

McNeil River State Game Sanctuary Annual Management Report 2020

Thomas M. Griffin

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Cover Photo: Two young adult Brown bears (*Ursus arctos*) in play bout at McNeil River State Game Sanctuary. ©2020 ADF&G. Photo by Beth Rosenberg.

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Executive Summary

The McNeil River State Game Sanctuary (MRS GS) and McNeil River State Game Refuge (MRS GR) were created by the Alaska State Legislature in 1967 and 1991, respectively. The sanctuary was established primarily to provide permanent protection for brown bears (*Ursus arctos*) 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 at 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 bear viewing program, known public use, land status and management issues, and the effects of fishing and fishery enhancement activities on these resources.

The bear index count numbers at McNeil River falls, the primary bear gathering and viewing location, averaged 34 bears; while below the historic average of 40.8 bears and lower than the averages of the last 3 years, bear viewing was still considered good this season. Staff observed 115 individual bears this season, which spent a total of 2,468 days within the sanctuary (bear use days) for the full 7 June–25 August season. Both indices were above their long-term averages of 94.7 individual bears (1976–2019) and 2,106 bear use days (1980–2019).

The bear-viewing program at MRS GS attracted 1,211 applicants from 17 different countries, who vied for 185 guided permits and 57 standby permits allocated through a lottery. Fifty-six percent of applicants were Alaska residents and 44% were nonresidents. Due to COVID-19 travel restrictions the 169 permits issued were distributed to 89% Alaska residents and 11% non-residents: instead of the normal 65%–35% regulatory distribution. The 153 participants who used their permits all came from the United States. The MRS GS bear viewing and permit program generated \$79,911.00 for the 2020 season, which is ultimately allocated to the state's Fish and Game Fund.

The 2020 cumulative McNeil River chum salmon (*Onchorynchus keta*) aerial survey escapement index was estimated at 8,850 fish, below the sustainable escapement goal (SEG) range of 24,000–48,000. The 2020 run timing of McNeil River chum salmon was earlier than the historic average. ADF&G–Division of Commercial Fisheries, continued working on a remote video project designed to estimate bear predation on chum salmon at McNeil River falls.

During 2020 the Cook Inlet Aquaculture Association (CIAA) opened the Paint River fish ladder from 17 June through 26 September for potential salmon colonization. CIAA also had 2 staff persons on site and video weir operation at the Paint River ladder site for the duration of the season. The video fish enumeration system documented escapement of 4,893 coho, 17 pink, and 131 chum salmon colonizing the system.

A total of 11 ADF&G special areas permits, and 12 ADF&G commercial access permits were issued during 2020. These included the special areas and commercial access permits issued to commercial transport companies in the McNeil River, Paint River, Kamishak River, and Chenik Creek areas. There were no mineral resource developments or activities permitted or reported to the department within MRS GS or MRS GR during 2020. The Pebble Mine project, which is making its way through the federal permitting process, has the potential for impacts to wildlife resources, management, and public uses within the MRS GR and MRS GS. ADF&G staff are working within the Army Corps of Engineers (ACOE) process to identify and attempt to address MRS GS/SGR issues and concerns.



Introduction

McNeil River, located in southwestern Alaska (Fig. 1), supports the world's largest congregation of brown bears (*Ursus arctos*). The Alaska State Legislature established the McNeil River State Game Sanctuary (MRSGS) 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 above and to maintain and enhance the unique bear-viewing opportunities within the sanctuary; and 3 provide opportunities that are compatible with 1 above for wildlife viewing, fisheries enhancement, fishing, temporary safe anchorage, and other activities (AS 16.20.162(a)). Hunting, trapping, and mineral entry are prohibited in the sanctuary.

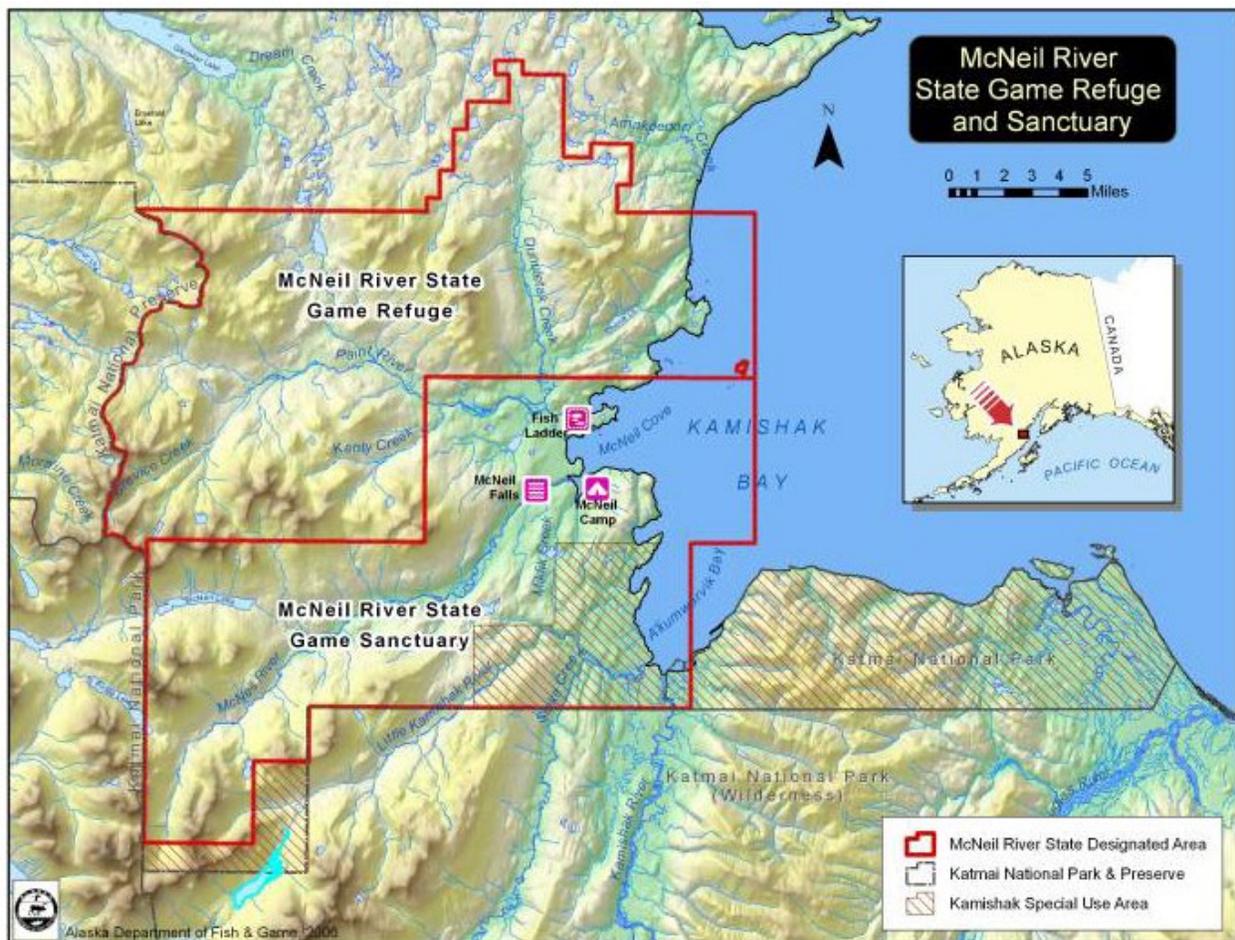


Figure 1. Location of the McNeil River State Game Sanctuary and McNeil River State Game Refuge in Southwest Alaska.

The sanctuary was expanded and the adjoining McNeil River State Game Refuge (MRSGR) was created in 1991; however, implementation of this legislation was delayed until January 1993 when the commissioner of the Alaska Department of Fish and Game (ADF&G) certified the

newly constructed Paint River fish ladder as operational. The refuge was created for purposes like those of the sanctuary; however, hunting and trapping are allowed in the refuge at the discretion of the Alaska Board of Game (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. 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 bear viewing program, known public use, land status and management issues, and the effects of fishing and fishery enhancement activities on these resources. A condensed version of this report is submitted annually to the Alaska State Legislature by the commissioner of the department, as required by the sanctuary and refuge enabling legislation (AS 16.20.041(f) and AS 16.20.162(f), respectively).

Wildlife

BROWN BEAR MONITORING PROGRAM

MRS GS and MRS GR encompass approximately 388 mi². The department does not conduct bear surveys or have bear use data on the entirety of the sanctuary or refuge. Most of the brown bear monitoring and use data relate to the bear-viewing program centered at McNeil River falls, lower McNeil River, and the Mikfik Creek area. Some additional information is provided through self-reporting by commercial sport fish and bear-viewing guide services that operate within MRS GS and MRS GR. Monitoring and reporting statistics and subsequent management decisions are based on data gathered as part of the McNeil River bear-viewing program at the McNeil River falls–Mikfik Creek area.

The number of bears at McNeil River fluctuates daily and annually. Variability in bear use may be influenced by various factors, including food availability, the strength and timing of salmon runs in McNeil River and surrounding river systems, changes in the regional bear population, and human-caused disturbance and mortalities. A public advisory committee assisted the department with the development of sanctuary and refuge operational management plans in 1993. It was concluded that managers needed a consistent and reliable method for monitoring fluctuations in the number of bears at McNeil River falls. This information allows for proper management of the sanctuary in accordance with its legislative purposes. The department uses 3 different indices to monitor bear use at MRS GS: hourly index counts (the average of the 7 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).

Overall bear viewing at McNeil River State Game Sanctuary was good in 2020 (Figure 3). While viewing at McNeil River falls in July was below average, viewing during June and August were above average. June viewing yielded a mean of 27 individual brown bears per day; with 20–40 viewable per day throughout most of June. Four brown bears were observed fishing at McNeil River falls on 22 June and staff started regularly guiding visitors to the falls by 28 June, viewing 11–19 bears fishing there in the last days of June. Primary viewing at McNeil River falls continued through mid-July, with 5–50 individual bears observed there per day. After 17 July viewing switched to a combination of lower river/lagoon and McNeil River falls viewing for the

remainder of the season. The mean number of bears observed per day for the months of July and August were 42 and 19, respectively. Family groups using the lagoon, spit, tidal flats, and nearby sedge meadows continued to provide good bear viewing from camp in June and July.

Hourly index counts were slightly above average June through mid-July; below average in the second half of July; and above average in the second half of August. The 115 individual bears identified using MRSGS during the 2020 season is about 21% higher than the long-term average of 95 bears (1976–2019). Bear use days at McNeil River falls (874) were below average; however, total bear use days for the full season (2,468) were higher than average. We believe the above average annual individual bear count, the above average bear use days in June and August and lower use at McNeil River falls during the second half of July were the result of bears visiting the sanctuary but then moving on to other areas, likely due to low chum salmon escapement and low flows within McNeil River, and strong salmon runs in other area streams such as the Bruin, and the Big and Little Kamishak rivers. Details on each of the indices for 2020 are presented below.

Hourly Index Counts

The index count monitoring program involves counting all bears in view once each hour during the viewing day to develop an index of bear-viewing quality. Prior to 2011, these index counts were done only from the viewing pad at McNeil River falls each hour from 15 July through 5 August. Since 2011, staff have implemented these hourly counts throughout the bear viewing day at all locations for the entire season in order to gather additional data on bear use and the quality of bear viewing at other locations in addition to the McNeil River falls viewing pad. The number of hourly counts that occur from year to year is variable due to the changing and opportunistic nature of the daily bear-viewing schedule. To obtain the index, only counts between 11:00 a.m. and 8:00 p.m. are used in the analyses and cubs are excluded from the overall count numbers. While viewing cubs enhances the bear-viewing experience, cubs are more prone to mortality and may not return in future years; therefore, they are not included in the index averages until they mature. The average of the 7 highest hourly counts for the season is then calculated for the index.

During 2014–2015 a review of historical data and newer data gathered since 2011 revealed several factors that affect the index counts traditionally gathered at the falls viewing pad. For example, variations in the fish runs and high-water events affect the number of bears present at the falls. Thus the 7 highest hourly counts do not always fall during the traditional 15 July–5 August period; this can skew the index toward a lower number in some years, if only the 15 July–5 August period is considered. Additionally, the practice of not including cubs in these index counts and the range of viewing hours used were not consistently applied over the years. And finally, the Shewhart-CUSUM control monitoring scheme used to assess if the index number is within normal variation has not accounted for yearly variations in bear numbers.

In order to address these issues, ADF&G staff reviewed historical data and the Shewhart-CUSUM control monitoring scheme and determined that changes were needed to develop a more accurate index. Consequently, historical data were reanalyzed to apply the following rules, consistent with current approaches:

1. Hourly counts between 11:00 and 20:00 from McNeil River pad during 1 July–5 August are included (except that prior to 2005 counts began 15 July)
2. Cubs are not included in analysis.
3. The 7 highest hourly counts are averaged to yield the index number.
4. The Shewhart-CUSUM analysis incorporates a cumulative mean value of the 7 highest counts and uses an error of 2 standard deviations as the lower limit that would indicate a potential issue with viewing at McNeil River falls.

Data presented in Table 1 and Figure 2 represent data revised after having consistently applied these rules across all years.

Review of the 2020 hourly index counts for each day of the 2020 season showed about average viewing numbers for June through mid-July and early August, with below average numbers the latter half of July and above average numbers for the latter half of August (Table 1, Fig. 3).

In 2020 the highest hourly count, of 38 bears, was seen at McNeil River falls on 10 July. The index average (average of the 7 highest hourly counts) for the season of 34 bears was below the historical average of 40.8 bears, as were all 7 of the high hourly counts used to compute the average. All 7 of the highest counts used in computing the index occurred between 4 and 13 July, outside the historical 15 July–5 August window. Bear hourly index count numbers for 2020 were above the low levels observed in 2016 (29.3); but below numbers observed 2017–2019. The 2020 average of 34 bears was lower than the annual average for the past 5 years (2015–2019) of 40.2 bears.

Individual Counts

A second method of monitoring bear use and the quality of the bear-viewing program at MRS GS is tallying the number of individually identifiable bears (adults, subadults, and cubs) observed by sanctuary staff daily and throughout the season (Fig. 4, Table 2). Using unique identifying characteristics such as sex, age, size and shape, maternal status, claw color, scars, coat color, and behavior, a record of individually identifiable bears visiting the sanctuary has been documented every year since 1976. This monitoring method records the presence of an individual bear within MRS GS, if observed during viewing, on a daily basis. While it does not provide the true count of all bears present at MRS GS, it does provide an additional index in evaluating overall bear use of the sanctuary and the quality of the bear-viewing program. Only individual bears that are known or recorded a minimum of 3 times are included in this count. Hence, this method provides an inherently conservative estimate.

There were 115 individual bears identified at MRS GS during the 2020 season (Table 2). This is about 21% higher than the long-term (1976–2019) average of 95.0 bears. Since 1976 the lowest count has been 58 (1976) and the highest 144 (1997).

Table 1. High hourly index counts of brown bears at McNeil River State Game Sanctuary, Alaska, 2000–2020. (Underlined bold numbers = 7 highest hourly counts/season used for index.)

Date	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2001 to 2020 MEAN
7-Jun											3	5	4	8	5	2	2	6	10	8	5.00
8-Jun											8	5	4	4	3	1	3	6	8	7	4.67
9-Jun											5	7	4	3	2	2	4	4	7	9	4.22
10-Jun											6	8	5	5	2	2	9	4	8	8	5.44
11-Jun											5	10	7	4	10	2	6	3	8	6	6.11
12-Jun											5	10	7	5	7	4	3	4	10	10	6.11
13-Jun											4	14	4	3	6	2	6	6	6	8	5.67
14-Jun											10	8	6	4	3	2	3	4	8	12	5.33
15-Jun											4	7	7	6	4	1	4	1	10	12	4.89
16-Jun											10	12	4	3	4	5	5	7	12	11	6.89
17-Jun											11	8	9	4	7	4	4	7	16	8	7.78
18-Jun											13	9	2	7	4	4	5	3	12	13	6.56
19-Jun											12	13	3	5	7	4	4	5	13	9	7.33
20-Jun											10	22	5	5	5	6	9	6	11	14	8.78
21-Jun											13	22	9	5	6	4	7	8	9	21	9.22
22-Jun											11	18	5	1	3	4	5	9	10	11	7.33
23-Jun											8	16	9	6	5	8	6	15	11	12	9.33
24-Jun											4	16	5	9	6	7	6	9	14	7	8.44
25-Jun											7	11	6	14	11	10	8	10	10	11	9.67
26-Jun											12	11	11	12	12	15	3	10	17	10	11.44
27-Jun											14	7	6	17	14	20	7	2	13	13	11.11
28-Jun											6	8	3	22	5	25	12	6	11	12	10.89
29-Jun											18	6	9	28	12	20	15	12	12	12	14.67
30-Jun					11						21	11	7	18	18	25	19	16	16	15	16.20
1-Jul						1			13	7	18		14	38	19	27	28	17	26	21	18.91
2-Jul					13				14	14	18		17	35	18	27	16	22	26	23	20.00

Date	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2001 to 2020 MEAN
3-Jul								3	16	16	17	20	18	30	15	24	23	28	35	23	20.42
4-Jul					16	3			15	26	13	20	30	44	18	26	31	20	21	31	21.77
5-Jul					20	12	4	9	15	27	14	18	28	37	17	18	35	32	31	28	21.13
6-Jul					20	12	4	8	19	19	10		27	28	31	24	32	38	34	32	21.86
7-Jul					22	18		16	21	27	12	13	26	33	24	29	36	39	36	36	25.14
8-Jul					21	14	4	10	25		24	25	35	47	38	29	33	45	35	25	27.50
9-Jul					25	15		14	26		27	41	34	48	33	33	48	47	38	33	33.00
10-Jul					23	21	11	14	33	17	31	45	36	7	47	25	46	39	40	38	29.00
11-Jul				15	28	18	11	17	28	27	30	37	45	7	33	30	54	38	30	32	28.00
12-Jul				10	24	19	17	24	32	33	33	0	49	16	30	24	41	37	27	23	26.00
13-Jul				20	28	26	20	22	25	30	40	36	50	28	28	30	40	25	30	36	29.88
14-Jul				20	21	34	21	18	27	42	42	40	48	32	31	21	35	27	27	25	30.38
15-Jul	25	30	36	19	19	31	29	25	41	54	50	48	57	40	31	23	47	40	18	22	34.46
16-Jul	39	26	27	24	19	31	35	32	34	64	54	50	39	36	23	20	47	34	26	25	34.00
17-Jul	40	28	32	20	21	31	32	28	35	53	42	63	44	29	31	22	37	65	21	20	35.04
18-Jul	40	31	31	21	19	30	37	37	34	54	64	66	51	23	30	15	25	54	22	28	34.96
19-Jul	35	31	31	25	20	33	29	38	39	70	75	62	50	25	24	14		59	24	25	39.38
20-Jul	37	26	29	22	22	37	42	42	40	54	62	43	40	21	36	15	32	55	22	21	35.37
21-Jul	39	36	21	19	11	21	40	40	21	70	65	35	42	19	32	12	28	38	13	25	31.70
22-Jul	32	21	26	18	16	24	34	42	10	54	60	24	41	12	25	13	38	41	11	24	30.00
23-Jul	30	33	23	15	16	31	30	41	14	50	47	32	36	11	17	8	35	47	13	21	30.63
24-Jul	42	30	16	18	12	26	21	40	25	32	37	21	45	9	14	5	47	16	12	17	27.26
25-Jul	33	28	18	11	2	27	29	51	40	21	39	26	35	7	14	4	41	22	11	10	26.44
26-Jul	24	24	16	7	6	25	36	49	21	41	38	31	33	9	7	3	27	17	6	9	25.89
27-Jul	29	20	20	6	5	31	33	34	30	62	26	20	24	8	8	4	23	22	3	11	25.37
28-Jul	23	26	12	10	6	27	33	35	32	49	43	26	15	9	8	3	18	21	15	13	23.74
29-Jul	20	30	14	9	6	25	29	42	33	44	45	25	11	12	7	4	16	19	13	11	22.74
30-Jul	15	23	14	8	8	20	17	33	29	35	38	18	10	7	8	3	16	19	19	9	20.52

Date	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2001 to 2020 MEAN
31-Jul	11	25	11	10	7	20	22	35	18	31	24	19	7	7	12	3	19	18	9	5	18.11
1-Aug	7	21	9	8		12	15	30	14	23	22	14	3	4	8	3	17	12	11	7	15.38
2-Aug	5	19	11	9		11	13	18	10	28	11	10	3	5	8	2	12	17	7	10	13.27
3-Aug	3	15	5	8		10	16	19	8	19	7	9	5	3	6	3	14	16	12	5	12.13
4-Aug	3	9		4		10	14	19	-	12	5	10	3	6	4	2	9	12	12	12	9.05
5-Aug	4	8	6	5		6	7	18	9	19	9	11	6	5	4	1	12	7	8	7	8.68
6-Aug											8	13	3	4	5	1	13	10	12	7	7.67
7-Aug											7	15	3	3	4	2	14	8	7	8	7.00
8-Aug											6	10	3	7	2	1	15	8	10	9	6.89
9-Aug											5	7	6	3	5	1	5	8	12	7	5.78
10-Aug											7	5	5	2	4	2	14	10	8	7	6.33
11-Aug											6	2	0	1	7	1	6	5	9	4	4.11
12-Aug											8	4	2	1	3	4	12	12	6	5	5.78
13-Aug											6	3	2	1	4	0	7	3	6	6	3.56
14-Aug											7	4	2	2	5	2	9	9	10	8	5.56
15-Aug											7	5	2	1	2	2	8	6	7	8	4.44
16-Aug											8	3	1	1	5	1	5	7	6	9	4.11
17-Aug											5	3	1	1	1	1	6	4	6	7	3.11
18-Aug											7	3	2	2	3	1	6	3	7	9	3.78
19-Aug											2	4	2	0	2	3	7	2	3	12	2.78
20-Aug											3	2	1	0	2	3	7	4	5	12	3.00
21-Aug											2	3	1	1	3	1	7	5	6	6	3.22
22-Aug											4	2	2	1	1	2	7	2	2	13	2.56
23-Aug											4	2	2	2	1	3	5	8	2	11	3.22
24-Aug											3	4	3	1	1	2	3	5	6	7	3.11
25-Aug											3	2	0	2	2	1	1	6	7	9	2.67
Mean of 7 Daily Highs	38.9	31.6	30.3	21.7	24.6	32.6	36.7	43.9	37.6	61.1	61.4	53.9	50.0	41.4	35.7	29.3	47.1	53.1	35.6	34.0	40.06

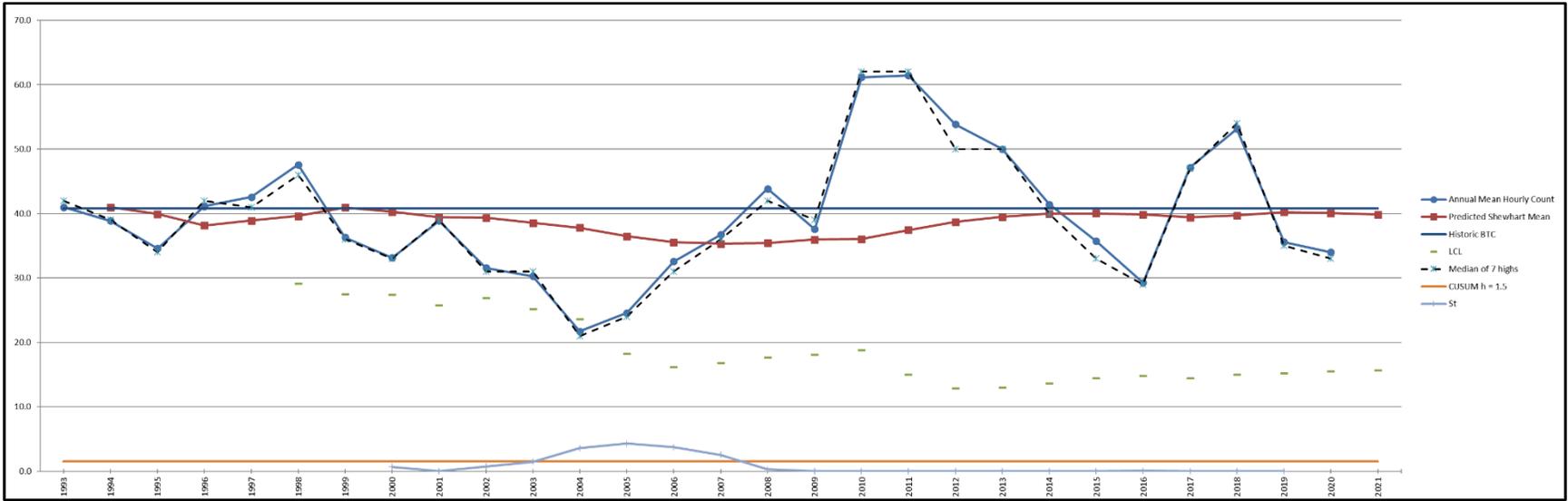


Figure 2. Historic hourly index counts (annual mean of 7 highest daily counts) of brown bears at McNeil River falls, McNeil River State Game Sanctuary, Alaska, 1993–2020.

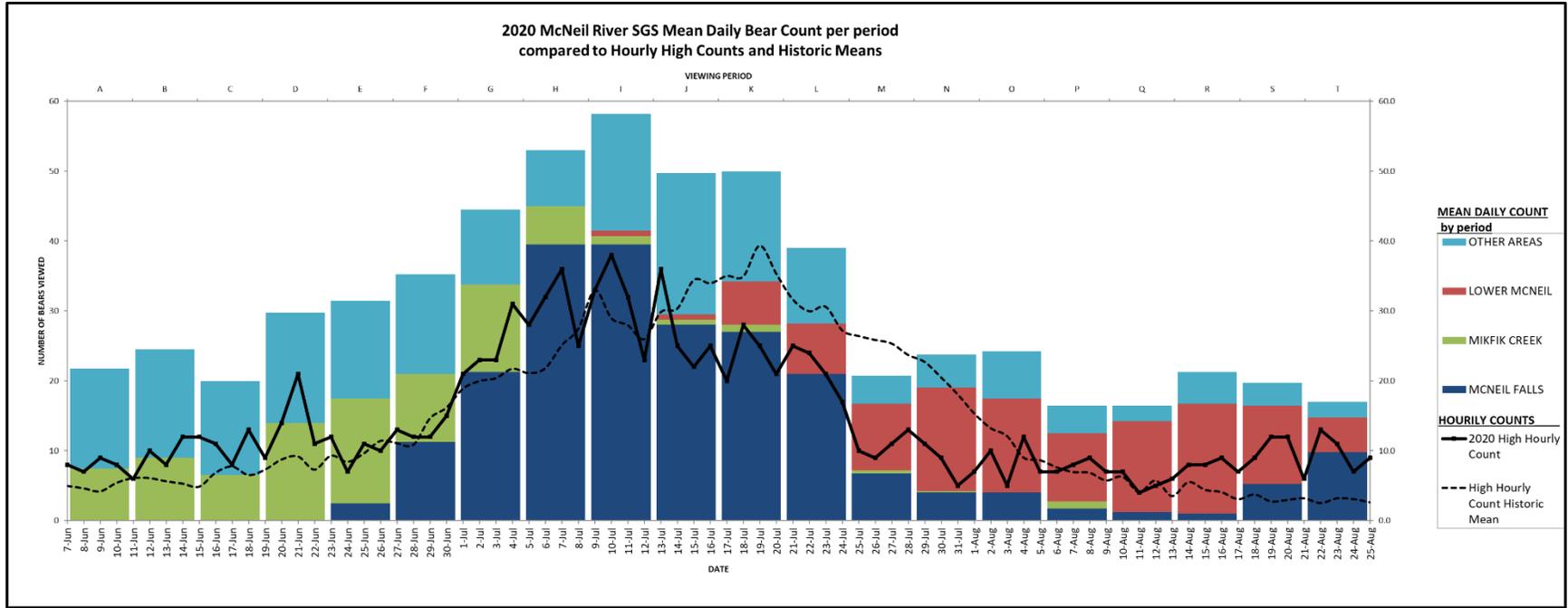


Figure 3. Daily and hourly index counts of brown bears at McNeil River falls, McNeil River State Game Sanctuary, Alaska, 2020 compared to 1993–2020 historical mean.

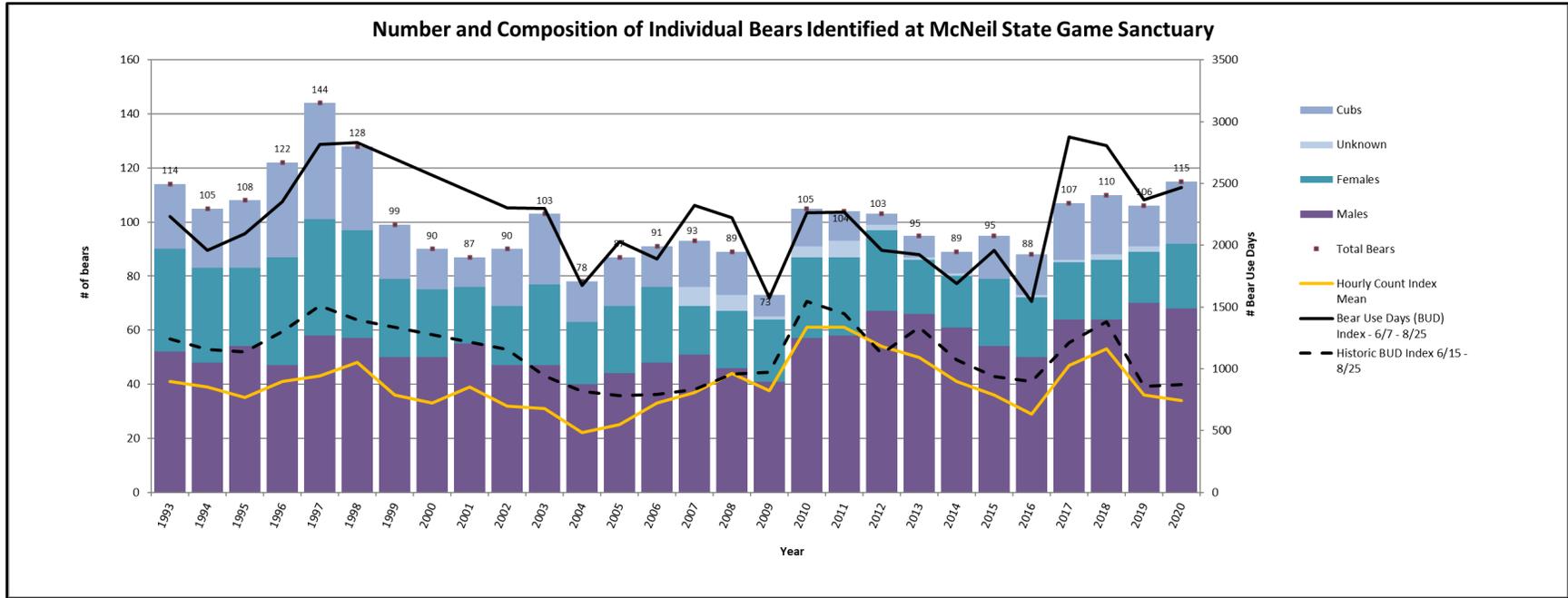


Figure 4. Annual number of individual brown bears observed, bear use days, and index counts compared to bear composition, McNeil River State Game Sanctuary, Alaska, 1993–2020.

Table 2. Composition of brown bears observed at McNeil River State Game Sanctuary, Alaska, 1993–2020.

Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Females w/cubs	11	11	14	20	19	15	11	7	5	10	12	7	10	8	9	10	5	7	5	2	4	4	10	7	10	10	7	12
Single Adult Females	19	15	12	14	19	19	<u>14</u>	<u>14</u>	12	8	16	12	13	14	7	9	16	20	22	24	16	15	14	15	9	9	8	7
Single Adult Males	48	45	49	46	55	54	<u>48</u>	<u>48</u>	53	45	45	39	41	40	46	45	40	56	56	65	66	61	53	46	59	61	59	62
Adult Sex Unknown	0	0	0	0	0	0	<u>0</u>	<u>0</u>	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Adults	78	71	75	80	93	88	<u>73</u>	<u>69</u>	70	63	73	58	64	62	62	64	61	83	83	91	86	80	77	68	78	80	74	81
Sub-Adult Females	8	9	3	6	5	6	<u>4</u>	<u>4</u>	4	4	2	4	2	6	2	2	2	3	2	4	0	0	1	0	2	3	4	5
Sub-Adult Males	4	3	5	1	3	3	<u>2</u>	<u>2</u>	2	2	2	1	3	8	5	1	1	1	2	2	0	0	1	4	5	3	11	6
Sub-Adult Sex Unknown	0	0	0	0	0	0	<u>0</u>	<u>0</u>	0	0	0	0	0	0	7	6	1	4	6	2	1	1	0	1	1	2	2	0
Total Sub-Adults (1)	12	12	8	7	8	9	<u>6</u>	<u>6</u>	6	6	4	5	5	14	14	9	4	8	10	8	1	1	2	5	8	8	17	11
Total Adults & Sub-Adults (2)	90	83	83	87	101	97	<u>79</u>	<u>75</u>	76	69	77	63	69	76	76	73	65	91	93	99	87	81	79	73	86	88	91	92
Total Cubs	24	22	25	35	43	31	20	15	11	21	26	15	18	15	17	16	8	14	11	4	8	8	16	15	21	22	15	23
Total Bears	114	105	108	122	144	128	<u>99</u>	<u>90</u>	87	90	103	78	87	91	93	89	73	105	104	103	95	89	95	88	107	110	106	115
<p>Notes: (1) Defined as 5.5 years old and younger from 1977 through the present. (2) These figures represent the minimum number of bears present at the sanctuary. Only bears that are recognizable as individuals (Known Bears) and seen on more than three days are included. Bears seen less than three times and / or unrecognizable as a known bear are not included.</p> <p>Underlined Bold Numbers represent average of data four years prior and after (No data were recorded in 1999 and 2000).</p>																												

Bear Use Days

In addition to the total number of bears that visit the area in a season, the quality of the bear-viewing experience is also affected by how many days these bears stay in the sanctuary and the number viewed on a daily basis. A bear use days (BUD) index is calculated by summing the individual bears observed daily throughout the season. These counts include all bears (all bears including cubs) in all viewing areas within MRS GS, 7 June–25 August (Fig. 4). For historical bear use day comparisons, only adult and subadults noted at McNeil River falls 15 June – 25 August are included. One bear seen during a day is counted as 1 bear use day. Bear use days are useful because they track how many days per season individual bears use the sanctuary. These data have been recorded since 1980, but no data were recorded in 1999, 2000, or 2001.

Bear use days (all bears including cubs) within the sanctuary totaled 2,468 for the 7 June–25 August season, higher than the long-term (1993–2019) average of 2,176. Total bear use days in 2020 were distributed 26%, 54%, and 20%, across June, July, and August, respectively. Bear use days for the primary bear viewing areas are presented in Table 3. For historical comparison, there were 874 total bear use days for adult and subadult bears at McNeil River falls 15 June – 25 August; compared to 1,194 for the long term (1976–2019) average and the prior 10-year average of 1,180.

Table 3. Bear use days at McNeil River State Game Sanctuary, 2020.

2020 BEAR USE DAYS					
Month	McNeil Falls	Lower McNeil River	Mikfik Creek	Other Areas (lagoon, flats, bluffs, etc.)	Total bear use days
June	55	0	247	349	651
July	748	141	87	359	1,335
August	92	289	4	97	482
Total	895	430	338	805	2,468

Sex and Age Composition

Changes in the sex and age composition of a wildlife population can indicate other changes in the species' habitat and environment. While males have typically outnumbered females at McNeil River, this difference has become more pronounced over the last 30 years. The percentage of male bears observed throughout the season has steadily increased while the number of females has slightly declined. Following a general increase in the numbers of both sexes through the late 1990s, there was a general decrease in all bears after 2000. This decrease was more pronounced in the females. And in the years since 2005, while seasonal numbers of male bears have increased, the numbers of females have remained consistent.

Overall, the number of females was consistent with the previous 5 years (2015–2019). There were increases in maternal and subadult females, while nonmaternal females decreased. There were 12 maternal females and 23 cubs observed in 2020, a slight increase from the numbers observed in the last 5 years (7–10 maternal females with 15–22 cubs, 2015–2019). The historical sex and age composition of bears using the McNeil River–Mikfik Creek viewing areas during the viewing season are presented in Fig. 4 and Table 2.

Bear Photo Identification Project

Sanctuary staff continued the task of photo documenting identifiable bears observed at McNeil, capturing digital images of individual bears and their defining characteristics. Initiated in 2007, the photo identification project is a long-term project that assists McNeil staff in enhancing daily and seasonal bear identifications, tracking the history of individual bears, tracking the movements of individuals, and sharing information with regional associates.

Other Areas

The department currently does not conduct bear surveys or monitoring in other areas of MRS GS or MRS GR. Some information is available through opportunistic surveys, fisheries escapement videos, and commercial guide reporting from the Mikfik Lake, Paint River, Chenik Creek–Lagoon, and Kamishak–Little Kamishak–Strike Creek areas. Mikfik Lake observations are detailed below under Other Wildlife | General Observations; Paint River observations are noted in the Fisheries Enhancement | Paint River Fish Ladder section below.

Kamishak River Drainage

The lower stretches of the Kamishak River, Little Kamishak River, and Strike Creek are within MRS GS. Bears fish these waters, graze in the Kamishak sedge flats, and dig clams in the Kamishak River mudflats. The department does not conduct bear surveys in these drainages. However, commercial sport fishing guide services operate in the area from approximately early July to early October and brown bears are typically observed daily. Based on reporting by 3 of the 4 guide services that operated in 2020, there were up to 7 bears seen per day (mean = 4) in the Kamishak–Little Kamishak–Strike Creek areas from 14 July to 19 September 2020. However, many of the guide services did not operate or had many fewer days in the sanctuary than normal due to the COVID-19 pandemic.

Chenik Creek

The department does not conduct bear surveys in the Chenik Creek area; typically, a couple of guides operating in the area and individual private users report observations. During 2020, these guides and private visits were limited due to COVID-19 pandemic travel mandates. Two people did camp at Chenik Lake 11–18 August and reported wildlife observations, which are included in the daily wildlife observations in Appendix A. They observed several individual brown bears, including a maternal female with 2 cubs. Other observations included caribou (*Rangifer tarandus*), red fox (*Vulpes vulpes*), short-tailed weasel (*Mustela erminea*) and a number of bird species common to the refuge.

OTHER WILDLIFE

General Observations

During the 2020 season, sanctuary staff recorded general wildlife observations, including birds, terrestrial mammals, and marine mammals opportunistically. Daily observations are summarized in the Appendix A.

There were many bird sightings and identifications over the course of the 2020 season. This year, less frequently observed species included short-eared owl (*Asio flammeus*), rock sandpiper (*Calidris ptilocnemis*), spotted sandpiper (*Actitis macularius*), black turnstone (*Arenaria melanocephala*), Bonaparte's gull (*Chroicocephalus philadelphia*), American pipit (*Anthus rubescens*), gray-crowned rosey finch (*Leucosticte tephrocotis*), pine grosbeak (*Pinicola enucleator*), wandering tattler (*Tringa incana*), caspian tern (*Hydroprogne caspia*), red-throated loon (*Gavia stellata*), harlequin duck (*Histrionicus histrionicus*), northern shrike (*Lanius borealis*), pigeon guillemot (*Cepphus columba*), peregrine falcon (*Falco peregrinus*), merlin (*Falco columbarius*), black scoter (*Melanitta americana*), white-winged scoter (*Melanitta deglandi*), surf scoter (*Melanitta perspicillata*), hairy woodpecker (*Dryobates villosus*), sandhill crane (*Antigone canadensis*) and black oystercatcher (*Haematopus bachmani*).

Marine mammal sightings during the 2020 season included the usual harbor seals (*Phoca vitulina*), which are generally seen at high tide throughout the season in McNeil River lagoon, McNeil Cove, and the lower tidal areas of McNeil River and Mikfik Creek.

An unusual observation was of numerous sea jellies washed up along the spit and beaches during the latter part of August. They appeared to be moon jelly (*Aurelia labiate*).

Other terrestrial wildlife observed this season included the following: Gray wolf (*Canis lupus*) sightings occurred in the lagoon and the lower McNeil River in June. Wolf tracks were observed in the lagoon and on the spit in mid-August. Red fox (*Vulpes vulpes*) did not have a den site near camp this year; consequently, several arctic ground squirrels (*Spermophilus parryii*) were present in and around camp, as were numerous fledgling birds. Masked shrew (*Sorex cinereus*), meadow jumping mouse (*Zapus hudsonius*), short-tailed weasel (*Mustela erminea*) and moose (*Alces alces*) were also observed in several locations. As usual, numerous wood frogs (*Rana sylvatica*) were observed in the camp sauna pond area and along McNeil River Trail.

ADF&G—Division of Commercial Fisheries (CF) staff recorded 2,063 hours of video connected with video monitoring of sockeye salmon (*Oncorhynchus nerka*) escapement into Mikfik Lake. In addition to the escapement data, reviewers documented wildlife transiting the camera's view, including moose, beavers (*Castor canadensis*), North American river otter (*Lontra canadensis*), and various waterfowl. Brown bears transited the field of view of the camera in 30 instances, an average of 0.34 bears per day of video operation ($n = 87$ days). One observation was of a female with 1 cub, the rest were of individual bears. Peak daily bear counts (2 bears) occurred on 7, 15, and 18 July.

ADF&G—CF also operates a video weir connected with the monitoring of sockeye salmon escapement at Chenik Lake. In 78 days of operation (15 May through 31 August), cameras

observed 87 bears transiting the Chenik video. Other species observed included North American river otter and various waterfowl.

HUNTING AND TRAPPING

MRS GS is closed to hunting and trapping by Alaska state statute (AS 16.20.162(b)), and MRS GR, 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 mi² that comprise MRS GS and MRS GR are part of a much larger area of approximately 5,585 mi², including Katmai National Park lands and state-owned lands within the Kamishak Special Use area, in which brown bears are protected from hunting.

Reported harvest data from units within and surrounding the MRS GS–S GR complex for regulatory years 2000–2019 are summarized in Table 3. Data for regulatory year 2020 are still being gathered (a regulatory year (RY) begins 1 July and ends 30 June, e.g., RY20 = 1 July 2020–30 June 2021).

Brown Bear

Hunting brown bear and hunting and trapping for other species are allowed on about 2,100 mi² within harvest units north and west of MRS GS and MRS GR. Brown bear hunts are open during the fall and the following spring of odd-numbered regulatory years (i.e., RY19 includes the fall of 2019 and spring of 2020).

The long-term average harvest from areas surrounding MRS GS (outside the sanctuary and refuge) from RY80 through RY10 was 78 brown bears every 2-year hunt period. Average 2-year harvest by decade was 62 in the 1980s, 77 in the 1990s, and 94 in the 2000s. During RY10–RY17 the 2-year harvest in areas surrounding MRS GS and MRS GR averaged 86 bears.

The COVID-19 pandemic significantly impacted bear hunting and harvest in Game Management Unit (GMU) 9 during RY19. In Unit 9, 70–80% of successful bear hunters are guided, nonresident hunters. Further, half or more of the bears are typically harvested during the spring season. During the spring of 2020, COVID-19 travel restrictions and health mandates eliminated nonresident participation and brown bear harvest within GMU 9. During RY19 only 18 brown bears were harvested in the GMU 9 subunits adjacent to the sanctuary and refuge, and those were all harvested during the fall of 2019. To address the loss of opportunity for hunters, the Alaska Board of Game adopted temporary regulations to open a special spring season during the spring of 2021; as a result, it is expected that additional brown bear harvest will occur at that time. Historic levels of reported bear harvests from areas surrounding the sanctuary and refuge are presented in Table 3 and Figure 5.

Brown bears have large home ranges. Data from early studies and staff observations show that some bears using MRS GS and MRS GR range far into adjacent lands including protected lands within Katmai National Park and Monument, and lands north and west of the sanctuary and refuge that are open to brown bear hunting. The effects of any bear harvests in these areas on bear use at McNeil River are unknown; however, these harvests do not appear to affect the

number of bears using the McNeil River. Based on the available information, legal hunting of bears outside the sanctuary is not a significant factor affecting the regional bear population.

Other Species

As noted above, the MRSGR portion of the MRSGS–MRSGR 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 (*Ursus americanus*), caribou, moose, beaver, lynx (*Lynx canadensis*), marten (*Martes americana*), river otter, wolf, wolverine (*Gulo gulo*), coyote (*Canis latrans*), red fox, mink (*Neovison vison*), weasel (*Mustela nivalis*), muskrat (*Ondatra zibethicus*), arctic ground squirrel, and marmot (*Marmota caligata*). However, ADF&G maintains harvest records only on the first 9 of these.

Harvest reporting and sealing records indicate that hunting and trapping of these species, except perhaps moose in MRSGR, is currently almost nonexistent. A few moose are taken from the game management subunit that includes MRSGR, however, this unit also includes lands outside of the refuge.



Table 3. Reported harvests of selected big game and furbearer species within and around McNeil River State Game Sanctuary (MRS GS) and McNeil River State Game Refuge (MRS GR), Alaska, regulatory years^a 2000–2019.

RY ^a	Species																			
	Brown bear		Black bear		Caribou		Moose		Beaver		Lynx		Marten		Otter		Wolf		Wolverine	
	MRS GS- MRS GR ^b	AA ^c																		
2000			0	0	0	114	0	16	0	12	0	1	0	0	0	0	0	3	0	1
2001	6	98	0	3	0	97	1	19	0	0	0	0	0	0	0	0	0	1	0	2
2002			0	1	0	39	3	18	0	0	0	0	0	1	0	0	0	1	0	4
2003	6	105	0	7	0	53	1	14	0	9	0	3	0	6	0	10	0	10	0	20
2004			0	1	0	33	2	15	0	0	0	0	0	0	0	2	0	1	0	2
2005	3	102	0	6	0	51	2	17	0	1	0	1	0	0	0	0	0	8	0	0
2006			0	2	0	25	0	10	0	0	0	4	0	2	0	1	0	2	0	7
2007	4	93	0	2	0	0	2	16	0	0	0	1	0	1	0	3	0	3	0	4
2008			0	1	0	5	0	18	0	4	0	3	0	0	0	0	0	4	0	2
2009	4	73	0	1	0	6	1	11	0	2	0	13	0	1	0	1	1	2	0	1
2010			0	1	0	0	0	6	0	13	0	27	0	0	0	8	0	2	0	2
2011	5	75	0	0	0	1	0	11	0	5	0	38	0	0	0	0	0	4	0	1
2012			0	0	0	0	1	10	0	0	0	33	0	0	0	0	0	5	0	5
2013	7	66	0	3	0	1	0	8	0	2	0	4	0	0	0	0	0	3	0	0
2014			0	0	0	1	1	15	0	3	0	2	0	0	0	2	0	0	0	2
2015	4	91	0	3	0	1	0	4	0	7	0	0	0	0	0	0	3	2	0	0
2016			0	0	0	8	0	14	0	10	0	3	0	0	0	4	0	1	0	8
2017	2	95	0	0	2	1	0	9	0	1	0	1	0	0	0	20	0	3	0	2
2018			0	0	0	12	2	20	0	0	0	0	0	0	0	0	0	0	0	2
2019	2	16	0	1	0	6	1	14	0	3	0	0	0	0	0	0	0	1	0	0
2020 ^d																				

^a A regulatory year (RY) begins 1 July and ends 30 June, e.g., RY19 = 1 July 2019–30 June 2020.

^b Harvest numbers for McNeil River State Game Sanctuary (MRS GS) and McNeil River State Game Refuge (MRS GR) are based on data from reporting areas that are largely within but extend slightly outside of the MRS GS–MRS GR complex. MRS GS is closed to hunting and trapping and MRS GR is closed to the hunting of brown bear.

^c AA = adjacent areas. Harvest numbers for surrounding areas largely from reporting areas outside of the MRS GS–MRS GR complex. Some data may be from within MRS GS and MRS GR where these reporting areas overlap the MRS GS–MRS GR complex boundary. MRS GS is closed to hunting and trapping and MRS GR is closed to hunting of brown bear.

^d Harvest reporting is not yet complete for regulatory year 2020, which ends 30 June 2021.

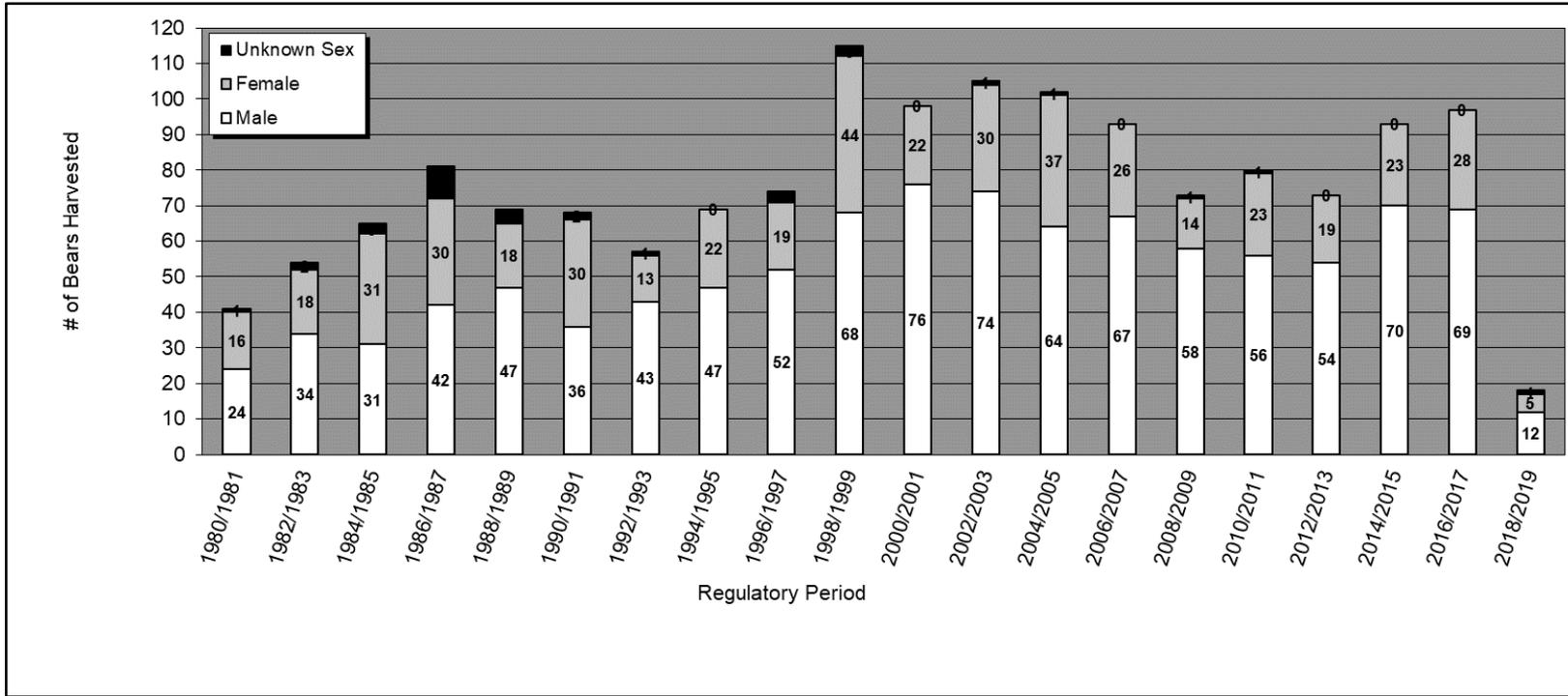


Figure 5. Brown bear harvest from areas surrounding the McNeil River State Game Sanctuary and McNeil River State Game Refuge, Alaska, 1980–2017, presented by 2-year hunt period. Harvest was from these Game Management Units/Uniform Coding Units: 9A/201, 301, 401, 501; 9B/301; and 9C/101, 201, 301, 601, 702, and 703. Even and odd regulatory year seasons are combined (a regulatory year begins 1 July and ends 30 June, e.g., regulatory year 1980 = 1 July 1980–30 June 1981).

Fisheries

MRS GS and MRS GR contain several rivers and streams that support both anadromous and resident fish populations. The Kamishak River drainages support 5 species of Pacific salmon as well as Dolly Varden (*Salvelinus malma*). The McNeil River drainage contains Dolly Varden, chum salmon, some coho salmon (*O. kisutch*), pink salmon (*O. gorbuscha*), and small numbers of Chinook salmon (*O. tshawytscha*). The Mikfik Creek–Lake drainage contains sockeye salmon, Dolly Varden, and rainbow trout (*O. mykiss*). Chenik Creek–Lake system supports sockeye salmon, some coho salmon, lake trout (*S. namaycush*) and Dolly Varden. The Paint River system contains rainbow trout, Arctic grayling (*Thymallus arcticus*), and lake trout, and recently, through fisheries enhancement, began supporting coho salmon and some pink and chum salmon. These fish resources contribute to annual sport fishing and commercial fishing effort and harvests within the lower Kamishak district.

COMMERCIAL FISHERIES

Periodic aerial surveys are flown to index the escapement of chum salmon to McNeil River, and remote video is used to monitor the escapement of sockeye salmon into Mikfik and Chenik lakes. In 2020, generally favorable stream conditions allowed for 4 effective aerial surveys of McNeil River, and the video system at Mikfik Lake operated successfully through 31 August. There was no commercial harvest targeting the Mikfik return, and the McNeil River subdistrict was closed for the duration of the chum salmon run. Consequently, the entire Mikfik sockeye and McNeil chum salmon runs entered their respective freshwater drainages this season.

McNeil River Drainage

The 2020 McNeil River chum salmon aerial survey escapement index was estimated at 8,850 fish (Table 4, Fig. 6). This value is below the sustainable escapement goal (SEG) range of 24,000–48,000. Chum salmon were seen in low numbers above the falls during aerial observations on 23 June and 7 July, but not during 2 subsequent surveys on 27 July and 4 August. A peak daily aerial estimate of 3,751 chum salmon occurred on 23 June, of which 500 were upstream of McNeil River falls. The peak above falls counts of 500 chum salmon occurred on 23 June and 7 July. The McNeil River subdistrict was closed 15 June without any commercial fishing inside the subdistrict. Chum salmon runs to some other Kamishak Bay district systems in 2020 were strong (e.g., Bruin, Big and Little Kamishak rivers), while others were weak (e.g., Ursus and Cottonwood creeks). Strong pink salmon runs in other districts contributed to modest fishing effort in the Kamishak District. Commercial harvest of chum salmon in the Kamishak District in 2020 is considered confidential due to fewer than 3 permit holders reporting harvest. The 2020 run timing of McNeil River chum salmon was earlier than the historical average.

McNeil River Chum Salmon Stock Status

In response to guidelines established in the Policy for Management of Sustainable Fisheries (5 AAC 39.222), in November 2016 at the Lower Cook Inlet Board of Fisheries meeting, ADF&G recommended that McNeil River chum salmon be designated as a “stock of management concern.” A “management concern” is defined as “a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for salmon

stocks within the bounds of the sustainable escapement goal (SEG)...”. Two natural conditions unique to McNeil River presumed to contribute to the present status of chum salmon are 1) a physical obstacle (McNeil River falls) located low in the drainage that impedes consistent use of upriver spawning habitats, and 2) a high density of brown bears aggregated at McNeil River falls to feed, essentially creating a biological impediment to upstream migration (Otis and Szarzi 2007) and also contributing to high predation rates on pre-spawning chum salmon in McNeil River below the falls (Peirce et al. 2011, 2013). Further details on the status of McNeil River chum salmon, including a review of past and current research and management actions, can be found in Otis et al. (2016a).

Table 4. Escapement estimates of salmon into Mikfik Lake and McNeil River, McNeil River State Game Sanctuary, Alaska, 2020.

2020 Date	Mikfik sockeyes cumulative total	McNeil chums (daily) ^a
1-Jun	0	ND
8-Jun	5	ND
15-Jun	11	ND
22-Jun	228	ND
23-Jun	-	3,751
29-Jun	230	ND
6-Jul	241	ND
7-Jul	-	1,260
13-Jul	271	ND
20-Jul	273	ND
27-Jul	280	382
3-Aug	286	ND
4-Aug	-	2,730
10-Aug	296	ND
17-Aug	303	ND
24-Aug	305	ND
31-Aug	305	ND
Escapement index	305 ^b	8,850 ^c

Note: ND = No data.

^a Daily estimate from individual aerial surveys and considered to be conservative.

^b The escapement index for Mikfik sockeyes is the cumulative total from the remote video system at Mikfik Lake; data above in the column reflect cumulative totals as of dates noted.

^c The escapement index for McNeil chums is 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.

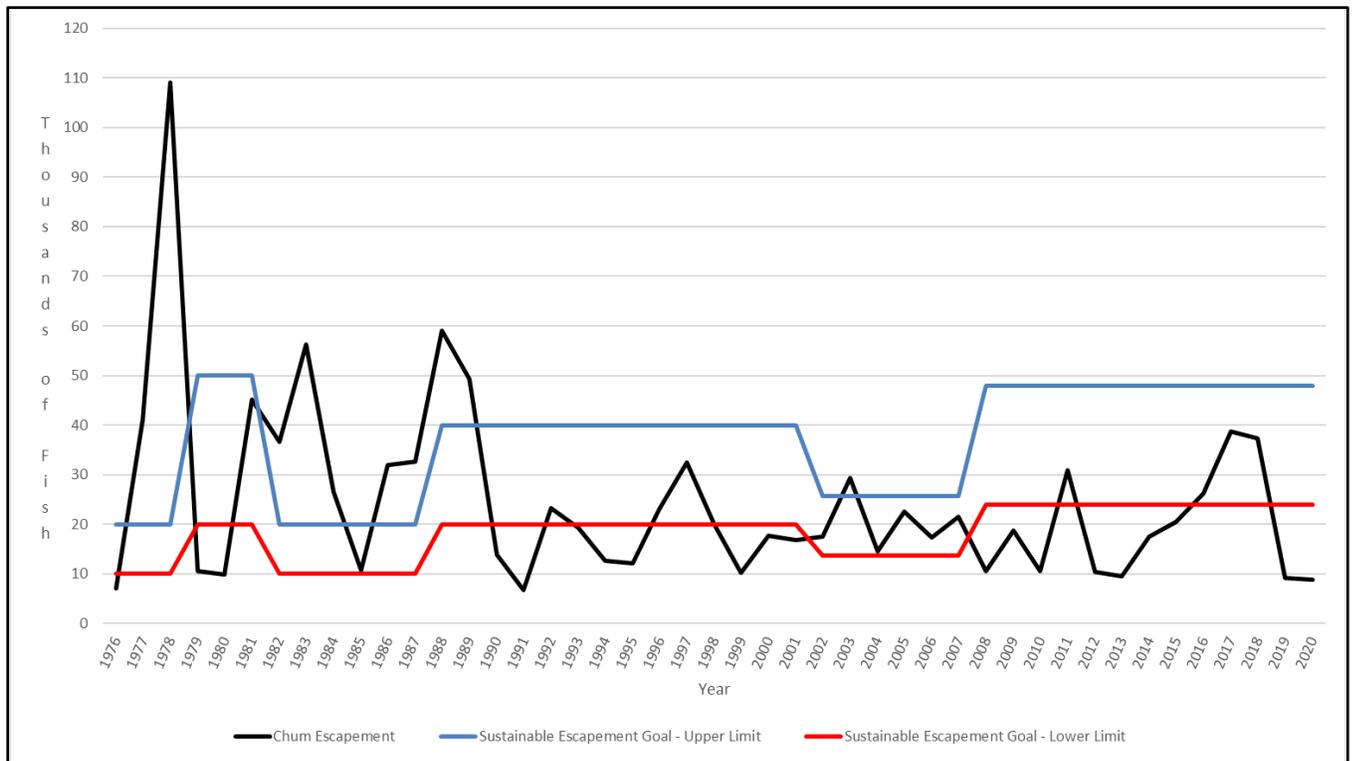


Figure 6. McNeil River chum salmon escapement 1976–2020, McNeil River State Game Sanctuary, Alaska.

Mikfik Creek and Lake System

A video camera attached to a digital video recorder used to document sockeye salmon escapement into Mikfik Lake showed a cumulative total of 305 fish escaping into the lake in 2020 (Table 4). Significant predation by bears occurs in Mikfik Creek, so only those fish documented reaching the lake are considered escapement. The video estimate of 305 fish was used as the final escapement estimate. This value is well below the sustainable escapement goal (SEG) range of 3,400–11,000 (Otis et al. 2016b). Post-season evaluation indicated that run timing of sockeye salmon into Mikfik Lake was more compressed than normal, with nearly 71% of the run entering the lake in just 3 days (18–20 June). Low water can impede the ability of fish to ascend the falls in lower Mikfik Creek and may have contributed to very few fish entering Mikfik Lake after 20 June. However, the 2020 run was weak, as evidenced by the reduced abundance of fish observed by staff in the lower river all season.

The McNeil River subdistrict was open to commercial fishing for Mikfik Creek sockeye salmon from 1 June to 14 June. No sockeye salmon were harvested in the McNeil River subdistrict in 2020.

Chenik Creek and 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, has a cascade

falls at tidewater which hinders fish passage. This cascade has been modified on several occasions by blasting or clearing resting pools, in 1926, 1932, and 1958. More recently a Cook Inlet Aquaculture Association (CIAA) fishery enhancement project modified the stream mouth in 1981–1982 and again in 1986 to allow fish easier 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, the return of adult sockeyes to the system dropped to very low levels between 1994 and 2002; however, more recent returns resulting exclusively from natural production have rebounded considerably. In fact, commercial fishing effort directed at this stock was allowed each year from 2004 through 2020, with resulting annual commercial harvests ranging from no harvest (2015) to more than 171,000 fish (2008). Additionally, the established sockeye salmon SEG for Chenik Lake of 2,900–13,700 sockeye salmon has been met or exceeded each year beginning in 2003, with the 2020 escapement cumulatively estimated by remote video as 11,686 sockeye salmon. The 2020 commercial harvest of sockeye salmon from the Chenik subdistrict is confidential due to fewer than 3 permit holders reporting harvests.

SPORT FISHING

A limited amount of sport fishing occurs within MRS GS and MRS GR. This occurs primarily in the Kamishak River area (Table 5). There is also a small amount of effort in the McNeil lagoon area by participants in the bear-viewing program.

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. Commercial sportfishing guides operating in the Kamishak River drainages of the sanctuary reported that travel and quarantine mandates related to COVID-19 pandemic response significantly impacted their operations during 2020. Of the 10 permitted operators, only 3 reported making any guided use trips to the area. Four companies reported making a total of 48 trips and spending a total 170 angler use days and 86 guide use days in the area between 14 July and 19 September. Anglers reported catching at least 2,412 fish, of which 26% were Dolly Varden, 54% were coho salmon, 2% were pink salmon, and 17% were chum salmon. Eighty-six percent of all fish caught were released, including all Dolly Varden, pink salmon, and chum salmon. Approximately 26% of all coho (the primary target species) caught were kept. This compares to the prior 5-year average of 3,831 fish caught, with an average makeup of 38.6% Dolly Varden, 43% coho salmon, 5.5% pink salmon, and 12.7% chum salmon; with 83% of all fish caught released and 38.1% of coho salmon caught retained.

Table 5. Visitor use and sport fish harvest reported from Kamishak River drainages, McNeil River State Game Sanctuary, Alaska, 2019.

No. of days in MRS GS	No. of guide use days	No. of angler use days	No. of non-angler days	COHO SALMON		CHUM SALMON		PINK SALMON		DOLLY VARDEN		Avg bears/day
				Kept	Released	Kept	Released	Kept	Released	Kept	Released	
48	86	170	0	340	963	0	429	0	49	0	631	4

McNeil Lagoon

Sporadic sport fishing occurs in McNeil lagoon (from the end of the spit) associated with staff and visitors in camp for recreational activities. Fishing effort was low in 2020. In addition to low interest, bear activity in the lagoon limited sport fishing effort by staff and visitors for safety reasons. A total of 6 silver salmon were harvested in mid-August.

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 to test the feasibility of developing a new sockeye salmon run in this salmon-barren drainage. Paint River, located approximately 2 miles north of McNeil River, is blocked to upstream fish migration by a steep waterfall at tidewater. In an ADF&G report, Quimby and Dudiak (1987) envisioned a Paint River fish ladder that could provide fish access to unutilized salmon spawning and rearing habitat upstream of the falls. Construction of the Paint River fish ladder was completed by CIAA in October 1991, and the ladder was formally declared operational in 1993. From 1986 to 1996 (except for 1987 and 1994) and in 2002, between 0.5 million and 2.2 million sockeye salmon juveniles were stocked annually in the Paint River lakes. However, the numbers of returning adult sockeye salmon resulting from these stocking efforts were disappointing with estimates ranging from only 30 (in 2000) to 2,000 (in 2005). Pink salmon fry were stocked annually 1980–1982. From 1993 to 2011, the ladder had not been opened to allow returning adult fish passage upstream. CIAA has been performing maintenance and repair improvements to the ladder since 2008. In 2011 it began opening the ladder each summer to allow for natural colonization by salmonids. Additionally, in 2015 and again in 2018 CIAA released pink salmon fry into Paint Lake, anticipating a 1–2% return of these fish to Paint River in 2016 and 2019; however, no pink salmon were known to return from these efforts. A video weir to enumerate salmon was attempted annually 2016–2018, but power failures and other technical issues

prevented continuous operation and escapement estimates could not be made. The video fish enumeration system was not installed during 2019. Each year 2014–2019 a small number (<200) of salmon or salmon carcasses were observed within or above the ladder from mid-July to late September. Salmon species viewed in or around the ladder during this time included sockeye, chum, coho, and pink salmon. Thus, up until 2020 detailed surveys had not been conducted and video weir monitoring attempts had been largely unsuccessful, but available information indicated that some natural colonization from straying salmon was occurring. During 2019 CIAA constructed an onsite cabin and in 2020 began staffing the ladder with 2 seasonal fishery technicians and a video monitoring weir.

In 2020, CIAA opened the Paint River fish ladder and began video monitoring of escapement on 8 July. Video monitoring continued through 13 September and the ladder was closed to fish passage on 19 September. A total of 131 chum, 17 pink, 4,893 coho, and one sockeye salmon were documented transiting through the ladder and into the Paint River system. Daily escapement is summarized in Appendix B. In addition to the video weir system, CIAA conducted one aerial survey of the Paint River system above the fish ladder on 4 September. During that survey 1,716 fish were counted, about 34% of the known escapement as of that date. The majority of these fish were observed using the main stem of the Paint River below the Sanctuary border and Dunuletak Creek. Fish were observed in the main stem from the ladder upstream to within 100 yards below Lower Paint Lake. No fish were noted in Lower Paint lake, Selukpuk Creek drainage or the 2 southern forks of the Paint River. During 2020, CIAA collected and submitted 101 coho salmon samples to ADF&G’s DNA archive for later analysis.

In addition to opening and closing the ladder, installation of the video weir, and daily monitoring, CIAA completed repairs to the effluent intake structure on the ladder. The supporting I-beam for the sieve plates that screen the effluent intake had failed, rendering the sieve plates inoperable. After consultation with the original design engineer, a workaround of removing the sieve plates and blocking off the effluent intake was implemented. The effluent pipe was originally added to attract fish to the ladder; but the repair is not expected to negatively affect ladder operation.

During 2020, CIAA staff, in coordination with ADF&G staff, also began collecting more structured bear and wildlife observations around the Paint River fish ladder. These data will be used to assess numbers of bears and other wildlife in proximity to the fish ladder site and to determine trends in bear usage of the site. These observations are included with the daily wildlife observations for the sanctuary in Appendix A.



Public Use and Land Management

To protect the bears, their habitat, and the unique visitor experience, access to MRSGS is restricted; an access permit issued by ADF&G is required for entry into the sanctuary. Under regulations developed by ADF&G (5AAC 93.030) and those adopted by the Alaska Board of Game (5AAC 92.065), ADF&G—Division of Wildlife Conservation (DWC) 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.

MRSGR 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, snowmachining, and camping, except that MRSGR is closed to brown bear hunting. Other activities and land uses are managed through an ADF&G special area permit issued by the Division of Habitat. Land use permits are also issued by the Alaska Department of Natural Resources (DNR).

MCNEIL RIVER FALLS—MIKFİK CREEK

Public use and access to the sanctuary, except for the McNeil Cove spit and beach, require 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 10 people daily between 7 June and 25 August and viewing access permits for this period are issued by lottery. Ten regular and 3 standby permits are issued for each of the established 4-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 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, filmmakers, or others acting in an official capacity and who would benefit professionally by visiting McNeil River. These permits are issued only to individuals whose work will benefit the McNeil River Sanctuary and/or general efforts to conserve bears.

The lottery application fee is \$30.00 per person. If selected in the lottery, each guided viewing permit holder is assessed a permit fee of \$225.00 for Alaska residents and \$525.00 for nonresidents. Camp-standby viewing permit holders are assessed a permit fee of \$112.00 for each Alaska resident and \$262.00 for each nonresident. The special access permit application fee is \$60.00 per person. If selected by the commissioner of ADF&G to receive a special access permit, there is a use fee of \$225.00 for each Alaska resident and \$525.00 for each nonresident.

ADF&G received 1,211 applications for McNeil River guided and standby bear-viewing permits by the 1 March 2020 deadline. Applications were received from residents of 17 different countries. Fifty-six percent of applicants were Alaska residents.

Following the 1 March application deadline and the 15 March McNeil River permit drawing, COVID-19 pandemic response mandates affected both the public's response to permit acceptance and purchase and the McNeil River viewing program's operations. Sanctuary staff implemented a number of measures in response to the pandemic and health mandates in order to provide for public safety and a successful viewing program.

Table 7 presents sanctuary visitor use information for 2020. Overall, 169 permits were issued, including 142 guided viewing permits, 18 standby viewing permits, and 9 special access permits granted by the commissioner. Of the 169 permits distributed, 89% were to residents and 11% were to nonresidents, exceeding the normal 65% resident to 35% nonresident regulatory guidelines due to nonresident travel and quarantine mandates related to COVID-19 pandemic response. Of the 169 permit holders, 153 visited the sanctuary, and 16 did not. The 5-year annual visitation average (2015–2019) was 188. The average number of permits used each day by permittees to view bears at the sanctuary in 2020 was 8.3 (out of a maximum of 10.0). Due to United States international travel restrictions, all international nonresidents lottery winners either did not purchase their permits or later cancelled and received refunds. All 153 participants in bear viewing during the 2020 season were residents of the United States. Of the 153 bear-viewing visitors to McNeil River, 88% were Alaska residents and 12% were nonresidents.

Visitor use days connected with the McNeil River bear-viewing program totaled 937 in 2020, which included all permitted bear-viewing visitors and administrative visitors. Permitted bear-viewing visitors spent a total of 922 visitor use days within the sanctuary during the viewing season. On average there were 11.4 visitors at McNeil River camp on any day, lower than both the 5- and 10-year averages of 12.6 and 12.1, respectively. On average there were 8.3 bear viewers in the group, slightly lower than the 5-year average of 8.5 and higher than the 10-year average of 8.1. And bear viewers used 660 of a possible 800 actual bear-viewing use days. Permitted visitors spent an average of 6.0 days each in the sanctuary and participated in the bear-viewing group an average of 4.3 days each.

Nine special access permits were issued in 2020 including the following recipients: USGS biologist, Katmai National Park biologist and bear management staff, and Alaska Zoo brown bear staff.

During 2020, 9 commercial transporter permits were issued to commercial operators for the purpose of transporting clients to the ADF&G McNeil River camp for bear viewing.

The MRS GS permit program generated \$79,911.00 in 2020, which is ultimately allocated to the state's Fish and Game Fund.

Table 7. Visitor use at McNeil River State Game Sanctuary and McNeil River State Game Refuge, Alaska, 1984–2020.

Year	Annual no. of applicants	Annual no. of bear viewing visitors	Mean no. of bear viewing visitors per day	Visitor use days bear viewing program	Minimum visitor use days other areas	Total known visitor use days MRS GS - MRS GR
1984	992	159		574		
1985	832	216		816		
1986	806	255		967		
1987	1,757	252		1,054		
1988	1,094	304		1,328		
1989	1,306	264		1,183		
1990	1,481	299		1,435		
1991	1,818	249		1,415		
1992	1,672	245		1,210		
1993	2,150	225	14.1	1,128		
1994	1,766	228	13.6	1,086		
1995	1,486	212	13.4	1,074		
1996	1,502	219	14.5	1,158		
1997	1,474	228	15.0	1,197		
1998	1,159	219	13.7	1,096		
1999	1,223	208	14.0	1,122		
2000	1,322	198	13.1	1,051		
2001	1,329	186	12.7	1,012		
2002	1,434	175	11.6	930		
2003	1,314	188	12.3	995		
2004	860	201	12.9	1,034		
2005	960	195	12.3	983		
2006	783	183	11.6	970		
2007	1,156	157	9.8	832		
2008	932	167	10.9	913		
2009	725	181	11.9	1,266	635	1,901
2010	714	176	11.7	1,100	350	1,450
2011	751	195	12.7	1,089	507	1,596
2012	719	180	12.0	1,041	572	1,613
2013	934	156	10.6	910	488	1,398
2014	1,075	171	11.0	923	639	1,562
2015	983	178	11.5	946	862	1,808
2016	819	175	11.2	929	461	1,390
2017	972	199	13.5	1,092	513	1,605
2018	862	187	12.9	1,044	388	1,432
2019	1,097	200	13.7	1,215	545	1,760
2020	1,211	153	11.4	937	254	1,191

KAMISHAK RIVER

Lodges and air charter services conduct sport fishing and wildlife viewing trips in the Kamishak River drainages within MRS GS and adjacent Katmai National Park. This area is also part of the Kamishak Special Use Area, which is managed by DNR. 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, DNR land use permit, and an ADF&G McNeil River SGS commercial access permit. The primary management concern is the food-conditioning of Kamishak River bears, which also visit Mikfik Creek and McNeil River. Food-conditioning of bears would not be consistent with the purposes for which the sanctuary was established and would jeopardize the bear-viewing program at McNeil River.

Businesses operating in this area holding ADF&G special area and commercial access permits are required to report the number of guides, clients, fish harvested or released, and the number of bears observed.

During 2020, 10 commercial operators had permits to operate within the Kamishak River area of the sanctuary. Some of these operators also held special area permits for the storage of boats and operations. Their primary activity is sport fishing; however, they also engage in wildlife viewing activities, primarily viewing of brown bears. Due to the COVID-19 pandemic, participation and use of these guide services was greatly reduced in 2020. Some operators reported that they did not operate at all or had large reductions in nonresident participation. Of the 10 commercial operators only 3 reported making guided use trips to the area. These guide services made an average of 15 trips each and spent 256 visitor use days in the sanctuary, which included 170 angler use days and 86 guide use days. This compares to the prior 5 years reporting average of 345 angler use days and 162 guide use days in sanctuary. Commercial guides reported seeing an average of 4 bears per day (range 3–7) during operations between 14 July and 19 September.

CHENIK LAKE–CREEK AREA

The mouth of Chenik Creek is another area within MRS GS where low levels of bear viewing have occurred historically. One commercial bear-viewing guide service from Homer obtained authorizations for a temporary tent camp at Chenik Lake in 2020. The operator reported that no trips were made to the Chenik Creek mouth area for bear-viewing activities due to the COVID-19 pandemic. One private group of 2 people were known to visit the Chenik Lake area 11–18 August 2020 (16 visitor use days).

BEAR-HUMAN CONFLICTS

As detailed above, there were 937 user days associated with ADF&G's bear-viewing program at the McNeil River camp. An additional 254 user days were reported by area guides or the public using the Kamishak River and Chenik Creek areas of MRS GS and MRS GR. CIAA staff reported 189 days at the Paint River fish ladder. All 1,380 user days represent activities, primarily bear-viewing and sport fishing, spent in proximity to brown bears. Staff document adverse bear-human interactions associated with ADF&G's bear-viewing program. Commercial guides and other entities perform self-reporting to ADF&G on any adverse interactions. During the 2020

season, there were no reported adverse interactions between bears and people in MRS GS or MRS GR.

LAND USE PERMITTING

Eleven ADF&G special areas permits and 12 ADF&G commercial access permits were issued during 2020. These included the special areas and commercial access permits issued to companies involved in commercial transportation, sport fishing, and wildlife viewing in the McNeil River, Kamishak River, and Chenik Creek areas; permits for fisheries enhancement at the Paint River; and helicopter landings associated with USGS land surveys.

There were no mineral resource or development activities applied for, permitted, or reported to the department within MRS GS or MRS GR during 2020.

During 2020 ADF&G staff reviewed and commented on the U.S. Army Corps of Engineers (ACOE) Environmental Impact Statement for the Pebble LLC development of the Pebble Mine in Bristol Bay, including one alternative that would place a road closer than one-quarter of a mile and an industrial port facility within 2 miles of the northern border of McNeil River State Game Refuge. The project has the potential for significant impacts to wildlife resources, management, and public uses within the MRS GR and MRS GS. ADF&G staff worked within the ACOE process to identify and address potential impacts to the sanctuary and refuge, area fish and wildlife resources, and public uses of the sanctuary and refuge. As a result of the public review and prior to the Record of Decision, the ACOE determined that the project would have significant impacts and altered the preferred alternative to include a northern route road system, instead of the southern route that was in near proximity to the sanctuary and refuge. On 20 November 2020, the ACOE Record of Decision was issued with a final finding that a permit would not be issued, determining that "...the proposed discharge does not comply with the 404 (b)(1) Guidelines" and that the "proposed project is contrary to the public interest."

Fish and Wildlife Research

This section summarizes new or ongoing fish and wildlife research projects within MRS GS and MRS GR.

MIKFİK CREEK VIDEO RESEARCH

A remote video escapement recorder was installed at the outlet of Mikfik Lake for the 23rd consecutive season. This project has proven invaluable to both in-season and post-season fisheries management and research in lower Cook Inlet, demonstrating that remote video and time-lapse recording technology is a viable alternative to aerial surveys as a means of collecting escapement data on small clear streams that do not warrant the expense of weirs or sonar.

In 2020, the video system at Mikfik Creek–Lake was installed on 2 June. The system operated continuously (~24 hr/d) and successfully recorded images 100% of the time that it was programmed to operate between 2 June and 27 August (2,063 hr). The 2020 sockeye salmon run into Mikfik Lake was characterized by 1 distinct pulse of escapement. More than 200 sockeye salmon (71% of the run) entered the lake over a 3-day period (18–20 June). Unlike some recent

years, in 2020 ADF&G—CF staff did not have to breach any active beaver dams on Mikfik Creek to allow migrating sockeye salmon to reach the lake.

A single camera mounted on the original (west bank) light pole was used to collect all video images of fish passage in 2020. Recordings were made using a time-lapse rate of 5 frames per second, which has proven to provide sufficient image quality. Fish were very easy to see, and the digital video recorder facilitated efficient and convenient video review to estimate escapement. Upon review of the images collected at Mikfik Creek, 305 sockeye salmon were counted entering the lake. In the past, to remain consistent with the historical Mikfik Creek database and with the methods used to derive the Mikfik sockeye salmon SEG, aerial survey data were normally used to generate the spawning escapement index. However, at the 2013 Lower Cook Inlet Board of Fisheries meeting, ADF&G lower Cook Inlet staff recommended revising the Mikfik Lake sockeye salmon SEG so it is based on remote video, the method currently used to monitor escapement (Otis et al. 2013). As a result, the remote video-based estimate of 305 fish was used as the final escapement index in 2020. The video-based escapement goal for Mikfik Creek sockeye salmon is 3,400–11,000 fish (Otis et al. 2016b).

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 2,063 hours of recorded video between 2 June and 27 August, reviewers documented 30 instances where brown bears transited the field of view of the camera, an average of 0.34 bears per day of video operation ($n = 87$ d). All but one sighting were of individual bears. Other wildlife species observed included moose, beaver, river otter, and various waterfowl.

MCNEIL RIVER BROWN BEAR AND CHUM SALMON RESEARCH

During 2009 and 2010, Western Washington University graduate student Ian Gill researched the fishing behavior of brown bears and bear-salmon predation at McNeil River falls (Gill and Helfield 2012). This research provided data and streamlined video sampling methodologies that allowed estimating the total number of chum salmon taken by bears at the falls; the information is also beneficial to the management of area fisheries.

ADF&G—CF Research Biologist Ted Otis worked with Gill to use the methodology and data in developing a model to estimate bear-salmon predation on pre-spawning chum salmon in McNeil River. Since 2011, ADF&G—CF staff has continued the video project to estimate the number of pre-spawning chum salmon killed by bears at McNeil River falls each year. The current project is being conducted in collaboration with Dr. Brad Harris, a professor at Alaska Pacific University (APU), where one of his students is reviewing the video. For the 2017 field season, APU purchased a new high-definition (HD) camera system to enhance the project's ability to collect accurate predation data and to evaluate the potential for identifying individual bears using enhanced video techniques. Use of the HD camera system continued in 2020; however, no results were available for this report as data are still being analyzed.

Sanctuary Administration and Management

STAFFING

Sanctuary Manager Tom Griffin completed his twenty-first season at McNeil River, his eleventh as manager. Beth Rosenberg completed her fifth season as Assistant Manager and Jason Rupp completed his second season as F&W Technician III. In order to reduce COVID-19 exposure and transmission and in response to health and travel mandates, the McNeil program and staff chose not to have staff breaks, staff replacements, or special administrative staff visits. The only administrative visits other than McNeil staff were that of ADF&G–CF staff setting up video monitors at McNeil River, Mikfik Lake, and Chenik Lake. McNeil River staff arrived at the camp on 24 May 2020 using 2 Otter airplane trips to transport staff and about 3,500 pounds of gear. Camp was pulled on 31 August 2020 using one Otter for the return trip.

Training for 2020 included annual ADF&G firearms safety training.

Volunteers

Scheduled volunteer maintenance work during the pre-season was cancelled in 2020 due to the COVID-19 pandemic.

FACILITIES

Trails

In lieu of the normal volunteer maintenance work project, McNeil staff conducted maintenance and repair of several trail sections, including; 1) trail maintenance at the base of east bluff, 2) maintenance of small sections of geoblock trail in Mikfik sedge east, 3) rebuild of a wooden bridge near the McNeil River trail head, 4) vegetation clearing and leveling of the McNeil River falls viewing pad, 5) repair of plank and run boards near the McNeil River falls viewing pad and close to the trailhead.

Camp

Maintenance items around camp included the normal painting, firewood preparation, trimming alders for better visibility, removal of invasive dandelions, weeding and graveling of several tent sites and sections of trail in camp, replacement of broken gutter and fascia on the east side of the back cabin, and thinning of successional vegetation in the sauna pond. The boat running line on the spit was also replaced.

COVID-19 Response

In response to COVID-19 it was necessary to implement several changes to the McNeil River viewing program in order to allow operations within national and local health mandates and provide for staff and public safety. Changes that were put in place to allow the viewing program to continue included:

- Extending payment deadline from typical 15 April to 15 May.
- Extending refund deadline from normal 15 May to 14 days prior to permittee first viewing day.
- Cancelling the pre-season volunteer maintenance work party.
- Limiting number of persons in camp and reducing viewing group size from 10 to 8 persons in June.
- Limiting number of persons in camp and viewing group size to 10 in July and August.
- Working closely with permittees and transporters to allow cancellations and redraw - resale of cancelled permits.
- Addition of disinfectant and hand sanitizer stations.
- Frequent disinfectant cleaning of the cook shack and living areas.
- Addition of family storage totes in the cook shack and rotating smaller groups of visitors through the cook shack.
- Daily temperature screenings.
- Use of masks while near others.
- Elimination of staff movements between camp and town.

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Appendix A. Daily wildlife observations during 2020, McNeil River State Game Sanctuary, Alaska.

Date	Location zone ^a	Comments
5/25/2020	CMP	American Robin.
5/25/2020	CMP/BCB	Wilson's Snipe. Many heard, not seen
5/25/2020	LAG	Fox Sparrow.
5/25/2020	CMP	Fox Sparrow.
5/25/2020	MSE	Fox Sparrow.
5/25/2020	CMP/MSE	Golden Crowned Sparrow. Different song from some GCSP, descending first note to 2nd note
5/25/2020		Savannah Sparrow.
5/25/2020	LAG	2 Bald Eagle. Not arrived yet- 1 adult flying and 1 juvenile
5/25/2020	CMP	Yellow Warbler.
5/25/2020	CMP	Wilson's Warbler.
5/25/2020	LAG	Mallard.
5/25/2020	LAG	Glaucous-winged Gull.
5/25/2020	LAG	Double-crested Cormorant. Also seen in outside waters
5/25/2020	CMP	Bank Swallow.
5/25/2020	CMP	Tree Swallows.
5/25/2020	CMP	1 Arctic ground squirrel. Seen near mushroom log
5/26/2020	CMP	1 Arctic ground squirrel. Same guy seen yesterday near mushroom log and on beach in front of camp
5/27/2020	Outside	12+ Unidentified Scoter. Lesser or greater?
5/29/2020	Outside	15+ Northern Shoveler. Shoveler-Mallard? Mixed flock in outside spit corner
5/29/2020	Outside	30+ Double-crested Cormorant. On rock yesterday, outside water feeding today
5/31/2020	Jungle	5 Alaska Violet. In "Jungle" area.
5/31/2020	CMP	3 Red Elderberry.
6/1/2020	LAG	25+ Brant.
6/2/2020	MCR	2 Greater Yellowlegs.
6/2/2020	CMP	1 Hairy Woodpecker. On SSB pole
6/3/2020	CMP	1 Wilson's Snipe.
6/3/2020	CMP	1 Wilson's Warbler. Morning, perched
6/3/2020	CMP	2 Nootka Lupine. First bloom, seen on water trail
6/4/2020	CMP	2 Tree Swallows. Perched, flying
6/4/2020	CMP	20+ Bank Swallow. In flight near back cabin

Date	Location zone ^a	Comments
6/4/2020	MRL	12 Villous Cinquefoil. West Bluff, 1st bloom observed on conglomerate walls
6/4/2020	SPT	6 Beach Fleabane. Not blooming yet, end of spit
6/4/2020	CMP	5+ Wild Geranium. First bloom
6/5/2020	SPT	6 Beach Pea. 1st bloom. Blooming at end of Spit
6/5/2020	CMP	Chocolate Lily.
6/5/2020	CMP	Nagoonberry.
6/5/2020	CMP	2 Common Raven. Flying
6/5/2020	LAG	6 Glaucous-winged Gull. Perched
6/6/2020	CMP	1 Golden-crowned Sparrow. Calling in evening
6/6/2020	CMP	1 American Robin. Calling in evening
6/6/2020	CMP	1 Yellow Warbler. Calling, perched behind front cabin, red streaks on chest
6/6/2020	CMP	1 Wilson's Warbler. Calling, in willows
6/6/2020	CMP	3 Tree Swallows.
6/6/2020	CMP	2 Common Redpoll.
6/6/2020	CMP	Largeleaf Aven.
6/7/2020	MCR	2 Greater Yellowlegs. Mikfik Creek riffles.
6/7/2020	MSE	100 Tree Swallow. Swarming, feeding on insects in sedge flats.
6/7/2020	TDF	25 Bank Swallow. Flying.
6/7/2020	CMP	12 American Robin. also observed in the willows around MCR.
6/7/2020	MSE	6 Wilson's Warbler. also observed in the willows around MCR.
6/7/2020	MSE	25 Savannah Sparrow. also observed in the willows around MCR, MCU, CMP.
6/7/2020	MCR	3 Fox Sparrow. also observed in MCU and CMP.
6/9/2020	MCR	6 Bald Eagle. 6-7 Bald Eagles in the Mikfik area staged at 14:00
6/9/2020	MCT	10+ Green-winged Teal. 10+ Green-winged Teal in the bend upstream of MCT
6/9/2020	MSE	3 Fox Sparrow.
6/9/2020	MSE	5 Wilson's Warbler.
6/9/2020	MCT	4 Green-winged Teal.
6/9/2020	MSE	6 Golden-crowned Sparrow.
6/9/2020	MSE	4 Hermit Thrush.
6/9/2020	MCR	12 Bald Eagle.
6/9/2020	TDF	13 Greater Scaup. hightide, in front of camp.
6/9/2020	TDF	2 Red-breasted Merganser. hightide, in front of camp.

Date	Location zone ^a	Comments
6/9/2020	CMP	2 Wild Iris. First bloom.
6/10/2020	MCR	1 Black-billed Magpie.
6/11/2020	TDF	4 Common Merganser.
6/11/2020	CMP	1 Arctic ground squirrel. Observed in camp.
6/11/2020	MCT	15+ Green-winged Teal. downstream of MCR toward MCT.
6/11/2020	MCR	3 Mew Gull. in flight at Mikfik riffle. One juvenile.
6/11/2020	MCR	20+ Bald Eagle. 20-25 Bald Eagles scavenging from riffle to upper Mikfik falls.
6/11/2020	MCU	100+ Sockeye (Red) Salmon. 100-150 Red Salmon in upper pool. Some making a push upstream.
6/11/2020	MSE	5 Wilson's Warbler.
6/11/2020	MSE	3 Yellow Warbler.
6/11/2020	CMP	2 Orange-crowned Warbler.
6/11/2020	MCR	2 Glaucous-winged Gull.
6/11/2020	MCL	1 Black-billed Magpie.
6/11/2020	MCL	1 Fox Sparrow.
6/12/2020	MSE	3 Wilson's Warbler.
6/12/2020	MSE	11 Bald Eagle.
6/12/2020	CMP	2 Common Raven.
6/12/2020	MCR	2 Orange-crowned Warbler.
6/12/2020	MCR	5 Yellow Warbler.
6/12/2020	MCT	1 Greater Yellowlegs.
6/12/2020	MCT	9 Green-winged Teal.
6/12/2020	MSE	12 Savannah Sparrow.
6/12/2020	CMP	4 American Robin.
6/12/2020	CMP	6 Tree Swallow.
6/12/2020	CMP	4 Hermit Thrush.
6/12/2020	TDF	8 Double-crested Cormorant.
6/12/2020	MCR	4 Tall Jacob's Ladder. 1st bloom observed on 6/12/20.
6/12/2020	MSE	100 Pacific Silverweed. Observed in bloom.
6/12/2020	MCR	100 Chocolate Lily.
6/13/2020	LAG	2 Mallard. 2 male Mallards in the lagoon.
6/13/2020	LAG	2 Northern Pintail. 1 male, 1 female.
6/13/2020	MCT	10 Green-winged Teal.
6/13/2020	CMP	Starflower. First bloom in Camp.
6/13/2020	CMP	Northern Yarrow. First bloom in Camp.
6/13/2020	TDF	2 Pigeon Guillemot. 2 Pigeon Guillemots by the seiner setting a net in the cove, nests seen on Corm rock wall 6/15.

Date	Location zone ^a	Comments
6/13/2020	TDF	1 Common Loon. Early hours - heard not seen.
6/13/2020	MSE	Northern Waterthrush. Heard in the willows on the East side of Mikfik. Heard by Kelsey Griffin, coastal biologist for Katmai NP.
6/13/2020	MSE	Grey-cheeked Thrush. Heard in MSE. Kelsey Griffin, coastal biologist for Katmai NP.
6/14/2020	TDF	3 Red-throated Loon. in the water, toward Polly Cove. ID'd by Laurie Degernes.
6/14/2020	TDF	Greater Scaup. in the water, toward Polly Cove. ID'd by Laurie Degernes.
6/14/2020	TDF	1 Black Scoter. in the water, toward Polly Cove. ID'd by Laurie Degernes.
6/15/2020	NBL	2 Gray Wolf. Two wolves on NBL, eventually crossed paths with 2 bears near Charlie McNeil site. Moving quickly. Came into LAG, swam across river mouth, and then continued upriver. One very light/white in color, the other grayer, with slight limp.
6/14/2020	MCU	1 Mew Gull.
6/14/2020	MCR	8 Bald Eagle.
6/14/2020	MSE	1 Fox Sparrow.
6/14/2020	MSE	6 Wilson's Warbler.
6/14/2020	MSE	4 Yellow Warbler.
6/14/2020	MSE	3 Savannah Sparrow.
6/14/2020	MSE	5 Golden-crowned Sparrow.
6/14/2020	MSE	3 Hermit Thrush.
6/15/2020	CMP	1 Wild Iris.
6/16/2020	MSE	1 Fox Sparrow. In the Feltleaf Willows in MSE.
6/16/2020	MSE	100 Feltleaf Willow.
6/16/2020	MRT	25 Arctic Willow.
6/16/2020	MRT	50 Labrador Tea.
6/16/2020	MRT	10 Alpine Azalea.
6/16/2020	MRT	10 Bog Blueberry.
6/16/2020	MRT	12 Alaska Violet.
6/16/2020	MRL	6 Marsh Marigold.
6/16/2020	MRT	12 Shrubby Cinquefoil.
6/16/2020	MRL	9 Villous Cinquefoil.
6/16/2020	WBL	50 Alpine Arnica. possibly Chamisso Arnica (<i>Arnica chamissonis</i> Less.) found on Kodiak
6/16/2020	MSE	20 Roseroot. growing on conglomerate wall.
6/16/2020	MRT	100 Chocolate Lily.
6/16/2020	MRT	250 Crowberry.
6/16/2020	MRT	100 Nagoonberry.

Date	Location zone ^a	Comments
6/16/2020	MSE	200 Starflower.
6/16/2020	MSE	200 Lady Fern.
6/17/2020	TDF	20 Canada Goose. Flew over spit and then over tidal flats.
6/18/2020	MCR	33 Bald Eagle. 33 Eagles in MCR area
6/19/2020	MRL	2 Moose. two moose crossed the mouth of McNeil River, possibly a cow and calf.
6/19/2020	MCR	2 Bumble Bee. with orange butt.
6/19/2020	MSE	1 Dwarf Fireweed. 1st bloom on east conglomerate wall.
6/19/2020	LAG	100 Beach Pea. along lagoon part of trail and the dunes.
6/19/2020	CMP	1 Wild Iris. Blooming is several places including camp.
6/19/2020	MSE	20 Tall Jacob's Ladder. Blooming is several places including MSE.
6/20/2020	LAG	2 Swans - Tundra or Trumpeter. 2 Swans in flight from SW over lagoon
6/20/2020	MCU	20+ Bald Eagle. Eagles at MCU
6/20/2020	MCU	150-200 Sockeye (Red) Salmon. 150-200 Reds in Mikfik upper pool
6/20/2020	MCT	15 Green-winged Teal.
6/21/2020	BCB	1 Gray Wolf. Wolf with some grey, some lameness, running along back bench toward Mikfik
6/23/2020	MSE	Abundant Lyngbye's Sedge. Abundant in Mikfik.
6/23/2020	MSE	12 Alaska Spiraea.
6/23/2020	MSE	100 Marsh Five-finger. Abundant in the Mikfik Sedge Flats.
6/23/2020	MSE	100 Pacific Silverweed. Abundant in the Mikfik Sedge Flats.
6/23/2020	MSE	6 Diamond-Leaf Willow. Also found in MCR, MCL & MCU.
6/23/2020	MSE	12 Feltleaf Willow.
6/23/2020	MSE	25 Sweet Gale.
6/23/2020	MSE	5 Red Elderberry.
6/23/2020	MCR	8 Arctic Dock.
6/23/2020	MCR	Abundant Arctic Star Flower.
6/23/2020	MCR	12 Arctic Daisy.
6/23/2020	MCR	20 Northern Yarrow.
6/23/2020	LAG	100 Beach Ryegrass.
6/23/2020	MSE	100 Common Lady Fern.
6/23/2020	MCR	Abundant Meadow Horsetail.

Date	Location zone ^a	Comments
6/26/2020	MCL	1 Black-billed Magpie. Very vociferous.
6/26/2020	LAG	6 Common Redpoll. Flying overhead, calling.
6/26/2020	LAG	Abundant Goose Tongue.
6/26/2020	WBL	12 Villous Cinquefoil. growing on conglomerate wall.
6/26/2020	CMP	100 Yellow Paintbrush. Abundant along trails.
6/26/2020	CMP	Abundant Wild Geranium. In full bloom along trails.
6/26/2020	LAG	Abundant Beach Pea. Blooming along the lagoon trail.
6/26/2020	SPT	2 Oysterleaf.
6/26/2020	LAG	15 Arctic Daisy. Blooming along the lagoon trail.
6/26/2020	LAG	Abundant Common Mare's Tail.
6/26/2020	MSE	Abundant Sitka Alder. Abundant in many zones, MSE, MCL, MCU, MRT etc.
6/26/2020	LAG	5 Bumblebee.
6/28/2020	MRF	1 Common Raven.
6/28/2020	MRF	12 Glaucous-winged Gull.
6/28/2020	MCR	1 Mew Gull.
6/28/2020	LAG	25 Kamchatka Rhododendron. blooming along the conglomerate on the west wall.
6/28/2020	MSE	100 Dwarf Fireweed. blooming on the conglomerate wall in the Lagoon.
6/28/2020	MRT	100 Nagoonberry. blooming along the McNeil River Trail.
6/28/2020	MRT	100 Low Bush Cranberry.
6/28/2020	MRT	100 Bog Blueberry.
6/29/2020	CMP	1 Meadow Jumping Mouse.
6/29/2020	UMS	100 Moss Campion. blooming on the conglomerate wall toward McNeil Head.
6/29/2020	UMS	100 Double-crested Cormorant. nesting in colony on conglomerate wall 3/4 mile east of camp toward McNeil Head.
6/29/2020	UMS	1 Gray-Crowned Rosy-Finch. Along the conglomerate wall near McNeil Head.
6/29/2020	UMS	200 Glaucous-winged Gull. nesting in colony on conglomerate wall 3/4 mile east of camp toward McNeil Head, also observed in the cove and on the mushroom rock.
7/1/2020	LAG	2 Caspian Tern. In flight vocalizing about the lagoon and the cove.

Date	Location zone ^a	Comments
7/1/2020	LAG	1 Peregrine Falcon. Flew directly over in the Lagoon.
7/1/2020	LAG	2 Common Redpoll. Flew directly over in the Lagoon.
7/1/2020	MRT	Abundant Sitka Burnet. Red in color.
7/1/2020	MRT	Abundant Sitka Burnet. 1st bloom, white in color.
7/1/2020	MSE	5 Least Sandpiper. Family group on the edge of the sedge grass along the willow creek.
7/3/2020	MRF	5 Common Merganser. 1 drake and 4 others.
7/4/2020	LAG	2 Caspian Tern. In flight over outside and lagoon water.
7/4/2020		200 Double-crested Cormorant. 87 nests in the Cormorant colony 051-008 near McNeil Head, 20% unoccupied, observations made by Barbra Slater.
7/4/2020		50 Glaucous-winged Gull. Observed by the Cormorant colony 051-008 near McNeil Head, nesting and flying.
7/4/2020		1 Peregrine Falcon. Flying around the Cormorant colony 051-008 near McNeil Head.
7/4/2020		2 Common Raven. Observed by the Cormorant colony 051-008 near McNeil Head.
7/4/2020		2 American Pipit. Observed on the coast 3/4 of mile past camp near the Cormorant colony 051-008 near McNeil Head.
7/5/2020	CMP	1 Meadow Jumping Mouse. Ran over someone's foot by mushroom stools.
7/5/2020	MCR	2 Swans. Observed in flight over Mikfik.
7/5/2020	CMP	Abundant Umbel Bittercress. Abundant along trails.
7/6/2020	MRF	1 Black Turnstone. Observed on the conglomerate at McNeil falls.
7/6/2020	MRT	5 Dwarf Birch. Observed along the McNeil River Trail.
7/6/2020	MRT	25 Sweet Gale. Observed along the McNeil River Trail.
7/6/2020	MRT	1 Moose. Observed crossing trail near Eagle rock, followed by a brown bear
7/8/2020	MRT	3 Western Canada Goldenrod. Observed along the McNeil River Trail.
7/7/2020	MRF	5 Common Merganser. Observed below the lower falls from McNeil falls, five drakes.
7/7/2020	CMP	3 Common Fireweed. 1st bloom, observed in camp.

Date	Location zone ^a	Comments
7/9/2020	MRF	1 Common Redpoll. Observed just below Lower Pad
7/10/2020	CMP	1 Pine grosbeak. Observed red male pine grosbeak to left of front cabin near alder patch island
7/10/2020	MRF	1 Black-billed Magpie.
7/10/2020	MRF	60 Glaucous-winged Gull. Observed at McNeil falls.
7/10/2020	MRF	8 Bald Eagle. Observed at McNeil falls.
7/10/2020	MRF	1 Mew Gull. Observed at McNeil falls.
7/10/2020	MRF	1 Mallard. Observed at McNeil falls.
7/10/2020	MRF	many Chum (Dog) Salmon. Observed at McNeil falls.
7/11/2020	MRF	1 Dolly Varden. Caught by a bear.
7/12/2020	MRF	6 Common Merganser. 6 Common Mergansers floating below lower McNeil falls
7/13/2020	MSE	1 Merlin. Flew directly over in MSE along the wall trail.
7/13/2020	LAG	100 White-Winged Scoter. Flew overhead in the Lagoon.
7/13/2020	MRF	1 Wandering Tattler. Observed on the conglomerate at McNeil falls.
7/13/2020	CMP	2 Pine Grosbeak. Observed both the red male and yellow-olive headed individual.
7/14/2020	MCT	15 Common Merganser. Mergansers flocking in Mikfik tidal
7/14/2020	MRF	1 Wandering Tattler. Wandering Tattler on conglomerate in front of lower pad at MRF
7/14/2020	MRT	1 Unknown Vole. Vole on McNeil River trail just before Eagle Rock
7/15/2020	MRF	1 Spotted Sandpiper. Observed on the conglomerate at McNeil falls.
7/15/2020	MRF	6 Common Merganser. Observed below the lower falls from McNeil falls.
7/15/2020	CMP	1 Wood Frog. Heard in the sauna pond, many tadpoles observed.
7/15/2020	MRF	1 Arrowleaf Ragwort. Observed between the viewing pad and the top of the hill at MRF.
7/15/2020	LAG	12 Woolly Lousewort. Observed growing on top of the conglomerate wall in the Lagoon.
7/15/2020	CMP	3 Pine Grosbeak. Observed in camp.
7/16/2020	MRT	1 Wood Frog. Observed on the McNeil River Trail.

Date	Location zone ^a	Comments
7/17/2020	MRT	1 Wood Frog. Observed on the McNeil River Trail.
7/17/2020	MRF	15 Common Merganser. Floating and flocking up below the lower falls, 9 then 12, 15.
7/17/2020	MRF	10 Bank Swallow. Observed flying at McNeil falls which is unusual.
7/18/2020	MRT	Abundant Northern Bedstraw. Observed along the McNeil River Trail and camp.
7/19/2020	MCL	5 Greater Yellowlegs. Moving in the shallow water of the back slough and in front of Enders
7/19/2020	MCL	1 Least Sandpiper. Juvenile sandpiper by Enders Island, buff breast brown spotted back
7/19/2020	MCL	8 Common Mergansers. Flocking in lower river
7/19/2020	MRF	1 Green-winged Teal. Single female Green-winged Teal above the falls
7/20/2020	MRF	20 Glaucous-winged Gull. Observed from McNeil River falls.
7/20/2020	MRF	2 Mew Gull. Observed from McNeil River falls.
7/20/2020	MRF	3 Bald Eagle. Observed from McNeil River falls.
7/20/2020	MRF	9 Common Merganser. Observed from McNeil River falls, Common Mergansers were below the lower falls in the river.
7/22/2020	MRT	3 Monkshood. Observed on the MRT just prior to the falls.
7/22/2020	MRL	1 Siberian Aster. Observed growing on Enders Island at the mouth of McNeil River.
7/24/2020	MRT	1 Wood frog. Observed a juvenile at the bog on the McNeil Trail.
7/24/2020	MRF	1 Unknown Sandpiper. Least Sandpiper at falls?
7/25/2020	LAG	Abundant Yellow Monkey Flower. Observed on conglomerate walls in the lagoon.
7/25/2020	MRL	100 Yellow Rattlebox. Observed on the islands in lower McNeil River.
7/25/2020	CMP	50 Yellow Pond Lily. Observed in the sauna pond in camp.
7/25/2020	LAG	4 Mertens' Rush. Observed in the lagoon near the dunes.
7/27/2020	MRL	4 Common Raven.
7/27/2020	MRL	2 Bald Eagle.
7/27/2020	MRF	10 Glaucous-winged Gull.
7/27/2020	MRL	2 Mew Gull.
7/27/2020	MRF	1 Black-billed Magpie.

Date	Location zone ^a	Comments
7/28/2020	UMS	1 Rock Sandpiper. Observed on beach walk near McNeil head.
7/28/2020	UMS	1 Belted Kingfisher. Observed on beach walk near McNeil head.
7/28/2020	UMS	200 Double-crested Cormorant. Observed the Cormorant colony 051-008.
7/28/2020	UMS	50 Glaucous-winged Gull. Observed nesting next to the Cormorant colony 051-008.
7/28/2020	UMS	1 Peregrine Falcon. Observed alarming above the Cormorant colony 051-008.
7/28/2020	BCB	1 Northern Harrier. Observed flying low (hunting) behind camp.
7/29/2020	MCR	10+ Least Sandpiper. In the area of Mikfik riffle
7/23/2020	SPT	10 Semipalmated Plover. Observed on the spit near camp.
7/24/2020	UMS	200 Double-crested Cormorant. Observed many nesting Cormorants with large offspring at the Cormorant colony 051-008.
7/24/2020	UMS	50 Glaucous-winged Gull. Observed at the Cormorant colony 051-008.
7/24/2020	UMS	2 Pigeon Guillemot. Observed in the cove just beyond the Cormorant colony 051-008.
7/24/2020	UMS	1 Peregrine Falcon. Observed alarming above the Cormorant colony 051-008.
7/26/2020	LAG	1 Bonaparte's Gull. One Bonaparte's with 2 Mew Gulls at island crossing in lagoon
7/30/2020	UMS	200 Double-crested Cormorant. Observed down the coast at the Colony.
7/30/2020	UMS	4 Bald Eagle. Observed two pairs, one pair at McNeil head near the big nest with eaglet on Islet; another pair just beyond camp on the cove side.
7/30/2020	UMS	2 Black Oystercatcher. Observed just beyond camp on the shoreline after during east wind with rain.
7/30/2020	UMS	60 Glaucous-winged Gull. Observed nesting next to the Cormorant colony 051-008.
7/30/2020	UMS	25 Bank Swallow. Observed nesting just beyond camp along the erosion wall.
7/30/2020	UMS	2 American Pipit. Observed near McNeil head along the coast.
7/30/2020	UMS	1 Gray-Crowned Rosy-Finch. Observed near McNeil head along the coast.
7/31/2020	LAG	6 Semipalmated Plover. 6 Semipalmated Plovers in rocks between McNeil Trailhead and Surprise Pt.
7/31/2020	MRL	3 Semipalmated Plover. 3 Semipalmated Plovers at Enders

Date	Location zone ^a	Comments
7/31/2020	LAG	20 Semipalmated Plover. Mixed flock of peeps in the lagoon, Semipalmated Plovers and Least Sandpiper
7/31/2020	LAG	20 Least Sandpiper. Mixed flock of peeps in the lagoon, Semipalmated Plovers and Least Sandpiper
8/5/2020	MRL	5 Greater Yellowlegs. 5 Greater Yellowlegs in the back slough, lower river
8/5/2020	SPT	20+ Least Sandpiper. Flock of Least Sandpipers on spit
8/1/2020	END	2 Bald Eagle.
8/1/2020	END	8 Glaucous-winged Gull.
8/1/2020	END	2 Mew Gull.
8/1/2020	END	2 Black-billed Magpie.
8/1/2020	END	9 Common Merganser.
8/3/2020	END	98 Mew Gull. A big flock flew in and landed in the lower river.
8/3/2020	END	6 Glaucous-winged Gull.
8/3/2020	END	9 Least Sandpiper.
8/3/2020	END	6 Harbor Seal. In the lower river at high tide.
8/3/2020	END	3 Greater Yellowlegs.
8/4/2020	MCT	5 Green-winged Teal. Observed a hen with four chicks in Mikfik Creek tidal at high tide.
8/4/2020	SPT	20 Least Sandpiper. Observed flying near spit.
8/5/2020	UMS	100 White-Winged Scoters. Observed flying overhead.
8/5/2020	UMS	3 Peregrine Falcon. Observed three Peregrine falcons alarming near the Cormorant colony 051-008.
8/5/2020	UMS	2 Wandering Tattler. Observed two Wandering Tattlers at McNeil Head on the conglomerate between the two beaches (Stonorov and Sisson).
8/5/2020	UMS	1 American Pipit. Observed along the coast near McNeil Head.
8/5/2020	UMS	200 Double-crested Cormorant. Observed at the Cormorant colony 051-008.
8/5/2020	UMS	50 Glaucous-winged Gull. Observed nesting next to the Cormorant colony 051-008.
8/5/2020	UMS	2 Bald Eagle. Observed one eaglet in the nest at McNeil Head with one adult flying and alarming.
8/5/2020	UMS	3 Spotted Sandpiper. Observed near McNeil head along the coast.

Date	Location zone ^a	Comments
8/7/2020	CMP	1 Northern Harrier. Flying low over camp.
8/7/2020	MRL	12 Common Merganser. Flocking in lower river
8/7/2020	MRL	8 Greater Yellowlegs. In lower river as tide was coming up
8/10/2020	LAG	1 Northern Harrier. Flying low over lagoon beach rye grasses and sedges
8/10/2020	MRL	4 Greater Yellowlegs. 4 Greater Yellowlegs in the lower river back slough
8/11/2020	SPT	1 Gray wolf. Single wolf tracks just in front of camp from Driftwood Point and out toward the lagoon. Wolf came through sometime between last night and early am on 8/11
8/11/2020	UMS	200 Double-crested Cormorant. Observed at the Cormorant colony 051-008, some up high on the nest sites, many in the water and some on rocks.
8/11/2020	UMS	75 Glaucous-winged Gull. Observed near Cormorant colony 051-008 along the coast.
8/11/2020	UMS	3 Gray-Crowned Rosy-Finch. Observed one adult and two fledglings.
8/11/2020	UMS	2 American Pipit.
8/11/2020	UMS	6 Black Turnstone. Observed along the water's edge just beyond camp.
8/11/2020	UMS	200 White-Winged Scoters. Observed several rafts offshore near McNeil Head.
8/11/2020	UMS	100 Surf Scoters. Observed rafts of shore.
8/11/2020	UMS	2 Wandering Tattler. Observed 2 Wandering Tattlers in different locations along the coast.
8/11/2020	UMS	1 Hermit Thrush.
8/11/2020	UMS	1 Savannah Sparrow.
8/11/2020	UMS	1 Short-tailed Weasel. Observed at McNeil Head feeding on the tideline.
8/11/2020	UMS	3 Peregrine Falcon. Observed near Cormorant colony 051-008 along the coast.
8/11/2020	UMS	4 Bald Eagle. Observed 2 adults and 2 Eaglets in the nest at McNeil Head between the beaches on the Eagle Islet.
8/11/2020	UMS	3 Harlequin Duck. Observed three just offshore.
8/11/2020	UMS	6 Spotted Sandpiper. Observed along the coast.
8/11/2020	UMS	1 Pigeon Guillemot. Observed at McNeil Head.
8/11/2020	UMS	1 Harbor Seal.

Date	Location zone ^a	Comments
8/11/2020	UMS	100 Blue Mussels. Observed along the coast toward McNeil Head.
8/11/2020	UMS	3 Soft-shelled Clam. Observed empty shells along the coast toward McNeil Head.
8/12/2020	MRL	30 -50 Pink (Humpback) Salmon. 1st day of spawning pink salmon outside of lower island in McNeil Lower River
8/13/2020	LAG	2 Merlin. 2 Merlins flying low over lagoon and spit
8/13/2020	CMP	2 Swans - Tundra or Trumpeter. 2 swans in flight from NE over lagoon and Mikfik
8/13/2020	MRL	2 Greater Yellowlegs. Observed a family group of four in the lower river.
8/13/2020	MRT	1 Northern Harrier.
8/13/2020	MRF	9 Common Mergansers. Observed in McNeil River below the lower falls, above MRL.
8/13/2020	CMP	1 Arctic ground squirrel. Observed on trail just outside of camp.
8/17/2020	MRT	1 Short-tailed Weasel/Ermine. Juvenile Ermine out from a hole in the log at the McNeil Trailhead
8/18/2020	MRL	5 Black-billed Magpie.
8/18/2020	MRL	4 Common Raven.
8/18/2020	MRL	250 Mew Gull.
8/18/2020	MRL	150 Glaucous-winged Gull.
8/18/2020	MRL	4 Bald Eagle.
8/18/2020	MRL	2 Unidentified Swans.
8/18/2020	MRL	6 Common Merganser.
8/18/2020	MRL	2 Sandhill Crane. Flying very high.
8/19/2020	END	1 Northern Shrike. Northern Shrike on a snag at Ender's Island, GWGU alarming in flight nearby
8/22/2020	END	Pink (Humpback) Salmon. Several sub adults at in the Lower River catching pink salmon and tossing them, smashing them on the water, and then not eating them
8/24/2020	BCB	2 Short-eared Owl. Two Short-eared Owls flying/hunting over back bench at nightfall
8/25/2020	LAG	1 Short-tailed Weasel. Observed at the McNeil trail head in the driftwood pile.
8/25/2020	UMS	2 Peregrine Falcon. Observed two at the driftwood area down the coast.

Date	Location zone ^a	Comments
8/25/2020	UMS	5 Gray-Crowned Rosy-Finch. Observed five together along the conglomerate wall down the coast.
8/25/2020	UMS	200 Double-crested Cormorant. Observed near the Cormorant colony 051-008, many down on the rocks along the coast.
8/25/2020	SPT	1 Moon Jelly. Observed along the tideline on the spit.
8/27/2020	MCU	25 High-Bush Cranberry. Observed along the upper and lower Mikfik creek.
8/27/2020	MCL	25 Siberian Aster. Observed on the McNeil River lower islands.
8/27/2020	SPT	3 Baltic Macomas. Observed along the tideline on the ocean side.
8/28/2020	MRF	1 Silver (Coho) Salmon. Caught by a bear.
8/11/2020	CLK	1 Caribou. Observed near Cabin at 18:00 (Observations made by Greg Thomson and Dave McCargo).
8/11/2020	CLK	1 Merlin. Observed near Cabin at 19:30 (Observations made by Greg Thomson and Dave McCargo).
8/11/2020	CLK	6 Red-breasted Merganser. Adult female with 5 chicks, swimming in lake, diving, frolicking near cabin at 20:00.
8/12/2020	CLK	1 Merlin. Observed near cabin at 10:00, flew by, perched on Alder branch by lake (photo).
8/12/2020	CLK	1 Bald Eagle. Observed near cabin at 1:00, catches fish!
8/12/2020	UMR	2 Bald Eagle. Observed flying over south side mountain at 15:00.
8/12/2020	UMR	1 Northern Harrier. Observed flying from the top of the south mountain at 15:30.
8/12/2020	UMR	1 Common Raven. Observed flying from the top of the south mountain at 16:00.
8/12/2020	UMR	2 Arctic ground squirrels. Observed from the top of the south mountain at 16:00.
8/12/2020	CLK	3 Brown Bear. Observed maternal female with two cubs at 20:40 near electric fence at camp site.
8/13/2020	CLK	1 Brown Bear. Bear heard at 02:40 not seen, near camp site.

Date	Location zone ^a	Comments
8/13/2020	CLK	1 Brown Bear. Observed a bear fishing in the lake near the south shore about 300-400 yards away at 15:10.
8/13/2020	CLK	1 Red-throated Loon. Observed flying south to north across the lake.
8/14/2020	CLK	1 Brown Bear. First observed (09:45) at the NE corner of the lake and he walked to the shoreline of the SW corner of the lake, and then along the south shore, seen from a distance.
8/14/2020	CLK	1 Brown Bear. Observed from across creek from the cabin, large, appeared to go down stream, seen from a distance.
8/15/2020	CLK	1 Merlin. Observed near cabin twice then gone at 11:15.
8/15/2020	CLK	1 Bald Eagle. Flew over Chenik Lake.
8/15/2020	CLK	1 Common Merganser. Observed at 13:45.
8/15/2020	CLK	1 Red Fox. Observed walking the southern shoreline, came to us out of curiosity at 15:40 (photos).
8/15/2020	CLK	1 Brown Bear. Observed from a distance in the SE corner of the dry lake, disappeared into alders at 16:55.
8/16/2020	CLK	1 Northern Harrier. Observed flying over Chenik Lake at 9:45.
8/16/2020	CLK	1 Spotted Sandpiper. Observed feeding along Chenik lake shore near cabin at 11:10.
8/16/2020	CLK	1 Short-tailed Weasel. Active along lake shore opposite cabin at 11:25 (photo).
8/16/2020	UCC	3 Spotted Sandpiper. Observed at Chenik Creek at 13:50.
8/16/2020	CLK	2 Mallard. Flew over cabin along shore, landed in lake at 19:30.
8/17/2020	CLK	1 Merlin. Flew over lake at 11:00.
8/17/2020	CLK	1 Brown Bear. Observed limping, walking along the north beach toward cabin. Watched for about 45 minutes at 12:00.
8/17/2020	CLK	1 Short-tailed Weasel. Investigates Dave, goes into his tent then scampers away at 14:30.
8/17/2020	CLK	1 Brown Bear. Observed Maternal female with a cub, walked north beach to cabin, not sure if they went down Chenik creek at 15:20.

Date	Location zone ^a	Comments
8/17/2020	CLK	1 Brown Bear. Observed limping bear walking along lake, detoured around us, fished the head of Chenik creek at 19:00.
8/18/2020	CLK	2 Arctic Loon. Observed on the lake near cabin at 08:30.
8/18/2020	CLK	3 Brown Bear. Observed Maternal female with two cubs of the year on SW shore, they were splashing in the water, the cubs running to and from (we watched for about 20 minutes at 11:25).
6/4/2020	NPB	Moose on hillside to the north of Paint River fish ladder camp.
6/5/2020	SAK	Three adult bears seen across the cove from observers. Two grazing and one fishing unsuccessfully in the cove. No interaction
6/5/2020	NAK	Sow and two cubs on the beach to the north of trailhead appx. 600 yards from observer. No interaction
6/6/2020	SAK	One blonde bear napping across cove. No interaction
6/24/2020	SAK	Two adult bears across cove from observers. No interactions
6/24/2020	NAK	Sow and two cubs to the north of trailhead appx. 600 yards from observer. No interaction
6/25/2020	SAK	Blonde adult bear across cove from observers. Remained at the site first spotted as plane landed and departed. No interactions
7/13/2020	PLA	Believed to be female. Walked past cabin site. Tolerant of crew who identified themselves to let her know they were there. Adult with crescent shaped mark on left hind quarters
7/19/2020	NAK	Adult of unknown sex walked the beach past trail site to the south. No interaction
7/26/2020	NAK	Sow with two cubs at a distance with no interaction. Too far for any additional markings or behavior
7/26/2020	PRC/NAK	Crew spotted bear eating plants on hill up from beach. Possibly sub-adult of unknown sex. Came down to beach as plane landed to eat a seal skin. Did not move or leave as plane landed. Crew waited on beach because bear was eating in front of trail. After 15 minutes bear headed to NAK.
8/11/2020	PLA	Large adult of unknown sex walked past cabin site on trail. Crew gently let the bear know they were there, and bear continued walking while paying no attention to crew or cabin site.
8/11/2020	PLA	Sub-adult bear of unknown sex walked trail past cabin site. Left quickly when crew made noise to let the bear know they were there.
8/12/2020	NAK	Sub-adult bear fishing in cove was chased away by a larger bear. Too far away to tell if it was two bears from 8/10
8/17/2020	CAK	Bears both fishing out in the middle of cove. Too far for markings or sex
8/21/2020	PLA	Saw bear on trail passing towards cove. Watched this bear fishing on cove later in the evening.
8/24/2020	PLA	Walked past cabin site from river to cove. Same bear was at the beach 1 hour later fishing.
8/24/2020	PLA	Bear from earlier walked the reverse of original path back to the river.

Date	Location zone ^a	Comments
8/31/2020	PLA	Sow with two large (possibly young of year cubs) walked past cabin site towards the river.

^a Location zones: BCB = Basecamp Bench; CAK = Akejemequiga Cove flats – central; CLK = Chenik Lake; CMP = Camp; END = Enders Island; LAG = Lagoon; MCL = Mikfik Creek Lower Falls; MCR = Mikfik Creek Riffles; MCT = Mikfik Creek Lower Tidal Sect.; MCU = Mikfik Creek Upper Falls; MRF = McNeil Falls; MRL = Lower McNeil River (below lower McNeil Falls to Lagoon); MRT = McNeil/Mikfik Bench; MSE = Mikfik Sedge East; NAK = Akejemequiga Cove Flats – north; NBL = North Bluff; NPB = North Paint River Bluffs/uplands; ODP = Opposite Driftwood Pt.; PLA = CIAA Paint River Lease Area; SAK = Akejemequiga Cove Flats – south; SPT = Spit; TDF = Tidal Flats; UCC = Upper Chenik Creek; UMR = McNeil River Refuge General; UMS = McNeil River Sanctuary General; WBL = West Bluff.

Appendix B. 2020 daily escapement through CIAA Paint River Fish Ladder, McNeil River State Game Sanctuary, Alaska.

Date	Sockeye	Coho	Chinook	Pink	Chum
07/7/2020	0	0	0	0	0
07/8/2020	0	0	0	0	0
07/9/2020	0	0	0	0	0
07/10/2020	0	0	0	0	0
07/11/2020	0	0	0	0	0
07/12/2020	0	0	0	0	2
07/13/2020	0	0	0	0	0
07/14/2020	0	0	0	0	0
07/15/2020	0	0	0	0	4
07/16/2020	0	0	0	0	0
07/17/2020	0	0	0	0	0
07/18/2020	0	0	0	0	0
07/19/2020	0	0	0	0	0
07/20/2020	0	0	0	0	0
07/21/2020	0	0	0	0	53
07/22/2020	0	0	0	0	10
07/23/2020	0	0	0	0	5
07/24/2020	0	1	0	0	1
07/25/2020	0	0	0	0	19
07/26/2020	0	0	0	0	2
07/27/2020	0	0	0	0	1
07/28/2020	0	0	0	0	1
07/29/2020	0	0	0	0	0
07/30/2020	0	5	0	0	4
07/31/2020	0	1	0	0	12
08/01/2020	0	2	0	0	11
08/02/2020	0	4	0	0	4
08/03/2020	0	8	0	0	2
08/04/2020	0	5	0	0	0
08/05/2020	0	4	0	0	0
08/06/2020	0	0	0	0	0
08/07/2020	0	21	0	0	0
08/08/2020	0	9	0	0	0
08/09/2020	0	86	0	0	0
08/10/2020	0	122	0	0	0
08/11/2020	0	45	0	0	0
08/12/2020	0	166	0	0	0
08/13/2020	0	31	0	1	0
08/14/2020	0	142	0	0	0

Date	Sockeye	Coho	Chinook	Pink	Chum
08/15/2020	0	40	0	0	0
08/16/2020	0	85	0	0	0
08/17/2020	0	154	0	0	0
08/18/2020	1	207	0	0	0
08/19/2020	0	54	0	0	0
08/20/2020	0	101	0	0	0
08/21/2020	0	40	0	0	0
08/22/2020	0	14	0	0	0
08/23/2020	0	6	0	0	0
08/24/2020	0	0	0	0	0
08/25/2020	0	0	0	0	0
08/26/2020	0	0	0	0	0
08/27/2020	0	1,757	0	7	0
08/28/2020	0	713	0	3	0
08/29/2020	0	58	0	0	0
08/30/2020	0	572	0	1	0
08/31/2020	0	209	0	1	0
09/01/2020	0	139	0	0	0
09/02/2020	0	12	0	0	0
09/03/2020	0	19	0	0	0
09/04/2020	0	3	0	1	0
09/05/2020	0	12	0	1	0
09/06/2020	0	22	0	1	0
09/07/2020	0	4	0	0	0
09/08/2020	0	7	0	0	0
09/09/2020	0	5	0	0	0
09/10/2020	0	5	0	0	0
09/11/2020	0	2	0	1	0
09/12/2020	0	1	0	0	0
09/13/2020	0	0	0	0	0
TOTAL	1	4,893	0	17	131

