



**UNITED STATES AIR FORCE
JOINT BASE ELMENDORF-RICHARDSON
ALASKA**

ENVIRONMENTAL CONSERVATION PROGRAM

**ABUNDANCE AND RUN TIMING OF SMOLT AND
ADULT SALMON IN THE SIXMILE CREEK DRAINAGE
ON JOINT BASE ELMENDORF-RICHARDSON,
ALASKA, 2012**

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Final

Abundance and Run Timing of Smolt and Adult Salmon in the Sixmile Creek Drainage on Joint Base Elmendorf-Richardson, Alaska, 2012

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Introduction

In 2008, National Marine Fisheries Service (NMFS) listed the Cook Inlet beluga whale (*Delphinapterus leucas*) as endangered (NMFS 2008). Beluga whales are predatory in nature and follow eulachon (*Thaleichthys pacificus*) into the Upper Cook Inlet during the spring then switch to consuming salmon (*Oncorhynchus spp.*) as the eulachon numbers decline (NMFS 2009). Critical habitat was established within Cook Inlet, Knik Arm, this area included the mouth of Sixmile Creek (NMFS 2009).

The Sixmile Creek drainage (Figure 1), located in Southcentral Alaska, consists of Upper and Lower Sixmile Lakes and Sixmile Creek on Joint Base Elmendorf-Richardson (JBER). The lakes were created in 1951 when Sixmile Creek was dammed in two locations (Abbott and Allgair) to create a floatplane base. The first records of sockeye salmon (*Oncorhynchus nerka*) in Sixmile Creek drainage occurred in 1975 (Rothe et. al. 1983). These sockeye have been genetically linked to stocks in Big Lake and Fish Creek (Habicht et. al. 2007).

In 1988, the Conservation and Planning Element of the Environmental Flight, 3rd Civil Engineering Squadron began monitoring the returning adult salmon using a weir and continued to monitor through 2008. In 2009 and 2010 the Alaska Department of Fish and Game (ADFG) was contracted to conduct data collection and daily operations of the weir. In 2011 JBER Natural Resources Conservation section (CEANC) once again operated the weir and collected salmon escapement data.

Salmon smolts have been counted emigrating from Lower Sixmile Lake from mid-May through June. Sixmile smolt out-migration includes sockeye and coho salmon (*Oncorhynchus kisutch*). While pink salmon (*Oncorhynchus gorbuscha*) spawn below the lake and chum salmon (*Oncorhynchus keta*) rarely spawn in the creek. Sockeye salmon smolts are the most abundant species ranging from 4,037 – 23,644, while coho salmon smolts have ranged from 23 – 393 fish.

The Sixmile adult weir is operable by mid-July with biologists, technicians, and volunteers releasing and counting salmon until mid-September. Four out of the five North American Pacific salmon can be found spawning in the Sixmile Creek drainage. Sockeye, coho, and a small fraction of the pink salmon can be enumerated at the weir. Chum salmon and pink salmon spawn primarily in the creek thus, a stream walk is necessary to enumerate their spawning numbers.

Objective

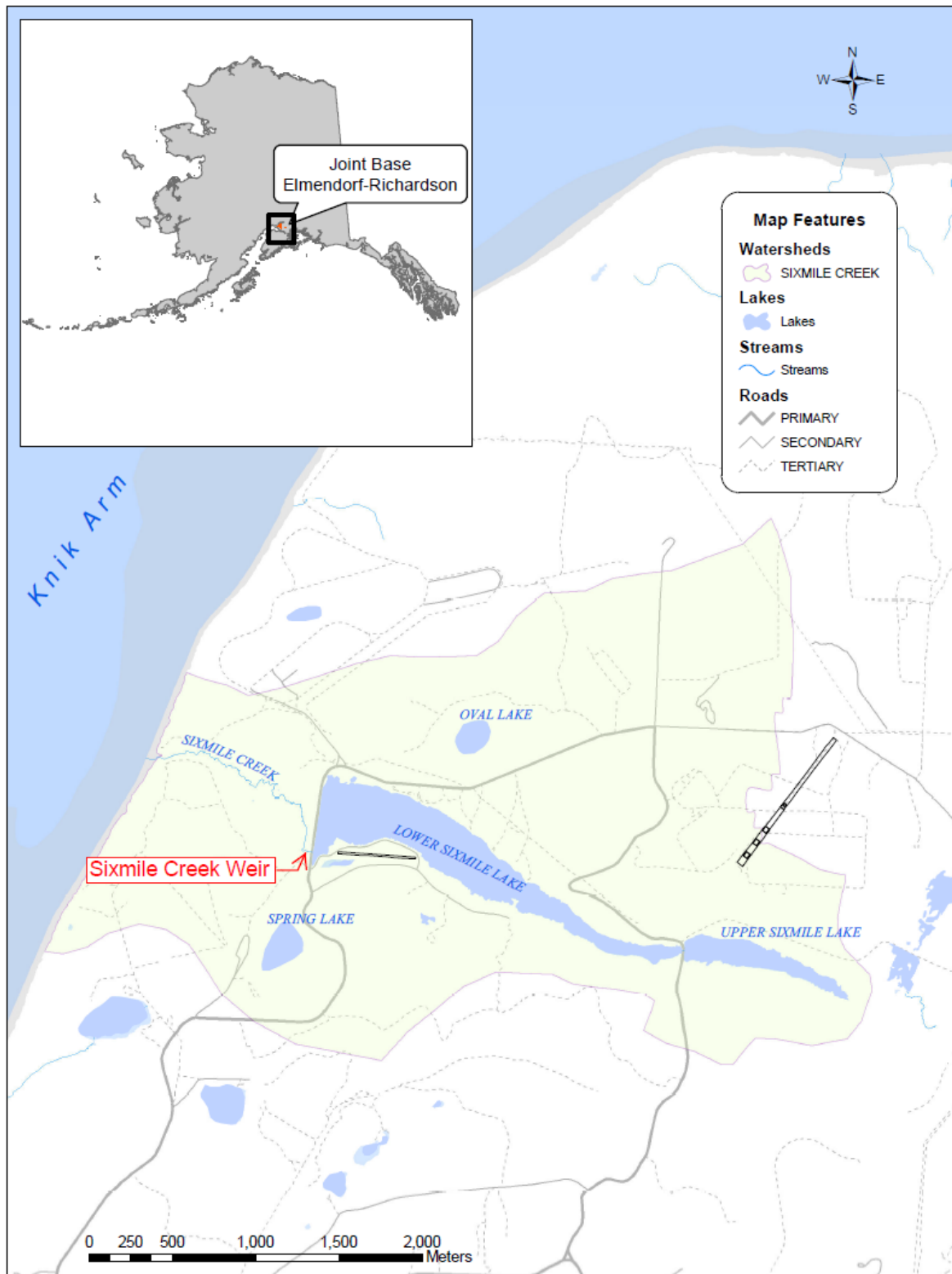
The objective of this project were to enumerate the out migrating smolt species and the adult salmon species returning to the Sixmile Creek drainage to spawn. The second objective was to maintain the historical database and evaluate long term salmon population trends.

Study Site

The Sixmile Creek drainage covers approximately 2,033.15 acres, on JBER (Figure 1). The drainage includes Sixmile Creek, Lower Sixmile Lake, and Upper Sixmile Lake. The lakes and creek occupy a valley created by an old channel of Eagle River. The system is charged primarily by ground water entering the south side of Upper Sixmile Lake. The lakes are approximately 3.39 kilometers (km) in length. Sixmile Creek flows approximately 1.5 km from Lower Sixmile Lake into the Knik Arm of Cook Inlet.

During 1975, when sockeye were first recorded in Sixmile Creek drainage, a fish ladder was installed at the outflow of Lower Sixmile Lake (Gotthardt 2006). During the summer of 1996, a new fish friendly culvert with splash pool was placed between Upper and Lower Sixmile Lake. The culvert was then revamped in 2004 to add a beaver baffler to prevent beaver from clogging the culvert and preventing fish passage.

From 1988 until 1997 the adult weir was located in a meadow half way between Lower Sixmile Lake and Cook Inlet (61.29209 -149.82277). Since 1998 the adult weir has been located at the out flow of Lower Sixmile Lake under the Fairchild Avenue bridge. The bridge site for the adult weir is also the location for the smolt weir.



(Gumpert,2011)

Figure 1: The Sixmile Creek drainage on JBER, AK.

Methods

Smolt Weir Design and Operation

Sockeye and coho salmon smolts emigrating from Sixmile Lake are typically counted from mid-May through the end of June. In 2012, smolts were enumerated from Sixmile Lake from 17 May through 30 June.

Sockeye and coho smolts were captured daily using a weir and counted by hand and released. The weir consisted of four 4' x 8' panels that spanned from the bridge abutment. This ensured that the entire stream width was effectively fished. These panels were made out of aluminum frame covered in poly vinyl mesh netting. The panels narrowed to a cylindrical entrance into a rectangular aluminum box with 1.0 m x 0.85 m x 0.80 m (L x W x H) dimensions. The panels were inspected daily by the sampling crew for gaps that could allow smolts to pass through undetected. Water temperature (°C) was collected at the site on a daily basis.

Adult Weir Design and Operation

The weir consisted of chain link covered gates under the Fairchild Avenue bridge. Salmon assembled behind the gates under the bridge and were enumerated as they were released into the lake. The weir was visually inspected daily to ensure there were no gaps that would allow salmon to pass through undetected and cleaned of debris. The weir was checked a minimum of twice daily during daylight hours as fish gathered. During the peak of the run, the weir was checked more often. Late in the run, the weir was checked once a day. Before the gates were opened to pass fish, the exit of the fish ladder was blocked so that fish were unable to escape down creek. A beach seine net was used to herd the fish through the open fence where they were identified and counted. Water temperature (°C) was collected at the site on a daily basis.

2012 Foot Surveys

Two surveys of adult salmon were conducted on foot in the stream from the weir to the Knik Arm tide line. The first was conducted 22 August 2012, at the peak of the pink salmon return, and second was completed on 12 September 2012, the last day of weir operation for the season. The first survey was done in a three-person team. One person was, wearing polarized sunglasses and constantly counting fish seen in the creek channel. A second person was surveying for fish while looking for bears and the third person was constantly looking for bears. The second survey was conducted in a four-person team. Two people were wearing polarized sunglasses and constantly counting fish seen in the creek channel. The other two people were constantly looking for bears.

Data Analysis

CEANC maintains two historical databases, one for enumeration of the out migrating smolts and the other for the enumeration of the returning adults. The total number of smolt and adult sockeye and coho were added to their representative database. Graphs depicting cumulative and daily counts for 2012, for both the smolt and adults, were compared to previous years' mean counts.

Results

Smolt Weir

The weir was fully operational at 1430 hours on 17 May 2012, with no fish counted that day. The first smolts counted for the season were 25 coho smolts on 24 May, with the last one passing the weir on 27 June (Table 1). The first sockeye were seen on 25 May, while sockeye were still being seen on the 30th of June, last day of operation (Table 1). A total of 23,644 sockeye and 107 coho were counted for the year. The weir was checked at least twice daily if not three times a day, depending on the number of smolt out migrating. The average water temperature for during the smolt out migration was 16.2 °C. The weir was removed on 30 June 2012 at 1400 hours.

Table 1. Smolt daily and cumulative (Cum) counts of sockeye and coho salmon at the Sixmile Creek weir, JBER 2012.

Date	Sockeye		Coho		Water Temp (°C)
	Daily	Cum	Daily	Cum	
17-May	0	0	0	0	-
18-May	0	0	0	0	-
19-May	0	0	0	0	-
20-May	0	0	0	0	-
21-May	0	0	0	0	-
22-May	0	0	0	0	-
23-May	0	0	0	0	-
24-May	0	0	25	25	14.2
25-May	70	70	0	25	14
26-May	234	304	0	25	14
27-May	69	373	15	40	14.1
28-May	2404	2777	20	60	14
29-May	2134	4911	10	70	13.9
30-May	430	5341	2	72	14
31-May	562	5903	1	73	14.1
1-Jun	12	5915	0	73	13.6
2-Jun	20	5935	1	74	15
3-Jun	23	5958	0	74	14.8
4-Jun	636	6594	0	74	14.5
5-Jun	2049	8643	9	83	13.5
6-Jun	891	9534	1	84	15
7-Jun	2677	12211	1	85	15
8-Jun	1017	13228	4	89	15
9-Jun	1029	14257	1	90	15
10-Jun	813	15070	0	90	15
11-Jun	195	15265	0	90	15.5
12-Jun	505	15770	2	92	15
13-Jun	1129	16899	0	92	14
14-Jun	2603	19502	3	95	15
15-Jun	1075	20577	0	95	15
16-Jun	799	21376	4	99	16
17-Jun	612	21988	2	101	16
18-Jun	546	22534	0	101	20
19-Jun	146	22680	2	103	17.5
20-Jun	34	22714	0	103	19

Date	Sockeye		Coho		Water Temp (°C)
	Daily	Cum	Daily	Cum	
21-Jun	97	22811	1	104	18.5
22-Jun	60	22871	1	105	18
23-Jun	101	22972	0	105	20.5
24-Jun	15	22987	0	105	21
25-Jun	51	23038	0	105	21
26-Jun	41	23079	0	105	19
27-Jun	203	23282	2	107	19.5
28-Jun	23	23305	0	107	18.5
29-Jun	60	23365	0	107	19
30-Jun	279	23644	0	107	19
Total		23644		107	16.2

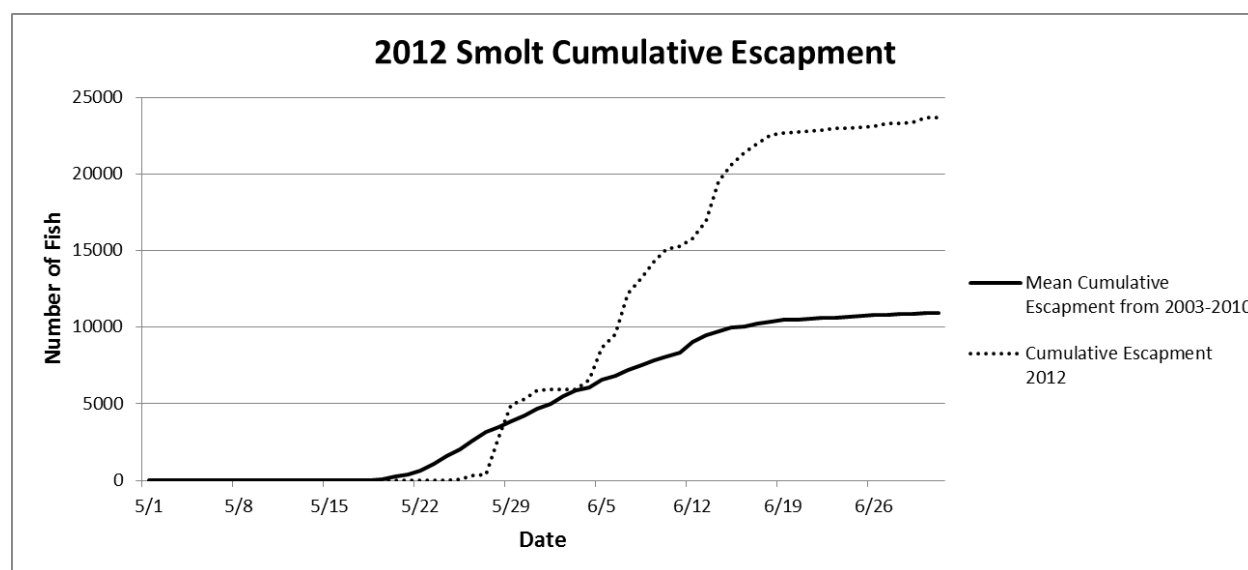


Figure 2: A comparison of the total 2012 sockeye smolt out migration and the average from the other years.

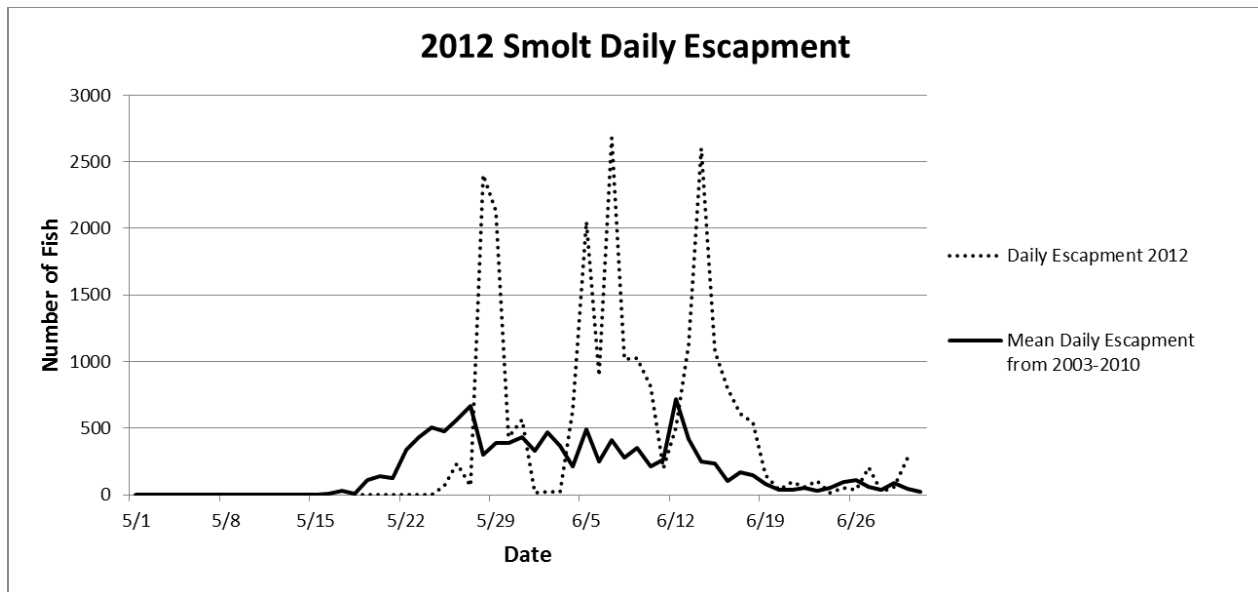


Figure 3: A daily comparison of the total 2012 sockeye smolt out migration and the average from the other years.

Adult Foot Surveys

The first survey was conducted on 22 August, from 1030-1230, during partly sunny weather conditions, while, the second survey was conducted on 12 September, from 1000-1200, while it was overcast and raining. Both surveys included living and dead salmon. During the first survey, observers counted a total of 559 pink, 4 chums, and 2 sockeye. On the final survey observers counted a total of 68 pink, 14 coho, 4 sockeye, and 136 unknown dead salmon. These numbers do not fully represent the number of fish that spawn below the weir due to missing salmon during the surveys, and missing salmon in between the surveys. These surveys were done during what is thought to be the peak of the pink salmon run.

Adult Weir Data

The weir was fully operational at 1407 hours on 16 July 2012, with zero salmon counted that day. A large hole was found in the fencing panel on 30 July 2012 and was repaired that day. It is assumed that fish passed through the hole. There were three days during the season that the weir was not checked. The days can be found on Table 2 as dash lines through the daily counts. The weir was removed at 1200 hours on 12 September 2012.

The average water temperature for the season was 15.5 °C. Water temperature can be a factor in whether the sockeye choose to migrate up river to spawn or not. Ideal migration temperatures range from 6.0 °C to 12.0 °C (Wilson and Kelly 1984). Water clarity was excellent for the entire season.

Adult salmon were counted at the weir from 16 July until 12 September with a total of 317 sockeyes, 79 coho, 5 pinks and zero chum passing through the weir. The first sockeye passed the weir on 25 July, while the last sockeye passed on 8 September (Table 2). The first coho was seen on 3 August with the last one passing the weir on 31 August (Table 2).

Table 2. Adult daily and cumulative (Cum) counts of sockeye, coho and pink salmon at the Sixmile Creek weir, JBER 2012.

Date	Sockeye		Coho		Pink		Water Temp (°C)
	Daily	Cum	Daily	Cum	Daily	Cum	
16-Jul	0	0	0	0	0	0	-
17-Jul	-	0	-	0	-	0	-
18-Jul	0	0	0	0	0	0	10
19-Jul	0	0	0	0	0	0	10
20-Jul	0	0	0	0	0	0	-
21-Jul	0	0	0	0	0	0	10
22-Jul	0	0	0	0	0	0	-
23-Jul	0	0	0	0	0	0	-
24-Jul	0	0	0	0	0	0	10.5
25-Jul	1	1	0	0	0	0	9.8
26-Jul	4	5	0	0	0	0	9
27-Jul	1	6	0	0	0	0	-
28-Jul	4	10	0	0	0	0	-
29-Jul	1	11	0	0	0	0	-
30-Jul	141	152	0	0	0	0	19
31-Jul	22	174	0	0	0	0	-
1-Aug	57	231	0	0	0	0	18.5
2-Aug	28	259	0	0	0	0	19
3-Aug	10	269	4	4	0	0	17
4-Aug	0	269	0	4	0	0	17.5
5-Aug	0	269	3	7	0	0	17
6-Aug	10	279	2	9	0	0	17
7-Aug	5	284	4	13	4	4	17
8-Aug	0	284	0	13	0	4	16.5
9-Aug	0	284	1	14	0	4	17.5
10-Aug	8	292	2	16	0	4	17.5
11-Aug	0	292	0	16	1	5	-
12-Aug	3	295	6	22	0	5	18
13-Aug	0	295	0	22	0	5	18.5
14-Aug	3	298	3	25	0	5	18.5
15-Aug	2	300	3	28	0	5	19
16-Aug	4	304	15	43	0	5	18.5
17-Aug	10	314	17	60	0	5	18.5
18-Aug	1	315	6	66	0	5	17.5
19-Aug	0	315	0	66	0	5	-
20-Aug	0	315	0	66	0	5	-
21-Aug	0	315	7	73	0	5	16.5
22-Aug	0	315	0	73	0	5	16.5
23-Aug	0	315	0	73	0	5	-
24-Aug	0	315	0	73	0	5	16.5
25-Aug	0	315	0	73	0	5	17
26-Aug	0	315	0	73	0	5	-
27-Aug	0	315	0	73	0	5	-
28-Aug	0	315	4	77	0	5	15
29-Aug	0	315	0	77	0	5	15.5
30-Aug	0	315	1	78	0	5	-
31-Aug	0	315	1	79	0	5	15.5
1-Sep	0	315	0	79	0	5	15
2-Sep	1	316	0	79	0	5	-
3-Sep	0	316	0	79	0	5	-
4-Sep	0	316	0	79	0	5	13.5
5-Sep	0	316	0	79	0	5	-
6-Sep	0	316	0	79	0	5	12
7-Sep	0	316	0	79	0	5	-
8-Sep	1	317	0	79	0	5	13

Date	Sockeye		Coho		Pink		Water Temp (°C)
	Daily	Cum	Daily	Cum	Daily	Cum	
9-Sep	0	317	0	79	0	5	-
10-Sep	0	317	0	79	0	5	-
11-Sep	0	317	0	79	0	5	-
12-Sep	0	317	0	79	0	5	10.5
Total		317		79		5	15.5

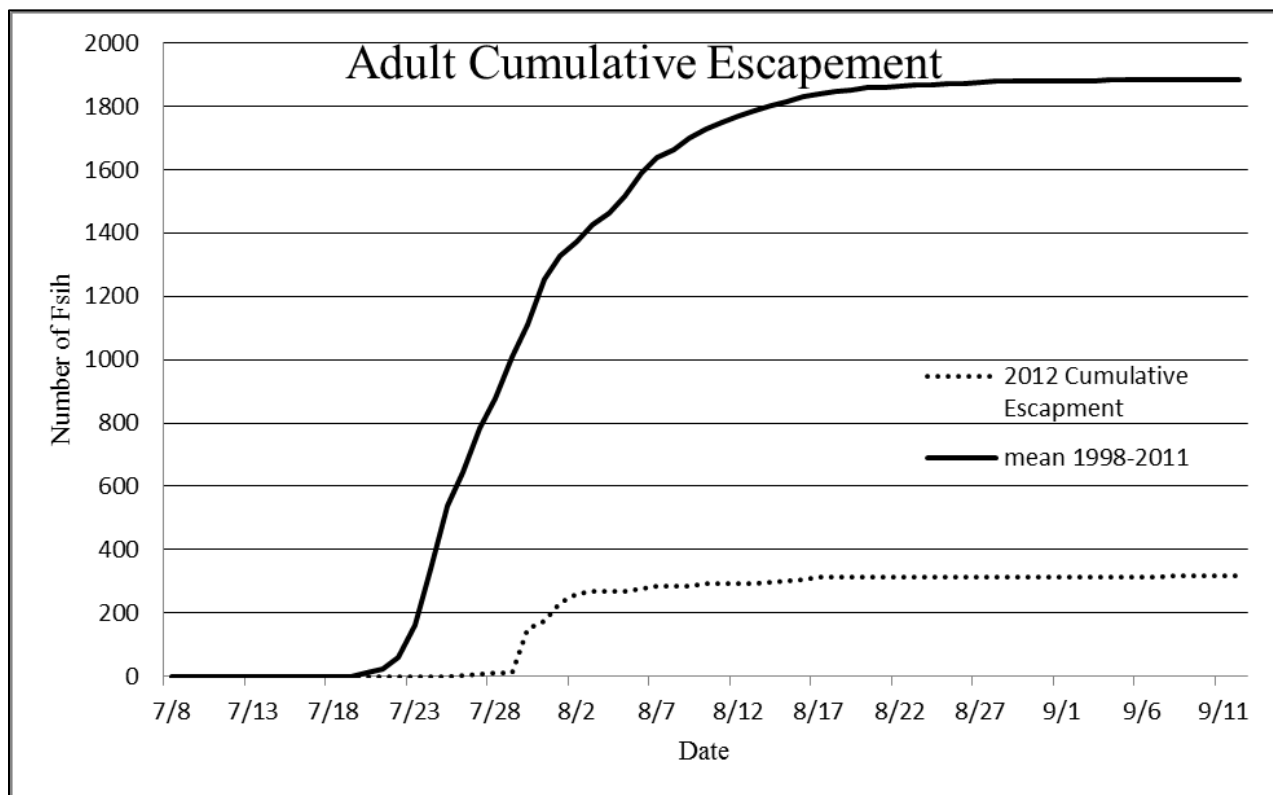


Figure 4: A comparison of the total sockeye run from 2012 and the previous 13 year average.

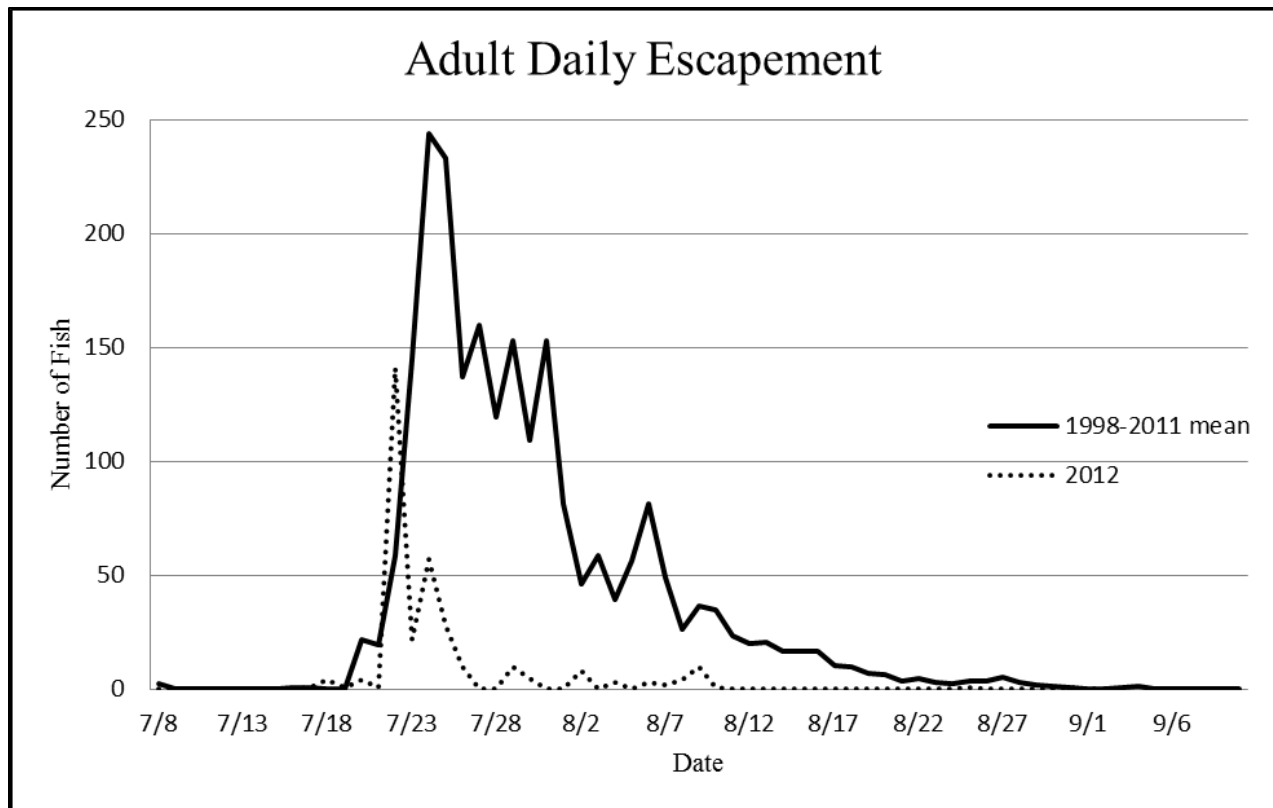


Figure 5: is a comparison of the daily totals for 2012 and the previous 13 year average.

Discussion and Conclusion

The objective of this project was to enumerate the smolt out migration and adult salmon species returning to the Sixmile Creek drainage to spawn to determine if there were any trends in the data from year to year. During the 2012, season a record number of sockeye smolts, 23,644, were enumerated (Appendix 1). While the number of coho enumerated, 107 smolts, was an average year. The enumeration of the smolts project had no equipment issues or any other issues.

The 2012, adult sockeye return total was the lowest recorded in 21 years (Table 2) and well below the 12 year average of 1,974 fish (Figure 4). Historically the majority of fish pass through the weir the last week of July. With a large hole being found on 30 July it is unknown how long the hole was there or how many fish went through unaccounted for. Also, the volunteers were inconsistent in recording the number of salmon that they had passed.

The sockeye escapement peaked on 22 July (Figure 5). The peak escapement occurred two days earlier than the 13 year average. On 30 July, fifty percent of the seasons count had passed the weir (Figure 4). The 30 July date of 50% is one day later than the 13 year average. The largest run of sockeye in the Sixmile Creek drainage occurred in 2001 with a total of 4,043 fish being counted (Appendix 2). The rest of the sockeye runs have been much smaller than what occurred in 2001(Appendix 2).

Literature Cited

- Abbott, Maj George A. and Lt Col John A. Allgair. "Float Plane Base: Assigned Project No. 21-50A." Elmendorf Air Force Base, Alaska, n.d. Copy available in the 673rd Air Base Wing History Office, Joint Base Elmendorf-Richardson.
- Gotthardt, T. 2003. Inventory and Mapping of Sixmile Lakes sockeye spawning habitat on Elmendorf Air Force Base, Alaska. Alaska Natural Heritage Program, Environment and Natural Resources Institute. Univ. Alaska, Anchorage.
- Gotthardt, T. 2006. Limnological and fishery investigations concerning sockeye salmon production in Sixmile Lakes, Elmendorf Air Force Base, Alaska. Alaska Natural Heritage Program, Environment and Natural Resources Institute. Univ. Alaska, Anchorage.
- Gumpert, J. 2011. Sixmile Creek Watershed. JBER 673 Civil Engineer Group, JBER, Alaska.
- Habicht, C., W. D. Templin, T. M. Willett, L. F. Fair, S. W. Raborn, L. W. Seeb. 2007. Post-season stock composition analysis of Upper Cook Inlet sockeye salmon harvest, 2005-2007. Alaska Department of Fish and Game, Fishery Manuscript No. 07-07, Anchorage.
- National Marine Fisheries Service. 2008. Conservation Plan for the Cook Inlet beluga whale (*Delphinapterus leucas*). National Marine Fisheries Service, Juneau, Alaska.
- National Marine Fisheries Service, Alaska Regional Office. Cook Inlet Beluga Whales. 2009. Web. 14 Mar. 2012. <<http://www.fakr.noaa.gov/protectedresources/whales/beluga/cibrochure09.pdf>>.
- Rothe, Thomas C., S. H. Lanigan, P. A. Martin, G. F. Tande. 1983. Natural Resource Inventory of Elmendorf Air Force Base, Alaska, Part I. U.S. Fish and Wildlife Service, Special Studies.
- Wilson, William J. and Kelly, Michael D. "Instream Temperature Modeling and Fishery Impact Assessment for the Proposed Susitna Hydroelectric Project". Arctic Environmental Information and Data Center University of Alaska, 1984. Web. 4 Apr. 2012. <<http://www.arlis.org/docs/vol2/hydropower/SUS418.pdf>>

Appendices

Appendix 1 – Smolt sockeye escapement counts by date, Sixmile Creek Drainage, 2003-2012

Date	Year							Average
	2003	2004	2005	2006	2009	2010	2012	2003-2006, 2009-2010
12-May				0				0
13-May				0				0
14-May	0			4				2
15-May	0	4		1		0		1
16-May	21	2		2		0		6
17-May	1	126		1		0		32
18-May	21	7		0		0		7
19-May	8	402		13	26			112
20-May	165	407	92	44	114	0		137
21-May	220	185	121	118	86	8		123
22-May	815	464	30	181	192			336
23-May	1,383	146	15	637	402	5		431
24-May	740	325	155	1,725	87	1	0	506
25-May	864	319	312	986	375	14	70	478
26-May	460	616	309	1,919	83	7	234	566
27-May	731	266	229	1,897	209		69	666
28-May	445	714	365	229	38	34	2,404	304
29-May	673	63	125	1,424	28	26	2,134	390
30-May	275	693	20	1,316	23	6	430	389
31-May	1,047	172	595	781	8	5	562	435
1-Jun	506	74	447	836	64	47	12	329
2-Jun	688	41	961	882	117	117	20	468
3-Jun	521	394	660	418	123	67	23	364
4-Jun	128	92	600	90	238	150	636	216
5-Jun	384	13	608	254	1,071	639	2,049	495
6-Jun	243	140	265	350	483	5	891	248
7-Jun	1,104	37	96	107	963	162	2,677	412
8-Jun	111	25	234	114	1,103	84	1,017	279
9-Jun	478	47	274	65	636	616	1,029	353
10-Jun	173	22	129	174	357	427	813	214

Date	Year							Average
	2003	2004	2005	2006	2009	2010	2012	2003-2006, 2009-2010
11-Jun	1,076	0	143	29	44	277	195	262
12-Jun	3,660	58	144	62	123	281	505	721
13-Jun	1,536	7	134	148	488	176	1,129	415
14-Jun	779	26	132	223	303	30	2,603	249
15-Jun	573	18	344	230	237	23	1,075	238
16-Jun	96	11	190	113	10	181	799	100
17-Jun	134	2	161	596	42	80	612	169
18-Jun	20	12	118	188	318	220	546	146
19-Jun	14	17	366	30	47	28	146	84
20-Jun	6	16	88	72	38	20	34	40
21-Jun	3	5	122	53	35	26	97	41
22-Jun	9	1	213	14		26	60	53
23-Jun	2	35	62	12	29	61	101	34
24-Jun			27	73	12	99	15	53
25-Jun			308	16	0	51	51	94
26-Jun			218	188	18	9	41	108
27-Jun			88	80		2	203	57
28-Jun			20	129	3	3	23	39
29-Jun			27	297	1	16	60	85
30-Jun			28	100		8	279	45
1-Jul					40	0		20
Totals	20,113	6,004	11,580	19,227	10,623	6,047	25,656	11,348
Totals	20,113	6,004	9,575	17,221	8,614	4,037	23,644	10,927

The first total in the average column (11,348) is the sum of those averages. The second total in the average column (10,927) is the average from all of the yearly totals.

Appendix 2 – Adult sockeye escapement counts by date, Sixmile Creek Drainage, 1998-2012

Date	Year												Average			
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	1998-2011
1-Jul											0					0
2-Jul											0					0
3-Jul											0					0
4-Jul																0
5-Jul																0
6-Jul																0
7-Jul																0
8-Jul				4							1					3
9-Jul											0					0
10-Jul				1							0					1
11-Jul											0			0		0
12-Jul											0			0		0
13-Jul											0		0	0		0
14-Jul							1				0	0	0	0		0
15-Jul											0	0	0	0		0
16-Jul	2										0	0	0	2	0	1
17-Jul	3										0	0	0	0	-	1
18-Jul	1				0						0	0	0	0	0	0
19-Jul					0						1	0	0	0	0	0
20-Jul	3			149	0						0	0	0	0	0	22
21-Jul	17			133	0		5				1	0	0	1	0	20
22-Jul	17			285	0		107			1	0	0	119	0	0	59
23-Jul	43		518	300	0		100			1	0	0	487	0	0	145
24-Jul	487		178	1,188	0		18			1	8	358	200	0	0	244
25-Jul	184		78	405	328	158	0	276		4	516	582	67	198	1	233
26-Jul	56		21	26	173	251	2	124			344	268	0	241	4	137
27-Jul	48		3	130	476	364	2	22		219	100	537	0	18	1	160
28-Jul	4			286	300	394	13	2		14	32	264	7	0	4	120
29-Jul	154		200	297	363	279	24	2		1	9	260	247	2	1	153
30-Jul	20		180	91	162	132	321	31	205	3	67	86	119	1	141	109
31-Jul	20		133	305	59	176	301	160	359	80	112	181	103	0	22	153
1-Aug	21		44	151	91	95	43	92	50	171	46	70	187	0	57	82
2-Aug	0		38	59	40	44	26	72	2	34	31	100	151	2	28	46
3-Aug	138		24	45	86	88	41	40	3	13	17	12	140	115	10	59
4-Aug	48		5	70	76	86	59	35	3	7	21	14	34	57	0	40

Date	Year															Average
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	1998-2011
5-Aug	0		33	26	65	128	30	50	154	36	20	44	141	5	0	56
6-Aug	115	386		11	49	70	9	21	84	125	2	76	107	0	10	81
7-Aug	56	206	48	16	67	83	17	51	39	37	9	21	40	0	5	49
8-Aug	0	1	17			34	62	14	41	1	14	37	98	0	0	27
9-Aug	56	7	3	13	62	58	39	28	18	5	15	74	135	0	0	37
10-Aug	40		30		28	18	147	37	12	9	5	32	61	0	8	35
11-Aug	29			9	30	11	38	14	33	22	22	64	11	2	0	24
12-Aug	25	4	4	2		82	22	16	15	48	9	31	4	0	3	20
13-Aug	24	14	3		42	22	31	16	70	6	21	13	9	0	0	21
14-Aug	17	3	1			40	12	65	7	10	18	13		0	3	17
15-Aug	13	3			36	41	21	18	5	11	3	37	9	5	2	17
16-Aug	9	3		23		44	9	18	16	5	3	61	10	0	4	17
17-Aug	12		3			32	14	7	8	4	0	17	17	0	10	10
18-Aug	0	3	5	4	11	15	6	41	11	10	9	16	4	0	1	10
19-Aug	0			5		9	1	17	16		2	14	6	3	0	7
20-Aug	0				19	3	7	9	9	4	1	15	5	1	0	7
21-Aug	0	1				7	7	7	6	2	1	8	3	0	0	4
22-Aug	0	2	1		15	2	0	9	10	8	2	9	2	0	0	5
23-Aug	0	4	1				1	12	3	8	0	4	2	0	0	3
24-Aug					1		7	3	1	1	0	5	5	2	0	3
25-Aug						10	0	10	3		0	5	0	0	0	4
26-Aug		7					13	6	1		0	1	0	0	0	4
27-Aug		2				9	28	5	1		1	1	0	0	0	5
28-Aug		6			1		15	0	4	2	0	0		0	0	3
29-Aug							3	4	0		0	4	0	1	0	2
30-Aug							4	2	3		0	0	0	0	0	1
31-Aug							0	5	0		0	0	2	0	0	1
1-Sep							1		0		0		0	0	0	0
2-Sep							0		0		0		0	2	1	0
3-Sep		3					3		0		0		0	0	0	1
4-Sep		7					1		0		0		0	0	0	1
5-Sep							0		0		0		0	0	0	0
6-Sep		1					0		0		0		0	0	0	0
7-Sep							0		0		0		0	0	0	0

	Year															Average
Date	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	1998-2011
8-Sep							0		0		0		0	0	1	0
9-Sep													0	0	0	0
10-Sep													1	0	0	1
11-Sep														0	0	0
12-Sep														0	0	0
13-Sep														0		0
14-Sep														0		0
15-Sep														0		0
Totals	1662	663	1571	4034	2580	2778	1611	1341	1192	903	1463	3334	2533	658	317	2255
Totals	1662	663	1571	4034	2580	2778	1611	1341	1192	903	1463	3334	2533	658	317	1880

The first total in the average column (11,348) is the sum of those averages. The second total in the average column (10,927) is the average from all of the yearly totals.