

**STATUS OF
BROWN BEARS AND
OTHER NATURAL RESOURCES IN THE
McNEIL RIVER STATE GAME SANCTUARY AND REFUGE
IN 2002**

**ANNUAL REPORT TO
THE ALASKA STATE LEGISLATURE**

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EXECUTIVE SUMMARY

The McNeil River State Game Sanctuary and State Game Refuge were created by the Alaska State Legislature in 1967 and 1991, respectively. The *sanctuary* was established primarily to provide permanent protection for brown bears and other fish and wildlife populations and their habitats and to maintain and enhance the unique bear-viewing opportunities within the sanctuary. The *refuge* was established for similar reasons and human use in the refuge is managed to maintain and enhance the bear-viewing opportunities within the adjoining sanctuary. The sanctuary supports the largest gathering of brown bears in the world as they congregate to feed on migrating salmon. The Alaska Department of Fish and Game operates a world-renowned bear-viewing and photography program in the sanctuary at McNeil River.

As many as 144 individual bears have been observed along McNeil River during summer and as many as 70 bears have been seen at one time at McNeil River Falls, the primary bear gathering and viewing location. However, the number of bears at McNeil River has declined significantly since 1998 and has dipped below the level identified by sanctuary managers where it may affect the quality of the bear-viewing program. The reason for the decline is likely due to the low returns of chum salmon to McNeil River, which have failed to meet escapement goals for 11 of the past 13 years. Compounding the low salmon escapement in McNeil River, nearby systems have been experienced relatively high salmon returns, which likely draws bears away from the McNeil River system in search of a more abundant food source. The sex and age composition of bears at McNeil River has also changed in the past several years and relatively few subadult bears and maternal females were observed in 2002.

The bear-viewing program at McNeil River remains popular. Applications were received from 1,434 people for the 185 regular permits and 57 standby permits selected by lottery. During 2002, 175 people participated in the sanctuary's bear-viewing program, which included the lottery winners and 18 individuals issued special permits at the discretion of the Commissioner. This permit program generated \$76,035 that was deposited into the Fish and Game Fund.

Bristol Bay area sport fishing lodges brought approximately 625 visitors to the Kamishak River in the sanctuary and adjoining Katmai National Park in 2002. These guided operations utilized jetboats to access the river where clients engaged in sport fishing and wildlife viewing activities. Concerns of overcrowding, boating safety, and impacts to the fisheries, bears and other resources have been expressed and use limitations have been suggested by some of the users.

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

The sanctuary was expanded and the adjoining McNeil River State Game Refuge was created in 1991; however, implementation of this legislation was delayed until January 1993 when, the Commissioner of the Department of Fish and Game certified the Paint River fish ladder as operational. The refuge was created for purposes similar to those of the sanctuary; however, hunting and trapping were allowed to continue in the refuge at the discretion of the 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 and mineral entry in the refuge is permitted.

The Alaska Department of Fish and Game (the Department) manages both the sanctuary and refuge, the former of which contains the world's largest concentration of brown bears. The Department administers a world-renowned bear-viewing and photography program at this site along McNeil River.

This report is submitted annually to the Alaska State Legislature by the Commissioner of the Department as required by the statutes establishing the sanctuary and refuge (AS 16.20.041(f) and AS 16.20.162(f), respectively). This report provides a summary of the status of brown bears and other fish and wildlife resources within the sanctuary and refuge, the effects of fishing and fishery enhancement activities on these resources, land status and management issues, and known public use.

I. STATUS OF BROWN BEARS

Population Monitoring

The number of bears at McNeil River Falls fluctuates daily and annually and is likely due to several factors including: the regional bear population level, food availability, and the strength and timing of salmon runs in McNeil River and in surrounding systems. A public advisory committee assisted the Department with the development of the sanctuary and refuge operational management plans in 1993 and concluded that managers needed a consistent and reliable method for monitoring the fluctuations in the number of bears at McNeil River Falls. This information allows for the proper management of the sanctuary in accordance with its legislative purposes. There are three methods for monitoring the population of bears at McNeil River.

Index Counts- A monitoring program that detects large, short-term declines or gradual, long-term declines in the average number of bears was established. A "bear threshold criterion" was established and represents a statistically significant lower level in the observed number of bears. A decline below the "criterion" may result in adverse impacts to the purposes for which the sanctuary was established and would initiate an assessment of the possible causes.

This monitoring program involves the hourly counting of bears at McNeil River Falls from July 15 through August 5 and during the viewing period of approximately 11:00 a.m. to 7:00 p.m. The annual medians of the seven highest daily counts of bears at the falls from 1983 to 1992 were averaged to establish a standard of 48.6 bears as the benchmark for maintaining bear numbers and quality viewing opportunities in the sanctuary (Figure 1). The "bear threshold criterion" (40.8 bears) represents the lower limit of these medians. These daily counts were taken opportunistically throughout the day rather than hourly, as the current monitoring method utilizes.

The 2002 mean of the seven highest hourly counts (the count index) was 36.0 bears, a decline from 39.1 bears in 2001 (Table 1). This year marks the fourth year in a row that the number of bears observed at McNeil River Falls is below the threshold criterion and indicates a declining trend in the number of bears at the falls. The highest count indices were 61.0 bears in 1990, 58.0 bears in 1997 and 57.0 bears in 1985.

The hourly counts conducted in 2002 equaled or exceeded 40 bears on only two of the 22 days monitored. In comparison, the hourly counts exceeded 40 bears on 11 days in 1997 and 1998 when as many as 66 bears were observed at one time. The highest numbers of bears ever seen at one time at the falls was 70 in 1997.

Individual Counts- A second method of monitoring the sanctuary's bear population and the quality of the bear-viewing program is by counting the number of individual bears observed by sanctuary staff through the summer (Table 2). Using unique identifying marks such as scars, coat color, sex and behavior, each bear visiting the sanctuary has been documented nearly every year since 1976. While this monitoring method only records the presence of an individual bear and not the frequency or amount of time it spends at McNeil River, it provides an additional index in evaluating the overall bear use and the quality of the bear-viewing program.

While the number of individual bears at McNeil River increased slightly from 2001 (when 87 bears were observed), the overall trend of this population monitoring method is similar to that observed with the hourly index counts and only 90 individual bears were observed in 2002. This is significantly lower than that observed in most previous years and is comparable to counts from the early 1980s. The peak number of individual bears observed was 144 identified individuals in 1997.

Sex and Age Composition

Changes in the sex and age composition of a wildlife population can be indicative of other changes in the species' habitat and environment. The sex and age ratios of bears using McNeil River and the falls have changed dramatically in the last several years (Table 2). While males have typically outnumbered females, this has become more pronounced in recent years and nearly three-quarters of bears now observed are male. In addition to the composition of bears shifting to primarily males, the number of subadult bears (both sexes) has recently declined and 2002 only to six individuals were observed; the lowest observed since 1979. While the percentage of subadult bears at the falls has ranged from approximately 10-25% since initiation of intensive data collection in 1976, it was approximately 8% in 2001 and 2002.

The use of McNeil River by maternal females doubled from five in 2001 to ten in 2002 and the total number of cubs (yearlings and cubs-of-the-year) observed nearly doubled from 11 to 21. While these

represent increases from 2001, the number of maternal females and cubs at McNeil River has declined in recent years and is comparable to counts from the early 1980s. The peak number of maternal females observed on the river was 20 in 1996 and the total number of cubs on the river peaked at 43 in 1997.

Use Patterns

As discussed above, the "*index count*" and "*individual count*" monitoring programs at McNeil River have identified a declining trend in the number of bears and a significant shift in the sex and age composition, all of which may have influenced the quality of the bear-viewing program at McNeil River. These trends over the past four years are likely associated with the long-term failure to meet chum salmon escapement returns to McNeil River, as discussed in more detail below. Observations from the sanctuary indicate low salmon returns will result in a short-term increase in bear use as they expend more effort and time catching enough fish to meet their nutritional requirements. However, long-term fish shortages will alter established use patterns as bears seek alternative sources for salmon or other sources of food. These long-term changes in use patterns appear to have started in 1999 and have continued to date.

In addition to the size of the salmon run, the timing of run appears to also influence the number of bears utilizing McNeil River. An evenly distributed run will generally attract more bears to the falls while a similarly sized run that arrives in a relatively short period will not afford a larger number of bears the opportunity to catch fish, thus they seek food elsewhere.

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

Large chum salmon returns throughout lower Cook Inlet in the past three years (with the unique exception of the McNeil River system), and large sockeye salmon returns to some nearby Bristol Bay drainages, may also be contributing to the decline in bear numbers by attracting bears away from McNeil River.

Department staff have assessed historic bear use at McNeil River including overall numbers and changes in sex and age composition, brown bear harvest from surrounding areas, and chum salmon escapement at McNeil River and surrounding systems. Various management actions were considered such as changes in brown bear harvest levels, changes in McNeil River commercial fishery harvests levels and fishing practices, and artificial enhancement of the chum salmon population. Sanctuary managers felt that these actions would have minimal or no affect on the McNeil River bear population, or in the case of fisheries enhancement would not be feasible and would not be consistent with management goals of the sanctuary. However, managers felt that further study of the McNeil River chum salmon spawning habitat and other parameters would assist in the future management of

these resources and the sanctuary. While partial funding from the National Park Service through the National Natural Landmark program has been obtained, additional funding is required to complete this study.

Hunting

The sanctuary is closed to brown bear hunting by statute (AS 16.20.162(b)), and in October 1995, the Alaska Board of Game closed the refuge to brown bear hunting effective July 1996. Areas south of the sanctuary including Katmai National Park and state-owned lands between the sanctuary and park are also closed to brown bear hunting; the park by federal regulations and the state-owned lands by Alaska Board of Game action. The McNeil River sanctuary and refuge are within an area of approximately 5,585 square miles where bears are currently protected from hunting.

The area west of the sanctuary and refuge, and north of the refuge are open to hunting and experienced higher-than-average harvests in the past two regulatory hunt years (July 1999–June 2000 and July 2001–June 2002, Figure 2). The brown bear harvest in these areas was 93 during the 2001 regulatory year (fall 2001 and spring 2002 hunts,). While this represents a 21% decrease in harvest from the previous hunt (regulatory hunt year 1999), it is the second highest harvest reported from this area. The increase in harvest is likely due, in part, to the liberalized bear hunting seasons in Game Management Unit (GMU) 9B adopted by the Alaska Board of Game in an effort to bolster recruitment into the local moose population and to provide more opportunity for a sustained harvest of this resource. Based on brown bear regional population estimates, harvest levels, and the sex and age composition of harvested animals, it appears that legal hunting of bears outside the sanctuary is not significantly impacting the population of bears utilizing McNeil River.

The next scheduled brown bear hunt in this area is during the fall of 2003.

II. WILDLIFE OBSERVATIONS

Notable wildlife sightings from the 2002 season include two wolves observed on several different occasions in June and July. Numerous (perhaps several thousand) wood frogs were observed along the trails in the sanctuary for the first time in at least 27 years. Bear feeding and viewing opportunities were maintained through August as a larger than normal number of pink salmon entered McNeil River after the chum salmon run diminished.

A female bear with two spring cubs died from unknown circumstances. The fate of one cub is unknown but the second cub was temporarily adopted by another female with yearling cubs who allowed the spring cub to occasionally nurse. The orphaned cub was eventually captured and transported to Anchorage where it was met by personnel from the Denver, Colorado Zoo. While interested in the cub for the zoo, it was found to have a severely shattered femur and was euthanized.

III. FISHERIES

Commercial Fisheries

The cumulative Mikfik Creek sockeye salmon escapement index for 2002 was 16,650 fish while the McNeil River chum salmon escapement was estimated at 11,300 fish. There was no commercial fishing effort targeting sockeyes in the McNeil River Subdistrict this season and the subdistrict was closed for the duration of the chum return. As a result, no harvest occurred and the entire Mikfik Creek sockeye and McNeil River chum returns entered their respective drainages to spawn.

The Mikfik Creek escapement goal, formerly set at 5,000 – 7,000 sockeye salmon, was increased to a new sustainable escapement goal (SEG) of 6,300 - 12,150 fish after review and approval by the Alaska Board of Fisheries in November 2001. The 2002 Mikfik Creek escapement at nearly 17,000 sockeyes, exceeded the upper end of the SEG range by approximately 37% or 4,500 fish.

This season was the fourteenth consecutive year the McNeil River chum salmon run failed to produce a significant harvestable surplus, while the escapement failed to reach the lower end of the established escapement goal range (presently an SEG set at 14,000 – 26,000 chums) for the eleventh time in the past thirteen seasons (Figure 3). As has been the case in the two previous seasons, this contrasts sharply with the nearby Big and Little Kamishak Rivers, where chum salmon returns were relatively strong for a third consecutive season, as were those at more northerly systems between Bruin Bay and the northern limits of the district. Also for the third successive season, significant effort directed at chum salmon occurred in the Kamishak Bay District, both in the southern portion of the district (Kamishak and Douglas River Subdistricts) and in the north (Cottonwood and Iniskin Bay Subdistricts), resulting in a district-wide harvest of nearly 35,000 fish, the third highest since 1988.

The number of spawning chum salmon documented upstream of McNeil River Falls in 2002 was similar to recent seasons but once again was extremely low. Two separate but nearly identical peak daily counts of only 340 and 375 fish were made on July 12 and 30, respectively. Only one other survey detected fish above the falls, albeit a relatively insignificant count of 30 fish on July 2.

A post-season evaluation of the salmon runs indicate that run timing was approximately 10 days late for the Mikfik sockeye return, while that of McNeil chums was close to normal or perhaps slightly late. The three different methods used to derive the total McNeil chum escapement index yielded mixed results: 1) the historic mean run timing curve, used to extrapolate the "tail" of the run after the July 30 survey, produced a cumulative total of 15,761 fish; 2) the preferred method (calculates area under the curve assuming a 17.5-day stream life factor), now used to estimate escapements for most pink and chum streams in Lower Cook Inlet, resulted in a cumulative estimate of 11,293 chums; 3) simple accumulation of daily counts, usually made after the first observed peak, did not apply this season because the highest daily count occurred during the last survey on July 30; thus the count of 10,875 chums made on that day represented the estimated escapement using this method. The second method has been adopted as the standard methodology for generating escapement indices and is considered the most precise estimate of escapement. Another method for estimating escapements using a video camera (and for the first time, a computer) to record the video images (see below), was used at Mikfik Creek/Lake this season. Those images have not yet been reviewed for escapement estimates.

Mikfik Creek Video Research

A remote video escapement recorder (RVER) was installed at the outlet of Mikfik Lake for the fifth consecutive season. This project was expected to demonstrate that remote video and time-lapse recording technology is capable of supplanting aerial surveys as a means for collecting escapement data on small clear streams that do not warrant the expense of weirs or sonar.

Until 2002, the Mikfik video system consisted of a single remote video camera mounted directly over the stream at a height of approximately 20 feet and pointed slightly upstream, and a time-lapse videocassette recorder (VCR) logging one frame per second onto analog VHS tapes. While this system produced images of sufficient quality to facilitate reliable fish counts, it had shortcomings. Weekly flights were necessary to refresh videotapes (producing a lag in the timeliness of escapement information), the analog tapes were fragile and cumbersome to review and tracking individual fish was difficult at one frame per second.

To counteract these deficiencies, this season the Department contracted with a private vendor specializing in outdoor video recording to develop a new video system that would record up to 15 digital frames per second, store them on a computer hard drive, and then transmit them back to Homer via satellite each night. The intent was to facilitate near real-time escapement monitoring and eventually reduce the number of flights necessary to maintain the system. The satellite link would theoretically provide the ability to monitor system status and expedite recovery efforts in the event of a system failure. The new digital video system also included custom image processing (IP) software programmed to identify video frames containing fish while simultaneously editing out blank frames. The image processing was completed by the computer in the field before transmitting images back to Homer.

The video system was deployed on June 12 and digital images were recorded locally to the on-site computer's hard drive. Regrettably, the computer unexpectedly shut down on June 14, before a satellite link had been established, so the problem went undetected until the next aerial survey on June 18. At that time, it was discovered that a line of sight issue prevented a successful satellite linkup, so the satellite dish was moved to higher ground. Fortunately, the Mikfik sockeye return was late and few fish had passed the video site before it became fully operational. The laptop computer that had caused this initial shut down was replaced with a desktop unit programmed to restart following a power loss.

To facilitate the best quality images, necessary for effective IP software operation, a second camera was installed atop an 18-foot high aluminum "quadrapod" erected on the east bank of the creek, opposite the light pole supporting the original camera. Due to the long arc of Alaska's summer sun, a single camera could not be situated to avoid strong glare during all hours of the day. The second camera helped attain high quality images; however, the IP program will require additional refinements before it is capable of overcoming the wide variety of environmental conditions (e.g., glare, surface turbulence, rain, etc.) that can cause an excessive number of false images. To promote efficient satellite transmission, video images were compressed significantly after compilation by the IP program. This resulted in some reduction in quality that may affect the ability to count fish effectively. Further evaluations were conducted this summer at other Lower Cook Inlet locations to find an appropriate compression format that should yield sufficient image quality while maintaining manageable file sizes. That information will be applied next year at the Mikfik Creek project. The 2002 Mikfik images will be reviewed later this winter so the results from the 2002 operation are not

yet available. To remain consistent with the historical Mikfik database, aerial survey data was once again chosen to generate the 2002 spawning escapement index.

Sport Fishing

Limited sport fishing occurs in McNeil Lagoon and Chenik Creek but is incidental to bear-viewing activities. The only area in the sanctuary that attracts significant sport fishing interest is on the Kamishak River and, to a lesser extent, the Little Kamishak River and its tributary, Strike Creek. Due to low sampling effort and questionnaire returns, the annual survey of sport anglers conducted by the Division of Sport Fish does not accurately portray angler effort in this area. However, seven Bristol Bay area lodges operate in the area during summer and, as a condition of their sanctuary access permits, are required to report their sport fishing activities (Table 3).

These lodges brought 625 visitors to the sanctuary who were primarily interested in sport fishing; however, wildlife viewing, primarily brown bears, is a significant part of their activities. These anglers caught 15,664 fish, primarily coho salmon and Dolly Varden (the latter being mainly a catch-and-release fishery). Chum and pink salmon were also reported in their catches but were likely caught incidental to the other species.

Fisheries Enhancement

Fisheries enhancement continues to play a major role in Lower Cook Inlet salmon production. The results of enhancement and rehabilitation of the Kamishak District sockeye stocks have made significant contributions to commercial salmon harvests. However, sockeye salmon returns to the Paint River enhancement project in 2002 were negligible as stocking to the Paint River Lakes was discontinued in 1997.

The Paint River Lakes were first stocked with sockeye salmon 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 salmon 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 adult sockeye salmon has only ranged from 30 (in 2000) to 1,870 (in 1998). Consequently, the structure has never been opened to allow fish passage upstream through the ladder.

The Cook Inlet Aquaculture Association (CIAA) stocked Upper Paint Lake in early October 2002 with 536,000 sockeye fry/pre-smolts. An amendment to the 2002 Trails Lake Annual Management Plan granted the aquaculture association authorization for a one-time release of fry that were surplus to the 2002 Annual Management Plan stocking schedule. The surplus fry were a result of unexpected high survival rates during incubation at Trails Lake Hatchery. Unlike previous releases when the Paint Lakes were stocked with smaller spring fry and no smolt evaluation was conducted, the larger fingerlings stocked in October may better avoid predation and survive the rigors of overwintering. A condition of the 2002 release mandated that efforts be made to evaluate smolt production during the 2003 spring smolt migration from the lakes. The majority of adults from this release are expected to return as 1.2 and 1.3-aged fish in 2005 and 2006.

Prior to resumption of future ladder operations, several issues need to be addressed: (1) the construction site has not revegetated and is subject to erosion; (2) water levels at the upstream exit to

the ladder are very shallow and bears would likely be attracted to salmon as they emerge from the ladder, making bears vulnerable to being swept over the 40-foot waterfall; and (3) the fence installed along the lower portion of the ladder has been destroyed by high water, potentially allowing bears to gain access to the uncovered portions of the ladder.

IV. LAND STATUS/USE

An assessment of the land status within the sanctuary and refuge was finalized by the Habitat and Restoration Division as part of the federal Wildlife Conservation and Restoration Program (WCRP) (Figure 4). These efforts confirmed that all lands within the boundary of the sanctuary are state patented with the exception of certain lands in Akumwarvik Bay, including the mouths of the Kamishak and Little Kamishak Rivers. These parcels are "Tentatively Approved" state-selected lands and are managed as state land pending final conveyance from the federal Bureau of Land Management (BLM). Likewise, most lands within the boundary of the refuge are "Tentatively Approved" state lands awaiting final conveyance from the BLM and are also managed as state-owned lands; however, the refuge contains two parcels not managed by the state.

The land status assessment revealed approximately 150 acres of land in the extreme southwestern corner of the refuge is federal land managed by the BLM. The Department plans to investigate the potential of acquiring this parcel. The second parcel includes 14 sections of "state selected" land along the coast in the eastern portion of the refuge, which encompasses Chenik Lake and Chenik Head. The State will assume ownership from the BLM once all encumbrances to these lands have been addressed and the land conveyance process is completed. A long-standing issue regarding the commercial use of a site near Chenik Head is close to resolution by the BLM and the State of Alaska (Departments of Natural Resources and Fish and Game).

A commercial operator constructed multiple buildings that served as the headquarters for a bear watching and wilderness retreat enterprise and attempted to obtain a lease for approximately 10 acres of land in the Chenik Head area. The State submitted a letter of non-concurrence to the BLM concerning the issuance of the Chenik Head lease and the lease was subsequently denied. The applicant appealed the lease denial and this appeal was rejected by the BLM. The BLM notified the applicant that any remaining structures at the site were to be removed or burned after September 15, 2002. This deadline has now passed and the BLM is negotiating a final resolution of this issue. The BLM is also developing a restoration and revegetation plan for the site.

The land status assessment revealed an RS2477 right-of-way (ROW) within the sanctuary and refuge. The "Paint River Trail" is approximately 15 miles long and encompasses 190 acres of land. The ROW extends from McNeil Cove, west through the sanctuary and into the refuge, terminating in the headwaters of the Paint River near its confluence with Crevice Creek. This trail originates from copper and gold mining activity by Charlie McNeil and others during the first two decades of the 1900s.

The land status assessment also clarified the marine boundaries of the sanctuary and refuge, which include all islands and tidelands, with the exception of Nordyke Island and its tidelands; identified an existing valid land lease to the Cook Inlet Aquaculture Association for the Paint River fish ladder including a right-of-way to Akjemguiga Cove and a water rights for the fish ladder; several Land Use

Permits on the Kamishak River (discussed below); and two trespass cabins on the Kamishak and Little Kamishak Rivers.

Land Use Permitting

Seven lodges in the Bristol Bay region operated sport fishing and wildlife viewing operations on the Kamishak River within the sanctuary and adjacent Katmai National Park in 2002. These lodges store their riverboats on the lower reaches of the river and three of the lodges operate a guide camp at this location. These activities are managed through Special Area Permits issued by the Habitat and Restoration Division, Access Permits issued by the Division of Wildlife Conservation, and Land Use Permits issued by the Department of Natural Resources (DNR). This area is also part of the Kamishak Special Use Area, which is managed by DNR.

These lodges typically base their activities within the sanctuary and travel upstream into the national park to sport fish and observe wildlife, primarily bears. Permit stipulations assure these operations are conducted in a manner compatible with sanctuary guidelines and have been developed in coordination between the state agencies and the National Park Service for consistency in requirements. However, recent compliance and law enforcement efforts have documented multiple violations potentially affecting management of bears and other resources in the area. The Habitat and Restoration Division and DNR have issued several notices of violations to these operators.

The area should continue to be monitored for compliance and identification of possible impacts. The primary management concern is the food-conditioning of Kamishak River bears, which also visit Mikfik Creek and McNeil River. This condition would not be consistent with the purposes for which the sanctuary was established and would jeopardize the bear-viewing program at McNeil River. Additionally, concerns have been expressed about overcrowding; boating safety; and impacts to the fisheries, bears and other resources on the Kamishak River, and use limitations have been suggested by several of the operators and guides.

V. SANCTUARY MANAGEMENT

Staff

Sanctuary Manager Larry Aumiller logged his 27th season at McNeil River. Tom Griffin, Wildlife Technician III, and Samantha Wilson, College Intern from the University of Alaska Fairbanks returned for their third seasons at the sanctuary. Larry and Tom plan to return for the 2003 season and the Department plans to convert the college intern position to a Fish and Wildlife Technician III, which is more consistent with the duties of this position.

Volunteers

A community-based volunteer work party assisted sanctuary staff for the tenth season in 2002. This program creates an opportunity for volunteers to assist with camp preparations and maintenance before the beginning of the bear-viewing program. This program continues to be a very successful cooperative venture, and in 2002, the volunteers cleared trails to McNeil River Falls and Mikfik Creek, collected and cut firewood, prepared boats, painted facilities, and hauled gravel for trail and campground hardening. Sanctuary staff also conducted routine maintenance of all sanctuary facilities.

Remote Camera Project

This was the fourth season of a project to transmit real-time images of bear activity at McNeil River Falls to locations in Homer and broadcast to the internet. The live video feed was broadcast at several locations in Homer and was used in educational programs and displays on bears and the sanctuary. The video images also were broadcast on the local cable television system and were used as part of a remote camera technology research project at Texas A & M University.

The camera provided a good opportunity for public exposure to, and education about, the sanctuary and bear conservation. Few problems were experienced at the sanctuary with the camera and other equipment, although bears occasionally damaged equipment and the camera housing occupies a desirable portion of the McNeil River Falls viewing pad.

VII. PUBLIC USE

McNeil River Falls/Mikfik Creek

Public use and access into the sanctuary, with the exception of McNeil Cove spit and beach, requires a permit from the ADF&G (5 AAC 92.065). Since 1973, bear-viewing at established sites on McNeil River and nearby Mikfik Creek has been limited to ten people daily between June 7 and August 25, and permits for these viewing periods are issued by lottery. Currently, 185 regular permits and 57 standby permits are issued in the lottery. An additional 15 regular permits are issued as Special Permits at the Commissioner's discretion for scientific, educational and other purposes. Ten regular and three standby permits are issued for each of the established four-day permit periods.

The number of people who visited the sanctuary has declined in recent years to 175 people in 2002, the lowest number since 1984 (Table 5). The decline is likely attributable to several factors including the streamlining of the permit system, limits placed on campground capacity, limits placed on the number of nights each individual is allowed to stay in the sanctuary, and more recently, the reduction in the number of standby permits issued. Likewise, the average number of permits used each day at the sanctuary (6.6 in 2002, out of a maximum of 10.0) remains below the long-term average permit use rate of 8.3 per day (Table 4). The Department will attempt to maximize the use of permits by offering unclaimed standby permits to the next highest ranking applicants in the lottery and by changing staff schedules slightly to accommodate late arriving visitors.

There were 1,434 applications submitted in 2002 for the 185 regular and 57 standby permits (Table 5). This represents a slight increase in the number of applicants from the previous four years, but is well below the 2,150 record number of applicants in 1993. While the number of applicants fluctuates annually, likely in response to media coverage of the sanctuary, the general decline in applicants starting in 1993 may have been a result of the Board of Game regulation adopted that year that established a four-year waiting period for permit winners. This regulation may have prevented some applicants from applying more frequently. The Board of Game modified this regulation in 1999 to require only a one-year waiting period for successful applicants and may account for the increases in the number of applicants since then.

Five applications from 16 individuals were received for the Commissioner's scientific/educational permits available at the sanctuary and included representatives of state and federal agencies involved in the management of bear-viewing programs elsewhere in the state, two local school districts, a commercial filmmaker, and a researcher from the International Bear Foundation in the Netherlands. Using evaluation criteria developed by the Commissioner for issuing these permits, approval for the agency personnel, one school district and the bear researcher was granted. Additionally, five Commissioner's Permits were issued to eight individuals at the Commissioner's discretion.

In 2002, \$76,035 was generated from the McNeil River sanctuary permit program and all revenues were deposited in the Fish and Game Fund.

Kamishak River

The seven Bristol Bay area lodges that operated on the Kamishak River in 2002 brought 625 visitors to the sanctuary and adjacent Katmai National Park (Table 3). Their primary activity was sport fishing; however, they also engaged in wildlife viewing activities, primarily of brown bears.

Bear-Human Conflicts

There were no known adverse interactions between bears and people in the sanctuary or refuge during the 2002 season.

VIII. ACKNOWLEDGEMENTS

Sanctuary Manager Larry Aumiller and his staff (Tom Griffin and Samantha McNearney) gathered data on bear use and visitor activities. Earl Becker provided information on the bear-monitoring program; Mark Dickson prepared the narrative on fishing activities with input from Ted Otis and Lee Hammarstrom; Josh Peirce, Jason Graham, Carol Barnhill and Frances Inoue researched and produced the land status map and Bruce Bartley and Colleen Matt edited a draft copy of this report.

Figure 1. One-sided Shewhart Control Chart for the 7 Highest Daily and Hourly Bear Counts at McNeil River Falls ($\alpha = 0.01$).

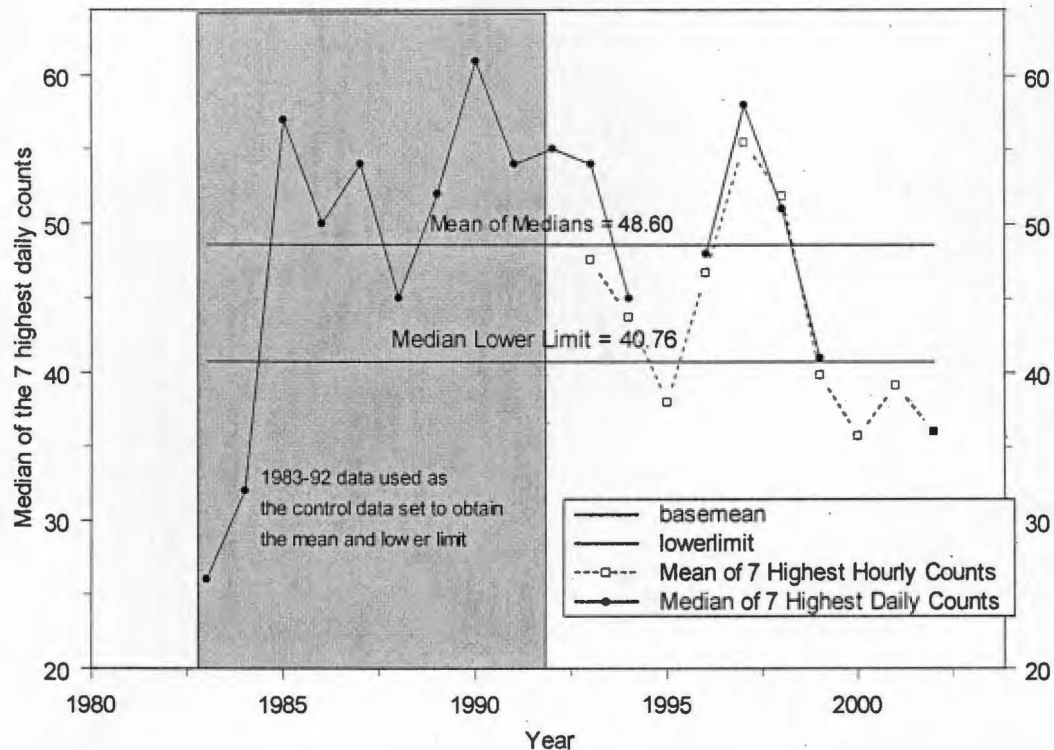
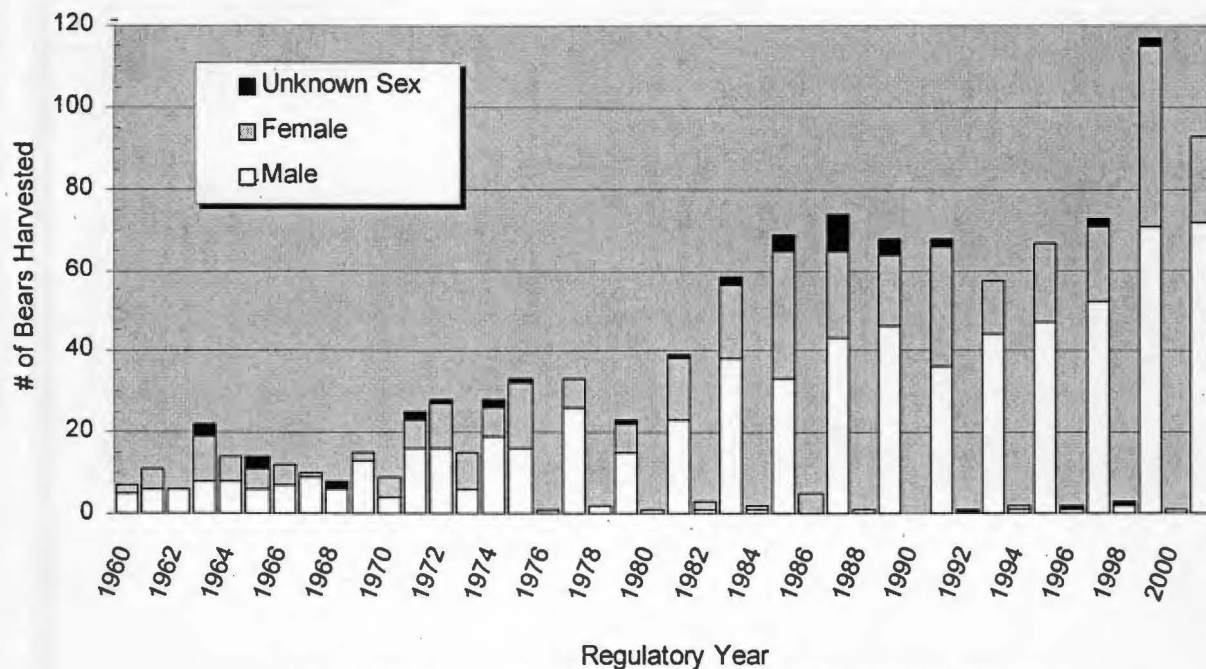
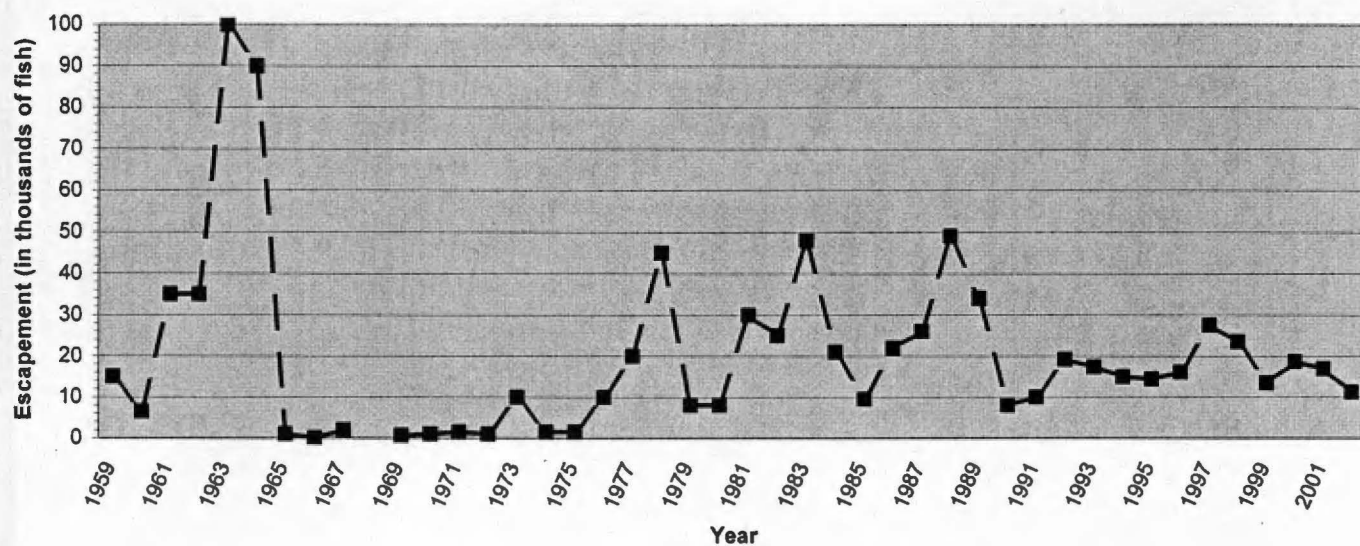


Figure 2
Brown Bear Harvest From Areas Surrounding the McNeil River
State Game Sanctuary and Refuge 1960 - 2001*
(Harvest from GMU/UCUs: 9A/201, 301, 401, 501; 9B/301; and 9C/201, 301, 601, 702, 703)



* Note: a regulatory year starts July 1 and ends June 30 of the following year

Figure 3
McNeil River Chum Salmon Escapement *
McNeil River State Game Sanctuary 1959 - 2002



* Note: The Sustainable Escapement Goal (SEG) has been set at 14,000 - 26,000 fish.

Figure 4. Land status map of McNeil River State Game Sanctuary and Refuge.

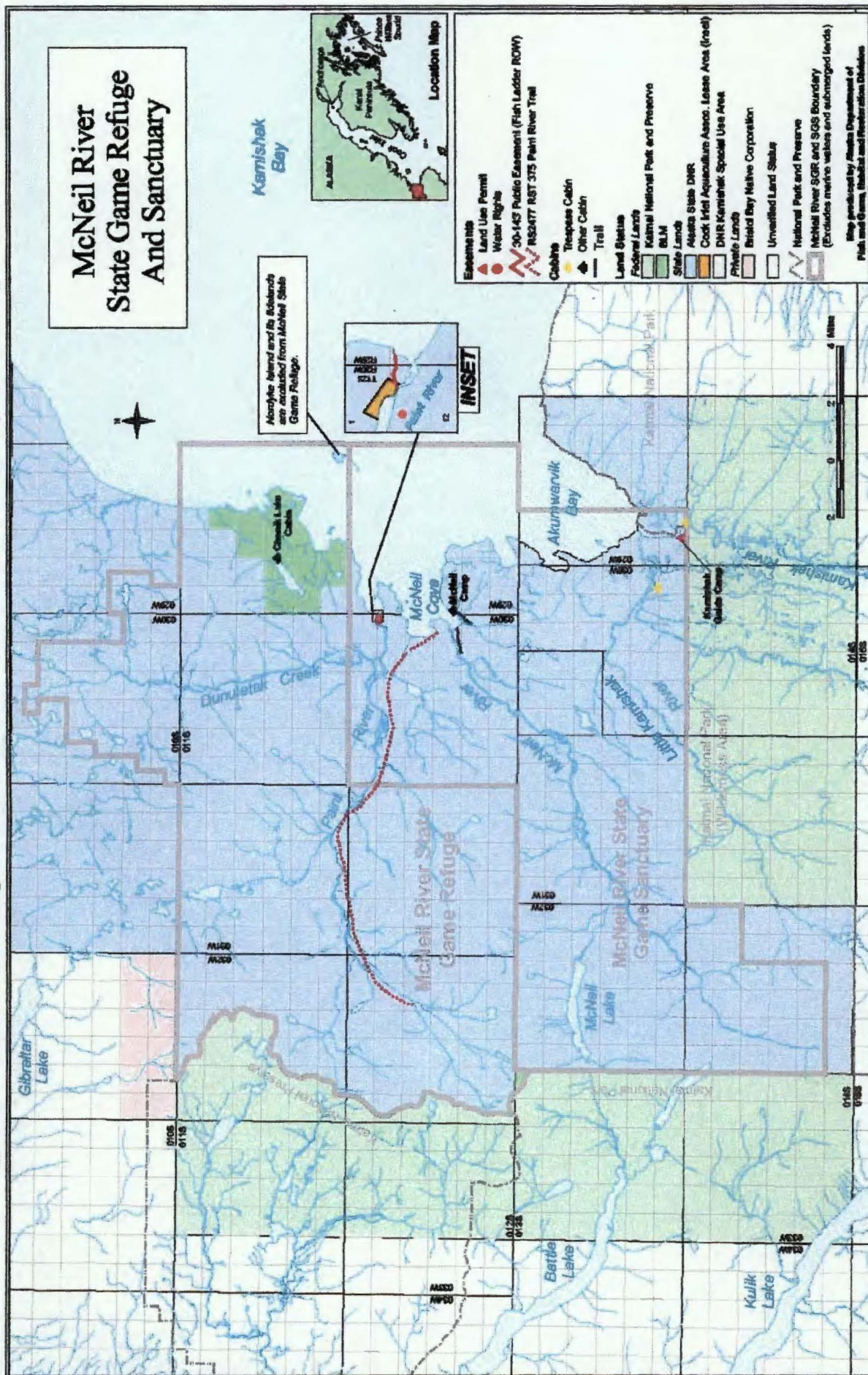


Table 1
Peak Brown Bears Hourly Counts at McNeil River Falls
McNeil River State Game Sanctuary, 1993 - 2002

	1993	1994	1995	1996 *	1997	1998	1999	2000	2001	2002	10 year average
	highest hourly count	highest hourly count	highest hourly count	highest hourly count	highest hourly count	highest hourly count	highest hourly count	highest hourly count	highest hourly count	highest hourly count	highest hourly count
15 July	-	-	-	38	40	47*	28	37*	25	30	35
16	-	-	-	46*	32	42	28	31	39*	26	35
17	-	-	-	29	47	46	35	31	41*	32	37*
18	37*	30	29	44*	43	47*	26	32*	40*	33*	36
19	58*	50*	33*	54*	66*	57*	36	36*	35*	35*	46*
20	55*	37*	40*	40*	52*	32	37*	23	37*	26	38*
21	46*	43*	28	47*	50*	10	35	28	40*	40*	37*
22	54*	26	48*	49*	44	18	38*	37*	32	25	37*
23	49*	43*	29	47*	63*	35	42*	36*	30	41*	42*
24	30	52	31	33	52*	43	32	36*	42*	32	38*
25	18	18	39*	40*	51*	46	29	36*	33	30	34
26	28	37*	30	31	54*	63*	35	32*	24	30	36*
27	34*	44*	39*	37	49	50*	31	23	29	22	36*
28	24	33	28	33	27	51*	37*	23	23	34*	31
29	28	32	12	21	30	48*	36	24	20	36*	29
30	21	25	32*	29	27	39	41*	28	15	31	29
31	19	20	35*	26	15	34	42*	19	11	33*	25
1 August	13	16	23	22	17	35	42*	15	7	25	22
2	7	16	16	18	24	31	29	20	5	21	19
3	-	-	-	18	21	23	27	25	3	19	19
4	-	-	-	11	11	12	16	14	3	11	11
5	-	-	-	10	-	18	23	4	1	9	11
Ave. of 7 high days	48	44	38	47	55	52	40	36	39	36	

Highest hourly count is the single highest count of the day taken on the hour and includes all bears (adults, subadults and cubs)

High daily count is a one time count of the highest number of bears taken when the most bears are present

- = counts were not made

* = 7 high daily counts for the season or 10 year average of 7 high daily counts

+ = observations are generally made between 11:00AM and 7:00PM and average 6.5 hours a day

Table 2
Sex and Age Composition of Brown Bears at McNeil River
McNeil River State Game Sanctuary, 1976-2002

	'76	'77	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02
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	11	7	5	10
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	-	-	12	8
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	-	-	53	45
Adult Sex Unknown	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-	0	0	0
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	-	-	70	63
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	-	-	4	4
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	-	-	2	2
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	-	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	-	-	6	6
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	-	-	76	69
Total Cubs	20	21	20	17	12	14	16	12	17	28	26	30	31	42	34	30	31	24	22	25	35	43	31	20	15	11	21
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	-	-	87	90

⁺ 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.

- Data not collected

Table 3
Visitor Use and Fish Harvest at Kamishak River
McNeil River State Game Sanctuary, 2002

# OF ANGLERS	# OF NON-ANGLERS	# DAYS GUIDED	COHO SALMON		CHUM SALMON		PINK SALMON		DOLLY VARDEN	
			Kept	Released	Kept	Released	Kept	Released	Kept	Released
625	14	149	904	5,615	26	482	28	1,250	133	7,226

Table 4
Average Daily Permit Use at McNeil River
McNeil River State Game Sanctuary, 1993 - 2002

	1993	1994	1995	1996	1997	1998	1999	2000 ^C	2001 ^D	2002 ^D	10yr Average
June 7-August 25 (80 days)											
x permits used daily	9.0	8.4	8.7	9.3	9.0	9.2	7.4 ^B	7.8 ^B	8.0 ^B	6.6 ^B	8.3
% with regular permit	74	76	82	85	83	81	86	88	88	88	83
% with standby permit	26	24	18	15	17	19	14	12	12	12	17
x daily visitors in the sanctuary^A	14.1	13.6	13.4	14.5	15.0	13.7	14.0	13.1	12.7	11.6	

^A= Includes all visitors (those who flew out as well as those who stayed overnight).
^B= 1999 to 2002 (unlike 1993-1998) use figures are lower due to lack of a second staff person to bring late arrivals to the viewing area.
^C= The number of Standby Permits dropped from 5 to 3 per period (95 to 57 annually).
^D= Use figure may be lower due to fewer air taxis serving the sanctuary hence travelers may have to come late or depart earlier.

Table 5
Visitor Use Summary, McNeil River
McNeil River State Game Sanctuary, 1984 - 2002

Year	Footnotes	Number of Applicants	Number of Visitors	Total User Days in Sanctuary	Total Permit days for July/Aug (560 possible)	Comments on Season Length
1984	A,F	992	159	574	377	6/5 - 8/27
1985	A	832	216	816	449	6/10 - 8/25
1986	A	806	255	967	430	6/9 - 8/25
1987	A,G	1,757	252	1,054	473	6/9 - 8/23
1988	A	1,094	304	1,328	498	6/1 - 8/29
1989	A	1,306	264	1,183	488	5/22 - 8/26
1990	A	1,481	299	1,435	524	6/8 - 8/25
1991	B,E	1,818	249	1,415	526	6/1 - 8/27
1992	C,E,H	1,672	245	1,210	478	6/1 - 8/25
1993	D	2,150	225	1,128	516	6/7 - 8/25
1994	D,I	1,766	228	1,086	484	6/7 - 8/25
1995	D	1,486	212	1,074	475	6/7 - 8/25
1996	D	1,502	219	1,158	494	6/7 - 8/25
1997	D	1,474	228	1,197	489	6/7 - 8/25
1998	D	1,159	219	1,096	504	6/7 - 8/25
1999	D,J	1,223	208	1,122	398	6/7 - 8/25
2000	D,J,K,L,M	1,322	198	1,051	424	6/7 - 8/25
2001	D,J,K,L,M,N	1,329	186	1,012	437	6/7 - 8/25
2002	D,J,K,L,M,N	1,434	175	930	351	6/7 - 8/25

Footnotes Table:

A = No limit on standby or camp numbers

B = 1st come, 1st served for standby w/no camp limit

C = 1st come, 1st served for standby w/camp limit of 15

D = All permits (regular & standby) by lottery including June

E = Unlimited permits prior to June 15 then 10/day

F = \$5 application fee instituted in 1983

G = \$10 application fee and \$40 user fee instituted

H = \$20 application fee and new user fees (\$100 Resident/\$250 Non-resident) instituted

I = Visitors to the sanctuary must wait four years to re-apply

J = Lower staffing levels prevented late arriving or early departing visitors from joining the group

K = \$25 application fee and new use fees (\$150 Resident/\$350 Non-resident) instituted

L = Number of Standby permits drop from 5 to 3 per period (95 to 57 annually)

M = Visitors to the sanctuary must wait one year to re-apply

N = A major air taxi operator retires, leaving only one primary carrier to serve MRSGS