

Kodiak National Wildlife Refuge

Kodiak, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1992

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

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US FISH & WILDLIFE SERVICE--ALASKA

REVIEW AND APPROVALS
KODIAK NATIONAL WILDLIFE REFUGE
Kodiak, Alaska



ANNUAL NARRATIVE REPORT

Calendar Year 1992

Jay Bellinger
Refuge Manager Date

George M. ... 5/13/93
Associate Manager Date

Rowan W. Gould 5/17/93
Regional Office Approval Date

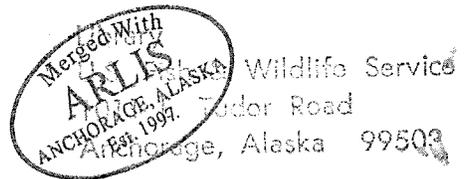


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A. Highlights: (D. Munoz)

- ☛ Land acquisition of Native owned lands within the old refuge boundary was the subject of numerous tours to focus attention on pending congressional legislation (Section C.1).
- ☛ Acquisition of Native Owned land on Afognak Island is proposed to the Exxon Valdez Oil Spill Trustee Council (Section C.3).
- ☛ Construction of a cabin on Native conveyed lands found to be incompatible with refuge purposes under language found in Section 22(g) of ANCSA (Section D.2).
- ☛ Public Use Management Plan revisions were turned over to the Regional office for final editing (Section D.2).
- ☛ River Management Planning effort was initiated on the Ayakulik River (Section D.4).
- ☛ Environmental assessment finds Hidden Lake sockeye salmon stocking compatible with refuge purposes (Section D.4).
- ☛ Research on brown bears, deer, salmon, waterfowl and bald eagles provided critical data for current and future management decisions (Section D.5).
- ☛ Volunteer program results in 2,580 hours of donated time (Section E.4).
- ☛ Only 15 percent of 1260 funds were available for projects during FY93 (Section E.5).
- ☛ Substantial increase in bald eagle nesting activity was documented (Section G.6).
- ☛ Total documented mortalities of brown bears was 132, or one below the 10 year average (Section G.8).
- ☛ Sitka black-tailed deer survey efforts initiated with Subsistence funding (Section G.8).
- ☛ Uganik River weir operated successfully and added significant data to the total knowledge of salmon resources in this system (Section G.11).
- ☛ Guided sport fishing use increases substantially (Section H.9).
- ☛ Environmental education outreach efforts include drafting a new Refuge EE plan (Section H.3).
- ☛ Eighty-seven bear viewing participants experience the unique opportunity of seeing bears at O'Malley River (Section H.11).

B. Climatic Conditions: (D. Munoz)

The climate of the Kodiak Region is dominated by a strong marine influence. Typically, this results in cloudy skies, moderately heavy precipitation, and cool temperatures. During winter, the waters of the North Pacific Ocean provide the moisture that makes clouds and rain the norm. The relatively warm marine waters also provide a relatively mild climate year-round. Weather conditions vary greatly over the island because of exposure, aspect, and terrain. In general, easterly exposures (such as Kodiak State Airport where we get our weather records) are wetter and warmer than north or west slopes. Table 1 depicts a summary of weather conditions for 1992 as collected by the National Weather Service at Kodiak State Airport.

Table 1. 1992 Weather Data Summary

Month	Snow-fall Inches	Precip. (Inches)	Precip. Departure from Normal	Temperature Maximum (°F)	Temperature Minimum (°F)	Average	Temperature Departure From Normal
January	7.0	9.07	+0.78	42	16	33.3	+1.4
February	27.6	2.14	-4.15	42	10	27.7	-1.7
March	15.0	1.14	+1.43	45	11	32.3	-0.4
April	0.8	2.10	-2.74	54	18	39.0	+1.0
May	0.8	7.52	-0.21	63	28	44.5	+1.3
June	0.0	5.59	+2.22	72	38	50.9	+1.2
July	0.0	2.25	-1.66	71	43	55.4	+1.7
August	0.0	6.02	+0.81	71	41	53.7	-1.1
September	0.0	2.69	-4.91	65	26	46.4	-3.5
October	0.0	4.84	-5.15	53	24	40.2	-1.0
November	1.2	4.83	-1.84	47	21	35.4	+0.7
December	29.4	4.97	-1.84	46	11	29.9	-0.9
Totals	81.8	53.16	-17.26	55.9 (Avg.)	23.9 (Avg.)		-1.3

Total rainfall during 1992 was 53.16 inches, or 17.26 inches below average. Total snowfall was 81.8 inches, or 7.3 inches higher than average. Average high and low temperatures were 55.9 and 23.9° F, respectively (normal high and low are 46.3 and 35.1).

The snowfall figures for February and March reflect the fact that conditions during late winter were severe enough to cause problems for the refuge's deer

population. Effects of winter kill on deer is detailed in the wildlife section.

Although statistically relatively mild, the winter of 1992-93 contained a number record-setting fluctuations. Significant snowfall didn't hit Kodiak until December 10. The National Weather Service reported that 1992 highlights included a record snowfall for February, the fourth driest fall season recorded and a record-setting early cold stretch in September. February's snowfall included 21.3 inches that blanketed Kodiak over a 48 hour period. The 19 inches that fell on the 23rd set the one-day February snowfall record. In spite of record rainfall during the final days of May, the spring of 1992 was the driest in 20 years.

After a normal summer, dry and cold weather moved into Kodiak for September, 4th driest on record. The cold air that invaded Kodiak mid-September resulted in 9 record lows and included the coldest temperature ever recorded so early in the season (26° on the 21st of September). The dry trend continued through October and November. The three months yielded a precipitation deficit of 11 inches. However, the year ended on a snowy note with 29.4 inches of snow falling during late December.

Strong winds were common throughout the year. Peak gusts of at least 30 mph were recorded on 108 days, 40 mph on 32 days, and 50 mph on 7 days. July was the only month when peak wind speed was below 30 mph.

Table 2 depicts normal temperatures and precipitation over the past 30 years as compiled by the National Climatic Data Center.

Table 2.

Condition	New Normals (1961-1990)	Old Normals (1951-1980)	Change
Maximum Temperature (°F)	46.8	46.3	+0.5
Minimum Temperature (°F)	34.8	35.1	-0.3
Average Temperature (°F)	40.8	40.7	+0.1
Rainfall (Inches)	67.58	74.24	-6.66

C. Land Acquisition: (J. Bellinger)

1. Fee Title:

No inholdings were acquired this year, however the media continued to press for acquisition. Articles appeared in numerous publications. The refuge hosted the board of directors for the Conservation Fund and the World Wildlife

Fund this year. The Conservation Fund directors approved an acquisition program for Kodiak inholdings after the trip and the World Wildlife Fund started a campaign asking for donations for acquisition.



Don Berry and Katheleen Fuller of the World Wildlife Fund visited Kodiak NWR to get a first-hand impression of the inholding acquisition issue. (D. Munoz)

2. Easements:

Several public 17(b) easement trail controversies were settled this year. A final location for the trail up the Dog Salmon River was negotiated with Akhiok-Kaguyak Incorporated (AKI). We were also able to obtain a public easement across patented land owned by AKI at Cannery Cove on Olga Bay. This easement was needed to connect the Akalura River trail with Olga Bay.

We also found out that the easement trails in Kiluda Bay cross 1906 native allotments. Therefore, the easements were cancelled and public access to remaining refuge lands in this area was cut off. We are presently putting an appeal together for the Public Land Appeals Board in an attempt to restore public access to that portion of the refuge (native land borders the ocean along this entire bay). There has been an increase in interest in the

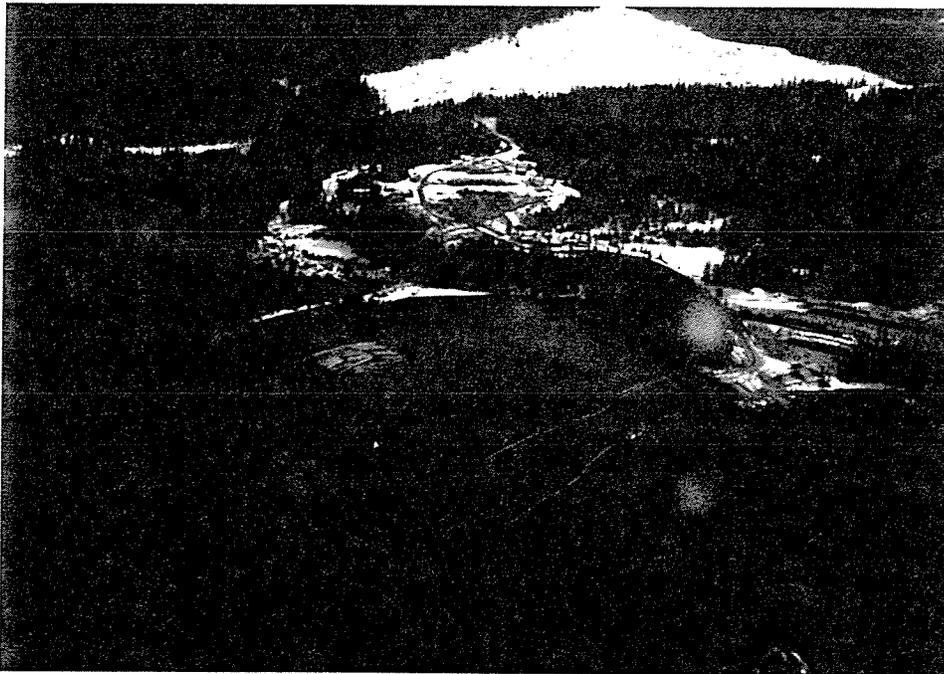
location of 17(b) easement trails since Akhiok-Kaguyak and Koniag Native Corporations initiated land use fees. Also, the big game guide selection process resulted in situations where the big game guide contracted for operation on native lands was not selected as the refuge permittee.



Assistant Manager Dick Munoz and Akhiok-Kaguyak Inc. corporation president Ralph Eluska cooperatively posted a 17(b) easement trail at Cannery Cove in Olga Bay. This trail provides public access to Federal lands that are blocked off from key access points by Native Conveyed lands. Legal mandate for access is found in Section 17(b) of ANCSA. (M. Hansen)

3. Other:

Logging at Afognak Island on native corporation land has focused increased attention on the possibility of acquisitions that may involve additions to the refuge's Afognak unit. Acceleration of logging activity on these lands has increased the attention placed on this action.



Effects of logging on privately owned Native lands on Afognak Island are depicted above. Especially note the amount of siltation evident in the bay. This imminent threat has focused increased attention on acquisition in areas adjacent to refuge land. (D. Munoz)

D. Planning:

1. Master Plan: Nothing to report.

2. Management Plan: (P. Taylor)

An environmental assessment was prepared to analyze the impacts of moving the bear viewing program from Dog Salmon Falls to O'Malley River during 1992. The preferred alternative included situating the base camp well away from the viewing area, leaving the public use cabin empty during the program, and closing an area around the viewing area to public access. The closure was approved by Associate Manager Constantino on a temporary basis for 1992. Commercial operators were notified that the O'Malley area was off limits during the bear viewing program. Also, air taxis were asked to voluntarily comply with the 2000 foot AGL recommendation for overflights through the O'Malley corridor. Compliance with these restrictions was generally good. A request by a commercial operator to guide photography clients into O'Malley was received and denied. This decision was appealed to the Regional Director and the original denial was upheld.

A compatibility determination was prepared during 1991 on the construction of cabins in the Karluk Lake area by Koniag Native Corporation. The construction occurred at the Portage on Karluk River, on Camp Island and on Thumb Lake during the summer of 1991. Development was on conveyed lands subject to Section 22(g) of the Alaska Native Claims Settlement Act. This section states that use and development on conveyed lands must be compatible with the purposes for which Kodiak Refuge was established.

From what is known of the locations, facilities and probable uses of the cabins at Camp Island and Portage on Karluk River, and given Koniag's willingness to work with the refuge on an operating plan to minimize impacts, it was determined that the economic activity of constructing and operating these cabins might be done in a manner compatible with the purposes for which the refuge was established. However, given that a cabin at Thumb Lake is in a critical bear and eagle feeding area and will cause significant direct and indirect impacts to the Karluk Lake brown bear populations, the Refuge had no choice but to find construction of a cabin at Thumb Lake, on Native lands subject to Section 22(g), to be incompatible with refuge purposes.

The Refuge Manual (5 RM 20.3) states that, "Use of a national wildlife refuge may not be permitted unless first determined to be compatible with purposes for which the refuge was established. Refuge use must also be consistent with refuge objectives and applicable laws and policies."

Section 22(g) of ANCSA states that, "Every patent issued by the Secretary pursuant to this Act, which covers lands lying within the boundaries of a National Wildlife Refuge on the date of enactment of this Act shall contain a provision that such lands remain subject to the laws and regulations governing use and development of such refuge." The sites in question are located on habitat virtually the same in characteristics as adjacent refuge land. The same fish and wildlife populations use both lands. Human use of these cabins will especially have a direct impact on refuge bear populations. The Kodiak Refuge Comprehensive Conservation Plan, the draft Public Use Management Plan and the Management Plan for Commercial Fishing Activities, stipulate that no new cabins are to be built on the refuge because of their incompatible impacts

to the major purposes for which the refuge was established.

The Public Use Management Plan (PUMP), traveled a substantial distance down the road to completion during 1992. Following Dave Menke's departure mid-1991, revision of the PUMP was turned over to RO Planner Mike Haase. Mike has been quite diligent and responsive, and continues to do a fine job. Changes made during the year include:

- General housekeeping (usage, grammar etc)
- Insertion of a discussion of fishery management
- A total rework of the Environmental Consequences section
- Significant change to the Brown Bear Concentration, Long-term Camping, Upland Landing, Jet Boat, and Proposed Regulations sections
- Consolidation of information common to all appendices

These changes were the result of review by not only Mike and the Kodiak Refuge staff, but also other RO personnel and the State of Alaska. Following a rather negative response from the State's Division of Governmental Coordination, a meeting was arranged to discuss possible modification of strategies in the areas of public access and lands closure. A good exchange of ideas resulted in a largely win/win revision of proposed closures and restrictions.

Internal review of the final draft will be completed in early 1993. Target date for printing will be sometime in March. Following release and the required 45 day review, final signature and adoption should occur by late spring. Next step will be ASAP promulgation of regulations.

Work on a River Management Plan got off the ground with the hiring of Ron Squibb. Coordinated by Leslie Kerr of Planning, this is a project of enormous potential impact. Starting out as an RO mandate to develop a Sportfish Guide Allocation Plan, this project has evolved into something substantially more complex and far-reaching. Ron came on board with only a sketchy idea of what was expected of him. With little time to work on study plan development, it was determined that a protracted stay on the Ayakulik River, in the company of a pre-planned LE observation team, would provide a good initial look at a typical river recreation scenario. Ron spent a month at that location, documenting use and people/wildlife interactions.

Observation of use at the Ayakulik, as well as a more provocative examination of the issue, led to an expansion of study scope. Use of river systems is not limited to guided sportfishermen. And if resource impact is the motivation for the study, other significant sources of use must be considered. As a result, the Sportfish Guide Allocation Plan concept has been expanded to something more comprehensive, now known as the River Management Plan.



Resource Planner Ron Squibb initiated data collection on the Ayakulik River to provide information for the River Management Planning process. From this vantage point above the Ayakulik River-Bare Creek confluence, Ron was able to keep track of public use and wildlife use. (D. Munoz)



Ayakulik River sport fishing use for king salmon during June, such as the float trip pictured above, has increased significantly in recent years. (D. Munoz)



Guided day use of the Ayakulik River is the subject of a planning effort to allocate use through a bid prospectus system. (D. Munoz)

Following completion of the Ayakulik observations and a 3-day reconnaissance of other potential study locations, Ron spent the remainder of his temporary appointment developing alternative strategies and budgets for completion of the plan, with December of 1995 as the implementation target. Additionally, he wrote a comprehensive analysis of data collected on the Ayakulik during his June/July stay.

The first step identified in Ron's preliminary study plan was development of a public participation plan by the end of 1992. Because of demands imposed by the ill-fated bear viewing privatization, Refuge Ranger Taylor was not able to make any progress on this front. Additionally, just \$34K was approved for the 1993 budget. This amount is far below the absolute minimum requested and will significantly reduce 1993 progress. Ron's salary will expend all but about \$4K. Transportation, supplies and an assistant for \$4K cannot be realistically projected. Expected results will be scaled back accordingly.



Bear attractants in recreational camps is one of the concerns that has become an issue along the Ayakulik River during the king salmon fishery in June. Bear-human interaction is inevitable, however keeping a clean camp can minimize the attraction of bears to a campsite. (R. Stovall)



Use of salmon eggs for bait by sport fisherman creates a potential bear attractant. Refuge personnel at the Ayakulik field camp try to educate campers in the best ways to minimize bear problems. (D. Munoz)

3. Public Participation: (R. Stovall)

Village Meetings were held during October at Akhiok, Karluk, Old Harbor and Larsen Bay. Discussions included subsistence management, problem bears, sport fishing and hunting impacts on village life and land acquisition.

4. Compliance with Environmental and Cultural Resource Mandates: (T. Chatto)

In 1992 the Alaska Department of Fish and Game (ADF&G) proposed to stock sockeye into Hidden Lake on the Ban Island/Afognak Unit of the refuge. Hidden Lake is the third largest lake on Afognak Island and did not support anadromous fish due to an impassable barrier falls located below the lake outlet which precluded fish access. The ADF&G strategy for the project is to use the freshwater environment of Hidden Lake for stocking sockeye fry and subsequent rearing of juveniles that will migrate to the ocean and return as adults. The goal of the project is to enhance the common property fishery in the Kodiak area.

Since returning adult sockeye will not be able to ascend to the lake, most (\geq 90%) of the returning adults will be available for harvest. It is expected that annual stocking of approximately 1.25 million sockeye fry will result in returns of approximately 70-90 thousand fish each year, worth approximately 415 to 533 thousand dollars.

In July 1992, the refuge prepared an environmental assessment (EA) on the project which examined the proposal and a no-action alternative for physical, biological, cultural, economic and subsistence 810(a) impacts and how they relate to refuge purposes. Based on the results of the EA and a review of enhancement guidelines by the Regional Office, the project was found to be compatible with refuge purposes and a Finding of No Significant Impact (FONSI) was declared for the project. Several specific guidelines were required by the EA and FONSI for the project to proceed, these included:

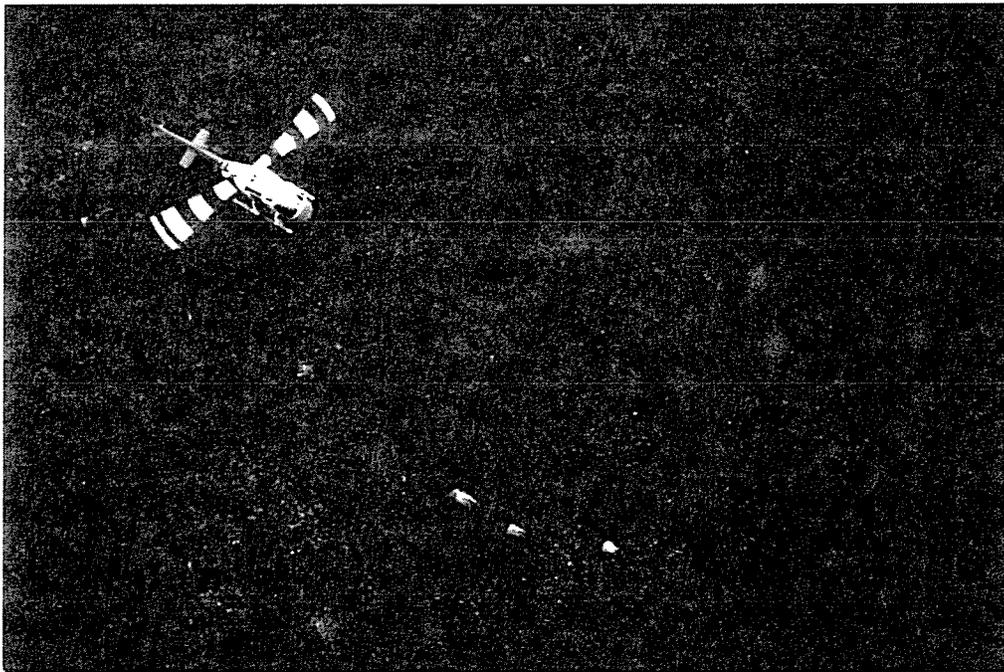
- 1) Stocking will proceed with a full evaluation of nutrient, algal and zooplankton response on an annual basis.
- 2) If negative impacts to the nutrient base in the lake are detected, stocking will be reduced or terminated until the lake recovers naturally.
- 3) The ADF&G will ensure that approximately 7,000 sockeye will be allowed to escape upstream to provide for wildlife use such as brown bear.
- 4) The ADF&G and the refuge will draft a monitoring plan to address biological factors such as nutrient/zooplankton levels, indigenous fish populations and changes in bear and eagle feeding behavior.
- 5) Continuation of the project will remain subject to a comprehensive review of project effects after three years and a policy review of enhancement projects on refuges in Alaska.

The refuge issued a Special Use Permit for the project in early September, and ADF&G stocked approximately 0.26 million sockeye fry into Hidden Lake later that month.

5. Research and Investigations:

(1). Kodiak NR 92 - "Habitat Utilization and Seasonal Distribution of Sitka Black-tailed Deer on the Spiridon Peninsula, Kodiak Island, Alaska (74530-89-01) (Zwiefelhofer)

University of Alaska - Fairbanks (UAF) graduate student Jeff Selinger continued toward completion of his course work during 1992. The need to correct the mapping done by a contractor set the completion date for Mr. Selinger's thesis back several months. A draft final report is anticipated to be available by July, 1993. Unfortunately, due to financial considerations the formal presentation and defense of the thesis will be delayed until late 1993.



Radio telemetry plays an integral part in brown bear research. Research biologist Vic Barnes and ADF&G big game biologist Roger Smith cooperatively collared 14 bears on southwest Kodiak Island as part of a study to improve density estimates and evaluate population monitoring procedures. (R. Hander)

(2). Kodiak NR 92 - "Survival and Productivity of Female Brown Bears and Survivorship of Cubs on Kodiak Island, Alaska" (FWS, ADF&G, and Kodiak Bear Trust) (Barnes)

The sample of radio-collared females declined from 43 in 1991 to 41 in 1992. In spring, 1992, 11 of 16 eligible females emerged from dens with new cub litters. Mean litter size was 2.6. Also during spring, 13 litters were

weaned, including 5 at 2 years, 6 at 3 years, and 2 at 4 years. Mean litter size of weaned litters was 1.8. Current estimates for mean age of first weaned litter and mean reproductive cycle (weaning to weaning) are 9.85 and 3.88 years. Survival of first-year and yearling cubs from spring to fall was 79% and 81%, respectively, in 1992. For the entire study, 114 (45%) of 255 cubs in 108 monitored litters have survived to be recruited into the population. All 41 adult females survived to enter winter dens in fall of 1992.

(3). Kodiak NR 92- "Application of Aerial Survey Methods to Estimate Density and Composition of Brown Bears on Kodiak Island, Alaska" (FWS, ADF&G, and Kodiak Bear Trust) (Barnes)

This is a new, 2-year cooperative study designed to improve density estimates and evaluate population monitoring procedures for key resource areas on southwest Kodiak Island. Objectives of the study address brown bear habitat and population concerns (i.e. subsistence use, private inholdings, expanding recreational use).

The purpose of 1992 work was to initiate capture and marking of animals for the conduct of a mark/recapture density and composition estimate in 1993. The highest priority was capturing single, adult females to ensure a sample of marked females with first-year cub litters in 1993. Fourteen females were captured and radio-collared; they included 2 subadults, 8 single adults, and 4 females with old (\geq 1yr) cub litters. All 14 females were alive and in winter dens at the end of the year. Animals representing other components of the population (adult bears and sub-adults) will be captured just prior to the population estimate surveys in 1993.

(4). Kodiak NR 92 - "Brown Bear Activity, Behavior, and Distribution Related to a Bear Viewing Program at O'Malley River, Kodiak Island, Alaska (74530-91-01) (Barnes)

Objective of this study is to evaluate effects of a structured bear viewing program on bear use patterns and bear/human interactions. In 1991 data were collected under conditions of comparatively unrestricted public use. During 1992, the same sampling protocol was used while public use was limited to participants in the bear viewing program. Data were collected from 23 June through 22 September; during that period sampling was conducted on 67 days and resulted in 617 scan samples. In addition, we logged about 200 hours of intensive monitoring (focal sampling) of individual bears.

A minimum of 63 different bear groups (133 bears including cubs) were observed in the study area in 1992. In a pattern similar to that noted in 1991, bear use of the area in 1992 increased sharply during July, declined in August, and increased again during September (Figure 1). Preliminary comparison of bear use (bear groups observed per scan) in 1991 and 1992 disclosed a 29% increase in bear use during 1992 and a 42% increase in those specific areas where most human activity occurred in 1991. Also in 1992, the number of bear groups (single or family units) that were moderate to highly habituated to humans rose from 11 to 16.

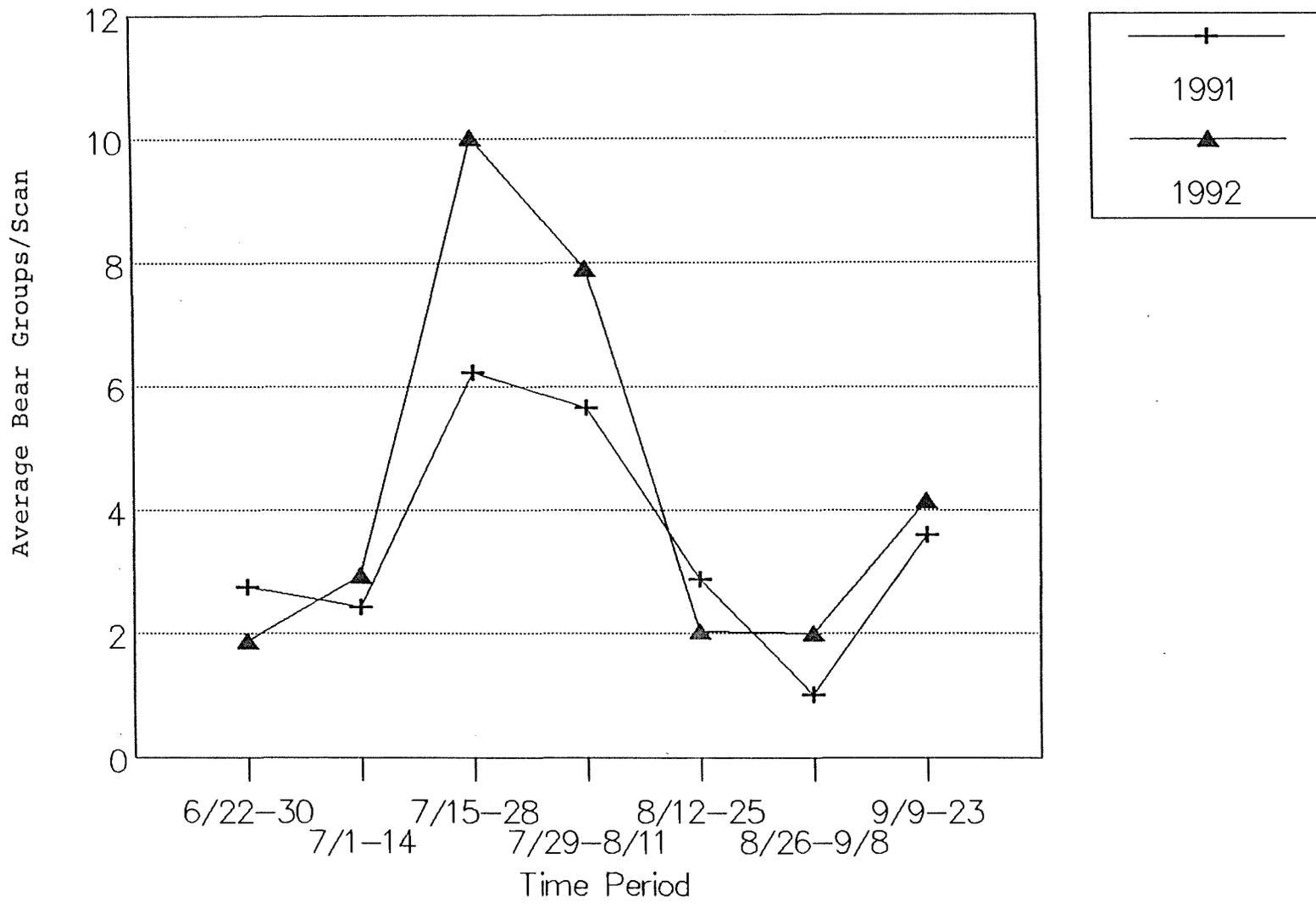


Figure 1. Seasonal use (average bear groups observed per scan) pattern of brown bears on the O'Malley River study area, 1991 and 1992.

The different forms of public use management in 1991 and 1992 were reflected in observations recorded by the study team. The frequency that human groups were observed on the meadow and beach area adjacent to the O'Malley Cabin declined 82% from 1991 to 1992, while the frequency of observations on O'Malley River (area used by bear viewers) increased 60%. Overall, the rate that human groups were observed in the study area increased 11% from 1991 to 1992. Also, average group size was greater in 1992 than in 1991 (6.9 vs 4.5).

(5). Kodiak NWR 92 "Karluk Lake Sockeye Salmon Studies" Fish and Wildlife Service 8140-02 ADF&G (Chatto)

The Karluk Lake sockeye run is composed of both early and late returning fish. Total returns in the mid-1920's ranged up to 4.8 million fish but by the 1950's this highly productive run was reduced to total returns ranging between 300 and 800 thousand sockeye. Starting in the mid 1950's management efforts were undertaken to determine why the returns had not rebounded even with fairly restrictive harvest regulations in place. Major rehabilitation efforts between the late 1970's and 1990 involved continued restrictive harvest measures, life history studies, egg plants and fertilization. Since 1985, with the exception of 1988, overall total returns have ranged between 1.0 and 2.2 million fish.

Preliminary ADF&G figures indicate that the 1992 total sockeye return to Karluk was approximately 1.39 million fish. Escapement in 1992 was approximately 209 thousand early-run and 622 thousand late-run fish. The early-run management escapement goal of 150-200 thousand fish was met and the late-run goal of 400-to-500 thousand was exceeded by approximately 13 percent. Overall sockeye escapement in 1992 is considered excellent by management.

Sockeye smolt studies in Karluk were continued in 1992 by ADF&G. Approximately 3.8 million smolt are estimated to have migrated from the lake to the ocean in 1992. A majority of these migrating fish were 2 and 3 year-olds. This number of migrating smolt represents a significant increase compared to the average of 1.2 million observed in the late 1970's and early 1980's.

In 1992 the ADF&G and the refuge evaluated the existing data on the early-run escapement goal for Karluk sockeye to determine if a reduction in early-run escapement would enhance the return-per-spawner for these fish. The Department had proposed a reduction from the existing goal of 250-350 thousand to a lower level of 150-250 thousand fish. After examination of factors which included what effect this may have on escapement into tributaries used extensively by brown bear feeding on salmon, the new goal was initiated in 1992. The refuge monitored escapement and bear use in these tributaries during 1992 and preliminary results indicate no change in use was detected compared to previous years.

(6). Kodiak NR 92 - "Fraser Lake Sockeye Salmon Studies" ADF&G (Chatto)

This project was continued in 1992 by the ADF&G. The project was begun in 1988 to restore the rearing base for juvenile sockeye in the system by a reduction in the escapement goal and a lake fertilization program under the auspices of an EA prepared by the refuge. The final year for fertilization of the lake was 1992. ADF&G preliminary data indicate a total of 419 thousand fish returned in 1992; of this figure, 206 thousand fish escaped upstream. This is a substantial reduction in the estimated total return compared to the 1.27 million fish observed in 1991. Although a total return of 1.08 million fish was forecast for 1992 by ADF&G, the bulk of this forecast return was dependent on 6 year-old fish from the 1986 brood year. It is unknown why these fish did not return as expected in 1992. These fish may have encountered a stressed rearing environment in 1987 prior to fertilization and their survival may have been significantly reduced.

(7). Kodiak NR 92 - "Sockeye Salmon Overescapement Studies" ADF&G (Chatto)

The ADF&G continued work on this study in 1992 as part of the 1989 Exxon Valdez oil spill assessment studies. This work is directed at assessment of sockeye overescapement into the Ayakulik and Akalura systems on the refuge and how it may have effected future sockeye production. To assess the affects of overescapement, the ADF&G initiated a sockeye smolt monitoring program from 1990 to 1992. Results of this work indicate that the smolt numbers leaving the lake from the 1988 and 1989 brood years are extremely low and this will result in poor or below average returns of adult fish in 1994 and possibly 1995. Examination of the numbers of two and one-year old smolt from the 1987 and 1988 brood years, respectively, that migrated from the lake as smolts prior to the 1989 brood-year impacts, indicates that the lake rearing environment may have already been stressed before oil spill impacts occurred.

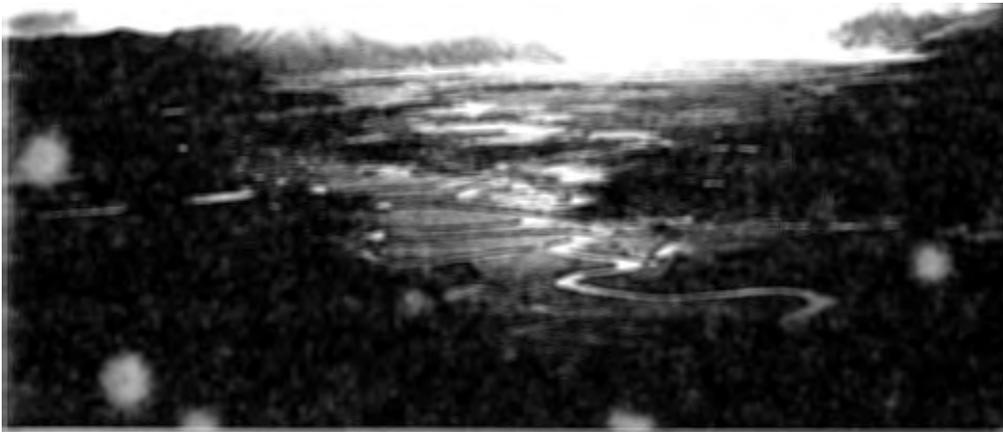
Returns forecasted by ADF&G for the Ayakulik (1993) indicate that the minimum escapement level of 200 thousand fish may be difficult to achieve. The ADF&G-FRED Division has proposed that, if escapement levels are not achieved, a rehabilitation program be initiated. The main emphasis of this program will be to take sockeye eggs, incubate them at their hatchery and plant the fry back into the lake for rearing. The objective is to increase survival of a portion of the run, to make up for the decrease in escapement. This project would be funded through the oil spill restoration funds. This project will require an Environmental Assessment for compatibility with refuge purposes.

(8). KODIAK NR 92 - "Uganik River Salmon Escapement Investigation"- Kodiak NWR (Chatto)

Salmon escapement into the Uganik River in 1992 was monitored by the Service through the use of a floating fish-counting weir. This project was initiated in 1990 to determine the magnitude and timing of sockeye, pink, chum, and coho salmon. In addition, efforts were made to determine the relative number of steelhead which may use the drainage. The weir was operated by the Kenai FAO from May 12 to October 8. As in previous years, the operation of the weir was a success except for a period of time in June when high water events precluded

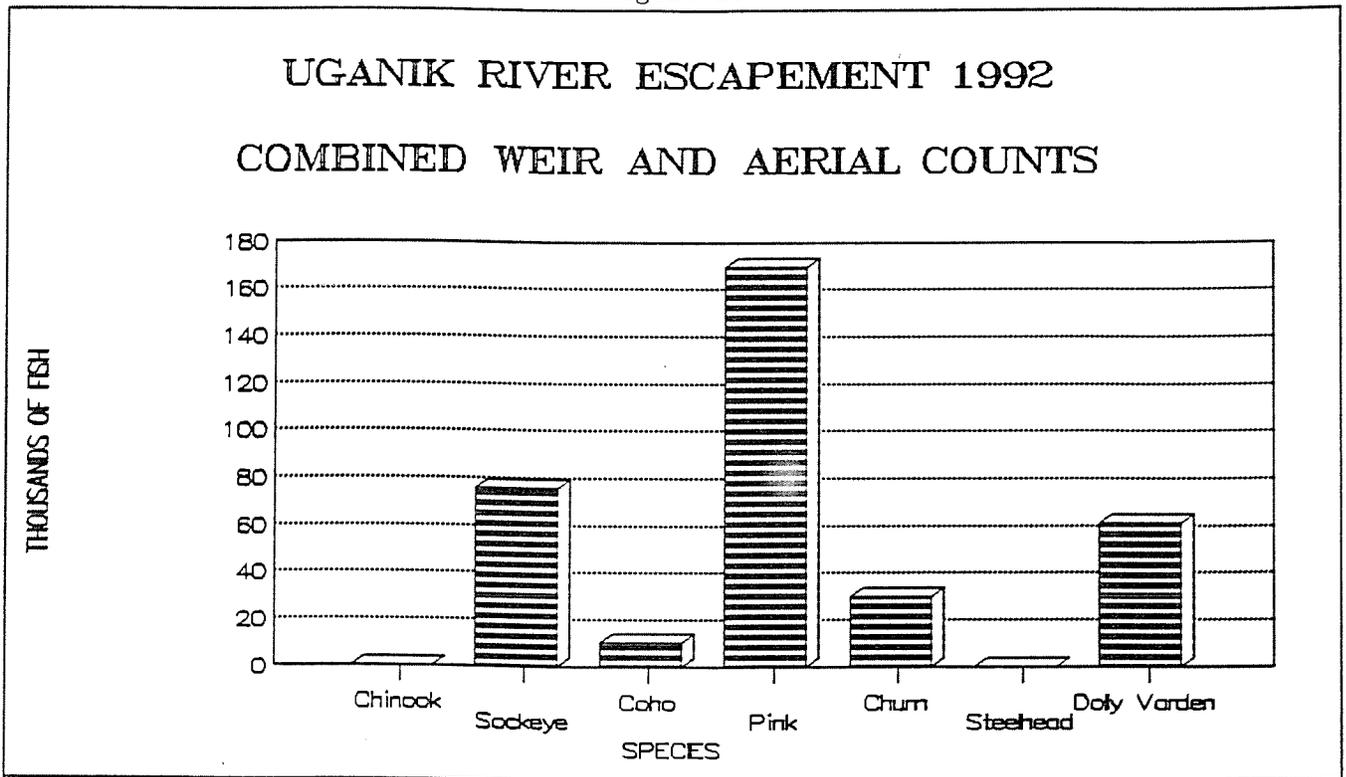
accurate counts of sockeye.

Escapement of salmon into the Uganik River is illustrated in Figure 2. These counts include approximately 51,840 pinks and 17,980 chum salmon which spawned below the weir. Additionally, the sockeye count includes 59,400 fish which were estimated to have passed over the weir during high water events in June. The sockeye estimate is predicated on four different aerial surveys conducted by the refuge from late July to the first week of September. The data was used to generate an area-under-the-curve estimate of what had passed over the weir during the high water events. Escapement for 1992 met or exceeded minimum goals for all species.



The Ayakulik River headwaters and mainstem provide important habitat for refuge fish and wildlife resources. This area was the scene of refuge work involving coho salmon and waterfowl production. (T. Chatto)

Figure 2.



Preliminary estimates of harvest for Uganik stocks in 1992 indicate approximately 40,880 sockeye, 2,500 coho, 42,565 pinks, 13,161 chum and 310 chinook were harvested in the inner Uganik ADF&G statistical areas (253-12 and 253-13). With the exception of pink salmon, these estimates are within the range observed in 1991. The catch of chinook in 1992 is significantly higher than that observed in 1991, but it is suspected that a majority of these fish were "feeder" chinook and were destined for other systems.

Overall, during its three years of operation the Uganik River weir project has been a success. Due to funding constraints, continued operation of the weir will have to be conducted by the ADF&G. The Kenai FAO is preparing a final report on the operations and biological sampling conducted during the years 1990 to 1992. A major benefit of the project has been that the fish counts show Uganik is a more important system, particularly for sockeye, than earlier data indicated. In addition, during the conduct of aerial surveys for sockeye by the refuge in 1991 and 1992 it was observed that certain upper Uganik River sections were heavily used by brown bear family groups.

(9). Kodiak NR 92 - "Spiridon Lake Sockeye Enhancement Project"-ADF&G
(Chatto)

This project was initiated in 1991 under the auspices of an environmental assessment prepared by the refuge. Spiridon Lake was barren of anadromous fish due to a series of impassable falls which prevented salmon access from the ocean. The ADF&G has stocked sockeye fry into the lake since 1991. These fish migrate to the ocean and return as adults to be harvested in the common property fishery.

In July 1992, 2.2 million sockeye fry were stocked into Spiridon Lake. The fry were transported to the lake via float plane and released. The Department also monitored the sockeye smolt migration from the lake in May and June 1992. These fish are the result of 3.49 million fry stocked in 1991. Preliminary results from ADF&G indicate that a total of approximately 1.4 million smolt survived to reach the ocean. This represents an approximate survival of 40 percent from fry to smolt. Given the good rearing conditions in the lake for these fish, a high survival rate is expected during the initial stages of the project.

A total of nine aerial salmon index surveys on Spiridon River were conducted by the ADF&G and the refuge in 1992. Index peak escapement counts for the river were 18,200 pinks, 16,900 chum, 3,570 coho and 300 sockeye. Escapement for pink and chums was above the minimum target goal of 15,000 fish each. The coho index was 10 percent below the minimum goal of 4,000 fish. The documentation of 300 sockeye in a small lake within the drainage is the first observation of these fish actively spawning in an area where rearing opportunities may be conducive to maintaining a small population within the drainage. This population will be indexed in future years as the Spiridon Lake enhancement project starts producing adult returns.

Results of the 1992 limnological and resident fish sampling in the lake are not yet available. In addition, seabird and marine mammal surveys completed as part of the project evaluation carried out in 1992 are not yet summarized. These surveys are being carried out by the ADF&G and are evaluated at an annual meeting in March of each year by the refuge and ADF&G.

Assessment of brown bear use in the Spiridon Peninsula area continued in 1992. This work which is funded by the Kodiak Regional Aquaculture Association (KRAA) is being conducted to evaluate the impacts of the project on brown bear. During 2-6 July, 13 bears were captured on the Spiridon Peninsula and radio-collared; five of the animals were recaptured to replace old radio collars and eight were bears captured for the first time. The animals were relocated 2-3 times per month through October and 1-2 times thereafter to locate their winter dens. Eleven of the bears were in dens located on the peninsula by the end of 1992. These animals will be monitored again in 1993.

(10). Kodiak NR 92 - "Terror Lake Hydroelectric Project - Fisheries Studies"
74530-82-05 (Chatto)

In July 1992 the Fisheries Monitoring Group for the Project met to discuss the results reported in the final fisheries studies and the adequacy of the current FERC mandated minimum flow regime. A summary of the final reports was

prepared by the Alaska Power Authority for review by the monitoring group. Overall, the summary indicated that study results did not quantitatively establish all of the effects of the project on salmon production. In addition, the project appears to have had no significant affect on stream-flow or temperature which could negatively affect the fishery resources. Indications are that the project has reduced the natural variations in stream-flow extremes which had negatively impacted salmon production in pre-project years. The summary indicates that without any proposed changes in the minimum FERC stream-flows, there was no need to continue the monitoring studies.

Service comments on this summary focused on the inconclusive nature of the results on salmon production. A decrease in the return-per-spawner ratio for pinks was observed in the Terror River, but not in adjacent rivers which also had a post-project increase in escapement of pink salmon. In addition, the Service felt that since the original means to quantify spawning/incubation habitat was the use of Instream Flow Incremental Methodology, this method should be re-applied to quantify habitat gain or loss due to post-project flow regimes.

In 1992 the Kodiak Electric Association (KEA) proposed an additional project within the Terror Lake Project area. This project involved the use of release-water from the Terror River which would be shunted via a 9,000 foot-long penstock to a powerhouse/generator downstream. The water would then be routed back into the river to maintain fishery values. The KEA is petitioning that the current wilderness proposal for this area be modified to delete those lands encompassing this project from possible wilderness designation. If this occurs, the KEA will have to prepare an Environmental Assessment on the project.

(11). Kodiak NR 92 - "Coho Salmon Investigations Karluk and Ayakulik Rivers"
(Chatto)

In 1992, the final year of the movement and distribution analysis for coho spawners was completed. As in 1991, a total of 60 coho spawners were marked with radio-tags in the Karluk and Ayakulik Rivers. These fish were closely monitored by aerial tracking. A draft final report on the identification of major spawning areas and coho spawner stream life was completed in December 1992. Results for the Ayakulik indicate that 44 and 38 percent of the marked fish spawned in selected portions of the lower mainstem and upper mainstem, respectively. The average stream-life for these fish was approximately 36 days. Data for the Karluk indicated that 60 percent of the fish spawned in the upper mainstem and associated tributaries. Average stream life for Karluk coho was approximately 29 days.



The coho salmon telemetry work resulted in discovery of one transmitter in bear scat near the outlet of Karluk Lake. (R. Stovall)

In 1993/94 the final phase of the coho analysis will be initiated through quantification of the major spawning areas identified through the telemetry work. A desired escapement level will then be calculated. This work will be conducted as part of a graduate thesis by one of the refuge's temporary employees working through the UA Fairbanks.



Volunteer Debra Spangler releases one of 60 coho salmon marked with radio tags to evaluate movement and distribution for coho spawning. (T. Chatto)

6. Other: (T. Chatto)

A meeting of the Kodiak Regional Salmon Planning Team was held in Kodiak in January 1992. The Refuge is an ex-officio member of the team which meets on an annual basis to discuss and plan fishery enhancement and direction in the Kodiak area. In 1992 the team reviewed and made recommendations on the public review draft of phase two of the Kodiak Regional Comprehensive Salmon Plan. The refuge provided input at the meeting and written comments on the plan.

Refuge personnel attended two-day ADF&G Kodiak Regional Management and Research meeting in late January. During the meeting, all aspects of salmon management and research for the Alaska Peninsula and Kodiak were discussed. The refuge presented a brief overview of fishery work being conducted on the refuge by the Service.

In March, refuge personnel attended a Karluk Lake Sockeye Symposium in Kodiak. The symposium was hosted by the KRAA. The purpose of the symposium was to gather fishery scientists and industry representatives together to examine the past, present and future management of the Karluk Lake sockeye population. The refuge gave a brief presentation on the status of the run from a refuge perspective. The general consensus of the participants was that the late run of sockeye into the Karluk has responded to rehabilitation efforts, but the early run has not. Therefore, the escapement goal for the early run may need to be adjusted to a lower level in order to increase the return-per-spawner ratio (see Section D. 5.1).

During the year, comments on the 1992\93 Alaska Board of Fisheries proposals which could affect refuge fisheries were prepared and sent to the Regional Office. One proposal by the ADF&G would have reduced sport fish harvest opportunities for anglers who wished to keep smaller salmon (< 20") in addition to their normal daily possession limit for larger fish. The refuge opposed this proposal since most smaller returning salmon are usually males (Jacks) and additional harvest of these fish did not pose a threat to stock conservation (given the magnitude of most salmon stocks in the refuge). This proposal was eventually withdrawn from consideration by ADF&G.

Fishery Biologist\Pilot Chatto attended the annual Alaska Chapter meeting of the American Fisheries Society in Valdez Alaska in 1992. A summary report of the meeting was prepared and sent to the regional office for distribution.

During a brief visit by Director Turner in August of 1992, the refuge provided an overflight of some fisheries enhancement projects on the refuge. Concern was expressed by the Director that these projects might not be compatible with refuge purposes. The staff briefed him on the existing guidelines for evaluating enhancement proposals and indicated that under the auspices of the refuge Comprehensive Conservation Plan and Fishery Management Plan, enhancement projects are not prohibited, but must be evaluated under the NEPA process. This prompted the Director to call for a review of fisheries enhancement in the region.

E. Administration: (D. Munoz)

1. Personnel:



*Left to right; back row: 3, 15, 9, 1, 14, 22, 2
front row: 13, 5, 6, 7, 16, 4*

1. Jay R. Bellinger, Refuge Manager, GM-13, PFT, EOD 1/8/84
2. John R. Munoz, Asst. Refuge Manager, GS-11, PFT, EOD 1/28/90
3. Donald A. Chatto, Fishery Biologist/Pilot, GS-12, PFT, EOD 3/21/81
4. James A. Patterson, Airplane Pilot, GS-12, PFT (Local Hire), EOD 6/7/89
5. Paul B. Taylor, Park Ranger, GS-11, PFT, Transferred from Back Bay NWR 4/15/92
6. Dennis C. Zwiefelhofer, Wildlife Biologist/Boat Operator, GS-11, PFT, EOD 5/78
7. Julie C. Revalee, Refuge Clerk, GS-6, PFT, EOD 9/17/91
8. Ronnie D. Bowers, Maintenance Worker, WG-9, PFT, EOD 4/3/83, Resigned 9/1/92

9. William J. Lanahan, Maintenance Worker, WG-8, PFT, EOD 12/16/92
10. Rasmus Anderson, Jr., Laborer, WG-2, PPT, EOD 6/11/83
11. Raymond F. Hander, Biological Technician, GS-5, TFT (Local Hire)
EOD 7/3/88
12. Scott Shelton, Biological Technician, GS-6, Temporary (Local Hire)
EOD 5/15/91, Terminated 9/30/92
13. Diana Brooks, Assistant Park Ranger, GS-9, PFT, EOD 9/1/91
14. Robert Stovall, Wildlife Biologist/Subsistence, GS-9, PFT EOD
12/23/91
15. Gary Johnson, Biological Technician/Subsistence, GS-6, PFT (Local
Hire), EOD 11/1/91
16. Jacke Barnes, Office Automation Clerk, GS-3, PFT (Local Hire), EOD
1/23/92
17. Marcia Heer, Coop Student, GS-5, EOD 6/92, Returned to school 9/92
18. Greg Wilker, Seasonal Biological Technician, GS-5
19. Sally Wilker, Seasonal Biological Technician, GS-5
20. Steve Curry, Seasonal Biological Technician, GS-5
21. Ron Squibb, Resource Planner, GS-11, Temporary Appointment Detailed
to Kodiak from Regional Office

ALASKA FISH AND WILDLIFE RESEARCH CENTER

22. Victor G. Barnes, Jr., Wildlife Biologist, GS-12, PFT, EOD 6/19/82

New additions to the refuge staff during 1992 included Refuge Ranger Paul Taylor, Maintenance Worker Bill Lanahan, Coop Student Marcia Heer, and seasonal Biological Science Technicians Keith Globis and Steve Curry.

Paul Taylor arrived in Kodiak on April 15 to fill the slot vacated by Dave Menke. Paul transferred from Back Bay NWR.

Bill Lanahan began work at Kodiak NWR on December 16, filling the maintenance worker slot vacated by Ron Bowers. Bill was working in the private sector in Anchorage. Ron resigned from the Service September 1 to return to West Virginia.

Biological Science Technician Ray Hander moved to Fairbanks to begin a Master's study in fisheries. Ray is on intermittent status and will return to work as a bio. tech. through the summer of 1993.

Marcia Heer spent the summer on the refuge as a coop student out of Oregon State University. Projects Marcia participated in included the Ayakulik River study camp, the waterfowl production survey, and the O'Malley bear viewing program and study.

Seasonal bio. tech. Keith Globis joined Scott Shelton as the O'Malley bear viewing program guides. Keith has extensive experience on Kodiak working as a bear guide and proved to be very effective working with program participants.

Seasonal bio. tech. Steve Curry is a local Kodiak resident who spent the summer as our logistics coordinator.

Table 3. Staffing at Kodiak NWR from 1989 to 1992

Fiscal Year	Permanent Full Time Employees	Permanent Part Time Employees	Temporary Employees	Total Full Time Equivalents*
1992	10	1	6**	10.5
1991	10	1	5**	10.5
1990	9	1	4	9.5
1989	9	1	4	9.5
1988	9	1	3	9.5
1987	9	1	2	9.7

*Local hire appointments do not count toward full time equivalents.

**Includes one Cooperative Education Student.

Positions upgraded during 1992 included the Refuge Manager to a GM-13 and the Refuge Clerk to Administrative Technician GS-6.

Laborer Rasmus Anderson sustained an on-the-job injury on November 27. He was placed on continuation of pay on November 30, 1992. He will be unable to perform his duties for an indefinite period.

2. Youth Programs: Nothing to report.
3. Other Manpower Programs: Nothing to report.
4. Volunteer Program: (P. Taylor)

A loyal crew of more than 20 volunteers kept the Visitor Center open on weekends year-round again in 1992. A total of 580 hours were donated for this purpose. Charlie Elliot put in the most hours in the VC, a total of 112 for the year. He also assisted with the orientation of new VC volunteers when RR Brooks' maternity leave began earlier than anticipated.



Refuge Ranger Diana Brooks (left) is pictured training volunteer Janet Taylor on the new cash register that was installed this year in the sales area to improve security and facilitate inventory control. (P. Taylor)

Hans Tschersich, a local doctor and volunteer, translated the script for the Refuge orientation film for the benefit of our many German-speaking visitors. The actual dubbing will be accomplished in 1993.

Resource support volunteers donated in excess of 2000 hours, with 1600 of these donated by veterinarian Vicki Vanek.

Tammy Olsen spent 30 hours making current and correct maps of inholdings; Claudia Hander identified the contents of fish stomachs for 144 hours; Steve and Pam Homnold spent 40 hours rehabilitating birds; Tim Revalee helped dismantle the bear viewing facilities and installed a new stove in the O'Malley cabin (28 hours); Debra Spangler tagged fish, tracked fish and contributed significant office support throughout a 3 month period, totalling approximately 400 hours.

Ten of the 22 VC volunteers have been recruited since fall of 1991. As a result, Volunteer Coordinator Brooks prepared a volunteer manual to serve as a reference and assist in orienting them to Refuge policy and procedures. Additionally, Brooks developed a system of awards to be distributed annually. Backtracking through the records of active volunteers, Brooks tallied all hours of service in preparation for the annual awards banquet. The awards protocol and recipients for 1992 are as follows:

25 hours --- Volunteer Hat
(Elliot, Himelbloom, Munk, Provost, Ramos, Roberts,
Robinson, Rudio, Taylor)

50 hours --- Volunteer Pin and Wildlands for Wildlife
(Elliot, Himelbloom, Munk, Provost, Rudio)

100 hours --- Certificate of Appreciation and Mug
(Elliot, Himelbloom, Munk, Provost, Rudio)

150 hours --- Certificate of Appreciation and Field Guide to Salmon
(Elliot, Munk, Provost, Rudio)

250 hours --- Refuge T-Shirt and Field Guide to the Grizzly
(Elliot, Munk, Provost, Rudio)

300 hours --- Certificate of Appreciation and Pen/Pencil Set
(Provost, Rudio)

500 hours --- USFWS 500 hour Pin and Guide to the Birds of Alaska

1000 hours --- Certificate of Appreciation and Original Artwork

Start-up of the awards program resulted in a fairly large number of awards in 1992. Subsequent years will see a leveling out of the process. In addition to the annual cumulative hours award system, three other special award categories were established: Volunteer of the Year, Outstanding Special Project, Exemplary Service. 1992 Volunteer of the Year was Charlie Elliot; the other two special award categories were not filled in 1992.

5. Funding: (J. Bellinger)

Table 4 depicts Kodiak Refuge funding in thousands of dollars by program for the last five fiscal years. After the peak in FY91, we have experienced a downhill budget cycle during the last two years. The overall budgets for 1260 (less subsistence funds) and 1331 fell 3 percent and 9 percent, respectively, from 1992. However, the percentage of the budget available for field projects has taken a more drastic turn for the worse than these percentages would indicate.

Table 4. Kodiak National Wildlife Refuge Funding Levels

Program	FY89	FY90	FY91	FY92	FY93
1260 Fixed Costs/Overhead	520.0	536.0	555.0	616.0	668.0
1260 Projects	139.0	119.0	283.0	201.0	126.0
1260 Subsistence	-----	-----	73.0	103.0	95.0
1260 MMS	7.0	18.0	38.0	67.0	48.0
1230 Projects	-----	-----	-----	3.0	4.0
1331 Fixed Costs/Overhead	90.0	79.0	75.0	67.0	77.0
1331 Projects	10.0	12.0	24.0	13.0	5.0
Totals	756.0	734.0	1048.0	1070.0	1023.0

Table 5 shows the percentage of the budget that is available to conduct field projects. In FY91, 33 percent of 1260 and 24 percent of the 1331 budgets were available for actual field projects. In FY93 we will have 15 percent of the 1260 and 6 percent of the 1331 budget available for projects. If this budget trend continues, we probably will only have two more years to do field work on the refuge. At that time we will either have to downsize staff and facilities to free up operations money or stay in the office and not meet our legal mandates.

Table 5. Changes in Funds Available for Field Projects

Fund	FY89	FY90	FY91	FY92	FY93
1260 Budget	659.0	655.0	838.0	817.0	794.0
1260 % for Operations	21%	18%	33%	24%	15%
1331 Budget	100.00	91.0	99.0	90.0	82.0
1331 % for Operations	10%	13%	24%	14%	6%

After only three years of subsistence management, funds for this activity decreased 8 percent in FY93. Fixed cost and overhead will consume 89 percent of these funds.

The maintenance management system funds continued to provide some assistance in our maintenance backlog. A back log of over \$300,000 in projects remains, however, after receiving the 48K in FY93.

6. Safety: (R. Stovall)

Robert Stovall served as safety officer for 1992. The following is a listing of safety meeting topics for the year:

April - Use and maintenance of ELT's and EPIRB'S.

May - Watercraft safety, lecture.

Bear safety, lecture, weapons review, and weapons qualification.

June - Seasonal and temporary employees completed watercraft and bear safety courses. WB Stovall completed basic first aid and CPR training.

August - Discussion and video, "Fire Power", on fire safety for boat, plane, home and office. Planner Squibb completed basic first aid and CPR Training.

September - Discussion of stress management.

October - Discussion on office safety.

November - Discussion and Videos, "Hypothermia and Shoreline Survival", on cold weather survival. The two videos were locally produced by the U. S. Coast Guard Base Kodiak, and the Fisheries Tech Center here in Kodiak. These videos were well received by refuge staff.

On November 27, Custodial Worker Anderson injured his hip while removing trash from the office to the dumpster. This injury resulted in his filing for workman's compensation and a permanent disability retirement.

7. Technical Assistance: (D. Munoz)

WB Zwiefelhofer provided bald eagle nest tree locations to logging contractors working in several off-refuge areas of Afognak Island during 1992.

An assessment of lands on Afognak Island under consideration for purchase as mitigation for habitat loss suffered by the Exxon Valdez oil spill was undertaken by the Region 7 - Division of Realty. The Kodiak refuge staff provided logistical and technical support in completion of the March to August 1992 data collection phase of the assessment.

8. Other: (T. Chatto)

In January, a special use permit (SUP) was issued to ADF&G-FRED Division to use a helicopter for evaluation of potential fish pass sites on selected pink salmon streams on the refuge. This work was part of the Oil Spill fishery restoration activity.

A SUP was also issued to the ADF&G-FRED Division in February for the final year of the Frazer Lake fertilization project (section D. 5.2).

The ADF&G Commercial Fish Division conducted their annual pre-emergent pink salmon sampling on refuge streams in 1992. The refuge issues a SUP to the Department for the use of a helicopter to access refuge streams each spring.

F. Habitat Management: Nothing to report.

G. Wildlife:

1. Wildlife Diversity: Nothing to report.
2. Endangered and/or Threatened Species: Nothing to report.
3. Waterfowl: (D. Zwiefelhofer)

The continued need to quantify wildlife resource presence and use of popular recreational areas compelled the refuge to conduct waterfowl production surveys along the upper portion of Ayakulik river. Nine of the eleven plots surveyed in 1991 were again covered. Inclement weather and lack of funding precluded full coverage. Although 1992 spring phenology was somewhat earlier because of clear weather, the precipitation levels were far below normal. However, heavy June rainfall in the area resulted in near-normal water levels by the July survey period. The lack of water during the early part of the 1992 breeding season seems to have had an adverse impact on waterfowl production.

Kodiak's waterfowl production surveys were conducted July 13-23, 1992 by WB Zwiefelhofer and Cooperative Education Student, Marcia Heer. The two-person survey crew was dropped off via fixed-wing aircraft, at a point approximately 3 miles downstream from the Ayakulik main stem's source lakes. Adverse weather conditions precluded the original plan of a drop-off on one of the source lakes. Transportation of equipment and personnel between survey plots was accomplished by use of a 10-foot rubber raft. Water bodies in the plots were surveyed on foot, with exception of those plots which contained portions of the main stem of the Ayakulik river. These river segments were surveyed while in transit with the rubber raft. Two low strata plots and seven "other" strata plots were surveyed during the period.

Table 6 presents the number of observed broods and brooding hens, by species, found in the random plots during the survey. Figure 3 compares the total broods observed for the species encountered during the 1991 and 1992 production surveys. Waterfowl species occurring on the production survey plots are present throughout the year on the Kodiak archipelago. Monitoring the local waterfowl population's availability for resident subsistence users could be accomplished with the addition of survey coverage in other Kodiak waterfowl production areas.

Table 6. Waterfowl Production Summary - Observed Broods

Production Area: South Central Year: 1992
 Selected Data: ALL STRATA
 Number of Plots: 9
 Expanded Area: 56

Species Observed	Class I	Class II	Class III	Brooding Hens	Total
Mallard	1	0	0	1	2
Gadwall	0	0	0	0	0
American Widgeon	0	2	0	2	4
Green-winged Teal	1	1	2	1	5
Northern Pintail	0	0	1	0	1
DABBLER SUBTOTAL	2	3	3	4	12
Greater Scaup	1	0	0	1	2
DIVER SUBTOTAL	1	0	0	1	2
Red-breasted Merganser	3	0	0	0	3
MISC. DUCK SUBTOTAL	3	0	0	0	3
Unidentified Duck	0	0	0	0	0
Tundra Swan	0	0	0	0	0
Common Loon	0	0	0	0	0
Red-throated Loon	0	0	0	0	0
TOTAL	6	3	3	5	17

BROODS OBSERVED ON AYAKULIK RIVER WATERFOWL PRODUCTION PLOTS

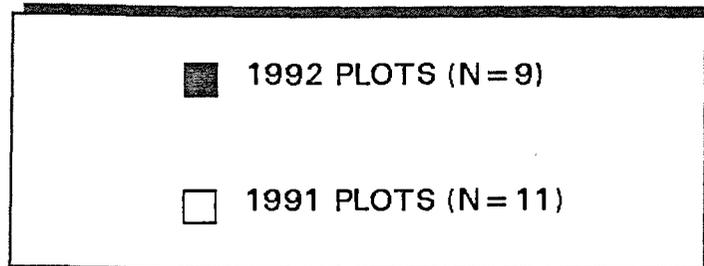
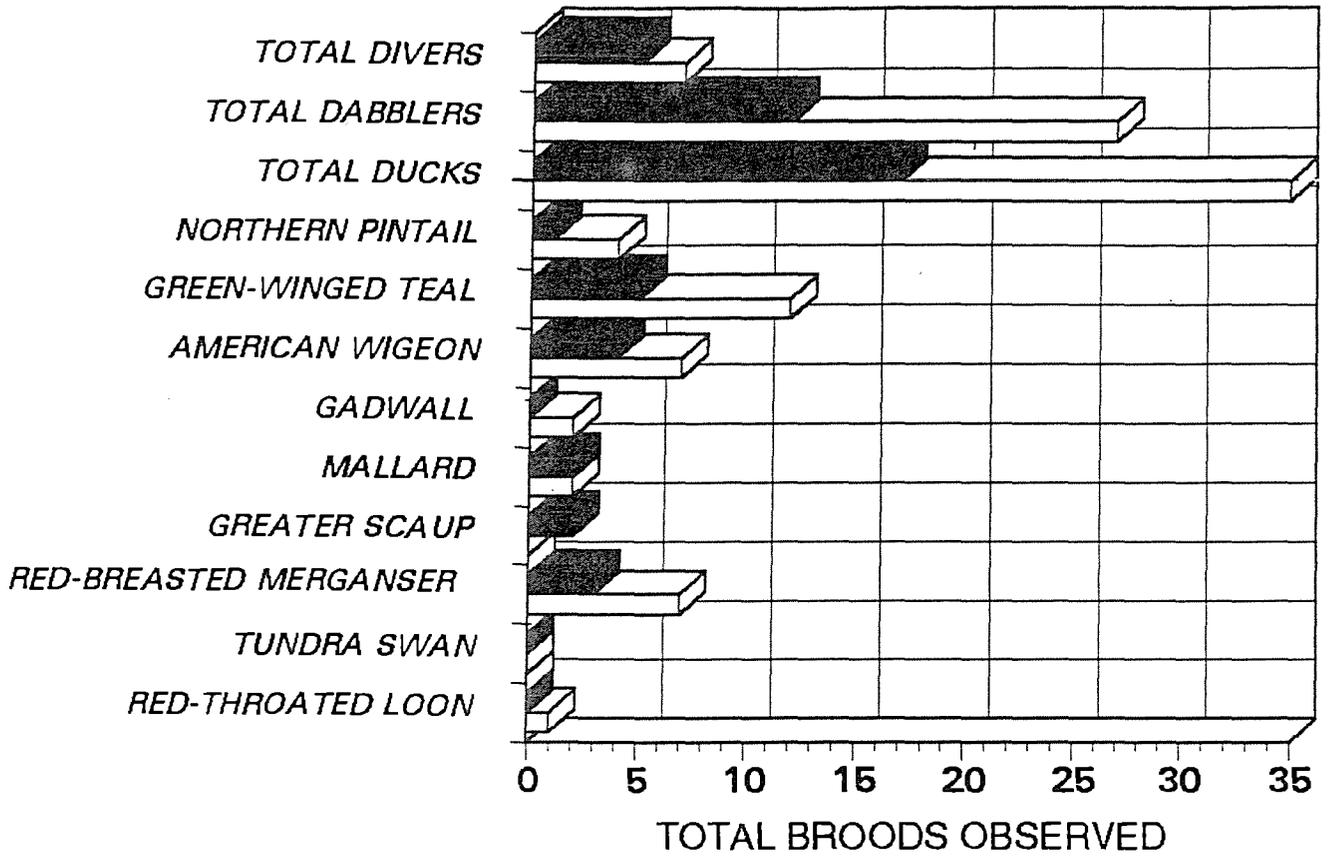


Table 7 compares 1991 and 1992 expanded waterfowl production and population estimates for the 56 square miles of the Ayakulik drainage sampled. Despite the occurrence of adults, no tundra swan broods were found on the production plots during 1991 or 1992. Table 8 displays the number of observed adults on the 1992 waterfowl plots.

The annual refuge aerial tundra swan nesting survey was conducted on 10 June. Adverse weather conditions reduced survey coverage to approximately 85% (7 of 11 quad maps) of the traditional survey area. A total of 66 adult tundra swans were counted during the survey. Seven swan nests and 5 broods (12 nest sites) containing a total of 13 cygnets were also tallied.

The tundra swan production survey was conducted on 18 August covering all of the traditional survey area. Of the 13 cygnets found in the 5 early broods during the spring survey, 7 (2 broods) of the cygnets were found during the productivity survey. Unlike 1991, 1992 cygnet survival rate for early-hatching broods was slightly less than the rate of cygnet survival for the remaining 7 tundra swan nest sites located on the 1992 nest survey. A total of 26 cygnets (including the 7 from early broods) from 8 broods were counted during the productivity survey. Six broods hatched from the 7 late nest sites. Three additional broods were located in the traditional survey area not covered during the June survey effort, bringing the total cygnet count to 33. The average brood size of 3.0 cygnets for the 1992 nesting season represented an increase over the 9-year mean of 2.7. The results of both 1992 surveys are included in the summary of refuge's historic tundra swan nesting data found in Tables 9a and 9b.

A tundra swan neck-collared on the Izembek National Wildlife Refuge was observed near the Kodiak island village of Old Harbor on March 25. The collared swan was accompanied by 2 other tundra swans.

Kodiak provides wintering habitat for a population of emperor geese from September until May. Emperor geese neck-collared on the Yukon Delta were repeatedly sighted in Women's Bay again this year. WB Zwiefelhofer counted 148 emperors in that area on January 25. Two previously observed neck-collared birds (6T9, last observed December 10, 1989 and 6P4 last observed March 14, 1985) were with this flock. Goose 6T9 was reportedly seen in Women's Bay on March 11 in a flock of 174 emperors. Two other neck-collared emperors (D94 and 17K) were observed with this flock. Both geese had been collared in the same area of the Yukon Delta as those seen in Women's Bay in previous years. It is not known whether all the emperors wintering on Kodiak breed in the same region of the Delta. A much larger segment of the Kodiak wintering population is found on the southern end of Kodiak archipelago. A flock of 1100 emperor geese were counted in Sukhoi Lagoon on September 11, along with 1300 dabbling ducks, 250 diving ducks and 41 tundra swans (40 adults, 1 cygnet). Efforts to improve our knowledge of emperor use and numbers on the southern portion of the refuge have been hampered by lack of funding and logistical support facilities. Increased commercial, recreational, and subsistence demands in this area have resulted in potentially conflicting human use patterns.

Table 7. KODIAK NWR WATERFOWL PRODUCTION SUMMARY
 - EXPANDED ESTIMATES -

Production Area: South Coastal
 Selected Data: ALL STRATA
 Number of Plots: 1992 N=9 1991 N=11
 Expanded Area: 56

SPECIES	Broods Expanded		Broods C.V.		Adults Expanded		Adults C.V.		Young Expanded		Young C.V.	
	1991	1992	1991	1992	1991	1992	1991	1992	1991	1992	1991	1992
Mallard	9	17	0.65	0.79	61	151	0.39	0.28	17	97	1.00	0.83
Gadwall	0	0			13	0	0.47	0.00	24	0	0.81	0.00
American Wigeon	30	26	0.69	0.61	34	56	0.57	0.47	93	96	0.70	0.69
Green-Winged Teal	53	48	0.53	0.81	48	125	0.38	0.83	211	99	0.55	0.69
Northern Pintail	17	13	0.25	1.00	13	22	0.47	0.65	57	78	0.47	1.00
DABBLER SUBTOTAL	109	104	0.32	0.51	168	35	0.25	0.46	402	37	0.33	0.36
Greater Scaup	0	9	0	0.65	0	9	0.00	0.65	0	52	0.00	0.65
Red-breasted Merganser	35	22	0.56	0.65	22	22	0.66	0.50	72	160	0.54	0.69
Unidentified Duck	4	0	1.00	0.00	0	0	0.00	0.00	4	0	1.00	0.00
TOTAL	156	135	0.27	0.30	191	582	0.23	0.13	478	582	0.28	0.08
Tundra Swan	0	0	0	0	30	26	0.49	0.69	0	0	0.00	0.00
Red-throated Loon	4	0	1.00	0	21	13	0.79	1.00	4	0	1.00	0.00

Table 8. WATERFOWL PRODUCTION SUMMARY - ADULTS

Production Area: South Coastal Year: 1992
 Selected Data: ALL STRATA
 Number of Plots: 9
 Expanded Area: 56

Species	Observed	Expanded	S.E.	90% Limits	
				Lower	Upper
Mallard	27	151	42	81	220
Gadwall	0	0	0	0	0
American Wigeon	11	56	26	13	99
Green-winged Teal	13	125	105	-47	298
Northern Pintail	3	22	14	-2	45
DABBLER SUBTOTAL	54	353	162	86	621
Greater Scaup	2	9	6	-1	18
DIVER SUBTOTAL	2	9	6	-1	18
Red-breasted Merganser	31	220	111	37	403
MISC. DUCK SUBTOTAL	31	220	111	37	403
Unidentified Duck	0	0	0	0	0
TOTAL	87	582	76	457	707
Tundra Swan	6	26	18	-4	55
Common Loon	0	0	0	0	0
Red-throated Loon	3	13	13	-8	34
LOON TOTAL	3	13	13	-8	34

Table 9a. Kodiak National Wildlife Refuge Tundra Swan Surveys

1992 Spring Survey Summary

Adults and Subadults								
Year	No. Maps	No. Obs.	In Pairs	As Singles	In Flocks	Sub-Total	Cygnets	Total Swans
1980	10	31	38	8	15	61	0	61
1981	10	45	62	10	13	85	0	85
1983	12	51	86	8	0	94	23	117
1984	11	53	62	21	4	87	8	95
1985	10	50	76	8	13	97	20	117
1986	12	58	80	17	7	104	1	105
1987	11	64	98	11	20	129	12	141
1988	11	55	74	17	9	100	0	100
1990	11	49	82	7	16	105	12	117
1991	11	45	84	2	3	89	25	114
1992	7	34	58	3	5	66	13	79

Table 9b. 1992 Fall Survey Summary

Adults and Subadults									
Year	No. Maps	No. Obs.	In Pairs	As Singles	In Flocks	Sub-Total	Cygnets	Percent Juveniles	Total Swans
1980	8	28	46	5	0	51	32	39%	61
1981	7	36	56	5	18	79	33	29%	112
1984	5	24	32	4	16	52	28	35%	80
1985	8	33	60	0	21	81	31	28%	112
1986	9	33	52	2	17	71	17	19%	88
1987	10	54	80	12	16	108	35	24%	143
1988	11	59	90	8	37	135	60	30%	195
1990	11	34	64	1	27	92	33	26%	125
1991	11	34	60	3	27	90	26	22%	116
1992	11	38	60	4	34	98	33	25%	131

4. Marsh and Water Birds: (D. Zwiefelhofer)

Winter observations of Great Blue Herons around the Kodiak area continue to be recorded. A juvenile heron was observed Feb. 19 in a tidal area adjacent to the Kodiak harbor.

5. Shorebirds, Gulls, Terns, and Allied Species: (D. Zwiefelhofer)

The annual wintering pelagic seabird, sea duck, and marine mammal survey was conducted on February 12 to 18 in Kodiak east-side bays and February 20 to February 28 in the west-side bays. Tables 10a and 10b compare the total number of the various species counted during 1991 and 1992 surveys.

Since these surveys were initiated, copies of data collected during the annual Kodiak winter surveys has been provided to the Regional Migratory Bird Office which agreed, because of the size of the database, to archive these data on the regional main-frame computer. However, with the tremendous strides made in personal computers over the past few years, the ability to maintain Kodiak's portion of the pelagic database at the refuge level finally became a reality. After two years of waiting, a copy of the data which had been submitted to the regional office was received at the refuge office. The past year was spent proofing, correcting, and replacing data missing from the original data set. A report analyzing the past survey efforts had been planned for FY92 but due to numerous problems encountered in the database, the report will be delayed until all of the discrepancies have been identified and corrected.

Sooty and short-tailed shearwaters, which are pelagic summer migrants to the Kodiak area from their southern hemisphere breeding areas, were observed in large numbers in the near-shore waters of the archipelago. A number of salmon gill-net fisherman reported catching shearwaters that appeared to be near starvation. The last time shearwaters were found in the local area in weakened condition occurred during the last "El Nino" sea water temperature increase.

Table 10a. Birds

Species Common Name	1991 Numbers	1992 Numbers
American Widgeon	3	0
Bald Eagle	94	120
Barrow's Goldeneye	710	720
Black-legged Kittiwake	3	2
Black Oystercatcher	30	106
Black Scoter	1998	1980
Bufflehead Duck	66	40
Common Loon	1	0
Common Merganser	165	11
Common Murre	3909	5065
Emperor Goose	12	0
Greater Scaup	24	42
Glaucous-winged Gull	935	612
Green-winged Teal	10	0
Harlequin Duck	1020	1298
Horned Grebe	359	297
King Eider	252	640
Mallard Duck	47	91
Marbled Murrelet	985	1060
Mew Gull	764	290
Old Squaw	1814	2158
Pigeon Guillemot	305	237
Red-breasted Merganser	897	484
Red-necked Grebe	288	285
Rock Sandpiper	89	0
Steller's Eider	15	280
Surf Scoter	293	296
Cormorant Sp.	1222	1147
Loon Sp.	243	317
White-winged Scoter	981	1180

Table 10b. Marine Mammals

Species Common Name	1991 Numbers	1992 Numbers
Dall Porpoise	4	2
Harbor Porpoise	3	11
Harbor Seal	35	13
Sea Otter	382	118
Stellar's Sea Lion	39	25
Unidentified Whale	1	0

6. Raptors: (D. Zwiefelhofer)

In accordance with the Kodiak National Wildlife Refuge's Migratory Bird Management Plan, all the refuge lands are to be surveyed for bald eagle nesting activity at five year intervals. The last refuge-wide survey for bald eagle nesting activity occurred in 1987. A total of 304 occupied nest sites were located during the 1987 survey, up from the 1982 total of 223 occupied nests. During the 1992 survey, another substantial increase in bald eagle nesting activity on the Kodiak refuge was observed. Although the survey area was expanded in 1992 to include Sitkalidak Island, the number of occupied nests located was double the 1982 occupied nest total even without the addition to the survey area.

The initial occupancy survey flights to determine nest location and status were completed on May 4, 5, 12, 14, 18, and 20. A total of 38 flight hours were expended during the survey. The follow-up productivity survey to determine the status of nests observed to be occupied during the May survey was completed from August 8 to 10. A total of 20.5 hours of flight time was required to finish the nest productivity survey.

Surveys were accomplished utilizing the refuge's PA-18 Piper supercub. The initial nest occupancy survey effort was flown by Fisheries Biologist/Pilot T. Chatto with WB D. Zwiefelhofer as the observer. The productivity survey flight was piloted by J. Patterson with WB D. Zwiefelhofer again acting as the observer.

A total of 435 active and 7 occupied bald eagle nests were found during the May occupancy survey. In addition, a single active golden eagle nest was located at a cliff site near Red Lake which had historically been used by bald eagles. The golden eagle nest was unsuccessful and was not included in any of the reported nesting results. Tree nests comprised 64% of the active (277) and occupied (5) nests. Ground or cliff nests comprised 36% of the active (158) and occupied (2) nests. The results of the May occupancy survey are

presented in Table 11.

Table 11. Kodiak NWR Bald Eagle Nest Occupancy Survey Data, May, 1992.

Nest Type	Empty	Occupied	Active	Not Found
Tree	263	5	277	127
Ground	173	2	158	19
Totals	436	7	435	146

Without the addition of Sitkalidak Island to the historic survey area, the 1992 total of active and occupied bald eagle nest sites is 406 and 6, respectively. Sitkalidak Island added a total of 1 occupied and 33 active nests to the 1992 total. The 1992 bald eagle active and occupied nest total represents a 100% increase over the 1982 total of 223 nests.

On May 18, a bald eagle nest located on Ayakulik Island was observed to have 2 newly hatched young. This observation marks the earliest hatching date recorded for bald eagles on the Kodiak archipelago since aerial surveys were begun in 1963.

Of the 442 active and occupied nests located in May, a total of 409 were re-checked to ascertain the number of young produced. A successful nest rate of 58% (239), combining occupied and active nests, was observed during the production surveys. Ground nests were less productive with a 47% (73) nest success rate versus a 65% (166) success rate for tree nests. The .68 young per occupied nest produced by ground nesting bald eagles was also less than the 1.05 young per occupied tree nest. Table 12 summarizes the 1992 productivity survey results.

Table 12. Kodiak NWR Bald Eagle Productivity Survey Summary, August, 1992.

Nest Type	Nests Rechecked	% Occ. Nests Successful	% Act. Nests Successful	No. Young Fledged	No. Young/Occ. Nest	No. Young/Succ. Nest
Tree	254	64%	65%	267	1.05	1.61
Ground	155	46%	46%	106	0.68	1.45
Totals	409	58%	58%	373	0.91	1.56

Inclement weather and prior personnel commitments delayed the follow-up productivity survey by 7 to 10 days. The delay was not felt to have influenced the number of young counted during the survey. The abundant amount of vegetation and lack of disturbance in the failed nests led observers to believe that many of the unsuccessful nests had failed early in the nesting season. Four active nest sites were destroyed during the summer. Seven other active nest sites were not relocated despite an extensive search of the area where the nests had been observed in May. Table 13 presents the 1992 and historic bald eagle data from Kodiak refuge survey efforts.

Table 13. Summary of Kodiak Bald Eagle Nest Data.

Survey Year	Empty Nests	Active-Not Rechecked	Active W/O Yg	Active W/1 Yg	Active W/2 Yg	Active W/3 Yg	Yg/Occ. Nest	Total Young
1992'	436	33	170	112	120	7	0.9	373
1991'''	145	36	28	22	22	0	0.9	66
1990''	380	5	149	108	160	6	1.1	446
1989''	308	3	94	94	134	13	1.2	401
1988'''	119	4	35	57	52	4	1.2	173
1987'	318	94	81	66	63	0	0.9	192
1986'''	92	8	39	47	21	1	0.9	92
1985	25	1	17	23	18	1	1.1	62
1982'	155	197	2	9	14	1	1.5	40
1980	75	11	20	15	10	0	0.8	35
1978	67	9	29	19	4	0	0.5	27
1977	106	17	10	13	20	0	1.2	53
1976	79	17	10	24	7	1	1.0	41
1975'	136	151	18	23	14	0	0.9	51
1974	85	48	14	15	17	0	1.1	49
1973	117	54	21	13	8	0	0.7	29
1972'	135	135	8	8	8	0	1.0	24
1971	9	4	14	13	7	0	0.8	27
1970	31	40	6	14	8	0	1.1	30
1968	68	57	11	8	14	2	1.2	42
1967'	91	109	17	11	26	0	1.2	63
1966'	85	81	15	10	14	0	1.0	38
1965'	91	86	16	12	7	0	0.7	26
1964'	55	48	23	8	13	1	0.8	37
1963'	95	72	27	20	26	3	1.1	81

' = Complete KNWR survey coverage.

'' = Includes Afognak, Shuyak, Whale, Raspberry, Ban, Amook, Uganik, and Spruce Islands plus the north and west sides of Kodiak Island.

''' = Random plot data only.

Note: Occupied and active nest statuses are combined and reported as "active".

Kodiak's bald eagle nesting population may be reaching a saturation point. Nesting bald eagles are contributing to the increase both by pioneering into the tundra habitats on the southwestern portion of the refuge and by establishing new nest sites in the midst of historic bald eagle territories. Observations indicate that bald eagle nesting activity on the Kodiak archipelago is most likely being limited by food availability rather than nesting habitat quality. Presently, an increasing number of Kodiak bald eagle nest sites can be found in what can best be described as marginal habitats. Utilizing small hills, slopes, even sand dunes or the crossing branches of willow trees, Kodiak bald eagles seem to be more concerned with access to a reliable food source than structural stability or access to the nest by predators. Plans for the future of this project include analysis and comparison of the individual nesting areas and historic productivity rates. A geographical bald eagle nest database containing individual nest locations and historic nest status information for the Kodiak Island Archipelago is nearing completion and will be utilized in performing the analysis.

Raptor Mortality

The number of dead and injured bald eagles received by and reported to the Kodiak refuge decreased in 1992 for the first time in 3 years. A total of 8 carcasses (or parts of carcasses) were reported or collected during 1992, compared to 31 in 1991 and 16 during 1990. The 1992 bald eagle mortality is comparable to the 1989 total and may be closely related to the severity of winter weather. Severe winter weather results in extensive black-tailed deer winter-kill, providing abundant carrion for scavenging bald eagles. Only during the record-breaking winter of 1989 were fewer dead or injured bald eagles reported. This may not be a direct relationship, since a number of eagle mortalities found or reported along the Kodiak road system are a result of accidents or shooting. However, over the remainder of the archipelago the relationship between deer winter-kill and bald eagle survival appears to be strong.

Three other raptor mortalities were recorded during 1992. These included 2 immature Peale's peregrine falcons and a sharp-shinned hawk.

Injured Raptors

A total of 5 injured bald eagles were handled in 1992. Three of the injured birds were transferred to the Arctic Animal Hospital in Anchorage and recovered after extensive surgery or long term rehabilitation efforts. An injured Peale's peregrine and a common raven with a wing injury were also transported to Anchorage for treatment during 1992.

Other dead or injured bird species received during 1992 included: a juvenile tundra swan, a common murre, a pelagic cormorant, a red-necked grebe, and 2 belted kingfishers.

7. Other Migratory Birds:

Hummingbirds (thought to be Rufous) continue to frequent a few lucky Kodiak residents' bird feeders throughout the summer and early fall. No birds in definitive plumage have been observed, making a positive species identification very difficult.

8. Game Mammals:

a. Brown bears: (V. Barnes)

General

Brown bears were a focal point for numerous issues and activities in 1992, including the inholding/acquisition issue, the bear viewing program, fishery enhancement, research, and sport hunting. There was no shortage of recreationists, planners, and decision and/or policy makers, most of whom were interested in seeing bears in their natural habitat. Research and management efforts, including cooperative FWS/ADF&G studies, aerial surveys and monitoring the sport harvest continued on schedule. Finally, there was a deluge of photographers, writers, and film-makers who were interested in documenting all of the above activity for their respective organizations.



Three Saints Bay, site of the first Russian settlement on Kodiak Island, depicts typical habitat found along the east side of the Refuge. (V. Barnes)

Surveys

Aerial counts of bears along select streams on southwest Kodiak Island have been conducted for more than 30 years. This year surveys were conducted on 19, 20 and 27 July, and 11 and 24 August. On 4 occasions all of the key streams were flown; the high and low counts of total bears were 180 and 109 on 27 July and 11 August, respectively. Peak counts for individual streams were: Sturgeon River - 38 on 27 July, East Sturgeon River - 36 on 27 July, Connecticut Creek - 41 on 20 July, Southeast Creek - 29 on 11 August, and Pinnell Creek - 29 on 11 August.



Shallow waters along the shore of Karluk Lake provide optimum fishing opportunity for bears during late summer and fall. (V. Barnes)

Single bears comprised 44% of 513 observations recorded during the surveys. Composition of other categories was: maternal female -18%, old (> 1yr) cubs - 20%, and first-year cubs -13%. Compared to 1991 surveys, composition of old and new cubs was 4% lower and 6% higher, respectively, in 1992. Individual values fell within ranges recorded in recent years.



A radio-collared sow and her two 2-year old cubs enjoy an afternoon of snowsliding on the Refuge. (V. Barnes)

Mortality

Sport harvest of brown bears on the refuge was 124 in 1992 (Table 14). The total was 9 less than in 1991 and 4 above the average of the previous 10 years. The harvest on refuge land comprised 70% of the harvest for GMU 8 (Kodiak Archipelago).

Excellent weather during much of the spring season contributed to a harvest of 85 bears, of which 59 (69%) were males. Ten of the males were trophy class animals (28 inch skulls), including 2 very large animals with skull measurements exceeding 29 inches. The fall harvest resulted in a kill of 29 bears, a male composition of 62% and 2 trophy class animals.

Eight non-sport mortalities were reported within refuge boundaries during the year. Six of the kills were the result of Defense of Life or Property (DLP) incidents and 2 were attributed to unknown cause. Among DLP mortalities, 3 resulted from deer hunting activity and 3 occurred in Native Villages.

Table 14.
Reported brown bear mortality on
Kodiak National Wildlife Refuge, 1982 to 1992

Year	Source			Total
	Sport	DLP*	Other**	
1982	108	7	3	118
1983	112	2	5	119
1984	131	4	3	138
1985	125	11	8	144
1986	121	12	8	141
1987	120	7	9	136
1988	128	3	6	137
1989	125	4	8	137
1990	116	6	2	124
1991	115	4	2	121
1992	124	6	2	132
Average	122	6	5	133

* Defense of Life or Property.

** Includes accidental study deaths and mortality from natural or unknown causes.

b. Sitka black-tailed deer: (R. Stovall)

Population studies for the introduced Sitka black-tailed deer began in earnest with the additions of WB Stovall and BT Johnson to the subsistence program. Winter deer surveys completed this year included: coastal aerial census, ground counts, and mortality surveys.

In order to limit the factors influencing black-tailed deer mortality to naturally occurring events, surveys were initiated after the conclusion of the sport hunting season. The severity of winter weather is considered the limiting factor influencing the Sitka black-tailed deer population on the Kodiak archipelago. Therefore, the number of black-tailed deer surviving the winter will have a direct correlation to the number of deer available for subsistence and sport harvest. Additional data will be needed to determine which habitats are critical to wintering coastal black-tailed deer populations.

The deer ground counts and mortality surveys represent an initial effort toward establishing a deer population index for selected winter concentration areas. The surveys will also assist in the development of a broad-based subsistence deer availability index.

Coastal Aerial Survey

The coastline of the Kodiak National Wildlife Refuge was aerially surveyed for black-tailed deer concentrations on January 30, 31, February 3 and 7 using a chartered Cessna 206 on floats. The total number of deer observed during the four days of the survey was 2,331. This total should be considered a minimum number, due to the extensive biases associated with aerial surveys. A total of 1,157 km of coastline was surveyed. An observed density of 2.0 deer/km of shoreline (range .46 - 4.8) was recorded. Actual density in the winter concentration areas was believed to be much higher. The highest numbers of deer were observed in the southwestern portion of the refuge.

The initial intent of the project was to identify segments with the highest population densities that would represent good ground count and mortality survey areas. Unfortunately, logistical problems, adverse weather conditions, and limited accessibility to the high count segments required revisions to this plan.

Ground Counts

Deer ground counts were completed in seven different locations on the Kodiak archipelago (Table 15). These count areas were selected utilizing previous knowledge of known deer-wintering areas as well as data gathered during the coastal aerial reconnaissance flights. The proximity of deer concentrations to regions of subsistence effort was also a factor in the selection of the count areas. Travel to all ground count areas was by the refuge's 48 foot vessel, M/V Ursa Major II. Observation points were accessed on foot and ranged from sea level to 300 meters in elevation.

West-side survey areas included North and South Chief Cove (completed January 18 to 20), the northwest side of Uganik Island (done on February 22), and East Arm Uganik Bay (completed on February 24). Kodiak east-side survey areas included the north side of Eastern Sitkalidak Strait (counted from Cathedral Island on February 13); Sitkalidak Island, encompassing the north end of McDonald Lagoon and Tanginak Anchorage (done on February 14); plus Natalia Bay (completed on February 15 and 16).

Aerial vs Ground Comparison Counts

On January 19, a comparison between aerial and ground counts utilizing the refuge's 206 amphibious float plane, N9623R, was attempted (Table 16). Three transects were flown in each area, one at the tide line, one at the 150 meter level and the third at 300 meters. In the North Chief Cove count area the tide line transect was flown at the 90 meter level in order to count deer in the beach and beach berm areas. At South Chief Cove an upper-level transect was flown at approximately 450 meters elevation. Ground count scans for each of the Chief Cove areas were done immediately before the aerial surveys commenced.

At first the overall results of this comparison appeared encouraging, particularly in the flat topography of North Chief Cove. However, identifying area coverage, duplicate counting and observability remain a problem during

aerial census. Double counting results when the size of the area necessitates using multiple transects to effectively cover the available wintering deer habitat. Movement of the deer, overlapping flight lines, or overlapping observer coverage all provide biases to survey results. Other factors influencing the detection of deer include topography, thick vegetative cover, sun glare, low light conditions and air turbulence. The conclusion: a costly effort would be needed to quantify these factors in order to utilize aerial surveys for enumerating deer.

Table 15. Kodiak Archipelago Deer Surveys 1992

COUNT SITE	AREA (SQ.KM.)	# SCANS	HIGHEST COUNT	MEAN # DEER	DEER/ SQ.KM.
North Chief Cove	6.19	8	349	293.75	47.46
South Chief Cove	4.58	15	75	55.93	12.21
Northside of East Sitkalidak Strait	4.05	4	73	60.25	14.01
Tanginak Anchorage/North part of McDonald Lagoon	5.95	4	125	56.75	10.13
Natalia Bay and Lagoon	3.73	6	82	55.67	44.77
Northwest Uganik Island	2.43	5	71	48.00	19.75
East Arm of Uganik Bay	5.67	6	106	38.50	6.80
TOTAL	32.60	48	881	608.85	18.68

Table 16. Results of the Chief Cove Aerial Survey and Ground Count Comparison:

<u>Location</u>	<u>Survey Type</u>	<u>Time</u>	<u># of Deer Counted</u>
North Chief Cove	Ground	1500	306
North Chief Cove	Aerial	1530	312
South Chief Cove	Ground	1430	37
South Chief Cove	Aerial	1500	18

Mortality Surveys

Deer mortality survey transects were completed in eight locations on Kodiak archipelago during the months of April and May 1992. West-side transect areas included north and south Chief Cove (completed on April 6-8), northwest Uganik

Island (completed May 1), and east arm Uganik Bay (completed May 8 and 9). East-side transect areas included Olga Bay (completed on April 10 and 11), Kempff Bay (completed April 24), north Sitkalidak Strait (completed May 20 and 21), and Tanginak Anchorage (completed on May 20).

Survey areas were accessed utilizing one of the following methods: the refuge's 48 foot vessel, M/V Ursa Major II; the refuge Cessna 206 aircraft, N9623R; or by charter aircraft.

Results of the eight mortality surveys are presented in Table 17. The survey transects covered a total of 46 km of coastline with 21 km in west-side deer winter areas and 25 km from east-side areas. A total of 220 deer carcasses were located during the survey effort with 191 (87%) of the total from west-side areas. The density of deer carcasses per mile of coastline in the west-side transects was more than seven times greater than that of the transects covered in east side areas. Several factors may contribute to this disparity, including differences in habitat, temperature and snow coverage.

Ninety-one percent of the carcasses checked contained bone marrow that indicated mortality by starvation. The remaining nine percent (found in Olga Bay), contained bone marrow which was white and firm, suggesting the cause of death was not starvation.



ADF&G big game biologist Roger Smith begins a necropsy on a Sitka black-tailed deer carcass found in the Chief Cove area. Significant winter-kill has occurred in four of the past five years. (R. Stovall)

The presence of parasitic lung worm in the Chief Cove wintering deer population was confirmed during a necropsy performed on April 8 by ADF&G Biologist R. Smith. The yearling male had been dead less than a day and displayed all the physical symptoms consistent with starvation. The necropsy uncovered additional internal indications of starvation with no subcutaneous or mesenteric fat present around the vital organs and muscle tissue with yellow, gelatinous marrow in the long bones. Inspection of the lungs revealed a light infestation of lung worms but this was not likely a major factor in the deer's demise.

Table 17. Results of Deer Mortality Survey

DATES	LOCATION	# OF CARCASSES	TOTAL LIN KM	CARCASS/K M
WESTSIDE				
April 6, 8	South Chief Cove	45	4.0	11.3
April 7	North Chief Cove	64	5.6	3.6
May 1	Uganik Island	13	2.4	5.4
May 8, 9	East Arm Uganik	69	8.8	5.3
TOTAL	WESTSIDE	191	20.8	9
EASTSIDE				
April 10, 11	Olga Bay	5	9.6	<1
April 24	Kempff Bay	11	1.6	6.9
May 20	Tanginak/McDonald	2	4.4	<1
May 21	North Sitkalidak Straits	11	9.2	1.2
TOTAL	EASTSIDE	29	24.8	1.2
TOTALS	COMBINED	220	45.6	5

Roger Smith has also conducted deer winter mortality surveys annually in the Chief Cove area since 1988. Results of this work is presented in Table 18.

Table 18. Annual sex and age composition of deer winter mortalities for Chief Cove, 1988-92, as prepared by ADF&G big game biologist Roger Smith.

Year	Number of Adults	Percent	Number of Yearlings	Percent	Number Fawns	Percent	No. Age Unknown	Total Number
1988*	8 (5M, 1F)	21%	4 (3m)	11%	30 (6M, 6F)	79%	10	52
1989	16 (13M)	10%	6 (2M, 4F)	4%	98 (41M, 29F)	58%	41	161
1990	34 (8M, 12F)	31%	0	0%	77 (8M, 7F)	69%	1	112
1991	-----	-----	-----	-----	-----	-----	8	8
1992	14 (6M, 5F)	16%	17 (16M, 1F)	19%	59 (25M, 20F)	66%	19	109
Total	72 (32M, 18F)	20%	27 (21M, 5F)	7%	264 (8M, 62F)	73%	79	442

No apparent correlation between the number of deer counted in an area and the number of carcasses located during subsequent spring mortality surveys was exhibited by the data collected. More information documenting the fluctuation of deer numbers in wintering areas and the pattern of mortality throughout the winter period needs to be gathered before any inferences can be made. Plans for the future include the use of monthly or bi-monthly ground counts in conjunction with mortality surveys to enhance the accuracy of the data collected. The mortality survey transects will be adjusted to correspond with the boundaries of the ground count areas. A hand-held Global Positioning System device will be utilized in future efforts. Historic Kodiak weather data will be analyzed and used to develop a winter severity index.

Mountain Goats:

ADF&G big game biologist Roger Smith reported that preliminary harvest surveys for 1992 were as follows:

UNIT	TOTAL HARVEST
871 (Off Refuge)	3
872 (Off Refuge)	7
873 (Part Refuge)	7
874 (Part Refuge)	6
875 (Refuge)	6
876 (Refuge)	5
877 (Refuge)	4
TOTAL	38 (22 males, 16 females)

This total is six higher than the 1991 harvest, when 17 males and 15 females were reported by hunters to ADF&G. Total permits issued was 125. Smith has recommended that 25 more permits be issued during 1993.

Roosevelt Elk:

Alaska Department of Fish and Game big game biologist, Roger Smith reported that the Waterfowl Lake elk herd which utilizes refuge lands on Afognak Island is estimated to number 100. Three elk have been radio-collared (one in 1989, and two in 1992) in this herd and are tracked by Smith. During 1992 surveys conducted by Smith, 83 elk were actually counted.

Estimates and actual counts for the Waterfowl Lake herd since 1989 are as follows:

YEAR	TOTAL ELK OBSERVED	MAXIMUM ESTIMATED POPULATION
1989	413	500
1990	231	475
1991	167	285
1992	128	150

Smith has recommended that the refuge portion of Afognak Island remain a registration hunt. This will represent the most liberal access for elk on Afognak. The State is recommending that the season opening be moved to October 10 and that the existing drawing areas be expanded to include the bulk of Afognak Island. The later opening date will probably offset the potential shift of hunting pressure to the remaining registration area, as the chances of freeze-up in interior lakes will limit access to areas frequented by elk. The later date, Smith feels, will also improve the bull-to-cow ratio and increase the breeding potential of larger bulls.

c. Subsistence: (R. Stovall)

In January, public comments on the Draft Environmental Impact Statement on Federal Management of Subsistence were submitted to the Subsistence Office. These comments were gathered at meetings held during November and December of 1991 in Kodiak, Old Harbor, Ouzinkie, Karluk and Larsen Bay.

In March, WB Stovall acted as an observer during subsistence harvest interviews conducted by ADF&G Subsistence office personnel. This survey, funded by the Service, is designed to gather information on subsistence use by residents of the City of Kodiak, Kodiak borough road system, and the Coast Guard base.

On October 5 and 6, Regional Subsistence office staff members Peggy Fox, Mike Lockhart, Ron Thuma, Dirk Moses and ARD for Subsistence Dick Pospahala were in Kodiak to hold a public meeting and work session on the Federal Subsistence Management Program. On October 5th, an interagency meeting was held between

Refuge and Coast Guard staff to address issues affecting the CG community. Later that evening, Subsistence Coordinator/WB Stovall and ARM Munoz attended the Kodiak public meeting; Stovall attended the work session on October 6. The meetings were conducted to hear local concerns on the 1993-94 Federal Subsistence Regulations and to recruit for Regional Advisory Council members.

Also during October, Subsistence Coordinator Stovall and ARM Munoz conducted village subsistence meetings in Karluk, Akhiok, Old Harbor, Ouzinkie, and Larsen Bay. Bad weather resulted in cancellation of the scheduled Port Lions meeting. Village issues, concerns and the Federal Subsistence Management program were discussed. Other topics included the Regional Subsistence Advisory Councils and techniques for submitting proposals to change the Federal Subsistence Regulations.

In November, RM Bellinger served on a committee which recommended individuals for service on the regional subsistence advisory councils.

A draft final report of the ADF&G Subsistence Harvest Survey was submitted to the Refuge for staff review and comment in December by ADF&G Subsistence Specialist Craig Mishler. Field work for the report began on February 20, 1992 and was completed on May 28, 1992. The survey questionnaire was verbally administered to 207 randomly selected heads-of-households located in areas connected to the Kodiak road system. Subsistence harvest information gathered by the survey included the take of salmon, shellfish, land mammals, marine mammals, furbearers, birds and wild plants. The fisheries section included subsistence fish taken during commercial or non-commercial activities and the type of gear used. The mean per capita harvest for all resources was determined in pounds of edible weight. Demographic and economic data were also gathered during the survey.

Regulation proposals for Federal management of subsistence which were sent to the subsistence office for the regulatory year of 1993-1994 included only one blue book proposal (Proposal #20), which relates to change of bag limits, methods and means. This proposal would change the time that salmon can be subsistence harvested (currently between the hours of 6 a.m. and 9 p.m.) to 1/2 hour before sunrise until 1/2 hour after sunset. Two more proposals (not in the blue book) included one to allow rural residents to harvest fish and shellfish for other rural residents and another to allow rural residents of Unit 8 to take subsistence deer for other Unit 8 residents as long as the recipient has a current hunting license and deer harvest tickets. These two proposals can be handled administratively and are currently being investigated for implementation by Refuge staff. Three proposals were forwarded to the Federal Subsistence staff for customary and traditional use determinations. The first of these proposals would allow residents of Kodiak Coast Guard Base to subsistence fish for salmon; the second would allow the taking of brown bear for subsistence purposes; and the third would create a subsistence elk hunt in Unit 8.

9. **Marine Mammals:** Nothing to report.

10. **Other Resident Wildlife:** (R. Stovall)

Funding was not available for censusing the refuge's remnant reindeer herd in FY92. The unherded Kodiak reindeer for many years were considered a feral animal by the state of Alaska but are now regulated as caribou. Local residents still utilize the species for subsistence when the herd moves near the coast. Historically, as many as 1500 animals have been reported in the Ayakulik River drainage. In October of 1992, two small adjacent herds totaling 168 individuals were photographed along the upper Ayalulik River by refuge Fisheries staff. With very little reproduction in the herd over the past few years, the herd's decline and subsequent disappearance from the tundra seems assured.

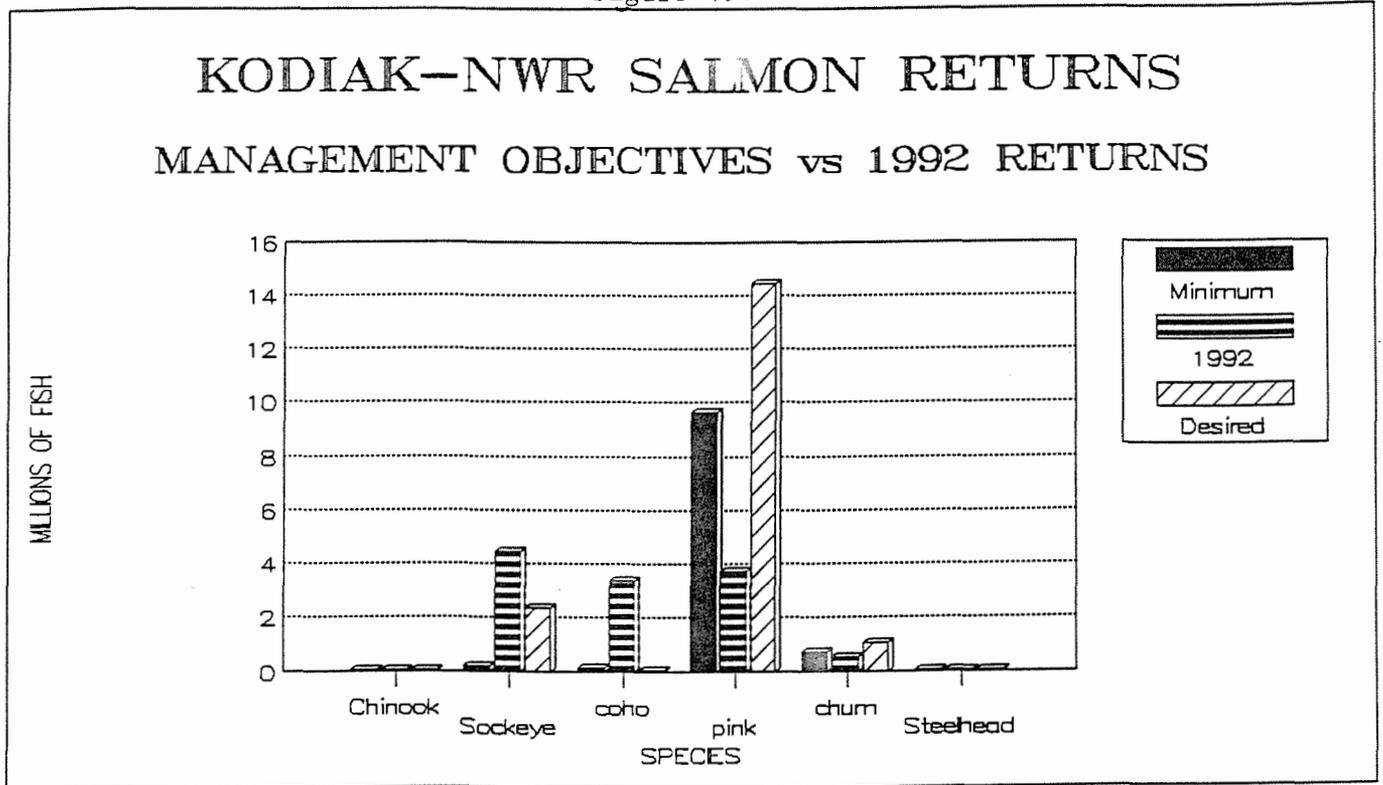
11. **Fisheries Resources:** (T. Chatto)

There are 114 streams and numerous lakes located within the refuge boundary and on native conveyed (22g) lands adjacent to the refuge. These systems support one or more species of Pacific salmon, rainbow trout, Dolly Varden and arctic char. These populations contribute to a multi-million dollar commercial fishery, a subsistence fishery and sport fisheries within the Kodiak Archipelago. In addition, these species of fish (particularly salmon) provide a critical seasonal food source for dense populations of brown bear and bald eagles on the refuge and native lands.

The goal of the refuge for fisheries is to conserve water resources, fish populations and habitat in their natural diversity for the benefit of both human and wildlife use. To accomplish this goal, the refuge manages human use and works cooperatively with the various divisions of ADF&G in conducting studies and routine annual management surveys.

In 1992 the estimated total indexed salmon returns to the refuge (including conveyed 22g lands) for chinook, sockeye, coho, and steelhead were estimated to be at or above refuge management objectives for these species (Figure 4). Estimated total indexed returns for pink and chum salmon were 38 and 74 percent, respectively, of the minimum desired level. The ADF&G speculates that marginal environmental conditions in the nearshore areas during 1991 may have affected early marine plankton abundance as a food source for foraging pink salmon.

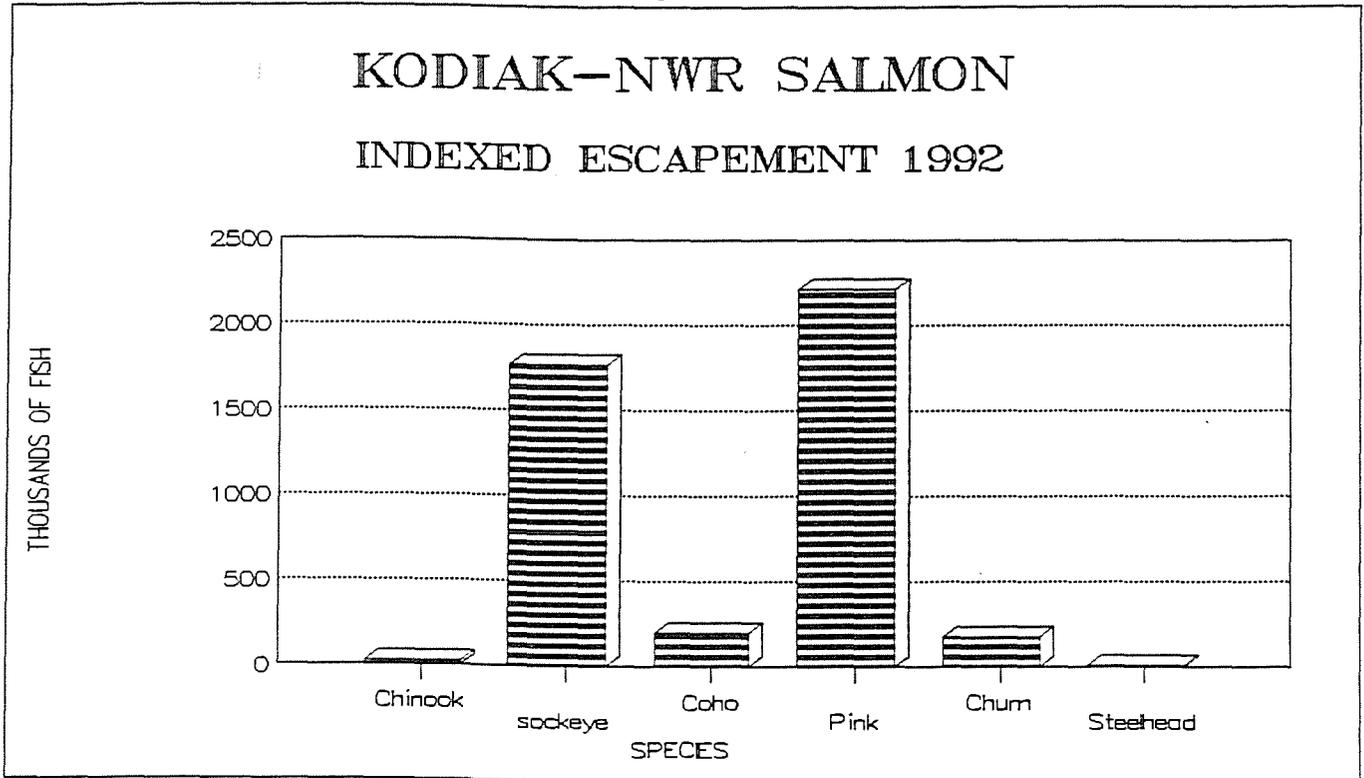
Figure 4.



1. Salmon Escapement:

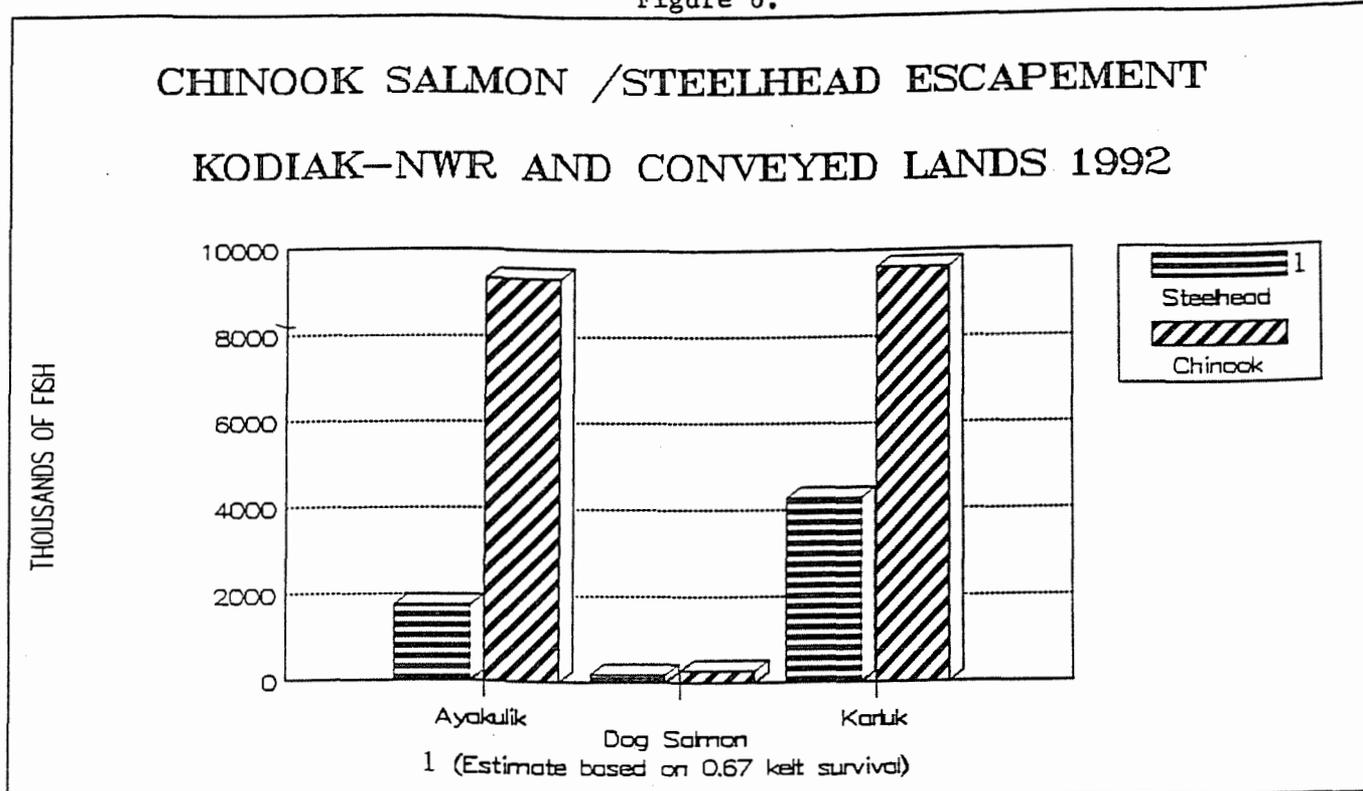
In 1992, a total of six fish-counting weirs (5 ADF&G, 1 FWS) and repeated aerial index surveys on an additional 51 streams were used by the refuge and ADF&G to monitor salmon escapement. Preliminary refuge-wide escapement indexes by species for 1992 are illustrated in Figure 5. This information does not represent any variation for individual streams on the refuge, but does present an overview of escapement. The escapement index for sockeye, coho and chinook in 1992 is above the 1981-85 baseline management goal outlined in the refuge Fishery Management Plan. Escapement of pink and chum salmon is 59 and 57 percent, respectively, of the 1981-85 average.

Figure 5.



Chinook salmon and steelhead escapement by river system is shown in Figure 6. Escapement of chinook in all systems in 1992 is considered excellent and is well within management goals. Figure 4 indicates that steelhead returns are within desired goals. Estimates of total returns (Figure 4) and escapement for steelhead (Figure 6) are predicated on 1992 kelt counts and an over-winter survival of approximately 50-67 percent from studies conducted by the refuge and ADF&G.

Figure 6.

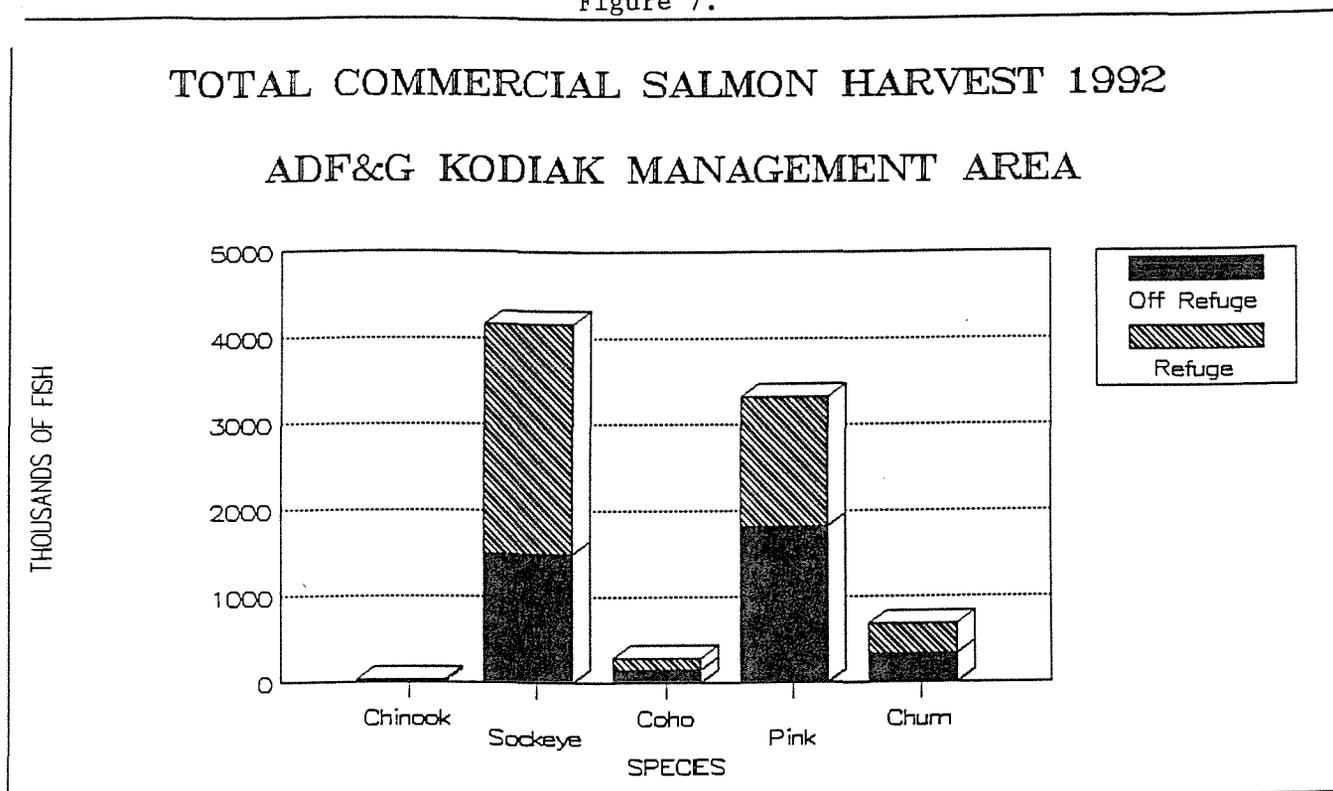


In 1992 the refuge conducted aerial escapement index surveys on selected tributaries of the Karluk, Ayakulik and Sturgeon Rivers which are used extensively by brown bear. During the surveys, an index of the number of spawning salmon and bears was recorded. A total of nine surveys on each tributary were flown from June through August 1992. This information was collected to develop a relative index of abundance trend between salmon and bears in order to evaluate proposed adjustments to escapement levels in sensitive bear feeding areas such as the O'Malley River in the Karluk drainage (see Section D. 5.1.).

2. The Commercial Fishery:

The commercial fishery in Kodiak is regulated by the ADF&G. In 1992, the total harvest in the Kodiak area was approximately 8.5 million salmon (Figure 7), worth an ex-vessel value to fisherman of approximately 39.9 million dollars. The refuge-based salmon contribution (including conveyed 22g lands) is estimated at 4.7 million fish, worth approximately 24.0 million dollars ex-vessel value. These fish are harvested in bays and nearshore areas surrounding the refuge by commercial fishermen using purse seine, set net and beach seine gear.

Figure 7.



The commercial harvest of refuge-based stocks in 1992 was only 28.3 percent of the 16.6 million fish observed in 1991, but the ex-vessel value was approximately equal to the 24.7 million dollars paid to fishermen in 1991. This was due to an increase in price per pound paid to fishermen for all species except chinook in 1992. As in past years, the catch of sockeye and pink salmon dominated the harvest of refuge-based fish.

3. The Sport Fishery:

There are 14 streams on the refuge (including conveyed 22g lands) currently used by sport fishermen. Sport fishing catch on the refuge is managed through the Alaska Sport Fishery Regulations, as promulgated by the Alaska Board of Fisheries. In addition, the refuge manages commercial sport fishing guides through the special use permit process. Fishing occurs from late May through early November. A majority of the effort takes place in June for chinook, August and September for coho and from September through October for steelhead. Dolly Varden char are caught in all months. Although coho, pink, sockeye and chum salmon are found in numerous streams around the refuge, populations of chinook and steelhead are only found on the southwest portion of the refuge.

Sport fishing catch for unguided anglers on the refuge is unknown. The sport fish effort is monitored through analysis of the use reports for those sport

fish guides that are permitted to operate on the refuge. Some of the guides permitted on the refuge also operate on conveyed lands under permit from the native corporations and report their catch to the refuge. Other guides that are under permit for native lands only, do not report their catch to the refuge. The primary areas used by guided anglers in 1992 on refuge lands only, were the Ayakulik, Uganik and Upper Dog Salmon rivers (Figure 8). Although guided angler use on refuge lands has increased approximately 146 percent since 1990 (Figure 9), a majority of this increase has occurred on the Ayakulik and, to a lesser extent, the Uganik River.

Figure 8.

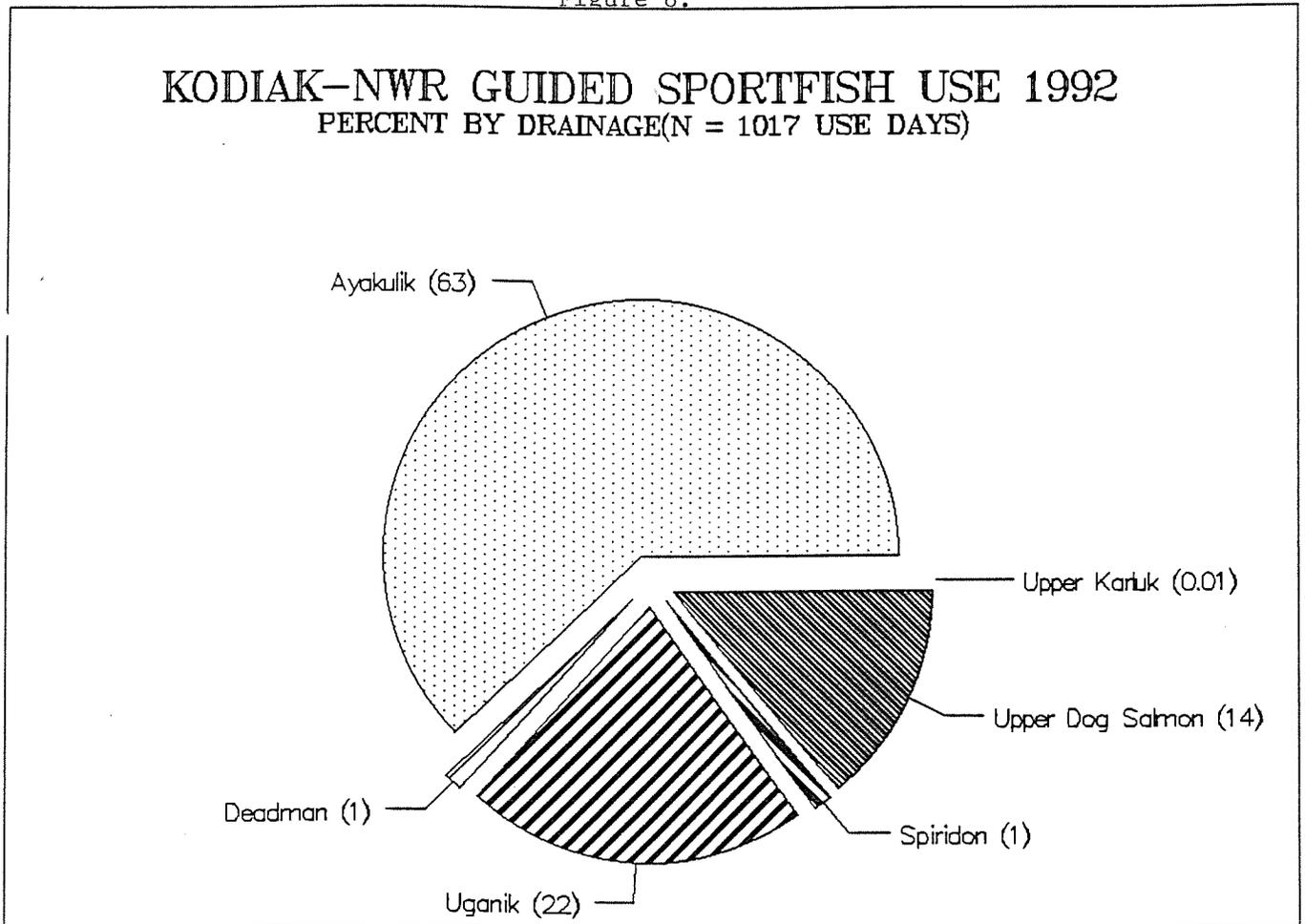
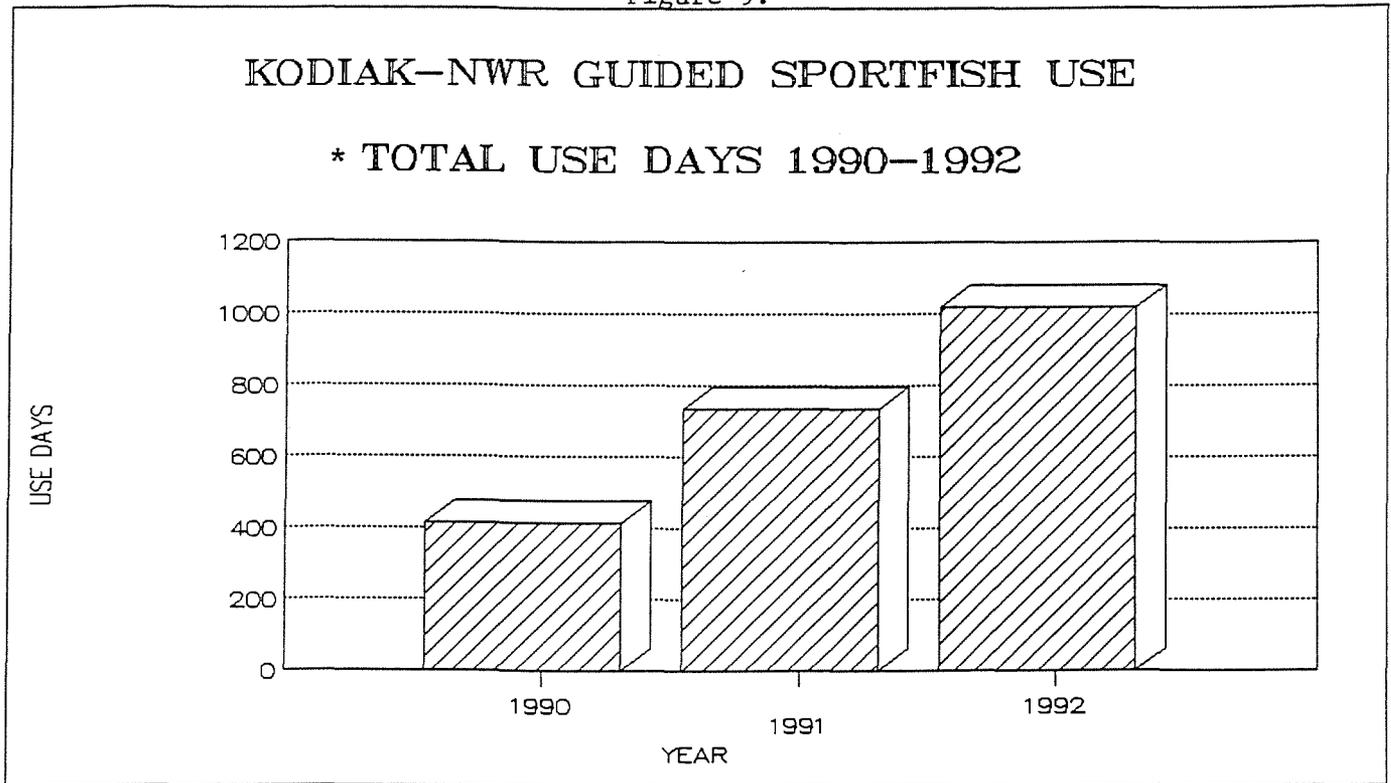


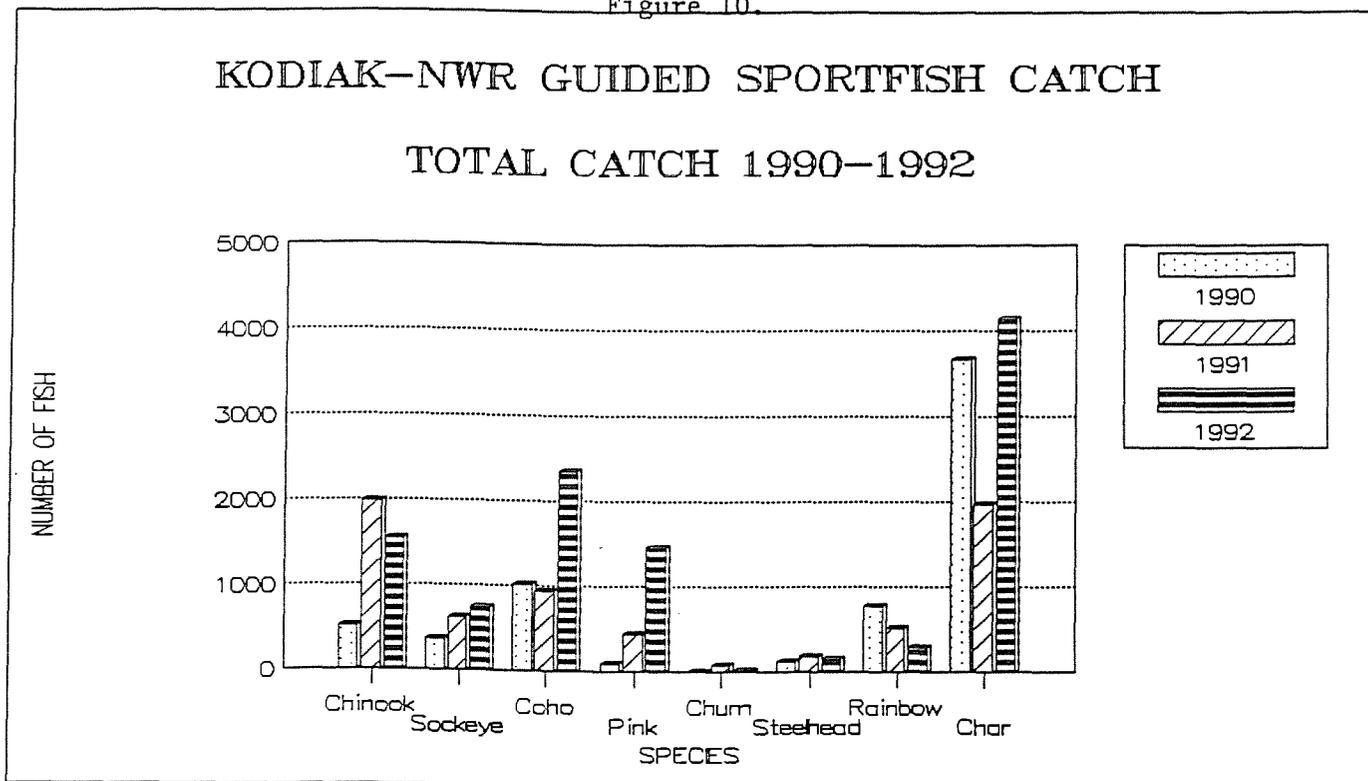
Figure 9.



* One angler visit to any river is equal to one angler use day

Overall, the guided catch on refuge lands in 1992 was at or above that reported since 1990 (Figure 10). A majority (45%) of the total fish caught were Dolly Varden char, followed by coho (20%) and chinook (12%) salmon. In 1992 average catch for all species per-angler-day for all areas was 8.8 fish, with 10.5 fish per-angler-day calculated for refuge lands only. These figures are similar to observed values in 1991. A subsample of guided catch indicated that the percentage of fish kept (killed) ranged from less than one percent for steelhead and rainbow trout, to 14 and 23 percent for coho and sockeye, respectively.

Figure 10.



A sport fishing creel census during the popular chinook salmon run on the Ayakulik River was not conducted in 1992, but a rough maximum harvest estimate by ADF&G of approximately 750 chinook was calculated. Escapement of chinook into the Ayakulik in 1992 was 9,135 fish (Figure 6). The escapement goal ranges from a minimum of 6,500 to 10,000 chinook. The estimated sport harvest at its maximum (8 % of the 1992 escapement) does not pose a threat to the

conservation of the resource at this time. The refuge conducts a creel survey every three years to track any changes in the fishery.

12. Wildlife Propagation and Stocking: Nothing to report.

13. Surplus Animal Disposal: Nothing to report.

14. Scientific Collections: Nothing to report.

15. Animal Control: Nothing to report.

16. Marking and Banding: Nothing to report.

17. Disease Prevention and Control: Nothing to report.

H. Public Use: (P. Taylor)

1. General:

The Refuge's Public Use shop underwent significant evolution during 1992. The loss of the very talented Dave Menke and Kathy Rezabeck left a large gap which is starting to be bridged. Rangers Brooks and Taylor have filled the positions and are coming up to speed.

The work Menke accomplished on PUMP development was substantial. Menke's transfer has slowed the process, but the end is in sight. RR Taylor is picking up the pieces on this and other projects. Rezabeck's departure reduced progress in Environmental Education and Interpretation, however Brooks is gathering steam in those areas.

On the positive side of the ledger, the bear viewing program had a successful season, the EE and Interpretive programs are again taking shape, and a new thrust in river use management is being developed.

Visitor Center use has proved difficult to track. Weekend use documentation by volunteers is not always reliable, and the entryway electric eye records exaggerated numbers whenever a visitor lingers too close to the beam. Beginning in 1993, RR Brooks will attempt to refine weekend counting by volunteers, and the electric eye will be relocated to a more favorable position. Estimated Visitor Center use during 1992 was 8500 visits, with an average length of stay of 30 minutes.

2. Outdoor Classroom - Students:

RR Brooks responded to requests from teachers for visits to their classrooms, particularly during Wildlife Week and Sea Week, with a total of 24 visits reaching 554 students. The number of students served overall is almost double the previous highest total.



Rewards for hard work sometimes come from unexpected sources. Refuge Ranger Diana Brooks received many positive comments for her work with local grade schools including the above thank you booklet from Peterson School first graders. (D. Brooks)

Twenty-one school groups came to the Visitor Center for Environmental Education activities coordinated by RR Brooks. A total of 395 students participated in a variety of activities including films and video, interpretive talks, and interpretive walks.

Lesson plans were prepared for each of the classroom visits. Brooks consulted teachers about learning readiness, mastery of background information, and subjects causing interest in the Refuge. Because of the time necessary for preparation of lesson plans for individual groups, a newly developed EE plan includes the strategy of preparing a block of lessons on various subjects from which teachers may choose in advance. This will not only focus teachers on topics which support Refuge EE goals, but will also reduce planning time and eliminate off-the-wall requests for help in areas which fail to address topics relevant to the Refuge. A "station" approach, developed to standardize Visitor Center trips, employs various VC exhibits and a questioning "guided discovery" strategy. Again, such a standardization reduces planning requirements, focuses topics, and introduces a broad range of age groups to

the fundamentals of Refuge management.

RR Brooks assisted with management of EE activities in a week-long Boy Scout day camp. During the course of the program, her efforts reached several groups of various ages, correlating merit badge requirements with area-specific environmental themes and concepts.

3. Outdoor Classroom - Teachers:

Kodiak Island Borough has one public school district which serves 2,293 students in town school, 298 in village schools, and 44 by correspondence. In total, the District employs 172 teachers. Additionally, three private schools serve approximately 250 students and employ 18 teachers.

RR Brooks, with the help of RR Taylor and the RO planning staff, initiated a significant expansion of EE outreach efforts by authoring a draft of a new Refuge EE plan. Brooks made a strong effort to involve District teachers and planners during plan development in order to create a plan which is responsive to local needs as well as satisfactory to the USFWS. A substantial portion of the effort is teacher-directed, taking maximum advantage of the "multiplier effect" that occurs when a teacher carries the EE message to up to 30 students yearly.

Development of the new EE plan will significantly impact the way the Refuge influences environmental education on Kodiak Island. Some of the Refuge's more traditional EE involvement will remain in place. Brooks will offer assistance with VC field trips, will accommodate, when possible, requests for classroom assistance, and will maintain and enhance the Refuge's curriculum and EE supplies loan program.

Three new EE strategies will require significant attention during the coming years. Coordinating with the District's Curriculum Director, Brooks has developed an EE curriculum focus for each of grades 3 through 6. In 1993 she will offer, in cooperation with Kodiak College, a one credit course which will introduce the selected curricula to District teachers in a pilot program format. On each of four weekends, participating teachers will receive comprehensive training in the use of a grade-specific curriculum. Third grade teachers will focus on habitat; 4th grade on salmon; 5th grade on wetlands; and 6th grade on bear management. Following evaluation by participants, the curricula will be revised as necessary. The eventual goal is formal adoption of the materials into the District's science framework.

The second ground-breaking strategy will build on the above curricula to focus off-the-shelf curricula on something more Kodiak-specific. This will be accomplished by adapting materials and lessons with topics and materials specifically targeting Refuge management of key Kodiak species. Much work will be required for these adaptations which will require continuing refinement over a number of years.

The third innovative strategy to be employed will tie the Refuge's volunteer resource to the Environmental Education program, extending EE service far beyond what could reasonably be expected from one EE specialist. Toward that

end, Brooks will develop a number of "ready-to-go" EE programs with which to arm trained volunteers. At the same time, she will assemble a cadre of interested and capable volunteers who will be trained to carry the programs to classrooms as requested. In this way, Kodiak's EE message will reach a broader audience, directly involve more and more Refuge supporters, and provide service far beyond that which a single employee might hope to offer.

4. Interpretive Foot Trails:

The Buskin View Trail, a short nature trail located adjacent to the Visitor Center, receives sporadic traffic. About 50 leaflets are used during each fair weather month (May - September). Since a percentage of used leaflets are returned to the box, actual use may be up to double that number, but is not reportable.

Following Dave Menke's departure, the trail was not well maintained or promoted until RR Brooks arrived. Brooks rewrote and reprinted the interpretive pamphlet, and ordered replacements from Kenai NWR for missing station markers.

The remainder of the trail is in acceptable condition. The local Audubon chapter is scheduled to manicure the entire route in early spring. That should keep it up and running for the remainder of the 1993 summer season.

5. Interpretive Tour Routes: Nothing to report.

6. Interpretive Exhibits/Demonstrations:

In February, an award winning third grade geography project was displayed in the Visitor Center. In April, bird research results from local high school students were displayed. And in December, elementary school botanical specimens and research work brightened the audio-visual room.

The Refuge maintained a booth at the City of Kodiak's annual Crab Festival. The theme, developed by RR Brooks, was National Fishing Week. Hands-on activities were well received, despite the weather's attempt to place the exhibit in the bay. Brooks' work resulted in a Director's Award for "outstanding participation."

Brooks also developed an exhibit for a Coast Guard open house during the summer. Borrowing a display from PAO, she adapted other Refuge materials for an exhibit which we estimate to have been seen by up to 2000 Coast Guard base visitors.

7. Other Interpretive Programs:

Staff members are often asked to participate in both onsite and offsite information exchanges. Many cannot be accommodated by an already overburdened staff. Whenever possible, however, some of the larger groups are squeezed in if a significant opportunity exists to promote the Refuge. Outstanding examples include:

Mar. 31: WB Stovall and RR Brooks represented the Refuge and served as a judges at the St. Mary's School and Peterson School science fairs.

Jun. 15: RR Taylor was the guest speaker at a Coast Guard luncheon for visiting Russian dignitaries. Taylor provided an overview of the Service, the Refuge and wildlife of Kodiak Island. This event became interesting when Taylor arrived to find none of the attendees spoke English!

Jul. 12: Manager Bellinger, WB Chatto and RR Taylor flew to Uganik Bay to meet a large group of environmental activists aboard the cruise ship Aurora I. Chatto and Taylor supervised a visit to the Uganik river fish weir. Bellinger and Taylor provided an on-board overview of Refuge issues and an interpretive slide program.

Sep. 18: A group of mixed military and civil service executives, sponsored by the US State Department and the Senior Executive Service, toured the Visitor Center. Manager Bellinger and RR Taylor provided information and answered questions.

Oct. 12: Manager Bellinger addressed the Anchorage chapter of the Audubon Society. Of course, the featured topic was the inholdings issue. Bellinger described the situation, introduced the Land Protection Plan and discussed possible outcomes. Hopefully, it is these types of discussions which will spur the kind of interest necessary to produce action and start an acquisition program rolling.

Oct. 26: RR Brooks presented a bear safety program to a group of Search and Rescue dog handlers.

8. Hunting:

Estimating any Refuge use with precision is difficult. Presently, the primary tools available are end-of-season reports submitted by hunting, fishing, and sightseeing/photography guides and quarterly reports submitted by air transporters. Although the information these people provide is sometimes suspect, no other more reliable means exist. It should be noted that the present reporting system does not easily differentiate use on current Refuge lands from use on conveyed lands. As a result, the totals cited in this section include all lands within the Refuge boundary (current and former Refuge lands).

We know that significant use from commercial marine transporters, private boat operators, private pilots, and Native villages occurs. Currently, we are somewhat limited in our ability to count that use. Professional estimates, based on collective staff experience, along with the observations of weir personnel, State of Alaska biologists, and Refuge users, must be used to fill these gaps.

Deer populations on Kodiak Island, including portions of the Refuge, remain depressed from recent severe winters. For that and possibly other reasons, large numbers of vulnerable animals are not as apparent in coastal areas where

the heaviest harvesting has historically occurred. Local hunters report that the hunting is not as good as it used to be, and appear to have reduced their effort accordingly. In 1992, guides and air transporters reported 762 deer hunters, averaging 6 days of hunting, for 4,583 use days. Refuge law enforcement field checks indicate that at least 50% of surveyed deer hunters reach Refuge lands by means other than Refuge-permitted guides and air transporters. Adding 50% to reported use, results in an estimate of 1,143 visits (number of deer hunters) for a total of 6,875 use days.

Since all bear hunting on Refuge lands is by permit only, bear hunting effort is primarily determined by bag and season limits imposed by the State of Alaska. Guide and air transporters reported 208 bear hunters, averaging 10.5 days afield, for 2,177 use days. These figures do not account for all resident hunters, some of whom doubtless provided their own marine or air transportation.

State records indicate that 183 resident bear permits and 113 non-resident bear permits were issued in 1992 for hunt areas which incorporate the Refuge (201; 60% of 204; 205-225; 40% of 226; 231; 60% of 234; 235-255; 40% of 256). The same records demonstrate that in 1992, 72% of residents who were issued permits actually hunted, and 90% of non-residents who were issued permits actually hunted. That means that only 132 resident and 102 non-residents actually made it into the field. Assuming 10.5 days to be the average length of stay, the estimate of total use according to State records would be 234 visits and 2457 use days. These figures are approximately 13% higher than those reported by guides and air transporters; the difference being resident hunters who provided their own transportation.

Goat hunting on Refuge lands is by drawing permit only. Guides and transporters reported 19 visits, an average stay of 6.4 days, and 121 use days. These figures do not account for all resident hunters, some of whom doubtless provided their own transportation.

State records indicate that 52 goat permits (resident and non-resident) were issued in 1992 for hunt areas which incorporate the Refuge (33% of 873; 874; 875; 50% of 876; 877). According to ADF&G Project W-23-4, Study 12.0, during a five year period ending with the 1990-91 season, an average of 55% of goat permits issued in GMU 8 were actually used. If 55% of 52 permits were used, the number of hunters who actually made it into the field is 27. Assuming 6.4 days to be the average length of stay, the estimate of total use days is 173. These figures are approximately 42% higher than those reported by guides and air transporters, the difference being resident hunters who provided their own transportation.

Hunting of other species (fox, squirrel, hare, ptarmigan, reindeer, waterfowl) does occur, but normally incidental to some other primary activity, or not in significant measure.

9. Fishing:

Guides and air transporters reported 1342 visits by sport anglers, averaging 3.8 days, for a total of 5160 use days. The present reporting system does not

easily differentiate use on current Refuge lands from use on conveyed lands. As a result, these totals include all lands within the Refuge boundary (current and former Refuge lands).

Most sportfishing use which does not appear on guide and air transporter reports (marine transporter, private boat, Native villages) is probably not significant. Whereas marine transporters bring a large number of hunters to the Refuge, seldom does anyone charter a boat for the primary purpose of accessing Refuge sportfishing waters (rivers and lakes). Similarly, private boats are seldom used as Refuge sportfishing transportation. Finally, no records or observations exist which indicate that Native villagers are a significant sportfishing use factor on Refuge lands.



Sport fishing for king salmon is becoming more and more popular. Activity is concentrated at the Bare Creek confluence because this represents the only float plane access. Use allocation is the subject of a River Management Plan that is being developed. (D. Munoz)

Private pilots, on the other hand, do make regular trips to the Refuge to fish. It is estimated that unreported use by private pilots constitutes an additional 5% of reported use, making the legal sportfishing total 1409 visits and 5418 use days.

10. Trapping:

The State trapping season does not follow the calendar year. The seasons for Kodiak species (primarily red fox, river otter, beaver) begin in early November and end by late April. As a result, it is not practical to record calendar year use. Trapping reported in this narrative is that which occurred from fall of 1991 through spring of 1992. During that period, 5 permits to trap on Refuge lands were issued. No report of use is available at this time.

11. Wildlife Observation:

The Refuge bear viewing program entered its third operating season in 1992. Following two trial seasons at the Dog Salmon Creek site, venue was changed to a more favorable location adjacent to the O'Malley River. To optimize viewing conditions and minimize impact on wildlife, the surrounding area was closed (50 CFR 36.42) to all other public uses from June 25 to September 30. Additionally, in a letter and subsequent public meeting, aircraft operators overflying the area were requested to voluntarily maintain a minimum altitude of 2000 feet.



A group of bear viewers begins the 1 1/4 mile hike from base camp to the viewing platform. (J. Taylor)

Scott Shelton, biological technician for the program's first two years, was joined by Keith Globis. Both proved to be capable guides and camp hosts, and were well received by participants. At no time did any participant express concern for safety or security under the care of these two individuals.



Bear viewing program participants enjoying a quality experience on O'Malley River. (V. Barnes)

Groups of 6 people participated in 4-day viewing sessions sandwiched between travel days. The first session began on July 4; the final session was completed on September 16. Of a total of 90 persons selected by lottery, 87 participated (including cancellation replacements). These 87 visits, averaging 6 days in length, constituted 522 use days. The program fee remained at \$100 per person. Participants arranged and paid for their own food and transportation to base camp.

Base camp facilities, located at Stony Point on Karluk Lake, included three Weatherport sleeping quarters (with bunks), a metal cookshack dome, and two pit-type outhouses. Propane heaters, lanterns and cooking stoves were also provided.

A wooden platform (8'x16') was erected at the viewing site. Each day participants carried small folding stools to and from this location. The mile and quarter hike between camp and the viewing area proved moderately strenuous. No reportable injuries occurred.

Study 74530-91-01, Brown Bear Activity, Behavior and Distribution Related to a Bear Viewing Program at O'Malley River, Kodiak, Alaska was continued for the second season. Observations made from the study site indicated that bears occasionally violated camp space and operated unacceptably close to camp structures. An electric fence was delivered to the site too late to be deployed.



Bears habituated to people on the viewing platform which provided many unique opportunities for program participants to observe and photograph fishing behavior at close range. (V. Barnes)



Competition for fishing space often creates tense moments on O'Malley River. (J. Taylor)



Family groups were the favorite subjects of most photographers that participated in the bear viewing program. (V. Barnes)

To develop and maintain an acceptable level of bear habituation, fixed travel windows of time were established. Departure from camp was limited to 9-11 AM. Return between 5 and 7 PM, weather permitting, was strongly encouraged. Daily viewing at the platform averaged from 4 to 8 hours. Numbers of bears observed during the viewing periods ranged from a low of 2 to a high of 40. Ninety-three percent of participants indicated satisfaction with the number of bears observed.

Following review and evaluation of the 1992 program, the decision was made to move to private operation for the 1993 season. Such a move, it was determined, would free government funds for other Refuge activities, and would promote safe continuation of the program by the private sector. Legal difficulties connected with aspects of the operator selection process proved too great, however, and the program was postponed. There will be no 1993 program. According to RO direction, Refuge staff will proceed with development of the privatization process with the intent of bringing the program back on line for the 1994 season.



Working on the bear viewing study, seasonal biological technicians Greg and Sally Wilker identified a minimum of 133 different bears (including 70 cubs) that used the O'Malley River study area in 1992. This overview of the O'Malley River corridor shows the confluence of O'Malley River (uppermost water body), Canyon Creek and Karluk Lake (far upper right). The viewing platform was located in the upper left portion of this photo on a bench just above O'Malley River. (V. Barnes)

Sightseeing/photography use (outside the O'Malley program) reported by guides and air transporters was 160 visits, averaging 2.8 days, for 450 use days. It is estimated that unreported use (marine transporters, private boats and aircraft, Native villages) was an additional 25% of this reported use. The total use in this category (O'Malley BVP plus sightseeing/photography) was 287 visits and 1085 use days.

12. Other Wildlife-Oriented Recreation:

Participation in the public use cabin program is very strong during certain seasons. There is virtually no use of the system during the months of January, February and March. Use in April and May is focused on bear hunting. June is somewhat slack, but use by fishermen and sightseers/photographers picks up in July, August and September. During October and November deer and bear hunters keep most cabins operating near capacity. Due to freeze-up only the three coastal cabins receive use in December for the close of the deer season, and that use is sparse.

Beginning in 1993, tracking of cabin use will be accomplished by PC computer. A program designed by Office Automation Clerk Barnes will maintain a current accounting of use which can be queried at any time for current data. It will be a great improvement over the former system, providing superior accuracy and flexibility.

Also beginning in 1993, reservations will no longer be accepted from December 1 through March 31 for any of the 6 inland cabins. The threat of fast freeze-up is just too great of a hazard.

Biological Technician Johnson planned and supervised reconstruction of the South Frazer cabin. Built at the same site, the new cabin is now the "Cadillac" of Kodiak Refuge public use cabins. The design is sturdy, a bit roomier than previous designs, and pleasing to the eye. Unfortunately, the site is well back from the shoreline and significantly upslope and could not be made wheelchair accessible. Biologist Stovall and several volunteers provided the additional labor necessary to complete this project in under two weeks.

Notice has been served to the RO that relocation of Little River Lake, O'Malley River and Red Lake cabins is necessary. All three impact significant bear concentrations to an unacceptable degree. Environmental assessments will be written during 1993, and assuming no Congressional roadblock occurs, relocations will be accomplished during 1993-95.

13. **Camping:**

A significant portion of the use occurring on the Refuge is overnight use. Most camping, however, is incidental to the primary objectives of sightseeing/photography, fishing and hunting. To preclude confusing double counting, no use will be assigned to this category.

14. **Picnicking:** Nothing to report.

15. **Off-Road Vehicling:** Nothing to report.

16. **Other Non-Wildlife-Oriented Recreation:**

The only legitimate activity appropriate to this section is snowmobiling. Even though the Refuge boundary is up to 25 miles from town, a small group of enthusiasts does make periodic forays onto Refuge lands when sufficient snow cover exists. In response to interest expressed by this group during PUMP development, it was determined that snowmobiling on the Refuge could be allowed outside of bear denning areas. A map of denning areas which are off limits to snowmobiles will be published in the PUMP. Actual restriction will not occur until PUMP regulations are promulgated in late 1993.

It is difficult to assess the actual level of snowmobile use on Refuge lands. In all probability, the use from Kodiak is sporadic and does not constitute a significant number of use days. The numbers supplied in the table below are a "best guess" only. It does not include any use that may be emanating from villages.

17. **Law Enforcement:** (B. Patterson)

Five refuge employees have law enforcement authority: Refuge Manager Bellinger, Assistant Refuge Manager Munoz, Refuge Ranger Taylor, Wildlife Biologist Stovall, and Pilot Patterson. All officers attended the required annual refresher in 1992. Firearms qualification was completed in March during the annual training sessions and in October at the Kodiak Island Sportman's Associations firing range.

This was the second year that the refuge operated a law enforcement camp on the Ayakulik River to monitor sport fishing during the king salmon run. This camp has provided good data on the actual commercial and general public use of this area, as well as establishing an LE presence on the refuge during a time of very heavy use.

Law enforcement activities during the year resulted in the following violation notices and citations:

1. Six hunters were cited for illegal use of cabins.
2. A citation was issued for conducting a commercial operation on the refuge without a special use permit. To wit: commercial fishing base camp on the refuge.
3. One hunter was cited for possession of a deer without proper proof of sex.

In addition, law enforcement efforts were conducted to monitor big game and sport fish guides for compliance with their permit conditions. One Refuge Officer was detailed to Kodiak NWR to assist with the spring waterfowl enforcement effort.

18. Cooperating Associations: (P. Taylor)

Sales for the Kodiak Refuge branch of Alaska Natural History Association totaled \$12,876 in FY92, a 16% increase over the previous year when ferry repairs limited tourist access to Kodiak. To further improve sales and stimulate interest, RR Brooks eliminated several "slow sellers" and replaced them with more exciting items.

In mid-summer, a theft of \$60 from the cash box in the visitor center ANHA sales area prompted a move to improve security. Research by Brooks uncovered a cash register unit which was surprisingly inexpensive, yet provides significant improvements in security as well as improving accountability and record keeping.

1992 will be the last year under an accounting system which required the outlet to "sell out" stock by the end of the fiscal year. This system, instituted to solve one set of problems, created even greater ones; branches lost sales due to low inventory; prospective purchasers went away empty-handed; and volunteer clerks had to deal with disappointed customers. Beginning in FY93, outlets new policy will not require this annual depletion of inventory. The result should be improved sales and a happier public.

The branch paid for a re-print of the newspaper-format brochure entitled Bear Country. Previously, a State of Alaska tourism grant had funded half this cost, but these funds are no longer available. Without ANHA help, this and other valuable Refuge resources might not be possible. Other materials purchased with ANHA profits included: biological reference books, EE materials, and volunteer uniform components.

RR Brooks has reached agreement with volunteers Fred Roberts and Willie Heinrichs on plans to improve the ANHA sales area. Using ANHA funds, they will provide the expertise and labor necessary to modify the counter area. The result will be increased storage, improved ergonomics, and better access to stock on hand. This assistance represents an outstanding utilization of a very talented volunteer resource.

19. Concessions: (P. Taylor)

The Special Use Permit (SUP) program did not see substantial change in 1992. Following the departure of Dave Menke in 1991, Pilot Patterson assumed program supervision. Due to his knowledge of the Refuge, local commercial operators, and the characteristics of air transport, Patterson will continue to function in this capacity.

Some conflict may develop around several holders of 1992 sport fishing permits. Despite continued interest, those who have failed to demonstrate use during the year may be terminated. In addition to that potential controversy, it remains to be seen whether or not the Refuge would refill any sportfish permit vacancies that might occur in 1993. Even though the number of permitted guides (out of a maximum of 24) who have continued to be active has trended down over the past few years, visitation by guided sport anglers has increased sharply. In light of this fact, it may not be wise to foster even more use by filling previously lightly used permits with new guides anxious to develop substantial business on the Refuge. During the period of time that a River Use Management Plan is being developed, the best course of action may be to resist further increases in use on river systems for which limits are have yet to be established.

1992 was the final complete year of the big game guide system that has been in place for some time. Guides selected through prospectus in late 1992 and early 1993 will begin operation during the fall of 1993. One set of big game guide SUP's will be issued to cover the spring bear hunt. A new set will be cut for the fall bear, deer and goat hunts.

Photography/sightseeing permits are just beginning to gather significant interest. Of 11 SUP's issued which authorized this category, 8 went to sport fish guides, 1 went to an air transporter, and one went to a big game guide. Only one was issued to a guide offering no other service.

SUP's for commercial set net cabins and hunting cabins were issued without significant incident.

TABLE 19. SUMMARY OF PUBLIC USE FOR THE CALENDAR YEAR 1992

	<u>\$\$\$\$\$</u>	<u>#####</u>	<u>VISITS</u>	<u>USE DYS</u>	<u>ACT HRS</u>
<u>GENERAL</u>					
Visitor Center			8500	8500	4250
Volunteers	25				520
News Releases	16				
Radio/TV Spots	36				
<u>OUTDOOR CLASSROOM - STUDENTS</u>					
--- STAFF CONDUCTED					
Offsite EE Students	24	554	554	554	554
Onsite EE Students	21	395	395	395	297
--- NONSTAFF CONDUCTED					
Offsite EE Students	0	0	0	0	0
Onsite Students	0	0	0	0	0
<u>OUTDOOR CLASSROOM - TEACHERS</u>					
Teachers, OC	45	54	54	54	41
Teacher Wrkshp	0	0	0	0	0
EE Material Loans	41				
<u>INTERPRETIVE FOOT TRAILS</u>					
Buskin View Trail			235	235	118
<u>INTERPRETIVE TOUR ROUTES</u>					
No activity in this section					

INTERPRETIVE EXHIBITS/DEMONSTRATIONS

Exhibits/Demonstrations	2	4000	4000	800
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\$\$\$\$\$ ##### VISITS USE DYS ACT HRS

OTHER INTERPRETIVE PROGRAMS

Staff Talks (on-site)	5	310	310	150
Staff Talks (off-site)	15	629	629	668

HUNTING

Deer	1143	6875
Bear	234	2457
Goat	27	173

FISHING

Sportfishing	1409	5418
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TRAPPING

Trapping	5	?	?
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WILDLIFE OBSERVATION

BVP	\$ 8700.00	87	522
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OTHER WILDLIFE ORIENTED RECREATION

Cabin Use	\$ 8870.00	160	491	1047	21288
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\$\$\$\$\$
#####
VISITS
USE DYS
ACT HRS

OTHER NON-WILDLIFE ORIENTED RECREATION

Snowmobiling	24	48
--------------	----	----

LAW ENFORCEMENT

Citations	7
-----------	---

COOPERATING ASSOCIATIONS

ANHA	\$12876.00
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CONCESSIONS --- Special Use Permits

Big Game	\$ N/A*	15*
Cabins	\$ N/A*	1*
Sport Fish	\$ N/A*	20*
Air Taxi	\$ N/A*	12*
W/P/S	\$ N/A*	11*
Set Net	\$ 1600.00	8
Other	\$ N/A*	6
 Total	 \$ 6400.00	 96

* In 1992, permitted uses and associated fees were consolidated into single SUP's for authorized multiple use operators. Multiple fees for multiple uses were not charged. A flat fee of \$100 was charged each operator for the uses marked with an (*), regardless of the number of uses permitted. The figure in each cell of the second column represents the number of persons permitted to conduct that use. Beginning in 1993, multiple use operators will be issued multiple permits and will pay multiple fees. A separate permit will be written for every authorized use.

TOTALS

VISITS	USE DYS
18092	31217

I. Equipment and Facilities:

1. New Construction: (D. Munoz)

A modular building was constructed at the headquarters site to house subsistence program personnel.

2. Rehabilitation: (D. Munoz)

The Lily Lake float plane dock was rehabilitated by maintenance worker Ron Bowers. Funding for this project came from the Maintenance Management System.



Maintenance Management System funding was used to replace the float plane dock at Lily Lake. (S. Shelton)

3. Major Maintenance: (D. Munoz)

The South Frazer cabin was replaced with a new cabin immediately adjacent to the old cabin. South Frazer is one of three cabins built years ago by bear guides and the elements finally made repair ineffective. MMS money was used to fund this work. Other MMS projects completed this year included:

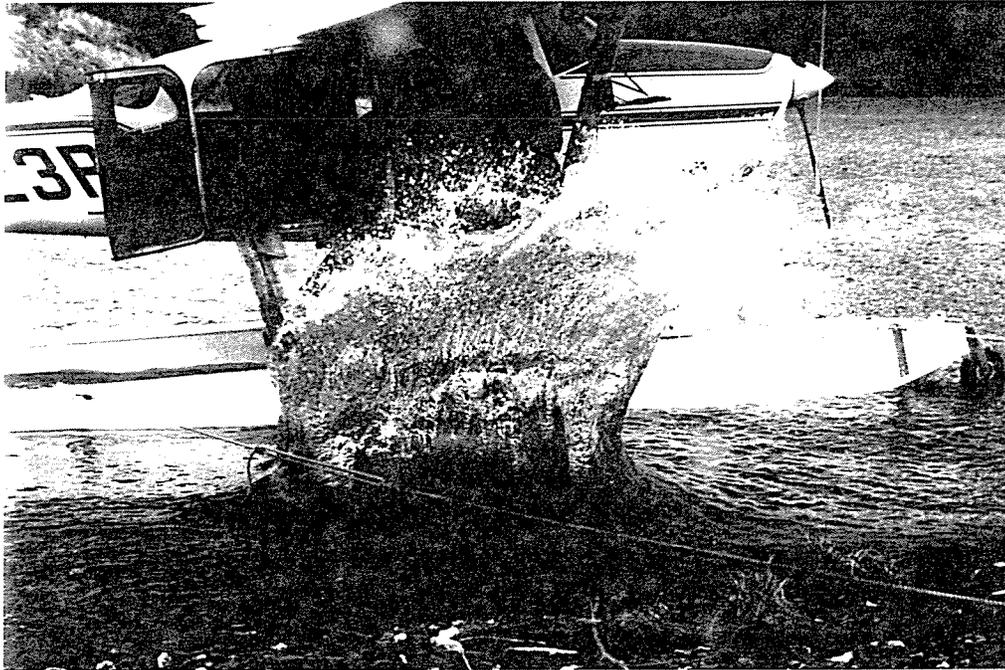
1. replacement of the outboard motor on the skiff that is used with the Ursa Major II, and
2. replacement of obsolete computers.



Biotech/Deckhand Gus Johnson (left) and volunteer Vicki Vanek put the finishing touches on the new South Frazer public use cabin funded through MMS. The old cabin was removed immediately after completion of the new cabin. (R. Stovall)

4. Equipment Utilization and Replacement: (D. Munoz)

Delivery of aviation fuel, as depicted in the following sequence of photos, involves most of the staff and both the refuge 206 aircraft and the M/V Ursa Major II. The Ursa crew positions the 55 gallon drums at the head of Larsen Bay. From there, the drums are ferried with the 206 to Camp Island. The fuel is utilized to support field activity throughout the summer.



Delivery of 55 gallon aviation fuel drums is an annual rite of spring at Kodiak NWR. (V. Barnes)



Biotech. R. Hander provides "mule power" at Camp Island. (V. Barnes)



Pilot Butch Patterson fueling the refuge 206 at Camp Island. (V. Barnes)

Marine Vessel: (D. Zwiefelhofer)

Safe marine vessel operations in Kodiak waters dictate, at a minimum, annual dry docking for hull cleaning and inspection, replacement of sacrificial anodes, and the renewal of the anti-fouling bottom coating. The annual maintenance dry docking of the refuge marine research/patrol vessel, M/V Ursa Major II occurred on September 9 to 19 at the local boat yard.

Additional safety items for added sound reduction, stability, and operator visibility were installed while at dry dock. A spare prop to carry on board the vessel was purchased in December.

5. **Communications Systems:** Nothing to Report.

6. **Computer Systems:** (D. Zwiefelhofer)

During FY92, the refuge was able to begin initiating the approved Office Automation Plan. Hardware acquired included: 4 desktop personal computers and 3 notebook laptop computers. Peripherals acquired included a dot matrix and 2 laser printers plus a digitizing table and plotter. Word processing, spreadsheet, database, statistical analysis, and geographic information system softwares were purchased to improve the efficiency and assist in the performance of the various functions accomplished by the different refuge staff receiving the new computers. The arrival of the new computers was very timely as the refuge's lone desktop computer had to have the hard drive and monitor replaced within weeks of acquiring the new equipment.

7. **Energy Conservation:** Nothing to report.

8. **Other:** Nothing to report.

J. Other:

1. **Cooperative Programs:** (D. Munoz)

Cooperative programs detailed throughout this report include:

1. ADF&G cooperative brown bear research (Section D.5).
2. ADF&G cooperative weir activity and fish surveys (Section D.5, G.11).
3. ADF&G subsistence harvest survey (Section G. 8.c).
4. Signing of 17-B easement trails in cooperation with Akhiok-Kaguyak, Inc. (Section C. 2).
5. Kodiak Island Borough School District environmental education outreach effort (Section H. 2).

6. Eagle tree nest location for Afognak Island logging activities on native lands (Section E.7).
7. Vessel support for Realty Office assessment of Afognak Island acquisitions (Section C.3).

2. Other Economic Uses: Nothing to report.

3. Items of Interest: Nothing to report.

4. Credits:

The writing of the annual narrative is a team effort. Staff members who wrote or contributed to a section are identified in parentheses following the section title. Typing and organization was accomplished by Julie Revalee.

K. Feedback: Nothing to report.

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