Special Areas Management Report

McNeil River State Game Sanctuary

Annual Management Report

2011

Thomas Griffin
Edward W. Weiss

December 2011

Alaska Department of Fish and Game **Division of Wildlife Conservation**

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the reports by the Division of Wildlife Conservation. 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)

centimeter	cm
deciliter	dL
gram	g
hectare	ha
kilogram	kg
kilometer	km
liter	L
meter	m
milliliter	mL
millimeter	mm

Weights and measures (English)

cubic feet per second	ft^3/s
foot	ft
gallon	gal
inch	in
mile	mi
nautical mile	nmi
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
degrees kelvin	K
hour	h
minute	min
second	s

Physics and chemistry

all atomic symbols	
alternating current	AC
ampere	A
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

General

all commonly-accepted abbreviations; e.g., Mr., Mrs., AM, PM, etc.	
all commonly-accepted professional titles; e.g., Dr., Ph.D., R.N., etc.	
Alaska Administrative Code	AAC
Alaska Department of Fish and Game	ADF&G
at	@
compass directions:	
east	E
north	N
south	S
west	W
copyright	©
corporate suffixes:	
Company	Co.
Corporation	Corp.
Incorporated	Inc.
Limited	Ltd.
District of Columbia	D.C.
et alii (and others)	et al.
et cetera (and so forth)	etc.
exempli gratia (for example)	e.g.
Federal Information Code	FIC
id est (that is)	i.e.
latitude or longitude	lat. or long.
monetary symbols (U.S.)	$, ¢
months (tables and figures):	first three letters (Jan,...,Dec)
registered trademark	®
trademark	™
United States (adjective)	U.S.
United States of America (noun)	USA
U.S.C.	United States Code
U.S. state	use two-letter abbreviations (e.g., AK, WA)

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
approximately	~
base of natural logarithm	*e*
catch per unit effort	CPUE
coefficient of variation	CV
common test statistics	(F, t, χ^2, etc.)
confidence interval	CI
correlation coefficient (multiple)	R
correlation coefficient (simple)	r
covariance	cov
degree (angular)	°
degrees of freedom	df
expected value	E
greater than	>
greater than or equal to	≥
harvest per unit effort	HPUE
less than	<
less than or equal to	≤
logarithm (natural)	ln
logarithm (base 10)	log
logarithm (specify base)	$\log_2$, etc.
mean	$\bar{x}$
minute (angular)	'
not significant	NS
null hypothesis	H_O
percent	%
plus or minus	±
population size	N
probability	P
sample size	n
second (angular)	"
standard deviation	σ or s
standard error (of the mean)	$s_{\bar{x}}$
type I error probability	P_a
type II error probability	P_b
variance	σ^2 or s^2

Cover Photo: Brown bear *(Ursus arctos)*. McNeil River State Game Sanctuary. Photo © 2011 ADF&G, by Thomas Griffin.

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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 and its publications comes from appropriations made by the Alaska Legislature.

Governor of Alaska : Sean Parnell
ADF&G Commissioner: Cora Campbell
Division of Wildlife Conservation Director: Corey Rossi
Lands and Refuges Program Coordinator: Joe Meehan

It is the mission of the Division of Wildlife Conservation to conserve and enhance Alaska's wildlife and habitats and provide for a wide range of public uses and benefits.

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. Reports are available through the Alaska State Library and through the department's Internet website at www.adfg.alaska.gov.

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

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Table of Contents

List of Figures

List of Tables

List of Appendices

Executive Summary

The McNeil River State Game Sanctuary (MRSGS) and McNeil River State Game Refuge (MRSGR) 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.

In 2011, bear viewing was very good for the second season in a row; as indicated by all three data indices. Bear index count numbers at McNeil River falls, the primary bear gathering and viewing location, returned an average of 60.9 bears, slightly higher than 2010 average (59.9) and above the benchmark average of 48.6 bears. Between July 19 and July 21 staff also observed up to 80 bears at one time at McNeil River Falls, a record number in the history of the program. Staff observed 104 individual bears this season at MRSGS; expending approximately 1,446 bear use days within the sanctuary. Both the long-term (1976-2011) average and the median number of individual bears annually identified are 94.

The 2011 cumulative McNeil River chum salmon aerial survey escapement index was estimated at 30,977 fish. This season was the 23rd consecutive year the McNeil River chum salmon run failed to produce a significant harvestable surplus; however, chum salmon escapement into the system did exceed the low end of the Sustainable Escapement Goal range of 24,000-48,000 chums. The number of spawning chum salmon documented upstream of McNeil River Falls in 2011 was considered excellent and was the highest observed during the past 19 seasons. The 2011 run timing of McNeil River chum salmon seemed somewhat earlier than previous years.

The bear-viewing program at MRSGS attracted 751 people from five countries applying for the 185 regular permits and 57 standby permits. Fifty-two percent of applicants were Alaska residents and forty-eight percent were non-residents. The 195 Guided, Standby, and Special Access Permits were distributed to 61% Alaska residents and 39% non-residents. The McNeil River SGS bear viewing permit program generated approximately $64,250 in 2011 that was deposited into the state's General Fund.

In 2011, ADF&G staff continued to photograph and catalog bears under the MRSGS photo identification project (initiated in 2007). This collection and storage of digital images of individual bears and their defining characteristics is intended to be a long term project that will enhance and improve management of the bear viewing program and assist in monitoring life histories of individual bears.

ADF&G Division of Commercial Fisheries Research Biologist Ted Otis, worked with Western Washington University graduate student Ian Gill to develop a video-based method and a model to address bear-salmon predation on chum salmon in the McNeil River system. Preliminary results indicate the method may be a useful towards estimating bear predation on pre-spawning chum salmon and in refining estimates of chum salmon spawning escapement into McNeil River.

Under a Federal Aid Cooperative Endangered Species Conservation Fund grant, sea otter carcass surveys continued along sanctuary and refuge shorelines to assist the US Fish and Wildlife Service in determining the cause of declining sea otter population in Southwest Alaska. During the 2011 surveys, six confirmed sea otters were found in the Kamishak Bay area.

From July 25-28, a film crew from the UAA Planetarium and Visualization Theater (PVT) came to McNeil to obtain footage for a planetarium show. The show will use the immersive video capabilities of the PVT to share the McNeil River experience. The crew obtained excellent footage of a variety of bear behaviors, including different fishing techniques, dominance, play and aggression. Interviews were also conducted with AF&G staff and other visitors. The UAA PVT staff is now in the process of reviewing and sorting the footage.

A total of nine ADF&G Special Area Permits and twelve Commercial Access Permits were issued during 2011. These included Special Areas and Commercial Access Permits issued to commercial operators for their camping, boat storage, sport-fish guiding, and bear viewing guide operations in the Kamishak River and Chenik Creek areas, as well as providing commercial access to McNeil River camp. Special Areas Permits were issued to Cook Inlet Aquaculture Association (CIAA) for maintenance and repairs to the Paint River Fish ladder; the USDA NRCS for establishment of a Snotell Site at McNeil River Camp; and the ADF&G Division of Commercial Fisheries for remote camera operations at McNeil River Falls. There were no mineral resource development activities permitted or reported to the Department within the McNeil River SGS or SGR during 2011.

During 2011 CIAA completed maintenance repairs and improvements on the Paint River fish ladder and opened the ladder to water flow for evaluation purposes and potential salmon colonization. Work was completed on installation of grating on open cells and periphery areas to prevent bears from falling into or accessing the ladder.

I. 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.

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).

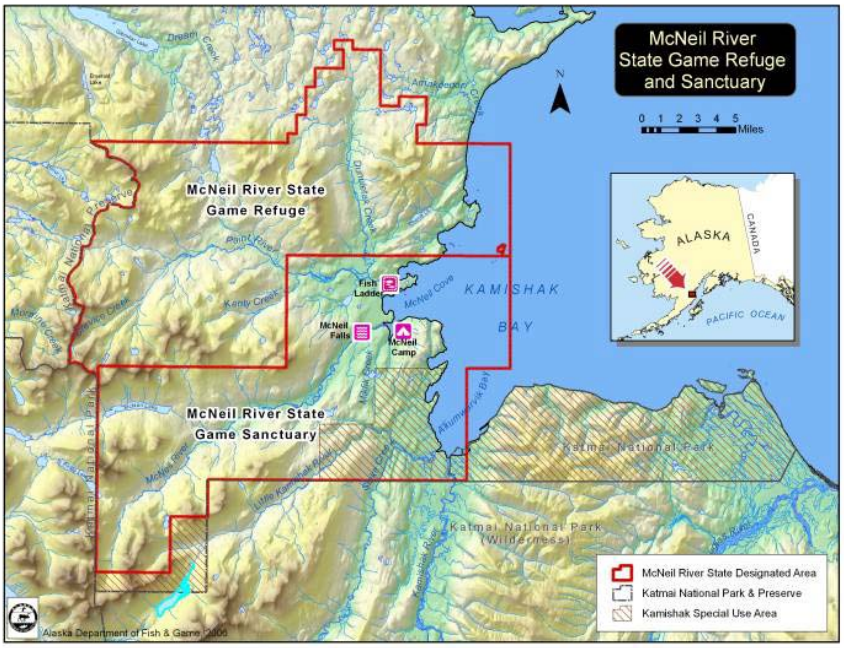

Figure 1. Location of the McNeil River State Game Sanctuary and Refuge in southwest Alaska.

II. 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. Some additional information is provided through self reporting by commercial sportfish and bear viewing guide services that operate 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 in the surrounding 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 ADF&G uses three different methods to monitor bear use at MRSGS: *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 from July 15 through August 5 between 11:00 a.m. and 7:00 p.m. The number of hourly counts (data points) that occur from year to year is variable due to the changing and opportunistic nature of the daily bear-viewing schedule. This monitoring program detects large, short-term declines or gradual, long-term declines in the average number of independent bears at McNeil River Falls and includes 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. The average of the seven highest hourly counts is calculated and used as an index that is weighed against the BTC. A decline below this "criterion" 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 2011 the average of the seven highest hourly counts was 60.9 bears, which is above the benchmark average of 48.6 bears. Bear index count numbers during 2011 continued a trend of higher numbers than those seen in the previous decade. All seven of the highest hourly counts for 2011 are above the lower BTC limit (40.8 bears) and also above the base average (48.6 bears). The 2011 average of 60.9 was slightly higher than 2010 average (59.9) and these two years were the highest averages recorded since 1997, when the average of the seven highest hourly counts was 55. Between 1993 and 2009 the highest and lowest averages of the seven highest hourly counts were 55 (1997) and 22 (2005), respectively. From 1998 to 2005, there was a relatively steady decline in the average of the seven highest hourly counts. From 2006 to 2011, there has been a steady increase in the average of the seven highest hourly counts. Hourly Index counts for 2011 are presented in Table 1. The index numbers (medians pre 1995 and means post 1995 of the seven highest hourly counts) for 1983 – 2011 are presented in Figure 2).

Of note for 2011 are two individual counts of 76 bears, observed on July 19 and July 21, as well as a count of 80 bears on July 19. These counts are record highs for McNeil River; however, they are not included in the index count for 2011 as they occurred outside the standard count hours (after 2100).

Individual Counts

A second method of monitoring bear use and the quality of the bear-viewing program at the MRSGS is by tallying the number of individually identifiable bears (adults, sub-adults, & cubs) observed by sanctuary staff daily and throughout the season (Table 2, Appendix A). Using unique identifying marks 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 (36 years). Only individual bears that are 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 MRSGS, if observed during viewing, on a daily basis. While it does not provide the true count of all bears present at MRSGS, it does provide an additional index in evaluating the overall bear use and the quality of the bear-viewing program.

There were 104 individual bears identified at MRSGS during the 2011 season. This is consistent with the 105 individual bears observed in 2010 but represents a significant increase over the numbers observed during the previous decade. Since 1976 the lowest count was 58 (1976) and the highest count was 144 (1997). The long-term average of individually identifiable bears from 1976 to 2011 is 94 bears.

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 sub-adult 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 during 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.

There were 1,446 Bear Use Days at McNeil River Falls in 2011, which is up from the low of 781 Bear Use Days in 2005 and slightly lower than the 1,547 Bear Use Days in 2010. The lowest count was 709 Bear Use Days in 1980, which was the first year this data was recorded. The long-term average (1980 to 2011) of Bear Use Days is 1,219, while the 10-year average is 1,024. It is worth noting that 2011 Bear Use Days (1,446) may have been closer to the 2010 number (1,547) had staff started viewing at McNeil Falls earlier than normal. The chum salmon run began early at McNeil River during the 2011 season and therefore bears came earlier than usual to fish McNeil Falls. Bear viewing activities primarily remained at Mikfik Creek (which is the common viewing practice) until late June because the viewing there was very good. If staff had chosen to view bears at McNeil Falls consistently during the end of June, the 2011 Bear Use Days number may have been higher as there were also bears fishing McNeil River Falls at that time.

Table 1. Hourly Index Counts of brown bears at McNeil River Falls, McNeil River SGS, Alaska, 1993-2011.

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

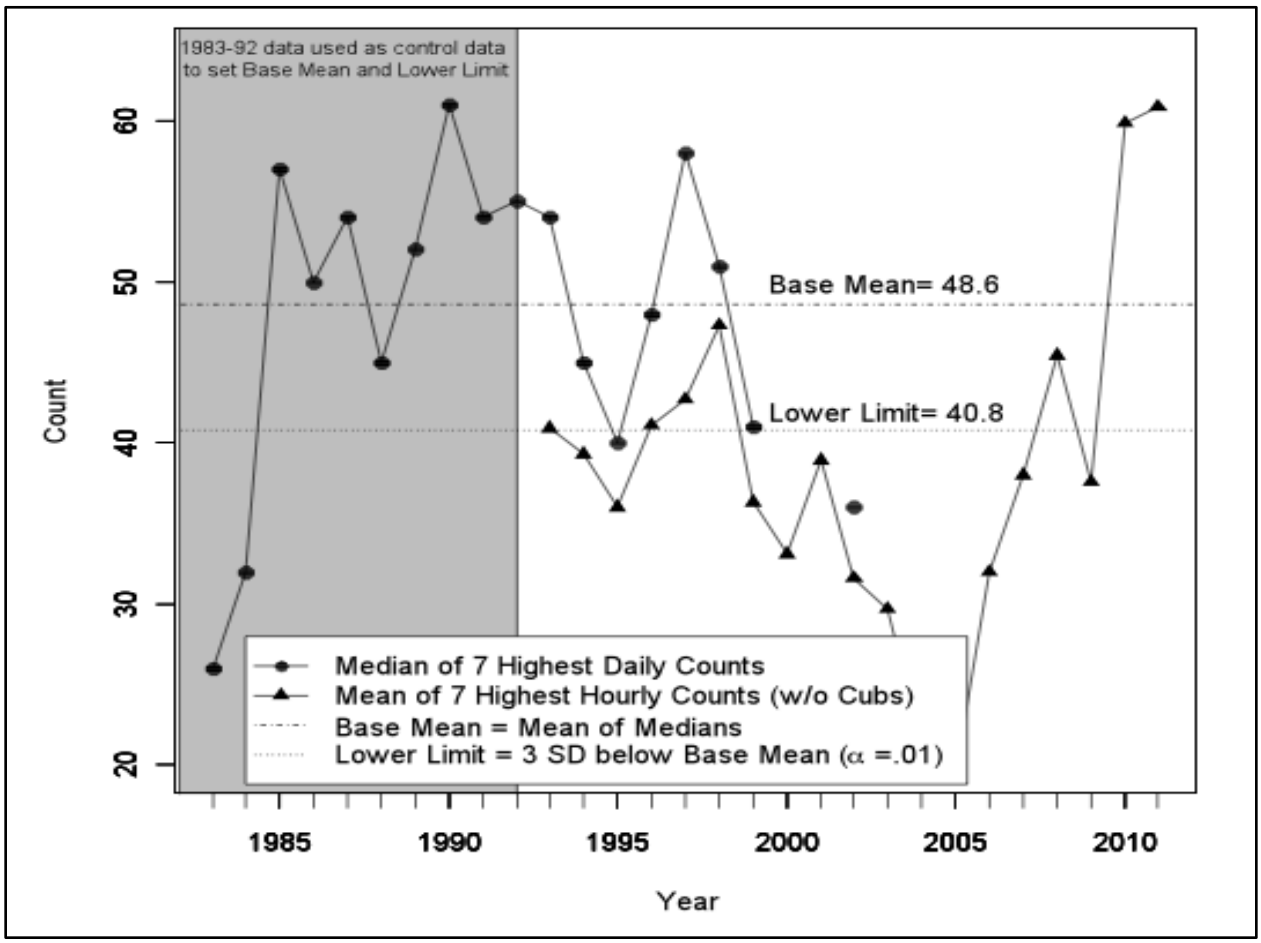

Figure 2. One-sided Shewhart control chart for the annual average of seven highest daily and hourly bear counts at McNeil River Falls, McNeil River State Sanctuary, Alaska, 1983 - 2011 (α = 0.01).

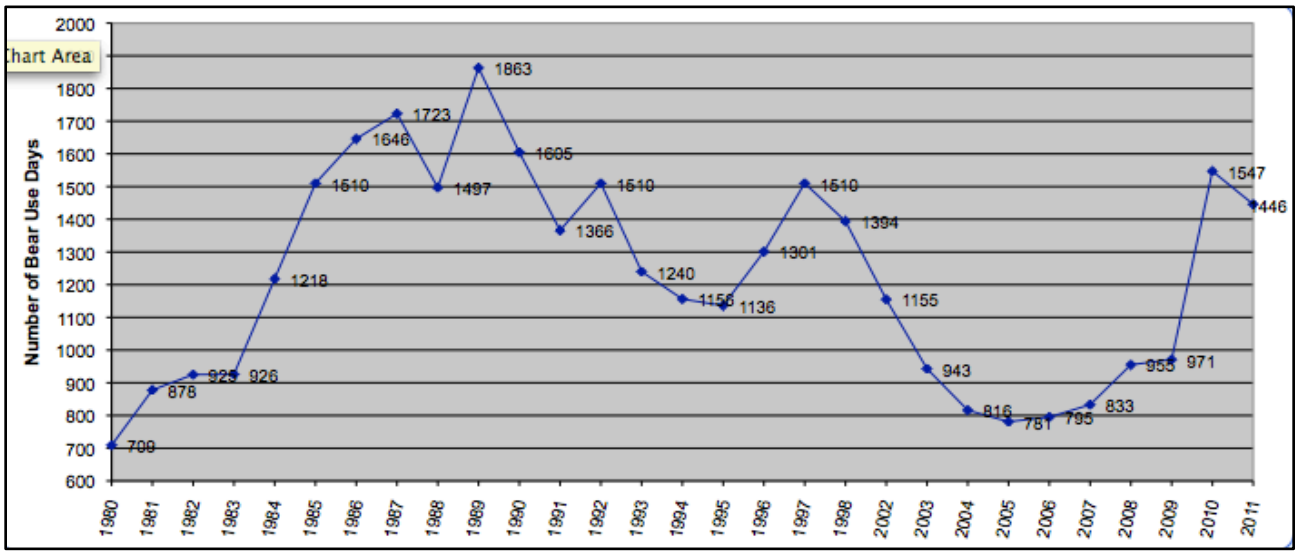

Figure 3. Bear Use Days* at McNeil River Falls, McNeil River State Game Sanctuary, Alaska, 1982 - 2011.

***** Annual summation of individual adult and sub-adult bears observed at McNeil 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 (Figure 4 & 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 2007-2011 (5-year) average of 69%.

There were 5 maternal females and 11 cubs observed within the viewing areas during 2011 (Table 2). It is noteworthy that the 5-year averages (Figure 6); starting from 1987-1991 and going through 2007-2011, exhibit an overall decline in maternal females in the past several decades. The number of sub-adult bears observed in 2011 was 10. In looking at the data, it can be observed that the average number of sub-adults declined steadily from the 1982-1986 (5-year) average of 14 to the 2002-2006 (5-year) average of 7, and then increased between the 2002-2006 (5-year) average of 7 and the 2007-2011 (5-year) average of 9.

Table 2. Composition of brown bears observed at McNeil River State Game Sanctuary, Alaska, 1976-2011.

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
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
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	**14**	**14**	12	8	16	12	13	14	7	9	16	20	22
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	**48**	**48**	53	45	45	39	41	40	46	45	40	56	56
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	**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	**73**	**69**	70	63	73	58	64	62	62	64	61	83	83
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	**4**	**4**	4	4	2	4	2	6	2	2	2	3	2
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	**2**	**2**	2	2	2	1	3	8	5	1	1	1	2
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	**0**	**0**	0	0	0	0	0	0	7	6	1	4	6
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	**6**	**6**	6	6	4	5	5	14	14	9	4	8	10
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	**79**	**75**	76	69	77	63	69	76	76	73	65	91	93
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
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	**99**	**90**	87	90	103	78	87	91	93	89	73	105	104

Notes: *(1)* Defined as 5.5 years old and younger from 1977 through the present.

(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.

Underlined Bold Numbers represent average of data four years prior and after (No data was recorded in 1999 & 2000).

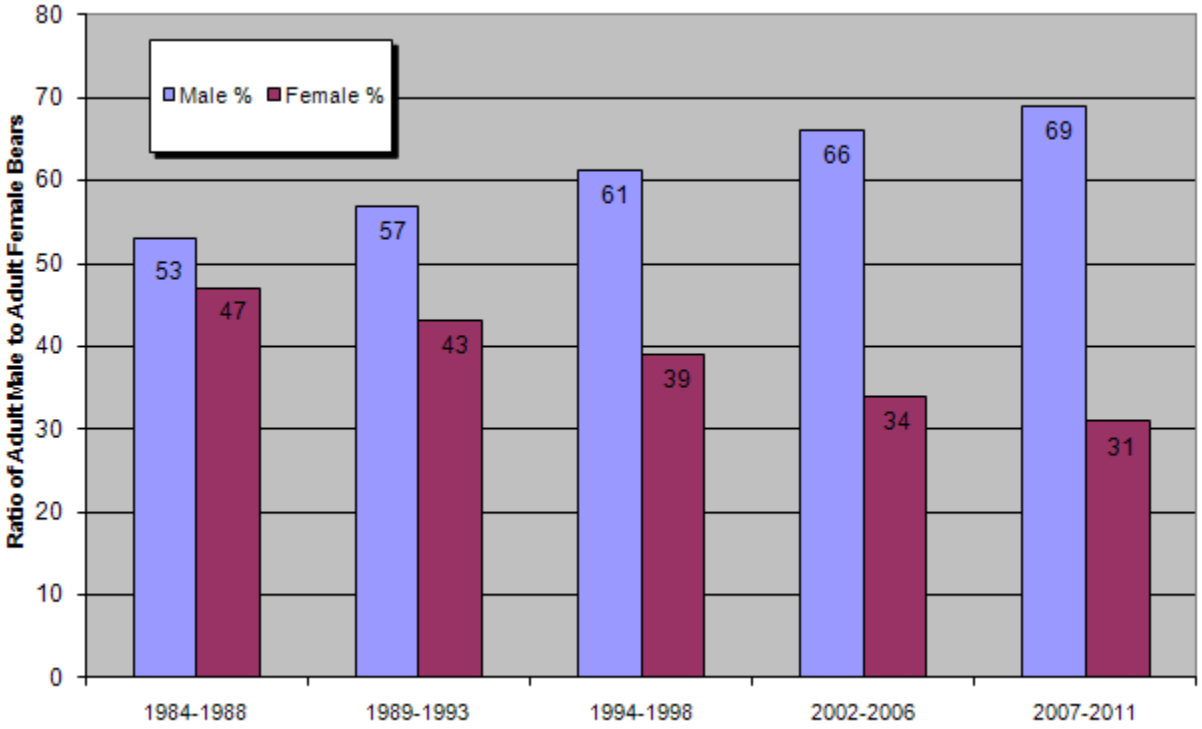

Figure 4. Average annual proportion of adult male and adult female bears observed at McNeil River State Game Sanctuary, Alaska, 1984 – 2011.

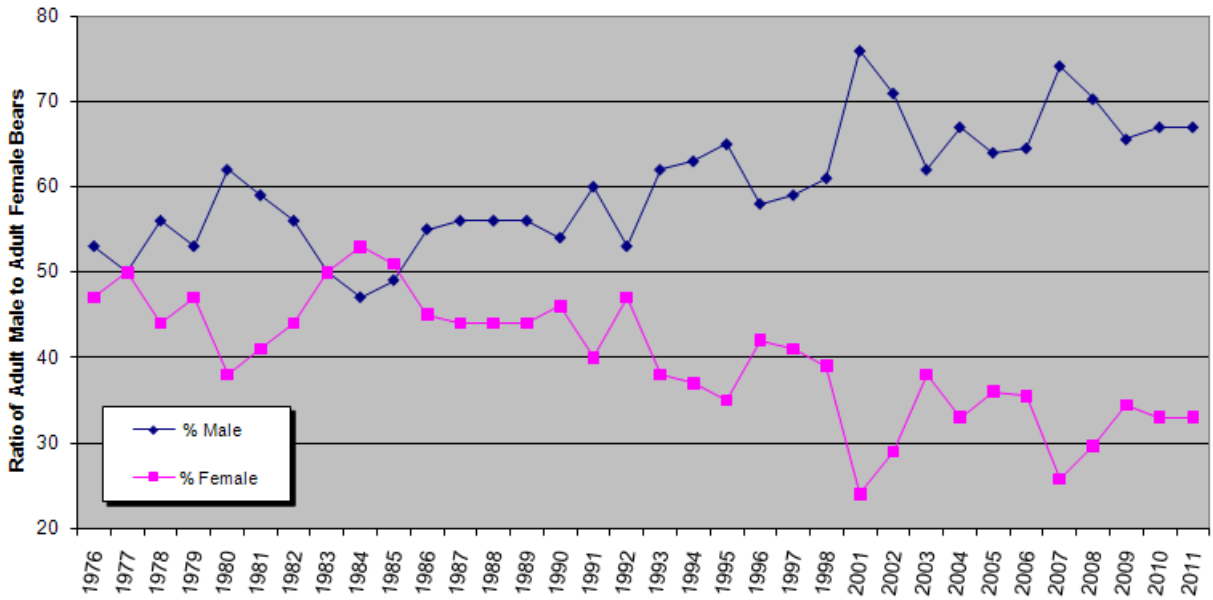

Figure 5. Annual proportion of adult male and adult female bears observed at McNeil River State Game Sanctuary, Alaska, 1976-2011.

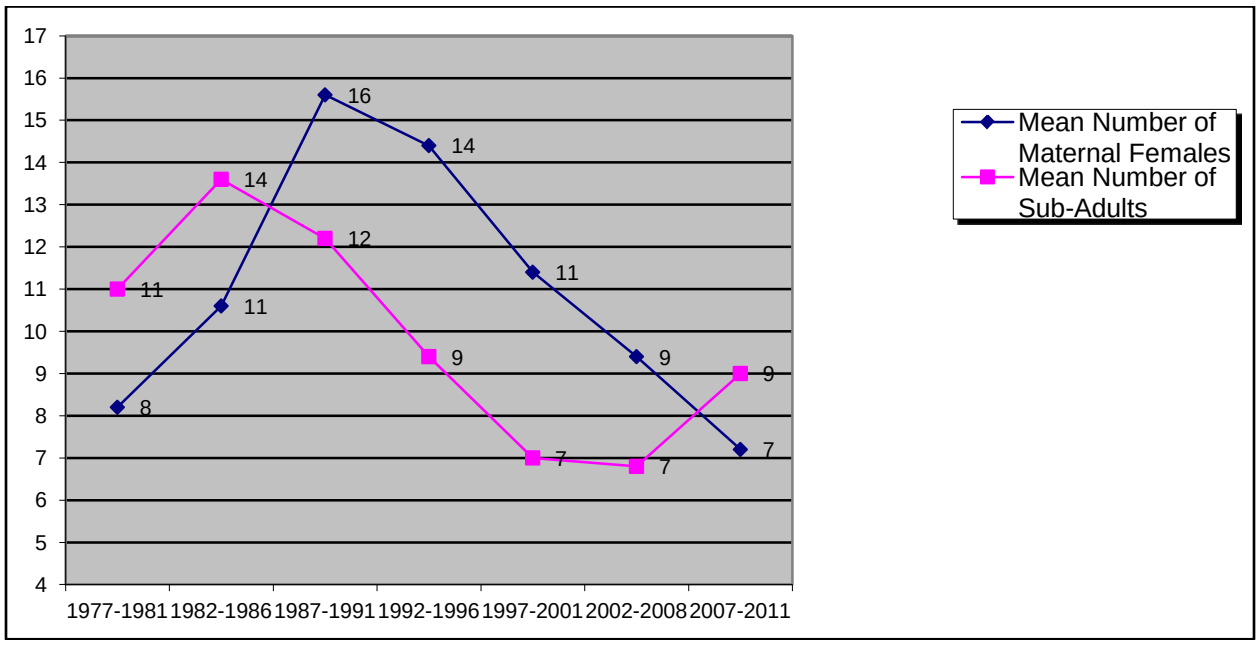

Figure 6. Average annual number of maternal females and sub-adult (both sexes) observed at McNeil River Falls, McNeil River State Game Sanctuary, Alaska, 1976-2011.

Bear Photo Identification Project

The field portion of the photo identification project was initiated in 2007. From 2008 to 2011, 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. The collection and cataloging of bear photo data 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. In the 2011 season, ADF&G staff Drew Hamilton installed Picassa (photo-editing software) so that staff could more easily catalog and sort individual bear photographs.

In 2006 Friends of McNeil River (FOMR) and McNeil River staff had the idea to utilize future cataloged photos of individual bears to create a field book that would augment the visitor experience. A first edition was printed in 2009. Then, utilizing photos from 2007-2009; a second edition was printed for use in the 2010 season and sold in 2011, as well. FOMR volunteers, current and former ADF&G Sanctuary staff, and past Sanctuary visitors/photographers participated in the project. The book contains information about MRSGS and MRSGR, maps (regional, Sanctuary trails, and camp), bear safety, plant, mammals, birds, descriptions and identifying photos of more than 30 brown bears, as well as space for keeping notes.

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 four guide services operating in 2011 the average number of bears seen per day on the Kamishak River from 7/22/11 through 9/4/11 was 8.4.

Chenik Creek

The Department does not conduct bear surveys in the Chenik Creek drainage; however, during the 2011 season, assistant sanctuary manager Tony Carnahan and staff member Drew Hamilton both visited Chenik Creek and made these opportunistic observations. On July 16, Tony observed 14 bears total in the lower Chenik Creek / lagoon area with the following composition: one female and three yearlings, one female and one yearling, one female and two 2.5 year old cubs, two adult females, one sub-adult, and two adult males. Drew visited Chenik Creek between June 30 and July 2, and observed 13 bears total in the lower Chenik Creek / lagoon area with the following composition: one female with three 2.5 year old cubs, two adult females, two adult males, and five unknowns.

A long time private bear-viewing guide operating in the Chenik Creek area between July 1 and July 17 also consistently observed bears fishing in the lower Chenik Creek / lagoon area. He reported, a high count of 22 bears seen at one time on July 10. Through observations on multiple visits he estimated up to 30 individual bears total using the area with the following composition: three females with six cubs, eight adult females, seven adult males and six sub-adults.

Historic Brown Bear Use Patterns

The number of individual bears observed at McNeil River increased from a 24 year low of 78 bears in 2004 to 105 individual bears in 2010, then slightly decreased to 104 bears in 2011. The brown bear monitoring program at McNeil River indicates 1) an increase in the number of bears observed over the last seven years and 2) a continued shift in the sex composition of bears viewed. The reasons for these changes are not well understood but do not appear to be influenced by the sanctuary viewing program; sanctuary, refuge, or fisheries management actions; current hunting practices; or land use activities in the region. In 2002 Department staff conducted a preliminary assessment of historic bear-use at McNeil River including overall numbers and changes in sex and age composition, brown bear harvest from surrounding areas, and salmon escapement at McNeil River and surrounding systems. While results suggest some correlations may exist, more in-depth research is needed to better understand the effects that salmon escapement in McNeil River (and nearby drainages) have on bear use of McNeil River SGS & SGR. Likewise, more information would be needed to better understand the effects of legal hunting outside the sanctuary on bears that may frequent McNeil River.

As discussed in more detail in the Fisheries section below, McNeil River has experienced a long-term trend of low chum salmon returns that frequently fails to achieve the escapement goal. It is worth noting that the chum salmon run during the 2011 season was stronger than in recent years and the strongest year since 1997. The commercial seine fishery in waters of McNeil River Subdistrict has been closed for the duration of the chum salmon return every season since 1997 and virtually no commercial harvest of this stock has occurred since 1988. Periodic low salmon returns may result in a short-term increase in bear-use as they expend more effort and time catching enough fish to meet their nutritional requirements. Long-term fish shortages may alter established use patterns as bears seek alternative sources for salmon or other sources of food. In addition to the size of the salmon run, the timing of the run also appears to influence the number of bears utilizing McNeil River. An evenly distributed run will generally attract more bears to the falls while a similarly sized run that arrives in a relatively short period

will not afford a larger number of bears the opportunity to catch fish, thus they seek food elsewhere. Comparatively strong chum salmon returns throughout Lower Cook Inlet in eleven of the past twelve years (with the unique exception of the McNeil River system) and strong sockeye salmon returns to some nearby Bristol Bay drainages may have contributed to the prior declines in bear use by attracting bears away from McNeil River in the past. This, however, does not explain the high bear numbers at McNeil during 2010 when the McNeil River chum run was relatively poor. In 2011, there were high bear numbers again and an improved chum salmon run.

Observations at McNeil River also indicate that during periods of prolonged salmon shortages, the most dominant bears (generally larger males) occupy the most successful fishing spots and preclude use by less dominant bears. The least dominant bears (sub-adults and maternal females) typically fish in the less desirable locations downstream of the falls. In this area, they frequently consume partially eaten fish or fish scraps discarded by the more satiated bears upstream. During periods of diminished runs, overall fishing effort is less successful, particularly in the less desirable locations. Additionally, the dominant bears occupying the desired locations typically consume the entire fish, as they are not reaching satiation, leaving no opportunity for scavenging bears downstream.

In addition to commercial fishery closures, various management actions including artificial enhancement of the chum salmon population were also considered at one time or another. However, sanctuary managers felt that these actions would have minimal or no effect on the McNeil River bear population; or in the case of fisheries enhancement, would not be feasible nor consistent with management goals of the sanctuary. Managers did feel that further study of potential bottlenecks to the freshwater production of McNeil River chum salmon might provide insight into future management actions to benefit resources in the Sanctuary. In 2003, a survey was conducted to evaluate the availability of spawning habitat above and below McNeil Falls. The Department also conducted a chum salmon radio telemetry study during 2005-2006 to determine spawning distribution and estimate the average stream life of McNeil River chum salmon. Results from the telemetry study were used in a retrospective analysis of historical escapements above and below McNeil Falls. That analysis resulted in an increase in the escapement goal range for McNeil River chums in 2008, intended to stimulate greater utilization of underused spawning habitat upstream of the falls when the run recovers (see Fisheries section below).

Other Wildlife

General Observations

During the 2011 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 2011 season. Some were species that are regularly seen in the MRSGS, including Wilson's Snipe, Golden-crowned Sparrows, Savannah Sparrows, American Robins, Hermit Thrush, Tree Swallows, Glaucous-winged Gulls, Brant, Green-winged Teal, Common Ravens, Common and Red-breasted Mergansers, Greater Yellowlegs, Northern Pintails and Bald Eagles. Less frequently seen birds were also observed, including Tundra Swans, Black Oystercatchers, Pelagic Cormorants, Merlin and Peregrine Falcons. Willow Ptarmigan were again observed on the McNeil River trail, while Pigeon Guillemots and Black Scoters were observed at McNeil Head. Horned Puffins were also observed at McNeil Head, which is noteworthy since Puffins have not been observed in the vicinity of McNeil Head in recent years. It is also notable that a Pomarine Jaeger was observed at McNeil Falls on August 4.

Marine mammal sightings during the 2011 season were limited exclusively to Pacific Harbor Seals. These Harbor Seals were generally seen at high tide throughout the season in MRSGS waters, namely in the lagoon, McNeil Cove, and the lower tidal areas of McNeil River and Mikfik Creek.

As for terrestrial mammals, a moose was observed on the trail to McNeil River on June 27. On July 6, a gray wolf was seen at McNeil Falls and passed within 50 feet of the bear-viewing pad. Several Arctic Ground Squirrels were observed in camp and, once again, a red fox family took up residence in a den near camp. The adult fox and two kits were involved in an unusual wolverine predation event at the end of the season on August 22. The wolverine was after the fox kits and the predation event could be deemed unusual due to the proximity the wolverine maintained to camp, and humans, on and off during a day-long period. It was determined by ADF&G Staff that one of the fox kits fell prey to the wolverine based on soft tissue findings near camp. The fox appeared only to have one kit after the full-day predation event. The vocalizations of the adult fox were notable as the event unfolded over the course of the day. Because wolverines are so elusive, this predation event provided much excitement for staff and visitors.

Also of note during the 2011 season were the deaths of two Bald Eagles in the Mikfik area of MRSGS. After several days of unusual behavior, the first eagle died and approximately one week later a second eagle was exhibiting similar behavior and eventually found dead. This second specimen was sent to the USGS National Wildlife Health Center for necropsy. It was determined this adult male eagle was emaciated and had died from a severe *Aspergillosis fumigatus* infection of the lungs and air sacs in the upper body. No other infectious diseases were detected, lead levels in the liver were below detection and tests for avian influenza and West Nile virus were negative. According to Dr. Kimberley Beckman, Aspergillosis is the most common infectious disease that kills birds in Alaska.

As detailed below within the Mikfik Creek Video Research section, Commercial Fisheries Division staff recorded 1,398 hrs 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, various waterfowl, and river otters. Brown bears transited the field of view of the camera in 36 instances. Most of the bears were observed between June 16-24 and July 15-20.

Hunting & 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 – 2011 are summarized in Table 3. Data for 2010-2011 is 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 mi^2 currently open to hunting.

The long-term average harvest from areas surrounding McNeil River SGS (outside the sanctuary) from the period 1980/81 thru 2008/09 is 78 brown bears every two years (39 bears annually). The tally for the two-year period including 2010 and 2011 has 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), and 73 (2008-2009). 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 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 non-existent. A few moose are taken from the reporting unit that contains the MRSGR; however, this unit also includes lands outside of the refuge.

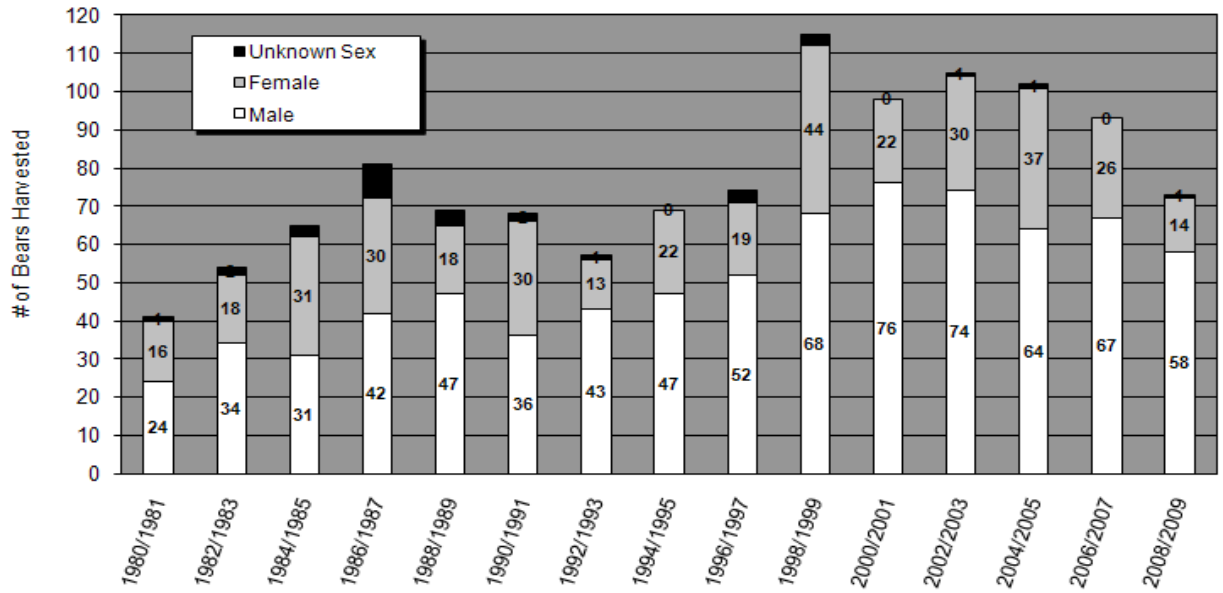

Figure 7. Brown bear harvest from areas surrounding the McNeil River State Game Sanctuary and Refuge, Alaska, 1980-2009 (harvest from GMU/UCUs: 9A/201, 301, 401, 501; 9B/301; and 9C/101, 201,301, 601, 702, and 703). Two consecutive regulatory years* are lumped. This graph does not include harvest data for 2010-2011 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 - 2011

YEAR	Brown Bear		Black Bear		Caribou		Moose		Beaver		Lynx		Marten		Otter		Wolf		Wolverine	
	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/R *	Adjacent Areas**	MRSGS/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	3	102	0	1	0	33	2	15	0	0	0	0	0	0	0	2	0	1	0	2
2005			0	6	0	51	2	17	0	1	0	1	0	0	0	0	0	8	0	0
2006	4	93	0	2	0	25	0	10	0	0	0	4	0	2	0	1	0	2	0	7
2007			0	2	0	0	2	16	0	0	0	1	0	1	0	3	0	3	0	4
2008	4	73	0	1	0	5	0	18	0	4	0	3	0	0	0	0	0	4	0	2
2009			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	15	0	27	0	0	0	8	0	2	0	2
2011***	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~	~

* 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.

*** Harvest data for 2011 is still being gathered and is incomplete (numbers subject to change).

III. 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. In 2011, generally good weather and stream conditions allowed for effective aerial surveys. 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 2011 cumulative McNeil River chum salmon aerial survey escapement index was estimated at 30,977 fish (Table 4). This season was the 23rd consecutive year the McNeil River chum salmon run failed to produce a significant harvestable surplus; however, chum salmon escapement into the system did exceed the low end of the sustainable escapement goal range of 24,000-48,000 chums (Figure 8). The number of spawning chum salmon documented upstream of McNeil River Falls in 2011 was considered excellent and was the highest observed during the past 19 seasons. Chum salmon were consistently seen above the falls during aerial observations from June 28 through the last survey on August 11th. A peak daily aerial estimate of 4,200 chums upstream of McNeil River Falls occurred on July 6. By comparison chum returns to other Kamishak Bay District systems in 2011 were also reasonably strong for the 11th time in the past 12 seasons. Despite the relatively strong returns, low fishing effort contributed to a district-wide commercial harvest of just 3,850 chums, the lowest total since 2007. The 2011 run timing of McNeil River chum salmon seemed somewhat earlier than previous years.

For McNeil River to realize its full productive capacity, favorable spawning habitats upstream of McNeil Falls need to be consistently seeded by spawners. Approximately 10 km of quality spawning habitat exists upstream of McNeil Falls, compared to less than 1 km below McNeil Falls. At least three factors interact to determine how many chum salmon ascend McNeil Falls: 1) the density of fish below McNeil Falls, 2) river discharge, and 3) the number of bears at McNeil 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 2007). 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 Falls was much higher than the stream life for fish spawning below McNeil Falls.
- Ninety percent of the tagged fish above McNeil Falls lived long enough to spawn, whereas, 47% of the tagged fish below McNeil 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 Falls.

Using this information, Division of Commercial Fisheries staff conducted an in-depth retrospective analysis of historical chum salmon escapements above and below McNeil 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 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 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 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 30,977 chum salmon for McNeil River in 2011.

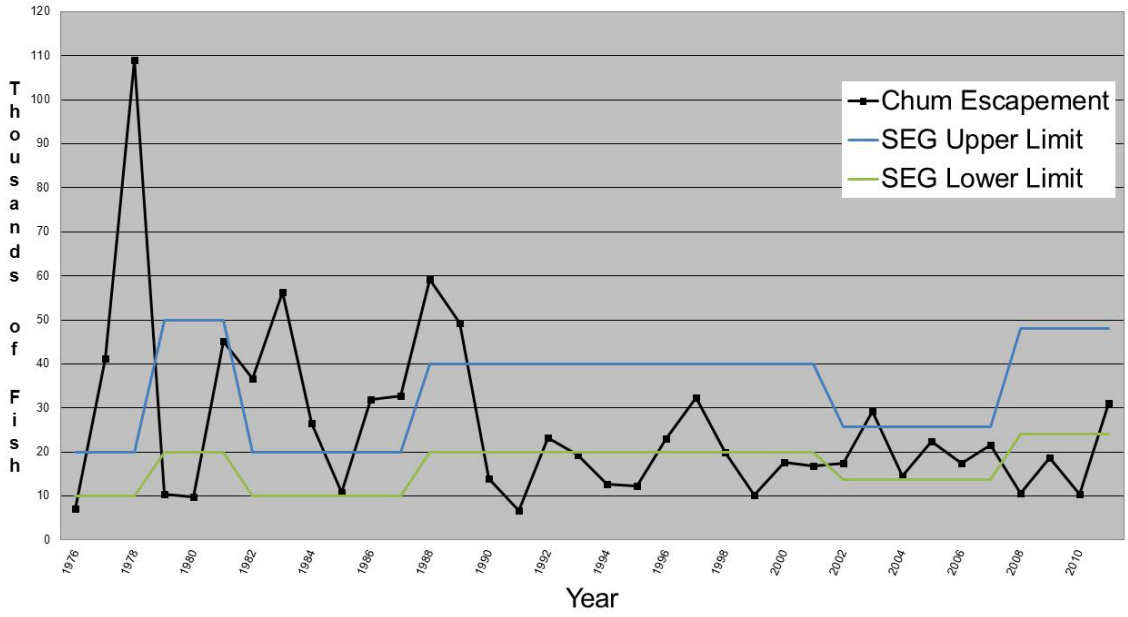

Figure 8. McNeil River chum salmon escapement 1976-2011, McNeil River State Game Sanctuary, Alaska.

Table 4. Aerial escapement estimates of salmon in the Mikfik Lake and McNeil River drainages, McNeil River SGS, Alaska, 2011.

Survey Date	Mikfik Sockeyes (Daily)[a]	McNeil Chums (Daily)[a]
5/27/11	0	
5/30/11	0	
6/6/11	0	
6/10/11		
6/23/11	0	
6/28/11		**7,500**
7/2/11		**5,804**
7/6/11		**19,241**
7/8/11		**8,880**
7/15/11	160	**10,082**
7/20/11		**3,622**
7/27/11	124	**2,670**
8/11/11	244	6,242
8/28/11	395	
Escapement Index	**395[b]**	**30,977[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 peak daily count from all the aerial surveys flown that year.
[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 2011 Mikfik Creek/Lake estimated escapement as determined through aerial surveys, at 395 sockeye salmon, fell well below the SEG range of 6,300 - 12,150 (Table 4). On June 23rd, 5,120 salmon were observed in the intertidal waters of McNeil Lagoon. Although they were initially identified as sockeye salmon, post season analysis of the run suggests they were likely early run chum salmon returning to McNeil River. A video camera attached to a digital video recorder (see below), used to document sockeye salmon escapement into Mikfik Creek/Lake again this season, showed a cumulative total of only 244 fish actually escaping into the lake. A late season aerial survey of Mikfik Lake conducted on 28 August produced a similarly low estimate of 395 fish. Post-season evaluation indicated that run timing of sockeye salmon into Mikfik Lake was a little early, with over 85% of the escapement reaching the lake by June 14th, despite a fairly typical run entry into McNeil Lagoon (June 6-10).

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 2011, 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 2011 escapement cumulatively estimated by remote video as 10,330 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 2011. Visitors and ADF&G staff harvested approximately 29 sockeye salmon, 16 chum salmon, 5 pink salmon, and 4 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 2011 season, four lodges and transporters reported a total of 267 angler use days during 89 days within the sanctuary for sportfishing. Wildlife viewing, primarily brown bears, was also a significant part of their activities. These anglers reported catching 3,393 fish, of which 52% were Dolly Varden, 30% were coho salmon and 18% were chum salmon. Nearly all Dolly Varden were released as were most pink and chum salmon. Eighty-five percent of all fish caught were released.

Table 5. Visitor Use and Sportfish harvest reported from Kamishak River Drainages, McNeil River SGS, Alaska, 2011.

# of Days in SGS	# of Guide Use Days	# of Angler Use Days	# of Non-Angler Use Days	COHO SALMON		CHUM SALMON		PINK SALMON		DOLLY VARDEN		
				Kept	Released	Kept	Released	Kept	Released	Kept	Released	# of bears
89	143	267	0	399	603	32	564	0	14	74	1707	749

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 2011, cursory surveys of the Paint River area were conducted with no salmon observed in freshwater and no significant numbers in saltwater in that immediate area.

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.

At this time there are no definitive plans to conduct any salmon stocking of the Paint River system, but that option remains a possibility and CIAA is investigating potential options for pink and chum salmon enhancement. While no specific plans are in place, discussions are ongoing within CIAA regarding development of a return to Paint River.

During June 2011, CIAA staff completed maintenance repairs and grating improvements started in 2010 and opened the ladder to water flow for evaluation purposes and potential salmon colonization. CIAA staff returned in September and October 2011 conduct site inspections and to insert stop logs, closing and diverting flows from the ladder for the season. During CIAA visits no fish or bears were observed in the area of the fish ladder. ADF&G Commercial Fish staff also included a check of the Paint River Fish ladder in their Mikfik Creek and McNeil River escapement aerial surveys. While a few fish (6) were seen in Akjemguiga Cove on one occasion, no fish were observed near or believed to be using the ladder or the Paint River. On July 20, 2011 under excellent aerial survey conditions, ADF&G staff surveyed the Paint River approximately 1.29 miles upstream of the ladder; no fish or bears were observed.

IV. Public Use & 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 and adopted by the Alaska Board of Game (5AAC 92.065 and 5AAC 93.030) 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-Alaskan residents. Camp-Standby Viewing Permit holders are assessed a permit fee of $75 for each Alaskan resident and $175 for each non-Alaskan 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-Alaskan Resident.

In 2011, the ADF&G received 751 applications for McNeil River Guided and Standby bear viewing permits. Payments were received for 169 Guided Viewing Access permits and 31 Standby Viewing Access permits. There were 11 Special Access (Science-Education/Commissioner) permits granted by the Commissioner. Overall, there were 195 permit holders (Guided Viewing, Camp Standby, and Special Access) who visited the sanctuary (Table 6) in 2011. The 5-year annual visitation average (2007-2011) is 175. The average number of permits used each day (permittees that bear viewed) at the sanctuary in 2011 was 8.4 (out of a maximum of 10.0). This number was in part the result of 10 guided permit holder no shows, 6 standby permit holder no shows, and 31 standby permits that were not filled. Of the 195 visitors to McNeil River in 2011, 61% were Alaska residents and 39% were non-residents. Coincidentally, of the 211 people who purchased permits, the ratio was also 61% resident to 39% non-resident.

The 11 Special Access permits issued in 2011 included the following recipients: ADF&G Hunter Education and Wildlife Education volunteers, the Great Bear Foundation, Alaska State Parks, KTUU-Channel 2 News, State Legislative Affairs, staff, and the UAA Planetarium and Visualization Theater.

In 2011, $64,250 was generated from the McNeil River sanctuary permit program and deposited in the state's General Fund.

During 2011, eight Commercial Transporter Permits were issued to commercial operators for the purposes of transporting clients to the ADF&G McNeil River camp for bear viewing.

Kamishak River

Lodges and air charter services conduct sport fishing and wildlife viewing trips within the Kamishak River drainages within the MRSGS 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. 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 that hold ADF&G Special Area Permits for boat storage at this location 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."

Four commercial sport fishing guide services operated in the Kamishak River area of the MRSGS in 2011 and spent 410 visitor use days in the sanctuary, which included 267 angler use days and 143 guide use days. These operators 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

Two commercial bear viewing guide services from Homer brought clients to the Chenik area in 2011. These services obtained special area permits for temporary tent camps at Chenik Lake in 2011 and reported a total of 97 visitor use days, including 34 guide use days. Private groups were also known to have visited the Chenik area in 2011.

Bear-Human Conflicts

As detailed above there were 1,089 user days associated with the ADF&G's bear viewing program at the McNeil River camp. An additional 507 user days were reported by area guides utilizing the Kamishak River and Chenik Creek areas of the MRSGS / MRSGR. All 1,596 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 2011 season, there were no reported adverse interactions between bears and people in the MRSGS or MRSGR.

Land Use Permitting

The ADF&G Wildlife Conservation Division 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 (five year term, 2008 – 2012) 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 nine Special Areas Permit and twelve Commercial Access Permits were issued during 2011. These included the Special Areas and Commercial Access Permits issued to the commercial operators in the McNeil River, Kamishak River and Chenik Creek areas; as well as Special Area Permits issued to: CIAA for

maintenance and repairs to the Paint River Fish ladder; the USDA NRCS for establishment of a Snotell Site at McNeil River Camp; and the ADF&G Division of Commercial Fisheries for remote camera operations at McNeil River Falls. There were no mineral resource development activities permitted or reported to the Department within the McNeil River SGS or SGR during 2011.

Table 6. Historic Visitor Use at McNeil River State Game Sanctuary, Alaska, 1984-2011.

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	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

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 joing 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 Santuary 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.

V. Fish & 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 14th consecutive season. This project has already proven invaluable to both inseason 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 2011, the video system at Mikfik Creek/Lake was installed on June 1 and shut down on July 24. The system operated continuously during daylight hours (~20 hrs/d) and successfully recorded images approximately 85% of the time that it was programmed to operate between June 1 and July 24 (1,398 hrs). The peak of the run into Mikfik Lake occurred during June 13-15, with 90% of the sockeye salmon return entering the lake over that 3- day period. Unfortunately, due to a mechanical failure, no images were recorded June 28 - July 9, resulting in approximately 212 hrs of “down time”, but fish passage during this post-peak period was believed to be minimal based on subsequent aerial surveys and the extremely low number of fish observed after the camera failure.

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 2011. 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, 244 sockeye salmon were counted into the lake, representing 151 fewer fish than were estimated by the peak aerial survey of the lake. In order to remain consistent with the historical Mikfik Creek database and with the methods used to derive the Mikfik sockeye salmon SEG, aerial survey data were used to generate the 2011 spawning escapement index (395 sockeyes). LCI staff are currently studying the best approach for integrating the video counting estimates into the historical escapement database and for developing a new escapement goal tailored to video-based escapement monitoring.

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 1,398 hrs of recorded video between June 1 and July 24, reviewers documented 36 instances where brown bears transited the field of view of the camera, an average of approximately 0.67 bears per day of successful video operation (n=54 d). Most of the bears were observed between June 16-24 and July 15-20. Nearly all sightings were of individual bears, but a few sightings were of females with one or two cubs. Other wildlife observed included moose, eagles, beavers, various waterfowl, and river otters.

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 Falls. This research provided data and streamlined video sampling methodologies that allowed estimating the total 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 in the McNeil system. Preliminary results and analysis determined that the data and modeling was a useful tool for estimating the removals of pre-spawning chums at McNeil River. In 2011 the ADF&G Division of Commercial Fish implemented the project, with minor changes to the equipment, to gather data to use in refining estimates of chum salmon spawning escapement into McNeil River. This video data are being reviewed this winter and results should be available in spring 2012.

Sea Otter Carcass Surveys

In August of 2005 the Southwest Alaska population of northern sea otters was listed as threatened under the ESA. The listed population ranges from Kamishak Bay in lower Cook Inlet to Attu Island in the western Aleutians. Disease is one of several lines of investigation being explored to understand the reasons for the decline in the listed population. Since 2001 the U.S. Fish and Wildlife Service (the Service) has been developing a sea otter stranding network in Alaska in order to obtain baseline data on health and disease of this nearshore-sentinel species. Data obtained from dead otters is compared to health assessments of live-captured otters to determine impacts (if any) disease may have on the population. The Service has had great success in receiving carcasses from areas adjacent to large human population but lacks data from many areas in the state due to their remote location.

In September of 2006 an Unusual Mortality Event was declared for northern sea otters in Alaska. This was prompted by a large number of animals dying from Streptococcus bovis endocarditis/septicemia (SBE/S) in the area of Kachemak Bay. In the summer of 2008 the Service had numerous reports from Kamishak Bay about dead sea otters. The ADF&G camp at McNeil Cove responded to this event by retrieving dead otters

and shipping them to the Service in Anchorage for necropsy. Every carcass was examined by a veterinarian familiar with marine mammal necropsy techniques or a board-certified veterinary pathologist. Samples from dead otters were submitted for testing at the Wildlife Health Center located at U.C. Davis for histological examination. It was discovered that these otters were succumbing to Streptococcus bovis endocarditis/septicemia (SBE/S). Prior to 2008 the Service had no data from Kamishak Bay to assess whether SBE/S was a factor for listed otters from this area.

In response to this event ADF&G invited Verena Gill, a wildlife biologist with the Service's Marine Mammals Management office, to visit McNeil in July 2008 and assess the potential for collaboration between the two agencies. During this time over twenty miles of coastline were surveyed, 3 sea otter carcasses were retrieved and processed, staff were trained in collection procedures, and a procedure for future systematic beach walks was established.

In 2009 Verena Gill (USFWS) and ADF&G secured Federal Aid funding (Cooperative Endangered Species Conservation Fund (Section 6 ESA – 75% plus 25% state match) for a three year (2009-2011) project to search for and gather northern sea otter carcasses in the Kamishak Bay area and to have necropsy, histology, and diagnostic analysis conducted. The project consists of the following: Foot surveys from Contact Point (Amakdedori Beach) to the Kamishak River and around Augustine Island for an annual survey of winter kill sea otters in Kamishak Bay; Systematic weekly beach surveys in and adjacent to McNeil Cove looking for dead sea otters found; sending tissues samples to UC Davis for further analysis; and entering data into an existing Access database.

The initial 2010 systematic beach survey from the north end of Amakdedori Beach to McNeil camp began on May 27 and concluded on May 29. During that survey, 9 possible sea otter carcasses were found (3 confirmed and 6 suspected). From June 14 through August 12, there were eight subsequent systematic beach surveys north or south from camp. No carcasses or skulls were found on any of these surveys. Furthermore, no samples were sent in for analysis from the original 9 possible sea otter carcasses as no soft tissue was found. No necropsies were performed for the same reason. Although no carcasses were in good enough condition for in-depth analysis, the lack of dead sea otters is an informative data point.

The initial 2011 systematic beach survey from the north end of Amakdedori Beach to McNeil camp began on June 12 and concluded on June 15. During that survey, the skeletal remains of only two sea otters were found, although numerous marine mammal bones were located that could not be identified to specific species. Additionally, a sea otter skull was found at McNeil River camp the week before the systematic survey. All three skulls (FW11027, FW11028, and FW11029) were brought back to the Service's office in Anchorage for age analysis. From June 16 through August 17, there were six subsequent beach surveys north or south from camp. On 8 July an intact adult male sea otter carcass (FW11044), weighing 98 lbs, was found and sent into the Service for a full necropsy. Cause of death could not be determined as the carcass was too decomposed. However, hard parts were collected for archive and age analysis. On the 17 July, the remains of two other sea otters were found but there was not enough material for a necropsy. One of these carcasses (FW11049) still had an intact skull so it was collected for age analysis. In summary, six confirmed sea otters were found in Kamishak Bay during the 2011 surveys.

VI. Sanctuary Administration & Management

Staffing

Sanctuary Manager Tom Griffin completed his twelfth season at McNeil River, his second as manager. Assistant Sanctuary Manager Tony Carnahan and Drew Hamilton (Wildlife Technician III) both completed their second season as McNeil River staff members. Staff arrived at the McNeil River camp on May 30, 2011and pulled camp on August 27, 2011. We were very fortunate to have John Hechtel (retired ADF&G bear researcher) and Larry Aumiller (previous McNeil River Sanctuary Manager) as fill-in guides when regular staffs were on leave. In addition to their normal duties at the sanctuary, the McNeil staff completed the ADF&G Fire Arms Safety training. Tony Carnahan also completed Wilderness First Responder training.

Volunteers

A crew of 6 volunteers worked at MRSGS from June 1 to June 6, 2011. The volunteer crew along with staff performed a variety of tasks prepping camp and sanctuary trails for the 2011 season. Volunteers assisted with a number of tasks around camp including chopping/stacking firewood, cleaning and preparing the buildings and assisting staff with building and equipment maintenance projects. Volunteers and staff also spent several days on trail maintenance activities.

Facilities

A number of facility management and maintenance activities occurred during the 2011 season. ADF&G staff Tom Griffin, Tony Carnahan, Drew Hamilton, with the volunteer crew, conducted maintenance on a 1/4-mile stretch of the McNeil Falls Trail. In addition to performing general maintenance tasks throughout the season, staff graveled the viewing pad at McNeil River Falls and put sod in place there to mitigate the effects of erosion. In Staff Cabin #2, Tony Carnahan reconfigured the solar panels, replaced a substandard window on the west wall, and performed aesthetic and functional improvements to the woodstove firewall. Tony also replaced a leg and ladder on the camp cache using driftwood. Tony Carnahan and Tom Griffin together installed six new crib foundations (4x4' cribs made of pressure-treat lumber) to replace the old pilings and level the cook shack. Larry Aumiller did facilities work during the 2011 season, as well. He completed aesthetic and functional improvements to the woodstove firewalls of the research quarters and the sauna. The work done on the sauna greatly improved its efficiency and heat retention. Larry also completed a number of general maintenance tasks around camp as needed.

VII. Acknowledgements

Sanctuary Manager Tom Griffin, Assistant Sanctuary Manager Tony Carnahan, and ADF&G Wildlife Technician Drew Hamilton 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. Meghan Riley (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, fish enhancement, and fish research. Nathan Weber (CIAA) provided information about Cook Inlet Aquaculture Association Paint River fish ladder activities. Mike Bouwkamp (ADF&G-DWC) provided bear viewing applicant information. Paul Blanche (ADF&G-DOH) provided Special Area Permit information. Verena Gill (USFWS) provided sea otter carcass survey information. Earl Becker (ADF&G-DWC) provided the Shewhart Control Chart.

Appendix A. List of Bears identified at McNeil River SGS, 2011

Individual Bears McNeil River SGS 2011

	Adult Males	Adult Females	Females w/young	Sub-Adults
1	Boog	Simba	Lax /3 coy	Yellow Collar
2	Holden	Sloth	Light Sow w/2 yearlings	Fluffy
3	Chops	Waterfalls	Dark Sow w/2 yearlings	Tiny
4	Brave Heart	Yolanda	Sow w/2 yearlings	Goober #1
5	Leo	Chrisco	Sow w/2 large cubs (2.5 years)	Goober #2
6	Teddy's Boy (TB)	Mouse		Red Sox
7	Jordan	Short Round		Calico
8	I-man	Holderman		Mickey
9	Otto	XL		Sub-adult #1
10	Derek	Bearded Lady		Sub-adult #2
11	L?	Gimpy		
12	Hot Lips	Smirkette		
13	Ted	Diamond-eyes		
14	Smirk	Rasta		
15	Aardvark	Lady Aardvark		
16	Pop-eye	Bulls-eye		
17	True Coat	Lady Gaga		
18	Donnie	Jughead		
19	Elvis	Ivory Girl		
20	Cliff	Platinum		
21	Ian	Black & Tan		
22	Panda	Sweet Cheeks		
23	Plunger			
24	Wolfgang			
25	2 Face			
26	Luther			
27	Ted-Like			
28	Rocky			
29	Twinkle Toes			
30	Right Slash			
31	Droop			
32	White Collar			
33	Not-Ears			
34	Dusty			
35	Beggar			
36	Scraper			
37	Slothman			
38	Ivan			
39	Pin Tail			
40	Left Check			
41	Ghost Bear			
42	Young White Claws			
43	Bobber			
44	Roman			
45	Ears			
46	Seuss			
47	Spots			
48	Hamburgler			
49	Chunky Monkey			
50	Lanky Slim			
51	Tina Fay (TF)			
52	Red Beard			
53	Seal Skin			
54	Asterisk			
55	Swiper			
56	Honey Badger			
57				

Totals	56	22	5	10
	Total Males: 56	Total Females: 27		**83 + 10 subs + 11 cubs = 104 bears**

Appendix B. 2011 Daily Wildlife Observations, McNeil River State Game Sanctuary.

Date	Comments
5/30/2011	Seen in camp: 1 Brown Bear (*Ursus Arctos*) grazing on sedge in front of camp (1st sighting), 1 Wilson's Snipe (*Gallinago delicata*) seen in camp, Golden-crowned Sparrows (*Zonotrichia atricapilla*), American Robins (*Turdus migratorius*), Savannah Sparrows (*Passerculus sandwichensis*), Hermit Thrush (*Catharus guttatus*), Tree Swallows (*Tachycineta bicolor*). Seen near camp or on the spit: 100 Brant (*Branta bernicla*), 1 Bald Eagle (*Haliaeetus leucocephalus*), 1 Common Raven (*Corvus corax*).
5/31/2011	Seen near camp or on the spit: 2 Common Mergansers (*Mergus merganser*), 2 Pacific Harbor Seals (*Phoca vitulina*), 100 Brant, 1 Common Raven, 1 Bald Eagle.
6/1/2011	1 Wilson's Warbler (*Wilsonia pulsilla*)
6/2/2011	1 Greater Yellowlegs (*Tringa melanoleuca*) and 1 Northern Pintail (*Anas acuta*) seen in Mikfik Sedge east. 1 Tundra Swan (*Cygnus columbianus*) in the lagoon. 1 Arctic Ground Squirrel (*Spermophilus parryii*) in camp.
6/3/2011	Seen in Mikfik Creek Tidal area: Sockeye (Red) Salmon (*Oncorhynchus nerka*, 1st sighting in Mikfik area), 2 Pacific Harbor Seals, 2 Common Mergansers. Seen in Mikfik Sedge east: 2 Greater Yellowlegs, Bald Eagles. 1 Bumble Bee seen near camp.
6/4/2011	1 Northern Harrier (*Circus cyaneus*) seen behind camp
6/5/2011	1 Greater Yellowlegs in Mikfik Creek riffle
6/6/2011	150 Brant seen flying around the spit in strong winds
6/7/2011	200 Brant sent flying in a tight formation above McNeil Cove. 8 Pacific Harbor Seals in Mikfik Creek tidal area. 2 Red-breasted Mergansers (*Mergus serrator*) in Mikfik Creek riffles. 1 Merlin (*Falco columbarius*) flying above Mikfik Creek lagoon.
6/8/2011	Seen in Mikfik Creek riffles: 21 Glaucous-winged Gulls (*Larus glaucescens*), 1 Greater Yellowlegs, 11 Bald Eages.
6/9/2011	2 Common Mergansers in Mikfik Creek riffle. 1 Spotted Sandpiper (*Actitis macularia*) in the lagoon.
6/10/2011	5 Bald Eagles
6/11/2011	8 Common Mergansers in Mikfik Sedge east
6/12/2011	2 Common Mergansers in Mikfik Creek tidal area
6/15/2011	1 Common Merganser in Mikfik Creek riffle
6/16/2011	1 Greater Yellowlegs and 14 Bald Eagles seen in Mikfik Creek riffle. Seen in Mikfik Sedge east: 1 Fox Sparrow (*Passerella iliaca*), 1 Savannah Sparrow, 1 Hermit Thrush.
6/17/2011	Seen at the Mikfik riffles: 1 Greater Yellowlegs, 11 Bald Eagles, 5 Savannah Sparrows.
6/19/2011	1 Fox Sparrow seen in camp. Nootka Lupine (*Lupinus nootkatensis*), Nagoonberry (*Rubus arcticus*) and Starflower (*Trientalis europea ssp. arctica*) seen near camp. Wild Geranium (*Geranium erianthum*) and Tall Jacob's Ladder (*Polemonium acutiflorum*) seen near the Mikfik Creek riffles.
6/21/2011	Large Leaf Avens (*Geum macropyllum ssp. Macrophyllum*) and Chocolate Lily (*Fritillaria camschatcensis*) seen near Mikfik Creek riffles. 1 Greater Yellowlegs seen in Mikfik Creek tidal area. 2 Common Redpoll (*Carduelis flammea*) seen in camp, in the alders in front of the front cabin.
6/23/2011	1 Wood Frog (*Rana sylvatica*) seen in camp.
6/25/2011	Wild Iris (*Iris setosa*) seen in camp. Seen on the West Bluff: Wild Iris, Wooly Lousewort (*Pedicularis kanei ssp. Kanei*), Nootka Lupine. 150 Chum (Dog) Salmon seen at McNeil River Falls (1st sighting).
6/26/2011	1 Dolly Varden/Arctic Char (*Salvelinus malma, S. alpinus*) in Walker Creek – 2 year old fish, found with blotchy fungus (saphrolignia)
6/27/2011	1 Common Redpoll and 1 Northern Harrier seen in camp. 1 Moose (*Alces alces gigas*) seen on the McNeil River trail.
6/29/2011	Seen at McNeil Head: 6 Pigeon Guillemots (*Cepphus Columba*), 8 Red-breasted

	Mergansers, 4 Brant, 12 Black Scoters (*Melanitta nigra*), 1 Moss Campion (*Silene acaulis*), 3 Threespine Sickleback (*Gasteorsteus aculeatus*).
6/30/2011	4 Willow Ptarmigan (*Lagopus lagopus*) seen on McNeil River trail. 10 Common Redpoll seen in camp. 1 Spotted Sandpiper seen near the pool McNeil River Falls.
7/2/2011	2 Willow Ptarmigan seen on McNeil River trail.
7/4/2011	5 Willow Ptarmigan seen at McNeil River Falls. 1 Dolly Varden/Arctic Char seen at McNeil River Falls.
7/5/2011	1 Red Fox (*Vulpes vulpes*) seen in camp.
7/6/2011	1 Gray Wolf (*Canis lupus*) seen at McNeil River Falls. 6 Pelagic Cormorants (*Phalacrocorax pelagicus*) seen at McNeil Cove, outside of spit.
7/7/2011	6 Pelagic Cormorants seen at McNeil Cove, outside of spit. 45 Bald Eagles seen from camp. 1 Arctic Ground Squirrel seen in camp.
7/13/2011	6 Bonaparte's Gulls (*Larus Philadelphia*) and 1 Black-legged Kittiwake (*Rissa tridactyla*) was found dead at the pad at McNeil River Falls.
7/15/2011	5 Common Mergansers and 8 Red-breasted Mergansers seen at McNeil River Falls. 3 Tree Swallows seen in camp. 1 American Dipper (*Cinclus mexicanus*) seen at Chenik Lake and 1 Willow Ptarmigan seen at Chenik Creek.
7/16/2011	1 Red Fox and 1 Hoary Marmot (*Marmota caligata*) seen at Chenik Head. 1 Black Oystercatcher (*Haematopus bachmani*) seen south of the Paint River.
7/17/2011	Seen at Horseshoe Cove: Beach Fleabane (*Senecio pseudo-arnica*), 2 Peregrine Falcons (*Falco peregrinus*), 2 Black-billed Magpies (*Pica hudsonia*) , 7 Pigeon Guillemot. 5 Common Ravens seen at McNeil Head. Sitka Burnet (*Sanguisorba stipulata*) seen on McNeil River Trail.
7/18/2011	1 Green-winged Teal (*Anas crecca*) seen at McNeil River Falls.
7/19/2011	1 Pelagic Cormorant seen from camp.
7/20/2011	1 Pine Grosbeak (*Pinicola enucleator*) seen on McNeil Coast.
8/4/2011	1 Pomerine Jaeger (*Stercorarius pomarinus*, 1st sighting to date) and 1 Bonaparte's Gull seen at McNeil River Falls.
8/13/2011	5 Whimbrel (*Numenius phaeopus*) and 2 Green-winged Teal seen at Lower McNeil River. 3 Greater Yellowlegs seen in the lagoon.
8/14/2011	2 Merlin and 1 Peregrine Falcon seen on the spit.
8/17/2011	2 Horned Puffin (*Fratercula corniculata*) and 1 Peregrine Falcon seen at McNeil Head.
8/21/2011	1 Wilson's Snipe seen on the McNeil River Trail.
8/22/2011	1 Wolverine (*Gulo gulo*) seen in camp.