

McNeil River State Game Sanctuary Annual Management Report 2013

Thomas Griffin
Edward W. Weiss



© 2013 ADF&G, Photo by Thomas Griffin.



January 2014

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in this report. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

Weights and measures (metric)		General		Mathematics, statistics	
centimeter	cm	<i>all commonly-accepted abbreviations;</i>		<i>all standard mathematical signs, symbols</i>	
deciliter	dL	<i>e.g., Mr., Mrs., AM, PM, etc.</i>		<i>and abbreviations</i>	
gram	g	<i>all commonly-accepted professional</i>		alternate hypothesis	H _A
hectare	ha	<i>titles; e.g., Dr., Ph.D., R.N., etc.</i>		approximately	~
kilogram	kg	Alaska Administrative Code	AAC	base of natural logarithm	<i>e</i>
kilometer	km	Alaska Department of		catch per unit effort	CPUE
liter	L	Fish and Game	ADF&G	coefficient of variation	CV
meter	m	at	@	common test statistics (<i>F, t, χ², etc.</i>)	
milliliter	mL	compass directions:		confidence interval	CI
millimeter	mm	east	E	correlation coefficient (multiple)	<i>R</i>
		north	N	correlation coefficient (simple)	<i>r</i>
		south	S	covariance	cov
		west	W	degree (angular)	°
Weights and measures (English)		copyright	©	degrees of freedom	df
cubic feet per second	ft ³ /s	corporate suffixes:		expected value	E
foot	ft	Company	Co.	greater than	>
gallon	gal	Corporation	Corp.	greater than or equal to	≥
inch	in	Incorporated	Inc.	harvest per unit effort	HPUE
mile	mi	Limited	Ltd.	less than	<
nautical mile	nmi	District of Columbia	D.C.	less than or equal to	≤
ounce	oz	<i>et alii</i> (and others)	et al.	logarithm (natural)	ln
pound	lb	<i>et cetera</i> (and so forth)	etc.	logarithm (base 10)	log
quart	qt	<i>exempli gratia</i> (for example)	e.g.	logarithm (specify base)	log ₂ , etc.
yard	yd	Federal Information Code	FIC	mean	\bar{x}
		<i>id est</i> (that is)	i.e.	minute (angular)	'
Time and temperature		latitude or longitude	lat. or long.	not significant	NS
day	d	monetary symbols (U.S.)	\$, ¢	null hypothesis	H ₀
degrees Celsius	°C	months (tables and figures):	first three	percent	%
degrees Fahrenheit	°F	letters (Jan.,...,Dec)		plus or minus	±
degrees kelvin	K	registered trademark	®	population size	<i>N</i>
hour	h	trademark	™	probability	<i>P</i>
minute	min	United States (adjective)	U.S.	sample size	<i>n</i>
second	s	United States of America (noun)	USA	second (angular)	"
		U.S.C.	United States Code	standard deviation	σ or <i>s</i>
Physics and chemistry		U.S. state	use two-letter abbreviations	standard error (of the mean)	<i>s</i> \bar{x}
<i>all atomic symbols</i>			(e.g., AK, WA)	type I error probability	<i>P_a</i>
alternating current	AC			type II error probability	<i>P_b</i>
ampere	A			variance	σ ² or <i>s</i> ²
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity (negative log of) pH					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

McNeil River State Game Sanctuary Annual Management Report 2013

Thomas Griffin,
Alaska Department of Fish and Game
Division of Wildlife Conservation
333 Raspberry Road
Anchorage, Alaska 99518-1565

and

Edward W. Weiss,
Alaska Department of Fish and Game
Division of Wildlife Conservation
333 Raspberry Road
Anchorage, Alaska 99518-1565

January 2014

Alaska Department of Fish and Game
Division of Wildlife Conservation
333 Raspberry Road
Anchorage, Alaska 99518



The State of Alaska's wildlife refuges, sanctuaries, and critical habitat areas are managed by the Lands and Refuges program of the Division of Wildlife Conservation in the Alaska Department of Fish and Game. Funding for the program and its publications comes from appropriations made by the Alaska Legislature.

Special Area Management Reports address management activities and goals within specific Refuges, Critical Habitat Areas and Sanctuaries managed by the division. The Special Areas Management Reports are intended for biologists or other technical professionals, as well as to inform the general public about the special areas.

This publication was reviewed and approved for publication by Joe Meehan, Lands and Refuges Program Coordinator.

Special Areas Management Reports are available from the Alaska Department of Fish and Game's Division of Wildlife Conservation, PO Box 115526, Juneau, Alaska 99811-5526; phone (907) 465-4190; email: dfg.dwc.publications@alaska.gov; website: www.adfg.alaska.gov. The report may also be accessed through most libraries, via interlibrary loan from the Alaska State Library or the Alaska Resources Library and Information Service (www.arlis.org).

This document should be cited as follows:

Griffin, T. and Weiss, E.W. 2014. McNeil River State Game Sanctuary Annual Management Report, 2013, Alaska Department of Fish and Game, Special Areas Management Report ADF&G/DWC/SAMR-2014-1, Anchorage, Alaska.

The Alaska Department of Fish and Game (ADF&G) administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act (ADA) of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility please write:

- ADF&G ADA Coordinator, P.O. Box 115526, Juneau, AK, 99811-5526
- U.S. Fish and Wildlife Service, 4401 N. Fairfax Drive, MS 2042, Arlington, VA, 22203
- Office of Equal Opportunity, U.S. Department of the Interior, 1849 C Street, NW MS 5230, Washington D.C., 20240

The department's ADA Coordinator can be reached via telephone at the following numbers:

- (VOICE) 907-465-6077
- (Statewide Telecommunication Device for the Deaf) 1-800-478-3648
- (Juneau TDD) 907-465-3646, or (FAX) 907-465-6078

For information on alternative formats and questions on this publication, please contact:

ADF&G, Division of Wildlife Conservation, Lands and Refuges Program. 333 Raspberry Road, Anchorage, AK 99518-1565. email dfg.dwc.publications@alaska.gov; phone (907) 267-2257.

Cover Photo: Brown bear (*Ursus arctos*) at McNeil River falls, McNeil River State Game Sanctuary. Photo ©2013 ADF&G, by Thomas Griffin.

Table of Contents

List of Figures.....	ii
List of Tables	ii
List of Appendices.....	ii
Executive Summary	iii
Introduction.....	1
Wildlife.....	2
Brown Bear Monitoring Program	2
Index Counts	2
Individual Counts.....	3
Bear Use Days.....	5
Sex and Age Composition.....	6
Bear Photo Identification Project.....	9
Other Areas	9
Kamishak River Drainage	9
Chenik Creek.....	9
Other Wildlife	10
General Observations.....	10
Hunting and Trapping	12
Brown Bear	12
Other species.....	13
Fisheries	15
Commercial Fisheries	15
McNeil River Drainage.....	15
Mikfik Creek/Lake System	18
Chenik Creek/Lake System.....	18
Sport Fishing.....	18
McNeil Lagoon	18
Kamishak River	18
Fisheries Enhancement	19
Paint River Fish Ladder	19
Public Use and Land Management.....	21
McNeil River falls/Mikfik Creek.....	21
Kamishak River	22
Chenik Area	23
Bear-Human Conflicts	23
Land Use Permitting	23
Fish and Wildlife Research	25
Mikfik Creek Video Research	25
McNeil River Brown Bear & Chum Salmon Research	26
Sanctuary Administration and Management	27
Staffing.....	27
Volunteers	27
Facilities.....	27
Acknowledgments	29
Literature Cited	29

List of Figures

Figure 1. Location of the McNeil River State Game Sanctuary and Refuge in southwest Alaska.....	1
Figure 2. Historic Index counts of brown bears at McNeil River falls, McNeil River SGS, 1983–2013....	4
Figure 3. Bear Use Days at McNeil River falls, McNeil River SGS, Alaska, 1980–2013.....	5
Figure 4. Average annual proportion of adult male and adult female bears observed at McNeil River SGS, Alaska, 1984 – 2013.....	7
Figure 5. Average annual number of maternal females and subadult (both sexes) observed at McNeil River falls, McNeil River SGS, Alaska, 1976–2013.....	7
Figure 6. USFS & Alaska DNR mapping of alder defoliation within MRS GS / SGR.....	11
Figure 7. Brown bear harvest from McNeil River SGS and SGR area, 1980–2011.....	14
Figure 8. McNeil River chum salmon escapement 1976–2013, McNeil River SGS, Alaska.....	17
Figure 9. New campground outhouses, McNeil River SGS.....	28

List of Tables

Table 1. Daily highs of systematic hourly index counts of brown bears at McNeil River falls, McNeil River SGS, Alaska, 1993-2013.....	4
Table 2. Composition of brown bears observed at McNeil River SGS, Alaska, 1976-2013.....	8
Table 3. Reported harvests of selected big game and furbearer species within and around McNeil River SGS / SGR, 2000 - 2013.....	14
Table 4. Aerial escapement estimates of salmon in the Mikfik Lake and McNeil River drainages, McNeil River SGS, Alaska, 2013.....	17
Table 5. Visitor Use and Sportfish harvest reported from Kamishak River Drainages, McNeil River SGS, Alaska, 2013.....	19
Table 6. Visitor Use at McNeil River SGS / SGR, Alaska, 1984-2013.....	24

List of Appendices

Appendix A. 2013 Daily Wildlife Observations, McNeil River State Game Sanctuary.....	30
--	----

Executive Summary

The McNeil River State Game Sanctuary (MRS GS) and McNeil River State Game Refuge (MRS GR) were created by the Alaska State Legislature in 1967 and 1991, respectively. The sanctuary was established primarily to provide permanent protection for brown bears and other fish and wildlife populations and their habitats and to maintain and enhance the unique bear-viewing opportunities within the sanctuary. The refuge was established for similar reasons and human use in the refuge is managed to maintain and enhance the bear-viewing opportunities within the adjoining sanctuary.

The sanctuary supports the largest gathering of brown bears in the world as they congregate to feed on migrating salmon. The Alaska Department of Fish and Game (ADF&G) operates a world-renowned bear-viewing program in the sanctuary at McNeil River and nearby Mikfik Creek. This report provides a summary of the status of brown bears and other fish and wildlife resources within the sanctuary and refuge, the effects of fishing and fishery enhancement activities on these resources, land status and management issues, and known public use.

Bear viewing remained good in 2013 as indicated by all three data indices. Bear index count numbers at McNeil River falls, the primary bear gathering and viewing location, averaged 49.9 bears, lower than the 2012 average (53.9) and 2011 average (60.9) yet above the benchmark average of 48.6 bears. Staff observed 95 individual bears this season at MRS GS; expending approximately 1,338 bear use days within the sanctuary. The long-term (1976–2013) average number of individual bears annually identified is 94 and the median number of individual bears annually identified (1976–2013) is 95.

The bear-viewing program at MRS GS attracted 934 applicants from 13 different countries, who vied for 185 regular permits and 57 standby permits issued through a lottery. Sixty eight percent of applicants were Alaska residents and thirty two percent were nonresidents. The 189 Guided, Standby, and Special Access Permits purchased were distributed to 68% Alaska residents and 32% nonresidents. The 156 participants in bear viewing during the 2013 season came from seven countries, including Canada, France, Germany, Japan, Spain, Switzerland and the United States. The MRS GS bear viewing permit program generated approximately \$62,025 in 2013 that was deposited into the state's Fish and Game Fund.

The 2013 cumulative McNeil River chum salmon aerial survey escapement index was estimated at 9,498 fish. The 2013 run timing of McNeil River chum salmon was somewhat earlier than previous years. ADF&G Division of Commercial Fisheries (CF), continued working on a remote video project designed to estimate bear predation on chum salmon at McNeil River falls. CF staff also worked collecting baseline genetic samples from wild pink, coho and chum salmon stocks in McNeil River and nearby streams (e.g., Kamishak River, Amakdedori Creek).

A total of ten ADF&G Special Area Permits and sixteen Commercial Access Permits were issued during 2013. These included permits issued to commercial operators for their guide operations in the Kamishak River and Chenik Creek areas; commercial access to McNeil River camp; renewals issued for the Paint River Fish ladder and for ADF&G DCF management & research projects. There were no mineral resource developments or activities permitted or reported to the Department within the McNeil River SGS or SGR during 2013.

During 2013, CIAA conducted some minor maintenance and opened the Paint River fish ladder to allow water flow for evaluation purposes and potential salmon colonization between June 24 and September 4.

Introduction

McNeil River, located in southwestern Alaska (Figure 1) supports the world's largest congregation of brown bears. The Alaska State Legislature established the McNeil River State Game Sanctuary in 1967 to: (1) provide permanent protection for brown bears and other fish and wildlife populations and their habitats so that these resources may be preserved for scientific, aesthetic, and educational purposes; (2) manage human use and activities in a way that is compatible with the permanent protection of brown bears and other purposes described in (1) and to maintain and enhance the unique bear-viewing opportunities within the sanctuary; and (3) provide opportunities that are compatible with (1) for wildlife viewing, fisheries enhancement, fishing, temporary safe anchorage, and other activities (AS 16.20.162(a)). Hunting, trapping and mineral entry are prohibited in the sanctuary.

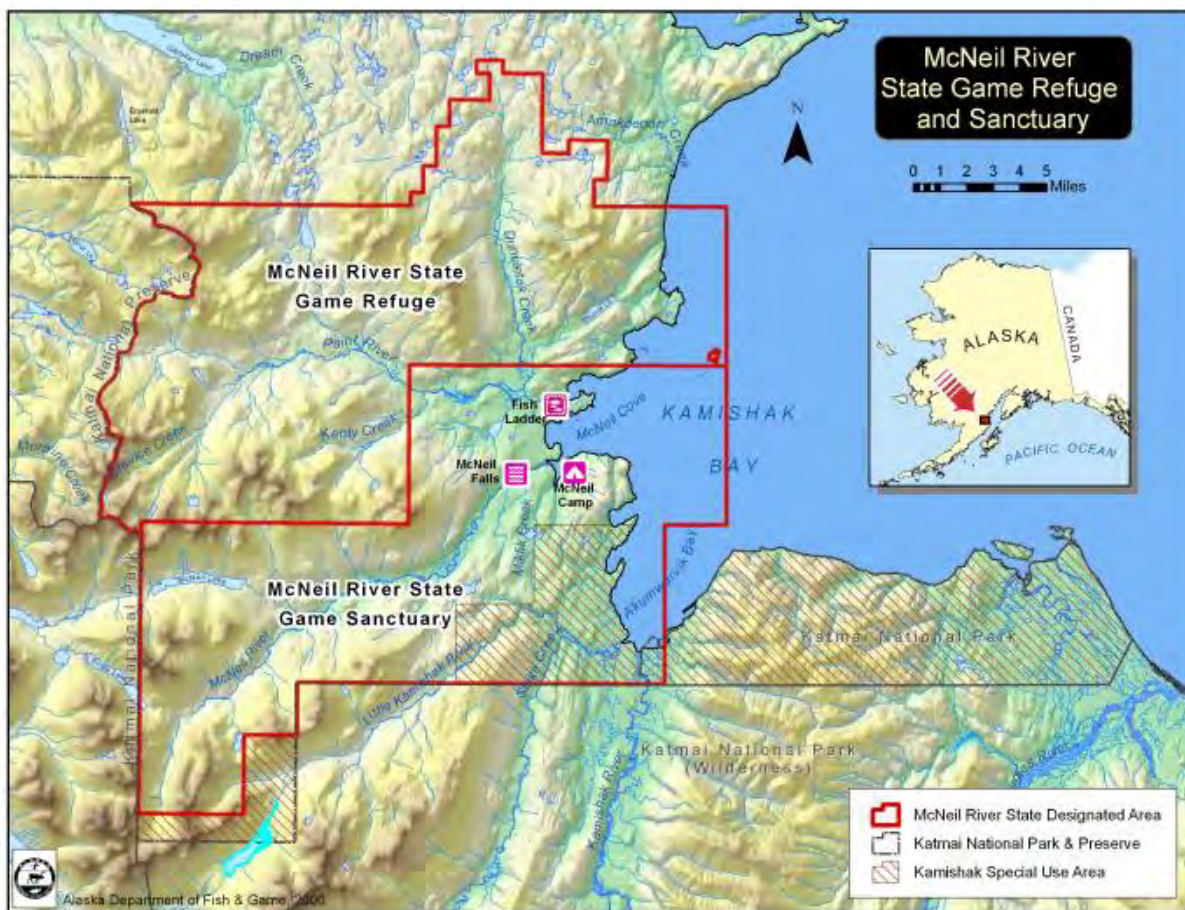


Figure 1. Location of the McNeil River State Game Sanctuary and Refuge in southwest Alaska.

The sanctuary was expanded and the adjoining McNeil River State Game Refuge was created in 1991; however, implementation of this legislation was delayed until January 1993 when the Commissioner of the Department of Fish and Game (the Department) certified the newly constructed Paint River fish ladder as operational. The refuge was created for purposes similar to

those of the sanctuary; however, hunting and trapping are allowed to continue in the refuge at the discretion of the Alaska Board of Game (BOG) (AS 16.20.041). Additionally, human use in the refuge is managed to maintain and enhance the unique bear-viewing opportunities within the adjoining sanctuary and mineral entry in the refuge is permitted.

This report provides a summary of the status of brown bears and other fish and wildlife resources within the sanctuary and refuge, the effects of hunting, fishing, trapping, fishery enhancement activities and resource development on these resources; and public use and management issues. A condensed version of this report is submitted annually to the Alaska State Legislature by the Commissioner of the Department as required by the sanctuary and refuge enabling legislation (AS 16.20.041(f) and AS 16.20.162(f), respectively).

Wildlife

Brown Bear Monitoring Program

The McNeil River SGS & SGR encompass approximately 388 square miles. The Department does not conduct bear surveys or have bear use data on the entirety of the sanctuary or refuge. The majority of the brown bear monitoring and use data is connected with the bear viewing program centered at McNeil River falls, Lower McNeil River and Mikfik Creek area. Some additional information is provided through self-reporting by commercial sportfish and bear viewing guide services that operate within McNeil River SGS & SGR. Monitoring and reporting statistics and subsequent management decisions are based on the data gathered as part of the McNeil River bear viewing program at McNeil River falls / Mikfik Creek area.

The number of bears at McNeil River falls fluctuates daily and annually. Variability in bear use may be influenced by several factors including: food availability, the strength and timing of salmon runs in McNeil River and surrounding river systems, changes in the regional bear population, as well as hunting and other human-caused mortalities. A public advisory committee assisted the Department with the development of the sanctuary and refuge operational management plans in 1993. It was concluded that managers needed a consistent and reliable method for monitoring the fluctuations in the number of bears at McNeil River falls. This information allows for the proper management of the sanctuary in accordance with its legislative purposes. The Department uses three different methods to monitor bear use at MRS GS: *index counts* (the average of the seven highest hourly counts each season at McNeil River falls), *individual counts* (the minimum number of individual bears observed during the season), and *bear use days* (the sum of the number of days each individual bear was present).

INDEX COUNTS

The index count monitoring program involves counting all bears in view from the viewing pad at McNeil River falls once each hour between 11:00 a.m. and 7:00 p.m.; July 15 through August 5. Historically these index counts have only been done at the falls viewing pad July 15 through August 5. Since 2011, staff have implemented these hourly counts throughout the bear viewing day at all locations for the entire season in order to gather additional data on bear use and the

quality of the bear viewing at locations in addition to the McNeil River falls viewing pad. For consistency with historical data these data are generally only analyzed for the period July 15 through August 5. The number of hourly counts that occur from year to year is variable due to the changing and opportunistic nature of the daily bear-viewing schedule. In order to obtain an index, the average of the seven highest hourly counts is calculated and that is weighed against a Bear Threshold Criterion (BTC). The annual medians of the seven highest daily counts of bears at the falls from 1983 to 1992 were averaged to establish a standard of 48.6 bears as the benchmark for maintaining bear numbers and the quality viewing opportunities in the sanctuary. The BTC (40.8 bears) represents the lower limit of these medians and represents a statistically significant lower level in the observed number of bears. This index monitoring program allows the department to detect large, short-term declines or gradual, long-term declines in the average number of independent bears at McNeil River falls. A decline below this BTC may be indicative of adverse impacts to the purposes for which the sanctuary was established and would initiate an assessment of the possible causes.

In 2013 the average of the seven highest hourly counts was 49.9 bears; above the benchmark average of 48.6 bears. As noted above, historically these highest counts are derived from data collected between July 15th and August 5th, however, during 2013 three of the highest counts occurred outside this typical window (July 12, 13 and 14) and were used in the resulting index. Bear index count numbers during 2013 continued a slight downward trend from the higher numbers experienced in 2010 and 2011; but still well above those seen in the previous decade. All seven of the highest hourly counts for 2013 are above the lower BTC limit (40.8 bears) and five of the seven hourly counts are above the benchmark average (48.6 bears). The 2013 average of 49.9 was lower than the 2010 average (59.9), the 2011 average (60.9) and the 2012 average (53.9); however these past four years were some of the highest averages recorded since 1998. Between 1993 and 2013 the highest and lowest averages of the seven highest hourly counts were 61 (2011) and 22 (2005), respectively. From 1998 to 2005, there was a relatively steady decline in the average of the seven highest hourly counts. From 2005 to 2013, there has been an increase in the average of the seven highest hourly counts. Hourly Index counts for 2013 are presented in Table 1. Index numbers (medians pre-1995 and means post-1995; of the seven highest hourly counts) for 1983 – 2013 are presented in Figure 2.

INDIVIDUAL COUNTS

A second method of monitoring bear use and the quality of the bear-viewing program at the MRS GS is by tallying the number of individually identifiable bears (adults, subadults, & cubs) observed by sanctuary staff daily and throughout the season (Table 2). Using unique identifying characteristics such as sex, age, size and shape, maternal status, claw color, scars, coat color, and behavior, a record of individually identifiable bears visiting the sanctuary has been documented every year since 1976 (38 years). Only individual bears that are known or recorded a minimum of three times are included in this count. Hence, this method provides an intrinsically conservative estimate. This monitoring method records the presence of an individual bear within MRS GS, if observed during viewing, on a daily basis. While it does not provide the true count of all bears present at MRS GS, it does provide an additional index in evaluating the overall bear use and the quality of the bear-viewing program.

Table 1. Daily highs of systematic hourly index counts of brown bears at McNeil River falls, McNeil River SGS, Alaska, 1993–2013.

Date	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	*2012	**2013
July 15	-	-	-	38	40	47	28	37	25	30	42	24	23	31	31	25	41	54	50	48	57
16	-	-	-	46	32	42	28	31	39	26	31	31	22	31	35	32	34	60	54	50	39
17	-	-	-	29	47	46	35	31	41	32	36	22	23	31	37	29	35	53	42	63	44
18	37	30	29	44	43	47	26	32	40	33	40	23	21	30	37	39	34	54	61	66	51
19	58	50	33	54	66	57	36	36	35	35	40	28	20	33	32	41	39	69	74	62	49
20	55	37	40	40	52	32	37	23	37	26	38	27	24	37	42	46	40	54	62	43	39
21	46	43	28	47	50	10	35	28	40	40	30	21	13	21	40	40	21	70	65	35	42
22	54	26	48	49	44	18	38	37	32	25	37	22	16	26	36	42	10	54	60	24	39
23	49	43	29	47	63	35	42	36	30	41	27	17	18	31	30	42	14	50	47	32	34
24	30	52	31	33	52	43	32	36	42	32	20	20	13	25	21	40	25	32	37	21	45
25	18	18	39	40	51	46	29	36	33	30	25	11	2	27	29	53	40	21	39	26	32
26	28	37	30	31	54	63	35	32	24	30	21	7	8	25	36	51	21	41	38	31	33
27	34	44	39	37	49	50	31	23	29	22	24	6	7	31	33	34	30	58	26	20	24
28	24	33	28	33	27	51	37	23	23	34	17	12	8	27	33	38	32	49	43	26	15
29	28	32	12	21	30	48	36	24	20	36	14	9	6	25	29	42	33	44	45	25	11
30	21	25	32	29	27	39	41	28	15	31	16	10	8	20	17	33	29	35	38	18	10
31	19	20	35	26	15	34	42	19	11	33	-	14	7	20	22	42	18	31	24	19	7
August 1	13	16	23	22	17	35	42	15	7	25	-	9	-	14	15	30	14	23	22	14	3
2	7	16	16	18	24	31	29	20	5	21	-	12	-	11	14	18	10	28	11	10	3
3	-	-	-	18	21	23	27	25	3	19	-	10	-	10	16	19	8	19	7	9	5
4	-	-	-	11	11	12	16	14	3	11	-	4	-	10	16	19	-	12	5	10	3
5	-	-	-	10	-	18	23	4	1	9	-	7	-	6	6	20	9	19	9	11	-
Average of 7 high days	48	44	38	47	55	52	40	36	39	36	38	25	22	32	38	45	38	60	61	54	50

* 2012 = One of the 7 highest hourly counts was prior to July 15- August 5, 45 Bears o(7/10/12).

** 2013 = Three of the 7 highest hourly counts were prior to July 15-August 5; 49 Bears (7/12/13), 50 Bears (7/13/13) and 48 Bears (7/14/13).

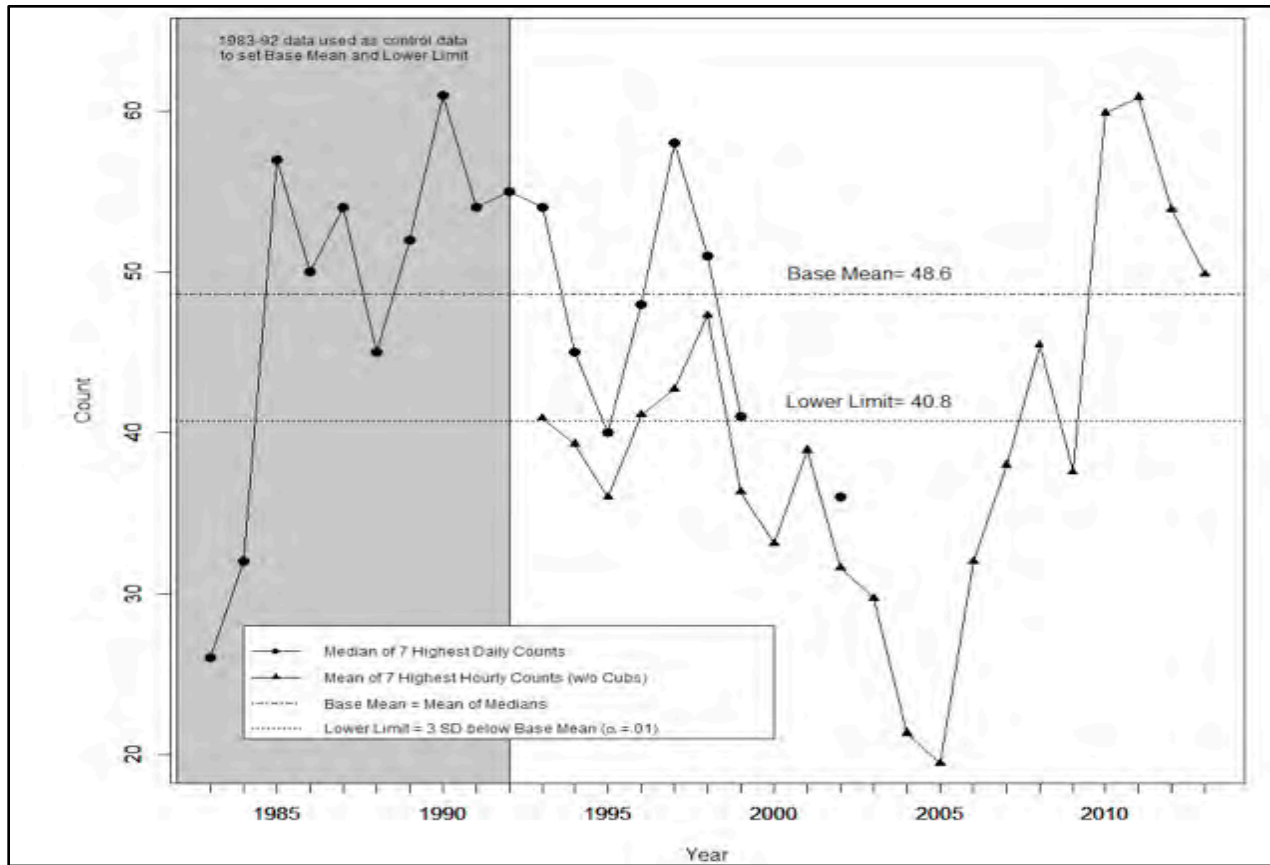


Figure 2. Historic Index counts (annual mean of seven highest systematic daily counts) brown bears at McNeil River falls, McNeil River SGS, Alaska, 1983–2013 ($\alpha = 0.01$).

There were 95 individual bears identified at MRS GS during the 2013 season. This is lower than the 105–103 individual bears recorded during 2010–2012; but remains higher than lower numbers observed during the previous decade and consistent with the long-term (1976 to 2013) average of 94 bears. Since 1976 the lowest count was 58 (1976) and the highest count was 144 (1997).

BEAR USE DAYS

The quality of the bear viewing experience is not just a matter of the number of bears that visit the area in a season, but also the number viewed on a daily basis and how many days the bears stay in the Sanctuary. By summing the individual adult and subadult bears observed daily throughout the season an index of the number of bear use days is calculated. While these counts include bears within all viewing areas within McNeil River SGS, only data from McNeil River falls, June 15 through August 25, is used for the index and historical comparison (Figure 3). One bear or family group at McNeil River falls seen during a day is counted as one Bear Use Day. This monitoring method may be less reliable than the index counts discussed above due to variability of bear identification among sanctuary staff and the variable timing of the counts. However, it can be used to further the interpretation of these other monitoring methods and it generally follows the same trends as the other methods. Bear Use Days are useful because they track how many days per season individual bears use the sanctuary. This data has been recorded since 1980, but no data were recorded in 1999, 2000, or 2001.

While index and individual counts were about average; the number of bear use days was above average. There were 1,338 Bear Use Days at McNeil River falls in 2013, which is above both the long-term average (1980 to 2013) of 1,220 and the more recent 10-year average of 1,060. The lowest count was 709 Bear Use Days in 1980 (first year this data collected) and the highest count was 1,863 in 1989.



Figure 3. Bear Use Days at McNeil River falls, McNeil River SGS, Alaska, 1980–2013. Annual summation of individual adult and subadult bears observed at McNeil River falls during each bear-viewing day June 15 through August 25.

SEX AND AGE COMPOSITION

Changes in the sex and age composition of a wildlife population can be indicative of other changes in the species' habitat and environment. The sex and age ratios of adult bears using McNeil River and Mikfik Creek have changed in the last several years (Figures 4 and 5; Table 2). While males have typically outnumbered females, this difference has become more pronounced in the last 20 years. The percentage of male bears observed throughout the season has steadily increased from the 1984–1988 (5-year) average of 53% to the 2009–2013 (5-year) average of 70%.

There were 4 maternal females and 8 cubs observed within the viewing areas during 2013 (Table 2). It is noteworthy that the 5-year averages (Figure 4); starting from 1994–1998 and going through 2009–2013, exhibit an overall decline in maternal females in the past several decades. The number of subadult bears observed in 2013 was 1. In looking at the data, it can be observed that the average number of subadults declined steadily from the 1984–1988 (5-year) average of 14 to the 1999–2003 (5-year) average of 6, and then increased slightly for the 2004–2008 (5-year) average of 9 and declined to the 2009–2013 (5-year) average to 6 bears (Figure 5).

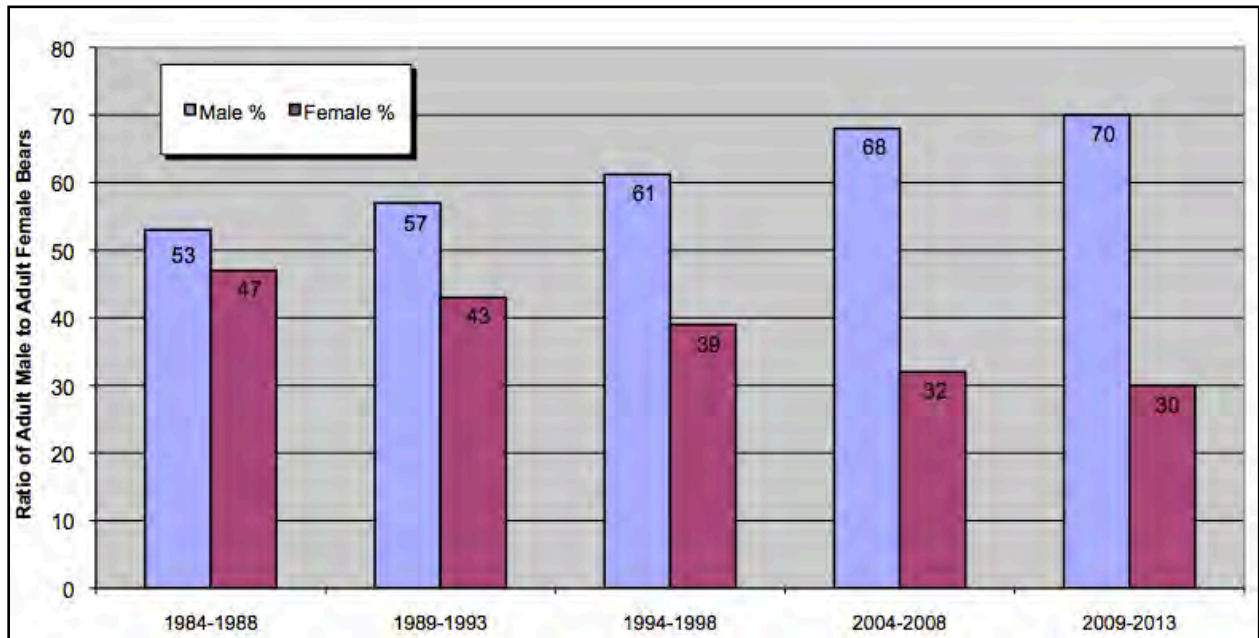


Figure 4. Average annual proportion of adult male and adult female bears observed at McNeil River SGS, Alaska, 1984 – 2013.

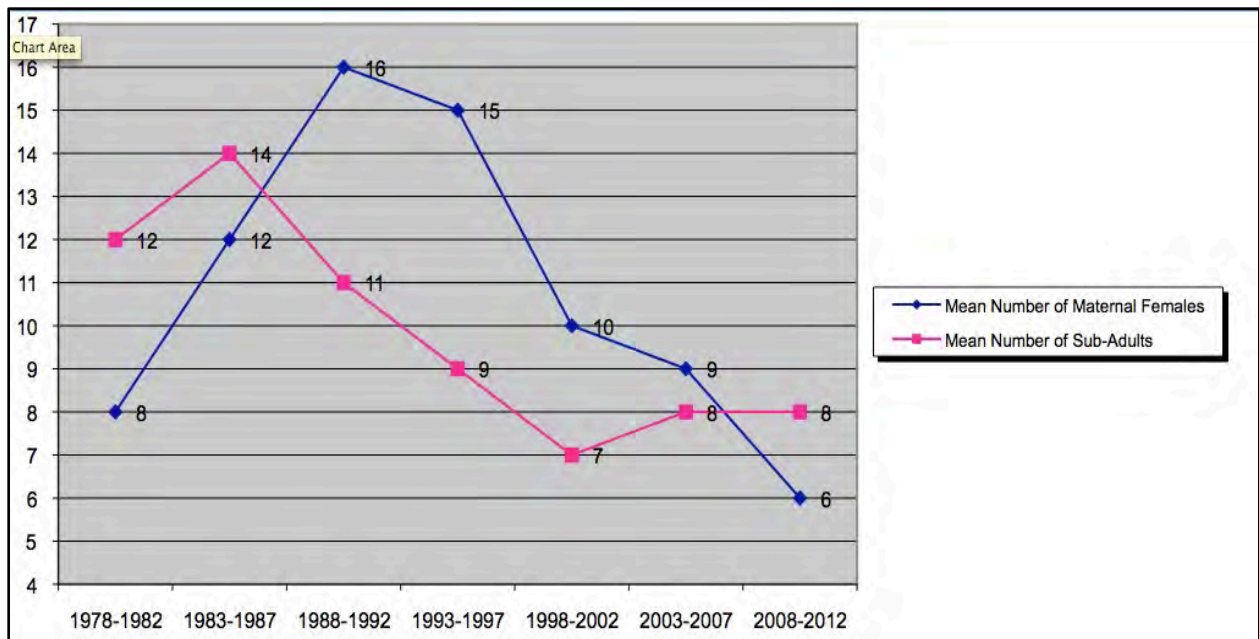


Figure 5. Average annual number of maternal females and subadult (both sexes) observed at McNeil River falls, McNeil River SGS, Alaska, 1976–2013.

Table 2. Composition of brown bears observed at McNeil River SGS, Alaska, 1976–2013.

Year	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Females w/cubs	9	10	8	9	6	8	7	7	9	16	14	14	14	19	16	15	16	11	11	14	20	19	15	11	7	5	10	12	7	10	8	9	10	5	7	5	2	4
Single Adult Females	5	8	6	8	8	10	9	15	16	12	11	13	13	14	16	12	19	19	15	12	14	19	19	<u>14</u>	<u>14</u>	12	8	16	12	13	14	7	9	16	20	22	24	16
Single Adult Males	16	18	18	19	23	26	20	22	22	27	31	34	34	42	37	41	39	48	45	49	46	55	54	<u>48</u>	<u>48</u>	53	45	45	39	41	40	46	45	40	56	56	65	66
Adult Sex Unknown	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<u>0</u>	<u>0</u>	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Adults	31	36	32	36	38	44	36	44	47	55	56	61	61	75	69	68	74	78	71	75	80	93	88	<u>73</u>	<u>69</u>	70	63	73	58	64	62	62	64	61	83	83	91	86
Sub-Adult Females	4	3	4	2	6	9	11	9	8	2	7	7	9	4	5	6	6	8	9	3	6	5	6	<u>4</u>	<u>4</u>	4	4	2	4	2	6	2	2	2	3	2	4	0
Sub-Adult Males	0	5	4	0	0	1	1	4	5	10	7	8	8	5	5	4	2	4	3	5	1	3	3	<u>2</u>	<u>2</u>	2	2	2	1	3	8	5	1	1	1	2	2	0
Sub-Adult Sex Unknown	3	4	5	3	4	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<u>0</u>	<u>0</u>	0	0	0	0	0	7	6	1	4	6	2	1	
Total Sub-Adults (1)	7	12	13	5	10	15	15	14	13	12	14	15	17	9	10	10	8	12	12	8	7	8	9	<u>6</u>	<u>6</u>	6	6	4	5	5	14	14	9	4	8	10	8	1
Total Adults & Sub-Adults (2)	38	48	45	41	48	59	51	58	60	67	70	76	78	84	79	78	82	90	83	83	87	101	97	<u>79</u>	<u>75</u>	76	69	77	63	69	76	76	73	65	91	93	99	87
Total Cubs	20	21	20	17	12	14	16	12	17	28	26	30	31	42	34	30	31	24	22	25	35	43	31	20	15	11	21	26	15	18	15	17	16	8	14	11	4	8
Total Bears	58	69	65	58	60	73	67	70	77	95	96	106	109	126	113	108	113	114	105	108	122	144	128	<u>99</u>	<u>90</u>	87	90	103	78	87	91	93	89	73	105	104	103	95
<p>Notes: (1) Defined as 5.5 years old and younger from 1977 through the present.</p> <p>(2) Only the bears that are recognizable as individuals (Known Bears). In addition bears that are recognizable but seen less than three times and not regular users of Mikfik Creek, McNeil River or McNeil Cove are not included. Hence these figures represent the minimum number of bears present at the sanctuary.</p> <p><u>Underlined Bold Numbers</u> represent average of data four years prior and after (No data was recorded in 1999 & 2000).</p>																																						

BEAR PHOTO IDENTIFICATION PROJECT

Sanctuary staff continued the task of photo documenting identifiable bears observed at McNeil. Digital images of individual bears and their defining characteristics were collected using a Canon 30D SLR camera with a Canon 100–400mm zoom lens. This photo identification project was initiated in 2007 and is intended to be a long term project that will assist McNeil staff in the following ways: expedite and enhance the process of bear identification; improve communication between staff members; enhance the process of tabulating the number of individual bears; enhance the process of tracking the history of individual bears; assist in sharing information and tracking the movements of individuals; assist in the identification of male and female characteristics; and, provide basic life history information.

OTHER AREAS

The Department currently does not conduct bear surveys or monitoring in other areas of the McNeil River State Game Sanctuary or Refuge. Some information is available through opportunistic surveys and commercial guide reporting from the Chenik Lagoon area and from the Kamishak River and Little Kamishak / Strike Creek areas.

Kamishak River Drainage

The lower stretches of the Kamishak River, Little Kamishak River, and Strike Creek are within the McNeil River State Game Sanctuary. Bears fish these waters, graze in the Kamishak sedge flats, and dig clams in the Kamishak River mud flats. The Department does not conduct bear surveys in these drainages. However, commercial sportfishing guide services operate in the area from approximately early July to mid-September and brown bears are typically observed on a daily basis. Based on reporting by the five guide services operating in 2013 the average number of bears seen per day on the Kamishak River from 7/16/13 through 9/11/13 was 4.5.

Chenik Creek

The Department does not conduct bear surveys in the Chenik Creek area; however two local Homer guides did view bears in the lower Chenik Creek/Chenik Lagoon area in 2013. One bear-viewing guide reported that he observed up to 10 individual bears July 7 – 15, 2013 with the following composition: one maternal female with one blond yearling cub, four or five subadults, one adult female and two large adult males. Another longtime retired guide was bear-viewing in the Chenik Creek area and reported viewing up to 12 individual bears during his visit. He commented that he saw one maternal female with a single yearling.

The Assistant Area Biologist from Homer received a report of a brown bear carcass in the Chenik Creek area by fisherman between 8 July – 10 July. The bear viewing guide operating at Chenik also confirmed this with observations a bear carcass close to Chenik falls from 7 July through 15 July. The bear appeared to be a smaller subadult.

Other Wildlife

GENERAL OBSERVATIONS

During the 2013 season Sanctuary staff recorded general wildlife observations, including birds, terrestrial mammals, and marine mammals opportunistically. Daily observations are summarized in Appendix B.

There were many bird sightings and identifications over the course of the 2013 season. Some were species that are regularly seen in the MRS GS, including Wilson's Snipe, Golden-crowned Sparrows, Savannah Sparrows, Fox Sparrows, Wilson's Warblers, American Robins, Hermit Thrush, Tree Swallows, Common Redpoll, Glaucous-winged Gulls, Mew Gulls, Brant, Green-winged Teal, Common Ravens, Red-breasted Mergansers, Greater Yellowlegs, Northern Pintails, Black-billed Magpies, Northern Harriers and Bald Eagles. Less frequently seen birds were also observed, including an Arctic Tern, a Black Turnstone, Black Scoters, a Sandhill Crane, an Orange-crowned Warbler, Tundra Swans, Bank Swallows, Short-eared Owls, Double-crested Cormorants, Peregrine Falcons, Gadwall and a Greater White-fronted Goose. Willow Ptarmigan were again observed on the McNeil River trail, and Pigeon Guillemots and Harlequin Ducks were observed from McNeil Head. A single Osprey was observed flying over the Mikfik Creek riffles area on May 31st.

Marine mammal sightings during the 2013 season were limited exclusively to Pacific Harbor Seals. These Harbor Seals are generally seen at high tide throughout the season in McNeil River lagoon, McNeil Cove, and the lower tidal areas of McNeil River and Mikfik Creek.

As for terrestrial mammals, a Gray Wolf (*Canis lupus*) was observed in the lagoon in June using a spotting scope. Also, several Arctic Ground Squirrels (*Spermophilus parryii*), a Hoary Marmot (*Marmota caligata*) and a family of Red Fox (*Vulpes vulpes*) with four kits were observed in and around camp. Moose (*Alces alces*) and a Beaver (*Castor canadensis*) were observed in June from the Mikfik area.

For the past two seasons, it has been noted by staff that some of the vegetation surrounding camp and on the adjacent hillsides was not greening up and instead appeared partially to wholly defoliated. This became more noticeable over time. After some investigation this was attributed to limited foliage on the Sitka alders and willows.

Staff contacted forest pathologist Robin Mulvey and entomologist Dr. James Kruse of the US Forest Service in 2012 and 2013 to discuss the potential causes of the defoliation. There are a multitude of hardwood defoliators in Alaska, including a variety of geometrid, tortricid and sawfly larvae with diverse hardwood hosts; as well as other agents such as Alder canker, caused by the native fungus *Valsa melandiscus*. Over the last 3–4 years USFS Forest Health Protection (FHP) and cooperators have documented a regional outbreak of undulated autumnal moth (*Epirrita undulata*) and Bruce spanworm (*Operophtera bruceata*) larvae in Southcentral and Southeast Alaska, including the general area of McNeil River, through aerial and ground surveys. These feed on alder, dwarf birch, some willow species, and other shrub species. According to the USFS this outbreak is nearing its end.

In 2013, McNeil staff collected caterpillar samples from several alders and forwarded them to Dr. Kruse for identification. These specimens were reared to determine species and all specimens taken were determined to be Birch Leaf Roller (*Epinotia solandriana*). According to Dr. Kruse these are commonly found on Alder, and also feed on Willow, Dwarf Birch, Aspen and Cottonwood. USFS FHP and DNR Division of Forestry Aerial Detection Surveys during 2013 mapped nearly 331,000 acres of Birch Leaf Roller defoliation, mostly in Southcentral and Southwest Alaska. The last outbreak of Birch Leaf Roller was in 2003, and the current upsurge may be the largest outbreak mapped to date. 7,500 acres of the current outbreak was in the area of the McNeil River SGS/SGR area (Illiamna quadrangle). Surveys also identified 65,400 acres of alder defoliation, 6600 acres willow defoliation, and 650 acres of alder canker in the area. 21,322 acres of alder defoliation were mapped within the McNeil River SGS / SGR (Figure 6).

Outbreaks commonly persist for 3 – 5 years and defoliated plants can generally recover after a few consecutive years of defoliations; however, mortality of stems causes longer-term damage to the host. McNeil staff will continue observations during the 2014 season.

As detailed below within the Mikfik Creek Video Research section, Commercial Fisheries Division staff recorded 1,421 hours of video connected with the video monitoring of sockeye salmon escapement into Mikfik Lake. In addition to the escapement data, reviewers documented wildlife transiting the cameras view including: brown bear, moose, eagles, beavers, red fox, various waterfowl, and river otters. Brown bears transited the field of view of the camera in 32 instances. This count is lower than past years, likely due to 500 hours of video down time that occurred in late-June/early-July. Bear observations were fairly evenly spread throughout the season, with a slight increase in late-July and early-August.

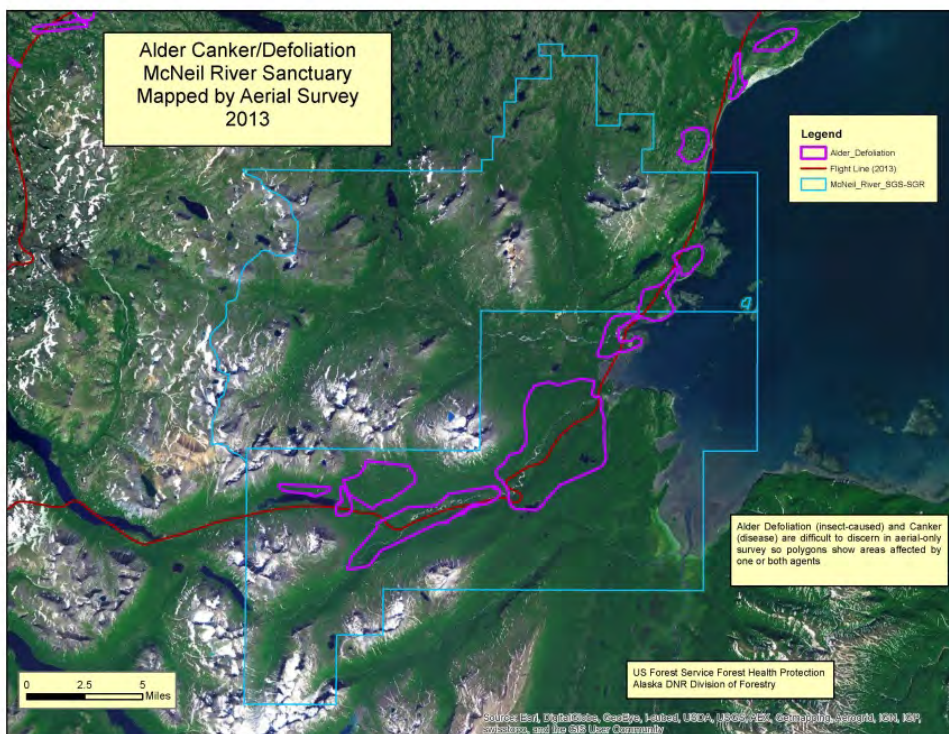


Figure 6. USFS & Alaska DNR mapping of alder defoliation within MRSGS / SGR.

Hunting and Trapping

The MRSGS is closed to hunting and trapping by Alaska state statute (AS 16.20.162(b)), and the MRSGR, while open to hunting and trapping of other species, has been closed to brown bear hunting by the Alaska Board of Game since July 1996. The approximately 388 square miles that comprise the MRSGS and MRSGR are part of a much larger area of approximately 5,585 square miles in which brown bears are protected from hunting. The larger area includes Katmai National Park lands and state-owned lands south of the sanctuary (including the Kamishak Special Use Area, managed by the Alaska Department of Natural Resources) that are closed to brown bear hunting; the national park by federal regulations and the state-owned lands by Board of Game action.

Reported harvest data from units within and surrounding the MRSGS / SGR complex for the period 2000 – 2012 are summarized in Table 3. Data for 2013 are still being gathered.

BROWN BEAR

Brown bear hunting, as well as hunting and trapping for others species are open on lands within harvest units north and west of MRSGS and MRSGR. During alternate regulatory years brown bear hunts are open during the fall of odd-numbered years and the spring of even-numbered years. Historic levels of reported bear harvests from areas surrounding McNeil Sanctuary and Refuge are presented in Figure 7 and Table 3. The area represented includes 2,100 mi² currently open to hunting.

The long-term average harvest from areas surrounding McNeil River SGS (outside the sanctuary) during the period from regulatory year (RY) 1980 through RY 2010 (e.g., RY80 = 1 July 1980–30 June 1981) is 78 brown bears every two years (39 bears annually). The tallies for the 2012 and 2013 regulatory years have not yet been completed. Average two-year harvest by decade was 62 in the 1980s, 77 in the 1990s and 94 in the 2000s. The harvests in the recent past were 102 (2004–2005), 93 (2006–2007), 73 (2008–2009) and 80 (2010–2011). Though brown bear harvests have increased since the early 80s, bear densities on the Alaska Peninsula have also increased. The lack of historic population data and information about hunting effort make it difficult to compare rates at which the population has been harvested. However, current harvest rates are sustainable based on recent population surveys and harvest indices.

Many brown bears have large home ranges, which include the protected lands and lands open to hunting to the west and north of the sanctuary and refuge. Historically, several bears marked at McNeil during early studies were later harvested by hunters in areas that were open to brown bear hunting. Other studies and staff observations also demonstrate that some bears using McNeil seasonally are vulnerable to harvest. Based on the available information, legal hunting of bears outside the sanctuary is not a significant factor affecting the regional bear population. The effects of these harvests on bear use at McNeil River are unknown; however, at this time these harvests do not appear to affect the number of bears using the McNeil River.

OTHER SPECIES

As noted above, the McNeil River State Game Refuge portion of the MRSGS/SGR complex is open for the legal harvest of species, other than brown bear, through hunting or trapping. Other furbearing or big game species that may be in the area include: black bear, caribou, moose, beaver, lynx, marten, otter, wolf, wolverine, coyote, red fox, mink, weasel, muskrat, ground squirrel, and marmot. However, the ADF&G only maintains harvest records on the first nine of these.

Harvest reporting and sealing records indicate that hunting and trapping for species other than perhaps moose in the MRSGR is almost nonexistent. A few moose are taken from the reporting unit that contains the MRSGR; however, this unit also includes lands outside of the refuge.

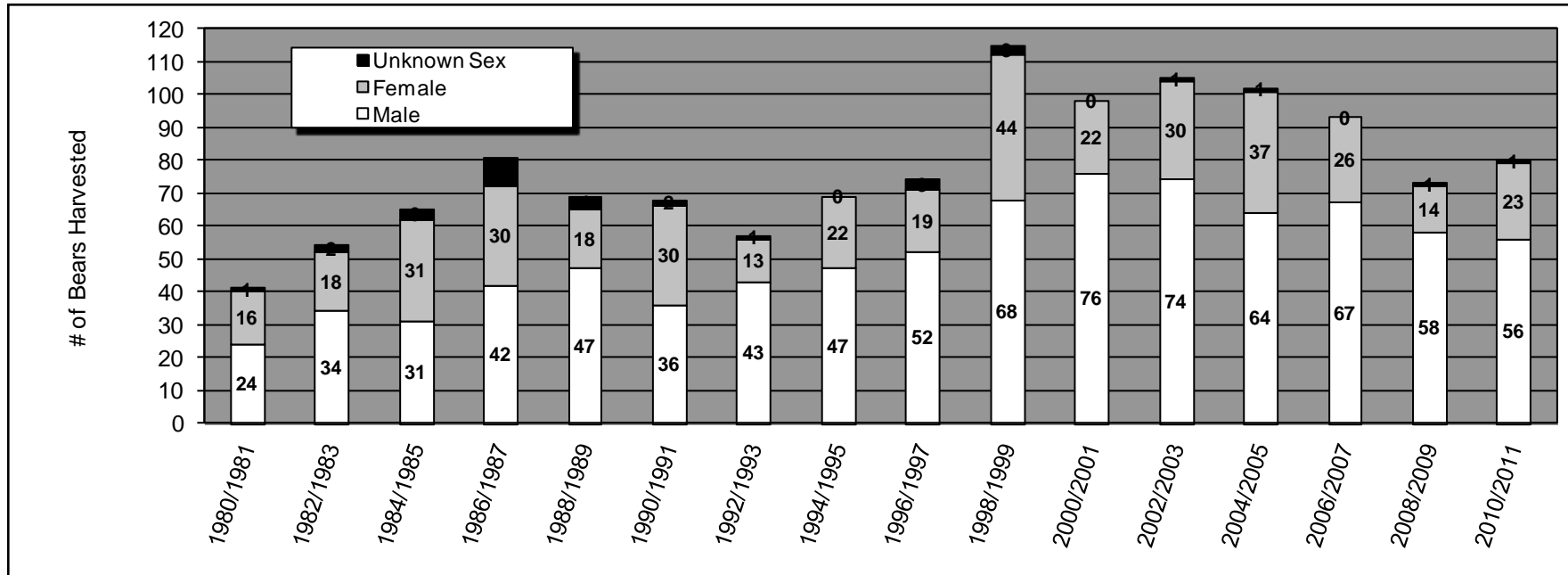


Figure 7. Brown bear harvest from areas surrounding the McNeil River SGS and SGR, Alaska, 1980–2011 (harvest from GMU/UCUs: 9A/201, 301, 401, 501; 9B/301; and 9C/101, 201,301, 601, 702, and 703). Two consecutive regulatory years* are lumped. This graph does not include harvest data for regulatory years 2012 and 2013 as the data is still being compiled.

Table 3. Reported harvests of selected big game and furbearer species within and around McNeil River SGS / SGR, 2000–2012.

YEAR	Brown Bear		Black Bear		Caribou		Moose		Beaver		Lynx		Marten		Otter		Wolf		Wolverine	
	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**	MRS/GS/R*	Adjacent Areas**
2000	6	98	0	0	0	114	0	16	0	12	0	1	0	0	0	0	0	3	0	1
2001			0	3	0	97	1	19	0	0	0	0	0	0	0	0	0	1	0	2
2002	6	105	0	1	0	39	3	18	0	0	0	0	0	1	0	0	0	1	0	4
2003			0	7	0	53	1	14	0	9	0	3	0	6	0	10	0	10	0	20
2004			0	1	0	33	2	15	0	0	0	0	0	0	0	2	0	1	0	2
2005	3	102	0	6	0	51	2	17	0	1	0	1	0	0	0	0	0	8	0	0
2006			0	2	0	25	0	10	0	0	0	4	0	2	0	1	0	2	0	7
2007	4	93	0	2	0	0	2	16	0	0	0	1	0	1	0	3	0	3	0	4
2008			0	1	0	5	0	18	0	4	0	3	0	0	0	0	0	4	0	2
2009	4	73	0	1	0	6	1	11	0	2	0	13	0	1	0	1	1	2	0	1
2010			0	1	0	0	0	6	0	13	0	27	0	0	0	8	0	2	0	2
2011	5	75	0	0	0	1	0	11	0	5	0	38	0	0	0	0	0	4	0	1
2012			0	0	0	0	1	6	0	0	0	27	0	0	0	0	0	5	0	4
2013	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Harvest numbers for McNeil River SGS & SGR are based on data from reporting areas that extend slightly outside of the McNeil River SGS/SGR complex. McNeil River SGS is closed to hunting & trapping and McNeil River SGR is closed to the hunting of brown bear.

** Harvest numbers for Surrounding Areas is inclusive of data from McNeil River SGS & SGR as the reporting areas include lands both within and outside of the McNeil River SGS/SGR complex. McNeil River SGS is closed to hunting & trapping and McNeil River SGR is closed to the hunting of brown bear.

Fisheries

The McNeil River SGS / SGR contain a number of river and stream systems that support both anadromous and resident fish populations. The Kamishak River drainages support all five species of Pacific salmon as well as Dolly Varden trout. The McNeil River drainage contains Dolly Varden trout (*Salvelinus malma*), chum salmon (*Onchorynchus keta*), some coho salmon (*O. kisutch*), pink salmon, and small numbers of Chinook salmon (*O. tshawytscha*). The Mikfik Creek / Lake drainage contains sockeye salmon (*O. nerka*) and Dolly Varden trout. Chenik Creek / Lake system supports sockeye salmon, some coho salmon, lake trout (*S. namaycush*) and Dolly Varden trout. The Paint River system contains rainbow trout (*O. mykiss*), Arctic grayling (*Thymallus arcticus*) and lake trout and has the potential for supporting a number of anadromous salmon species through fisheries enhancement. These fish resources contribute to annual sportfishing and commercial fishing effort and harvests within the Lower Kamishak district.

Commercial Fisheries

Periodic aerial surveys are flown to index the escapement of sockeye and chum salmon to Mikfik Creek and McNeil River, respectively. Remote video is also used to monitor the escapement of sockeye salmon into Mikfik Lake. In 2013, generally fair-poor stream conditions allowed for only marginally effective aerial surveys; conditions were so poor on the 17 July survey, typically the peak of the run, that survey results were not usable. No commercial fishing effort targeted sockeye salmon in McNeil River Subdistrict this season, and the subdistrict was closed for the duration of the chum run. Consequently, the entire Mikfik sockeye and McNeil chum salmon runs entered their respective freshwater drainages this season.

MCNEIL RIVER DRAINAGE

The 2013 cumulative McNeil River chum salmon aerial survey escapement index was estimated at 9,498 fish (Table 4, Figure 9). Chum salmon were consistently seen in low numbers above the falls during aerial observations from July 2nd through the last survey on July 26th. A peak daily aerial estimate of 552 chums upstream of McNeil River falls occurred on July 2nd. By comparison chum returns to some other Kamishak Bay District systems in 2013 were also relatively weak, resulting in low fishing effort and a district-wide commercial harvest of just 2,357 chums, the lowest total since 2007. The 2013 run timing of McNeil River chum salmon was earlier than previous years.

For McNeil River to realize its full productive capacity, favorable spawning habitats upstream of McNeil River falls need to be consistently seeded by spawners. Approximately 10 km of quality spawning habitat exists upstream of McNeil River falls, compared to less than 1 km below McNeil River falls. At least three factors interact to determine how many chum salmon ascend McNeil River falls: 1) the density of fish below McNeil River falls, 2) river discharge, and 3) the number of bears at McNeil River falls. Of these, only number one can be affected by the department, through openings and closures of the commercial fishery.

In an effort to better understand factors affecting the freshwater production of chum salmon at McNeil River, the department hired a graduate student intern in 2005 and 2006 to conduct a two year radio telemetry project to estimate freshwater stream-life, document spawning distribution and estimate predation by bears (Peirce et al. 2011, Peirce et al. 2013). The study determined that

-
- The average stream life of a McNeil River chum salmon was less than the stream life estimate used for other Lower Cook Inlet chum stocks.
 - The average stream life for fish spawning above McNeil River falls was much higher than the stream life for fish spawning below McNeil River falls.
 - Ninety percent of the tagged fish above McNeil River falls lived long enough to spawn, whereas, 47% of the tagged fish below McNeil River falls were killed by bears before getting a chance to spawn during 2005-2006.
 - The study also corroborated aerial survey observations regarding the inconsistent use of quality spawning habitat above McNeil River falls.

Using this information, Division of Commercial Fisheries staff conducted an in-depth retrospective analysis of historical chum salmon escapements above and below McNeil River falls (Otis and Szarzi 2007) as part of the escapement goal review for the 2007 Lower Cook Inlet (LCI) Alaska Board of Fisheries meeting. As a result of the retrospective analysis and some minor adjustments in the methods used to estimate annual escapement, the department increased the McNeil River chum salmon sustainable escapement goal range from 13,750-25,750 up to 24,000-48,000 fish and implemented the new range beginning with the 2008 field season. This change takes into account the lower stream life estimate now used in the area-under-the-curve (AUC) model. Once the run recovers, the increase is intended to stimulate greater future utilization of the currently underused spawning habitat available above McNeil River falls, which in turn, should provide higher and more consistent stream-wide production. The department has also installed a water level monitoring device immediately upstream of McNeil River falls every year since 2007. It will take years to build an adequate time series of discharge data, however, this information should help to evaluate the role discharge plays in affecting escapement above McNeil River falls.

AUC remains the best available method for deriving the total annual escapement index for McNeil River chum salmon, as well as most other pink and chum salmon stocks in LCI. The AUC method calculates the area under the escapement curve, points for which are determined by periodic aerial surveys, and then divides the resulting total “fish-days” by an average stream life (SL) factor to estimate the total annual escapement. Stream life, defined as the number of days salmon resided in the survey area and were available to be counted by aerial surveyors, is one of the key parameters in the AUC model. The AUC method resulted in a cumulative estimated escapement of 9,498 chum salmon for McNeil River in 2013.

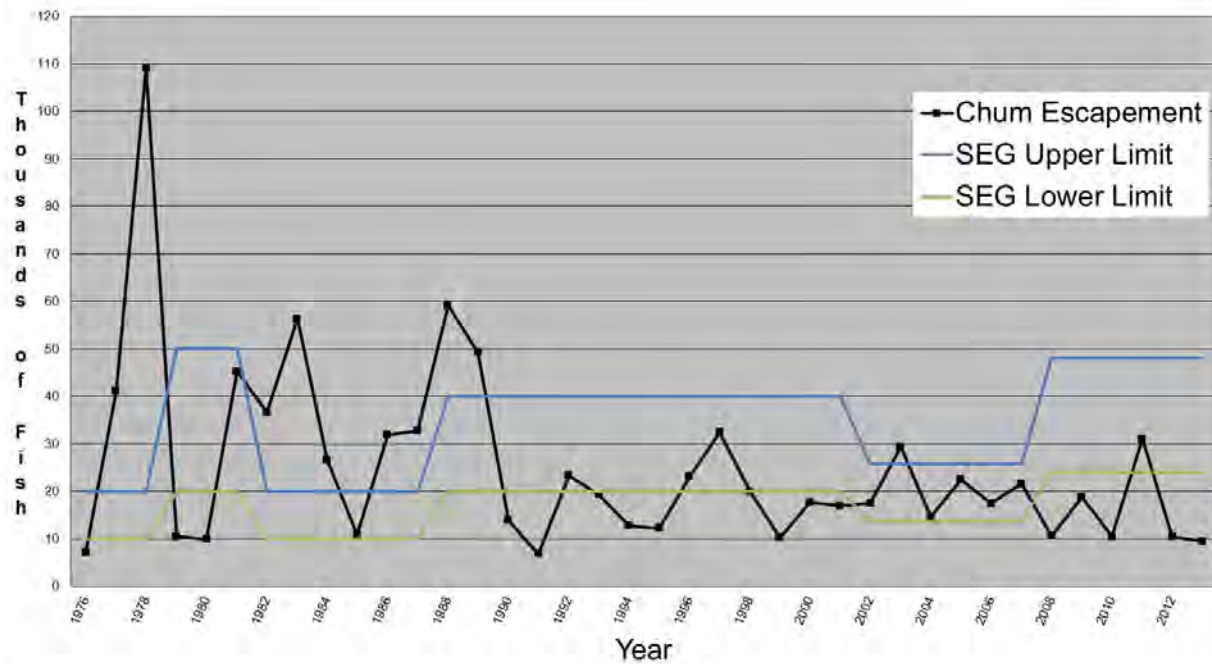


Figure 8. McNeil River chum salmon escapement 1976–2013, McNeil River SGS, Alaska.

Table 4. Aerial escapement estimates of salmon in the Mikfik Lake and McNeil River drainages, McNeil River SGS, Alaska, 2012.

Survey Date	Mikfik Sockeyes (Daily) ^a	McNeil Chums (Daily) ^a
6/17/13	1,410	
6/19/13	760	
6/24/13	1,940	
7/2/13		2,142
7/9/13	1,700	5,214
7/17/13	10	Too turbid to survey
7/26/13	40	1,630
8/24/13	822	
8/26/13	1,111	
9/11/13	1,400	
Escapement Index	4,042^b	9,498^c

^a All individual daily estimates are from individual aerial surveys and are considered to be conservative.

^b The escapement index for Mikfik sockeyes is the accumulative count from the remote video system at Mikfik Lake.

^c The escapement index for McNeil chums was derived by dividing the area under the escapement curve by a 13.8-day stream life factor and then applying a run-timing expansion factor to account for fish entering the system after aerial surveys were terminated.

MIKFIK CREEK/LAKE SYSTEM

The 2013 Mikfik Creek/Lake estimated escapement as determined through aerial surveys was 1,940 sockeye salmon. A video camera attached to a digital video recorder (see below), used to document sockeye salmon escapement into Mikfik Lake again this season, showed a cumulative total of 4,042 fish actually escaping into the lake. Significant predation by bears occurs in Mikfik Creek, so only those fish documented reaching the lake are considered escapement. The video estimate of 4,042 fish was used as the final escapement estimate. This value is below the SEG range of 6,300 – 12,150 (Table 4). Post-season evaluation indicated that run timing of sockeye salmon into Mikfik Lake was similar to past years, with most of the escapement reaching the lake by July 1st.

CHENIK CREEK/LAKE SYSTEM

Chenik Lake, located approximately 5.5 miles north of McNeil Lagoon, is the site of another sockeye salmon stock. The stream mouth of Chenik Creek, which drains the lake, was partially blocked as a result of the 1964 earthquake. A Cook Inlet Aquaculture Association (CIAA) fishery enhancement project modified the stream mouth in 1981-82 and again in 1986 in an effort to allow easier fish access to the creek. Hatchery-raised sockeye salmon fry were stocked into Chenik Lake annually between 1986 and 1996 (except for 1994), and the lake was also fertilized in an effort to increase sockeye numbers. Unfortunately, due to an outbreak of Infectious Hematopoietic Necrosis Virus (IHNV), the return of adult sockeyes to the system dropped to very low levels between 1994 and 2002, but more recent returns resulting exclusively from natural production rebounded considerably. In fact, commercial fishing effort directed at this stock was allowed each year from 2004 through 2013, with resulting annual commercial harvests ranging from just under 5,500 sockeye salmon (2010) to over 171,000 fish (2008). Additionally, the established sockeye salmon sustainable escapement goal (SEG) for Chenik Lake of 3,500 – 14,000 sockeye salmon has been met or exceeded each year beginning in 2003, with the 2013 escapement cumulatively estimated by remote video as 11,333 sockeye salmon.

Sport Fishing

A limited amount of sport fishing occurs within the McNeil River SGS & SGR. This occurs primarily in the Kamishak River area. There is also a small amount of effort in the McNeil Lagoon area associated with the bear viewing program.

MCNEIL LAGOON

Sporadic sport fishing occurs in McNeil Lagoon associated with staff and visitors in camp for bear-viewing activities. Fishing effort was low in 2013. Visitors and ADF&G staff harvested approximately 5 sockeye salmon, 1 chum salmon, 0 pink salmon, and 0 coho salmon.

KAMISHAK RIVER

The only area in the sanctuary that attracts significant sport fishing interest is the Kamishak River area including the Little Kamishak River and its tributary, Strike Creek. The target species are coho, chum, and pink salmon and Dolly Varden. Fishing activity at the Kamishak River and tributaries typically begins in mid-July and ends in mid-September. During the 2013 season, five lodges and transporters reported a total of 318 angler use days during 86 days within the sanctuary for sportfishing. Wildlife viewing, primarily brown bears, was also a significant part of their activities. These anglers reported catching 3,611 fish, of which 51% were Dolly Varden, 36% were coho salmon and 12% were chum

salmon. Nearly all Dolly Varden were released as were most pink and chum salmon. Eighty-seven percent of all fish caught were released.

Table 5. Visitor Use and Sportfish harvest reported from Kamishak River Drainages, McNeil River SGS, Alaska, 2013.

# of Days in Sanctuary	# of Guide Use Days	# of Angler Use Days	# of Non-angler Days	COHO SALMON		CHUM SALMON		PINK SALMON		DOLLY VARDEN		# of bears
				Kept	Released	Kept	Released	Kept	Released	Kept	Released	
86	130	318	0	428	870	2	447	0	12	43	1809	388

Fisheries Enhancement

Fisheries enhancement continues to play a major role in Lower Cook Inlet salmon production and commercial harvests. The results of enhancement and rehabilitation of Kamishak Bay District sockeye stocks have, at times in the past, made significant contributions to commercial salmon harvests.

PAINT RIVER FISH LADDER

Paint River Lakes were first stocked with sockeye salmon fry in 1986 in an effort to test the feasibility of developing a new sockeye salmon return to this salmon-barren drainage. Paint River, located approximately two miles north of McNeil River is blocked to upstream fish migration by a steep waterfall at tidewater. The Paint River fish ladder was envisioned to potentially provide access to unutilized salmon spawning and rearing habitat upstream of the falls. Construction of the Paint River fish ladder was completed in October 1991, and it was formally declared operational in 1993. From 1986 to 1996 (except for 1987), and also in 2002, between 0.5 million and 2.2 million sockeye salmon juveniles were stocked annually in the Paint River Lakes. However, the number of returning adult sockeye salmon resulting from these stocking efforts were disappointing and only ranged from 30 (in 2000) to 2,000 (in 2005). Consequently, the structure was never opened to allow fish passage upstream through the ladder.

In 2008 Cook Inlet Aquaculture Association (CIAA), responsible for building and operating the Paint River Fish Ladder, informed the Division of Wildlife Conservation that grant monies to conduct maintenance on the Paint River Fish ladder had been acquired. Under the grant CIAA intended to make repairs, cover open cells, and perform other maintenance to prepare the ladder for formal operation and fish passage. During 2010 CIAA performed maintenance repairs and improvements on the fish ladder to reduce potential bear problems associated with the operation of the ladder and other needed maintenance work. The Paint River Salmon Enhancement Project Operational Plan, drafted in 1993 but never approved, was also updated in 2010. A working draft was presented to the Cook Inlet Regional Planning Team at its April 2010 meeting. While the document is not a complete plan for the Paint River facility and is intended to be periodically updated, the CIRPT voted to accept the document as an appropriate planning document for the time being.

While no specific plans are in place at this time, CIAA hopes to conduct salmon stocking of the Paint River system, this option remains a possibility and CIAA is investigating potential options for pink and chum salmon enhancement.

The CIAA opened the Paint River fish ladder to allow water flow between June 24 and September 4, 2013; for evaluation purposes and potential salmon colonization. During their 3 visits on June 24th, July 22nd and September 4th they also conducted minor maintenance activities and completed the

grating. During the July 22nd visit CIAA also conducted an aerial survey of the two branches of the Paint River upstream of the fish ladder looking for fish. Approximately 30 pink salmon were noted in the lagoon but no fish were observed upstream of or in the vicinity of the fish ladder. No bears were observed in the area of the fish ladder during the visits; however, one was noted along the far shore of the lagoon during the June 24th visit. No fish were observed near or believed to be using the fish ladder or the Paint River.

Public Use and Land Management

To protect the bears, their habitat and the unique visitor experience, access to the McNeil River SGS is restricted requiring an access permit issued by ADF&G for entry into the sanctuary. Under regulations developed by the Department of Fish and Game (5AAC 93.030) and those adopted by the Alaska Board of Game (5AAC 92.065) the ADF&G Division of Wildlife Conservation uses the following types of permits to manage visitation to the sanctuary: Viewing Permits, Special Access Permits, Non-viewing Permits, Transporter Permits and Commercial Guide Permits.

The McNeil River SGR is open to most public uses provided the activity does not damage refuge resources, disturb wildlife or disrupt existing public uses. Allowed activities generally include legal hunting, trapping, fishing, wildlife watching, hiking, boating, snow machining, and camping; except that the MRSGR is closed brown bear hunting. Other activities and Land uses are managed through ADF&G Special Areas Permit issued by the Division of Habitat. Land use permits are also issued by the Alaska Department of Natural Resources.

McNeil River falls/Mikfik Creek

Public use and access to the sanctuary, with the exception of the McNeil Cove spit and beach, requires an access permit from the Department (5 AAC 92.065). Since 1973, bear-viewing at established sites on McNeil River and nearby Mikfik Creek has been limited to ten people daily between June 7 and August 25, and Viewing Access Permits for this period are issued by lottery. Ten regular and three standby permits are issued for each of the established four-day permit periods. Currently, 185 regular permits (Guided Viewing Access Permits) and 57 standby permits (Camp-Standby Viewing Access Permits) are issued in the lottery. An additional 15 guided viewing permits are issued as Special Access Permits at the Commissioner's discretion for scientific, educational, media and other purposes. The maximum number of people able to visit the sanctuary each season under the existing permit program is 257 people.

Guided Viewing Permits allow visitors to visit the sanctuary and the bear viewing sites in the sanctuary (McNeil River or Mikfik Creek) during a specified time period. A Camp-Standby Viewing Permit allows visitors to visit the sanctuary, view bears and wildlife in the vicinity of the campground and along a limited portion of the beach, and to go to the bear viewing sites (McNeil River or Mikfik Creek) when there are vacancies in the guided group. Special Access Permits are available to individuals that have a special need to visit the Sanctuary. These needs may include (but are not limited to) scientists, land managers, educators, public or artistic media representatives, film makers, or others acting in an official capacity and who would benefit professionally by visiting McNeil River. These permits are only issued to individuals whose work will benefit the McNeil River Sanctuary and/or the general efforts to conserve bears.

The lottery application fee is \$25.00 per person. If selected in the lottery, each Guided Viewing Permit holder is assessed a permit fee of \$150 for Alaskan residents and \$350 for non-Alaska residents. Camp-Standby Viewing Permit holders are assessed a permit fee of \$75 for each Alaskan resident and \$175 for each non-alaska resident. The Special Access Permit application fee is \$50.00 per person. If selected by the Commissioner of the Department of Fish and Game to receive a Special Access Permit, there is a use fee of \$150.00 for each Alaskan Resident and \$350.00 for each Non-Alaska Resident.

In 2013, the ADF&G received 934 applications for McNeil River Guided and Standby bear viewing permits. Applications were received from 13 different countries and 68% of applicants were Alaska residents. After winners were announced, payments were received for 147 Guided Viewing Access permits and 33 Standby Viewing Access permits. There were 9 Special Access (Science-Education/Commissioner) permits granted by the Commissioner. Overall, 200 permits were issued and 156 permit holders (Guided Viewing, Camp Standby, and Special Access) visited the sanctuary (Table 6) in 2013. The 5-year annual visitation average (2009–2013) is 178. The average number of permits used each day (permittees that bear viewed) at the sanctuary in 2013 was 7.2 (out of a maximum of 10.0). There were 29 guided permit holder no shows/cancellations, 14 standby permit holder no shows/cancellations, 1 special access permit holder no shows/cancellations and 21 standby permits that were not filled. The 156 participants in bear viewing during the 2013 season came from seven countries, including Canada, France, Germany, Japan, Spain, Switzerland and the United States. Of the 156 visitors to McNeil River in 2013, 65% were Alaska residents and 35% were nonresidents. Of the 189 people who purchased permits, the ratio was 68% resident to 32% nonresident.

There were a total of 910 visitor use days connected with the McNeil River bear viewing program, which included all permitted bear viewing visitors and administrative visitors. Permitted bear viewing visitors spent 848 days within the Sanctuary, logging 547 actual bear viewing days. On average there were 10.6 visitors at McNeil River camp on any day, slightly lower than the 5 and 10 year averages of 11.8 and 11.6, respectively. There was an average of 7.2 bear viewers per day, slightly lower than the 5 and 10 year averages of 7.8 and 7.7, respectively. Permitted visitors spent an average of 5.4 days each in the Sanctuary and participated in the bear viewing group an average of 3.7 days each.

The 9 Special Access permits issued in 2013 included the following recipients: ADF&G Hunter Education and Wildlife Education volunteers, UAA Visualization Theater Project and the Grizzly Bear Productions film crew.

During 2013, sixteen Commercial Transporter Permits were issued to commercial operators for the purposes of transporting clients to the ADF&G McNeil River camp for bear viewing.

A total of \$62,025.00 was generated from the 2013 McNeil River sanctuary permit program and deposited in the state's General Fund.

Kamishak River

Lodges and air charter services conduct sport fishing and wildlife viewing trips within the Kamishak River drainages within the MRS GS and adjacent Katmai National Park. This area is also part of the Kamishak Special Use Area, which is managed by the Department of Natural Resources. Businesses store riverboats on the lower reaches of the river and one of the businesses maintains a temporary guide camp on the lower Kamishak River; both activities require an ADF&G Special Area Permit and an ADF&G Commercial Access Permit. The primary management concern is the food-conditioning of Kamishak River bears, which also visit Mikfik Creek and McNeil River. Food-conditioning of bears would not be consistent with the purposes for which the sanctuary was established and would jeopardize the bear-viewing program at McNeil River.

Businesses operating in this area holding ADF&G Special Area and Commercial Access Permits are required to report the number of guides, clients, fish harvested/released, as well as the number of bear observed on a data sheet titled "Annual Report for Guides, Transporters, and Lodges."

Five commercial sport fishing guide services operated in the Kamishak River area of the MRS GS in 2013 and spent 448 visitor use days in the sanctuary, which included 318 angler use days and 130 guide use days. These operators also held Special Area Permits for the storage of boats and operations in the Kamishak River area. Their primary activity was sport fishing; however, they also engaged in wildlife viewing activities, primarily viewing of brown bears.

Chenik Area

One commercial bear viewing guide service from Homer brought clients to the Chenik area in 2013. This service obtained a special area permit for a temporary tent camp at Chenik Lake in 2013 and reported a total of 40 visitor use days, including 13 guide use days and 27 bear viewing (non-angler) use days. Private groups were also known to have visited the Chenik area in 2013.

Bear-Human Conflicts

As detailed above there were 910 user days associated with the ADF&G's bear viewing program at the McNeil River camp. An additional 488 user days were reported by area guides utilizing the Kamishak River and Chenik Creek areas of the MRS GS / MRS GR. All 1,398 user days represent activities; primarily bear viewing and sport fishing, spent in close proximity to brown bears. Staff document adverse bear-human interactions associated with the ADF&G bear viewing program. Commercial sportfishing and bear viewing entities perform self-reporting to the ADF&G on any adverse interactions. During the 2013 season, there were no reported adverse interactions between bears and people in the MRS GS or MRS GR.

Land Use Permitting

The ADF&G Division of Wildlife Conservation has a Special Area Permit and an Alaska Department of Natural Resources Interagency Land Management Assignment (5 year term, 2009 – 2014) for operation and maintenance of the McNeil River camp, trails, and bear viewing operation. The ADF&G Division of Commercial Fisheries holds a Special Area Permit for the installation and operation of a video fish escapement recorder and maintenance of the cabin at Chenik Lake. They also hold a Special Area Permit for the installation and operation of a video fish escapement recorder at Mikfik Lake.

A total of ten Special Areas Permit and seventeen Commercial Access Permits were issued during 2013. These included the Special Areas and Commercial Access Permits issued to the commercial operators in the McNeil River, Kamishak River and Chenik Creek areas; and renewals of Special Area Permits issued to the ADF&G DCF for management & research, and CIAA for maintenance and repairs to the Paint River Fish ladder.

The U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) Snotell Site continues to operate at Mikfik Lake. Snotell (SNOWpack TELEmetry) is an extensive automated system of sites installed and maintained by NRCS throughout the United States that collects snowpack and related climatic data. The program is part of the NRCS Snow Survey and Water Supply Forecasting program. Snotel site 1191 was established June 26, 2012 at Mikfik Lake (latitude 59.0835, longitude 154.2777) within the MRS GS. Hourly data on temperature, precipitation, winds, snow depth, and soil moisture for the site can be accessed through the NRCS website at: <http://www.wcc.nrcs.usda.gov/nwcc/site?sitenum=1191&state=ak>.

There were no other mineral resource or development activities applied for, permitted or reported to the Department within the McNeil River SGS or SGR during 2013.

Table 6. Visitor Use at McNeil River SGS / SGR, Alaska, 1984–2013.

Year	Footnotes	# of Applicants	# of Bear Viewing Visitors 6/7-8/25*	Bear Viewing User Days in Sanctuary 6/7-8/25**	Total Sanctuary Bear Viewing Visitor Days 6/7-8/25***	Total Sanctuary Visitor Days 6/7-8/25****	Visitor Days Viewing @ McNeil Falls 7/1-8/25 (560 possible)*****	Season Length
1984	A, F	992	159			574	377	6/5 - 8/27
1985	A	832	216			816	449	6/10 - 8/25
1986	A	806	255			967	430	6/9 - 8/25
1987	A, G	1,757	252			1,054	473	6/9 - 8/23
1988	A	1,094	304			1,328	498	6/1 - 8/29
1989	A	1,306	264			1,183	488	5/22 - 8/26
1990	A	1,481	299			1,435	524	6/8 - 8/25
1991	B, E	1,818	249			1,415	526	6/1 - 8/27
1992	C, E, H	1,672	245			1,210	478	6/1 - 8/25
1993	D	2,150	225			1,128	516	6/7 - 8/25
1994	D, I	1,766	228			1,086	484	6/7 - 8/25
1995	D, I	1,486	212			1,074	475	6/7 - 8/25
1996	D, I	1,502	219			1,158	494	6/7 - 8/25
1997	D, I	1,474	228			1,197	489	6/7 - 8/25
1998	D, I	1,159	219			1,096	504	6/7 - 8/25
1999	D, I, J	1,223	208			1,122	398	6/7 - 8/25
2000	D, J, K, L, M	1,322	198			1,051	424	6/7 - 8/25
2001	D, J, K, L, M, N	1,329	186			1,012	437	6/7 - 8/25
2002	D, J, K, L, M, N	1,434	175			930	351	6/7 - 8/25
2003	D, J, K, L, M, N, O, P	1,314	188			995	451	6/7 - 8/25
2004	D, J, K, L, M, O, P	860	201			1,034	462	6/7 - 8/25
2005	D, K, L, M, O, P	960	195			983	431	6/7 - 8/25
2006	D, K, L, M, O, P	783	183			970	420	6/7 - 8/25
2007	D, K, L, M, O, P	1156	157	540	781	832	356	6/7 - 8/26
2008	D, K, L, M, O, P	932	167	617	863	913	413	6/7 - 8/26
2009	D, K, L, M, O, P	725	181	639	948	1266	452	6/7 - 8/25
2010	D, K, L, M, O, P	714	176	593	932	1100	433	6/7 - 8/25
2011	D, K, L, M, O, P	751	195	674	1017	1089	447	6/7 - 8/25
2012	D, K, L, M, O, P	719	180	641	969	1041	458	6/7 - 8/25
2013	D, K, L, M, O, P	934	156	574	842	890	388	6/7 - 8/25

Footnotes Table:	
A =	No limit on standby or camp numbers.
B =	1st come, 1st served for standby with no camp limit.
C =	1st come, 1st served for standby with camp limit of 15.
D =	All permits (regular & standby) by lottery including June.
E =	Unlimited permits prior to June 15 then 10 a day.
F =	\$5 application fee instituted in 1993.
G =	\$10 application fee and \$40 user fee instituted.
H =	\$20 application fee and new user fees (\$100 Resident/\$250 Non-resident) instituted.
I =	Visitors to the sanctuary must wait four years to re-apply.
J =	Lower staffing levels prevented late arriving or early departing visitors from joining the group.
K =	\$25 application fee and new user fees (\$150 Resident/\$350 Non-resident) instituted.
L =	Number of standby permits drop from 5 to 3 per period (95 to 57 annually).
M =	Visitors to the sanctuary must wait one year to re-apply.
N =	A major air taxi operator retires, leaving only one primary carrier to serve MRSGS.
O =	Includes Resale permits (Unissued permits were reissued and used).
P =	Includes "fill in" permits.
*=	Sum of all Guided, Standby, & Special Access Permittees that visited McNeil River State Game Sanctuary.
**=	Sum of all Guided, Standby, & Special Access Permittees that bear viewed each day of season.
***=	Sum of all Guided, Standby, & Special Access Permittees in Sanctuary each day of season.
****=	Sum of all Guided, Standby, & Special Access Permittees & Non-Viewing permittees (staff subs not included) each day of viewing season.
*****=	Sum of all Guided, Standby, & Special Access Permittees each day during approximate McNeil Falls season.

Fish and Wildlife Research

This section summarizes new or ongoing fish and wildlife research projects within the MRSGS/SGR.

Mikfik Creek Video Research

A remote video escapement recorder (RVER) was installed at the outlet of Mikfik Lake for the 16th consecutive season. This project has already proven invaluable to both in-season and post-season fisheries management and research in Lower Cook Inlet, demonstrating that remote video and time-lapse recording technology has the capability to largely supplant aerial surveys as a means for collecting escapement data on small clear streams that do not warrant the expense of weirs or sonar.

When originally configured in 1998, the Mikfik video system consisted of a single remote video camera and a time-lapse videocassette recorder (VCR) logging one frame per second onto analog VHS tapes. While this system produced images of sufficient quality to facilitate reliable fish counts, it had shortcomings. Weekly flights were necessary to refresh videotapes, the analog tapes were fragile and cumbersome to review, and tracking individual fish was difficult at one frame per second. The next evolution of the Mikfik system, used from 2002 through 2005, recorded up to five digital frames per second and stored the images on a computer hard drive. However, relatively high power consumption by the computer resulted in recording downtime and led to the development of alternative equipment. The present setup, first implemented at Mikfik Creek in 2006, uses a time-lapse digital video recorder (DVR) in place of the personal computer. The new configuration reduced the power issues that affected the computer-based version; however, harnessing adequate solar/wind power at the Mikfik Creek site was continuously challenging due to the localized geography and the resulting wind patterns. Beginning in 2009, the DVR and its accompanying power generation equipment were relocated a short distance from the camera to a more exposed site on the shore of Mikfik Lake, making power generation for this equipment far less problematic (more wind). Images were delivered to the relocated DVR via a wireless transmitter/receiver configuration, and because the power requirements of the camera and wireless transmitter were modest, power generation at the camera site was provided by a relatively simple solar panel and battery arrangement that proved very successful.

In an effort to facilitate near real-time escapement monitoring and eventually reduce the number of flights necessary to maintain the system, transmission of recorded images via satellite back to Homer on a daily basis was previously tested with mixed success. The department believes these problems can be successfully resolved and plans to continue investigating this promising technology, ultimately incorporating it into the Mikfik remote video recording system and potentially applying it to similar projects throughout the management area.

In 2013, the video system at Mikfik Creek/Lake was installed on June 19 and shut down on August 17. The system operated continuously during daylight hours (~20 hrs/d) and successfully recorded images approximately 64% of the time that it was programmed to operate between June 19 and August 17 (1,422 hrs). The peak of the run into Mikfik Lake was shorter, but similar in timing to past years (late-June). Unfortunately, the remote video system experienced a lengthy mechanical issue in 2013, resulting in 508 hours of “down time” spread out over three weeks in late June/early July. Hence, the video escapement estimate likely under-represents the actual escapement into Mikfik Lake in 2013.

As was the case in 2001 and 2003 – 2009, a single camera mounted on the original (west bank) light pole was used to collect all video images of fish passage in 2013. Recordings were made using a

compression rate of five frames per second, which has proven to provide excellent image quality. Fish were very easy to see, and the DVR facilitated efficient and convenient video review to estimate escapement. Upon review of the images collected at Mikfik Creek, 4,042 sockeye salmon were counted into the lake, representing 2,102 more fish than were estimated by the peak aerial survey of Mikfik Creek and McNeil Lagoon. In the past, to remain consistent with the historical Mikfik Creek database and with the methods used to derive the Mikfik sockeye salmon SEG, aerial survey data was normally used to generate the spawning escapement index. However, at the 2013 LCI Board of Fisheries meeting, LCI staff recommended revising the Mikfik Lake sockeye salmon SEG so it's based on remote video, the method currently used to monitor escapement (Otis et al. 2013). As a result, the remote video based estimate of 4,042 fish was used as the final escapement index in 2013. The new video-based escapement goal for Mikfik Creek sockeye salmon is 3,400-13,000 fish and will go into effect in 2014.

One advantage of using a remote video counting tower to count salmon escapement at Mikfik Creek is the opportunity to incidentally monitor other wildlife in the area. During 1,422 hours of recorded video between June 19 and August 17, reviewers documented 32 instances where brown bears transited the field of view of the camera, an average of just over 0.5 bears per day of video operation (n=60 d). Nearly all sightings were of individual bears, but a few sightings were of females with one or two cubs. Other wildlife species observed included moose, eagle, beaver, red fox, various waterfowl, and river otter.

McNeil River Brown Bear & Chum Salmon Research

During 2009 and 2010, Western Washington University graduate student Ian Gill researched the fishing behavior of brown bears and bear-salmon predation at McNeil River falls. This research provided data and streamlined video sampling methodologies that allowed estimating the total number of chum salmon taken by bears at the falls; information that is also beneficial to the management of area fisheries.

ADF&G Division of Commercial Fisheries Research Biologist Ted Otis, worked with Ian to use the methodology and data in developing a model to address bear-salmon predation on fish escapement into McNeil River. Preliminary results and analyses determined that the data and modeling was a useful tool for estimating the removals of pre-spawning chums at McNeil River falls. In 2013 the ADF&G Division of Commercial Fish continued the project, with minor changes to the equipment, to gather data to use in refining estimates of chum salmon spawning escapement into McNeil River. The current project is being conducted in collaboration with Dr. Brad Harris, a professor at Alaska Pacific University, where one of his students is reviewing the video.

ADF&G Division of Commercial Fisheries continued collecting baseline genetic samples from wild pink, chum, sockeye, and coho salmon throughout Kamishak Bay in 2013. Ted Otis and his crew worked out of the MRSGS Camp while collecting samples from McNeil River and nearby streams (e.g., Kamishak River, Amakdedori Creek). They also collected samples from sockeye salmon in Chenik Lake and plan to collect samples from Mikfik Lake sockeye salmon in 2014 if adequate escapement is achieved.

Sanctuary Administration and Management

Staffing

Sanctuary Manager Tom Griffin completed his fourteenth season at McNeil River, his fourth as manager. Drew Hamilton completed his second season as Assistant Manager and his fourth season at McNeil River. Robin Dublin (Wildlife Technician III) joined sanctuary staff in 2013 completing her first season at McNeil River. Staff arrived at the McNeil River camp on May 23, 2013 and pulled camp on August 26, 2013. We were very fortunate to have John Hechtel (retired ADF&G bear researcher), Polly Hessing (retired ADF&G biologist) and Tony Carnahan (previous McNeil River Sanctuary Assistant Manager) fill-in this year as group leaders when regular staffs were on leave. In addition to their normal duties at the sanctuary, the McNeil staff completed the annual ADF&G Fire Arms Safety training and two staff members completed the Wilderness First Responder training in the spring of 2013.

VOLUNTEERS

Two professional carpenters volunteered their time at MRS GS from June 1 to June 6, 2013. John Tuckey and Pete Robinson, built two new public-use outhouses in the MRS GS camp area and provided technical assistance in review of maintenance items on other camp structures.

Facilities

In addition to performing general maintenance tasks around camp throughout the season, staff conducted maintenance on sections of the Mikfik Creek Trail and the McNeil River falls Trail, dug and moved one (staff) outhouse, worked on inventory, and secured upper viewing pad erosion at McNeil River falls by installing a dead-horse to stabilize the 4x4s in front of the upper pad. A replacement bracket was constructed to secure the SSB pole to the back of the front cabin and a new line was threaded through the pulley at the top of the SSB pole. Two new outhouses were constructed with the help of two incredible carpenters John Tuckey and Pete Robinson.

In late June of 2013, staff stabilized approximately 85 feet of trail within the sedge meadow on the east side of Mikfik Creek where the trail runs from the east bluff wall in the direction of Mikfik Creek riffles. The trail improvements were made to stabilize muddy trail sections and protect the sedge meadow vegetation. The application also improves visitor footing along the trail. Twenty-five (20" x 40") panels of Geoblock™ 5150 were attached end-to-end using 2.5" inch screws and 2" x 4" lumber for support at the joints. Six (13.3' foot) additional sections were added to the existing eight sections constructed in 2012 for a total of over 186 feet of treated trail. Each individual section was anchored down with a duckbill earth anchor at one end. Additional sections of the trail will be treated in a similar manner during future seasons if this year's treatment holds up to storm tides, wave action, shifting ice and break-up.



Figure 9. New campground outhouses, MRSGS.

Acknowledgments

Sanctuary Manager Tom Griffin, Assistant Sanctuary Manager Drew Hamilton, and ADF&G Wildlife Technician Robin Dublin collected data on bear use and visitor activities. Tom Griffin drafted this report. Ed Weiss (ADF&G-DWC) prepared land management, public and commercial use narratives, edited, and finalized this report. Chris Peterson (ADF&G-DWC) provided big game and furbearer harvest data. Glenn Hollowell and Ted Otis (ADF&G-CF) prepared the narrative on fish escapement, commercial fisheries and fish research. Lisa Ka'aihue (CIAA), provided information on activities at the Paint River fish ladder. Mike Bouwkamp (ADF&G-DWC) provided bear viewing applicant information. Megan Marie (ADF&G-DOH) provided Special Area Permit information. Earl Becker (ADF&G-DWC) provided the Shewhart Control Chart. Patti Harper (ADF&G-DWC) provided formatting and editing changes.

Literature Cited

Otis, E.O., and N.J. Szarzi. 2007. A review of escapement goals for salmon stocks in Lower Cook Inlet, Alaska, 2007. Alaska Department of Fish and Game, Fishery Manuscript No. 07-04, Anchorage.

Otis, E. O., L. F. Fair, and J. W. Erickson. 2013. A review of escapement goals for salmon stocks in Lower Cook Inlet, Alaska, 2013. Alaska Department of Fish and Game, Fishery Manuscript No. 13-08, Anchorage.

Peirce, J.M., E.O. Otis, M.S. Wipfli, E.H. Follmann. 2011. Radio telemetry to estimate streamlife of adult chum salmon in McNeil River, Alaska. *North American Journal of Fisheries Management* 31:315-322.

Peirce, J.M., E.O. Otis, M.S. Wipfli, and E.H. Follmann. 2013. Interactions between brown bears and chum salmon at McNeil River, Alaska. *Ursus* 24(1):42-53.

Appendix A. 2013 Daily Wildlife Observations, McNeil River State Game Sanctuary.

Date	Comments
5/23/2013	First observations seen from camp: 300 Brant (<i>Branta bernicla</i>) in the lagoon and the tidal flats, 3 American Robins (<i>Turdus migratorius</i>), 8 Tree Swallows (<i>Tachycineta bicolor</i>), 1 Arctic Ground Squirrel (<i>Spermophilus parryii</i>), 3 Wilson's Snipe (<i>Gallinago delicata</i>), 6 Golden-crowned Sparrows (<i>Zonotrichia atricapilla</i>), 1 Hermit Thrush (<i>Catharus guttatus</i>), 1 Northern Harrier (<i>Circus cyaneus</i>), 1 Northern Pintail (<i>Anus acuta</i>) in sauna pond, 1 Wilson's Warbler (<i>Wilsonia pusilla</i>), 1 Fox Sparrow (<i>Passerella iliaca</i>), 6 Greater Yellowlegs (<i>Tringa melanoleuca</i>) in the lagoon, 12 Glaucous-winged Gulls (<i>Larus glaucescens</i>) in the lagoon and the tidal flats at high-tide, 1 Red Fox (<i>Vulpes vulpes</i>) on the spit.
5/24/2013	First observation: 1 Yellow-rumped Warbler (<i>Dendroica coronate</i>) on the spit, 1 Bald Eagle (<i>Haliaeetus leucocephalus</i>) in the bench behind camp.
5/25/2013	First observation: 1 American wigeon (<i>Anas Americana</i>) and 6-10 Greater White-fronted Geese (<i>Anser albifrons</i>) both observed in the east Mikfik sedge flats. 1 Green-winged Teal (<i>Anas crecca</i>) observed from camp.
5/26/2013	First observation: 1 Pacific Harbor Seal (<i>Phoca vitulina</i>) in the cove.
5/27/2013	First observation: 1 Common Redpoll (<i>Carduelis flammea</i>) observed from camp.
5/28/2013	First observation: Chocolate Lily (<i>Fritillaria camschtcensis</i>) and Wild Iris (<i>Iris setosa</i>) observed in camp.
5/30/2013	First observation: 1 Merlin (<i>Falco columbarius</i>) observed on the spit, 1 Black-billed Magpie (<i>Pica hudsonia</i>) observed in camp.
5/31/2013	First observation: 2 Short-eared Owl (<i>Asio flammeus</i>) observed in flight together in the area bench behind camp, 1 Osprey (<i>Pandion haliaetus</i>) observed in flight above the Mikfik Creek Riffles and Sedge Flats, 10 Northern Shovelers (<i>Anas clypeata</i>) and a 1 Crackling Goose (<i>Branta Hutchinsii</i>) observed in the lagoon. Cow Parsnip (<i>Heracleum lanatum</i>) and Arctic Dock (<i>Rumex arcticus</i>) observed in the Mikfik area.
6/3/2013	First observation: 1 Common Raven (<i>Corvus corax</i>) observed in the camp area.
6/4/2013	First observation: 10 Double-crested Cormorants (<i>Phalacrocorax auritus</i>) observed nesting on the cliffs between camp and McNeil head, 1 Pigeon Guillemot (<i>Cephus Columba</i>) and 2 Harlequin Ducks (<i>Histrionicus histrionicus</i>) observed along the coast in the McNeil head area.
6/5/2013	First observation: 4 Black Scoters (<i>Melanitta americana</i>) observed in the McNeil cove.
6/7/2013	First observation: 1 Savannah Sparrow (<i>Passerculus sandwichensis</i>), 1 Willow ptarmigan (<i>Lagopus lagopus</i>) and a Hoary Marmot (<i>Marmota caligata</i>) observed in the camp area, 2 Mallards (<i>Anas platyrhynchos</i>) and a 1 Peregrine Falcon (<i>Falco Peregrinus</i>) observed in the Mikfik area.
6/9/2013	First observation: 1 Red-breasted Merganser (<i>Mergus serrator</i>) observed swimming in the lagoon.
6/10/2013	First observation: 2 Gadwall (<i>Anas strepera</i>) observed in the lagoon.
6/11/2013	First observation: 1 Moose (<i>Alces alces</i>) observed on the east bluff and a Semipalmated Plover (<i>Charadrius semipalmatus</i>) observed on the spit. First Bloom: Alaska violet (<i>Viola Langsdorffi</i>) and Jacob's Ladder (<i>Polemonium acutiflorum</i>) observed in the Mikfik area west of the creek.
6/12/2013	First observation: 2 Yellow Warblers (<i>Dendroica petechial</i>) observed in camp.
6/14/2013	First observation: Many Sockeye (Red) Salmon (<i>Oncorhynchus nerka</i>) observed in the Mikfik Creek Tidal area.
6/16/2013	First bloom: Chocolate Lily (<i>Fritillaria camschatcensis</i>) observed in the camp.
6/19/2013	First observation: 6 Mew Gulls (<i>Larus canus</i>) observed in the Mikfik Creek Riffle.
6/20/2013	First observation: 1 Beaver (<i>Castor canadensis</i>) observed in Mikfik Creek.
6/21/2013	First Bloom: Wild Iris (<i>Iris setosa</i>) observed near the Mikfik creek riffles and Wild Geranium (<i>Geranium erianthum</i>) observed in camp.
6/24/2013	First observation: 1 Gray wolf (<i>Canis lupus</i>) observed in the lagoon.
6/25/2013	First observation: 50 Canada Geese (<i>Branta Canadensis</i>) observed flying over lagoon.
6/29/2013	First observation: 1 Orange-crowned Warbler (<i>Oreothlypis celata</i>) observed in camp.
7/25/2013	First bloom: Monkshood (<i>Aconitum delphinifolium</i>) observed on the McNeil river trail near the overlook above McNeil River falls.

8/7/2013	First observation: 1 Arctic Tern (<i>Sterna paradisaea</i>), this individual was a juvenile observed in the lagoon, Rock Sandpiper (<i>Calidris ptilocnemis</i>) observed from Enders Island in lower McNeil river.
8/9/2013	First observation: 2 Red-throated Loons (<i>Gavia stellate</i>) observed in the lagoon.
8/13/2013	First observation: 5 Bank swallows (<i>Riparia riparia</i>) observed at low tide in the lagoon.
8/15/2013	First observation: 4 Tundra Swans (<i>Cygnus columbianus</i>) observed flying in the lagoon.
8/19/2013	First observation: 1 Black Turnstone (<i>Arenaria melanocephala</i>) observed at McNeil River falls.
8/20/2013	First observation: 6 Silver (Coho) Salmon (<i>Oncorhynchus kisutch</i>) observed jumping at McNeil River falls.
8/24/2013	First observation: 1 Sandhill Crane (<i>Grus Canadensis</i>) observed standing on the tidal flats near the end of the spit at low tide.

