

**Whiskey Lake
Sockeye Salmon
Data Report
2010**

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The Whiskey Lake Project was made possible through enhancement taxes paid by the commercial fishermen in Area H Cook Inlet and associated waters, 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 Whiskey Lake. The Whiskey Lake Data Report encompasses data collected from the 2010 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 Whiskey 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

Many individuals and agencies contributed to the success of the Whiskey Lake Project. Appreciation is extended to Cook Inlet Aquaculture Association 2010 Interns Alexandra Moeschl, Sean Lawrence, and Seasonal Assistant Matt Smukall. Special thanks go to the Alaska Department of Fish and Game for the support they provided during this project.

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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 Whiskey Lake. Whiskey Lake was known to have a population of northern pike.

The 2010 Whiskey Lake adult escapement monitoring was the first time CIAA enumerated salmon escapement to Whiskey Lake. Adult salmon escapement was enumerated daily as fish passed through a weir in the outlet stream below Whiskey Lake from 22 July through 2 September. During this time, 59 adult sockeye salmon were enumerated as they passed through the weir. Other fish enumerated included 1 adult coho salmon (*O. kisutch*), 22 adult pink salmon (*O. gorbuscha*), 40 adult chum salmon (*O. keta*) and 10 northern pike. Sockeye, coho, pink, and chum salmon were also observed downstream of the weir by foot and aerial surveys during weir operations.

During the escapement, 46 sockeye salmon were captured, sexed and measured for length to the nearest millimeter (mm). The average length of all the sockeye salmon measured was 523 mm (Std Error 8.5%). The average length of the 30 male sockeye salmon measured was 522 mm (Std Error 11.3%). The average length of the 16 female sockeye salmon measured was 523 mm (Std Error 12.9%). No scales were collected from the returning sockeye salmon for age determination.

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INTRODUCTION AND PURPOSE

To better understand the recent low adult sockeye salmon 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.

All information recorded by CIAA is provided to ADF&G.

This report documents adult salmon escapement to Whiskey Lake in 2010 and was funded, in part, by a grant (45888) from the Alaska Sustainable Salmon Fund.

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PROJECT AREA

Whiskey Lake (Latitude/Longitude 61° 39 N, 151° 23 W) is located approximately 77 km southwest of Talkeetna, Alaska (Figure 1). The outlet of Whiskey Lake flows east to Hewitt Creek before it empties into the Yentna River. The surface area of Whiskey Lake is 110 hectares (272 acres) and its maximum depth is approximately 8 meters (26 feet) (Figure 2).

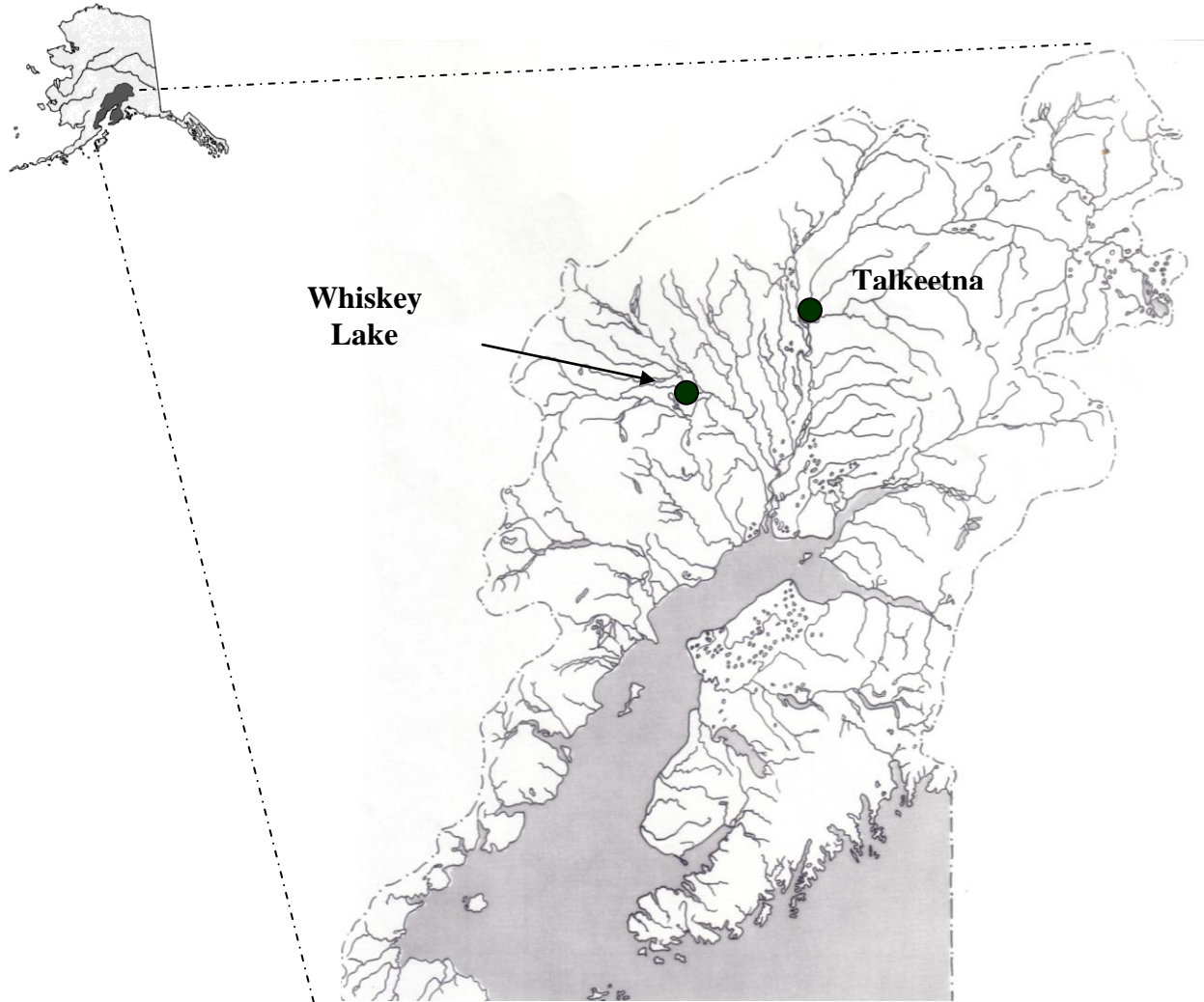


Figure 1 Whiskey Lake in relation to Cook Inlet and Alaska.

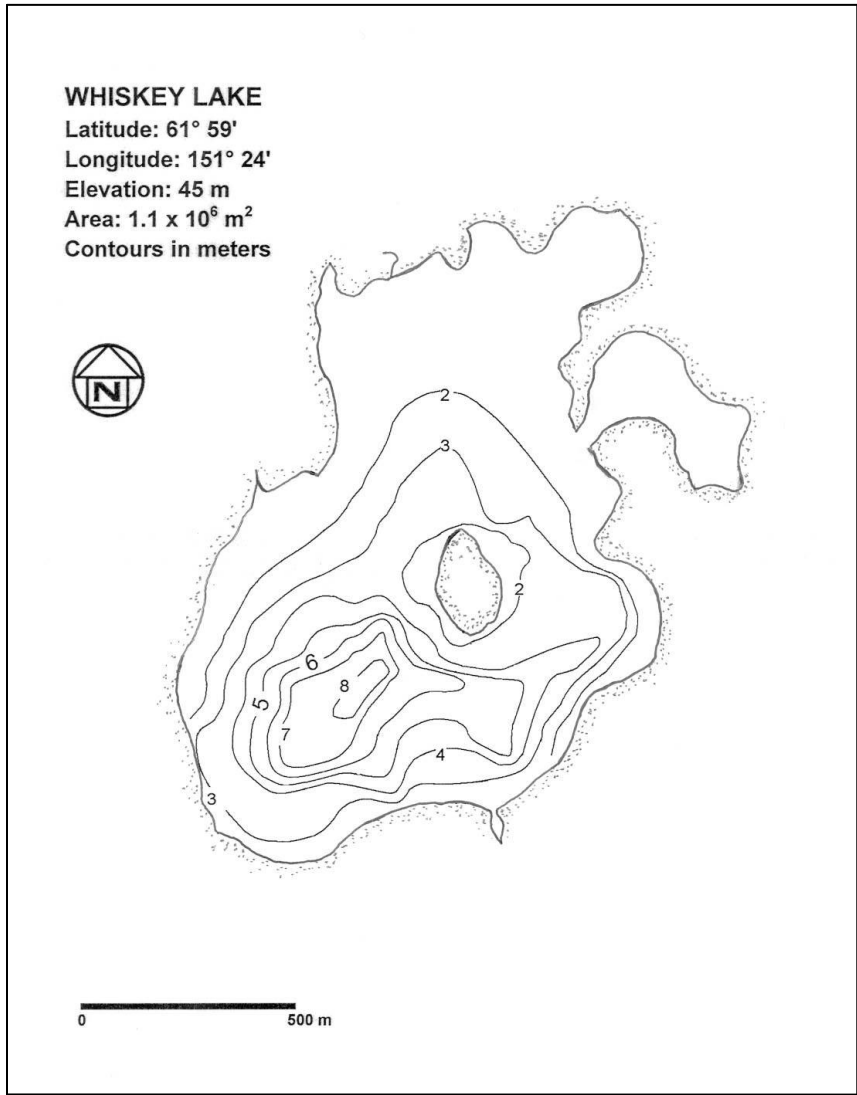


Figure 2 Morphometric map of Whiskey Lake.

METHODS

Environmental Conditions

To assess the environmental conditions during the adult sockeye salmon migration to Whiskey Lake, 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 2010).

Adult Enumeration

To enumerate and collect adult salmon returning to Whiskey Lake, a counting weir was temporarily installed in the outlet stream below Whiskey Lake in 2010. 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 outlet stream. 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 and standard fork length¹ of the returning population of sockeye salmon was also assessed by collecting a sample of sockeye salmon. The sex of each adult sockeye salmon collected was visually determined and the standard fork length measured to the nearest millimeter. During the 2010 adult escapement, 46 of the 59 sockeye salmon returning to Whiskey Lake were collected for sex determination and length measurement. All fish were unharmed and released upstream. Due to the small return, scale samples for age determination were not collected.

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 2010 adult escapement, environmental conditions were monitored from 22 July through 3 September. Stream stage measurements averaged 1.20 feet and ranged from 1.03 feet to 1.50 feet. Stream temperatures averaged 17°C and ranged from 14 to 19°C. Air temperatures averaged 17°C and ranged from 14 to 23°C. Eight percent of the days were clear, 41% were partly cloudy, and 51% were completely overcast. Measurable rain was recorded on 26 days during the adult escapement. A total of 225 mm of rain fell during this period.

Adult Enumeration

The adult escapement was enumerated from 22 July through 2 September. During this time, 59 adult sockeye salmon returned to Whiskey Lake. Other fish counted during this time were 1 adult coho salmon (*O. kisutch*), 22 adult pink salmon (*O. gorbuscha*), 40 adult chum salmon (*O. keta*) and 10 northern pike (*Esox lucius*).

During the escapement, 46 sockeye salmon were captured, sexed and measured for standard fork length to the nearest millimeter (mm). Sixty-five percent of the fish captured were males and 35% were females. The average length of the 30 male sockeye salmon measured was 522 mm (Std Dev. 61.8). The average length of the 16 female sockeye salmon measured was 523 mm (Std Dev. 51.4). The average length of all the sockeye salmon measured was 523 mm (Std Dev. 57.8).

On 13 August 2010, CIAA personnel walked the outlet stream to survey the number of fish downstream of the weir. The crew walked approximately one quarter mile until the creek opened into a marsh and observed approximately 20 adult salmon. Visibility was poor and the crew was unable to identify the species of salmon.

On 28 August 2010, CIAA personnel conducted an aerial survey of Whiskey Lake and Hewitt Creek. Fish were observed in Whiskey Lake and Hewitt Creek; however, visibility was poor

during the survey and an accurate count of all fish in the system was not possible. During this survey, an estimated 50 sockeye salmon, 20 pink salmon and 25 Northern Pike were observed in Whiskey Lake. An estimated 600 sockeye, 320 coho, 150 pink, and 100 chum salmon were observed in the outlet stream below Whiskey Lake and in Hewitt Creek down to the confluence with the Yentna River. It could not be determined if these fish were migrating to Whiskey Lake, Hewitt Lake or remained in the stream to spawn.

Cook Inlet Aquaculture Association field personnel surveyed the outlet of Whiskey Lake in 2012 and observed sockeye salmon spawning in the outlet stream above and below the previous weir site. It is unknown if progeny from the outlet spawning sockeye salmon rear in Whiskey Lake.

RECOMMENDATIONS

Even though the number of sockeye salmon returning to Whiskey Lake in 2010 was relatively small, monitoring to assess fry rearing conditions and sockeye salmon smolt production from the 2010 spawning population should be conducted in 2011 and 2012. To assess the rearing conditions of the lake, the water quality and the zooplankton community in Whiskey Lake should be sampled in 2011. To assess the sockeye salmon smolt production, the smolt out-migration should be enumerated in 2012. This information could then be used to assess future management strategies for the lake including control of invasive Northern Pike.

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LITERATURE CITED

CIAA, 2010. Whiskey Lake Procedures Manual. Cook Inlet Aquaculture Association 40610 Kalifornsky Beach Road Kenai, Alaska 99611, page 20.

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APPENDICES

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Appendix 1 Whiskey Lake 2010 – Environmental Conditions

Adult Migration						
Date	Sky	Precip. (mm)	Stage (ft)	Flow	Water Temp. (°C)	Air Temp. (°C)
22-Jul	3	ND	1.06	ND	19	20
23-Jul	4	0.0	1.04	ND	19	23
24-Jul	4	0.0	1.03	ND	14	16
25-Jul	5	6.8	1.03	ND	17	14
26-Jul	5	19.0	1.09	ND	17	14
27-Jul	2	10.0	1.17	ND	17	17
28-Jul	ND	11.0	1.18	ND	16	16
29-Jul	4	18.0	1.14	ND	17	16
30-Jul	ND	ND	ND	ND	ND	ND
31-Jul	ND	ND	ND	ND	ND	ND
1-Aug	3	7.5	1.14	ND	19	21
2-Aug	4	0.0	1.10	ND	19	20
3-Aug	5	25.0	1.19	ND	18	18
4-Aug	ND	ND	ND	ND	ND	ND
5-Aug	2	14.0	1.29	ND	17	18
6-Aug	4	18.5	1.29	ND	15	18
7-Aug	5	1.0	1.27	ND	17	15
8-Aug	5	3.8	1.22	ND	18	17
9-Aug	4	21.5	1.30	ND	17	15
10-Aug	3	4.5	1.36	ND	16	16
11-Aug	4	3.8	1.35	ND	16	15
12-Aug	3	5.0	1.33	ND	16	19
13-Aug	4	1.0	1.32	ND	17	18
14-Aug	3	5.0	1.31	ND	18	18
15-Aug	5	2.0	1.33	ND	17	21
16-Aug	5	5.0	1.32	ND	17	16
17-Aug	ND	ND	ND	ND	ND	ND
18-Aug	2	21.0	1.50	ND	17	16
19-Aug	1	0.0	1.37	ND	16	17
20-Aug	1	0.0	1.25	ND	16	17
21-Aug	2	0.0	1.20	ND	17	18
22-Aug	2	0.0	1.20	ND	17	20
23-Aug	2	0.0	1.13	ND	18	20
24-Aug	1	0.0	1.12	ND	18	20
25-Aug	2	0.0	1.10	ND	19	18
26-Aug	4	0.0	1.10	ND	17	18
27-Aug	5	2.5	1.08	ND	17	16
28-Aug	5	9.5	1.10	ND	16	15
29-Aug	3	0.0	1.13	ND	17	16
30-Aug	3	3.5	1.15	ND	17	17
31-Aug	5	3.0	1.15	ND	17	19
1-Sep	5	1.0	1.13	ND	17	17
2-Sep	3	2.0	1.13	ND	17	15
3-Sep	2	0.0	1.10	ND	17	16
Total		225				
Avg.		5.8	1.20	ND	17	17
Min.		0.0	1.03	ND	14	14
Max.		25.0	1.50	ND	19	23

Ice out = ND

Summary of Cloud Cover - Percent of Days					
	No. Days	Meas. Rain	Overcast	Partly Cloudy	Clear
Adults	39	67%	51%	41%	8%

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

ND = No Data

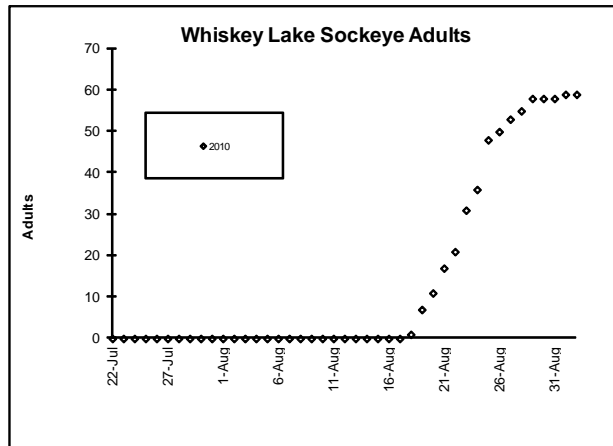
Appendix 2 Whiskey Lake 2010 – Adult Escapement

Date	Sockeye		Coho	King	Pink	Chum	Rainbow	N. Pike
	Daily Escapement	Total Return	Daily Escapement	Daily Escapement	Daily Escapement	Daily Escapement	Daily Escapement	Daily Escapement
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	2
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	1	1	0	0	0	0	0	0
19-Aug	6	7	0	0	0	0	0	3
20-Aug	4	11	1	0	0	0	0	5
21-Aug	6	17	0	0	1	0	0	0
22-Aug	4	21	0	0	0	1	0	0
23-Aug	10	31	0	0	3	9	0	0
24-Aug	5	36	0	0	1	0	0	0
25-Aug	12	48	0	0	3	6	0	0
26-Aug	2	50	0	0	4	3	0	0
27-Aug	3	53	0	0	3	3	0	0
28-Aug	2	55	0	0	1	7	0	0
29-Aug	3	58	0	0	2	6	0	0
30-Aug	0	58	0	0	1	0	0	0
31-Aug	0	58	0	0	0	2	0	0
1-Sep	1	59	0	0	0	0	0	0
2-Sep	0	59	0	0	3	3	0	0
Total	59		1	0	22	40	0	10

Appendix 3 Whiskey Lake 2010 – Summary

Misc. Activities	
Adult Crew On-site:	21-Jul
Adult Crew Off-site:	3-Sep

Adult Migration			
Dates:	22-Jul	to	2-Sep
			No. %
Sockeyes:			59 100%
Males:			38 65%
Females:			21 35%
Mortalities:			0
Age 1.2:			ND
Age 1.3:			ND
Age 2.2:			ND
Age 2.3:			ND
Coho:			1
King:			0
Pink:			22
Chum:			40
Rainbow:			0
Northern Pike:			10



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