-Aug	2	0	1.60	ND	19.5	18.5
21-Aug	4	23	1.66	ND	17.5	14.5
22-Aug	2	5	1.73	ND	ND	ND
Total	40	92				

- 1 = Clear
- 2 =Cloud Cover <50%
- 3 =Cloud Cover>50%
- 4 =Overcast
- 5 =Rain

ND = No Data

Appendix 2. Larson Lake 2005 – Sockeye Migration.

Date	Escapement		Morts	Total
	Daily	Total		
16-Jul	0	0		0
17-Jul	0	0		0
18-Jul	160	160		160
19-Jul	4	164		164
20-Jul	166	330		330
21-Jul	0	330		330
22-Jul	97	427		427
23-Jul	3	430		430
24-Jul	315	745		745
25-Jul	300	1,045		1,045
26-Jul	502	1,547		1,547
27-Jul	411	1,958		1,958
28-Jul	385	2,343		2,343
29-Jul	124	2,467		2,467
30-Jul	152	2,619		2,619
31-Jul	578	3,197		3,197
1-Aug	899	4,096		4,096
2-Aug	702	4,798		4,798
3-Aug	510	5,308		5,308
4-Aug	213	5,521		5,521
5-Aug	415	5,936		5,936
6-Aug	311	6,247		6,247
7-Aug	520	6,767		6,767
8-Aug	550	7,317		7,317
9-Aug	189	7,506		7,506
10-Aug	394	7,900		7,900
11-Aug	208	8,108		8,108
12-Aug	66	8,174	1	8,175
13-Aug	207	8,381	1	8,383
14-Aug	188	8,569	1	8,572
15-Aug	249	8,818		8,821
16-Aug	72	8,890		8,893
17-Aug	140	9,030		9,033
18-Aug	90	9,120		9,123
19-Aug	214	9,334		9,337
20-Aug	307	9,641		9,644
21-Aug	165	9,806	1	9,810
22-Aug	149	9,955		9,959
	9,955		4	