

**Fish Lakes Creek  
Sockeye Salmon  
Final Report  
2011**

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**The Fish Lakes Creek Project was made possible through an Alaska 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 Fish Lakes Creek. The Fish Lakes Creek Data Report encompasses data collected from the 2011 adult sockeye salmon escapement as it falls under the Alaskan Sustainable Salmon Fund grant.

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 Fish Lakes Creek 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 (*Oncorhynchus 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 Fish Lakes Creek. Fish Lakes Creek was known to have a population of northern pike.

The 2011 Fish Lakes Creek adult escapement monitoring was the first time CIAA enumerated sockeye salmon escapement to Fish Lakes Creek. Adult salmon escapement was enumerated daily as fish passed through a weir in the outlet stream below Fish Lakes from 18 July through 23 August. During this time, 82 adult sockeye salmon were passed through the weir. Other fish counted during this time were 1 adult coho salmon (*O. kisutch*), 2 adult king salmon (*O. tshawytscha*), 60 adult pink salmon (*O. gorbuscha*), 7 adult chum salmon (*O. keta*), 22 long nose sucker (*Catostomus catostomus*), and 12 northern pike.

During the escapement, 72 sockeye salmon were captured, sexed, measured for length to the nearest millimeter (mm) and a scale removed for age determination. Due to the quality of the scales collected, the age of 24 of the fish collected could not be determined. Only the 49 sockeye salmon or 60% of the total population were used to statistically describe the returning population. The average length of the assessed sockeye salmon was 574 mm (Std Error 3%). Eighty percent were male with an average length of 583 mm (Std Error 3%) and 20% were female with an average length of 540 mm (Std Error 3%). Fifteen percent of the sample population was age 0.3, 68% was age 1.3, 4% was age 2.2 and 13% was age 2.3.

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## INTRODUCTION AND PURPOSE

To better understand the recent low adult sockeye salmon (*Oncorhynchus 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 enumeration of adult salmon returns to Fish Lakes Creek was completed in the third year of a three year effort to enumerate sockeye salmon returns to the Susitna River drainage. Fish Lakes Creek was chosen for enumeration because invasive northern pike were known to be present.

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## PROJECT AREA

Fish Lakes Creek is located approximately 96 kilometers (60 miles) west of Anchorage, Alaska (Figure 1). The creek flows in a southerly direction before it empties into the Yentna River. There are five small lakes in the watershed with a combined surface area of 145 hectares (358 acres). Fish Lakes Creek is listed in the State of Alaska's Anadromous Waters Catalog (247-41-10200-2053-3180) (Johnson and Blanche, 2012) and reported to support sockeye salmon, coho salmon (*O. kisutch*), king salmon (*O. tshawytscha*) and pink salmon (*O. gorbuscha*).

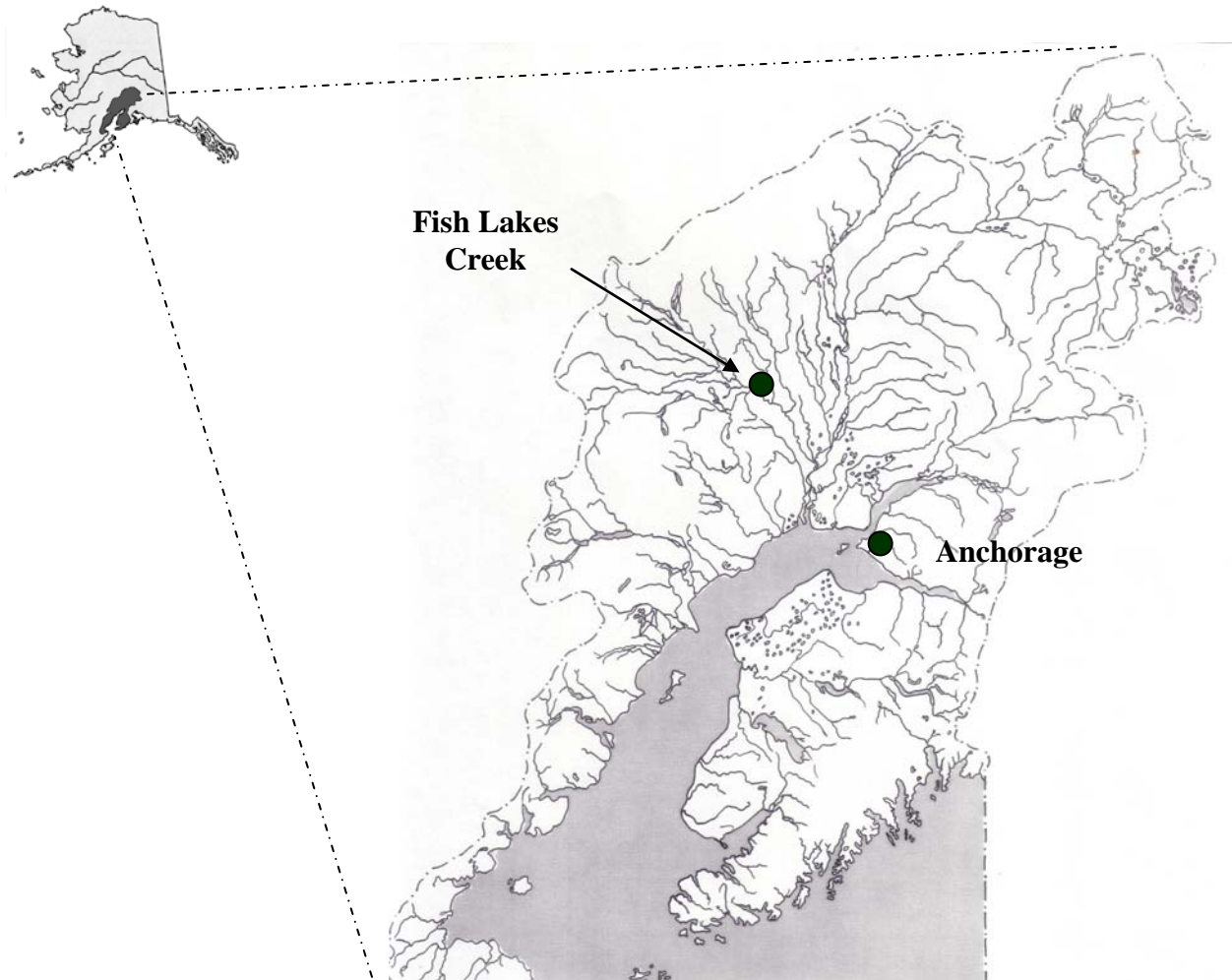


Figure 1 Fish Lakes Creek in Relation to Cook Inlet and Alaska.

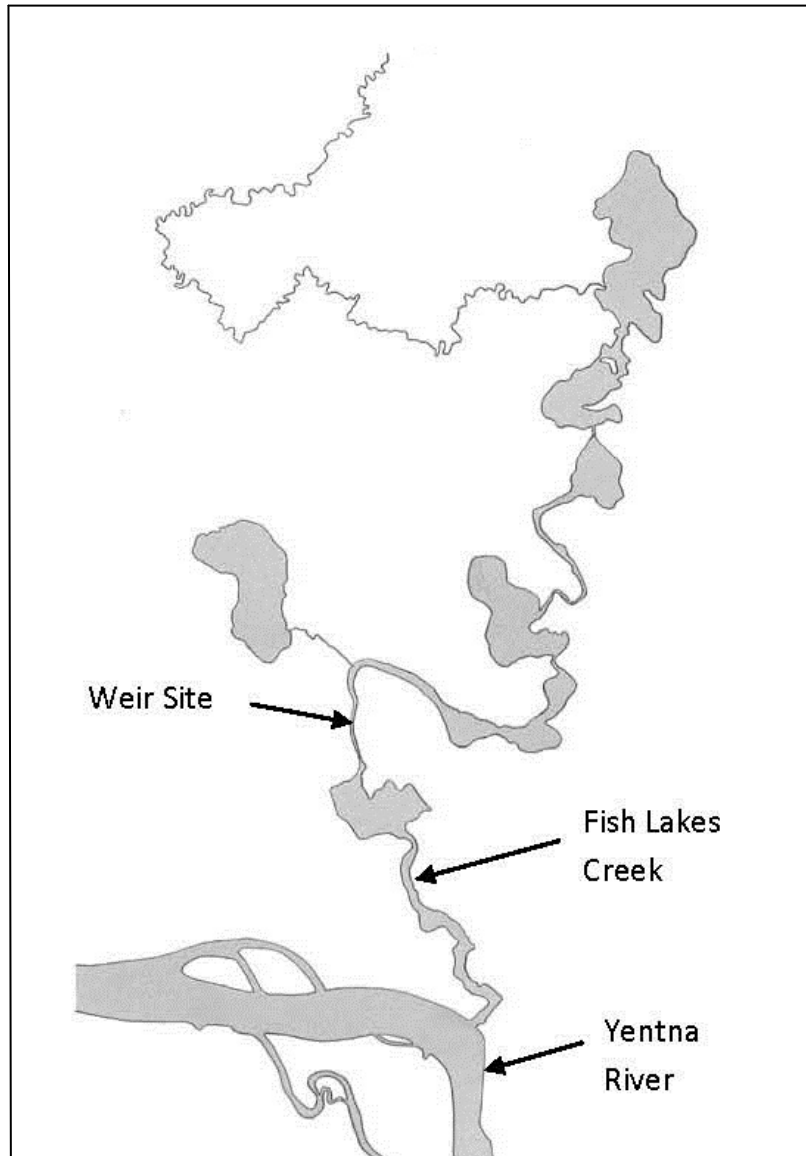


Figure 2 Fish Lakes Creek and Weir Site Location



## METHODS

### Environmental Conditions

To assess the environmental conditions during the adult salmon migration to Fish Lakes Creek, percent cloud cover was visually estimated, stream stage measured to the nearest tenth of a foot, precipitation measured to the nearest millimeter and water and air temperatures were recorded at 5:00 P.M. each day. Standard CIAA procedures were followed for collecting these observations (CIAA 2011).

### Adult Enumeration

To enumerate and collect adult salmon returning to Fish Lakes Creek, a counting weir was temporarily installed in the creek in 2011. The weir was located in Fish Lakes Creek above the first lake of the Fish Lakes Creek chain of lakes. Salmon habitat was limited below the weir site and few returning salmon were expected to remain below the weir site. 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 identified to species and counted the adult fish as they ascended the creek. By removing one or two pickets, fish were permitted to pass through the weir. Initially, counts were made at least twice a day. As the number of adult fish passing through the weir increased, counts were made more frequently.

In addition to the enumeration of the adult salmon escapement, the sex, age and MEF length<sup>1</sup> of the returning population of sockeye salmon was assessed by collecting a sample of sockeye salmon as they passed through the weir. The sex of each adult sockeye salmon collected was visually determined and the standard fork length measured to the nearest millimeter. For age evaluation, field personnel removed a scale from the primary growth area<sup>2</sup>. All scales were

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<sup>1</sup>MEF length was defined as the measurement from mid-eye to the fork of the tail.

<sup>2</sup>The primary growth area is located above the lateral line on a diagonal from the posterior insertion of the dorsal fin to the anterior insertion of the anal fin.

submitted to ADF&G for age determination. All captured fish were unharmed and released upstream.

## RESULTS AND DISCUSSION

### Environmental Conditions

During the 2011 adult escapement monitoring, environmental conditions were monitored from 18 July through 23 August. Stream stage measurements averaged 2.07 feet and ranged from 1.44 feet to 3.50 feet. Stream temperatures averaged 18°C and ranged from 14 to 24°C. Air temperatures averaged 17°C and ranged from 12 to 23°C. Eight percent of the days were clear, 43% were partly cloudy, and 49% were completely overcast. Measurable rain was recorded on 20 days during the adult escapement. A total of 162 mm of rain fell during this period.

### Adult Enumeration

The 2011 Fish Lakes Creek adult escapement monitoring was the first time CIAA enumerated salmon escapement to Fish Lakes Creek. Adult salmon escapement was enumerated daily from 18 July through 23 August. During this time, 82 adult sockeye salmon were passed through the weir. Other fish counted during this time were 1 adult coho salmon, 2 adult king salmon, 60 adult pink salmon, 7 adult chum salmon (*O. keta*), 22 long nose sucker (*Catostomus catostomus*), and 12 northern pike.

During the escapement, 72 sockeye salmon were captured, sexed, measured for length to the nearest millimeter (mm) and a scale removed for age determination. Due to the quality of the scales collected, the age of 24 of the fish collected could not be determined. Only the 49 sockeye salmon or 60% of the total population were used to statistically describe the sex ratio, age structure and size (length) of the returning sockeye salmon.

The average length of the assessed sockeye salmon was 574 mm (Std Error 3%). Eighty percent were male with an average length of 583 mm (Std Error 3%) and 20% were female with an average length of 540 mm (Std Error 3%). Fifteen percent of the sample population was age 0.3, 68% was age 1.3, 4% was age 2.2 and 13% was age 2.3.

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## RECOMMENDATIONS

In addition to long-nosed sucker and invasive northern pike, 5 species of Pacific salmon returned to Fish Lakes Creek in 2011 – sockeye, coho, King, pink and chum salmon. Four of the 5 species of Pacific salmon have previously been reported in Fish Lakes Creek and are listed as present in Alaska’s Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes (Johnson and Blanche, 2012). One species, chum salmon (*O. keta*) is not listed as present in Fish Lakes Creek, but was documented as present in 2011. It is recommended chum salmon be included as present in Fish Lakes Creek in Alaska’s Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes.

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## **LITERATURE CITED**

- CIAA, 2010. Fish Lakes Creek Procedures Manual. Cook Inlet Aquaculture Association. 40610 Kalifornsky Beach Road. Kenai, Alaska 99611. 20 pp.
- Johnson, J. and P. Blanche. 2012. Catalog of Waters Important for Spawning, Rearing, or Migration of Anadromous Fishes – Southcentral Region, Effective June 1, 2012. Alaska Department of Fish and Game, Special Publication No. 12-06, Anchorage. 349 pp.

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## **APPENDICES**

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## Appendix 1 Fish Lakes Creek 2011 – Environmental Conditions

Adult Migration					
Date	Sky	Precip. (mm)	Stage (ft)	Water Temp. (°C)	Air Temp. (°C)
18-Jul	3	0.0	ND	ND	ND
19-Jul	2	0.0	1.45	19	20
20-Jul	1	0.0	1.52	20	21
21-Jul	2	0.0	1.52	21	21
22-Jul	1	0.0	1.49	23	23
23-Jul	5	0.7	1.44	20	15
24-Jul	5	13.3	1.46	19	15
25-Jul	4	7.5	1.53	19	16
26-Jul	3	0.0	1.71	20	19
27-Jul	2	0.0	1.74	19	21
28-Jul	2	0.0	1.63	20	19
29-Jul	3	0.0	1.59	24	21
30-Jul	3	0.0	1.51	22	19
31-Jul	5	5.3	1.50	20	18
1-Aug	5	8.4	1.55	19	20
2-Aug	5	12.2	1.72	17	13
3-Aug	5	13.2	3.50	16	14
4-Aug	5	17.5	3.40	15	12
5-Aug	3	5.6	3.45	17	14
6-Aug	5	12.4	2.45	18	15
7-Aug	2	16.4	2.34	17	17
8-Aug	4	0.0	2.68	17	15
9-Aug	5	14.0	2.55	17	16
10-Aug	2	0.0	2.69	19	20
11-Aug	2	0.0	2.50	ND	ND
12-Aug	4	0.0	2.48	ND	ND
13-Aug	3	0.0	2.35	ND	ND
14-Aug	2	0.0	2.12	14	16
15-Aug	2	2.0	2.04	16	19
16-Aug	1	0.0	1.96	17	21
17-Aug	5	8.0	1.98	17	15
18-Aug	5	6.0	1.98	16	16
19-Aug	5	4.2	2.00	16	13
20-Aug	5	10.2	2.08	16	14
21-Aug	2	1.0	2.28	15	20
22-Aug	5	2.0	2.23	16	14
23-Aug	5	2.0	2.13	15	12
Total		162			
Avg.		4.4	2.07	18	17
Min.		0.0	1.44	14	12
Max.		17.5	3.50	24	23

Summary of Cloud Cover - Percent of Days					
	No. Days	Meas. Rain	Overcast	Partly Cloudy	Clear
Adults	37	54%	49%	43%	8%

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

ND = No Data

## Appendix 2 Fish Creeks Lake 2011 – Adult Escapement

Date	Sockeye		Coho	King	Pink	Chum	Long Nose Sucker	N. Pike
	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	1
20-Jul	1	1	0	0	0	0	0	0
21-Jul	0	1	0	0	0	1	0	1
22-Jul	0	1	0	0	0	0	0	0
23-Jul	0	1	0	0	0	0	0	0
24-Jul	0	1	0	0	0	1	0	0
25-Jul	0	1	0	0	0	1	0	0
26-Jul	2	3	0	0	0	1	0	0
27-Jul	2	5	0	0	0	0	0	0
28-Jul	8	13	0	0	0	0	0	0
29-Jul	2	15	0	0	0	0	0	0
30-Jul	12	27	1	0	0	0	0	0
31-Jul	1	28	0	0	0	0	0	0
1-Aug	3	31	0	0	1	1	0	0
2-Aug	5	36	0	0	1	1	0	0
3-Aug	2	38	0	0	0	0	0	0
4-Aug	0	38	0	0	0	0	0	0
5-Aug	4	42	0	0	0	0	0	0
6-Aug	0	42	0	0	0	0	0	0
7-Aug	2	44	0	0	0	0	0	0
8-Aug	0	44	0	0	0	0	0	0
9-Aug	1	45	0	0	0	0	0	0
10-Aug	0	45	0	0	0	0	0	0
11-Aug	0	45	0	0	0	0	0	0
12-Aug	0	45	0	0	0	0	0	1
13-Aug	0	45	0	0	0	0	0	1
14-Aug	0	45	0	0	0	0	0	2
15-Aug	6	51	0	0	7	0	0	5
16-Aug	8	59	0	0	6	0	6	1
17-Aug	4	63	0	0	0	0	4	0
18-Aug	6	69	0	0	4	0	1	0
19-Aug	5	74	0	0	10	0	3	0
20-Aug	4	78	0	1	10	1	4	0
21-Aug	0	78	0	0	8	0	2	0
22-Aug	4	82	0	1	9	0	2	0
23-Aug	0	82	0	0	4	0	0	0
Total	82		1	2	60	7	22	12

### Appendix 3 Fish Lakes Creek – Sockeye Escapement Hourly Counts

	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	
Total	0	0	8	14	46	6	2	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7/19/2011						0					0														
7/20/2011					1						0					0									
7/21/2011			0					0			0					0									
7/22/2011			0					0			0			0				0							
7/23/2011					0				0						0										
7/24/2011					0					0						0									
7/25/2011					0					0				0											
7/26/2011				1			1				0														
7/27/2011				1			1				0														
7/28/2011				8				0					0												
7/29/2011				2					0																
7/30/2011					12				0																
7/31/2011				1				0					0												
8/1/2011					3					0															
8/2/2011					5						0														
8/3/2011					2				0						0										
8/4/2011			0						0							0									
8/5/2011			0						4								0								
8/6/2011			0						0								0								
8/7/2011			0						2									0							
8/8/2011			0							0									0						
8/9/2011				1						0										0					
8/10/2011				0						0											0				
8/11/2011										0													0		
8/12/2011					0		0						0									0			
8/13/2011				0			0					0											0		
8/14/2011					0		0			0						0									
8/15/2011						6		0		0						0							0		
8/16/2011		8				0		0		0													0		
8/17/2011			0		4			0		0			0											0	
8/18/2011					6			0																0	
8/19/2011					5		0			0			0												
8/20/2011					4		0		0				0											0	
8/21/2011					0			0					0											0	
8/22/2011					4		0		0				0											0	
8/23/2011					0		0						0											0	

### Appendix 4 Fish Lakes Creek 2011 – Adult Sockeye Age, Sex and Length Composition

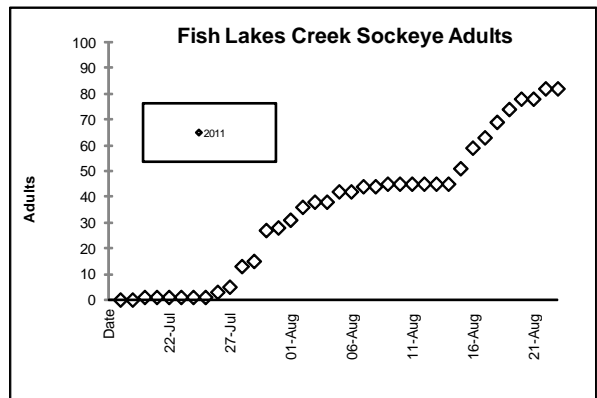
	Age Group				Total
	0.3	1.3	2.2	2.3	
Males	10	44	3	8	66
Percent	12.50%	53.75%	3.75%	10.00%	80.00%
Sample Size	6	26	2	5	39
Mean Lth (mm)	586	586	515	586	583
Std. Error	10	4	7	4	3
Females	2	12	0	2	16
Percent	2.50%	15.00%	0.00%	2.50%	20.00%
Sample Size	1	8	0	1	10
Mean Lth (mm)	542	537	-	550	540
Std. Error	-	4	-	-	3
Both Sexes	12	56	3	10	82
Percent	15.00%	68.75%	3.75%	12.50%	100.00%
Sample Size	7	34	2	6	49
Mean Lth (mm)	578	576	515	579	574
Std. Error	10	3	7	4	3

*Scale reading and analysis provided by ADF&G*

## Appendix 5 Fish Lakes Creek 2011 – Update

Misc. Activities	
Adult Crew On-site:	18-Jul
Adult Crew Off-site:	23-Aug

Adult Migration			
Dates:	18-Jul to 23-Aug		
	No.	%	
Sockeyes:	82	100%	
Males	66	80%	
Females	16	20%	
Mortalities:	0	0%	
Age 0.3:	12	15%	
Age 1.3:	56	69%	
Age 2.2:	3	4%	
Age 2.3:	10	13%	
Coho:	1		
King:	2		
Pink:	60		
Chum:	7		
Long Nose Sucker:	22		
Northern Pike:	12		



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