



**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, 2013**

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Abundance and Run Timing of Smolt and Adult Salmon in the Sixmile Creek Drainage on Joint Base Elmendorf-Richardson, Alaska, 2013

Prepared for:

673rd Civil Engineer Squadron, Civil Engineer Installation Management,
Environmental, Conservation Section

Prepared by:

Jessica Johnson
Research Associate II: Fisheries Biologist
Colorado State University
Center for Environmental Management of Military Lands

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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). In 2011, critical habitat was established within Cook Inlet, including Knik Arm in front of the mouth of Sixmile Creek (76 FR 20180, April 11, 2011).

The Sixmile Creek drainage (Figure 1), located in south-central 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 2003, Tracey Gotthardt with the Alaska Natural Heritage Program conducted a field study, "Limnological and Fishery Investigations Concerning Sockeye Salmon Production in Sixmile Lakes, Elmendorf Air Force Base, Alaska" (Gotthardt 2006). This was the first time that the out-migrating smolt had been enumerated from the Sixmile lakes. Since 2003, enumeration of the out-migrating smolt has been sporadic.

Historically, smolts have been counted out-migrating 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 with annual counts ranging from 4,037 – 23,644, while counts of coho salmon smolts have ranged from 23 – 393 fish.

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 them 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 Environmental Conservation Section (CEIEC) once again operated the weir and collected salmon escapement data.

The Sixmile Creek adult weir is operable by mid-July, with biologists, technicians, and volunteers counting and releasing salmon until mid-September. Four out of the five North American Pacific salmon species 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. Sockeye salmon are the most abundant species with annual counts ranging from 317 – 4,034, while counts of coho salmon have ranged from 1 – 178 fish.

Objective

The primary objective of this project was to enumerate the out-migrating sockeye smolt and the returning adult sockeye salmon to the Sixmile Creek drainage to spawn. The secondary 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 (U.S. Department of Defense 2012). The system is charged primarily by groundwater 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 the 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 lakes. 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 halfway between Lower Sixmile Lake and Cook Inlet (61.29209 -149.82277). Since 1998, the adult weir has been located at the outflow of Lower Sixmile Lake under the Fairchild Avenue Bridge. This site is where both the adult weir and smolt weir are located.

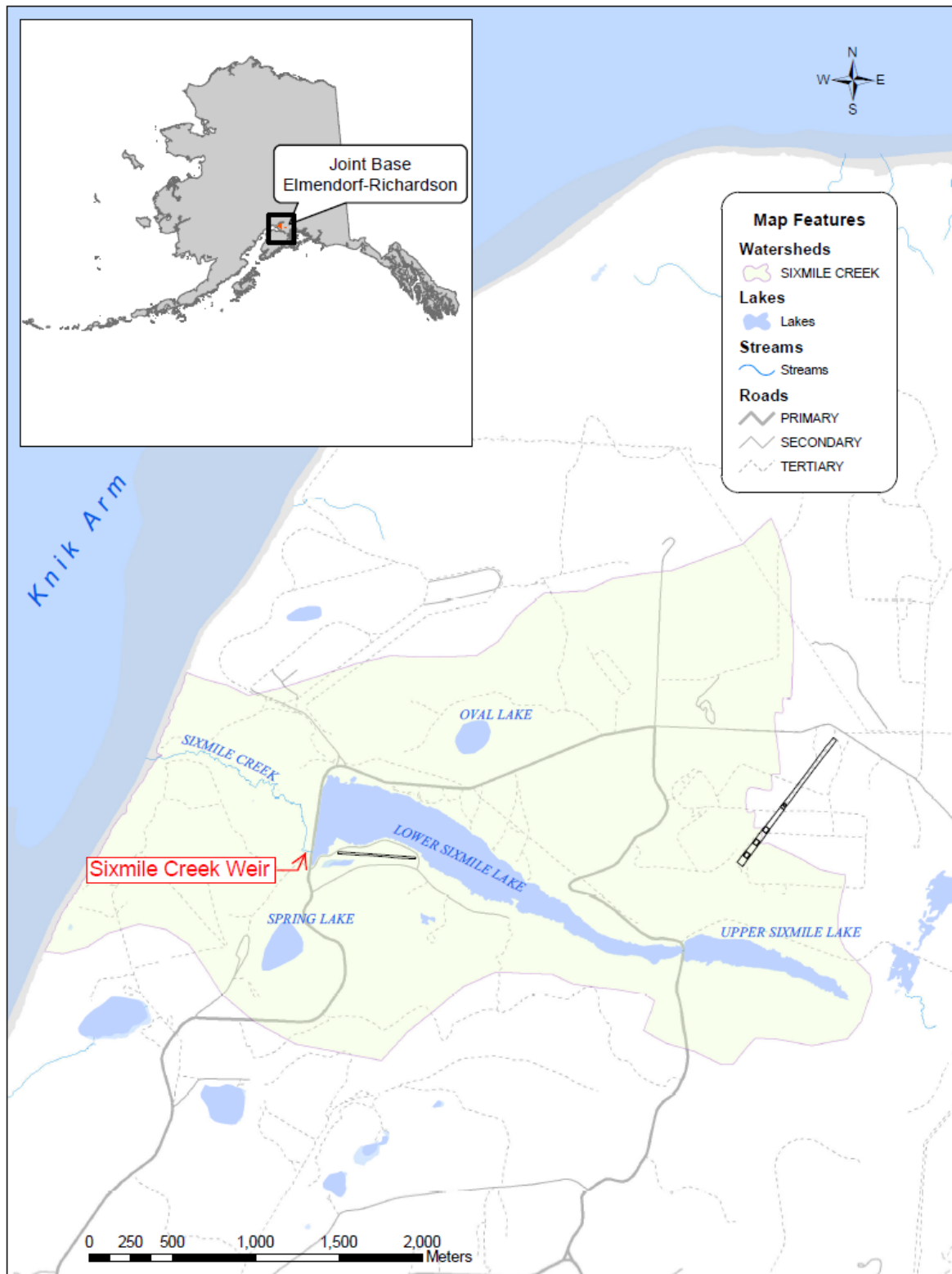


Figure 1: The Sixmile Creek drainage on JBER, AK (Gumpert 2011).

Methods

Smolt Weir Design and Operation

Sockeye and coho salmon smolts out-migrating from the Sixmile lakes are typically counted from mid-May through the end of June. In 2013, smolts were enumerated from 20 May through 1 July.

The smolts were captured by use of a weir with a live box, and they were checked at a minimum twice a day. 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, in Celsius (°C), was collected at the site on a daily basis also.

Adult Weir Design and Operation

Sockeye, coho, and a few pink salmon are counted and released in to Lower Sixmile Lake. The adult salmon counts typically occur between mid-July and mid-September. This year (2013), adults were counted from 16 July until 12 September. The weir was composed of chain link gates under the Fairchild Avenue Bridge. Salmon assembled behind the gates 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 also 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, in Celsius (°C), was collected at the site on a daily basis also.

Foot Surveys

Two surveys for adult salmon were conducted on foot. These surveys started at the mouth of Sixmile Creek, from Knik Arm tide line up to the weir at the outfall of Lower Sixmile Lake approximately 1.5 km. The first quarter of the creek walk, the crew was forced to walk in

the creek due to the steep banks and thick vegetation. The second quarter of the walk required the crew to walk along the bank on either side of the creek. The third quarter of the walk took the crew through a meadow where the stream was too deep to walk in. Therefore, the crew was forced to walk along the bank. It should be noted that, in the meadow, it is difficult to see the salmon because of bank overhangs and tall grasses along the bank. During the final quarter of the walk, the crew was able to walk along the bank in most of the areas but there were a few areas where the crew was forced into the creek. The crew consisted of a minimum of three people. One person wearing polarized sunglasses continually counted fish in the creek and the carcasses along the creek. The other two personnel were surveying the area for bears. Personnel looking for bears occasionally helped spot and count fish. The first survey is usually conducted in mid-August, at the peak of the pink salmon return, and the second is usually completed in mid-September. The second survey is done on the last day of the weir operation for the season.

Data Analysis

CEIEC maintains two historical databases, one for the 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 2013, for both the smolts and adults, were compared to previous years' average counts.

Results

Smolt Weir

The weir was fully operational at 1430 hours on 20 May 2013, with no fish counted that day. The first smolt counted for the season was one sockeye smolt on 27 May. Sockeye smolts were still being counted on 1 July, the last day of the operation. The first coho was counted on 31 May, while the last one was counted on 27 June (Table 1). A total of 20,463 sockeye and 250 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 during the smolt out-migration was 16.0 °C. To maintain consistency with the historical data the weir was removed on 1 July 2013 at 1200 hours.

Table 1. Smolt daily and cumulative (Cum) counts of sockeye and coho salmon at the Sixmile Creek weir, JBER 2013.

Date	Temp (C°)	Sockeye		Coho	
		Daily	Cum	Daily	Cum
20-May	6		0		0
21-May	7		0		0
22-May	7		0		0
23-May	6.5		0		0
24-May	7		0		0
25-May	8		0		0
26-May	8		0		0
27-May	8	1	1		0
28-May	10	0	1		0
29-May	13	0	1		0
30-May	14	40	41		0
31-May	14.5	104	145	15	15
1-Jun	15	320	465	12	27
2-Jun	15	386	851	9	36
3-Jun	15	881	1732	54	90
4-Jun	15	615	2347	13	103
5-Jun	15	2227	4574	17	120
6-Jun	16	963	5537	16	136
7-Jun	16	2376	7913	26	162
8-Jun	16.5	2255	10168	17	179
9-Jun	17	1349	11517	21	200
10-Jun	18	779	12296	11	211
11-Jun	18.5	352	12648	2	213
12-Jun	19	1757	14405	12	225
13-Jun	19	771	15176	5	230
14-Jun	19.5	1395	16571	3	233
15-Jun	19.5	1049	17620	7	240
16-Jun	19.5	1256	18876	4	244
17-Jun	21.5	737	19613	3	247
18-Jun	22	159	19772	1	248
19-Jun	24	50	19822	0	248
20-Jun	22	49	19871	0	248
21-Jun	21	14	19885	0	248
22-Jun	19	291	20176	1	249
23-Jun		93	20269	0	249
24-Jun	21	44	20313	0	249

Date	Temp (C°)	Sockeye		Coho	
		Daily	Cum	Daily	Cum
25-Jun	21	45	20358	0	249
26-Jun	20	18	20376	0	249
27-Jun	21	7	20383	1	250
28-Jun	21	1	20384	0	250
29-Jun	20	12	20396	0	250
30-Jun	20	11	20407	0	250
1-Jul	18	56	20463	0	250
TOTALS	16.0		20463		250

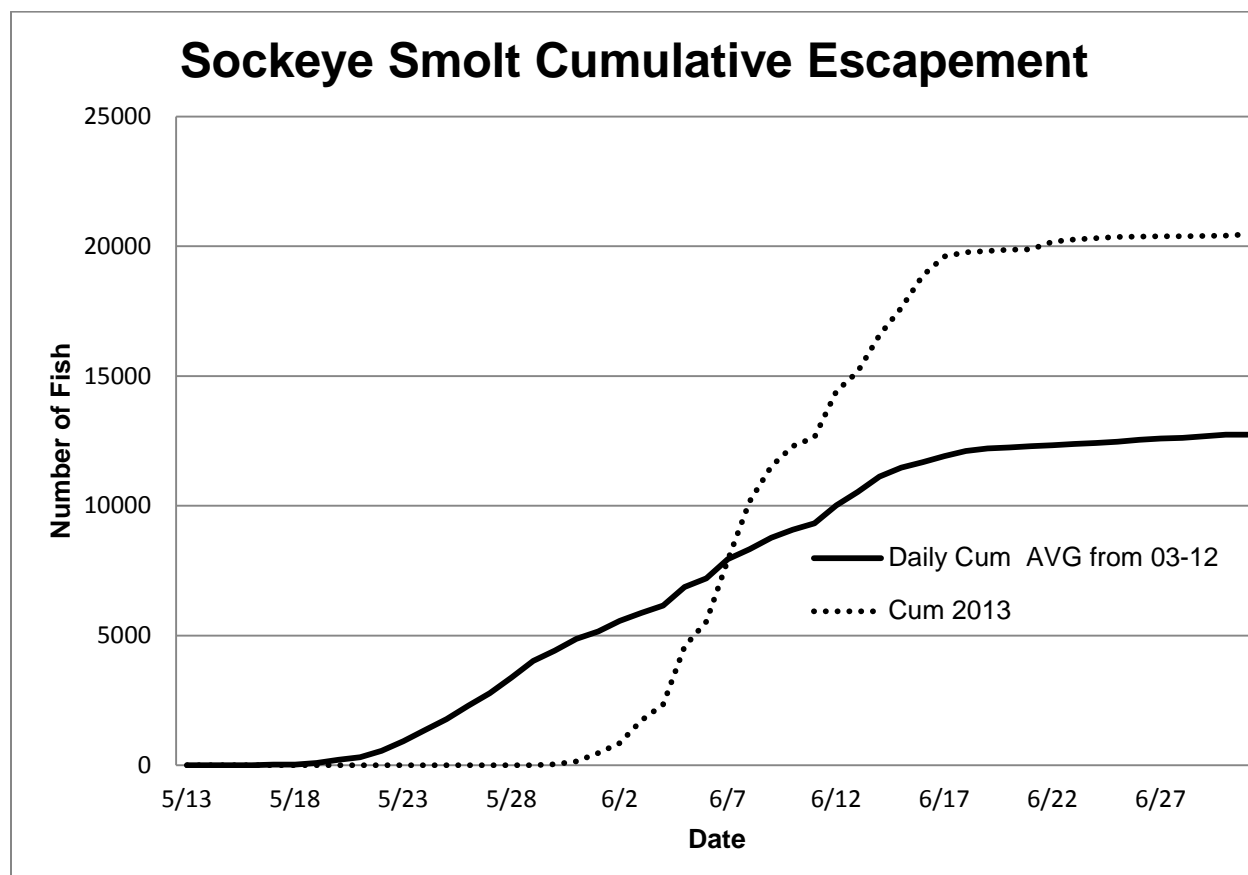


Figure 2. Daily cumulative comparison of 2013 sockeye out-migration and the average from 2003-2012.

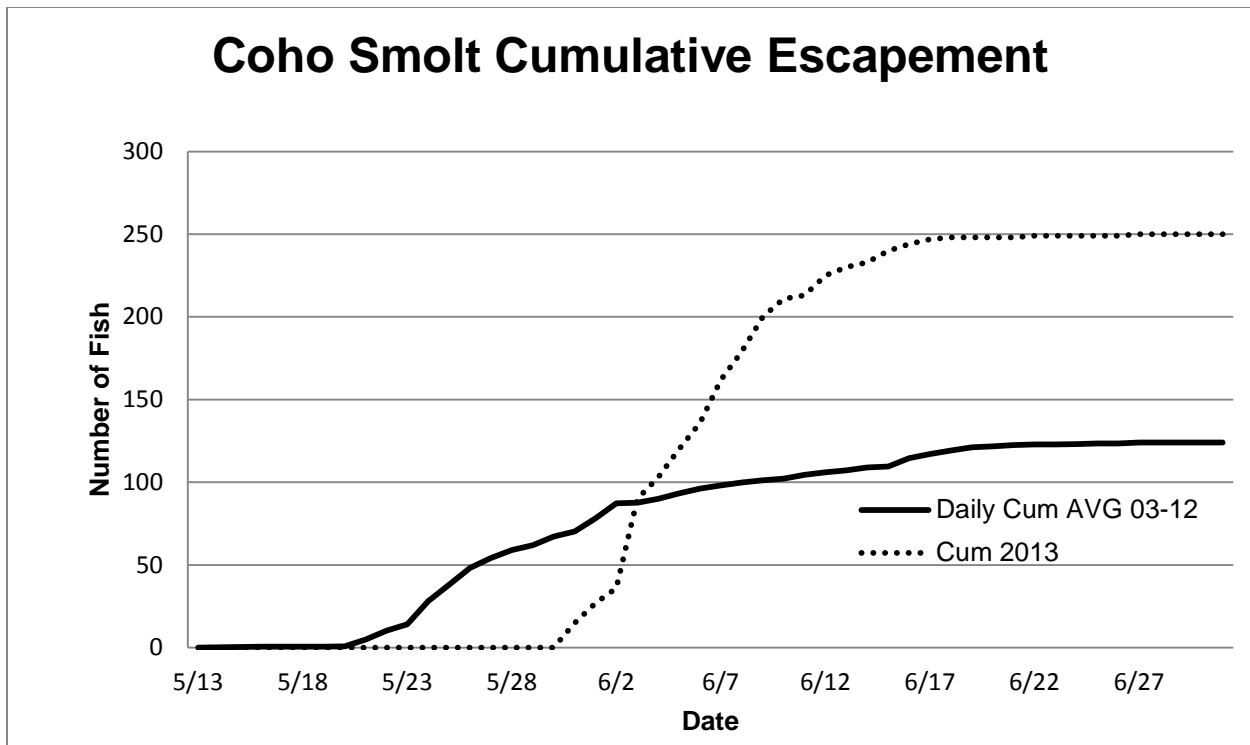


Figure 3. Daily cumulative comparison of 2013 coho out-migration and the average from 2003-2012.

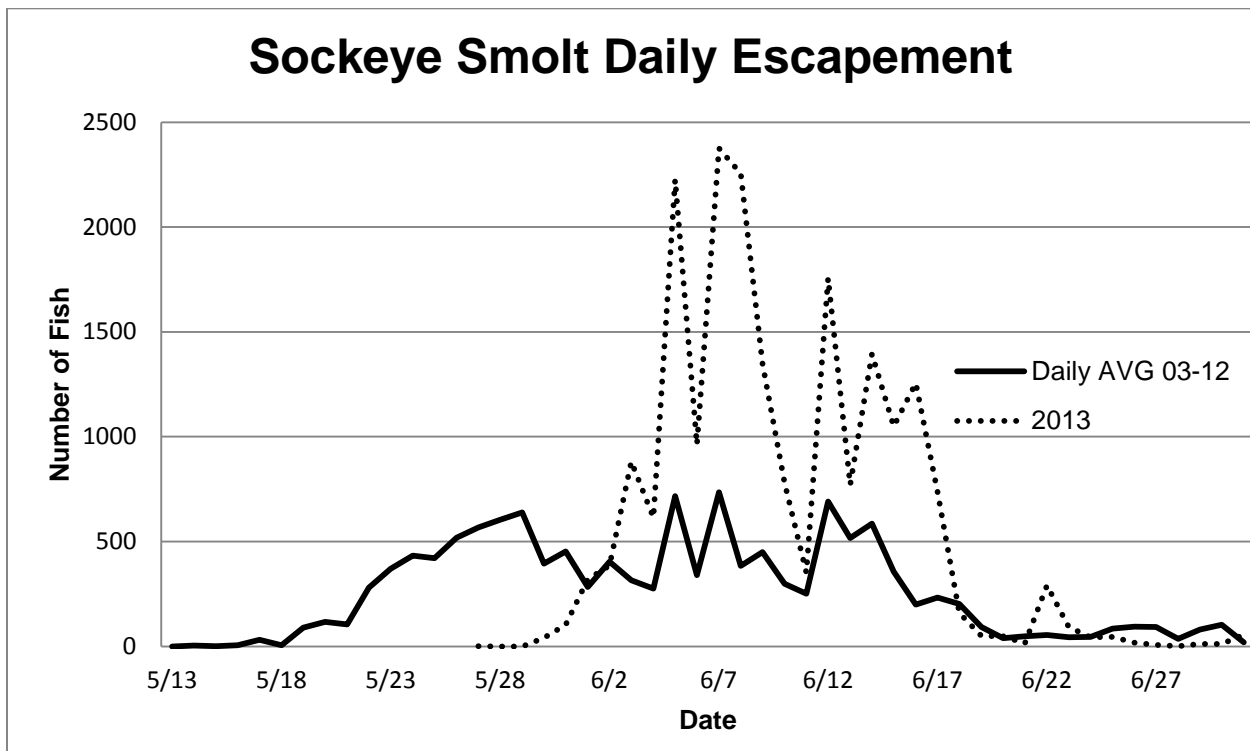


Figure 4. Daily comparison of 2013 sockeye out-migration and the average from 2003-2012.

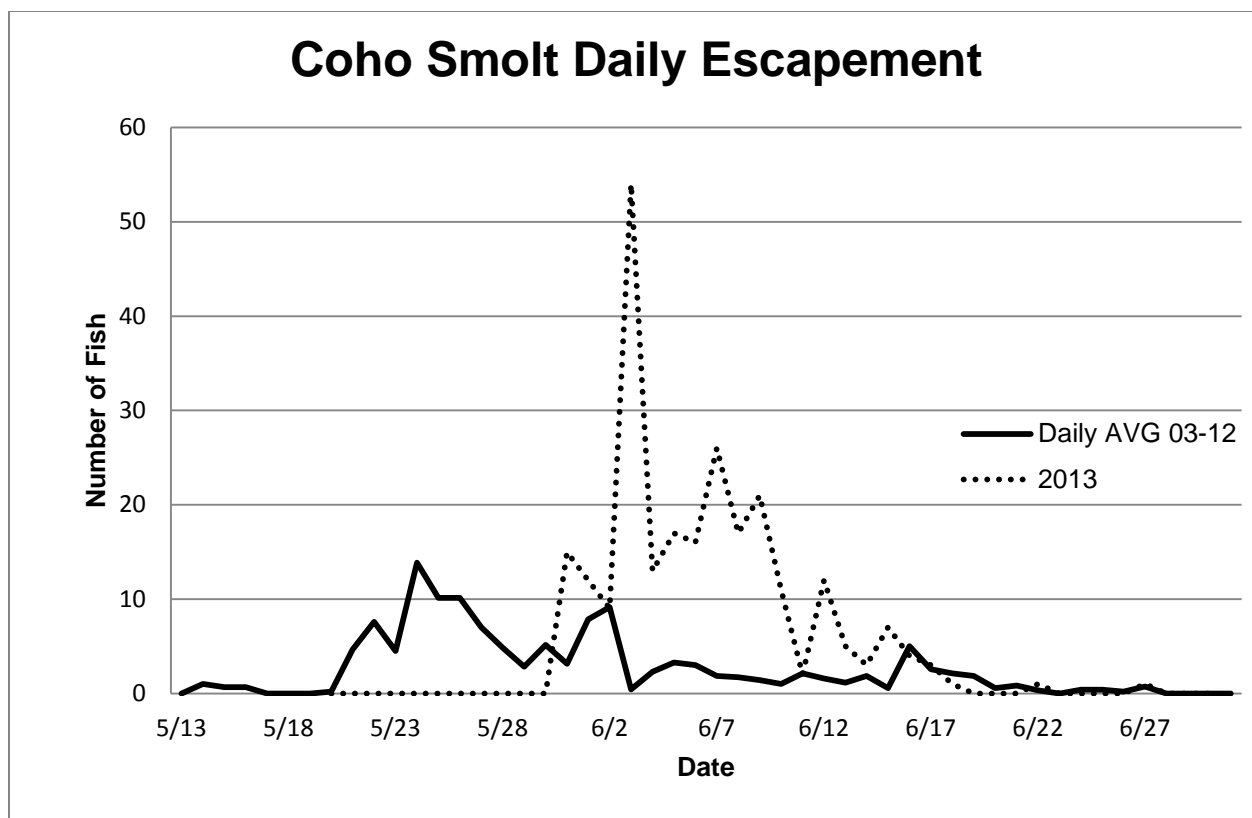


Figure 5. Daily comparison of 2013 coho out-migration and the average from 2003-2012.

Adult Foot Surveys

The first survey was conducted on 16 August, from 0915-1100, with overcast skies. The second survey was conducted on 12 September, from 0945-1145, with partly cloudy skies. During both surveys, living and dead salmon were counted. A total of 127 sockeye, 519 pink, 9 coho, and 28 unknown salmon were counted during both of these surveys (Table 2). These numbers likely under-represent the true number of salmon that actually spawned below the weir due to the potential for missing salmon during the surveys (e.g., fish positioned behind logs or under banks and carcasses pulled into the brush) and missing salmon between the surveys due to predators or the salmon had already spawned and left the system. The first survey was conducted during what is thought to be the peak of the pink salmon run. While the second survey was conducted during what is thought to be the end of the pink salmon run.

Table 2. Results of the adult foot surveys.

Date	Sockeye		Pink		Coho		Unknown	
	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
16-Aug	24	1	485	25	0	0	12	0
12-Sep	98	4	5	4	7	2	0	16
Total	122	5	490	29	7	2	12	16

Adult Weir Data

The weir was fully operational at 0930 hours on 16 July, 2013. Adult salmon were counted at the weir from 16 July until 12 September, with a total of 1,652 sockeyes, 54 coho, zero pinks, and zero chum passing through the weir. The first sockeyes passed the weir on 16 July, and the last sockeye passed the weir on 12 September (Table 3). The first coho passed through the weir on 12 August, and the last coho passed the weir on 12 September (Table 3). No major problems occurred during the time that the weir was in use, unlike the previous year, when a hole was cut into the fence. The weir was removed at 1200 hours on 12 September, immediately following the second adult foot survey.

The average water temperature for the 2013 season was 17.8 °C. This temperature was higher than other years and this can be attributed to more days with higher than normal air temperatures (National Weather Service 2013). Water temperature can be a factor in whether the salmon 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.

Table 3. Adult daily and cumulative (Cum) counts of sockeye and coho salmon at the Sixmile Creek weir, JBER 2013.

Date	Temp (C°)	Sockeye		Coho	
		Daily	Cum	Daily	Cum
16-Jul	20	27	27	0	0
17-Jul	20	10	37	0	0
18-Jul	20	0	37	0	0
19-Jul	21	0	37	0	0
20-Jul	21	0	37	0	0
21-Jul	20	0	37	0	0
22-Jul	20	1	38	0	0
23-Jul	20	0	38	0	0
24-Jul	21	0	38	0	0
25-Jul	22	3	41	0	0
26-Jul	22	152	193	0	0
27-Jul	21.5	309	502	0	0
28-Jul	21.5	197	699	0	0
29-Jul	22	27	726	0	0
30-Jul	22	14	740	0	0
31-Jul	22	0	740	0	0
1-Aug	24	3	743	0	0
2-Aug	24	27	770	0	0
3-Aug	21.5	196	966	0	0
4-Aug	20.5	255	1221	0	0

Date	Temp (C°)	Sockeye		Coho	
		Daily	Cum	Daily	Cum
5-Aug	19.5	83	1304	0	0
6-Aug	19	45	1349	0	0
7-Aug	19	29	1378	0	0
8-Aug	19	13	1391	0	0
9-Aug	18	19	1410	0	0
10-Aug	18	46	1456	0	0
11-Aug	17	39	1495	0	0
12-Aug	17	17	1512	3	3
13-Aug	17	27	1539	1	4
14-Aug	17	32	1571	1	5
15-Aug	17	12	1583	1	6
16-Aug	17	20	1603	3	9
17-Aug	17	3	1606	4	13
18-Aug	17	8	1614	1	14
19-Aug	17	7	1621	0	14
20-Aug	16	4	1625	0	14
21-Aug	17.5	5	1630	0	14
22-Aug	16	0	1630	1	15
23-Aug	16	2	1632	0	15
24-Aug	16	1	1633	3	18
25-Aug	16	3	1636	1	19
26-Aug	16	0	1636	0	19
27-Aug	16	0	1636	0	19
28-Aug	16	0	1636	0	19
29-Aug	16	0	1636	0	19
30-Aug	15.5	0	1636	1	20
31-Aug	15	3	1639	1	21
1-Sep	15	0	1639	0	21
2-Sep	15	3	1642	1	22
3-Sep	14.5	3	1645	0	22
4-Sep	14.5	1	1646	0	22
5-Sep	13.5	0	1646	17	39
6-Sep	13	2	1648	8	47
7-Sep		0	1648	0	47
8-Sep	13.5	1	1649	3	50
9-Sep	13	2	1651	0	50
10-Sep	13	0	1651	3	53
11-Sep	13	0	1651	0	53
12-Sep	13	1	1652	1	54
TOTALS	17.8		1652		54

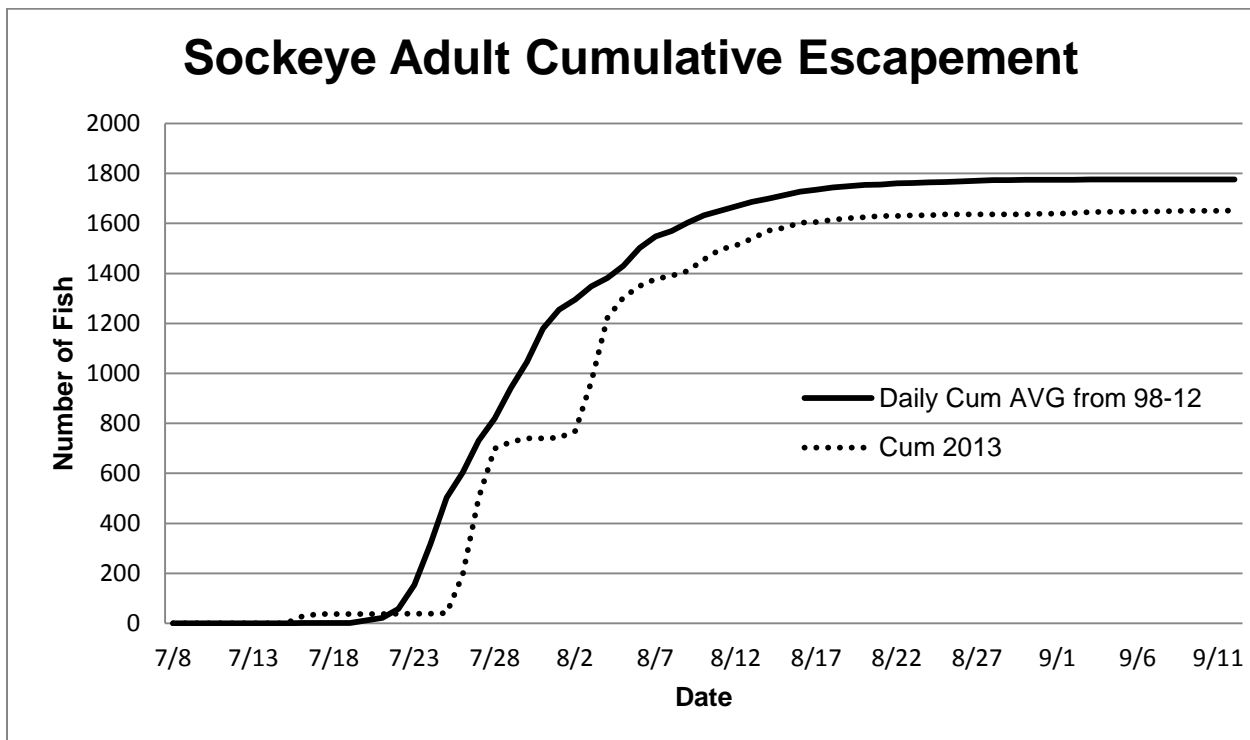


Figure 6. Comparison of cumulative for the 2013 sockeye run and the average cumulative from 1998-2012.

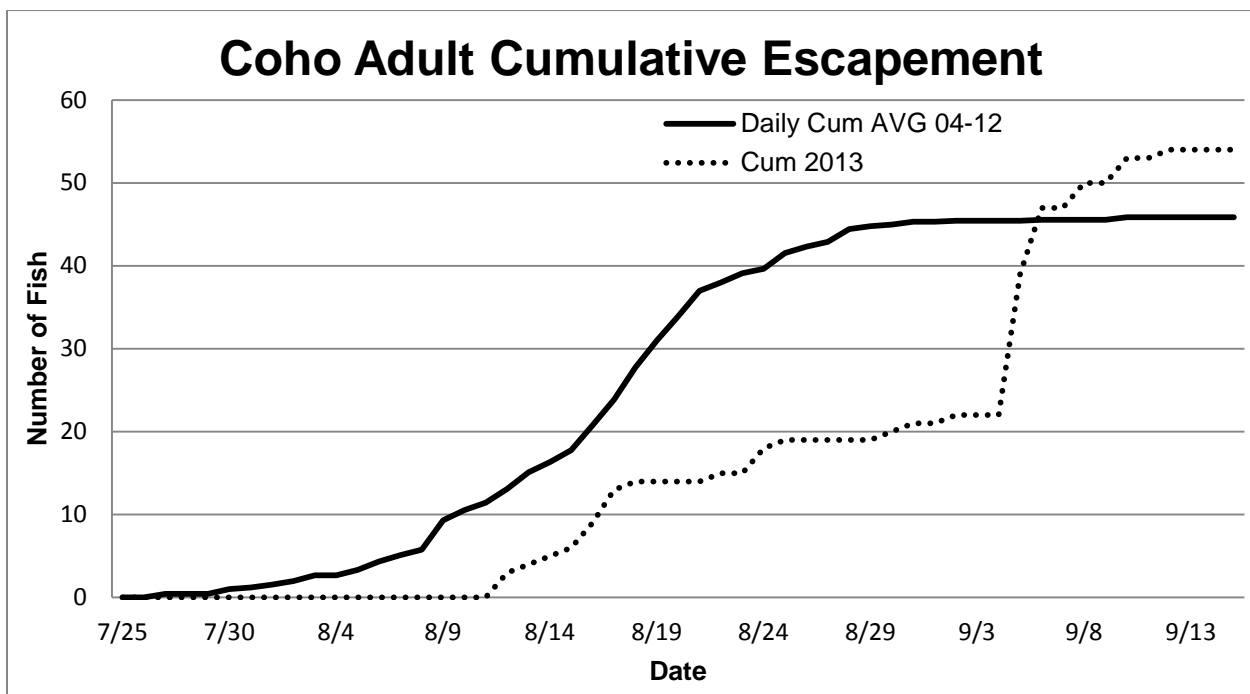


Figure 7. Comparison of cumulative for the 2013 coho run and the average cumulative from 2004-2012.

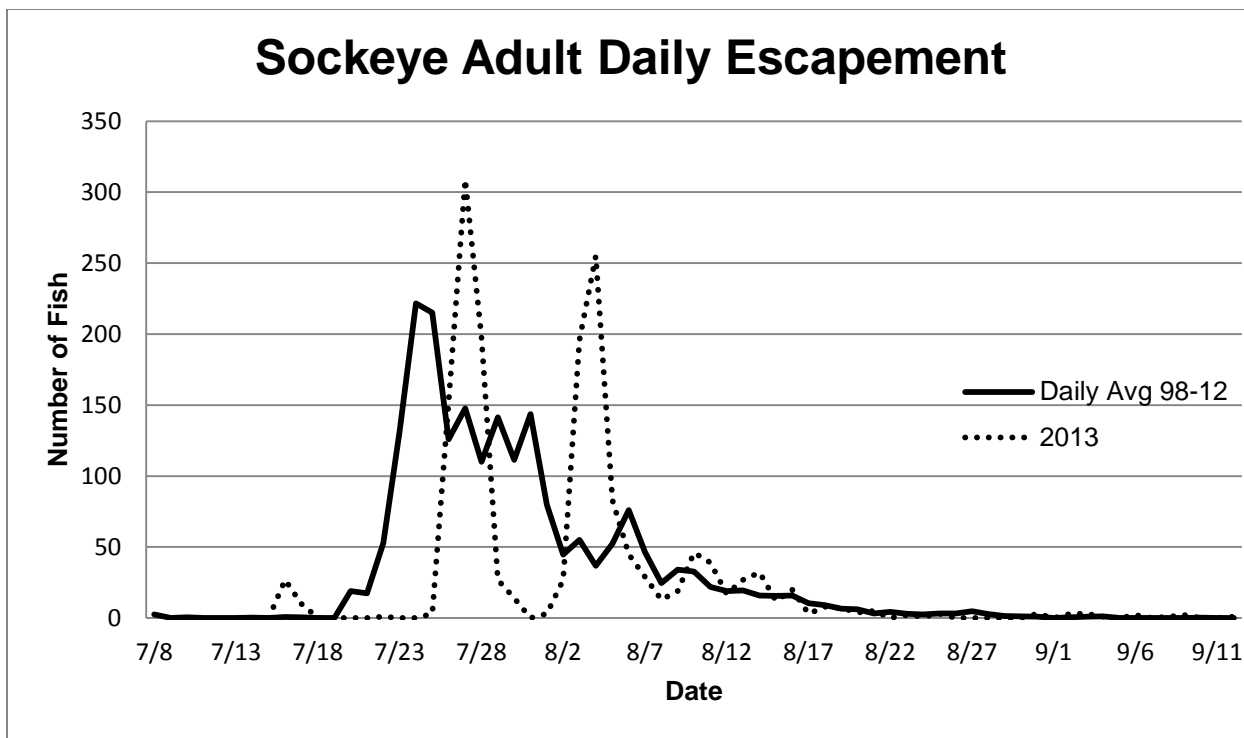


Figure 8. Comparison of daily totals from the 2013 sockeye run and the average from 1998-2012.

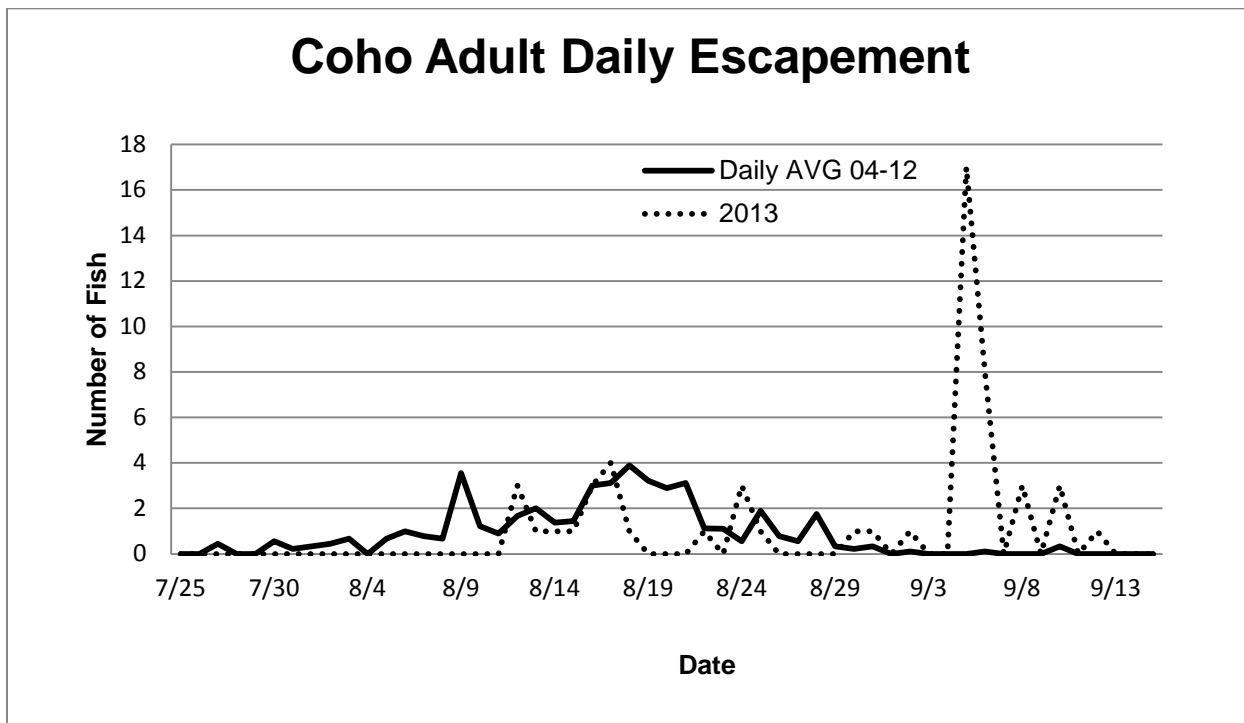


Figure 9. Comparison of daily totals from the 2013 coho run and the average from 2004-2012.

Discussion and Conclusion

The objective of this project was to identify and count the out-migration of smolt salmon and the returning adult salmon for the Sixmile Creek drainage. By using these counts, we hoped to identify year-to-year trends by comparing historical data to the current year's data. We were also trying to identify any environmental factors that may have caused negative effects on the salmon stock. As of 2013, there are eight years of data on out-migrating salmon smolt, and 15 years of data on the returning adult salmon.

During the 2013 season, Sixmile Creek reached its second highest count of out-migrating sockeye smolt (Appendix 1). The 2003-2012 ¹average was compared to this year's count of 20,463 fish. For 2013, there were three days in June that had over 2,000 smolts in a day (Table 1). The average from 2003-2012 shows similar peaks on or close to the same days as seen in Figures 4 and 5. By looking at Figure 4 (Daily Escapement), we also noticed that the sockeye smolt started out-migrating about a week later than previous years.

The 2013 coho count was the second highest recorded in eight years. The total coho smolt counted was 250 as seen in Table 1. Compared to the 2003-2012 average, the daily out-migration peak was also about a week late (Figure 5).

Both the sockeye and coho smolt out-migration started about a week late and this can be explained by environmental factors. In May of 2013, there were more days that were colder than average (National Weather Service 2013). These cooler days caused the ice on Lower Sixmile to remain longer. With a longer ice cover, the water temperature stayed cooler longer. This could have led to the later start of the out-migration this year.

The adult sockeye salmon had a total return of 1,652 fish for 2013. This is lower than the previous 15 year average of 1,775 fish (Figure 6). However, there were two days when the daily peaks for 2013 were higher than the highest peak for the 15 year average (Figure 8). On 27 July, 309 sockeye were counted, and, on 4 August, 255 sockeye were counted (Table 3). For 2013, 95% of the sockeye had passed through the weir by 14 August (Figure 6).

The 2013 adult coho cumulative escapement was actually higher than the average for the last eight years² (Figure 7). Daily escapements were about the same as the eight year average until September 5 when 17 coho passed the weir (Table 3 and Figure 9). Figure 9 also shows that there seems to be more coho pushing through later in the year than in years past.

¹ Note that not all years from 2003-2012 were sampled for smolts. See Appendix 1 for years sampled.

² Note coho salmon have not always been counted and recorded.

There are a few factors that affected our counts this year. Anglers were caught and fined for fishing in the closed waters at the weir and on other portions of Sixmile Creek. Another factor that affected the salmon counts was the presence of bears feeding on fish all of Sixmile Creek.

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Appendices

Appendix 1. Smolt sockeye escapement counts by date, Sixmile Creek drainage, 2003-2013.

Date	Year								Average
	2003	2004	2005	2006	2009	2010	2012	2013	2003-2006, 2009- 2010,2012
12-May				0				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		0	137
21-May	220	185	121	118	86	8		-	123
22-May	815	464	30	181	192			0	336
23-May	1,383	146	15	637	402	5		0	431
24-May	740	325	155	1,725	87	1	0	0	433
25-May	864	319	312	986	375	14	70	0	420
26-May	460	616	309	1,919	83	7	234	0	518
27-May	731	266	229	1,897	209		69	1	567
28-May	445	714	365	229	38	34	2,404	0	604
29-May	673	63	125	1,424	28	26	2,134	0	639
30-May	275	693	20	1,316	23	6	430	40	395
31-May	1,047	172	595	781	8	5	562	104	453
1-Jun	506	74	447	836	64	47	12	320	284
2-Jun	688	41	961	882	117	117	20	386	404
3-Jun	521	394	660	418	123	67	23	881	315
4-Jun	128	92	600	90	238	150	636	615	276
5-Jun	384	13	608	254	1,071	639	2,049	2,227	717
6-Jun	243	140	265	350	483	5	891	963	340
7-Jun	1,104	37	96	107	963	162	2,677	2,376	735
8-Jun	111	25	234	114	1,103	84	1,017	2,255	384
9-Jun	478	47	274	65	636	616	1,029	1,349	449

Date	Year								Average
	2003	2004	2005	2006	2009	2010	2012	2013	2003-2006, 2009- 2010,2012
10-Jun	173	22	129	174	357	427	813	779	299
11-Jun	1,076	0	143	29	44	277	195	352	252
12-Jun	3,660	58	144	62	123	281	505	1,757	690
13-Jun	1,536	7	134	148	488	176	1,129	771	517
14-Jun	779	26	132	223	303	30	2,603	1,395	585
15-Jun	573	18	344	230	237	23	1,075	1,049	357
16-Jun	96	11	190	113	10	181	799	1,256	200
17-Jun	134	2	161	596	42	80	612	737	232
18-Jun	20	12	118	188	318	220	546	159	203
19-Jun	14	17	366	30	47	28	146	50	93
20-Jun	6	16	88	72	38	20	34	49	39
21-Jun	3	5	122	53	35	26	97	14	49
22-Jun	9	1	213	14		26	60	291	54
23-Jun	2	35	62	12	29	61	101	93	43
24-Jun			27	73	12	99	15	44	45
25-Jun			308	16	0	51	51	45	85
26-Jun			218	188	18	9	41	18	95
27-Jun			88	80		2	203	7	93
28-Jun			20	129	3	3	23	1	36
29-Jun			27	297	1	16	60	12	80
30-Jun			28	100		8	279	11	104
1-Jul					40	0		56	20
Totals	20,113	6,004	9,575	17,221	8,614	4,037	23,644	20,463	13,293
Totals	20,113	6,004	9,575	17,221	8,614	4,037	23,644	20463	13,709

The first total in the average column (13,293) is the sum of those averages. The second total in the average column (13,709) is the average from all of the yearly totals.

Appendix 2. Adult sockeye escapement counts by date, Sixmile Creek drainage, 1998-2013.

Date	Year															Average	
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	1998-2012
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	27	1
17-Jul	3										0	0	0	0	-	10	1
18-Jul	1				0						0	0	0	0	0	0	0
19-Jul					0						1	0	0	0	0	0	0
20-Jul	3			149	0						0	0	0	0	0	0	19
21-Jul	17			133	0		5				1	0	0	1	0	0	17
22-Jul	17			285	0		107			1	0	0	119	0	0	1	53
23-Jul	43		518	300	0		100			1	0	0	487	0	0	0	132
24-Jul	487		178	1,188	0		18			1	8	358	200	0	0	0	222
25-Jul	184		78	405	328	158	0	276		4	516	582	67	198	1	3	215
26-Jul	56		21	26	173	251	2	124			344	268	0	241	4	152	126
27-Jul	48		3	130	476	364	2	22		219	100	537	0	18	1	309	148
28-Jul	4			286	300	394	13	2		14	32	264	7	0	4	197	110

Date	Year																Average
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	1998-2012
29-Jul	154		200	297	363	279	24	2		1	9	260	247	2	1	27	141
30-Jul	20		180	91	162	132	321	31	205	3	67	86	119	1	141	14	111
31-Jul	20		133	305	59	176	301	160	359	80	112	181	103	0	22	0	144
1-Aug	21		44	151	91	95	43	92	50	171	46	70	187	0	57	3	80
2-Aug	0		38	59	40	44	26	72	2	34	31	100	151	2	28	27	45
3-Aug	138		24	45	86	88	41	40	3	13	17	12	140	115	10	196	55
4-Aug	48		5	70	76	86	59	35	3	7	21	14	34	57	0	255	37
5-Aug	0		33	26	65	128	30	50	154	36	20	44	141	5	0	83	52
6-Aug	115	386		11	49	70	9	21	84	125	2	76	107	0	10	45	76
7-Aug	56	206	48	16	67	83	17	51	39	37	9	21	40	0	5	29	46
8-Aug	0	1	17			34	62	14	41	1	14	37	98	0	0	13	25
9-Aug	56	7	3	13	62	58	39	28	18	5	15	74	135	0	0	19	34
10-Aug	40		30		28	18	147	37	12	9	5	32	61	0	8	46	33
11-Aug	29			9	30	11	38	14	33	22	22	64	11	2	0	39	22
12-Aug	25	4	4	2		82	22	16	15	48	9	31	4	0	3	17	19
13-Aug	24	14	3		42	22	31	16	70	6	21	13	9	0	0	27	19
14-Aug	17	3	1			40	12	65	7	10	18	13		0	3	32	16
15-Aug	13	3			36	41	21	18	5	11	3	37	9	5	2	12	16
16-Aug	9	3		23		44	9	18	16	5	3	61	10	0	4	20	16
17-Aug	12		3			32	14	7	8	4	0	17	17	0	10	3	10
18-Aug	0	3	5	4	11	15	6	41	11	10	9	16	4	0	1	8	9
19-Aug	0			5		9	1	17	16		2	14	6	3	0	7	7
20-Aug	0				19	3	7	9	9	4	1	15	5	1	0	4	6
21-Aug	0	1					7	7	6	2	1	8	3	0	0	5	3
22-Aug	0	2	1		15	2	0	9	10	8	2	9	2	0	0	0	4
23-Aug	0	4	1				1	12	3	8	0	4	2	0	0	2	3
24-Aug					1		7	3	1	1	0	5	5	2	0	1	3
25-Aug						10	0	10	3		0	5	0	0	0	3	3
26-Aug		7					13	6	1		0	1	0	0	0	0	3
27-Aug		2				9	28	5	1		1	1	0	0	0	0	5

Date	Year																Average
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	1998-2012
28-Aug		6			1		15	0	4	2	0	0		0	0	0	3
29-Aug							3	4	0		0	4	0	1	0	0	2
30-Aug							4	2	3		0	0	0	0	0	0	1
31-Aug							0	5	0		0	0	2	0	0	3	1
1-Sep							1		0		0		0	0	0	0	0
2-Sep							0		0		0		0	2	1	3	1
3-Sep		3					3		0		0		0	0	0	3	1
4-Sep		7					1		0		0		0	0	0	1	1
5-Sep							0		0		0		0	0	0	0	0
6-Sep		1					0		0		0		0	0	0	2	0
7-Sep							0		0		0		0	0	0	0	0
8-Sep							0		0		0		0	0	1	1	0
9-Sep													0	0	0	2	0
10-Sep													1	0	0	0	0
11-Sep														0	0	0	0
12-Sep														0	0	1	0
13-Sep														0			0
14-Sep														0			0
15-Sep														0			0
Totals	1,662	663	1,571	4,034	2,580	2,778	1,611	1,341	1,192	903	1,463	3,334	2,533	658	317	1,652	2,098
Totals	1,662	663	1,571	4,034	2,580	2,778	1,611	1,341	1,192	903	1,463	3,334	2,533	658	317	1,652	1,776

The first total in the average column (2,098) is the sum of those averages. The second total in the average column (1,776) is the average from all of the yearly totals.