

**Neil Lake
Sockeye Salmon
Data Report
2011**

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DISCLAIMER

The Cook Inlet Aquaculture Association (CIAA) 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 data report is a synopsis of the monitoring and evaluation studies conducted for Neil Lake. This Neil Lake Data Report encompasses data collected during the 2011 adult sockeye salmon escapement.

The purpose of the data 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. This report is intended to provide a general description of project activity and is 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 other reports.

The Neil Lake Data Report was prepared by Cook Inlet Aquaculture Association under award of the Alaskan Sustainable Salmon Fund 45888 from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, administered by the Alaska Department of Fish and Game (ADF&G. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration, the U.S. Department of Commerce, or ADF&G.

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ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

DISCLAIMER	i
ACKNOWLEDGEMENTS	iii
TABLE OF CONTENTS	v
LIST OF FIGURES	vii
ABSTRACT	ix
INTRODUCTION AND PURPOSE	1
PROJECT AREA	3
METHODS	5
RESULTS AND DISCUSSION	7
RECOMMENDATIONS	9
LITERATURE CITED	11
APPENDICES	13

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LIST OF FIGURES

Figure 1	Neil Lake in relation to Cook Inlet and Alaska.....	3
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ABSTRACT

As part of the continued evaluation of lakes in the Susitna River watershed to determine the sockeye salmon (*Onchorynchus nerka*) abundance in key salmon producing lakes with and without northern pike (*Esox lucius*), Cook Inlet Aquaculture Association (CIAA) and the Alaska Department of Fish and Game (ADF&G) agreed to monitor adult sockeye salmon returns to Neil Lake. Neil Lake was known to have a population of northern pike. The 2011 Neil Lake adult escapement was the first time CIAA monitored Neil Creek. The adult escapement was enumerated from 18 July and continued daily until 22 August. During this time, zero adult sockeye salmon returned to Neil Creek. CIAA field staff observed 27 northern pike in the lake and creek during the monitoring period.

Due to the lack of adult sockeye returns to Neil Lake, CIAA will not pursue smolt migration or adult escapement monitoring at Neil Creek for the 2012 season.

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INTRODUCTION AND PURPOSE

To better understand the recent low adult sockeye salmon (*Onchorynchus nerka*) returns to the Susitna River drainage system, the Cook Inlet Aquaculture Association (CIAA), in cooperation with the Alaska Department of Fish and Game (ADF&G), is assessing sockeye salmon populations at several key salmon producing lakes with and without northern pike (*Esox lucius*) in the Susitna River drainage. The overall objective of this effort is to enumerate the smolt and adult returns and to assess the characteristics of these populations in terms of age composition, sex and size. Additionally, for some lake systems, environmental conditions and water quality measurements are being collected as well as genetic samples, mark-recapture studies and hydroacoustic surveys. The goal is to collect sound biological data to provide the foundation on which decisions for management and rehabilitation strategies can be made. Understanding the adult to juvenile relationship will allow management biologists to analyze and evaluate the production and rearing condition of each lake.

The evaluation of adult sockeye salmon returns to Neil Lake was completed in the last year of the three year project. At this point, the key production lakes (4 lakes; Shell Lake, Chelatna Lake, Judd Lake and Larson Lake) had been identified and were being monitored yearly. This left three lakes to be evaluated each year which could be discretionally determined based on assessment needs. Neil Lake was chosen because northern pike were known to be present and sockeye salmon abundance was unknown.

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PROJECT AREA

Neil Lake is located approximately 52 miles northwest of Anchorage, Alaska (Figure 1). Neil Lake lies in the Kroto Creek watershed which encompasses approximately 366 mi² of the Lower Susitna River Basin. Neil Lake's outlet flows into the Deshka River.

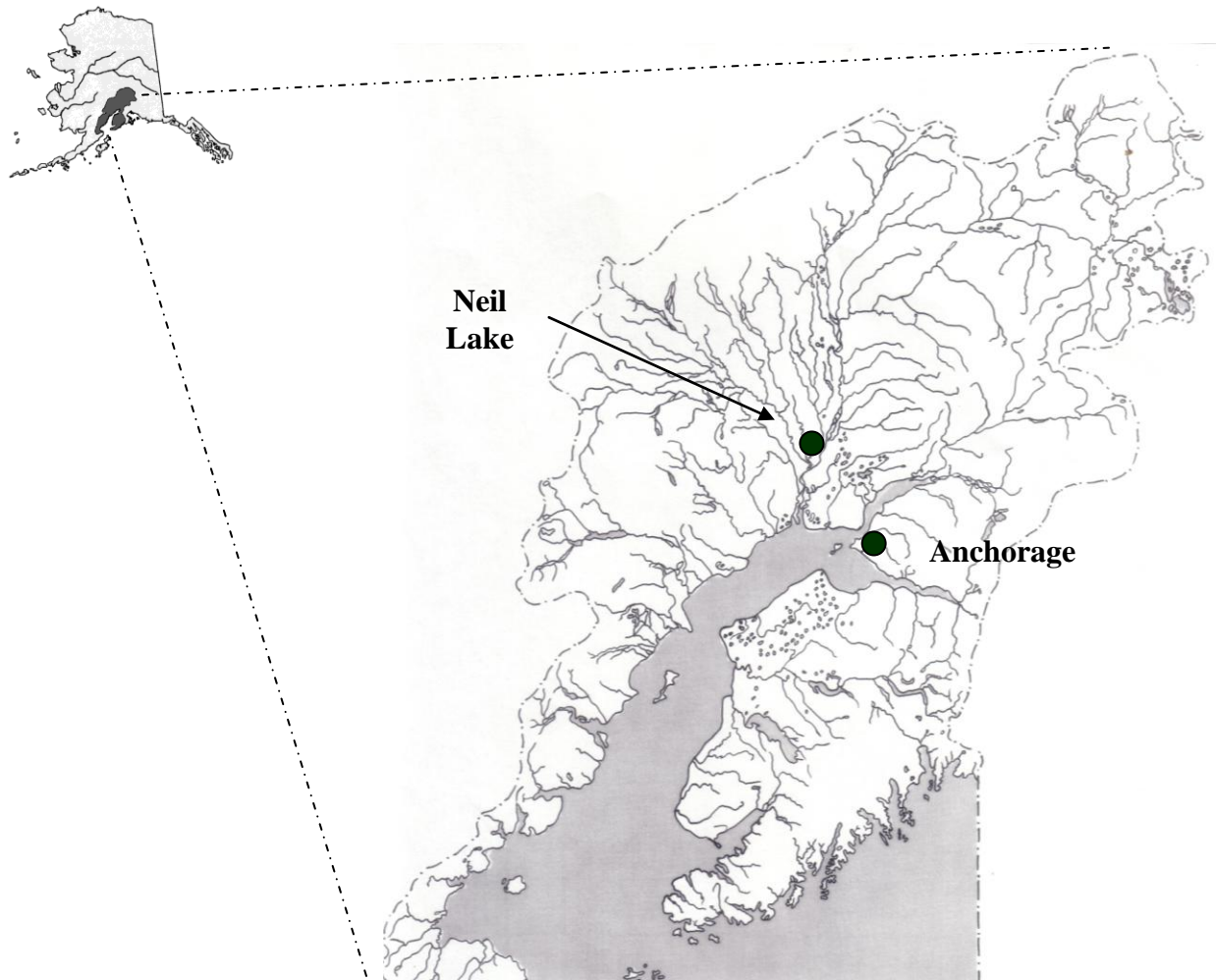


Figure 1 Neil Lake in relation to Cook Inlet and Alaska

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METHODS

Environmental Conditions

Environmental conditions were recorded daily at 5:00 pm and consisted of the percent cloud cover (visual determination), stream stage (measured to the nearest tenth of a foot), precipitation (measured to the nearest millimeter) and water and air temperatures. However, due to unexpected equipment and installation delays, precipitation and stage height data is incomplete for the full deployment of the weir. Standard CIAA procedures were followed for collecting these observations (CIAA 2011).

Adult Enumeration

To enumerate returning adult salmon and facilitate data collection, a counting weir was temporarily installed in Neil Creek. 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.

Field personnel visually checked the weir several times a day and would open the 1-2 pickets on the weir to allow fish to move upstream. CIAA adult salmon enumeration normally includes an assessment of the sex, age, and standard fork length¹ of the returning population of fish. However, due to no returns no sampling occurred.

¹Standard fork length was defined as the measurement from mid-eye to the fork of the tail.

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RESULTS AND DISCUSSION

Environmental Conditions

During the 2011 adult escapement, environmental conditions were monitored from 18 July to 22 August. However, due to unexpected equipment and installation delays no data was recorded for precipitation and stage height for the first 25 days of weir deployment (total days of deployment = 36). Therefore data for these two parameters should be considered incomplete. Stream temperatures averaged 15°C ($\pm 1.3^\circ\text{C}$). Air temperatures averaged 15°C ($\pm 3.2^\circ\text{C}$). Six percent of the days were clear, 47% were partly cloudy, and 47% were completely overcast.

Adult Enumeration

The adult escapement was enumerated from 18 July and continued daily until 23 August. During this time zero adult sockeye salmon returned to Neil Creek. The only fish species present during this time were 27 Northern Pike.

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RECOMMENDATIONS

Due to no returns of adult sockeye salmon in 2011, no enumeration of sockeye smolts is warranted. Neil Lake should be evaluated for control and/or removal of northern pike as well as a determination of the habitat conditions (limnology) in order to assess the success of reintroducing salmon to the lake.

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LITERATURE CITED

Cook Inlet Aquaculture Association (2011). Neil Lake Procedures Manual.

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APPENDICES

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Appendix 1 Neil Lake – Environmental Conditions

Date	Sky	Precip. (mm)	Stage (ft)	Water Temp (°C)	Air Temp (°C)
18-Jul	4	ND	ND	15	18
19-Jul	2	ND	ND	15	15
20-Jul	2	ND	ND	17	20
21-Jul	2	ND	ND	17	20
22-Jul	4	ND	ND	19	22
23-Jul	5	ND	ND	16	14
24-Jul	5	ND	ND	16	14
25-Jul	4	ND	ND	15	14
26-Jul	3	ND	ND	16	17
27-Jul	2	ND	ND	16	18
28-Jul	2	ND	ND	16	18
29-Jul	1	ND	ND	17	19
30-Jul	3	ND	ND	17	20
31-Jul	4	ND	ND	16	15
1-Aug	5	ND	ND	15	13
2-Aug	5	ND	ND	15	12
3-Aug	5	ND	ND	15	13
4-Aug	5	ND	ND	15	13
5-Aug	3	ND	ND	14	13
6-Aug	4	ND	ND	13	10
7-Aug	3	ND	ND	15	12
8-Aug	4	ND	ND	14	12
9-Aug	5	ND	ND	14	11
10-Aug	2	ND	ND	15	13
11-Aug	1	ND	ND	15	19
12-Aug	4	0.0	1.44	16	14
13-Aug	3	0.0	1.44	14	16
14-Aug	3	0.5	1.44	14	13
15-Aug	3	0.0	1.43	15	17
16-Aug	2	0.0	1.40	15	20
17-Aug	5	0.7	1.40	15	12
18-Aug	5	9.0	1.41	14	13
19-Aug	5	5.0	1.42	14	13
20-Aug	3	3.7	1.42	14	10
21-Aug	2	0.0	1.41	13	12
22-Aug	3	0.0	1.41	13	15
Total		Inc			
Avg.		Inc	Inc	15	15
Min.		Inc	Inc	13	10
Max.		Inc	Inc	19	22
SD		Inc	Inc	1.3	3.2
Summary of Cloud Cover - % of Days					
No. Days	Meas.	Rain	Overcast	Partly Cloudy	Clear
36	Inc		47%	47%	6%
1.0 = Clear 2.0 = Cloud Cover <50% 3.0 = Cloud Cover >50% 4.0 = Overcast 5.0 = Rain Inc = Incomplete ND = No Data					

*Rain (mm) and stage height (ft) data is incomplete due to equipment being late to arrive and be installed on site.

Appendix 2 Neil Lake – Adult Escapement

Date	Sockeye		Coho	King	Pink	N. Pike	Rainbow	D.V.
	Daily Escapement	Total Return	Daily Escapement	Daily Escapement	Daily Escapement	Daily Escapement	Daily Escapement	Daily Escapement
18-Jul	0	0	0	0	0	1	0	0
19-Jul	0	0	0	0	0	0	0	0
20-Jul	0	0	0	0	0	3	0	0
21-Jul	0	0	0	0	0	0	0	0
22-Jul	0	0	0	0	0	0	0	0
23-Jul	0	0	0	0	0	0	0	0
24-Jul	0	0	0	0	0	0	0	0
25-Jul	0	0	0	0	0	0	0	0
26-Jul	0	0	0	0	0	0	0	0
27-Jul	0	0	0	0	0	0	0	0
28-Jul	0	0	0	0	0	0	0	0
29-Jul	0	0	0	0	0	0	0	0
30-Jul	0	0	0	0	0	0	0	0
31-Jul	0	0	0	0	0	0	0	0
1-Aug	0	0	0	0	0	0	0	0
2-Aug	0	0	0	0	0	0	0	0
3-Aug	0	0	0	0	0	0	0	0
4-Aug	0	0	0	0	0	0	0	0
5-Aug	0	0	0	0	0	0	0	0
6-Aug	0	0	0	0	0	0	0	0
7-Aug	0	0	0	0	0	0	0	0
8-Aug	0	0	0	0	0	0	0	0
9-Aug	0	0	0	0	0	1	0	0
10-Aug	0	0	0	0	0	5	0	0
11-Aug	0	0	0	0	0	4	0	0
12-Aug	0	0	0	0	0	7	0	0
13-Aug	0	0	0	0	0	6	0	0
14-Aug	0	0	0	0	0	0	0	0
15-Aug	0	0	0	0	0	0	0	0
16-Aug	0	0	0	0	0	0	0	0
17-Aug	0	0	0	0	0	0	0	0
18-Aug	0	0	0	0	0	0	0	0
19-Aug	0	0	0	0	0	0	0	0
20-Aug	0	0	0	0	0	0	0	0
21-Aug	0	0	0	0	0	0	0	0
22-Aug	0	0	0	0	0	0	0	0
23-Aug	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	27	0	0

Appendix 3 Neil Lake – Update

Misc. Activities		
Adult Crew On-site:	18-Jul	2011
Adult Crew Off-site:	22-Aug	2011

Adult Migration			
Dates:	18-Jul	to	22-Aug
			Number
Sockeyes:			0
Mortalities:			0
Coho:			0
King:			0
Pink:			0
Northern Pike:			27
Rainbow:			0
Dolly Varden:			0

