

**Caswell Lake
Adult Sockeye Salmon
Data Report
2010**

**Prepared by:
CIAA Staff
2012**

The Caswell Lake Project was made possible through an Alaskan Sustainable Salmon Fund grant received from the Alaska Department of Fish & Game and the National Oceanic and Atmospheric Administration and a State of Alaska Designated Legislative Grant.

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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 Caswell Lake. The Caswell Lake Data Report encompasses data collected from the 2010 adult sockeye escapement as it falls under the Alaskan Sustainable Salmon Fund.

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. 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 other reports.

The Caswell Lake Data Report was prepared by CIAA 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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Our equal employment opportunity philosophy applies to all aspects of employment with CIAA including recruiting, hiring, training, transfer, promotion, job benefits, pay, dismissal, and educational assistance.

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ACKNOWLEDGEMENTS

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ABSTRACT

As part of the continued evaluation of lakes in the Susitna River watershed to determine the sockeye salmon (*Onchorhynchus 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 Caswell Lake. Invasive northern pike were suspected to be present Caswell Lake.

During the 2010 adult escapement, environmental conditions were monitored from 18 July through 24 August. Due to low water levels (~6 inches deep), water level fluctuation was not measured. Stream temperatures averaged 16.0°C (± 0.19 SE) and ranged from 15 to 18°C. Air temperatures averaged 15.6°C (± 0.60 SE) and ranged from 10 to 23°C. A total of 175 mm of rain fell during that period.

The adult escapement was enumerated from 18 July through 24 August, except for a three day period from 16 August through 19 August when the weir was unmanned and open for fish passage. During the time the weir was manned, no adult sockeye salmon returned to Caswell Lake. There were no adult fish species recorded passing through the weir.

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INTRODUCTION AND PURPOSE

To better understand the recent low adult sockeye salmon (*Oncorhynchus nerka*) returns to Upper Cook Inlet, 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, CIAA and/or ADF&G are recording environmental conditions and water quality measurements 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 enumeration of adult salmon returns to Caswell Lake was completed in the second year of a three year effort to enumerate salmon returns to the Susitna River drainage. Caswell Lake was chosen for enumeration because invasive northern pike were suspected to be present.

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PROJECT AREA

Caswell Lake is located approximately 35 km Southeast of Talkeetna, Alaska (Figure 1). The Lake is located in T22N, R4W, Section 10. The lake lies on the east side of the Susitna River Valley and has a surface elevation of 92 m. Caswell Lake has a surface area of 40 ha, and total volume of $1.8 \times 10^6 \text{ m}^3$. Caswell Lake has a maximum depth of 8.2 m, and a mean depth of 4 m (Figure 2). Tributaries to Caswell Lake include two small unnamed creeks, one which is on the north side of the lake, with the other lying on the southeast side. The lake's discharge forms Caswell Creek, which flows approximately 10 km to the Susitna River.

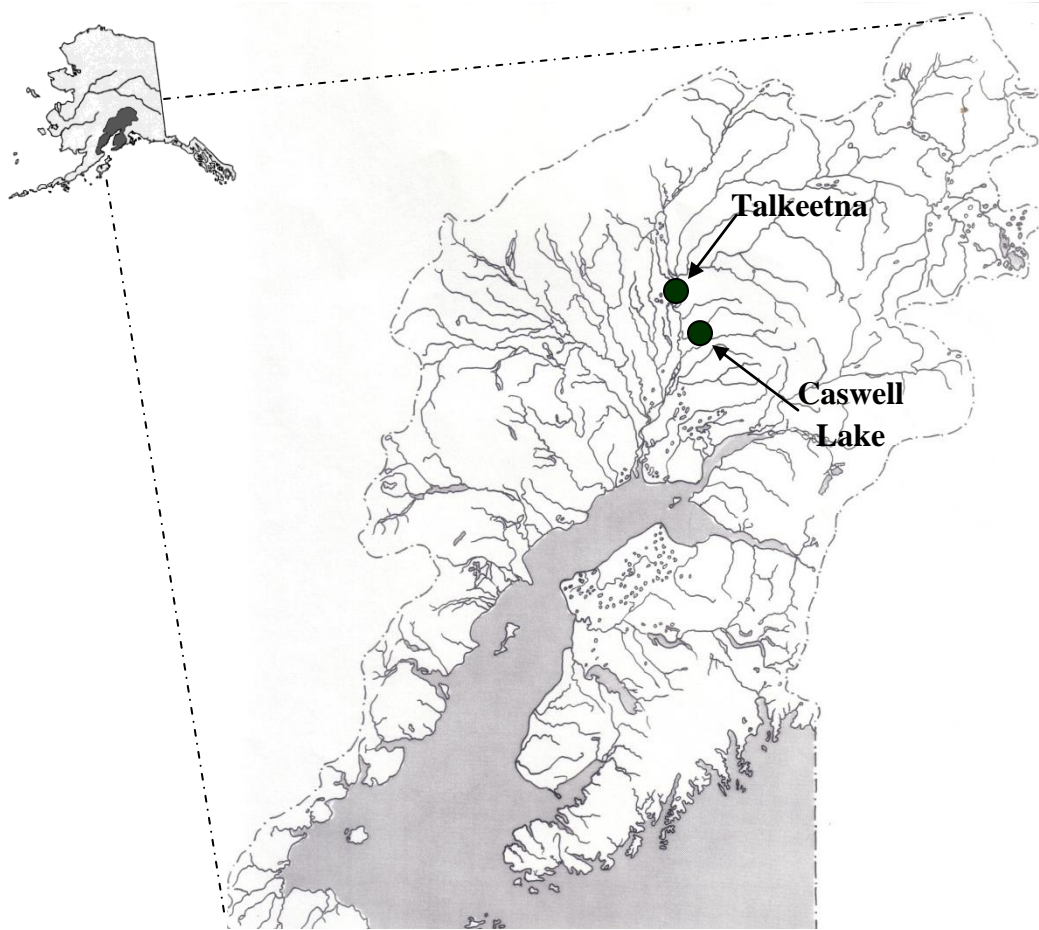


Figure 1: Caswell Lake in relation to Cook Inlet and Alaska

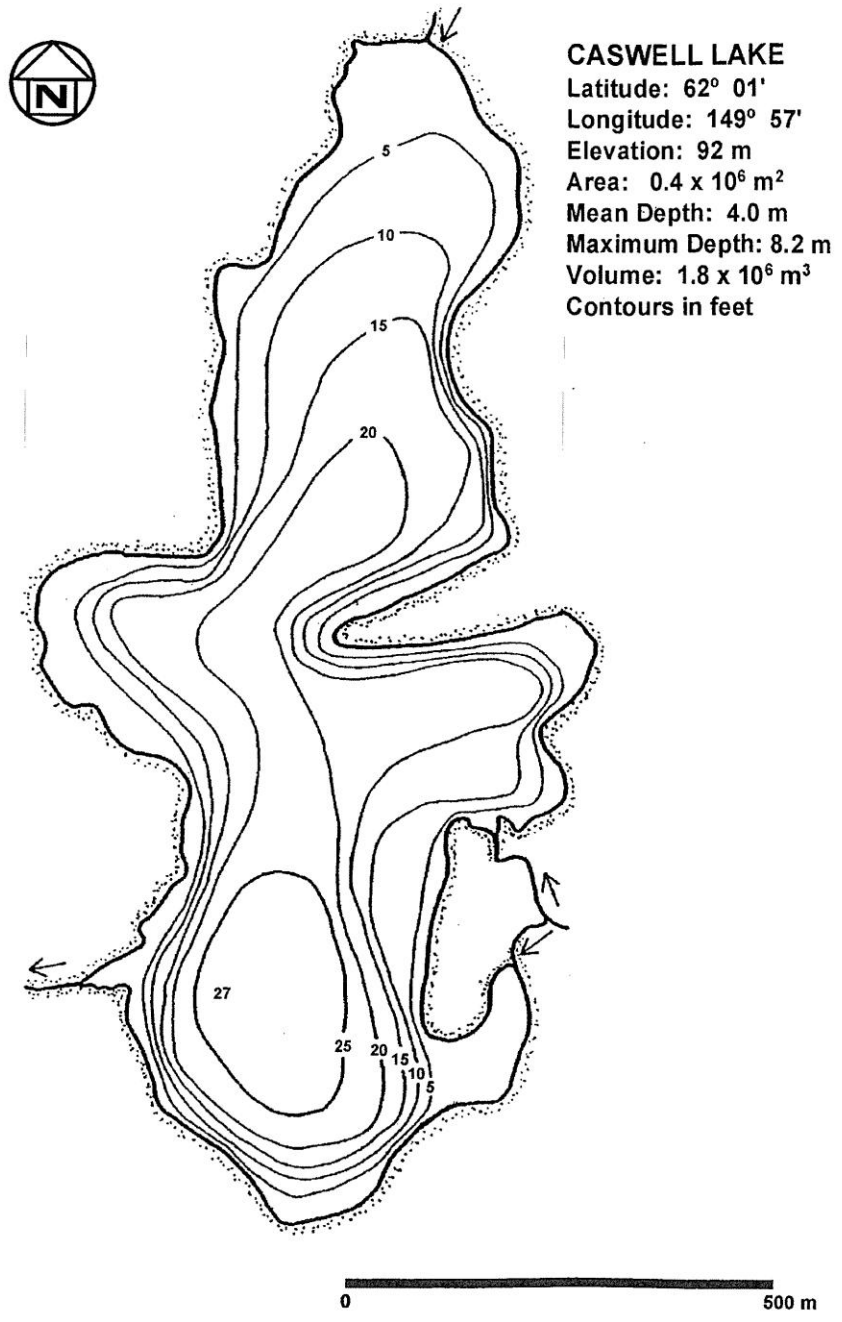


Figure 2: Bathymetric map of Caswell Lake

METHODS

Environmental Conditions

To assess the environmental conditions during the adult sockeye salmon migration to Caswell Lake, percent cloud cover was visually estimated, precipitation measured to the nearest millimeter and water and air temperatures to the nearest 1°C were recorded at 5:00 PM daily. Standard CIAA procedures were followed for collecting these observations (CIAA 2010). Due to low water levels (~6 inches deep), water level fluctuation was not measured.

Weir

To enumerate returning adult salmon and facilitate data collection, a fixed picket weir approximately 7 meters wide was temporarily installed across Caswell Creek, approximately 90 meters downstream from the outlet of Caswell Lake. 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.

Adult Enumeration

Passage counts were conducted several times daily. CIAA adult salmon enumeration normally includes assessment of the sex, age (scales), and mideye fork length¹ of up to 40 randomly selected adult sockeye daily (CIAA 2009). Real time count data was posted on the CIAA website. Due to no returns, no sampling occurred.

¹ MEF length is defined as the measurement to the nearest millimeter from the middle of the eye to the fork of the tail.

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RESULTS

Environmental Conditions

During the 2010 adult escapement, environmental conditions were monitored from 18 July through 24 August. Stream temperatures averaged 16.0°C (± 0.19 SE) and ranged from 15 to 18°C. Air temperatures averaged 15.6°C (± 0.60 SE) and ranged from 10 to 23°C. Six percent of the days were clear, 27% were partly cloudy, and 67% were completely overcast. Measurable rain was recorded on 23 days of the escapement. A total of 175 mm of rain fell during that period.

Due to larger amounts of rainfall, water levels in the stream were visually estimated to be elevated from 8 August through 13 August.

Adult Enumeration

The adult escapement was enumerated from 18 July through 24 August except for a three day period from 16 August to 19 August when personnel were not available to man the weir. During the three day period the weir was unmanned, the weir was left open and fish could enter the lake uncounted. No adult sockeye salmon or other fish species were enumerated through the weir during the period the weir was manned.

On 3 August, CIAA personnel walked to the Caswell Lake outlet and notched a beaver dam that could possibly impede fish movement. The dam appeared old and no further activity was seen after notching.

On 24 August, CIAA personnel drove areas accessible by road around Caswell Lake. Several other lakes in the area are connected by a series of marshy areas and streams. Although no adult salmon were seen returning to Caswell Lake, field personnel noted what appeared to be juvenile coho salmon (*O. kisutch*) in a marshy area around one of the other lakes nearby.

On 28 August, CIAA personnel conducted helicopter survey of Caswell Lake, following Caswell Creek to the Susitna River. Other than the previously notched beaver dam at the outlet of the lake, no obstructions appeared to be hindering fish movement. No fish were seen spawning in the lake, tributaries, or outlet.

Through contact with local residents living near the lake, it appears water levels of the lake may have dropped after a state agency removed existing man-made dams at the outlet of the lake intended for water control. Residents believe the salmon disappeared following this occurrence, possibly because the lake now freezes to the bottom in the winter due to lower water levels. This has not been confirmed as factual information.

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RECOMMENDATIONS

No adult sockeye salmon returned to Caswell Lake in 2010 and additional salmon monitoring is not warranted. However, Caswell Lake should be evaluated for presence, control and/or removal of northern pike and habitat conditions (limnology) in order to assess the success of reintroducing salmon to the lake. An investigation of lake water levels before and after removal of the water control structures may be warranted.

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LITERATURE CITED

CIAA 2010. Caswell Lake Adult Procedures Manual. Cook Inlet Aquaculture Association.

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APPENDICES

Appendix 1: Caswell Lake 2010 environmental conditions

Adult Migration					
Date	Sky	Precip. (mm)	Stage (ft)	Water Temp. (°C)	Air Temp. (°C)
18-Jul	5	0.5	ND	ND	ND
19-Jul	5	5.0	ND	17	13
20-Jul	5	4.0	ND	15	13
21-Jul	4	20.0	ND	15	13
22-Jul	3	0.0	ND	17	20
23-Jul	2	0.0	ND	17	18
24-Jul	5	18.0	ND	15	10
25-Jul	5	17.0	ND	15	12
26-Jul	5	25.0	ND	15	13
27-Jul	3	21.0	ND	16	15
28-Jul	4	4.0	ND	15	13
29-Jul	4	3.0	ND	15	13
30-Jul	3	4.0	ND	18	20
31-Jul	4	1.0	ND	16	18
1-Aug	4	0.0	ND	17	18
2-Aug	4	0.0	ND	17	18
3-Aug	3	0.0	ND	18	21
4-Aug	5	10.0	ND	17	16
5-Aug	3	13.0	ND	16	13
6-Aug	5	1.0	ND	15	12
7-Aug	4	0.0	ND	16	16
8-Aug	4	0.0	ND	17	17
9-Aug	5	9.5	ND	16	12
10-Aug	4	4.0	ND	15	12
11-Aug	5	8.0	ND	15	12
12-Aug	5	2.0	ND	15	12
13-Aug	3	0.5	ND	16	15
14-Aug	2	3.0	ND	16	19
15-Aug	4	0.0	ND	16	18
16-Aug	ND	ND	ND	ND	ND
17-Aug	ND	ND	ND	ND	ND
18-Aug	ND	ND	ND	ND	ND
19-Aug	ND	ND	ND	ND	ND
20-Aug	ND	ND	ND	ND	ND
21-Aug	2	0.0	ND	ND	17
22-Aug	5	0.5	ND	ND	16
23-Aug	1	1.0	ND	ND	21
24-Aug	1	0.0	ND	ND	23
Total		175			
Avg.		5.3	ND	16	16
Min.		0.0	ND	15	10
Max.		25.0	ND	18	23

Summary of Cloud Cover - Percent of Days

	No. Days	Overcast	Partly Cloudy	Clear
	Adults	33	67%	27%

ND= No Data

- 1.0 = Clear
- 2.0 = Cloud Cover <50%
- 3.0 = Cloud Cover >50%
- 4.0 = Overcast
- 5.0 = Rain

Appendix 2: 2010 Caswell Lake daily adult escapement

Date	Sockeye		Coho	King	Pink	Chum	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	0	0	0
19-Jul	0	0	0	0	0	0	0	0
20-Jul	0	0	0	0	0	0	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	0	0	0
10-Aug	0	0	0	0	0	0	0	0
11-Aug	0	0	0	0	0	0	0	0
12-Aug	0	0	0	0	0	0	0	0
13-Aug	0	0	0	0	0	0	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
24-Aug	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0

Appendix 3: Caswell Lake 2010 hourly escapement

	AM						PM												AM						
	6:00	7:00	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	19:00	20:00	21:00	22:00	23:00	0:00	1:00	2:00	3:00	4:00	5:00	
18-Jul							0			0					0										
19-Jul							0			0					0										
20-Jul							0			0					0										
21-Jul							0		0						0										
22-Jul							0			0					0										
23-Jul							0			0					0										
24-Jul							0			0					0										
25-Jul							0			0					0										
26-Jul			0				0			0					0										
27-Jul			0				0			0					0										
28-Jul							0			0					0										
29-Jul							0			0					0										
30-Jul							0			0					0										
31-Jul							0			0					0										
1-Aug							0			0					0										
2-Aug							0			0					0										
3-Aug							0			0					0										
4-Aug							0			0					0										
5-Aug							0			0					0										
6-Aug							0			0					0										
7-Aug							0			0					0										
8-Aug							0			0					0										
9-Aug							0			0					0										
10-Aug							0			0					0										
11-Aug							0			0					0										
12-Aug							0			0					0										
13-Aug							0			0					0										
14-Aug							0			0					0										
15-Aug							0			0					0										
16-Aug	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
17-Aug	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
18-Aug	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
19-Aug	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
20-Aug																									
21-Aug							0			0					0										
22-Aug							0			0					0										
23-Aug							0			0					0										
24-Aug							0			0					0										