KODIAK NATIONAL WILDLIFE REFUGE

Kodiak, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1986

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

REVIEW AND APPROVALS

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Refuge Manager — Date: 9/21/87

Refuge Supervisor Review — Date: 9/23/87

Regional Office Approval — Date: 10/14/87

Several major problems exist. One is that in recent years over 300,000 acres of the refuge's best wildlife habitat have been conveyed to Native Corporations under the provisions of the Alaska Native Claims Settlement Act. Although these lands remain subject to the rules that govern use and development of the Refuge [Section 22 (g) ANCSA], no one knows for sure what this means. The bottom line is that much of the best bear, eagle and fisheries habitat on the refuge is now privately owned.

Over 60 commercial fishermen use refuge lands for shore bases to support fishing operations. Over fifty of these have cabins on refuge land and there is pressure to allow more cabins on refuge lands and major expansions of existing sites. Brown bears are a wilderness type animal which will not survive substantial human intrusion into their habitats. Further expansion of cabins and human occupancy into refuge habitats, particularly interior areas, will certainly cause irreparable damage to bear populations.

Refuge staffing is shown elsewhere in this report. The staff occupies a headquarters complex five miles from municipal Kodiak. The complex is approximately 25 air miles from the refuge boundary and two Service aircraft and a 48 foot motor vessel provide the only transportation to and throughout the refuge. A field headquarters is maintained at Camp Island on Karluk Lake. This camp provides a more centralized base for field operations.

Although Kodiak NWR is larger than the State of Delaware no place is more than 15 miles from the sea. Helmet Mountain, east and northeast arms of Uganik Bay are in background and Uganik Lake is in lower left hand corner. (86-01) DM

INTRODUCTION

The Kodiak National Wildlife Refuge was established by Executive Order No. 8657 on August 19, 1941 "for the purpose of protecting the natural feeding and breeding range of the brown bears and other wildlife on Uganik and Kodiak Islands, Alaska". A one mile wide shoreline strip was made part of the refuge but remained open to the public land laws, resulting in numerous small coastal inholdings. In 1958 the one mile shoreline strip was closed to the public land laws and two large peninsulas were removed from the Refuge by Public Land Order No. 1634. These peninsulas were to be removed from the refuge so that they might be opened to livestock grazing. No leases have ever been let on these areas and in 1982 as part of mitigation for the Terror Lake Hydroelectric Project one of these peninsulas (the Shearwater) was permanently closed to livestock entry.

The Alaska National Interest Land Conservation Act (ANILCA) of 1980 added approximately 50,000 acres of land on Afognak and Ban Islands to the Refuge, bringing the total acreage to approximately 1.865 million acres, of which approximately 310,000 acres are Native owned but subject to Refuge regulations per Alaska Native Claims Settlement Act (ANCSA) Section 22 (g).

The refuge encompasses roughly the southwestern two thirds of Kodiak Island, all of Uganik Island (which lies off the northwest shore of Kodiak Island), the Red Peaks area on the northwest side of Afognak Island, and all of Ban Island, which is adjacent to the Red Peaks area. Habitats include salt water estuaries, riparian zones, wet tundra, extensive brushlands, alpine areas, bare rock, permanent snow and, on the Afognak addition, Sitka spruce forest.

The refuge is host to five species of Pacific salmon whose spawning grounds are the relatively short, swift streams characteristic of the Island. Approximately 200 breeding pairs of bald eagles nest on the refuge annually and a year round population of several hundred eagles gives Kodiak one of the highest numbers of bald eagle use days of any refuge in the system.

The combination of huge numbers of salmon, the tremendous berry crops found on the island and productive alpine sedge fields provide a virtually endless food supply for brown bears. Kodiak supports one of the highest densities of brown bears known.

Although the salmon, eagles and bears are the most widely known inhabitants of Kodiak, other species are abundant as well, including Sitka blacktail deer, red fox, beaver, river otter, tundra swan, many species of sea birds and, in offshore waters, many species of marine mammals.

INTRODUCTION

F. HABITAT MANAGEMENT (CONT.)

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

A. HIGHLIGHTS

Regional Office makes decision to let those set-netters with temporary structures under permit in 1985 to construct cabins after record of decision on CCP. Sec. D-1

Tsunami alert May 8, 1986. Sec. E-6

Karluk Lake fertilization program begins. Sec. F-6

Vancouver Canada goose introduction-Kodiak Archipelago. Sec. G-12

Brown bear Defense of Life and/or Property (DLP) kills continue to remain high for third consecutive year. Sec. G-8

Total salmon harvest in Kodiak area was worth 36.5 million dollars surpassing the 1981 record. Sec. G-11

Public use on refuge increased to 23,600 visits and 147,600 activity hours. Sec. H-1

Numerous VIP trips include one by Congressman Conte, Representative from Massachusetts and another by FWS Director Dunkle. Sec. J-3

B. CLIMATIC CONDITIONS

Table 1 presents a summary of weather conditions for Kodiak for 1986 (data from National Weather Service). The only weather recording station on Kodiak Island is the National Weather Service office at Kodiak State Airport, near the northeast tip of the island. Weather conditions vary greatly over the island because of exposure, aspect, and terrain. In general, easterly exposures (such as Kodiak State Airport) experience higher average precipitation and warmer average temperatures than westerly or northerly exposures.

Spring was colder than last year but less snow was recorded. April and May precipitation was below the norm (almost 5 1/2 inches in May alone). June was a radical change in the opposite direction with 13+ inches of precipitation received which was a little over 9 1/2 inches above the norm. This combined with cooler than normal temperatures severely impacted elderberry production and appears to have contributed to the retardation in bald eagle production phenology this year. July was dryer and warmer than normal but wet weather and cool temperatures returned in August.

The fall was generally dryer and warmer than normal. Brown bear stayed on the creeks longer than previously recorded feeding on salmon because of the elderberry crop failure.

The year ended with precipitation levels and temperatures above normal and our ability to conduct aerial surveys and radio-tracking flights severely hampered by bad weather.

Table 1
1986 weather data summary-National Weather Service, Kodiak, Alaska

Month	Snowfall (in.)	Precip. (in.)	Precip. dept. from norm (in.)	Temperatures max F°	min	Temperature dept. from norm
January	23.5	11.63	+3.34	42	18	-0.3
February	17.0	6.32	+0.04	52	- 6	+0.9
March	6.4	4.58	+0.49	46	9	-0.4
April	11.9	2.69	-2.15	57	10	-3.7
May	0.8	2.24	-5.49	65	28	+0.3
June	0	13.16	+9.79	78	39	-2.2
July	0	2.72	-1.19	74	40	+0.6
August	0	6.34	+1.13	68	38	-1.8
September	0	2.22	-5.38	65	35	+0.6
October	0	10.83	+0.84	58	27	+3.0
November	4.3	5.35	-1.32	54	15	+1.6
December	2.1	11.64	+5.36	46	19	+6.2
Total	66.0	79.72				

C. LAND ACQUISITION

3. Other

Approximately 285,000 acres of Native conveyed lands within the refuge were included in a proposed trade of Native lands within the boundaries of several Alaska refuges for oil and gas rights on the Arctic National Wildlife Refuge (NWR). The refuge staff was primarily involved in evaluating areas based on wildlife values, and ranked 34 different parcels in priority order. Staff also spent a considerable amount of time assembling resource and public use information for the Native landowners use in the negotiations. Negotiations are presently in progress between the Service and the Native landowners. However, even if the parties involved can agree on land values, the exchange would have to be approved by Congress.

One permittee proposed a land trade of a patented parcel for her permitted site. Inspection of the two sites, (Uganik Trading Company site for patented site number 204209), by

refuge staff revealed that the trade may be advantageous to wildlife. The proposal was forwarded to Realty.

D. PLANNING

1. Master Plan

The public review draft of the Kodiak National Wildlife Refuge Comprehensive Conservation Plan (CCP) was distributed to approximately 1500 individuals, interest groups, and agencies on December 20, 1985. This 291 page document was available for public comment through March 21, 1986.

During this period and periodically throughout the remainder of the year, the refuge staff was involved in a multitude of public meetings generated by the planning process. These meetings are listed in chronological order as follows:

Jan. 19 - Informational meeting with local chapter of the Audubon Society on CCP.

Jan. 20 - Informational meeting with special interest group (set-netters) on CCP.

Jan. 22 - Public hearing on CCP held in Kodiak.

Jan. 28 - Public meeting on CCP and proposed sea otter tagging regulations in village of Larsen Bay.

Jan. 30 - Public meeting on CCP and proposed sea otter tagging regulations in village of Akhiok.

Feb. 1 - Public meeting on CCP and proposed sea otter tagging regulations in village of Karluk.

Feb. 5 - Public hearing on CCP held in Anchorage.

Feb. 6 & 7 - Open house held at refuge visitor center to answer questions on CCP.

Feb. 11 - Public meeting on CCP and proposed sea otter tagging regulations in village of Old Harbor.

Feb. 18 - Presentation on CCP and proposed sea otter tagging regulations to leaders from all Kodiak area Native villages at Kodiak Area Native Association in Kodiak.

Mar. 7 - Second meeting on CCP at village of Akhiok.

Mar. 16 - Presentation on CCP and proposed sea otter tagging regulations at public meeting of Kodiak Fish and Game Advisory Board in Kodiak.

June 5 - Meeting with special interest group (set-netters), Fish and Wildlife Service, Regional Office (RO) personnel and refuge staff regarding RO decision to allow conversion of tent platforms to permanent cabins.

Oct. 15 - Workshop with special interest group (set-netters) to obtain input on needs of the fishery (size and type of facilities for base camps on refuge lands).

After agency, interest groups, and public comments were summarized, a considerable amount of refuge staff time was spent on rewriting some sections of the plan and writing responses to the public comments. The internal review draft of the final CCP was completed in late December.

Due to the strong support in the RO, we have held the line on most of the major issues in the preferred alternative (i.e. 73% wilderness, no new sites developed on the coastline for commercial fishing base camps, and oil & gas exploration and development and oil staging facilities are incompatible). Kodiak's final CCP should go out for comment in May, 1987.

FB/Pilot Chatto with just a portion of the material generated to produce the refuge CCP. (86-02) DM

2. Management Plan

During 1986 a draft sign plan and draft recreation cabin management policy guidelines were written. Both documents will be finalized in 1987.

In July 1986 comments were received from Fishery Resources on the draft Phase II of the Kodiak NWR Fishery Management Plan. Revisions were suggested by Fishery Resources since the plan guidelines were changed in April 1986. A revised draft was submitted in October 1986. As of December 1986, the staff was again making changes to the October draft in response to additional comments from Fishery Resources.

4. Compliance with Environmental and Cultural Resource Mandates

In February 1986 the refuge received a proposal by Alaska Department of Fish and Game (ADF&G) Fisheries Rehabilitation Enhancement and Development Division (FRED) to fertilize Karluk Lake as part of a program designed to restore the Karluk Lake sockeye populations. This proposal was based on the results of an eight year study of the freshwater rearing environment for juvenile Karluk sockeye. Data collected indicated that the seasonal pattern of zooplankton production utilized by juvenile sockeye was heavily skewed towards the late fall-winter period. The lateness of forage production was not in synchrony with the early emergent sockeye fry (April-May) and the later emergent fry (July) faced a attenuated growing season thus, in order to increase the zooplankton abundance as prey items for juvenile sockeye, the lake environment needed to be temporally stimulated through a nutrient enrichment program. This proposed program should enhance juvenile sockeye survival and hence the overall return of adults.

In response to the fertilization proposal, the decision was made to prepare a Environmental Assessment (EA) on the proposed action(s) in accordance with guidelines of the National Environmental Policy Act. A team composed of refuge, fishery research, and ADF&G personnel were designated to draft the EA. In March 1986 the team presented the completed EA to the RO.

The EA considered five separate alternatives plus the proposed action by ADF&G and a preferred alternative action. All of these alternatives and actions were considered in light of the current Memorandum of Agreement between the Service and ADF&G on the goal to restore Karluk Lake sockeye escapement to a sustained level of 0.8 to 1.0 million spawners.

The team recommended that if the Service declared a Finding of No Significant Impact (FONSI) for the controlled addition of nutrients into the lake that the preferred alternative be selected. This alternative basically allowed the controlled addition of nutrients into the main basin of the lake where

it was estimated that 55% of the total lake rearing area existed and where approximately 70% of the rearing juvenile sockeye are found. This alternative was a substantial change from the original ADF&G proposal.

In April of 1986 the Regional Director declared a FONSI for the action and the preferred alternative was selected. The refuge issued a Special Use Permit (SUP) in mid-May but due to weather and equipment problems the contractor hired by ADF&G was not able to begin nutrient application until the first week of June 1986.

This program will continue for approximately five years. Both the Service and ADF&G will monitor water quality and biological response of target and non-target species in the lake.

A Cessna Ag Truck was used to fertilize Karluk Lake as part of a sockeye restoration project. Material storage and transfer took place off refuge. (86-03) TC.

Alaska Department of Fish and Game and refuge staff collaborated on an EA for the introduction of Vancouver Canada geese to the Kodiak Archipelago. Alaska Department of Fish and Game was the lead agency on this EA which evaluated not only Vancouver but also Aleutian and dusky Canada geese for possible introduction. Latitudinal, climatic, topographic, and vegetative similarities between Vancouver Canada goose habitat in southeast Alaska and the Kodiak Archipelago suggested that this subspecies would have the greatest probability for success in a transplant. The project was funded with receipts from State of Alaska's first State duck stamp.

Two hundred nine (209) Vancouver Canada geese were transplanted on Kodiak and Shuyak Islands from southeast Alaska in July. (86-04) L. VanDaele

The Kodiak Island Borough and State of Alaska raised several concerns about the consistency of the Refuge's CCP with the Kodiak Island Borough Coastal Management Program (KIBCMP). The Service responded by noting that the States interpretation of the Coastal Zone Management Act (CZMA) appeared to be inconsistent with the legislative intent of the Act. One of the primary intents of the CZMA is to protect coastal resources. However, the policies and goals in the KIBCMP reflects a definite bias towards development. Section 304 of the CZMA specifically excludes federal lands, such as Kodiak NWR, from the coastal zone. However, the Borough and State ignored this in attempting to apply local and State policies to the refuge. The CZMA also states that all federal activities affecting the coastal zone shall be undertaken in a manner consistent to the maximum extent practible with the approved State management program. In other words, federal activities shall be consistent to the fullest degree permitted by existing law. The KIBCMP fails, however, to acknowledge this point.

5. Research and Investigations

Kodiak NR 85 - "Seasonal Migration and Movements of Kodiak Island Bald Eagles" (74530-82-01)

The bald eagle migration and movements study began in July 1982 with the placement of colored patagial markers on juvenile bald eagles from 11 nests in Uyak Bay and Karluk

Lake. In 1983 and 1984 the same general marking area along the northwest (Shelikof Strait) side of Kodiak Island was utilized. Radio transmitters were used in conjunction with patagial flags on seven juveniles in 1983, ten juveniles in 1984, and eleven juveniles in 1985. Marking efforts were conducted from Kiluida Bay to Cape Alitak on the southeast side of Kodiak Island during 1985 and 1986. Twenty-two fledglings from 14 nests were marked with colored patagial flags. Ten of the 22 young eagles were also fitted with radio transmitters in 1986 (Table 2).

Differences in areas utilized by wintering juvenile bald eagles during the 3 years is likely a function of food availability but may be a product of marking location. Wintering areas utilized by radioed juvenile bald eagles during this study are shown in Figure 1. The seasonal mean difference in distance from the marking location of west side (1983 and 1984) juvenile bald eagles and east side (1985) juvenile bald eagles is illustrated in Figure 2. The pattern of seasonal distance from marking locations appears very similar for west side juveniles (1983, 1984) but an almost inverse pattern of movement occurred in juveniles from the east side (1985) of Kodiak. Should this pattern continue throughout the study, it would suggest a certain amount of inherited predisposition in seasonal dispersal movements from a marking locality.

During the course of the 1986 marking effort two cases of abnormally long intervals between egg laying were observed. The first case involved eagles K113, K114, and K116 (Table 2) and were all found in a single nest on Miller Island. All three young appeared in excellent condition, but eagle K113 was estimated to be over 2 weeks younger than eagles K114 or K115. While eagles K114 and K115 were almost completely feathered, with wing chords of 15.9 and 16.0 inches, respectively, sibling K113 had only begun to attain feathers (70% downy) with a wing chord of less than 10 inches. The two larger fledglings were able to stand on their feet and move easily around the nest platform while K113 was unable to stand but sat on the "heels" of the tarsus as is common in young eagles less than 8 weeks of age. Nutrition was not considered to be a factor since all three fledglings were well fed, due in large part to nearby set gillnet fishing operation that made its non-target catch available to the nesting adults. The second case of an abnormally long egg laying interval involved eagles K109, K110, and a recently dead eaglet all from a nest on Cape Trinity (Table 2). The ages of K109 and K110 were estimated at 9 weeks at the time of marking while the dead eaglet was estimated at little over 6 weeks. The younger eaglet had been dead less than a week estimated by the lack of decomposition and minimal retreating of the eyes into the skull. Although bald eagles have been known to prey on other nesting eagle's young, no obvious signs of talon marks or feeding could be found on the carcass. The only wound on the dead bird was a small (1 cm) hole on the underside of

TABLE 2

1986 JUVENILE BALD EAGLE MARKING INFORMATION

MARKING * LOCATION	DATE	WING MARKER** CODE/COLOR	USFWS*** BAND	COLOR LEG BAND CODE	RADIO FREQ.	EST. AGE
Three Sisters Rock Creek	7/15/86	K99/GR-L K99/YL-R	13613	K99	N/A	7 wks
Three Sisters Rock Creek	7/15/86	K100/GR-L K100/YL-R	13614	K100	N/A	7 wks
Three Saints Bay-East Side	7/16/86	K101/GR-L K101/YL-R	13615	K101	N/A	6 wks
Three Saints Bay-East Side	7/16/86	K102/GR-L K102/YL-R	13616	K102	N/A	6 wks
Kiavak Bay	7/17/86	K103/GR-L K103/YL-R	13617	K103	150.702	10 wks
Old Kaguyak Bay	7/18/86	K104/GR-L K104/YL-R	13618	K104	N/A	7 wks
Kaguyak Bay	7/18/86	K105/GR-L K105/YL-R	13619	K105	N/A	7 wks
Inner Kaguyak Bay	7/18/86	K106/GR-L K106/YL-R	13620	K106	150.712	10 wks
Russian Harbor	7/19/85	K107/GR-L K107/YL-R	13621	K107	150.732	11 wks
Russian Harbor	7/19/86	K108/GR-L K108/YL-R	13622	K108	N/A	11 wks
Cape Trinity	7/19/86	K109/GR-L K109/YL-R	13623	K109	N/A	9 wks
Cape Trinity	7/19/86	K110/GR-L K110/YL-R	13624	K110	150.742	9 wks
Ahkiok Is. Alitak Bay	7/20/86	K111/GR-L K111/YL-R	13625	K111	N/A	10 wks
Ahkioh Is. Alitak Bay	7/20/86	K112/GR-L K112/YL-R	13626	K112	150.752	10 wks
Miller Is. Alitak Bay	7/20/86	K113/GR-L K113/YL-R	13627	K113	N/A	8wks
Miller Is. Alitak Bay	7/20/86	K114/GR-L K114/YL-R	13628	K114	150.762	11 wks
Miller Is. Alitak Bay	7/20/86	K115/GR-L K115/YL-R	13629	K115	N/A	11 wks
Deadman Bay	7/23/86	K116/GR-L K116/YL-R	13630	K116	150.773	12 wks
Alpine Cove	7/23/86	K117/GR-L K117/YL-R	13631	K117	150.792	10 wks
Olga Narrows	7/24/86	K118/GR-L K118/YL-R	13632	K118	150.812	11 wks
Olga Narrows	7/24/86	K119/GR-L K119/YL-R	13633	K119	N/A	11 wks
East Olga Bay	7/24/86	K120/GR-L K120/YL-R	13634	K120	150.832	11 wks

* - Approximate locations of nest sites are shown on Figure 2.

** - GR = green; L = left; YL = yellow; R = right

*** - The band prefix 629 is followed by the reported USFWS band number.

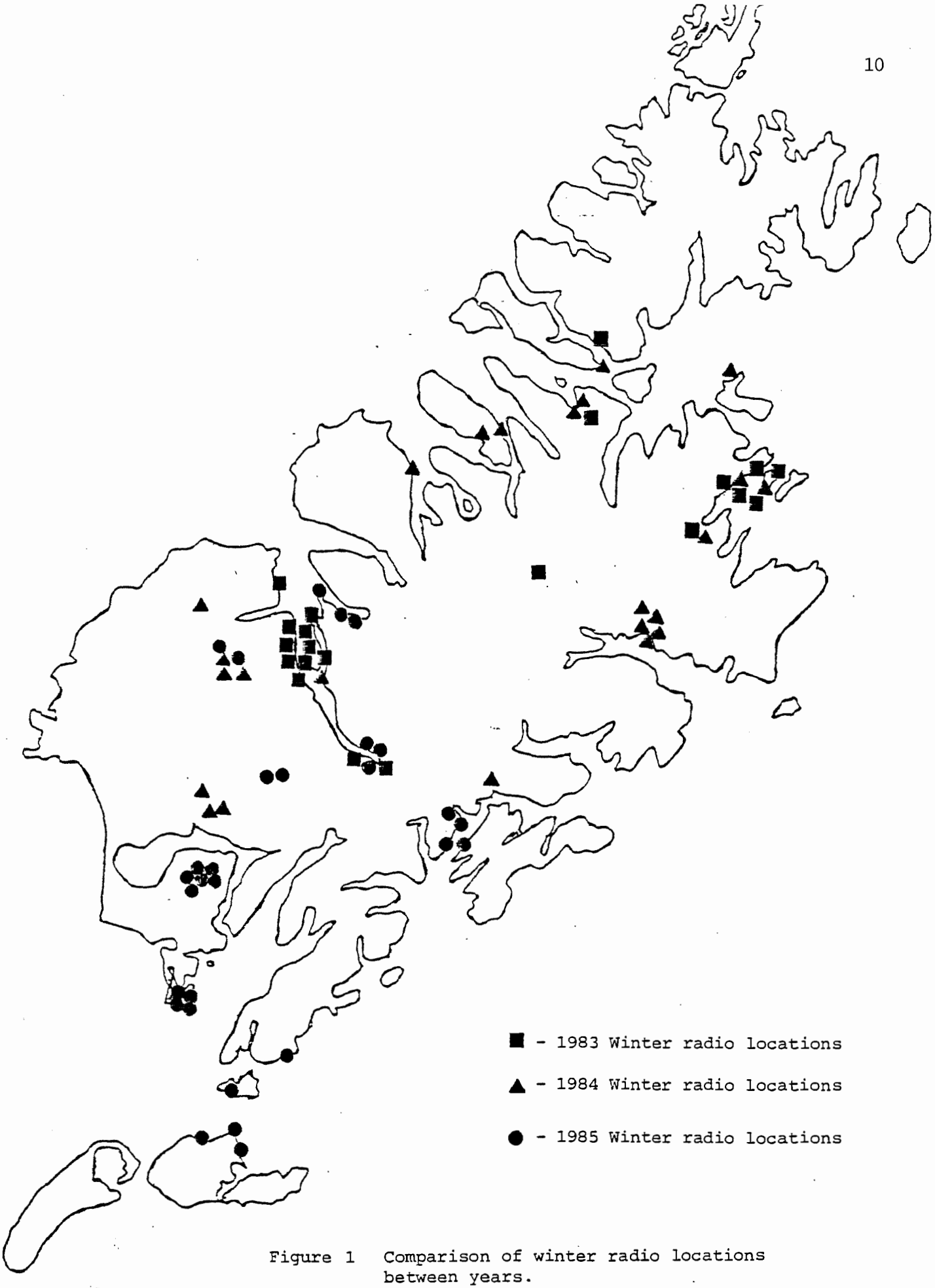


Figure 1 Comparison of winter radio locations between years.

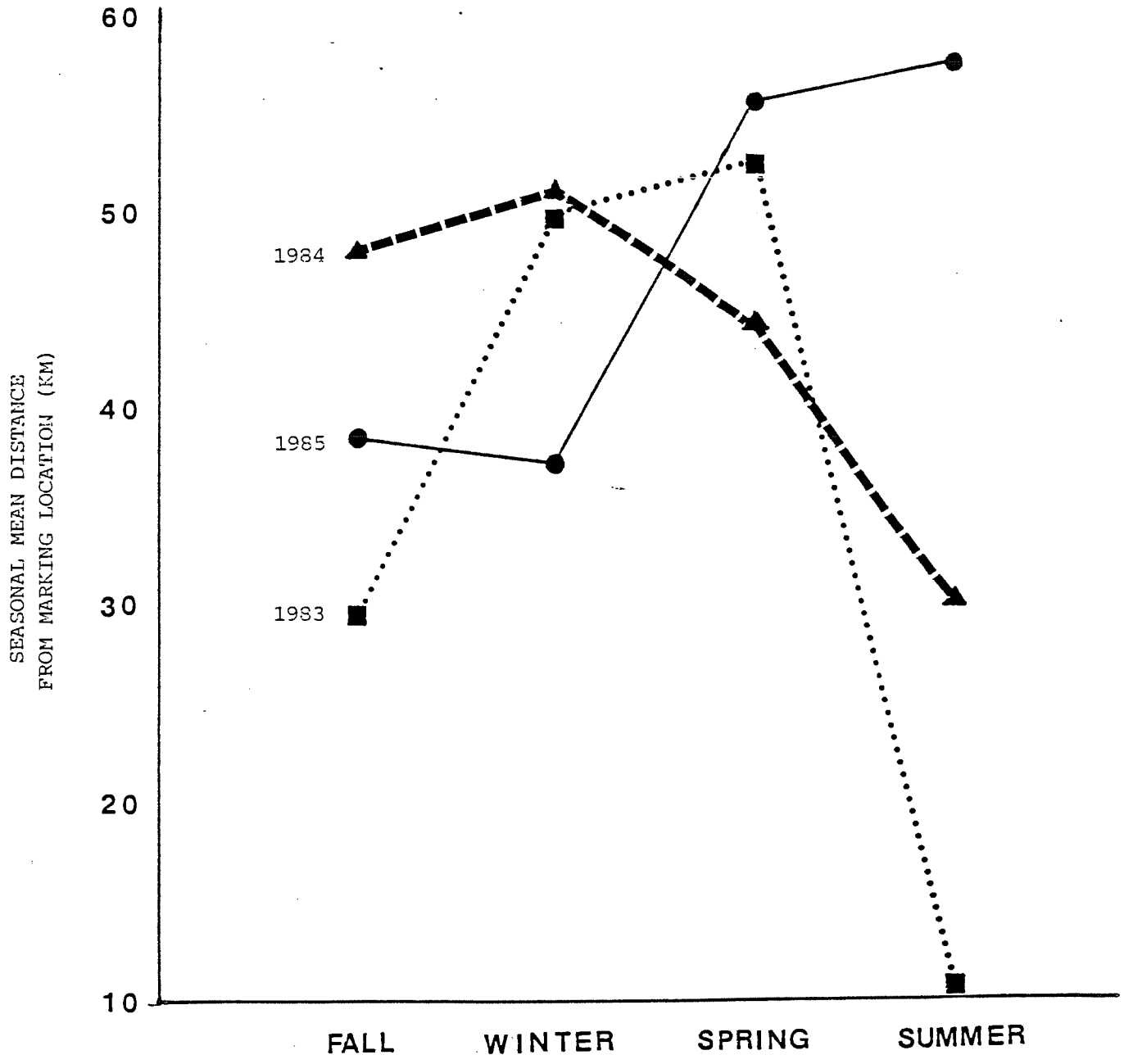


Figure 2 Comparison of seasonal mean distance from marking location between years.

the wing which did not extend through to the outer part of the wing as it would if made by a talon in the process of carrying it to the nest. Both of the live eagles (K109, K110) were in relatively poor condition as compared to the young in the other case discussed, so nutrition cannot be totally dismissed as an explanation to apparent difference in development. However, since no sign of sibling rivalry or feeding occurred on the carcass of the dead eaglet, one could assume that the age (size) difference was great enough that the older eaglets had no problem procuring the majority of the food brought to the nest and simply ignored the younger sibling's existence, even after it succumbed to apparent starvation. Bald eagles normally lay their eggs 1 to 3 days apart and abnormally long egg laying intervals has not been well documented. These two cases are the first documentation that abnormally long egg laying intervals may occur in northern bald eagles during extremely cool, dry spring weather such as was experienced in 1986.

Two cases of abnormally long intervals between egg laying in northern bald eagles were noted in 1986. The two birds on the right are an estimated two weeks older than the bird on the left. (86-05) DZ

Since July of 1982, 127 immature bald eagles on the Kodiak NWR have been color marked with patagial flags. Forty-one of the 127 were also radio tagged. One hundred and forty-five visual observations and over 440 radio locations have been made since initiation of the study. Movements of Kodiak Island juvenile bald eagles have been primarily within the Kodiak Archipelago. However, movements to and

from the Kenai Peninsula and across Shelikof Strait have been documented. Some differences in movement have been seen in juveniles marked on different sides of Kodiak Island. Data to date suggests that the majority of bald eagles on Kodiak Island are part of a resident population. Wintering bald eagle social and foraging behavior movements described in research from other bald eagle wintering areas also occurs on Kodiak Archipelago. Mortality of radioed juveniles is notably less (less than 25%) than reported in other studies of subadult bald eagle populations.

Kodiak NR 86 - "Steelhead Trout Movements and Habitat Use in the Ayakulik/Red River System Southwest Kodiak Island" (74530-84-01)

This study was initiated in the fall of 1984 to map and characterize overwintering and spawning habitat for steelhead on the Ayakulik River (Figure 3). In addition, the objective is to identify locations where these fish may be vulnerable to the sport fishery. Movement and distribution of steelhead are being determined by radio telemetry. Efforts in the fall of 1984 resulted in only two fish successfully being tagged, but tagging efforts in the fall of 1985 and 1986 resulted in 13 and 11 adult fish, respectively, being tagged and radio tracked.

Tagging technique in 1986 was similar to 1985 where fish were captured in a large mesh gill net drifted down stream on the lower maintstem Ayakulik River. Radio tags were inserted esophageally into the anterior portion of the stomach of captured fish.

Of the 13 steelhead tagged in the fall of 1985, eight (62%) were females and five (30%) were males. Mean length of females and males were 29.8 inches and 30.3 inches, respectively. Data on weights of fish tagged in 1985 is not complete and not present here.

Four (36%) of those fish tagged in the fall of 1986 were females. These fish had a mean length of 31.0 inches and a mean weight of 10.3 pounds. The remaining seven (64%) of steelhead tagged in 1986 were males with a mean length of 31.3 inches and mean weight of 10.8 pounds (Table 3).

A total of 126 observations on locations of marked fish were recorded from November 1985 to June 1986. During this time period five marked fish (38%) were followed until they were estimated to have emigrated back to the ocean, one (8%) fish was a definite known overwinter mortality, three (23%) experienced transmitter failure (2 during overwintering and one after moving to spawning grounds), three (23%) were estimated to be spawning mortalities, and one is estimated to have either emigrated or the transmitter failed (Table 3).

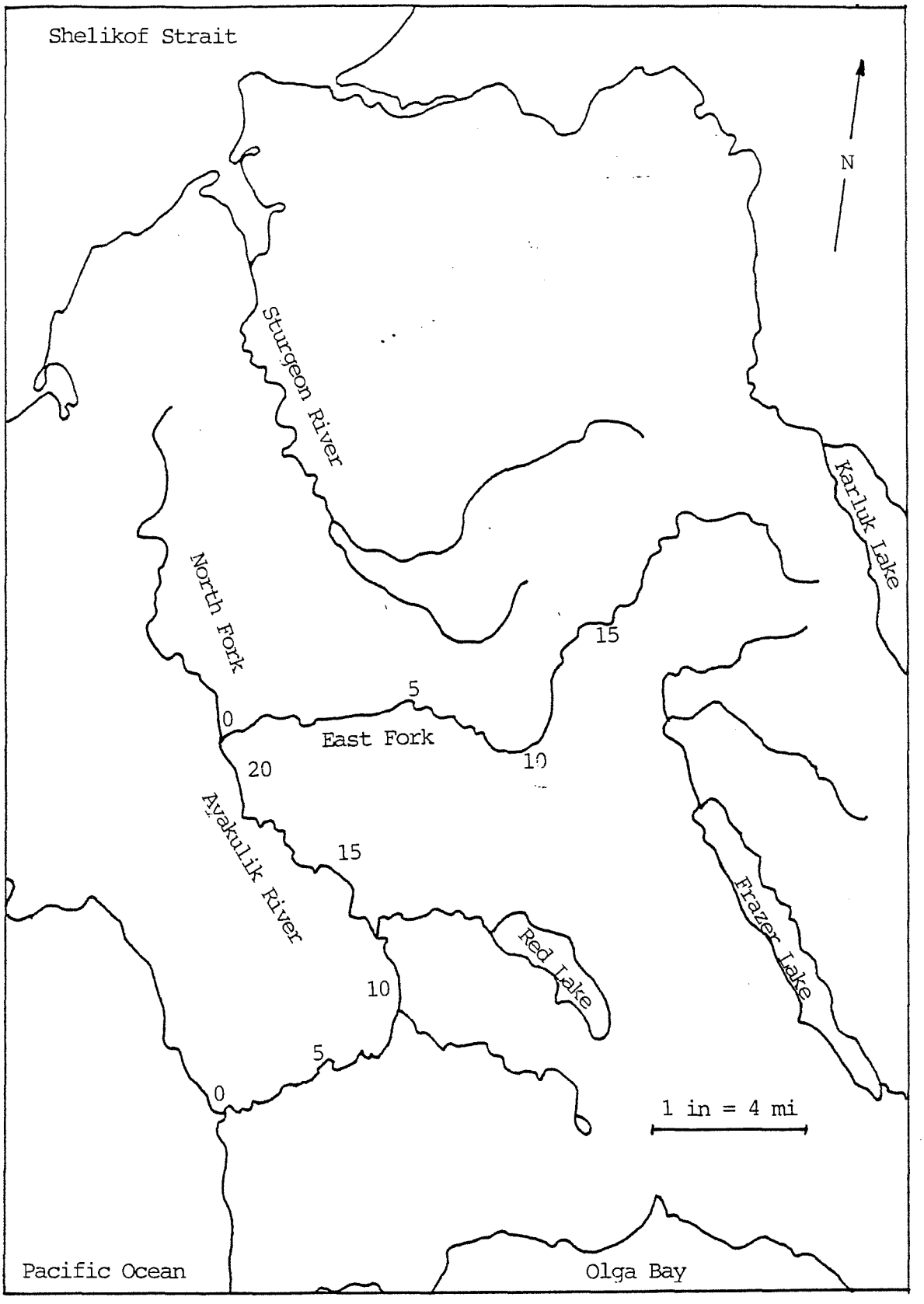


Figure 3. Ayakulik River drainage, south end Kodiak Island.

Table 3
Radio tag disbursement and estimated final status of Ayakulik River steelhead November 1985 to January 1986.

Tagging date	Location (rm)	Fish No.	Frequency (MHz)	Sex	Length (in)	Weight (lb)	(1) Status	Date
11-26-85	12.00	1	150.323	F	28.6	Unk	ETE/TF	5-30-86
11-26-85	12.00	2	152.152	M	27.6	Unk	TF	5-13-86
11-26-85	12.00	3	152.112	F	33.3	Unk	ETE	5-27-86
11-26-85	12.00	4	152.172	F	32.3	Unk	TF	4-09-86
11-26-85	12.00	5	152.272	F	30.5	Unk	SM/TF	5-13-86
11-26-85	12.00	6	152.102	M	28.0	Unk	TF	2-13-86
11-26-85	12.00	7	152.242	M	32.3	Unk	OM	2-13-86
11-26-85	12.00	8	152.132	M	28.4	Unk	ETE	6-10-86
11-27-85	12.00	9	152.302	F	29.9	10.0	ETE	6-10-86
11-27-85	12.00	10	152.212	F	26.8	7.0	ETE	5-30-86
11-27-85	12.00	11	152.293	M	32.1	11.0	SM/TF	5-30-86
11-27-85	12.00	12	152.182	M	31.3	10.0	SM/TF	5-30-86
11-27-85	12.00	13	152.223	F	29.0	8.0	ETE	5-30-86
12-11-85	12.00	14	150.203	M	33.3	11.8	SBT	12-30-86
12-11-85	12.00	15	150.214	F	31.3	10.8	SBT	12-30-86
12-11-85	12.00	16	150.223	M	30.8	9.5	SBT	12-30-86
12-11-85	12.00	17	150.269	F	31.9	10.3	SBT	12-30-86
12-11-85	12.00	18	150.320	F	28.6	8.5	SBT	12-30-86
12-11-85	12.00	19	150.350	M	31.5	12.0	SBT	12-30-86
12-12-85	11.75	20	150.338	M	30.1	9.8	SBT	12-30-86
12-12-85	11.75	21	150.363	F	32.3	11.5	SBT	12-30-86
12-12-85	11.75	22	150.372	M	29.0	9.0	SBT	12-30-86
12-12-85	8.75	23	150.383	M	32.5	12 +	SBT	12-30-86
12-12-85	8.75	24	150.393	M	31.9	11.3	SBT	12-30-86

(1)
OM - Overwintering mortality.
SM - Spawning mortality.
TF - Transmitter failure.
ETE - Estimated to have emigrated.
SBT - Still being tracked.

General Movement

In mid-December 1985 all 13 of those fish tagged in late November 1985 were located in the lower mainstem Ayakulik River between river mile (rm) 8.5 and 14.0 (Figure 3). By late December, 12 of the 13 marked fish were still located between rm 8.5 and 14.0. One fish had moved upstream from rm 10.6 into the Red River and was located at the outlet of Red Lake.

Locations of marked fish during the winter (January through mid-March) indicate very little overall movement. Of the 12 fish which were between rm 8.5 and 14.0, ten remained in this area (one of which was judged to be a mortality). One signal was also lost and not detected during the remainder of study period. Additionally one fish was not detected but locations prior to and after indicate it was also located between rm 8.5 and 14.0. The one marked fish in Red Lake remained stationary.

By early May a general movement of some tagged fish located between rm 8.5 and 14.0 was observed. Three of the marked fish moved upstream and entered the East Fork of the Ayakulik River (Figure 3) and were located between rm 2.5 and 4.5. Five fish were still located between rm 8.5 and 14.0. One tagged fish was not found but locations before and after indicate this fish was also located between rm 8.5 and 14.0. One fish remained near the outlet of Red Lake.

Observations through early June indicate five of the active transmitters which had been located between rm 8.5 and 14.0 were estimated to have emigrated back to the ocean. The one fish which had been located in the outlet of Red Lake was also suspected of returning to the ocean or the transmitter failed. The three fish which had been located in the East Fork were considered to be spawning mortalities and their carcasses were carried off by predators or the transmitters failed.

Habitat Utilization

Observations of tagged fish locations during overwintering indicate a preference for deep-glide habitat between rm 9.5 and 14.0. Movement to suspected spawning areas did not occur until late April. Subsequent locations of tagged fish show that of the 10 active tagged fish, three spawned in pool riffle complexes between rm 3.5 and 6.5 on the East Fork of Ayakulik, one at the outlet to Red Lake, and the remaining five spawned in the lower mainstem of the Ayakulik in riffle areas between rm 6.5 and 9.0. One fish was suspected to have spawned in the shallow-glide area at rm 12.0 where the Red River joins the mainstem Ayakulik.

Vulnerability to Fishery

A majority of the steelhead sport fishery is estimated to occur between rm 6.5 and 10.0 on the lower mainstem. Thus the major impact from the sport fishery could occur in this area from November through April.

Planned 1987 Activities

Radio tracking for those fish tagged in December 1986 will continue through to June 1987 and data for both periods (1985-86 and 1986-87) will be examined and, if results for these two periods are similar, the study will be terminated. If results are dissimilar then a additional year's data may be needed.

Kodiak NR 86 - "Chinook Salmon Movements and Habitat Use in the Ayakulik/Red River System Southwest Kodiak Island" (74530-85-02)

This study was initiated in late spring of 1986 to map and characterize critical spawning habitat of Ayakulik chinook salmon, and to determine timing of these fish through the sport fishery on the river. Movement and distribution of these fish is being determined by radio-telemetry.

Tagging of chinook was done by the ADF&G Commercial Fish Division (CFD) personnel at a fish counting weir located immediately above the intertidal zone in the Ayakulik Lagoon (Figure 3). Those adults trapped at the weir were instrumented by inserting radio tags esophageally into the anterior portion of the stomach. Age, weight, and length data were taken for all fish and each fish was marked with a external (floy) tag prior to release.

A total of 6371 chinook enumerated through the ADF&G weir at the lagoon between May 17 and August 30, 1986. The peak of the run occurred during the week of June 14 (Figure 4). During the run, a total of 25 adult chinook were tagged between May 28 and June 25, 1986 (Table 4). Tagged fish were tracked by aircraft at approximately weekly intervals until late August 1986.

Of the 25 tagged fish, three marked fish did not migrate upstream much above the weir site and were considered tagging or pre-spawning mortalities (Table 4).

General Movement

Twenty-two instrumented fish were followed to terminal destinations in the lower mainstem (rm 2.0 - 14.0), upper mainstem (rm 15.0 - 21.0) and the East Fork of the Ayakulik River (rm 2.0 - 14.0). None of the tagged fish utilized the Red River or Red Lake (Figure 3).

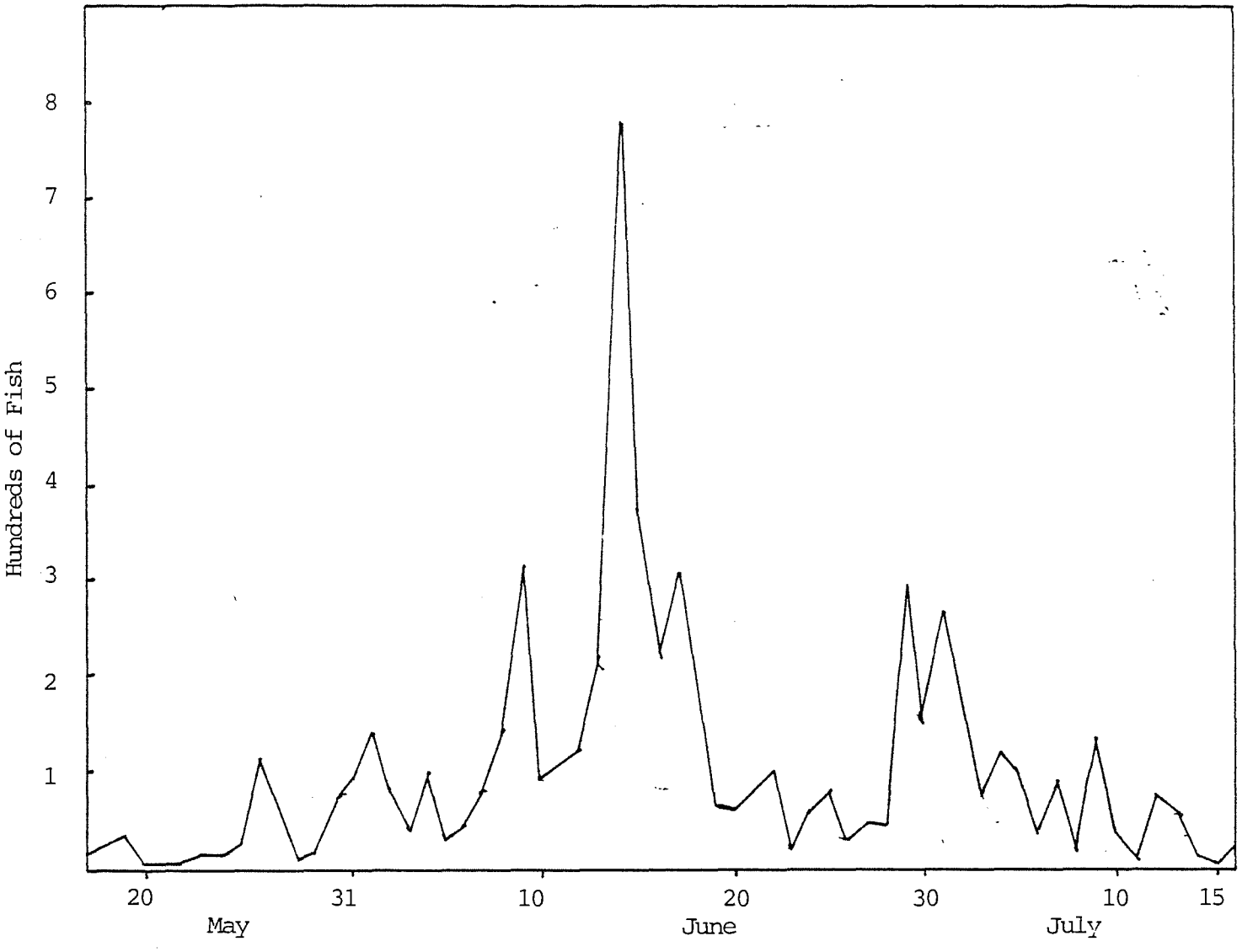


Figure 4. Chinook salmon escapement through the ADF&G fish counting weir May-July 1986.

Table 4
Tagging summary of Ayakulik chinook for 1986.

Fish No.	Frequency (MHz)	Floy Tag No.	Date	Length (in)	Weight (lb)	Sex
01	152.253	0002	5/28/86	96.0	24.5	F
02	152.343	0003	5/28/86	99.0	22.5	F
03	152.332	0004	5/28/86	82.0	15.5	M
04	152.122	0005	5/29/86	101.0	28 +	F
05	152.203	0006	5/29/86	83.5	15.5	F
06	152.262	0007	6/05/86	96.0	30 +	F
07	152.233	0008	6/05/86	100.0	30 +	F
08	152.163	0009	6/05/86	85.0	20	F
09	152.193	0011	6/05/86	87.0	Unk	F
10	152.312	0012	6/05/86	89.0	22	M
11	150.343	0013	6/05/86	77.0	18.0	F
12	150.323	0014	6/11/86	81.0	15.5	F
13	150.223	0015	6/11/86	83.0	17.5	M
14	150.396	0016	6/11/86	88.0	20.5	M
15	150.203	0019	6/11/86	86.0	16.5	M
16	150.220	0023	6/18/86	90.0	30 +	M
17	150.240	0022	6/18/86	93.0	21.0	F
18	150.430	0021	6/18/86	87.0	21.0	M
19	150.280	0055	6/25/86	107.0	28 +	F
20	150.300	0025	6/18/86	97.0	30 +	F
21	150.320	0058	6/25/86	80.0	13.0	M
22	150.310	0054	6/25/86	103.0	28 +	M
23	150.370	0056	6/25/86	89.0	17.0	M
24	150.502	0057	6/25/86	97.0	28 +	F
25	150.530	0053	6/25/86	98.0	28 +	F

Overall approximately 41, 9, and 50% of the tagged fish ended up in the lower mainstem, upper mainstem, and East Fork of the Ayakulik River, respectively. With a 1986 escapement of 6371 fish and utilizing tagging data it is estimated that in 1986 approximately 2750, 500, and 3100 spawners ended up in the lower mainstem (LMS), upper mainstem (UMS) and East Fork (EF) of the Ayakulik River, respectively. In addition, preliminary results based on the radio tagging data indicate approximately 50% of the fish entering in May during 1986, and 100% of the early portion of the run are destined for the East Fork Ayakulik, but only 17 to 33% of the late run fish are destined for the East Fork.

Based on telemetry data the estimated abundance of chinook in the LMS, UMS, and EF Ayakulik River between May and August 1986 is illustrated in Figure 5.

Habitat Utilization

Observations of tagged fish locations during 1986 indicate that those riffle areas between rm 6.0 and 10.0 on the LMS and rm 18.0 to 21.5 on the UMS were selected by a majority of the fish spawning in the main river. Spawners in the East Fork of the Ayakulik were generally concentrated in riffle areas between rm 2.5 to 5.0.

Vulnerability to Fishery

A majority of the chinook salmon sport fishery on the river occurs between rm 4.5 and 10.5 on the LMS. A public use and creel census project conducted on the Ayakulik between June 9 and July 7 (see section H-9) indicated that peak use occurred during the week of June 16. Figure 5 indicates that there were approximately 5580 chinook (88% of the total run) were present in the river between rm 2.0 and 14.0. In addition, very few fish moved upstream into the UMS and EF until the majority of the sport fishery was over. Despite the relatively high abundance of chinook in the area utilized by sport fishermen the total catch was projected at approximately 578 fish. Approximately 81% of the fish caught were released, thus estimated total harvest was approximately 110 fish. This projected harvest estimate represents less than 2% of the total escapement. Overall the sport fishery impact on the chinook run into the Ayakulik was considered to be negligable in 1986 with a mean catch per-angler-hour of less than 0.03 fish.

Brown Bear Predation

Radio marked chinook locations were co-located with radio marked brown bear in the Ayakulik River drainage during 1986. Within the entire drainage observations on the EF were the most noteworthy. As indicated in Figure 5 chinook spawners were present in the EF in abundance during and after the first week of July. By the week of July 12 it is

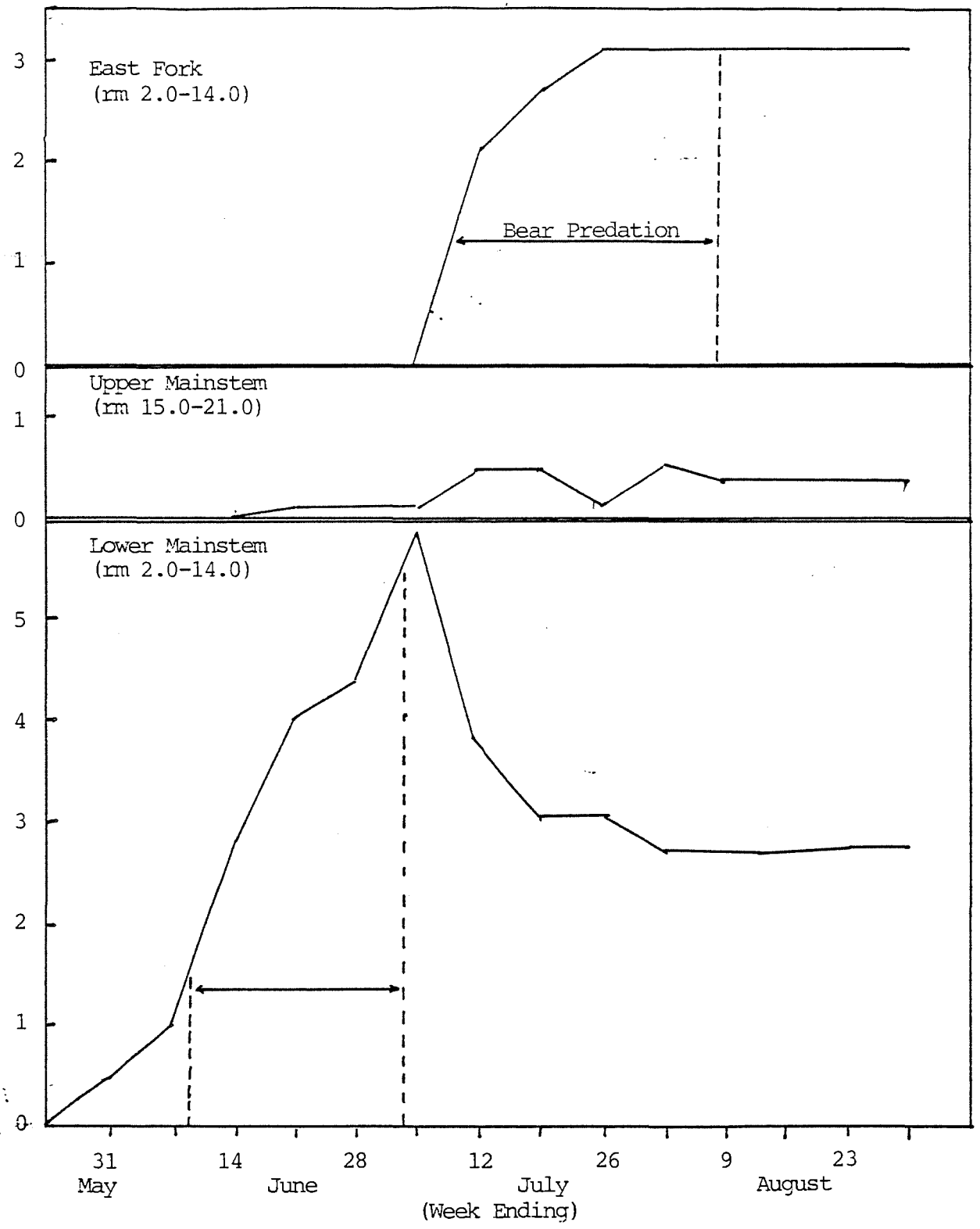


Figure 5. Estimate abundance of Ayakulik River chinook salmon through time May-August 1986. Data based on radio telemetry results.

estimated that aproximately 2120 fish were present between rm 2.0 to 14.0. Direct observation indicated a majority of these fish were located between rm 2.5 and 5.0. Aerial stream surveys conducted in 1986 indicated there was minimal targeted use of fish in the EF by brown bear prior to the first week of July. Subsequent observations indicated approximately 10-15 unmarked animals consistently utilized the EF during the month of July. In addition 14 observations of two different radio marked brown bear surveys for radio marked animals indicate that these two animals utilized the EF for catching chinook and were not normally found in the area at other times.

Although data for chinook in 1986 is considered preliminary until the results of 1987 tagging can be compared, it appears that those early run chinook are a vital and integral food source for a segment of brown bear in the area during the month of July.

Kodiak NR 86 - "Karluk Lake Sockeye Salmon Studies" (FWS 81410-02) (ADF&G)

This project was initiated in 1978 when ADF&G-FRED started work on rehabilitation of the Upper Thumb River early run sockeye, which are a sub-component of the total Karluk Lake sockeye run. The Thumb River system was considered by ADF&G-FRED to be the major producer of the Karluk system, especially the early run segment of the run. At the same time ADF&G-CFD was trying to rehabilitate the system by gradually building up the overall escapement for all segments of the Karluk sockeye (early and late). Prior to 1985 average annual escapements were between 300 to 500 thousand spawners and the ADF&G-CFD desired escapement goal was 900 thousand fish. Early historical escapement had been consistently above 900 thousand plus fish but there had been a general decline since the mid-1940's.

The refuge initially was opposed to some of the proposals by ADF&G-FRED at Karluk because of the refuge's concern for increased activity in Upper Thumb River which is considered optimum bear habitat and an initial proposal to utilize 100% of the remaining wild stock in Upper Thumb for an egg take. In addition, through an analysis done by the Services' Seattle National Fishery Research Center on the Karluk population, indications were that an egg take at Thumb River would not necessarily resolve the Karluk sockeye problem. As a result, in 1982 the ADF&G and the Service agreed to work cooperatively on the restoration of Karluk Lake sockeye. Components of the cooperative agreement included an active field project by the Alaska Office of Fish and Wildlife Research (AOFWR) to determine competator/predator relationships for Karluk sockeye and sockeye smolt studies. The ADF&G-FRED continued their effort at Thumb River by planting eyed-sockeye eggs to increase egg-to-fry survival and conducting limnological work. In addition, in 1986 a program of lake fertilization was begun (see section D-4).

The ADF&G-CFD continued their efforts to build escapement through protection of Karluk stocks in the Fishery.

Overall Project Results for 1986 are summarized below:

Alaska Office of Fish and Wildlife Research (Fish)

During 1986, sampling for predation on juvenile sockeye was completed and preliminary indications are that, although coho salmon predation on juvenile sockeye may be a limiting factor, at higher densities of sockeye the effect is minimal. Predation by Dolly Varden/char on migrating sockeye smolt was minimal and not considered a limiting factor to overall survival. The lowhead dam operated on the O'Malley River in 1985 was again installed in 1986. The purpose of this dam was to block migrating stickleback from entering O'Malley Lake for spawning. O'Malley Lake is a sub-component of Karluk Lake. The response of sockeye juvenile-stickleback interaction in O'Malley Lake is being measured. In 1986 preliminary data indicate that although the bulk of migrating adult stickleback were prevented from spawning in O'Malley Lake it appears those juveniles in the lake from previous broods are either not leaving the lake or there was a sleeper resident population which is now expanding. Plans for 1987 include operation of the barrier for a final year and measuring overall changes. This work could have major implications in the analysis of proposed or ongoing fertilization efforts since stickleback target on the same zooplanker species as juvenile sockeye but at a smaller size.

Alaska Department of Fish and Game

The 1986 adult sockeye escapement of 887.2 thousand sockeye was considered the second best escapement since 1937. Escapement in 1985 was 995 thousand fish. The harvest of Karluk sockeye in 1986 was estimated at 762.7 thousand fish. The estimated total return was approximately 1.7 million fish. A total return of this magnitude has not been observed since the late 1930's. Approximately 7.06 million sockeye fry were estimated to have migrated between April and May 1986 from the eyed egg plants on the Upper Thumb River ADF&G-FRED project. These fry are the result of a 1985 egg take from wild Thumb River sockeye. A total of 20.9 million green eggs were taken, of these 18.6 were planted as eyed eggs in the Fall of 1985.

In the summer of 1986 a total of 23.4 million green eggs were taken from Thumb River stocks, of these 19.8 million were planted as eyed eggs in Upper Thumb River. Survival of the 1986 eyed egg plant will be determined in the spring of 1987.

Kodiak NR 86 - "Alaska Department of Fish and Game Monitoring Program to Assess Project Effects During Construction and Operation of the Terror Lake Project on Salmon Egg and Fry Survival, and Trends in Salmon Escapement, Magnitude and Distribution" (ADF&G) (74530-82-05)

This study was initiated by ADF&G in 1982 due to the development of the Terror Lake Hydroelectric Project on Kodiak Island. The purpose of the study is to assess the magnitude of change, if any, in pink and chum salmon populations utilizing the Terror and Kizhuyak Rivers. The length of the study is three years during construction and three years post-construction.

A progress report for work done in 1985 was completed in 1986. This was the projects fourth year. Progress on work done in 1986 is not available yet. The primary objective so far has been the building of a data base from fry sampling and observations on salmon escapements, magnitude and spawning distribution. It is projected that actual data analysis and comparisons will be provided as the data base increases.

Kodiak NR 86 - "Investigation of Habitat Use and Evaluation of Aerial Surveys of Brown Bear in Southwest Kodiak Island" (74530-83-02)

This cooperative Research/Refuge study began in 1983 and is targeted for completion in 1987. Accomplishments in 1986 include 32 radio-tracking flights yielding approximately 900 relocations, 20 adults captured and radio-collared, intensive stream surveys (up to 8 replicates for some streams) that produced 800 bear sightings, establishment of a ground camp for observation of bear use on Connecticut Creek, digitizing of nearly 1700 relocations recorded during 1983-85, and completion of the 1985 Annual Progress Report.

Thirty-seven radio-collared bears were monitored all or part of 1986, including 17 animals marked in previous years, 10 bears that were recaptured and fitted with new collars in 1986, and 10 bears that were new captures in 1986. By year's end, 25 of those animals were alive and carrying functional radio-collars. Of the remaining 12, 2 died of natural causes, 4 were taken by hunters, 1 has an inoperative radio collar and the status of 5 has not been determined. Factors such as radio malfunction and attenuation of signals by winter dens probably account for most of the missing animals.

Five females emerged from 1985-86 winter dens with a total of 14 new-born cubs, but only 8 survived to December, 1986. Four of 17 yearlings also were lost from litters during the year.

As in 1985, bear use of salmon streams was prolonged because of an extremely poor berry crop. As late as mid-September

many bears were concentrated along streams that receive little use when berries are available. It was especially noteworthy that bears were feeding on dead and dying pink salmon in some areas.

Aerial surveys, flown between July 23 and August 7, produced high counts of bear. Twenty-four of 30 radio-collared bears that utilized survey streams were sighted at least once on a survey. The highest count (144) was recorded on July 31, with Sturgeon River and Connecticut Creek accounting for most (65%) observations.

Equally impressive counts were made from a ridge-top camp above Connecticut Creek during August 10-13. The most bears sighted along the stream at any one time was 52, but a minimum of 86 different bears were identified during the 4-day inventory period.

Recorded mortality of study bears in 1986 included 4 radio-collared adults (3 female, 1 male) and 5 marked (tattoos) subadults (2 female, 3 male) taken in the sport harvest, and 2 adult females that apparently died of natural causes.

Radio collared bears were frequently observed by visitors in the O'Malley area. (86-06) DM

Kodiak NR 86 - "Impacts of Construction and Post-construction Operation of the Terror Lake Hydroelectric Project on Brown Bears (Ursus arctos)" (74530-82-03)

This study is being conducted by the ADF&G under contract to the Alaska Power Authority. The field work phase of this study was completed in 1986; intensive data analysis and drafting of the final report are in progress. A summary of the study will be presented in the 1987 Kodiak NWR Narrative Report.

Kodiak NR 86 - "Movement, dispersal and life history of sea otters near Kodiak Island, Alaska, and relationships to shell fisheries".

This is a new study effort initiated by the AOFWR, with Tony DeGange as principal investigator. The following summarizes 1986 accomplishments.

Research was initiated near Kodiak Island in 1986 to evaluate the ongoing conflict between sea otters and fisheries over shellfish and to collect data on movements, dispersal and life history that will eventually be incorporated into a management program for sea otters in Alaska. Approximately 75% of the food items recorded eaten by sea otters were clams. At some sites within the study area near northern Kodiak and southern Afognak Islands clams constituted nearly 100% of the prey items eaten by sea otters. Additional prey of sea otters in the study area included chitons, fish, mussels, octopus, sea urchins and sea stars. Crabs accounted for 1.3% of the food items. Preliminary data strongly suggest that sea otters reduced the number, density and biomass of clams in recently invaded areas. In addition, sea otters changed the community structure of soft-sediment systems in which they fed by destroying dense tube mats of epifaunal polychaetes and by providing empty clam shells as sites of attachment for kelps and anemones. Survivorship of radio-marked sea otters during the limited tracking period to date was 0.947; the lone mortality was a female taken by a local Native hunter. Two of the remaining nine marked female sea otters gave birth to pups. With the exception of one male, all radio-marked sea otters remained within the core study area. Male sea otters tended to move greater distances than females; the latter were largely sedentry.

Although sea otters eat primarily clams in the Kodiak area they also take crab and a variety of other sea food. (86-07) DM

E. ADMINISTRATION

1. Personnel

Left to right; back row: 5, 1, 2, 13, 6
front row: 7, 14, 8, 12 (86-08) DM

Personnel

1. Jay R. Bellinger, Refuge Manager, GS-12, PFT
2. Kevin Ryan, Assistant Refuge Manager, GS-11, PFT
3. Michael T. Vivion, Wildlife Biologist/Pilot, GS-12, Transferred to Yukon Flats NWR 7/5/86 PFT
4. Kurt G. Becker, Wildlife Biologist/Pilot, GS-12, Transferred from Yukon Delta, NWR, EOD 9/27/86, PFT.
5. Donald A. Chatto, Fisheries Biologist/Pilot, GS-12, PFT
6. David W. Menke, Outdoor Recreation Planner, GS-9, PFT
7. Dennis Zwiefelhofer, Wildlife Biologist/Boat Operator, GS-9, PFT
8. Geraldine M. Castonguay, Refuge Clerk, GS-5, PFT
9. Evangeline Lamb, Clerk-Typist, GS-3, Resigned 3/4/86, PFT
10. Mary Manfredi, Clerk-Typist, GS-3, EOD 4/13/86, Termination of Appointment 6/6/86 - Temporary.

11. Patricia F. Fish, Clerk-Typist, GS-3, EOD 4/28/86, Resigned 7/11/86, PFT

12. Becky A. Brewer, Clerk-Typist, GS-3, EOD 09/22/86, PFT

13. Ronny D. Bowers, Maintenance Mechanic, WG-9, PFT

14. Rasmus G. Anderson, Laborer, WG-2, PPT

Alaska Office of Fish and Wildlife Research

15. Victor G. Barnes, Jr., Wildlife Biologist (Research), GS-12, PFT

Youth Conservation Corps

16. Marty Lafever, Enrollee, EOD 6/21/86, Separated 8/02/86

17. Jaycene Reyes, Youth Leader, EOD 6/21/86, Separated 8/31/86

Volunteers

18. John R. Heine, (Research), EOD 6/21/86, Separated 8/16/86

19. Stephanie Jones,(Refuge), EOD 6/2/86, Separated 8/16/86

20. Jeffrey S. Selinger, (Refuge), EOD 6/1/86, separated 8/28/86

Evangelinge Lamb resigned in March to accept a higher paying job with the City of Kodiak's Harbormaster Office. Van's pleasant personality was missed by all.

Mary Manfredi was hired as a temporary clerk-typist on an emergency hire from April 13, 1986 until June 6, 1986. Mary was quite competent, learned the job quickly, and we were sorry to see her leave when the appointment terminated.

Patricia Fish was hired to fill the vacant clerk-typist position on April 28, 1986. She resigned July 11, 1986.

Mike Vivion transferred to Yukon Flats NWR on July 5, 1986 as wildlife biologist/pilot. Mike was an old hand at Kodiak NWR having been here since March 1978. Mike served as Assistant Refuge Manager until 1984 when he transferred to the wildlife biologist/pilot position.

Kurt Becker transferred to Kodiak from Yukon Delta NWR in September to fill the wildlife biologist/pilot position.

Becky Brewer joined the refuge crew in September filling the vacant clerk-typist position.

Table 5 shows on board strength for the last five years.

Volunteer John Heine modeling the latest in eagle tree climbing fashion. (86-09) DZ

Table 5
Staffing 1982 to 1986

	(Number of employees) permanent full time*	permanent part time	temporary	Total FTE
FY 1986	9	1	1	9.5
FY 1985	9	1	0	9.5
FY 1984	9	1	0	9.5
FY 1983	9	1	1	9.5
FY 1982	8	0	1	8.3

* Includes career-seasonal (50 week) appointees.

2. Youth Programs

Two Youth Conservation Corps (YCC) enrollees were employed in 1986. Jaycene Reyes returned this year as a youth leader. Jaycene assisted in the office and Visitors Center most of the summer and was employed from June 21 to August 30. Marty Lafever was employed from June 21 to August 2 and was involved in a number of maintenance activities including alder control, general clean up of refuge headquarters site, vehicle washing and waxing, and establishment of lawns at quarters 1 and 2. There were no safety related incidents with the YCC program in 1986.

4. Volunteer Program

During fiscal year 1986 volunteers donated a total of 2124 hours of service to the refuge. Three summer volunteers were employed on biological surveys, bear and eagle tagging, surveys of fishing use and interpretive projects related to the refuge's public use and educational efforts. Fourteen volunteers (most associated with the Kodiak Audubon Society; Adopt-a-Refuge program) assisted the refuge by keeping the visitor center open Saturday and Sunday afternoons.

Volunteers Jeff Selinger and Stephanie Jones spent five weeks conducting a creel census and public use survey on the Ayakulik River during the king salmon seasons (see sport fishing for a summary of their findings). Jeff also was involved in cabin maintenance and various interpretive projects during the summer. Stephanie completed a survey of botanical specimens and assisted with a narrated slide program on Kodiak's wildflowers.

John Heine spent a second summer volunteering with AOFWR biologist Vic Barnes assisting with bear capture and marking, ground surveys, and data summary. John also participated in marking and radio equipping bald eagles.

Major work commitments of refuge volunteers during the past year included:

Public Use (creel census) Surveys	624 hours
Visitor Center Receptionist	430 hours
Fish and Wildlife Surveys	320 hours
Report Writing	200 hours
Environmental Education Projects	136 hours
Construction (cabin rehabilitation)	120 hours
Audio Visual Work	80 hours
Habitat Surveys	80 hours
Technical Writing	32 hours
Taxidermy	30 hours
Exhibit Preparation	40 hours
Bioexaminations	32 hours

As the above information indicates Kodiak NWR receives substantial benefits from its volunteer program allowing us

to accomplish many types of important work which would otherwise not be possible.

5. Funding

Table 6 depicts Kodiak NWR funding in thousands of dollars by programs for the last six fiscal years.

Table 6
Kodiak NWR funding levels

Program	Fiscal year 1982	1983	1984	1985	1986	1987*
MB-1210	100	100				
MNB-1220	188	322				
I&R-1240	48	48				
WR-1260 (O&M)			488.3	582.2	536	522
WR-1260 (Large ARMM)			86.7	152.8	125.9	
FR-1300	60	95	100	105	104	100
EFS-1510				1.4		
YCC-1520			4.9	2.8	3.4	1.7
Totals	396	565	679.9	842.8	769.3	623.7

* These figures represent planning totals for FY 87 without add-ons and are subject to change.

A total of 476.7 of the 1987 planning budget will be needed to cover fixed cost (76%). After other airplane costs (64K), printing cost for final CCP (22K), helio rental for research project support (12K), and necessary travel cost (18K) are deducted, only 31K (4%) of the budget remains for operations. This amount does not allow any flexibility for equipment replacement and may not cover needed expenditures for supplies.

6. Safety

Two accidents occurred in 1986, neither of which resulted in lost time. Fishery Biologist/Pilot Tony Chatto slipped on the entry strut of refuge aircraft N765 while exiting the aircraft. He fell against the wing strut and impacted his throat. Tony noted oil on his boot after the accident and this may have caused him to slip.

Maintenance Mechanic Ron Bowers was cutting old rain gutters off two refuge residences and bunkhouse on October 6. Metal particles got into his hair and on his face. When he went home after work a particle from his hair or face got in his eye and was aggravated by his rubbing it. Ron went to the doctor the next morning and was told he had a cut or "hole" in his eye.

Laborer Rasmus Anderson returned to work on March 18, 1986. Rasmus injured a deformed hip in a fall on November 8, 1984. He had been on sick leave and leave without pay since that time except for a few days in August 1985.

A Tsunami alert was issued for Kodiak Island waters on May 8 due to an earthquake in the Aleutian Islands. We did not get word in sufficient time to get the refuge vessel, Ursa Major, to safe waters so we took the log book, checked mooring lines and hoped for the best. No tidal wave materialized.

F. HABITAT MANAGEMENT

1. General

Kodiak Refuge encompasses about two-thirds of Kodiak Island, all of Uganik and Ban Islands, and part of Afognak Island in southwestern Alaska. The islands, part of the Kodiak Archipelago, lie at the western border of the gulf of Alaska in the Pacific Ocean.

Although Kodiak Refuge is larger than the State of Delaware, with about 1,886,000 acres of federal and Native lands, no place in the refuge is more than 15 miles from the sea. The refuge contains a variety of landscapes, including glacial valleys, tundra uplands, lakes, wetlands, sand and gravel beaches, salt flats, meadows, and rugged mountains. The mountainous interior is covered by lush, dense vegetation in summer. Vegetation varies from tundra type plants on the south end of Kodiak Island to a dense Sitka spruce forest on Afognak Island.

Kodiak Refuge is managed essentially as de facto wilderness (73% of the refuge has been recommended for wilderness designation in the preferred alternative of the CCP). Most of the habitats on Kodiak remain in a relatively undisturbed

Bear tracks in the high country are a common sight in early spring. (86-10) VB

Upper reaches of the Ayakulik River drainage offer some of the most primitive habitat on the Refuge. (86-11) J. Heine.

state, the major exception being the coastline, where considerable human development has occurred.

6. Other Habitats (Aquatic)

Manipulation of the rearing habitat for juvenile sockeye salmon in the Karluk Lake (fertilization) was initiated in June 1986. The project objective is to increase the amount of available nutrients in the lake and enhance sockeye growth. Refer to section D-4.

9. Fire Management

There were no fires reported on refuge lands in 1986. The Interagency Fire Management Plan completed in 1985, was signed off on in early 1986. This plan, involves the Fish and Wildlife Service, Bureau of Land Management (BLM), National Park Service, Bureau of Indian Affairs, ADF&G, and Alaska Department of Natural Resources-State Forestry Division. Essentially the plan outlines a let-burn strategy, with suppression used only to prevent damage to private property or human life.

11. Water Rights

A land withdrawal history for the Kodiak was completed in 1986. The purpose of the history is to form the basis for establishing Federal Reserved Water Rights. The refuge received word in 1986 that the BLM had determined no water bodies within the refuge are navigable.

12. Wilderness and Special Areas

There is currently no designated wilderness on Kodiak NWR. The draft CCP has recommended that 73% of the refuge (1,170,000 acres) be designated wilderness as shown in the preferred alternative. The Wilderness designation, if adopted, will include most interior areas and the heads of many bays with critical resource values. Unfortunately, many important areas which have been conveyed to Native corporations as a result of ANCSA will not be protected by wilderness designation although they have some of the highest wildlife values on the island. These areas include much of the Karluk, Sturgeon and Dog Salmon drainages. It is expected that the final CCP recommendation will be for 73% wilderness designation. The record of decision for the plan should take place in mid 1987.

G. WILDLIFE

2. Endangered Species

Humpbacked whales are occasionally sighted within the nearshore waters adjacent to the refuge during seasonal migrations. Humpbacks winter in the warm tropical waters of Hawaii and spend their summers in the Arctic Ocean passing by Kodiak Island during their sojourn. On September 12, three pairs of humpbacks were observed in outer Uyak Bay.

3. Waterfowl

Twelve tundra swans, including two cygnets, spent the winter months of January and February along the Ayakulik River marking the fourth winter in a row tundra swans have wintered on the refuge.

The first flock of spring tundra swan migrants were observed on March 21 at Womens Bay. Forty-two tundra swans were observed on the Ayakulik and Karluk on December 29 representing the largest number of tundra swans recorded on the refuge during December.

Two swans with blue neck collars, along with 5 uncollared swans, were observed in Olga Bay on February 17 and 18. Unfortunately, the observer was unable to read the collar codes making it impossible to determine the marking locations and species. It did appear that there were 4 figures in the code suggesting the swans are either tundra swans from Izembeck NWR or trumpeter swans from Kenai NWR.

A dead tundra swan was found on Mill Bay beach on April 16 and brought into refuge headquarters. The bird appeared to have died of starvation and was sent to the University of Alaska at Fairbanks to enlarge their natural history collection.

Unusual spring migrants included 2 smews observed in Womens Bay on March 18. An Eurasian wigeon was seen in the same area on March 27. A female tufted duck was observed on Lake Louise on April 5.

The annual refuge tundra swan nesting survey was conducted on May 27-28 and June 16. A total of 105 tundra swans including 20 nest sites and a single cygnet were counted during the survey. Below normal precipitation in April and May (7 inches below the 30 year mean) had an adverse effect on the refuge nesting tundra swan population. Many of the ponds usually used by the swans had water levels 2 to 3 feet below normal, with some ponds being completely dry. The follow-up productivity survey conducted on September 4 reflected the poor nesting conditions as only 7 broods containing 17 cygnets were found. This is approximately half of the normal

annual refuge tundra swan production. A summary of the 1986 and past refuge tundra swan surveys is presented in Table 7.

A small flock of approximately 80 emperor geese spent the winter of 1985 in the Womens Bay area and were again present during 1986. Four of these geese were neck collared on the Yukon River Delta in July of 1985 and were identified again adding to the evidence that this is the same flock which was present in 1985.

Other spring migrants included 48 black brant observed in Kalsin Bay on May 12 and 8 greater white-fronted geese in Womens Bay on May 7.

Two separate observations of Canada geese occurred in the Terror Lake area during 1986. On June 24 a pair of Canada geese were seen on a small beaver pond approximately 10 miles northeast of Terror Lake and on July 3 a flock of 7 Canada geese were observed in the same area.

Waterfowl observations of fall uncommon migrants included approximately 100 greater white-fronted geese in Sukhoi Lagoon on September 4 and 40 greater snow geese seen in Halibut Bay November 15-18.

4. Marsh and Waterbirds

A new addition to the refuge bird list was made when a pair of sandhill cranes were observed May 27 on the Ayakulik River. It is not believed the pair nested on the refuge as no further sightings were made during subsequent aircraft flights through the area.

5. Shorebirds, Gulls, Terns and Allied Species

WB Zwiefelhofer assisted WB Nysewander of the Alaska Maritime NWR in conducting seabird breeding colony surveys in Chiniak Bay on June 17-22. Black-legged kittiwakes, pelagic, and red-faced cormorant were the three target species surveyed. A total of 8438 black-legged kittiwake nests from 17 different colonies were tallied during the intitial survey. Pelagic cormorant nests totalled 648 nests from 21 colonies with 319 red-faced cormorant nests counted in 12 different colonies. Increased harassment of the colonies by bald eagles has been noted since the surveys began in 1975. As many as 11 bald eagles were observed at one point soaring in the vicinity of Long Island colonies during the surveys. This harassment may at least be partially responsible for the low production over the last two years.

Productivity surveys were conducted on August 4-8 with essentially no production of young in all three species. Only 17 young black-legged kittiwakes were hatched from the over 8400 nests. The cormorants fared only slightly better with 44 young pelagic cormorants counted and 12 young red-

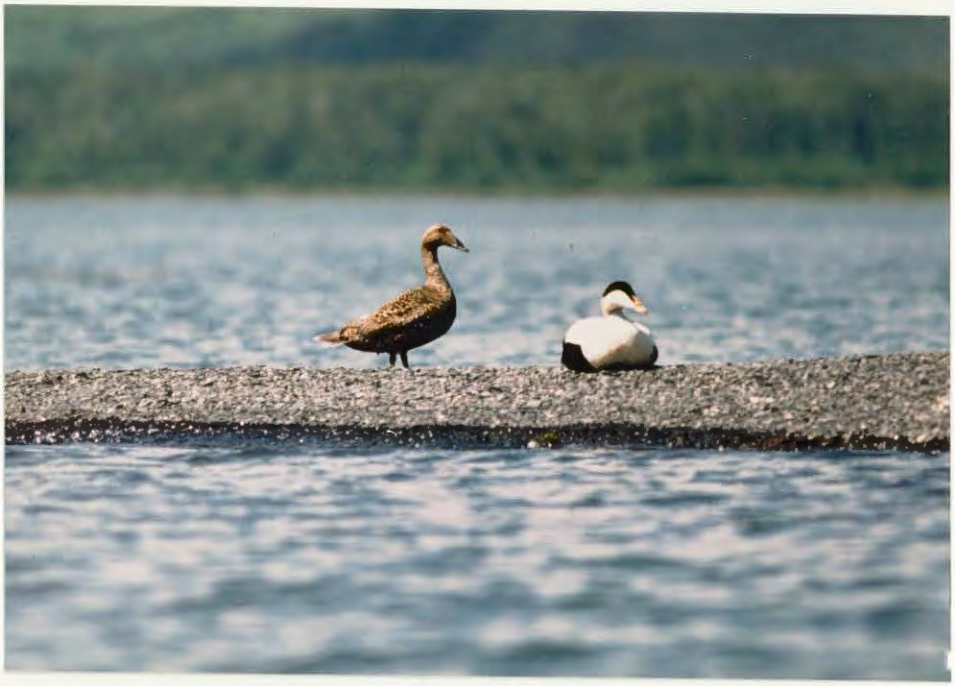
Table 7
Kodiak NWR Tundra Swan Spring Summary

			Adults and Subadults					
Year	No. maps	No. obs.	In pairs	As singles	In flocks	Subtotal	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

Kodiak NWR Tundra Swan Fall Summary

			Adults and Subadults						
Year	No. maps	No. obs.	In pairs	As singles	In flocks	Subtotal	Cygnets	Percent juveniles	Total swans
1980	8	28	46	5	0	51	32	39	83
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

Average brood size - 2.43



Common eiders nest on many small islands near Kodiak. (86-12) DM

Emperor geese congregate along the rocky beaches of Womens Bay near the U.S. Coast Guard Base. (86-13) DM

Red-throated loon. (86-14) DM

Arctic terns. (86-15) DM

Both tufted (above) and horned puffins (below) are common on small off shore islands surrounding Kodiak Island. (86-16) DM

(86-17) DM

Black oystercatchers are very common along the rocky shores of Kodiak as a year-round resident. (86-18) DM

Semi-palmated plover. (86-19) DM

faced cormorants. One colony, near the seafood waste processing plant, accounted for 42 of the pelagic young and all of the young red-faced cormorants. Several colonies of cormorants (both species) had renested after the June survey and were found to be still incubating eggs when the August survey was done. These nests were not expected to fledge any young.

The annual wintering pelagic seabird and waterfowl survey was conducted February 8-15. The results of the 1986 survey are presented in Table 8.

6. Raptors

Two observations of Peale's peregrine falcon were reported during 1986. The first sighting was of an immature bird observed over a two month period (January-February) in the Dry Spruce Bay area. The second observation was an adult falcon seen off Cape Chiniak on May 12. A peregrine eyrie in the same general vacinity was inactive in 1986.

A great grey owl was observed for the first time on the Kodiak Archipelago during the past year. The owl was first sighted on January 20 in the Dry Spruce Bay area and was heard hooting in the same locality several times throughout the winter. It was last heard on March 29.

The Kodiak NWR has surveyed bald eagle nesting activity for nearly twenty years. Because of personnel and budget constraints it is not always possible to survey the entire refuge each year. The refuge's migratory bird management plan calls for a refuge wide survey every five years. During 1986 random plots consisting of five degree longitude-latitude blocks were used to survey bald eagle nesting habitat on the refuge. A total of 28 fifteen minute quadrangle maps cover all the refuge lands with twelve 5-minute blocks on each map. Historic survey data (1963-67, 1972, 1975, 1982) during years the entire refuge had been surveyed for nesting bald eagles were utilized to determine the stratum for each plot. All the plots which were known to contain bald eagle nesting habitat were stratified into either high density (mean of 2 or more active nests/year) or low density (mean of less than 2 active nests/year) nesting habitat. One hundred thirty-four plots were found to contain nesting habitat of which 93 plots were low density and 41 were high density. Random number sets for the two different strata were generated with 11 (12%) of the low density plots and 12 (29%) of the high density plots selected to be surveyed.

The plots were flown May 17 and 21 to determine bald eagle nesting population. A total of 18 occupied nests and 33 unoccupied nests were located in the low density stratum plots (mean of 1.64 occupied nests/plot) and 53 occupied

Table 8
Densities of the most frequently occurring species or species groups observed in five bays of Kodiak Island, 1980 to 1986.

Species	Winter 1980	1981	1982	1983	1984[a]	1985[a]	1986[a]
Loons	0.47	0.87	0.76	0.85	0.56	0.54	0.97
Grebes	0.79	0.63	0.92	1.58	1.45	0.97	0.80
Cormorants	5.20	7.13	7.05	6.08	5.12	4.55	5.25
Goldeneyes	2.00	2.54	1.97	1.18	3.25	2.82	3.07
Oldsquaw	25.37	19.67	12.82	11.51	10.68	5.42	9.37
Harlequin Duck	3.24	3.25	3.35	3.01	3.81	3.14	3.77
Eiders	3.74	2.87	3.43	5.80	0.49	0.10	0.78
Black Scoters	10.54	12.18	10.58	12.59	7.55	8.31	7.13
White-winged Scoters	7.51	6.56	4.33	6.53	4.57	4.43	1.94
Surf Scoters	1.19	1.04	1.18	1.08	1.75	0.73	1.24
Unidentified Scoters	2.90	0.00	0.00	0.00	0.58	0.00	0.09
Total Scoters	22.14	19.78	16.09	20.20	14.45	13.47	10.40
Mergansers	0.84	0.53	0.40	0.45	0.96	0.82	1.62
Glaucous-winged Gull	1.94	1.95	1.16	3.71	8.75	1.80	4.73
Mew Gulls	2.61	4.20	4.49	3.23	4.07	2.26	5.32
Black-legged Kittiwake	0.14	0.12	11.72	0.46	3.40	0.13	0.36
Murres	106.57	49.23	71.95	38.26	31.28	14.35	39.85
Pigeon Guillemots	2.51	3.08	2.40	2.26	3.18	1.50	1.73
Brachyramphus Murrelets	7.93	4.90	10.29	4.30	9.82	1.70	5.82
Crested Auklets	6.99	0.44	0.40	13.82	0.07	4.26	18.62
Total Birds[b]	194.63	122.17	149.84	117.93	102.13	59.84	115.50

[a] - Data includes only Uyak Bay, Uganik Bay, and Kupreanof Strait.

[b] - Includes all species observed, not just species in above table.

nests and 60 unoccupied nests (mean of 4.17 occupied nests/plot) in the high density stratum plots (Table 9).

Using these data to estimate the total refuge bald eagle nesting population (95% CL) indicates a total of 323 (range 190 to 457) occupied nests during the 1986 nesting season. However, when analyzing the historic data using the same random plots the number of estimated occupied nests were on the average 30% greater than the actual number observed. If this correction factor of 30% is applied to the 1986 data, the adjusted number of occupied bald eagle nests on the refuge drops to 226 (range 133 to 320) and is probably closer to the actual nesting pair population.

On August 20 and 23, 49 of the 53 occupied nests in the high density plots and all 18 of the occupied nests in the low density plots were checked for production of young eagles (Table 10). Twenty-nine (59%) of the 49 nests in the high density stratum produced a total of 36 fledglings (.73 yg/ occupied nest) while 11 of the 18 (61%) occupied nests in the low density stratum produced a total of 14 fledglings (.78 yg/occupied nest).

An estimate of the total number of successful nests on the refuge by expanding from the random plot data would project a total of 136 (range 80 to 192) nests would produce young of the 226 nests estimated to be occupied. A total of 109 (range 64 to 154) bald eagle fledgings would be produced from the 136 nests. Both these estimates use the "corrected" number of occupied nests (226) projected from the random plots.

In addition to the nests surveyed in the random plots, 54 bald eagle nests from other areas on Kodiak Island were checked for production. Of these, 37 were successful (69%) producing a total of 50 young for an average of .93 young per occupied nest. This is slightly higher production than seen in the random plots but is felt to be biased as studies have shown that most nest failure occurs during the early portion of the breeding season. Therefore, it is more likely for occupied nests located later in the nesting season to be successful in producing young than those nests found to be occupied during the early portion of the breeding season.

Overall bald eagle nesting success and productivity on the refuge was lower than the 17 year average of 62% nesting success and 1.4 young per occupied nest. A cold dry May along with a delay in the start of the salmon runs could have been responsible for the decrease.

The entire refuge will be surveyed for nesting bald eagles during 1987 and the suitability of the random plots utilized in 1986 will be reviewed for accuracy.

Table 9
Kodiak NWR bald eagle nesting survey random plot data summary, May, 1986.

Stratum	Total plots	Plots sampled	Number occupied nests	Mean occupied nests	Estimated occupied nests in strata
High	41	12(29%)	53	4.2	171
Low	93	11(12%)	18	1.6	152
Totals	134	23	71		323*

* Total without 30% correction factor (CF) applied. With the CF, an estimate of 226 nests were occupied on the Kodiak NWR during 1986.

Table 10
Kodiak NWR bald eagle productivity random plot data summary, August, 1986.

Stratum	Occupied nests sampled	Occupied nests successful	Number young fledged	Number young/ occupied nest
High	49	29(59%)	36	.73
Low	18	11(61%)	14	.78
Totals	67	40	50	.75

Total refuge production without the 30% CF is estimated to be 155 fledglings.

7. Other Migratory Birds

Unusual sightings of other migratory birds included a three-toed woodpecker in the Fort Abercrombie State Park on March 24. An unidentified hummingbird, which was likely a rufous hummingbird, was seen during August in Kodiak. Since the species couldn't be determined, a new addition to the Kodiak birdlist was not made.

Orange-crowned warbler. (86-20) DM

8. Game Mammals

A. Brown Bear

Surveys

Aerial composition surveys were flown during July 23 to August 7. The number of replicate flights per stream ranged from 3 (Dog Salmon Creek) to 9 (Sturgeon River, Connecticut Creek). Three flights included all five of the traditional survey streams, providing total counts ranging from 57 (July 23) to 144 (July 31). The low count on July 23 was attributed to heavy rains that occurred on days immediately preceding the survey. High water undoubtedly curtailed fishing activity of bears. Peak counts of bear on individual streams were as follows:

Stream	Date	No. Bears
Sturgeon River	July 31	48
Connecticut Creek	July 31	45
Pinnell Creek	August 6	32
Southeast Creek (Red Lake)	August 7	41
Dog Salmon Creek	July 31	16

Peak counts for Pinnell and Southeast Creeks were the highest on record, and the count on Connecticut Creek was the second highest on record. Surveys of Sturgeon River and Connecticut Creek accounted for over 55% of sightings on complete surveys and 61% of observations for all surveys.

Table 11 shows composition of bears observed during 1986 stream surveys.

Alpine surveys were not flown in 1986. This marks the third consecutive year that poor weather has prevented us from flying those inventories.

Mortality

The 1986 sport harvest on Kodiak NWR totalled 121 animals (Table 12), including 79 taken during the spring season (April 1 - May 15) and 42 harvested in the fall season (October 25 through November 30). Males accounted for 60% of the harvest. The refuge harvest comprised 72% of the total harvest for Game Management Unit (GMU) 8 (Kodiak Archipelago).

Twenty non-sport mortalities were recorded in 1986, including 12 DLP kills and 8 kills attributed to other causes (unknown, natural, research; Table 12). Defense of life and property mortality continues to be a serious concern because an increasing trend is becoming apparent and we suspect that unreported kills are also increasing: Deer hunting activity is the single most important factor contributing to DLP mortality. Six of 12 DLP kills on the refuge and 9 of 15 kills for all of GMU 8 were attributed to deer hunters.

Table 11
Comparison of aerial stream counts
of brown bear, 1978 to 1986

Year	No. surveys complete	No. surveys partial	Single bear no.	Single bear %	Maternal female no.	Maternal female %	Yearling no.	Yearling %	Cub no.	Cub %	Total no.
1978	3	0	63	44	26	18	33	23	22	15	144
1979	3	0	38	54	12	17	12	17	9	13	71
1980	3	1	134	65	23	11	41	20	7	3	205
1981	7	2	169	55	41	13	79	25	21	7	310
1982	7	3	430	48	150	17	207	23	107	12	894
1983	---------- No Counts ----------										
1984	6	1	186	51	56	15	69	19	56	15	367
1985	6	4	434	54	110	14	189	24	67	4	800
1986	3	6	445	55	115	14	191	24	54	7	805
Average				53		15		22		10	

During a 5-day period in August over 80 different bears were identified from this camp overlooking Connecticut Creek. (86-21) J. Heine

Two females contest rights to a favored fishing spot.
(86-22) DM

"Unexplained fish-flipping behavior of Kodiak bears."
(86-23) DM

Sow brown bear looks inquisitively toward shore where her cubs wait for her to return with fish. (86-24) DM

Typical Kodiak bear family seen near Frazer Lake. (86-25) DM

Table 12
Sources of brown bear mortality on
Kodiak NWR, 1976 to 1986

Year	Source			Total
	Sport	DLP*	Other**	
1976	88	-	2	90
1977	98	3	-	101
1978	106	2	-	108
1979	105	3	-	108
1980	101	5	1	107
1981	112	3	2	117
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
1976 to 1984 Average = 101				

* Defense of Life and Property.
** Includes accidental study deaths and mortality from natural or unknown causes.

B. Mountain Goats

The 1986 mountian goat hunt was a drawing permit hunt with a September 6 to October 31 season. One hundred drawing permits were issued, 56 hunters reported they went into the field, and 40 (71%) hunters were successful. Males comprised 58% of the kill. About one-third of the harvest was estimated to have occurred on the refuge, with the remainder taken in areas adjacent to the northern boundary of the refuge (Table 13). The 1986 kill was 4 greater than in 1985 but 15 less than in 1983.

Population composition and trend data collected by ADF&G indicates that mountain goat numbers in the northern part of Kodiak Island are stable or slightly declining, but that the population is expanding into the southern (refuge) part of Kodiak at a slow rate. An aerial survey in February, 1986, indicated that overwinter of goats was good.

Table 13
Kodiak NWR goat harvest - 1986

Hunt area	Date	Sex	Location
873	10/24	M	East Terror Lake
873	10/24	F	East Terror Lake
874	9/8	F	West Terror Lake
874	9/8	F	West Terror Lake
874	9/28	M	Mt. Glottof
874	9/29	M	Mt. Glottof
874	9/29	F	Upper Uganik River
874	10/5	F	West Terror Lake
874	10/5	M	West Terror Lake
874	10/30	M	West Terror Lake
876	9/9	M	Upper Uganik River
876	10/4	M	Upper Uganik River

C. Sitka Black-tail Deer

The 1986 deer hunting season on Kodiak NWR extended from August 1 to January 7; the annual bag limit was 5 animals, with antlerless deer allowed after September 14. Subjective estimates of the number of hunters afield and animals harvested are 1600 and 3600, respectively. These figures are based on results of an ADF&G hunter survey (questionnaire) conducted in 1984 for all of GMU-8, with an adjustment for the percent of GMU 8 hunters that use the refuge. A survey done by refuge staff (See Section H-8) indicated that hunter success in 1986 (2.0 per hunter) was similar to that reported in the 1984 survey (2.3). Both surveys determined that bucks comprise over 70% of the harvest.

A relatively mild 1985-86 winter contributed to good deer survival into 1986. Although some hunters believe deer numbers have declined in a few areas along the west side of Kodiak Island, deer densities remain high throughout most of the refuge.

D. Roosevelt Elk

Hunters reported seeing 19 elk on Ban Island during the fall of 1986. Two elk were harvested from Ban Island during the elk hunting season. Sightings of elk have been reported from Uganik and Uyak Bays, however, these sightings have not been documentd by ADF&G or refuge personnel.

Kodiak NWR provides excellent habitat for Sitka black-tailed deer. (86-26) VB

9. Marine Mammals

No sea otter surveys were flown in 1986. The 1985 surveys were summarized by wildlife biologist Terry Simon-Jackson from the Anchorage Wildlife Assistance Marine Mammal Management Project in early 1986. A total of 2811 sea otters was observed in the 1985 survey. Direct comparison of the overall results with those of the 1975-76 and 1984 surveys is not possible as the surveys do not cover the same area due to adverse weather conditions. However, some trends in specific areas may still be apparent.

A comparison of the 1985 survey results with the 1984 survey reveals difference in distribution and relative abundance. Observations of sea otters totalled 2811 animals in the 1985 survey compared to a total count of 2662 animals for the same area in the 1984 survey. In the 1984 survey population centers appeared to be located at Kupreanof Strait, Raspberry Strait, Bluefox Bay, Shuyak (west), Latax Rocks, Shuyak (North), and Sea Otter Island. In the 1985 survey numbers are comparatively lower for Raspberry Strait, Latax Rocks, Shuyak (North) and Sea Otter Island. Numbers for Perenosa Bay and Seal Bay were higher in the 1985 survey than the 1984 survey, but still don't approach the counts for the 1975-76 survey. Numbers were higher in Afognak Strait, Whale Island, Marmot Bay area (7 in 1975-76, 106 in 1984, 750 in 1985). Adverse weather prevented a survey of the east side of Afognak Island in 1985 so it is difficult to predict where

these sea otters came from. We believe they moved into the area through Raspberry and Kupreanof Straits either as a result of normal dispersal patterns or because of Native hunting pressure.

10. Other Resident Wildlife

A. Reindeer

No surveys on this species were completed this year. Segments of the small reindeer population were observed periodically during the year. Population levels are thought to be steady or slowly declining. No information on harvest is available although the relative difficulty and cost of hunting reindeer versus deer on Kodiak limits this activity to a very few individuals.

B. River Otter

In the 1985-86 trapping season, a total of 64 river otters was taken on the refuge. Table 14 shows a breakdown by area.

Table 14
Kodiak NWR river otter harvest 1985-86 season.

Area	Sex			Total
	Males	Females	Unknown	
202-Blue Fox Bay	Nothing reported harvested			
304-Uganik Bay	1	5	0	6
306-Spiridon Bay	2	0	0	2
307-Uyak-Zachar Bay	1	0	0	1
308-Inner Uyak Bay	Nothing reported harvested			
309-Larsen Bay	3	1	8	12
312-Olga Bay	22	4	1	27
313-Frazer Lake	14	2	0	16
Total	43	12	9	64

11. Fisheries Resources

The Kodiak National Wildlife Refuge provides freshwater habitat for populations of all five species of Pacific

salmon, steelhead, rainbow trout, arctic char, and Dolly Varden. These refuge-based fishery stocks support a viable and active commercial, sport and subsistence (personal use) fishery which is regulated by the ADF&G-CFD, Sport Fish and FRED located in Kodiak. Species distribution, habitat use, escapement and harvest, and public use is monitored by the refuge fishery program utilizing data collected by ADF&G and field programs carried out by refuge personnel.

The Commercial Fishery

The 1986 commercial salmon catch in the Kodiak area totalled approximately 16.0 million fish worth an estimated ex-vessel value of approximately 36.5 million dollars. The estimated contribution of refuge based stocks was approximately 12.8 million salmon with an ex-vessel value of approximately 31.2 million dollars (Table 15). Harvest of refuge based stocks was above the 1981-85 average for all salmon species. The most noteworthy change was the harvest of sockeye which was 236% above the 1981-85 average of 770 thousand fish (Table 16). Overall refuge based stocks contributed 80% of the Kodiak area harvest in total numbers of fish and 85% of the total exvessel dollar value.

Salmon seiners off mouth of Ayakulik River. Refuge based salmon stocks contributed an estimated 31.2 million dollars to the commercial fishery in 1986. (86-27) DZ

Table 15

Estimated numbers, species composition and dollar value of commercially caught salmon by all gear types duing 1986 calculated to be of Kodiak NWR origin. (1)

Species	ADF&G Geographical Harvest Districts								Total	Ex-vessel value ($000's)
	Afognak	Uganik	Uyak	Karluk	Sturgeon	Red	Alitak	General		
Chinook	0	331	164	1428	157	1899	130	42	4151	57000
Sockeye	0	218174	155927	682467	131546	421374	965933	16947	2592368	22554000
Coho	38	14664	17594	33974	6677	20732	29146	7069	129894	808000
Pink	4256	3483785	1264338	3068875	329468	330364	722879	225751	9429716	6203000
Chum	0	264077	96526	107377	12003	20804	74853	34352	609992	1551000
Total									12766121	31173000

(1) Data compiled from ADF&G 1986 catch statistics for the Kodiak Management Area. Ex-vessel values are preliminary projections of actual value.

Table 16
Estimated average annual harvest and escapement values
for Kodiak NWR based salmon stocks 1981-85 compared to 1986 values. (1)

Species	Harvest		Indexed Escapement		Total Returns	
	Average 1981-85	1986	Average 1981-85	1986	Average 1981-85	1986
Chinook	2202	4151	15844	11022	18049	15173
Sockeye	770082	2592368	1426052	1853209	2359656	4445577
Coho	95004	129894	60981	74182	155985	204076
Pink (Even yr)	8290958	9429716	3745560	2891306	12036517	12321022
Pink (Odd yr)	3692772	0	1069501	0	4762272	0
Chum	486200	609992	300099	463550	786299	1073472

(1) Data compiled from ADF&G catch statistics and index salmon escapement counts for Kodiak area.

Sport Fishing

Sport fishing on refuge streams occurs in late May through July for chinook salmon, rainbow trout, and char, then again in September through November for coho salmon, steelhead trout, and char. Although coho salmon and char are present in all major and some minor systems on the refuge, chinook salmon and steelhead are only known to be abundant in the Karluk and Ayakulik/Red River systems. A smaller but accessible number of chinook and steelhead also occur on the Dog Salmon River which drains Frazer Lake. Table 18 depicts the known and peak escapement counts on refuge streams which supported species of major interest to sport fishermen during 1986. The actual numbers of coho salmon and steelhead trout which continue to enter the systems throughout the fall months is unknown.

Actual catch of chinook salmon on the Ayakulik River was 484 fish with a projected total catch of approximately 578 fish (See Section H-9). The total catch of chinook on the Karluk River is unknown but is projected to be less than 500 fish. Of these figures for both river systems it is estimated that approximately 80% of the fish caught are released.

Sport fishing harvest figures for steelhead, rainbow trout, coho salmon, and char on the refuge are unknown. Sport harvest on the Ayakulik River during the month of June 1986 is presented in Table 17.

Salmon Escapement

Adult salmon and trout escapements to the river systems on the refuge were monitored through ADF&G fish weir counts and aerial index surveys. Preliminary composite escapement index numbers for 1986 are presented in Table 18. Overall the 1986 salmon index escapements into refuge streams for sockeye (Table 19), coho and chum salmon were above the 1981-85 average by 30, 22, and 54% respectively. Escapement indexes of chinook and pink salmon were 30 and 23% below the 1981-85 average (Table 16).

For the second year in a row, sockeye salmon escapement into the Karluk system approached ADF&G's desired escapement goal of 900 thousand adult spawners. As in 1985, this escapement has not been met since 1938.

Although the overall chinook escapement index was 30% below the 1981-85 average, individual escapement indicies for the Karluk and Ayakulik Rivers was considered to be adequate for future production.

Steelhead escapement indexes (kelt counts) for systems important to sport fishing were comparable to previous years with the exception of the Karluk River (Table 18). Only 296 steelhead kelts were enumerated passing downstream through the weir in May through July of 1986. The 1986 count is only

Table 17
Ayakulik River creel census June 9-July 6, 1986

	Guided		Not guided		Total	
	released	retained	released	retained	released	retained
Chinook	154	26	240	64	394	90
Sockeye	84	19	259	18	343	37
Steelhead	210		82	1	292	1
D. Varden	91		27	1	118	1
Rainbow			5		31	
Total	565	45	613	84	1178	129
Day Use Breakdown						
Chinook	23	17	10	14	33	31
Sockeye	34	4	5		39	4
Steelhead			12		12	
D. Varden	1		4		5	
Rainbow	1				1	
Total	59	21	31	14	90	35
Camping Breakdown						
Chinook	131	9	230	50	361	59
Sockeye	50	15	254	18	304	33
Steelhead	210		70	1	280	1
D. Varden	90		23	1	113	1
Rainbow	25		5		30	
Total	506	24	582	70	1088	94

Total Number Fish Caught All Categories

	Chinook		Sockeye		Steelhead		D. Varden		Rainbow	
	Act*	Proj*	Act*	Proj*	Act*	Proj*	Act*	Proj*	Act*	Proj*
Retained	90	110	37	45	1	1	1	1	0	0
Released	394	468	343	422	292	291	118	121	31	33
Total	484	578	380	467	293	292	119	122	31	33

Act* = Actual fish recorded.
Proj* = Projected fish caught to end of groups stay.

Four "day use" groups were not contacted, not all the groups were contacted on their last fishing day on the river.

15% of the 1976-85 average of 1996 fish. The count of immigrant adult steelhead in the fall of 1985, prior to the weir being pulled in late September, was 414 adult steelhead (Table 18). It is estimated that the bulk of the steelhead enter the system during October and November and may continue to enter in smaller numbers through March of the following year. Thus the count of 414 steelhead by the end of September represents only a portion of the total return. In addition, by caculating the total return based on kelt counts (See Section D-5) the estimate for 1985-86 is approximately 600 adults, this would indicate that 70% of the Karluk steelhead run had entered the system prior to the end of September. This hypothesis is not consistent with previous data or general observations. The possibility of a miscount of kelts at the weir or a excessive inriver harvest of steelhead during the winter is being examined by the refuge and ADF&G.

Rainbow Trout Survey - Pinnell Creek

In 1986 a preliminary survey was completed by the refuge on the rainbow trout abundance of Pinnell Creek (the main tributary to Frazer Lake on the refuge). This tributary has been suspected of supporting a minor but important rainbow trout population which is utilized by sport fishermen and hunters visiting the refuge cabin located at the mouth of Pinnell Creek.

From July 17 to 21 sampling on the lower four miles of Pinnell Creek resulted in the capture of 11 adult rainbow trout. No juvenile rainbow were captured. Weights of adults ranged between 0.5 to 2.5 pounds and lengths ranged from 11.4 to 18.0 inches. A majority of the fish captured were between rm 0.75 and 2.0. No juvenile rainbow were caught despite intensive seining and trapping efforts.

Between October 4 to 7, 1986 an additional sampling effort resulted in very few juvenile rainbow (15) being captured with minnow traps. No adult fish were captured.

Overall, both sampling efforts in 1987 indicate that those rainbow utilizing Pinnell Creek may only be present during the late spring-early summer time period and a majority of the time these fish may be utilizing the lake environment. A spring sampling effort is planned for May 1987.

12. Wildlife Propagation and Stocking

On July 20 and 21, 1986, the ADF&G with volunteer assistance from the Kodiak Game Bird Association transplanted 209 Vancouver Canada geese (Branta canadensis fulva) from southeast Alaska to Kodiak and Shuyak Islands. The birds were removed from a molting flock of approximately 565 geese captured on July 20, 1986 in Fool Inlet, located at the north end of Seymour Canal on Admirality Island in southeast Alaska.

Table 18
Known and peak index escapement counts on refuge streams which supported species of major interest to sport fishermen during 1986

River system	King salmon	Coho salmon	Steelhead trout	Char
Little (3)	unk	unk	unk	unk
Browns Lagoon (3)	unk	unk	unk	unk
East Uganik (3)	unk	5400	unk	unk
Karluk (4)	4429	22836	(1) 414 (2) 296	(1) 13189 (2) 4091
Sturgeon	0	200	unk	unk
Ayakulik/Red (4)	6371	12215	(1) 46 (2)1015	(1) 21395 (2) 6759
Upper Station (4)	1	2469	unk	(1) 2787
Dog Salmon/Frazer (4)	221	5394	(1) 23 (2) 270	(1) 11063
Horse Marine (3)	0	unk	unk	unk
Midway (3)	0	12000	unk	unk

Table 19
Sockeye salmon escapement to major and minor sockeye systems on the Kodiak National Wildlife Refuge 1983-1985

River system	Escapement goals	Actual (Index) Counts 1984	1985	1986
East Uganik (3)	unk	40000	40000	21000
Little (3)	unk	12000	15000	9000
Karluk (4)	560000-900000	420268	995948	887171
Ayakulik/Red	200000-300000	283215	388759	318135
Akalura (3)	unk	20350	3000	9485
Upper Station (4)	150000-250000	319226	435817	466385
Horse Marine (3)	unk	3000	9000	5500
Dog Salmon/Frazer (4)	300000-400000	53524	506336	136533

(1) Immigrant adults passing upstream through weir.
(2) Outmigrant adults passing down through weir.
(3) Peak aerial surveys only.
(4) Fish weir count.

One hundred and ten adult geese (60 females, 50 males) were released in Weasel Cove, Spiridon Bay, on the Kodiak NWR. Ninety-nine geese (91 adults and 8 goslings) were released in Big Bay, located in Shuyak State Park in the northwest portion of Shuyak Island. Sex composition of the 91 adults consisted of 61 males and 30 females. All the birds were banded with U.S. Fish and Wildlife Service aluminum leg bands on the left leg and rust-colored plastic tarsal bands on the right legs at the Spiridon Bay release, and with white-colored plastic tarsal bands on the right legs of the Shuyak release. Three of the Spiridon Bay birds and two of the Shuyak birds were fitted with backpack radio transmitters.

The purpose of the goose release is to establish a huntable resident population of canada geese in the Kodiak Archipelago. The Vancouver sub-species is essentially non-migratory and hopefully will successfully nest in the release areas next spring. Annual evaluations of the releases will be conducted to determine the breeding success and feasibility of further releases. Initially, the flocks fragmented into several smaller flocks dispersing from the original release sites to other locations in the archipelago. However, the release sites have provided the majority of the observations and still support approximately half of the birds released in each area.

16. Marking and Banding

In conjunction with the refuge bald eagle migration and movements study (74530-82-01), 22 fledgling bald eagles were color-marked with patagial flags (green on left wing and yellow on right). In addition to the patagial flags a blue acrylic leg band and a standard FWS metal leg band were placed on these birds. Ten of the 22 were also fitted with radio transmitters.

Ten brown bears were ear-tagged and tattooed on the inside upper left and right lip, and groin as part of brown bear study (74530-82-02) being conducted on the refuge by the AOFWR. Twenty of the bears were fitted with radio collars, 10 were recaptures and 10 were new.

H. PUBLIC USE

1. General

Public use on the refuge increased to 23,600 visits and 147,600 activity hours in 1986 (compared to 20,700 refuge visitors and 124,600 activity hours in 1985). Table 20 summarizes public use levels for selected activities during the years 1984 through 1986.

Table 20
Refuge public use for selected activities from 1984 to 1986

Category	1984 Use	1985 Use	1986 Use
Interpretive center			
Visits	2217	6707	7719
Activity hours	1329	3353	3865
Environmental education			
Visits	307	826	1029
Activity hours	179	1209	1313
Deer hunting			
Visits	1386	1513	1620
Activity hours	36728	41435	52879
Sport fishing			
Visits	1445	1675	2430
Activity hours	13940	22800	30060

Twenty-two sport fishing guides and thirteen hunting transporter/outfitters operated on the refuge in 1986. Use levels for fishing guides and outfitters are documented in the following sections of this report. Both deer hunting and sport fishing use increased in the refuge during the past year.

Two very different types of public use are recorded for the refuge. People stopping at the visitor center headquarters building, located about four miles from the town of Kodiak, spend an average of one-half hour viewing films and exhibits, obtaining leaflets, and asking questions about the refuge. Visiting the refuge proper involves the expense of chartering a small aircraft or boat to get to an activity site. Most visitors spend two to four days on the refuge during hunting, fishing and photography trips.

Both the cabin leaflet and bird list were revised and printed during the year. Due to a printing error in the cabin leaflet the entire shipment was returned to the printing contractor (freight collect) and reprinted to correct the mistake. Opening of the Interagency Visitor Center in Fairbanks and increasing tour ship business in Kodiak are rapidly exhausting our supplies of leaflets. If we are to meet these increased demands in the future (Another interagency visitor center will be opening in Anchorage in 1987), we will need to think in terms of printing 20,000 to 25,000 copies of refuge leaflets instead of 6,000 to 10,000 copies ordered in the past.

The refuge has about 20 wildlife films, videos and slide/ tape programs which are available to local school teachers and service clubs. Regular orientations are put on at the Coast Guard Base by the refuge staff to provide "Coasties" with a preview of refuge programs and outdoor recreation opportunities on Kodiak. Several new films and videos were ordered for the refuge "film library" this past year.

A public use standards review was completed for the refuge. The review identified minimal needs required to upgrade the refuge's public use and I & E programs. As a result Outdoor Recreation Planner Dave Menke drafted a refuge sign plan and recreation cabin management policy guidelines.

2. Outdoor Classrooms

Just over 1000 Kodiak and village school children were involved in environmental education activities sponsored by the refuge. Programs and activities for students in Karluk, Larsen Bay, and Akhiok were presented during village trips to discuss refuge CCP progress. School groups using the visitor center are encouraged to complete environmental education worksheets prepared by the refuge staff. Outdoor Recreation Planner Dave Menke presented an audience response program on Kodiak birdlife to about 120 Kodiak junior high students.

FB/Pilot Chatto and friends at the village of Akhiok. Visits to Kodiak villages this year were made to discuss refuge CCP and to present environmental education. (86-28) DM

6. Interpretive Exhibits/Demonstrations

Use of the refuge visitor center increased about 6% compared to 1985 totals. Once again in 1986 we were able to keep the visitor center open on weekend afternoons using volunteers. Groups off tour ships accounted for much of the increased traffic through the center. When one large tour ship docked in Kodiak a record 409 people toured the center in a single day (September 7th). Improvements in the center included temporary display panels and a new book sales rack. During the year temporary exhibits included photos of Kodiak birds and an exhibit of duck stamps and duck stamp prints.

The most popular exhibit in the visitor center is a large topographic relief map which identifies the unique characteristics of Kodiak Island. Other displays feature information on natural and cultural history, weather, geology, marine life, salmon spawning, native and introduced mammals, birds, and refuge management and recreation opportunities. A fifteen minute video on Kodiak's wildlife is shown to visitors upon request. A variety of Service, ADF&G and Chamber of Commerce leaflets are distributed in the center. Approximately 50 sales items are provided in the small sales area.

Plans were drawn up for an exhibit which will include mounted brown bears in a stream side habitat setting. The mounted specimens are a female and two first year cubs which were killed in a DLP case near the village of Old Harbor. The bear hides were sent to California taxidermist Howard Thurlow in September. A railing to go around the exhibit will be fabricated locally.

A temporary display featured photos and posters promoting ducks and duck stamps. (86-29) DM

7. Other Interpretive Programs

Regularly scheduled weekend wildlife films have proven a popular feature, attracting nearly 2,300 visitors during 1986. The films are shown at 1:00, 2:00 and 3:00 p.m. both Saturdays and Sundays. The refuge owns 20 films and videos which are shown to any and all requesting groups.

8. Hunting

The entire refuge is open to hunting. Species hunted include brown bear, mountain goat, Sitka black-tailed deer, reindeer, fox, ptarmigan, snowshoe hare, and waterfowl. Hunting seasons and regulations are set by ADF&G.

Approximately 320 hunters used the refuge during the spring and fall bear hunts in 1986. Bear hunting on the refuge accounted for nearly 19,000 hours of public use. Fifteen big game guides have permits for hunting areas on the refuge. All non-resident bear hunters are required by state regulation to use guides.

Deer hunting use, both on and off-refuge, has increased dramatically in the past several years. Liberal bag limits (5 deer per hunter) and a five month long hunting season combined with Kodiak's high population of Sitka black-tailed deer attract many hunters to the island. An estimated 1,600 deer hunters spent nearly 53,000 activity hours hunting on the refuge in 1986. Harvest levels for deer and bear are reported in Sec. G-8.

From mid-October through early November the refuge staff assisted by Regional law enforcement personnel and a State Fish and Wildlife Protection office conducted a law enforcement check and survey of deer hunters on the refuge. The checks were conducted along the west coast of Kodiak from Viekoda Bay to Uyak Bay using the refuge vessel Ursa Major. Objectives were to: 1. Check all deer, bear, and waterfowl hunters for compliance with state laws and refuge regulations; 2. To develop a profile of refuge deer hunting by administering a survey to all hunters contacted in the field; and 3. To check recreation and set-net cabins on refuge lands for general condition and illegal use.

During the survey 89 deer hunters in 27 parties were contacted and interviewed with the following results:

1. Residence - 88% Alaska other than Kodiak, 9% Kodiak, 3% lower 48 and foreign.

2. Type of Hunt - 83% hunting without guides or outfitters, 13% with transporter/outfitters, 3% guided.

3. Camp Situation - 83% land based camps, 17% boat based.

4. Average Length of Hunt - 5.3 days.

5. Hunting Success - Average 2.1 deer per hunter and 1 deer for each 2 days of hunting (some hunters included in this statistic had not completed their hunts when surveyed).

6. Deer Harvested - 90 males, 41 females, 9 fawns.

7. Deer Observed During Hunt - Average 40 ranging between 1 and 200 observed per hunter.

Several of the hunters contacted reported that this was the only time they had been contacted in a field hunting or fishing situation in Alaska although they frequently hunted and fished. The refuge plans to repeat this activity in 1987. Law enforcement violations noted during field contacts are reported in Section H-17.

Requests for outfitter permits have also increased in the last two years. In 1985 only four transporter/outfitters were permitted. This past year thirteen land-based transporter/outfitters, four marine transporters, and three Natives operating on Native conveyed 22 (g) lands were issued permits for outfitting primarily related to deer hunting. The draft refuge CCP identifies a limit of 18 land-based outfitters operating on the refuge.

Transporters/outfitters are required to report use and harvest information as a condition of this permit. In 1986 transporter/outfitters reported 1404 days of use on the refuge by 267 clients and a total of 859 deer harvested. The majority of use on the refuge by transporter/outfitters was focused on the Uyak, Uganik, and Zachar Bay areas, with 77% of the use and 76% of the harvest reported in those areas.

Less than 40 mountain goat hunters used the refuge during the past year. Most of the other hunting activity on the refuge including small game, upland game (i.e. ptarmigan) and duck hunting occurs while on deer or bear hunting trips. At least two outfitters have conducted hunts for waterfowlers who want to hunt the varied sea and diving ducks wintering in the bays around Kodiak.

9. Fishing

Sport fishing is the most popular activity taking place on the refuge. This year 2,430 fishermen participated in over 30,000 activity hours of freshwater fishing on the refuge. The most popular fishing locations on the refuge include the Ayakulik and Karluk Rivers and Uganik Lake. The Karluk and Ayakulik Rivers support Kodiak's largest king salmon and steelhead runs. These three areas have well over half of the sport fishing pressure occurring on the refuge and Native conveyed 22 (g) lands.

From June 9 through July 7 a public use and creel census was conducted on the Ayakulik River by summer volunteers Stephanie Jones and Jeff Selinger. The main objective of the project was to collect sport fishing use data and monitor activities and possible conflicts occurring in the area. The primary specie targeted by sport fishermen on the Ayakulik is chinook salmon. During the census 99 fishermen in 23 parties were surveyed with the following results:

1. Residence - 61% non Alaskans, 38% Alaskans.

2. Type of Fishing - 56% were day-use, fly in fishermen, 44% camped overnight.

3. Guided/non Guided - 40% guided, 60% non guided.

4. Length of Stay - Day users average 4 1/2 hours, overnight users averaged 6 days.

5. Peak river use occurred on June 16 when 33 sport fishermen were on the river (most within a 2-3 mile area).

6. Fish caught - 484 chinook, 380 sockeye, 298 steelhead, 119 dolly varden, and 31 rainbow trout.
7. Fish released - 90% of the fish caught were released.

8. Fishing success - Less than 1 chinook for every three hours of fishing and about one fish for every two hours when all species were counted together.

Total chinook escapement on the Ayakulik River was 6,370 fish. The chinook catch documented in the census represented about 9% of the escapement, and the number of chinook salmon retained by sport fishermen represented less than 2% of the escapement.

Interest in sport fish guiding has grown rapidly during the past several years. In 1983, the first year any interest was shown, six sport fishing guides operated under SUP. By 1984 the number of guides reached nine, in 1985 fourteen guides received permits, and last year 22 sport fishing guides had permits for the refuge and Native conveyed lands within the refuge boundary. The upper limit for sport fishing guides in the preferred alternative in the CCP is 24.

As a condition of the SUP, guides are required to submit a report of their use and the number of fish caught and released by their clients. The 1986 guided sport fishing use on the refuge totalled nearly 625 visits and 8,500 activity hours. Most of the guided sport fishermen using the refuge are day use visitors.

Sport fish guides permits are limited to 7 days camping at any location. Only two guides are permitted to set up

overnight camps on a given drainage. Guides may, however, conduct day use operations at any location on the refuge. Several guides conduct exclusively day use operations.

10. Trapping

Ten Trapping Permits were issued on the refuge in 1986. Trapping effort remained at a low level on the refuge this year. Trapping on Kodiak appears to be primarily a recreational rather than an economic activity as the quality of fur is poor, and prices have been depressed for several years.

12. Other Wildlife Oriented Recreation

Use of refuge recreation cabins for photography, sightseeing and wildlife observation has been on the increase for several years. Because these recreational uses frequently occur in conjunction with hunting or fishing trips, the extent of photography and wildlife observation is difficult to document.

The refuge has nine public use cabins which are available to recreational users for a maximum stay of seven days per year. Use of most cabins is highest during the peak deer hunting and fishing periods. The South Frazer, Red Lake, and O'Malley cabins are beginning to receive heavy use by wildlife photographers from mid-June through the end of August. During the year about 800 recreationists stayed in the cabins.

Although the cabin reservation system causes a major drain on staff time (estimated to require 1/4 to 1/2 staff year to handle reservations and answer inquiries), we feel it has very positive public relations benefits. This year stoves were replaced in two cabins, and the Uganik Lake cabin received a new bunk and coat of paint. Cabin users are required to pay $10.00 per night to reserve cabins. Unfortunately, despite several requests there is currently no mechanism for returning monies collected for cabins to the refuge to fund needed maintenance and administration costs.

Two and one half year old bears seen throughout the summer near the O'Malley recreation cabin. (86-30) DM

17. Law Enforcement

Five violation notices were issued during fall deer hunter checks including shooting a fox out of season, two for illegal use of a set-net cabin outside of permitted season of use and two for failure to obtain or validate required deer harvest tickets. Several warnings were also issued to hunters for failing to validate harvest tickets at the time of the kill. One violation notice was also written during the summer check of set-net permittees for violation of special conditions of SUP (unlawful construction).

18. Cooperating Associations

This was the second year for the Alaska Natural History Association (ANHA) has operated a small sales outlet in the refuge visitor center. Sales this year totalled $9,200.00 compared to $5,200.00 last year. About fifty different items were offered for sale with wildlife posters selling for $2.00 each being the most popular single item by far.

Not only does the cooperating association provide high quality publications and interpretive items to the public, but it has also allowed the refuge to benefit from projects supported by sales outlet "profits". This past year the ANHA had a much improved book display/storage unit built for the sales area. A slide set featuring Kodiak mammals was

Special Agents and refuge officers checked numerous deer hunters in 1986. Tagging and use of set-net cabins for private recreational use are the most common violations. (86-31) DM

Refuge MV Ursa Major provided the transportation and living accommodation needs during set-net and hunter law enforcement efforts. (86-32) DM

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Refuge MV Ursa Major provided the transportation and living accommodation needs during set-net and hunter law enforcement efforts. (86-32) DM

produced. Alaska Natural History Association also donated publications to the refuge, city and Kodiak school system libraries. In the coming year anticipated projects include an exhibit case for mounted waterfowl, a refuge pin, a Kodiak bear poster, and a new slide set featuring Kodiak birds.

I. EQUIPMENT AND FACILITIES

2. Rehabilitation

The refuge road at headquarters from Quarters # 1 to the shop was upgraded, D-1 gravel was added to the surface, 3 culverts installed and a drainage ditch dug adjacent to the road.

Lawns were established at Quarters 1 and 2.

A contract was let in September and work began in late December on renovation of Unit 1 of the refuge triplex located in town. Scope of work includes tearing out all walls, installing new wiring and some plumbing, new kitchen, new bathroom, new utility room and heating system, and new windows.

The Uganik Lake recreation cabin was painted, steps built, a bunk built (now accomodates 4 people) and outhouse relocated. A new porch was added to the Little River cabin.

3. Major Maintenance

The annual dry docking of the refuge vessel MV Ursa Major on the city harbor grid occurred on June 9. The bottom of the hull was cleaned and repainted with the rudder and prop zincs also being replaced. The remainder of the vessel (above the waterline) was repainted during the summer by WB/BO Zwiefelhofer as time and weather allowed.

4. Equipment Utilization and Replacement

Two replacement vehicles were received in 1986; a Chevrolet 1 ton utility side 4x4 with snow plow attachment to replace the 1975 Dodge 4x4 and a Chevrolet Blazer to replace the 1978 Dodge stationwagon.

A new Cessna 206 was received in September. The 206 replaces the old DeHavilland Beaver and is faster and more economical to run.

6. Computer Systems

Numerous problems were encountered with the refuge's Data General 10SP microcomputer during 1986 resulting in at least 3 weeks of lost staff time dealing with the "mysteries" of

New Cessna 206 replaced old DeHavilland Beaver in 1986. (86-33) DM

computer troubleshooting. Printer malfunctions, hard disk fragmentation, nonexistence of any usable DG software, tape cartridge misfires, and difficulties with just trying to make backups provided the staff with a first hand view of the "timesaving" world of computers. We can only hope next year will be better.

8. Other

The Refuge Accelerated Refuge Maintenance Management (ARMM) budget was $114,800 ($50,000 large projects and $64,800 small projects). The approved large project in the Annual Work Plan was $50,000 for rehabilitation of Unit 1 of the Triplex. The small ARMM's was used to beef up our operations and maintenance budget and expended in 7 areas. Table 21 shows funding expenditures.

J. OTHER ITEMS

1. Cooperative Programs

Kodiak NWR "houses and hosts" Vic Barnes, a Research Biologist from AOFWR. Vic's research (Sec. D-5) is directed toward better management of the refuge's brown bear population. Vic has provided valuable assistance during the

Table 21
FY 86 ARMM projects

Project	Amount
KS-1 Buildings	
Routine maintenance of public recreation cabins	7280.00
Replace rain gutters on buildings 4 and 5	2000.00
Routine maintenance of HQ complex	5940.00
KS-2 Utility Systems	
Water and sewer at Triplex	1050.00
KS-3 Roads & Trails	
Road work at Refuge HQ	1500.00
KS-6 Habitat	
Wildlife Inventories	13000.00
Law Enforcement	3500.00
Public Use Survey	1200.00
Special Use Permit Issuance and Monitoring	4800.00
KS-7 Transportation Equipment	
OAS Availability for refuge aircraft (N765)	18000.00
Vessel Maintenance and moorage	3800.00
Routine vehicle maintenance	1000.00
KS-8 Other Equipment	
Routine office equipment maintenance	1200.00
Routine heavy equipment maintenance	530.00
*KD-1 Kodiak Triplex Rehabilitation	50000.00

*Large ARMM

drafting of the CCP and input on various compatibility determinations.

A SUP was again issued to the ADF&G-FRED, Kodiak for chum salmon egg take from the Sturgeon River. This egg bank is being used by ADF&G's Kitoi Bay Hatchery to establish a broodstock program. A SUP was also issued to ADF&G-CFD for operation of fish counting wiers on Lower Dog Salmon River and Olga Creek.

2. Other Economic Uses

Kodiak NWR is mandated by Public Law 96-487, ANILCA to provide land based support facilities for commercial fishing activities subject to reasonable regulations, if they are consistent with the purposes for which the refuge was established and not a significant expansion of commercial fishing activities within the refuge beyond the levels of such activities during 1979. There were at least 65 of these sites within the exterior boundary of the refuge in 1985.

The refuge presented a check to the Kodiak Island Borough for five hundred nine ($509.00) dollars in July 1986 under the revenue sharing provisions of Public Law 95-469. This represented Kodiak's share of refuge receipts for FY 85.

3. Items of Interest

Two brown bear maulings took place in the Kodiak Archipelago in 1986. Both occurred on Afognak Island south of the refuge boundary.

On November 5, 1986, Mr. Jack Danielson was mauled by a female brown bear accompanied by 2 large cubs on the west side of Kazakof Bay. Mr. Danielson and his partner, Mr. Oler, were butchering a deer when the sow approached them. Mr. Oler ran uphill approximately 100 yards and Mr. Danielson was knocked down with a "right cross to the head". This inflicted 2 deep scratches on either side of his left eye - a third scratch that would have hit his eye was deflected by his glasses. When he tried to crawl away, she "mouthed" him several times on the right leg and buttocks. When she got a grip of his buttocks she carried him a short distance from the deer carcass and left him. The cubs drug the deer carcass into the brush and the sow followed. This allowed Mr. Oler to come and help him get away. They were not able to return to town for two days. After 2 weeks of antibiotic treatments and whirlpool therapy, he was released from Kodiak Island Hospital.

Neither Danielson or Oler expressed any animosity toward the bears. Both said they felt they were in the bears' territory and the bears were only trying to get food. Danielson feels that the sow approached when Oler fled because she did not realize there was anyone on the carcass. Her "ears forward" advance and the fact that she left him once she had gotten

him away from the cubs suggested to him that she was not attacking him, per se, but trying to move him away from her food and cubs.

Tracy Ackers, a local resident, was bitten by a bear on October 25, 1986. Tracy said she was helping her husband pack out a deer he'd killed that day near King Cove when the incident occurred. She was carrying 2 hindquarters strung with rope over her shoulders and was ahead of her husband. They walked into a small clearing and she saw a bear at full charge toward her from her right side. She attempted to get the deer meat off her shoulders thinking that the bear was after the meat but the bear was approaching too fast. When she saw the bear was almost upon her, she fell on her left side and covered her face with her elbows. The bear stopped, bit her once on the upper arm and immediately ran away. Although the bears canine put a 1 inch puncture in her arm, the 3 layers of clothing on her arm weren't torn. She described the bite as being relatively light and at first did not believe she had even been injured.

4. Credits

This report continues to be a team effort. Bellinger wrote sections D-1; E-5; feedback and edited the report. Barnes wrote section D-5, and G-8. Chatto wrote part of sections D-2, D-4, D-5; section F-11 and G-11. Menke wrote sections D-2; E-4; F-12; H-1, 2, 6, 7, 8, 9, 10, 12, 17, 18; and the information packet. Ryan wrote the introduction; Sections A, B; C-3; part of D-4; part of E-1; E-2, 6; F-1, 6, 9; G-9, 10, 16; and J-1, 2, 3, 4. Zwiefelhofer wrote part of Section D-5; Section G-2, 3, 4, 5, 6, 12; I-3, 6. The undesireable job of typing and compiling was accomplished by Castonguay.

K. FEEDBACK

Refuge Comprehensive Conservation Plan

We can finally see some "light at the end of the tunnel" on our Refuge Comprehensive Conservation Plan (CCP). The latest schedule predicts a record of decision on the Kodiak Plan in July. The Regional Office is standing firm on several major issues (see section D-1) and we hope they are able to maintain this stand.

Once this document is completed, a major effort will be required to complete several "step down" management plans.

Section 22 (g) Regulations

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OID BEARS WHILE DEER HUNTING?

ars bears have learned that
by hunters are an easily accessible
od. To lessen the chance of
problems, deer hunters should
tips:

ot more than you can pack out
eld at one time - usually one deer.

ss and pack out your deer as soon
after the kill.

and avoid brush when packing
.

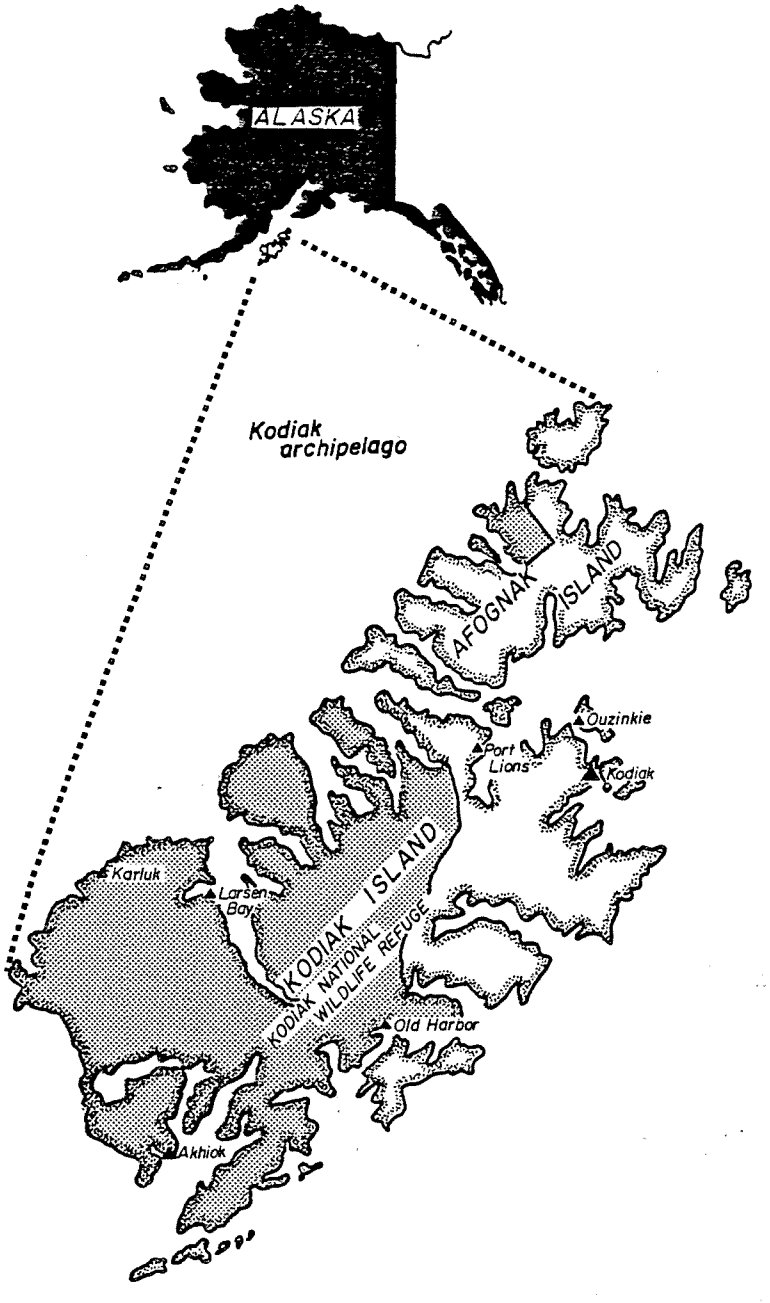
meat as high as you can (preferably
r more) and as far from camp
cal.

allows you to kill a bear to
our life but it is not legal
a bear to protect game meat.

GET MORE INFORMATION ON BEARS?

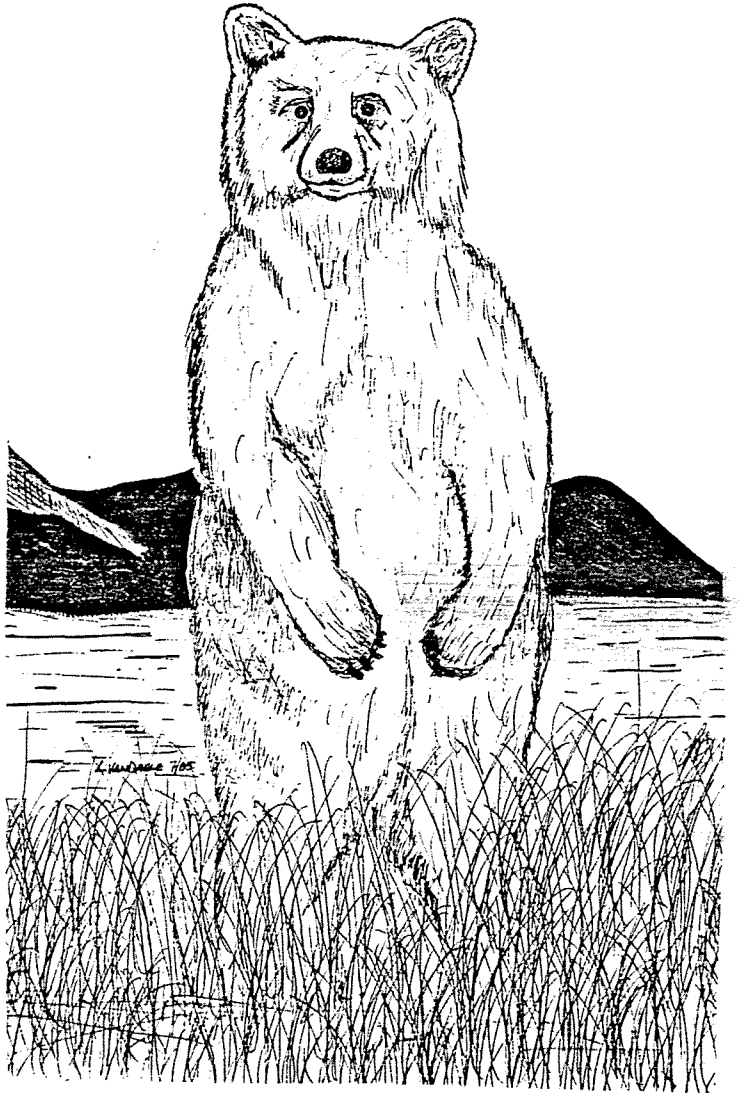
on bear biology, bear hunting
s on safe ways to enjoy bear
ly can be found at either of
ons:

tment — US Fish & Wildlife Service
me — Visitor Center
n — 1390 Buskin River Rd.
Road — Kodiak, AK 99615
99615 — (907) 487-2600
791



KODIAK

BEAR FACTS



KODIAK BEAR FACTS

c archipelago in Alaska is world
home of the Kodiak brown bear.
brochure we hope to answer some
st common questions, and dispel
he myths, about these impressive

RE KODIAK BEARS?

own bears (Ursus arctos middendorfi)
nized as the largest land carnivores
rld. Males (boars) are typically
0 lbs and can get up to 1500 lbs;
sows) are usually about 500-600 lbs.
t boar known from Kodiak was 24
and the oldest sow was 29.

BEARS LIVE?

in to leave their dens in April.
ie spring and early summer they
m sea-level to mid-elevation areas
n grasses and forbs. In July many
l in alpine meadows eating vegetation.
d-July bears start to congregate
as to fish for salmon. Salmon remain
ant food source as long as they
lable, but many bears leave the
in mid-September to eat elderberries,
club berries and salmonberries.
ually enter their winter dens in
umn from about Halloween to Thanks-
They prefer steep slopes or rock
for den sites. Some bears excavate
ile others use natural cavities.
just large enough for the bears
nto comfortably with little extra

HOW COMMON ARE BEARS ON KODIAK?

Biologists estimate that over 2500 bears live on Kodiak Island, about 1 bear per 1½ square miles. It is uncommon to see bears on Kodiak's road system. Like most wild animals, bears are often secretive around humans. They are most active in the early morning and late evening hours and spend much of their time in dense alder thickets. The best time to see bears on Kodiak is from July to mid-September.

WHAT ABOUT CUBS?

Kodiak brown bears usually have 2 to 3 cubs. They are born in the den in January, weighing less than a pound. Cubs and their mothers come out of their dens in June, later than other bears. By then they already weigh 15-20 lbs. Sows are fiercely protective of their cubs. Cubs spend most of their time playing and learning. They become sexually mature at age 4 and sows have been known to have cubs up to age 23.

HOW DANGEROUS ARE BROWN BEARS?

Brown bears are potentially very dangerous animals because of their size, strength, intelligence and unpredictable personalities. This is especially true when they are protecting their cubs or protecting their food caches. Fortunately, Kodiak bears rarely live up to their "man-killer" reputations. Bear/people encounters are very common on Kodiak, yet only 6 people were mauled between 1973 and 1986. None of these maulings were fatal and all victims recovered without any serious after effects. No one has been killed by a bear on Kodiak in over 30 years.

WHAT'S THE BEST WAY TO AVOID DANGEROUS SITUATIONS?

** AVOID SURPRISING BEARS! Watch for bears and bear signs; make noise or use "bear bells" to let bears know you are around.

** DO NOT CROWD BEARS! When a bear becomes aware of you, talk or shout to let it know you are human. Don't attempt to stalk bears for close photos.

** DO NOT IMITATE BEAR SOUNDS OR RUN FROM BEARS! This may encourage a bear to charge.

** RECOGNIZE BEAR WARNING SIGNALS! Bears indicate they are disturbed and may attack by popping their jaws, walking with their front legs stiff and lowering their heads with ears laid back.

They may also warn intruders by making short, false charges. When bears stand on their hind legs it is not to attack, but to see or smell people or other animals better.

If a bear is aware of your presence and walks toward you, drop your pack, coat or some other piece of apparel and back away slowly.

** LIE DOWN AND PLAY DEAD IF ATTACKED! Do not try to fight a Kodiak bear if you are actually attacked. Curl up in a ball, face down, with your arms tight against your head. This technique has been proven time and again to be a life saver.

K. FEEDBACK

Refuge Comprehensive Conservation Plan

We can finally see some "light at the end of the tunnel" on our Refuge Comprehensive Conservation Plan (CCP). The latest schedule predicts a record of decision on the Kodiak Plan in July. The Regional Office is standing firm on several major issues (see section D-1) and we hope they are able to maintain this stand.

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(907) 486-3929
(907) 486-3376

ISLAND MARINE CHARTERS
P.O. Box 814
Kodiak, Ak 99615
(907) 486-3672

KODIAK ISLAND CHARTERS
Star Route 10914
Kodiak, AK 99615
(907) 486-5380

KODIAK SEA CHARTERS
P.O. Box 2156
Kodiak, AK 99615
(907) 487-2683
(907) 486-4658

OCEAN RIVER CHARTERS
P.O. Box 2676
Kodiak, AK 99615
(907) 486-5397

PORT LIONS CHARTERS
Box 251
Port Lion, AK 99550
(907) 454-2264

SEA SURGEON
P.O. Box 95
Kodiak, AK 99615
(907) 486-4183

SZABO MARINE SERVICES
P.O. Box 1633
Kodiak, AK 99615
(907) 486-3853

TOUR GUIDE SERVICES

GRAY LINE TOURS
547 W. Fourth
Anchorage, AK 99510
(907) 486-8379
(907) 277-5581

ISLAND TERRIFIC TOURS
Roger Page/Lola Harvey
P.O. Box 3001
(907) 487-4014

ISLAND AIR SERVICE
P.O. Box 125
Kodiak, AK 99615
(907) 486-6196

SEA HAWK, INC.
P.O. Box 500 USCG
Kodiak, AK 99619
(907) 487-2477
(907) 486-5936

UYAK AIR SERVICE
P.O. Box 4188
Kodiak, AK 99615
(907) 487-4443
(907) 847-2210

SPORTING GOODS/CAMPING GEAR

CY'S SPORTING GOODS
P.O. Box 332
Kodiak, AK 99615
(907) 486-3900

G&S SPORTING GOODS
P.O. Box 2729
Kodiak, AK 99615
(907) 486-5972

KODIAK CAMP SUPPLY
1314 Mill Bay Road
Kodiak, AK 99615
(907) 486-3771

MACK'S SPORT SHOP
P.O. Box 1155
Kodiak, AK 99615
(907) 486-4276

SUTLIFF'S TRUE VALUE
P.O. Box 1157
Kodiak, AK 99615
(907) 486-5797

THE CHANDLERY
P.O. Box 95
104 Center Avenue
Kodiak, AK 99615
(907) 486-6158
Kodiak, AK 99615
(907) 487-5367

KODIAK BUSKIN RIVER INN
1395 Airport Way
Kodiak, AK 99615
(907) 487-2700

SHEFFIELD HOUSE
P.O. Box 1547
Kodiak, AK 99615
(907) 486-5712

SHELIKOF LODGE
P.O. Box 774
Kodiak, AK 99615
(907) 486-4141

STAR MOTEL
P.O. Box 553
Kodiak, AK 99615
(907) 486-5657

LODGE FACILITIES

AFOGNAK WILDERNESS LODGE
Roy Randall
Seal Bay, AK 99697
(907) 486-6442

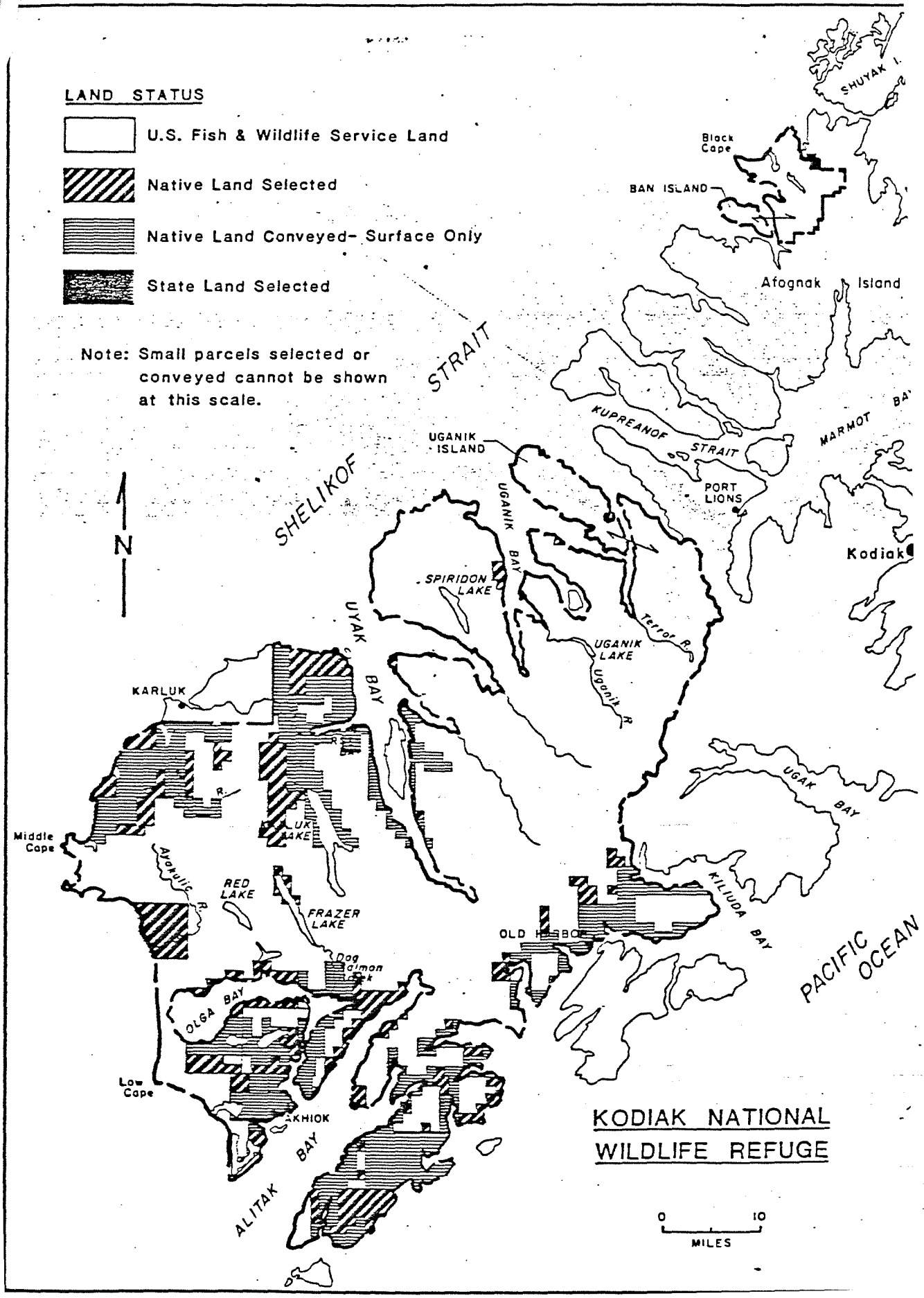
IRA SHEPARD
P.O. Box 247
Port Lions, AK 99550

KARLUK LODGE
Rob Sikes
Karluk, AK 99608
(907) 241-2229

LIONS DEN LODGE
P.O. Box 266
Port Lions, AK 99550
(907) 454-2301

MIKE MULLAN
P.O. Box 237
Port Lions, AK 99550

PLEASANT HARBOR LODGE
P.O. Box 94
Ouzinkie, AK 99644


LAND STATUS
U.S. Fish & Wildlife Service Land
Native Land Selected
Native Land Conveyed- Surface Only
State Land Selected
Note: Small parcels selected or conveyed cannot be shown at this scale.
N
SHUYAK I.
Black Cape
BAN ISLAND
Afognak Island
STRAIT
KUPREANOF STRAIT
MARMOT
PORT LIONS
Kodiak
UGANIK ISLAND
SHELIKOF
UGANIK BAY
SPIRIDON LAKE
UYAK BAY
UGANIK LAKE
Terror R.
Uganik R.
KARLUK
UGAK BAY
Middle Cape
RED LAKE
FRAZER LAKE
KILIUDA BAY
OLD HARBOR
PACIFIC OCEAN
OLGA BAY
Low Cape
KHIOK
BAY
ALITAK
KODIAK NATIONAL WILDLIFE REFUGE
0
10
MILES

available from
KODIAK NATIONAL WILDLIFE REFUGE
1390 Buskin River Road
Kodiak, Alaska 99615
(907) 487-2600

1. Kodiak Island

15 minutes - 3/4" Video
26 minutes - 16mm
Ages: K - Adult

Describes the interesting wildlife found on Kodiak Island with particular emphasis on Kodiak brown bears, salmon and bald eagles. Serves as an excellent introduction to Kodiak National Wildlife Refuge, a roadless area of 1.8 million acres where wildlife abound.

2. Kodiak National Wildlife Refuge Orientation

14 minutes - Slides, tape cassette and typed script
Ages: K - Adult

Explains management and research on refuge lands encompassing nearly 3,000 square miles on Kodiak Island. The slides portray the varied birds, mammals, plantlife and scenery found on Kodiak National Wildlife Refuge. A written script or recorded tape cassette is supplied with this 80 slide program.

3. Age of Alaska

30 minutes - 16mm
Ages: Jr. High - Adult

Highlights the federal stewardship of lands administered under the Alaska National Interest Lands Conservation Act of 1980. The scenic grandure of Alaskan lands managed by several federal agencies is captured on film.

4. All American Animals

26 minutes - 3/4" Video
Ages: 4 & 5 Grade - Adult

Several interesting North American animals are shown living in nature including such North American oddities as oppossum, scissor-tailed flycatcher and pronghorn antelopes.

5. America's Wetlands

28 minutes - 16mm
Ages: Jr. High - Adult

A new look is taken at swamps, bogs and potholes which have sometimes been viewed as worthless and dispensable wastelands. American wetlands provide far reaching benefits to a rich variety of birds, mammals, fishes and plants. For man the benefits of wetlands are even more profound

6. Antlered Kingdom — 26 minutes - 16mm & 3/4" Video
Ages: K - Adult

Many members of the deer family enrich our wildlife heritage. These graceful antlered animals are found in the woodlands and wildlands from Florida to Alaska. Members of the deer family found in Alaska include deer, caribou, moose and elk.

7. At the Crossroads — 26 minutes - 16mm
Ages: 4th grade - Adult

Endangered species and large predatory animals are shown in many spectacular scenes as the threats to their continued existence are documented. Wildlife biologists explain the necessary steps which must be taken if we wish to prevent the destruction of these animals in the wild.

8. Bears and Man — 27 minutes - 16mm
Ages: Jr. High - Adult

Can black bears and grizzlies live close to man? Through ignorance, carelessness and fear man has eliminated these species from much of their former range in North America. This film shows how humans can deal intelligently with bears to provide protection to these majestic mammals.

9. Chain of Life - The Aleutian Islands — 28 minutes - 16mm
Ages: Jr. High - Adult

Millions of seabirds and thousands of sea mammals inhabit this chain of islands stretching 1,100 miles from mainland Alaska to the heart of the Pacific Ocean. Virtually the entire island chain has been set aside as a National Wildlife Refuge protecting varied wildlife resources dependent upon remote island habitats.

10. Designs for Defense — 26 minutes - 3/4" Video
Ages: 4th grade - Adult

Rather then being eaten by predators many species of animals have evolved an amazing variety of self-protection methods.

11. Ducks on the Wing — 55 minutes - 16mm
Ages: Sr. High - Adult

Designed primarily to assist duck hunters with waterfowl identification, this film will be of interest to anyone who wants to learn how to tell the differences between ducks in flight.

12. Get the Drift — 13 minutes - 3/4" Video
Ages: Jr. High - Adult

Concerned citizens in Oregon have organized a major campaign to cleanup litter from beaches along the state's coastline. This effort includes education and cooperation with the news media to prevent litter problems.

13. In Celebration of America's Wildlife — 57 minutes - 3/4" Video
Ages: Jr. High - Adult

Over the past 50 years many species of North American wildlife have been restored from dangerously low population levels to a point where they are now present in healthy numbers.

14. Last Stronghold of the Eagles — 30 minutes - 16mm
Ages: 4th grade - Adult

Beautiful photographs of bald eagles in flight are featured in this film. The Chilkat Valley in Southern Alaska attracts as many as 3,500 eagles each fall and winter. The challenge of preserving this unique area with the largest winter concentration of bald eagles anywhere in the world is discussed.

15. Living with Wildlife — 26 minutes - 16mm
Ages: 4th grade - Adult

Man's attitudes toward wildlife are examined. This film illustrates how we can best live with and preserve our natural heritage of wildlife. Spectacular photography shows how man affects wildlife and benefits from the presence of wild creatures.

16. Mountain Monarchs — 26 minutes - 16mm & 3/4" Video
Ages: 4th grade - Adult

We admire the graceful majesty of wildlife adapted to living in the high mountains. The alpine lifestyles of bobcats, bighorn and dall sheep, cougars, golden eagles, ptarmigan, snowshoe hares and mountain goats are portrayed.

17. Owls - Lords of Darkness — 26 minutes - 16mm & 3/4" Video
Ages: K - Adult

Owls are well known as creatures of myth and legend. The complex and fascinating life histories of North America's owls are shown in many different habitats.

18. Polar Bear — 52 minutes - 3/4" Video
Ages: 4th grade - Adult

Man's presence in the Arctic regions could result in the decline of these magnificent mammals. North American and European researchers are striving to learn how to manage polar bears in the face of increasing human pressures.

19. The Predators — 26 minutes - 16mm & 3/4" Video
Ages: 4th grade - Adult

Nature's predatory wild animals, often feared and misunderstood, are depicted in many exciting and beautiful sequences. These animals are not shown as enemies of humans, but as a vital part of a balance of nature.

20. River of the Bears — 26 minutes - 3/4" Video
Ages: K - Adult

McNeil River on the Alaska Peninsula offers a truely unique opportunity to observe bears as they feed on abundant runs of spawning salmon.

21. Salmon on the Line — 51 minutes - 3/4" Video
Ages: Jr. High - Adult

Chinook, sockeye, coho, pink and chum salmon inhabit coastal waters of the Pacific Ocean. Scientific and technological resources are being applied to efforts to restore salmon and the environments which are necessary to their survival. But even scientists are unable to reprogram the inbuilt genetic codes which make artificial interference with the wild salmon a hazardous affair.

22. Salmon on the Run — 57 minutes - 3/4" Video
Ages: Jr. High - Adult

Discusses a vital natural resource and those who use and depend on wild salmon runs on the Klamath River in the Pacific Norhtwest. Indians, commercial fishermen and sport fishermen all compete for a declining resource. Will hatcheries be used to supplement wild salmon stocks? These questions and many more are discussed and debated.

23. Time of the Grizzly — 26 minutes - 16mm
Ages: K - Adult

This sometimes ferocious, sometimes funny wildlife giant is shown in its natural habitat. The entire spectrum of our attitudes toward the grizzly is examined as well as the complex behavior of the animal itself.

25. Watching Wildlife — 26 minutes - 3/4" Video
Ages: 4th grade - Adult

What makes seeing wildlife such an important part of the lives of millions of Americans? Wildlife can be seen and enjoyed in places as different as a backyard bird feeder and the remote wilderness expanses of Alaska.

26. Wild Babies — 26 minutes - 16mm & 3/4" Video
Ages: K - Adult

Childhood is the age of discovery and learning for wild animals. Baby skunks, flying squirrels, owls, black bears and raccoons and their antics are featured.

27. Wild Refuge — 27 minutes - 3/4" Video
Ages: 4th grade - Adult

Kodiak Refuge is just one of over 420 National Wildlife Refuges featured in this program. Our national system of refuges totalling nearly 88 million acres contains nearly all of the bird, mammal, reptile, and amphibian species found in the United States.

28. Wild Wings — 26 minutes - 16mm
Ages: K - Adult

Feathers and the ability to fly allow birds to survive in both the coldest and warmest climates in North America. An interesting variety of birds of all shapes, colors and sizes is featured.

29. Wildlife, Wetlands and You - The Duck Stamp Story — 18 minutes - 16mm
Ages: 4th grade - Adult

Since 1934, hunter purchases of "Duck Stamps" have provided money to buy rapidly disappearing wetlands vital to the survival of duck, geese and swans. This film documents the half century long crusade to preserve wetlands for wildlife.