

STATUS OF BROWN BEARS  
AND OTHER  
NATURAL RESOURCES  
IN THE  
McNEIL RIVER STATE GAME SANCTUARY AND REFUGE

Annual Report to Alaska State Legislature

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Alaska Department of Fish and Game

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### Executive Summary

The McNeil River State Game Sanctuary was legislatively established in 1967. The sanctuary was established to provide permanent protection for brown bears and other fish and wildlife populations and their habitats so that these resources may be preserved for scientific, educational and aesthetic purposes.

In May 1991, the Alaska State Legislature passed legislation (AS 16.20.160), which expanded the McNeil River State Game Sanctuary and created the McNeil River State Game Refuge. The legislation became effective on January 1, 1993, when the Commissioner of Fish and Game certified the Paint River fish ladder as operational.

The number of recognizable bears observed in the sanctuary during the 1998 season was 97; remained near the record high of 101 from 1997. The total number of adult bear-use days for the sanctuary increased about eight percent from the previous season. However, the adult bear-use days at McNeil falls actually decreased about eight percent from the 1997 season.

Public use of the sanctuary averaged 9.3 persons/day, with 219 permittees (standby and drawing combined) visiting the sanctuary. A total of 1,159 applications were received for the 280 permits. All 15 special use permits were issued by the Department.

Estimated sockeye salmon escapement to Mikfik Creek was 12,630 fish. The chum salmon escapement index for McNeil River was 23,530 fish. No commercial harvest was directed at these stocks and the entire return entered their respective drainages. The McNeil chum salmon escapement goal was achieved for the second time this decade, however for the ninth straight year, the McNeil chum run failed to produce a significant commercial harvest. Below normal precipitation resulted in low water levels in both Mikfik and McNeil and led to increased fishing success for bears.

A UAF graduate student completed field activities for her research program, investigating the relationship between chum salmon and brown bears in the sanctuary. Information has been analyzed, a final report written and will be made available to the Department after publishing. The third year of a research project initiated by sanctuary staff to investigate whether relationships between individual bears can be determined from DNA collected through hair samples was completed. Additional funds for laboratory analysis of the hair samples have not been secured, and continuation of this project is doubtful.

### Introduction

The sanctuary was established to (1) provide permanent protection for brown bears and other fish and wildlife populations and their habitats so that these resources may be preserved for scientific, aesthetic, and educational purposes; (2) manage human use and activities in a way that is compatible with the permanent protection of brown bears and other purposes described in (1) and, to manage uses and activities that would maintain and enhance the unique bear viewing opportunities within the sanctuary; and (3) provide opportunities that are compatible with (1) for wildlife viewing, fisheries enhancement, fishing, temporary safe anchorage, and other activities.

The refuge was established for similar, but somewhat different purposes. The differences are that human uses and activities in the refuge are to be managed to maintain and enhance the unique bear viewing opportunities within the sanctuary, that opportunities for brown bear hunting shall be determined by the Board of Game, and that mineral entry is allowed.

The statute requires the Commissioner of Fish and Game submit an annual report to the legislature regarding status of brown bears and other fish and wildlife resources within the sanctuary and refuge and effects of fishing and fishery enhancement activities on these resources. This report is provided in response to that requirement.

### Land Status

All land in the established refuge, sanctuary and sanctuary extensions is state-owned or tentatively conveyed, including 14 sections that encompass Chenik Lake and Chenik Head. These sections had previously been jointly selected by the state and Seldovia Native Corporation and were not subject to refuge authority until they became tentatively approved state land. Litigation regarding these lands has been completed, and the State identified as the legal owner. The State will take ownership from BLM after any and all encumbrances to these lands have been addressed. Currently, there remains an unresolved issue regarding commercial lease of a site at Chenik Head.

A private commercial interest has continued efforts to obtain a lease for approximately 5 acres of land in the Chenik Head area. This site contains several buildings that serve as headquarters for a private bear watching/wilderness retreat enterprise. Previous comments from Department of Fish and Game regional staff recommended that BLM deny the lease. As of the date of this report, the lease has not yet been granted, however DNR has published a public notice to issue a letter of concurrence to BLM to issue the lease. Department staff sent additional comments to DNR recommending denial of the lease. Recommendations from DNR will be sent to BLM for a final decision in February 1999.

### Regulatory Changes and Management Plan

The Department of Fish and Game formed an internal task force in January 1998 to consider improvements to the McNeil River State Game Sanctuary permit system. The charge of the Task Force was to review and evaluate the operation and effects of the current permit system, identify elements that influence public participation and, with public involvement, develop and present regulation proposals to the BOG for any recognized changes.

The Task Force formed a stakeholders group to provide public involvement and guidance in the investigation and decision making process. Participants included members from transportation

services, conservation groups, photography interests, local community interests and agency staff. The Task Force also pursued an information gathering effort by initiating a private contractor survey of past applicants. This group was asked a variety of questions regarding their visit to the sanctuary and what their experience was. The results were analyzed and presented to the Task Force in a published report. Regulation proposals submitted to the BOG reflect the recommendations of the stakeholders group and include the following changes:

- Establish three 6-day commercial use permits in the Scientific-Educational permit category with permit fees identical to lottery permit fees;
- Increase the number of time slots available on the permit application from 2 to 3 and establish assigned draw numbers to eliminate the need for a second drawing;
- Modify the 65/35 Alaskan residency preference rule;
- Establish an auction or raffle for two regular permits;
- Reduce the number of standbys in all periods from five to three;
- Eliminate the rule requiring a 4 year interval between visits for successful permittees;
- The length of regular permits remains at 4 days;
- Increase application and permit fees.

These proposals will be heard by the BOG at the March 1999 hearing.

#### Public Use

A permit is required for access to the sanctuary from June 7 through August 25. A system in place since 1993 has required that both regular and standby permits be issued through a lottery process. This system was established to reduce staff time required to manage the previous standby system and to reduce the potential for members of the public to receive more than one permit per year.

The number of people taken to a bear viewing area is limited to ten per day. In 1998, from June 7 to August 25, an average of 9.3 people per day visited bear viewing areas in the sanctuary. A sanctuary goal is to maximize the number of bear viewers within the required permit guidelines. However, all time slots are not always filled despite use of standby permits, primarily because occasional periods of stormy weather prevent airplane transportation, and the poor weather reduces visitors' enthusiasm to view bears. Additionally, bear viewing is less reliable at both ends of the season, and some vacancies occur as people cancel their visits to the sanctuary.

In 1998, ADF&G received 1,159 applications for the 280 available permits (185 regular and 95 standby). This represents the sixth year of decline from the record high number in 1993, of 2,150 permit applications (Table 1). The 1993-1997 average number of applications was 1,676. Application numbers have fluctuated considerably, especially after a media presentation on the

sanctuary. However, the continued declining trend in applications may represent a response to a regulation passed by the Board in 1993, which established a 4 year waiting period for successful permit winners. This regulation may prevent some applicants from applying on a more frequent basis resulting in declining revenues. A proposal to eliminate this regulation will be presented to the BOG in March 1999.

All 15 special permits were initially issued for the 1998 season, however some vacancies developed as the season progressed. Permittees that were able to visit the sanctuary included three members of the public, a film crew completing a film for the "Nature" television program, staff members from the Pratt Museum in Homer, a legislative aide from Senator Phillips' office and persons representing the Hunter Education and Project Wild programs. The demand for special permits continues to be high and the department receives numerous requests each year. Criteria developed by the department for issuing these permits provides consistency during the review of future proposals.

#### Brown Bear Status

Sanctuary staff record the number and sex of bears observed at Mikfik Creek, McNeil Falls, and other portions of the sanctuary during June, July, and August. The number of recognizable bears, excluding cubs, observed in the sanctuary during 1998 totaled 97, which is a slight decline from the 1997 record number of 101 (Table 2). Other classifications of bears remained near the 1998 record high numbers: single adult males 54, (compared to 55 in 1998), and total adults 88, (compared to 93 in 1998) (Table 2). The total of 31 cubs observed is very near the 10-year average of 32.

A method used to determine bear use in the sanctuary is to record the number of bear-use days. A bear-use day is any portion of a day that a recognizable adult or sub-adult bear (cubs are excluded) is observed in the sanctuary. Sightings are summarized by area within the sanctuary, are made on an opportunistic basis, and therefore represent the minimum number of bear-use days for the area. The most useful of these numbers, because of limited variability in data collection, is the bear-use data collected at McNeil Falls. For this area during 1998, there were 1,397 adult bear-use days, down from the record high in 1997, and a slight decline from the 1988-1997 average of 1,424 days. (Table 3).

For the entire sanctuary, a total of 2,205 adult and sub-adult bear-use days were recorded for the 1998 season (Table 3). This represents the second highest recorded bear use in the sanctuary since the record of 2,300 days in 1989, and continues a trend beginning in 1994, of increasing adult/sub-adult bear use for the sanctuary area. This increasing trend in bear use may be related to increased salmon escapements in Mikfik Creek and McNeil River. Another contributing factor to increased use, especially during the 1997 and 1998 seasons, may have been the lower than normal precipitation and associated low stream levels. These conditions combined to make salmon more vulnerable to predation and may have contributed to increased bear use.

Maintaining substantial salmon returns to McNeil River is a critical factor in providing a quality viewing experience. The Division of Commercial Fisheries Management and Development has

recognized this situation and is continuing cooperative efforts with the Division of Wildlife Conservation in management of the area.

#### Maximum Daily Counts

In early 1993, during development of the McNeil River State Game Sanctuary and Refuge Operational Management Plan, the public advisory group determined that a consistent, reliable method of determining fluctuations in bear numbers was needed. To address that concern, a "bear threshold criterion" was established and identified as a predetermined level of change in the population that would trigger an assessment of potential factors that may be adversely affecting the bear population or the sanctuary viewing program. The necessary statistical test, developed by division statistical staff, is based on the proven Shewhart-CUSUM quality control test. The test will detect large, short-term declines and gradual, long-term drift in the average number of bears.

Maximum daily counts, consistently collected at McNeil Falls from 1983 to 1992, were averaged to establish a standard of 48.6 bears as the benchmark for maintaining bear numbers and viewing opportunity. The median maximum count will be compared annually with the predetermined lower level of change to determine whether the number of bears observed is within the range of normal fluctuations. If the median annual maximum count drops below the threshold level of 41 bears, an investigation of probable causes will be initiated. The 1998 median annual maximum count was 50 bears, and indicates a stable population visiting the falls.

#### Brown Bear Hunting

The sanctuary is closed to brown bear hunting. In October 1995, the Board of Game closed the refuge to brown bear hunting, effective 1 July 1996.

#### Bear Mortality

An adult male brown bear skeleton was found on lower Mikfik Creek in early August. This animal appeared to have died in early spring and cause of death was not obvious. No bullet or bite wounds were observed on the remains, although so little remained of the carcass that no conclusions were possible. The bear was aged from skull size and tooth wear to be approximately 12 years old. Death from natural causes for a bear in this age class is very unusual.

Three yearling cubs became separated from adult females during 1998. Status of these yearlings was unknown after they became separated, but survival at this age is unlikely.

#### Bear Movements

Between 1962 and 1972, ADF&G staff captured a number of bears at McNeil Falls and fitted them with ear tags and some visual collars. During the 1998 season, two of those bears were again observed at McNeil Falls. A male bear identified as Flashman, ear tagged as a yearling in 1972, was 27 years old in 1998. This bear appeared to be in good physical condition and, although not very active, was observed catching salmon at the falls. The second bear, a female identified as Spooky, was first tagged in 1968 and again in 1972 at age 7+. This bear was 33 + years old during the 1998 season, and would be close to a record age for Alaskan brown bears in

the wild. She appeared to be in good shape and alert, but caught only a few salmon as she was frequently out-competed by other bears.

### Commercial Fisheries

The attached table (Table 4) summarizes the 1998 escapement estimates for Mikfik Creek sockeyes and McNeil River chums. The cumulative Mikfik sockeye escapement index was 12,630, while the McNeil chum escapement was estimated at 23,530. There was no commercial fishing effort in the McNeil Subdistrict this season and consequently the entire return of both sockeyes and chums entered the drainage to spawn. Although the lower end of the escapement goal range (20,000 - 40,000 fish) was achieved for the second time in this decade, the 1998 season was the ninth straight year that the McNeil River chum salmon run has failed to produce a significant commercial harvest. In general, other Kamishak District chum salmon runs appeared comparable to the McNeil River run. We did not document a significant harvestable surplus of chums anywhere in Kamishak this season.

The number of spawning chum salmon observed above the McNeil River falls was disappointing with the peak count of 230 fish made on July 13. The following week's survey (conducted July 22) was unsatisfactory due to extremely high muddy water. Only 33 chums were documented above the falls on July 28.

Post-season evaluation indicates that run timing was normal and the three different methods we have used to derive the total escapement index again yielded similar results. 1) The historic mean run timing curve, used to extrapolate the tail of the run after the August 10 survey, produced a cumulative total of 30,368. 2) The preferred method, now used to estimate escapements for most other streams in LCI, (calculates area under the curve assuming a 17.5-day stream life factor) resulted in a cumulative estimate of 23,530 chums. 3) A simple accumulation of counts from each survey after the observed peak on 7/28 produced a total of 23,383. The second method has been adopted as the standard methodology for generating escapement indices and is considered the most precise estimate of escapement.

### MIKFİK CREEK VIDEO RESEARCH

Commercial Fisheries staff began experimenting with remote video salmon counting at the outlet of Mikfik Lake this past season. We hope to demonstrate that remote video and time-lapse recording technology is capable of producing salmon escapement estimates similar in accuracy to weirs, which are considered the most accurate escapement-monitoring tool available. If its accuracy and reliability can be demonstrated, remote video may be able to replace aerial surveys as a means for collecting escapement data on small clear streams that don't warrant the expense of weirs or sonar.

The video system deployed on Mikfik Creek consisted of a remote camera suspended directly above the stream looking down so that its field of view encompassed both banks. Images of fish swimming past the site were recorded onto a time-lapse video cassette recorder (VCR). By programming the VCR to capture a single frame every 1.5 seconds, a standard 160-minute VHS tape could last up to 12 days. The whole system was powered by four 12-volt batteries, which in

turn were kept charged by a wind generator. Tapes were periodically retrieved in conjunction with aerial survey flights. Back in the Homer office, they were played at high speed to determine periods of high fish passage, which were then reviewed in more detail to estimate escapement.

As expected for a first-year effort, we encountered a couple minor problems that affected our results. First we found that the wind generator may not be adequate to keep the system powered without the additional use of a solar panel(s). We discovered the system had shut down on more than one occasion due to an insufficient power supply. Secondly, as the lake level dropped, water flow rates at the lake outlet were slow enough that the fish hesitated to migrate continuously across the camera's field of view. Instead of passing directly into the lake, the fish often would turn around and swim back downstream. This behavior made it difficult to obtain a true daily escapement estimate because it was impossible to determine if an individual fish had been counted more than once. We attempted to enumerate and subtract downstream migrants, but because they frequently moved downstream in sizable schools, the overall accuracy suffered.

Because of the problems described above, we elected to use aerial survey data for this season's spawning escapement index. We have developed several ideas that should allow us to address the problems encountered this season and are confident that this new technology will provide more precise data in future years.

#### Sport Fishing

Limited sport fishing occurs in McNeil Lagoon and Chenik Creek but is incidental to bear viewing activities. The only sanctuary area where fishing is allowed that attracts significant sport fishing interest is the lower Kamishak River. Due to low sampling effort and questionnaire returns, the Division of Sport Fish's annual survey of sport anglers does not accurately portray angler effort on the Kamishak River.

To address this problem, the Department included an angler reporting requirement for lodges receiving special area operating permits for the Kamishak River portion of the sanctuary. Seven lodges operated in the area during July, August, and September. As of this date, six of the lodges have completed their reporting requirements. A total of 395 anglers reported catching and keeping 535 coho salmon and 75 Dolly Varden during the 1998 season (Table 5). The same number of anglers reported catching and releasing 1,385 coho salmon, and 3,106 Dolly Varden. This represents a significant amount of angling effort on a single system. The information has been reported to Division of Sport Fish and they are further reviewing the data to determine if regulation changes may be required.

#### Fisheries Enhancement

Fisheries enhancement continues to play a major role in Lower Cook Inlet (LCI) salmon production. Enhancement and rehabilitation projects have made substantial contributions to commercial fishing harvests in the Kamishak Bay District. However, sockeye salmon returns to the Paint River enhancement project in 1998 were again poor, as they have been for the past several years. No commercial harvest occurred and only a very limited number of fish returned. The run strength was insufficient to warrant opening the ladder to fish passage for a seventh straight year.



The Paint River Lakes were first stocked with sockeye fry in 1986 in an effort to develop a new sockeye salmon return to the drainage, which is blocked to upstream salmon migration by a steep waterfall at tidewater. From 1991 to 1996, approximately 600,000-750,000 sockeye fry were stocked annually in the Paint River Lakes. Although construction of the Paint River fish ladder was completed in October 1991, the number of returning adults has only ranged from 200 to 800 fish. Consequently, the structure has never been opened to allow fish passage upstream through the ladder system. The low returns may be related to the current low productivity potential and high predation within both lake systems.

Cook Inlet Aquaculture Association continues to evaluate other suitable sockeye salmon broodstocks from the west side of Cook Inlet as potential replacements for the Tustumena sockeye stock that has been repeatedly released into the Paint River Lakes. Pink and chum salmon broodstock development is also being evaluated but is currently on hold until an adequate funding source is secured.

#### Volunteers

The 1998 season marks the sixth year for the non-department volunteer work party program. This program has created an opportunity for volunteers to assist staff in preparing the camp and trails prior to arrival of the first permittees. As in earlier years, the volunteers were from various local conservation groups. Work accomplished included trail upgrades, cabin cleaning, painting, treating cabin exteriors, camp site upgrades and fire wood collection. This program continues to be a very successful cooperative venture.

#### Land Use Permitting

Seven permits were issued for the establishment of sport fishing guide camps on the Kamishak River within the sanctuary. These camps appear to be operating in a manner compatible with sanctuary guidelines. Reporting requirements regarding number of clients and total fish caught are typically late in arriving at the Anchorage regional office. Additional compliance monitoring of the camps and storage permits may be necessary in upcoming seasons.

#### Bear-Human Conflicts

There were no known adverse interactions between bears and people in the sanctuary or refuge during the 1998 field season.

**Table 1**  
**Visitor use of McNeil River State Game Sanctuary (MRS GS)**

Year	Number of Applicants	Number of Visitors <sup>a</sup>	Total User Days in Sanctuary <sup>a</sup>	Total Permit days for July/Aug <sup>b</sup>	Comments on Season Length
1976		76	256	232	6/28 - 8/19
1977		122	365	311	6/29 - 8/14
1978		143	390	345	6/28 - 8/25
1979	669	75	185	91	6/28 - 8/25
1980	532	116	520	356	6/13 - 8/25
1981	397	133	519	434	6/17 - 8/27
1982	485	132	556	420	6/24 - 8/23
1983	625	178	738	454	6/11 - 8/25
1984	992	159	574	377	6/5 - 8/27
1985	832	216	816	449	6/10 - 8/25
1986	806	255	967	430	6/9 - 8/25
1987	1,757	252	1,054	473	6/9 - 8/23
1988	1,094	304	1,328	498	6/1 - 8/29
1989	1,306	264	1,183	488	5/22 - 8/26
1990	1,481	299	1,435	524	6/8 - 8/25
1991	1,818	249	1,415	526	6/1 - 8/27
1992	1,672	245	1,210	478	6/1 - 8/25
1993	2,150	225	1,128	516	6/7 - 8/25
1994	1,766	228	1,086	484	6/7 - 8/25
1995	1,486	212	1,074	475	6/7 - 8/25
1996	1,502	219	1,158	494	6/7 - 8/25
1997	1,474	228	1,197	489	6/7 - 8/25
1998	1,159	219	1,096	504	6/7 - 8/25

<sup>a</sup>Includes June visitation

<sup>b</sup>560 maximum possible (56 days x 10)

**Table 2**  
**SEX AND AGE COMPOSITION OF BROWN BEARS AT MCNEIL RIVER STATE GAME SANCTUARY: 1976-1998**

	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Total Females w/cubs	9	10	8	9	6	8	7	7	9	16	14	14	14	19	16	15	16	11	11	14	20	19	15
Single Adult Females	5	8	6	8	8	10	9	15	16	12	11	13	13	14	16	12	19	19	15	12	14	19	19
Single Adult Males	16	18	18	19	23	26	20	22	22	27	31	34	34	42	37	41	39	48	45	49	46	55	54
Adult Sex Unknown	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Adults	31	36	32	36	38	44	36	44	47	55	56	61	61	75	69	68	74	78	71	75	80	93	88
SubAdult Females	4	3	4	2	6	9	11	9	8	2	7	7	9	4	5	6	6	8	9	3	6	5	6
SubAdult Males	0	5	4	0	0	1	1	4	5	10	7	8	8	5	5	4	2	4	3	5	1	3	3
SubAdult Sex Unknown	3	4	5	3	4	5	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Sub-Adults+	7	12	13	5	10	15	15	14	13	12	14	15	17	9	10	10	8	12	12	8	7	8	9
Total Adults and Sub-Adults *	38	48	45	41	48	59	51	58	60	67	70	76	78	84	79	78	82	90	83	83	87	101	97
Total Cubs	20	21	20	17	12	14	16	12	17	28	26	30	31	42	34	30	31	24	22	25	35	43	31
Total Bears	58	69	65	58	60	73	67	70	77	95	96	106	109	126	113	108	113	114	105	108	122	144	128

+ -- defined as 5.5 years old and younger from 1977 through the present

\* Only the bears that are recognizable as individuals and given names are included. Hence these figures represent minimum number of bears present at the sanctuary.

Table 3  
McNeil River State Game Sanctuary Bear use totals for June, July, and August. (Does not include May or Sept. use)

	McNeil Falls			Lower McNeil River			Mikfik Creek			All other areas (flats, bluffs, etc.)			Total Bear Use		
	adult/ sub-ad	all cubs	Total	adult/ sub-ad	all cubs	Total	adult/ sub-ad	all cubs	Total	adult/ sub-ad	all cubs	Total	adult/ sub-ad	all cubs	Total
1980	709	140	849	14	15	29	46	21	37	162	56	218	924	218	1142
1981	878	224	1102	-	-	-	18	21	39	77	63	140	973	308	1281
1982	925	142	1067	21	9	30	28	2	30	83	33	116	1054	186	1241
1983	926	172	1098	-	-	-	8	0	8	100	41	141	1032	213	1245
1984	1218	274	1492	50	9	59	43	0	43	123	39	162	1432	322	1754
1985	1514	451	1965	37	31	68	150	56	206	195	100	295	1888	642	2530
1986	1649	494	2143	34	42	76	192	126	318	214	172	386	2061	825	2886
1987	1723	465	2188	9	12	21	235	86	321	161	152	313	2126	715	2841
1988	1515	417	1932	30	40	70	201	28	229	142	48	190	1873	524	2397
1989	1863	699	2562	119	80	199	156	71	227	174	189	363	2300	1032	3332
1990	1606	551	2157	76	57	133	229	159	388	264	251	515	2089	936	3025
1991	1393	388	1781	1	0	1	428	120	548	246	138	384	2039	631	2671
1992	1510	480	1990	3	6	9	385	115	500	178	139	317	2075	738	2813
1993	1240	86	1326	94	57	151	234	26	260	358	164	522	1921	227	2248
1994	1165	125	1290	95	59	154	212	29	241	208	103	311	1661	307	1968
1995	1137	147	1284	113	64	177	229	6	235	298	120	418	1741	329	2070
1996	1301	229	1530	90	40	130	419	105	524	153	75	234	1957	449	2406
1997	1510	454	1964	151	52	203	207	62	269	162	147	309	2030	715	2745
1998	1397	235	1632	147	61	208	473	205	678	181	179	360	2205	680	2885

- Each time a recognizable bear is seen in an area of the sanctuary, it is counted as one bear use day for that area. Hence if 10 different bears are seen at McNeil falls 10 days in a row, that equals 100 bear use days for McNeil falls. The total bears column may be less than the sum of the first four columns if a bear is counted using more than one area in the same day. Bears are noted opportunistically and figures reflect not only actual bear use but to some degree the amount of time spent viewing.
- McNeil falls sightings are made from the viewing pad and include any recognizable bear no matter where it is or how far down stream it is.
- Lower McNeil River sightings are made from the mouth of McNeil River, generally from Enders Island. Viewing occurs here in mid to late August after bear activity ceases at McNeil falls. Little or no time was spent viewing here from 1980-1983.
- Mikfik Creek is defined as the area up creek from the last area of tidal influence, including the area referred to as the "riffles".
- All other areas includes anywhere in McNeil cove that is not included in the first three categories. This includes the sedge flats, beach, by camp, or on any of the bluff areas. Through the years notations of bear use in these areas has been very casual as very little time comparatively is spent systematically bear watching away from the first three areas.

Table 4  
Aerial escapement estimates of sockeye and chum salmon in the  
Mikfik Creek and McNeil River drainages, 1998.

Date	Mikfik Sockeye	Estimated Cumulative <sup>1</sup>	McNeil Chum	Estimated Cumulative <sup>1</sup>
6/03	310	310		
6/10	1,300	1,300		
6/16	12,630	12,630	0	
6/22	5,413	12,630	0	
7/06	350	12,630	505	
7/13	1,950		4,950	4,950
7/22			0	4,950
7/28			9,533	14,483
8/10			8,900	23,383
9/15			0	23,530
CUMULATIVE TOTAL		12,630		23,530 <sup>2</sup>

<sup>1</sup> The cumulative estimate is not the sum of daily counts, but is adjusted for fish schooled in the lagoon that may have been observed in previous surveys; all estimates are unexpanded live counts and considered to be conservative.

<sup>2</sup> The cumulative total was derived by estimating area under the curve with 17.5-day stream life factor applied and compares favorably with the historical mean run timing curve for McNeil River chum salmon.

Table 5  
 1998 McNEIL RIVER SANCTUARY ANNUAL REPORT  
 FOR GUIDES, TRANSPORTERS AND LODGES

LODGE	# OF ANGLERS	COHOS KEPT	CHUMS KEPT	PINKS KEPT	DOLLYS KEPT
Alaska Rainbow Lodge	85	81	0	0	72
Bristol Bay Sportfishing Inc.	22	14	0	0	0
Iliaska Lodge	24	18	0	0	0
Kulik Lodge	82	149	0		0
Newhalen Lodge	82	95	0	0	
Point Adventure Lodge	100	178	0	0	0
<b>TOTAL</b>	<b>395</b>	<b>535</b>	<b>0</b>	<b>0</b>	<b>72</b>