KODIAK NATIONAL WILDLIFE REFUGE

Kodiak, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1984

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

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REVIEW AND APPROVALS

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Jay R. Dillinger 3/14/85
Refuge Manager Date

Larry L. Calvert 3/19/85
Refuge Supervisor Review Date

Regional Office Approval Date

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 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 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 (Sec.) 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.

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 ANCSA of 1970. Although these lands remain subject to the rules that govern use and development of the Refuge (Sec. 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 100 commercial fishermen use refuge lands for shore bases to support fishing operations. Over seventy of these have cabins on refuge land and there is pressure to allow more cabins on refuge lands. 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 irrepairable 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.

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A. HIGHLIGHTS

Two proposed land exchanges reviewed and considered in 1984. (Sec. C-3)

Comprehensive Conservation Planning (CCP) continued with draft plans for directions on resource management, subsistence use, public use and economic use completed. (Sec. D-1)

First documented occurrence of bald eagles hatched and marked on Kodiak Island being seen off the Kodiak Island Archipelago. (Sec. D-4)

Numerous personnel changes occurred this year. (Sec. E-1)

Refuge staff and vessel assist Denver Wildlife Research Center (DWRC) personnel on Semidi Island/Aleutian Canada Goose operation. (Sec. G-2)

Brown bear harvest again exceeds harvest quota guidelines and mountain goat harvest alarmingly high. (Sec. G-8)

Use of Refuge visitor center increases dramatically in 1984. (Sec. H-6)

Refuge residence (triplex) gets new roof-much more rehab needed. (Sec. I-2)

B. CLIMATIC CONDITIONS

Table 1 presents a summary of weather conditions for Kodiak in 1984 (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. Although the weather summary shown in Table 1 shows temperatures and precipitation near normal, most of the major stream drainages on the Refuge are in northerly and westerly exposures and water levels in the Karluk, Red and Frazer Lake drainages were at very low levels throughout the summer, since precipitation was quite low in these areas and snowpack at higher elevations was low (gages at high elevations on the Terror Lake Hydro Project recorded 9 feet of snowpack in February versus 18 feet last year).

The large snowfall in February (38.8 inches) appeared to be primarily restricted to the northeastern portion of the Island as well. Although these are subjective observations, many small tributary streams which normally flow year round were nearly dry by mid-July and lake levels were very low. Effects of these low water conditions may be felt on anadromous fish species primarily but are difficult to assess at this time.

Weather recording instruments have been purchased for installation at Camp Island field headquarters, so next year we should have comparative weather data for the summer months at least.

Table 1
1984 Weather Data Summary-National Weather Service, Kodiak, Alaska

Month	Snowfall (Inches)	Precip. (Inches)	Longterm Average Precip.	Temperatures Max (F°)	Min	Temperature Departure From Norm.
January	19.2	10.11	5.01	48	6	0.8
February	38.8	5.75	7.56	42	(-)2	(-)3.9
March	2.0	9.94	3.85	49	18	5.8
April	9.0	6.27	3.81	50	19	(-)1.3
May	0	4.90	4.85	59	28	0.5
June	0	5.15	4.12	70	40	1.78
July	0	3.04	3.54	78	42	(-)0.87
August	0	1.39	4.30	75	40	2.7
September	0	8.37	6.11	65	35	1.4
October	0	3.15	6.28	55	24	0.4
November	2.9	4.98	5.41	52	15	(-)1.69
December	6.0	5.50	5.03	56	18	(-)0.78
Total	77.9	68.55	56.70			

C. LAND ACQUISITION

2. Easements

The Refuge was directed by the Regional Office (RO) to assist the State of Alaska Attorney General's Office in their efforts to obtain testimony from individuals in Larsen Bay as to use of the portage trail from Larsen Bay to the Karluk River during the years 1936 through 1945. Initial contacts were made with several villagers and arrangements were completed for a meeting to obtain statements from them in January, 1985.

3. Other

Two proposed land exchanges were reviewed and considered this year. Alagnak, Inc., a Seattle-area development corporation (not a Native corporation) proposed exchanging numerous small coastal inholdings on Kodiak to the U.S. Fish and Wildlife Service (FWS) in exchange for FWS properties elsewhere (not specified). These parcels were originally owned by Alaska Packers, which was bought out by Del Monte Corporation (DMC) several years ago. DMC sold all its Alaska land holdings to Alagnak, Inc. this year, along with one major holding in Washington. Alagnak is now in the process of divesting itself of the Alaska holdings.

Most of the parcels offered to FWS are surrounded by Native owned former refuge lands, making acquisition by FWS inappropriate. The remaining parcels were proposed by refuge staff for acquisition. By year's end Alagnak had elected to sell (rather than exchange) their holdings on Kodiak and the extremely high per-acre cost proposed was far above FWS appraised values. It is likely that these parcels will be sold to the public rather than FWS.

Koniag, Inc., the Regional Native Corporation has once more proposed exchanging Native-owned lands on Kodiak Island back to FWS in exchange for lands or mineral rights elsewhere. Kodiak staff provided a priority ranking of these lands and wildlife values and justifications for re-acquisition. The proposal is being pursued at the Regional and Central Office levels. If such an exchange can be consummated it will provide massive benefits to habitat protection on Kodiak, as well as reopening considerable area to access by the recreational public. Any such exchange will undoubtedly require considerable time to complete.

The Refuge's original request for all of Camp Island under Sec. 3 (e) of ANCSA was resubmitted to Bureau of Land Management (BLM) after they disapproved our selection of the whole island. The amended application included the minimal acreage needed to accomplish our mission and protect our facilities on the north and south ends of the Island and a trail easement between the two for a total of 10.86 acres. The BLM concluded that this was the smallest practicable tract used by the FWS in connection with Sec. 3 (e) and sent their findings to Koniag, Inc. No known response had been received from Koniag at year's end.

D. PLANNING

1. Master Plan

Comprehensive Conservation Planning for refuge resources and public use during 1984 was accomplished through the cooperative effort of the CCP team and refuge staff. Numerous meetings and planning sessions were held during the year. Sixteen broad-based issues concerning the Refuge and its resources were drafted covering concerns such as commercial use facilities, Native-conveyed lands, private inholdings, brown bear mortality, public use, and fishery enhancement. In addition, draft plans were completed for directions on resource management, subsistence use, public use and economic use within the Refuge. These draft issues and management directions are being incorporated into a working draft of the Kodiak Refuge CCP by the RO CCP team.

2. Management Plan

Individual management plans for refuge resources and public use will be developed upon completion of the CCP and its selected alternative. Refuge personnel held several planning sessions with Fishery Resources personnel in the RO to discuss and develop standard Fishery Management Plan (FMP) guidelines. Although the FMP is not yet initiated, preliminary goals of the plan identified include: (1) assess for native resident and anadromous species; (2) assess and monitor population diversity of these species; and (3) integrate the information in 1 and 2 with wildlife needs and human use.

3. Public Participation

During the month of September, the five Native villages which own land within the Refuge, (Akhiok, Kaguyak, Karluk, Larsen Bay and Old Harbor), were visited by Manager Bellinger to discuss 22 (g) regulations, co-

operative agreements and CCP. Although the primary objective of these meetings was to set the stage for future public meetings, Manager Bellinger was able to gain some input from the villagers on these subjects.

5. Research and Investigations

Kodiak NR 84 - "Seasonal Migration and Movements of Kodiak Island Bald Eagles" (74530-82-01)

In 1982 colored patagial markers were placed on bald eagle fledglings from eleven nests in Uyak Bay plus Frazer Lake. Bald eagle fledglings from 17 nests were color marked during 1983, and seven of the larger fledglings were also fitted with radio transmitters. Detailed information regarding 1982 and 1983 study results can be found in previous annual narrative reports.

The same marking area used in 1983 was utilized during 1984 efforts with a total of 26 juvenile bald eagles from 16 nests receiving colored patagial markers (Figure 1). One juvenile from each of ten nests was also fitted with a radio transmitter (Table 2).

Attempts to capture and mark wintering subadult bald eagles were unsuccessful in 1984 due to low numbers of this segment of this population wintering in the Kodiak Harbor.

Thirty-seven observation reports of color-marked subadult eagles were received during the year. Six of the observations were of 1982 summer marked birds while the remaining 31 reports were of 1983 summer marked birds. Two of the observations were made in Katmai National Park on the Alaska Peninsula. This is the first time bald eagles hatched and marked on Kodiak Island have been seen off the Kodiak Island Archipelago.

Interchange between Kodiak Island and the Kenai Peninsula also was documented this year. A subadult bald eagle, Y07, captured and marked in the Kodiak Harbor on April 1, 1983 was seen in January of 1984 with approximately 80 other bald eagles congregated on the Homer spit. This bird spent the next two months in the Homer area until late March when the winter bald eagle concentration began to disperse. On April 17, 1984, Y07 was again seen three miles north of Sterling on the Kenai Peninsula.

Another subadult, Y02, was captured at the same Kodiak Harbor location on March 7, 1983. This bird returned to the Kodiak area on January 7, 1984, and was observed regularly until mid-May, implying it was a resident of Kodiak Island.

The home ranges of the four juvenile bald eagles were derived from a total of 89 radio locations and are represented in Figure 2. No locations were made off Kodiak Island, although not all the radioed eagles were found during the tracking flights. Juvenile eagles which were not found during any one tracking flight were subsequently located on Kodiak Island during later flights.

Figure 1 Nest locations of juvenile bald eagle marked during the summer of 1984.

Table 2

Juvenile Bald Eagle Markers and Bands Used During the Summer of 1984 on the Kodiak NWR

	Nest Location	USFWS Band # (Right Leg)	Blue Acrylic Band # (Left Leg)	Patagial Marker # (Right Wing Yellow) (Left Wing-Green)
1.	Camp Pt. - Karluk Lake	629-13560	K50	K50
2.	Long Pt. - Karluk Lake	629-13561	K51	K51
		629-13562	K52	K52
3.	Larsen Bay	629-13563	K53	K53
4.	Uyak Bay	629-13564	K54*	K54
		629-13565	K55	K55
5.	Amook Island	629-13566	K56*	K56
		629-13567	K57	K57
6.	North Side Zachar Bay	629-13568	K58*	K58
7.	East Side Zachar Bay	629-13569	K59	K59
		629-13570	K60	K60
8.	North Side Spiridon Bay	629-13571	K61	K61
		629-13572	K62*	K62
9.	South Side Spiridon Bay	629-13573	K63*	K63
		629-13574	K64	K64
10.	Telrod Cove - Spiridon Bay	629-13575	K65	K65
		629-13576	K66	K66
		629-13577	K67*	K67
11.	Cape Ugat	629-13578	K68*	K68
		629-13579	K69	K69
12.	Noisy Island	629-13580	K70*	K70
13.	West Uganik Island	629-13581	K71	K71
14.	South Side Uganik Passage	629-13582	K72*	K72
15.	Cape Uganik	629-13583	K73*	K73
16.	Karluk Lake	629-13584	K74	K74
		629-13585	K75*	K75

*Also fitted with radio transmitter.

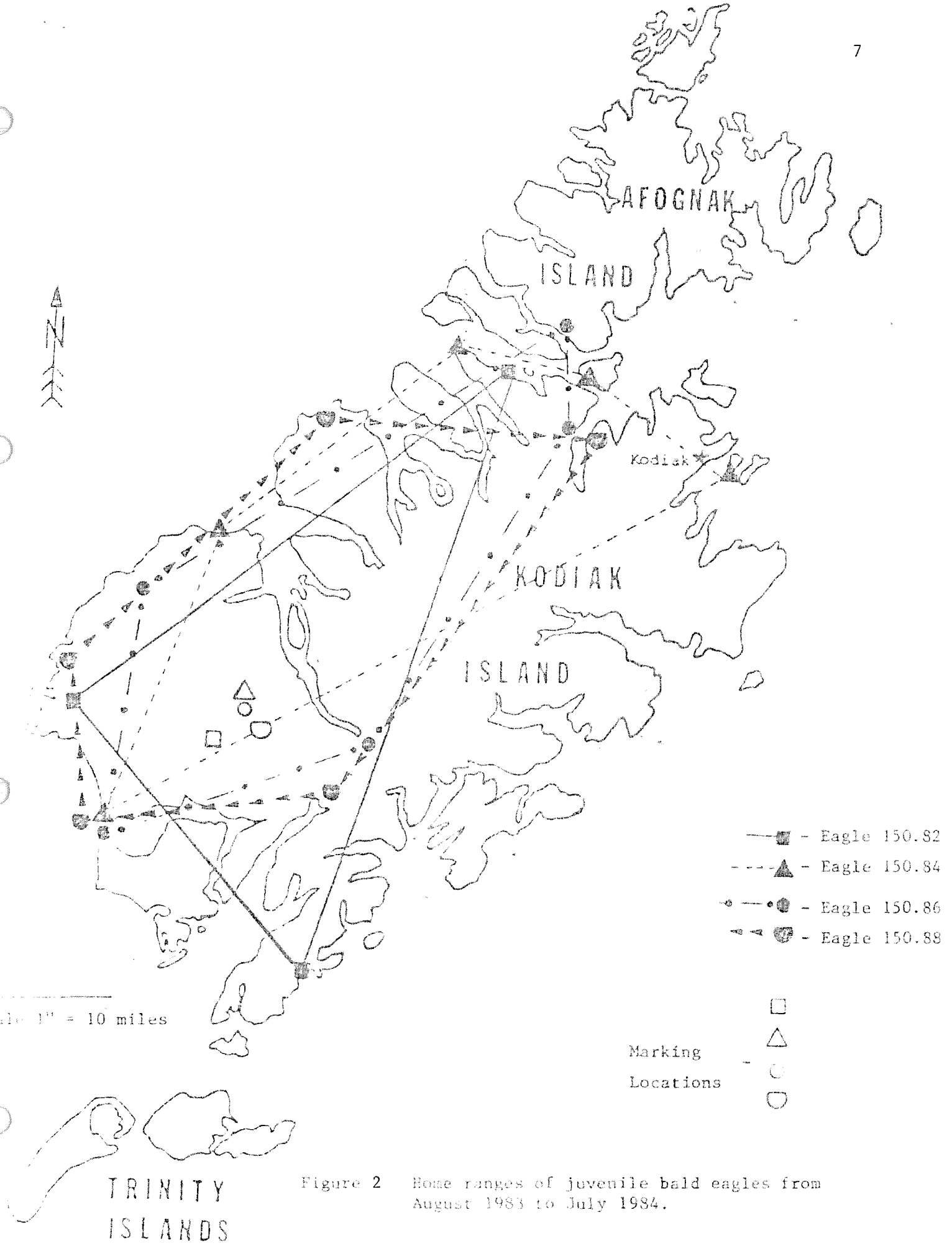

Figure 2 Home ranges of juvenile bald eagles from August 1983 to July 1984.

Subadult bald eagle Y07, captured and marked in the Kodiak Harbor in April, 1983, wintered on the Homer Spit in 1984. 4/83 (84-01) DZ

Juvenile bald eagle showing marking protocol used on the Kodiak bald eagle study. 7/84 (84-02) DZ

Summary

Since July of 1982, 79 immature bald eagles have been colormarked with patagial flags. Seventeen of the 79 were also radio tagged. Fifty-seven observation reports of marked eagles in addition to approximately 150 radio locations have been made.

Movements of Kodiak Island subadult bald eagles have been primarily within the Kodiak Archipelago, however movements across Shelikof Strait and Cook Inlet were documented. Data to date suggests that the majority of bald eagles on Kodiak Island are part of a resident population.

Kodiak NR - "Raptor Observations Associated With Terror Lake Hydroelectric Project (74530-82-02)

Raptors in the vicinity of the Terror Lake Hydroelectric Project (TLHP) (Figure 3) were studied to determine the effects of project construction and operation on nesting behavior. Two raptor species, bald eagles and rough-legged hawks, nest within the project area and had the greatest potential for project impacts. Bald eagles prefer coastal and river valley habitats for nesting and foraging (survey sectors 1 and 2, Figure 4). Rough-legged hawks utilized interior cliffs and rocky outcrops adjacent to Terror Lake (survey sector 3, Figure 4) for nesting and generally foraged for tundra voles in the sparsely vegetated alpine areas.

The most evident effects of TLHP construction disturbance on raptors has been in survey sectors 1 and 3. Both of these areas were exposed to direct construction disturbance. Project effects on raptors on the lower Terror River and Bay area (survey sector 2) would be indirect as no construction activity occurred in this area.

Survey Sector 1 - Kizhuyak Bay

The number of active bald eagle nests located in sector 1 during 1984 increased by two over 1983 (Table 3). Unfortunately, two nest trees were destroyed in 1984 by stream channel changes reducing the total number of nest trees (active plus inactive) in sector 1 from 15 to 13. During 1984 bald eagle productivity in this sector was comparable to previous years. One nest adjacent to the Port Lions transmission line (1/4 mi. So. of Barabara Creek) fledged three young during the 1984 nesting season. Bald eagles normally have only one or two young, but occasionally a nest will fledge three young. At least two other bald eagle nests outside the TLHP study area are known to have fledged three young each during 1984.

Survey Sector 2 - Terror River and Upper Terror Bay

Bald eagle nesting activity in survey sector 2 has been relatively stable since 1980; productivity in the area has fluctuated considerably during this time (Table 3).

Construction disturbance in this sector has been minimal and is not likely a contributing factor to these productivity fluctuations. The availability of food to feed fledglings in the form of spawning Terror River pink salmon is a more probable cause for these productivity changes. However, since only two bald eagle nesting territories occur in this sector,

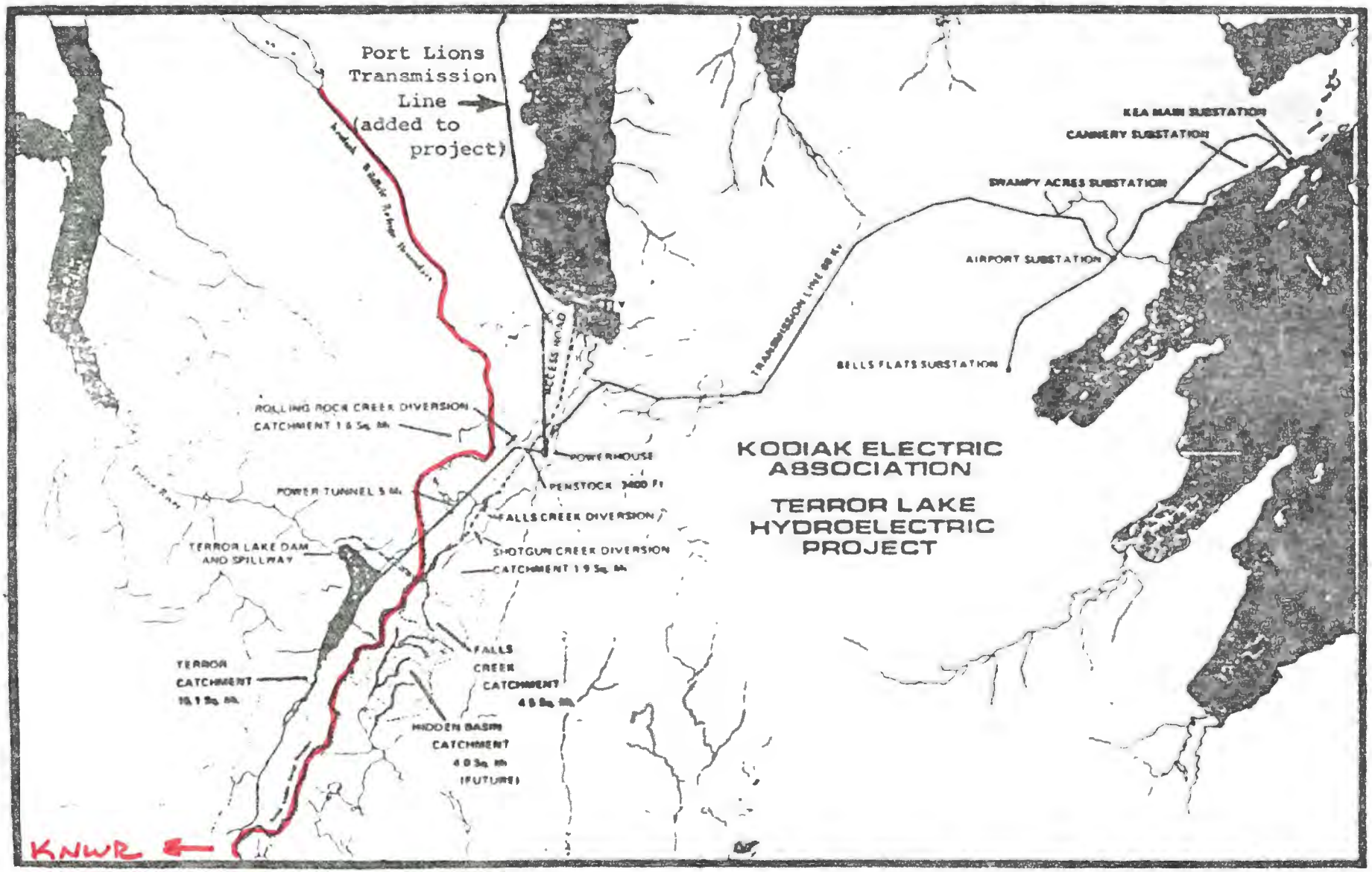
Port Lions
Transmission
Line
(added to
project)
KEA MAIN SUBSTATION
CANNERY SUBSTATION
SWAMPY ACRES SUBSTATION
AIRPORT SUBSTATION
BELLS FLATS SUBSTATION
TRANSMISSION LINE 69 kv
ACCESS ROAD
ROLLING ROCK CREEK DIVERSION
CATCHMENT 1.6 Sq. Mi.
POWERHOUSE
PENSTOCK 3400 Ft
POWER TUNNEL 5 Mi.
FALLS CREEK DIVERSION
TERROR LAKE DAM
AND SPILLWAY
SHOTGUN CREEK DIVERSION
CATCHMENT 1.9 Sq. Mi.
KODIAK ELECTRIC
ASSOCIATION
TERROR LAKE
HYDROELECTRIC
PROJECT
TERROR
CATCHMENT
16.1 Sq. Mi.
FALLS
CREEK
CATCHMENT
4.8 Sq. Mi.
HIDDEN BASIN
CATCHMENT
4.0 Sq. Mi.
(FUTURE)
KNWR

Figure 3

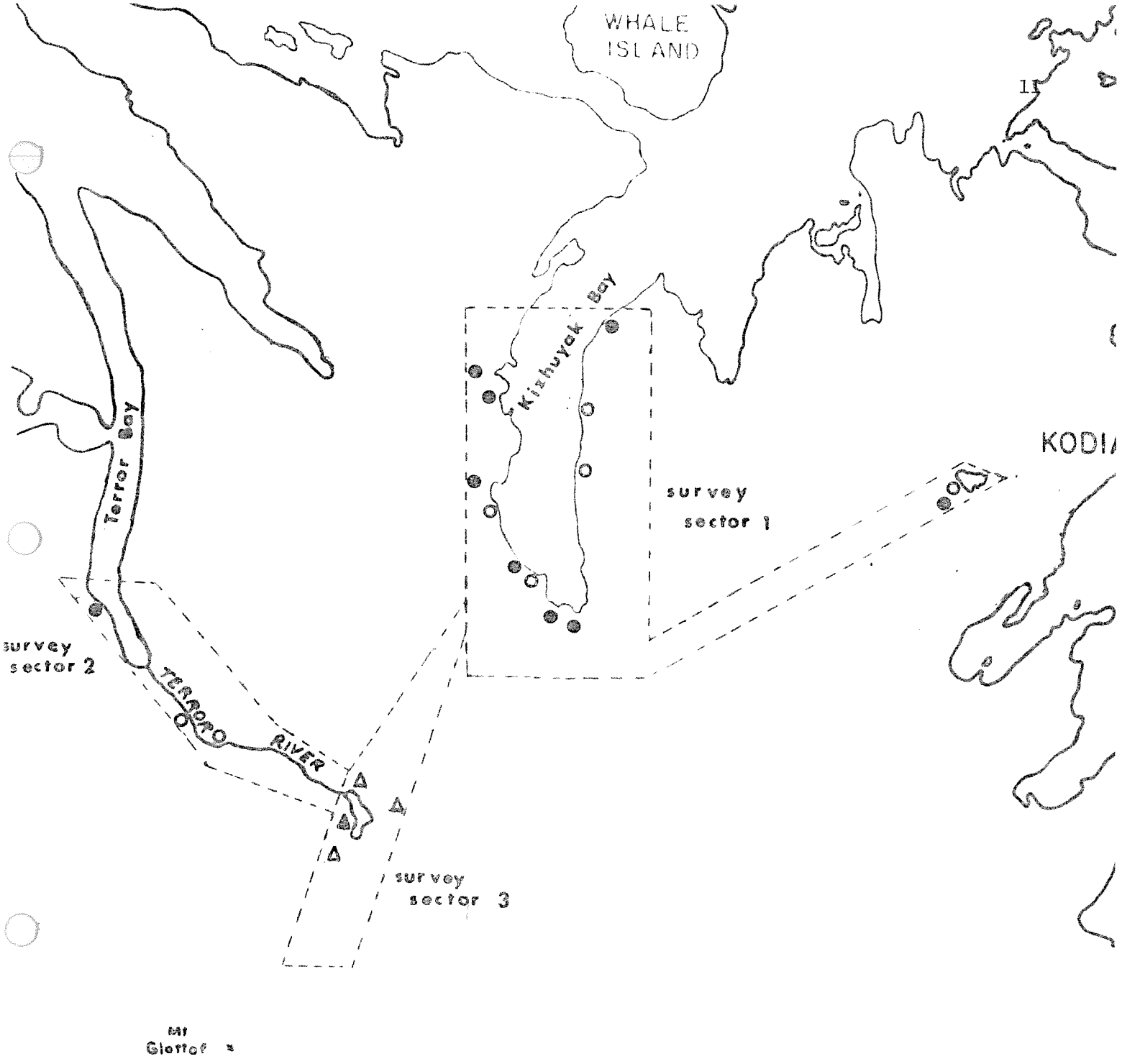

Figure 4 Terror Lake Hydroelectric
Project 1984 Raptor Nest Locations

individual pair behavior or other unquantifiable influences may be responsible. With the completion of the Terror Lake Dam, maintaining sufficient flow discharges to allow upstream passage of spawning pink salmon may influence future bald eagle nesting productivity in sector 2.

Survey Sector 3 - Terror Lake

Rough-legged hawks again utilized former nesting areas around Terror Lake in 1984 after being absent from these areas in 1983. With the completion of the Terror Lake Dam and elimination of the upper construction camp at the end of 1983, disturbance in this area was substantially reduced. The rough-legged hawks apparently responded favorably to this as three of the four nest sites located in 1984 contained fresh nesting material. Unfortunately, only one pair of hawks actually laid eggs and fledged young in 1984. It is not known whether cessation of construction activity will result in a return of rough-legged hawk nest productivity to pre-construction levels.

Miscellaneous Observations

The number of raptor observation reports decreased with the reduction of the project's work force (Table 4). Even though total numbers of raptors seen in 1984 were down because of the minimal observation reports, the numbers of species occurring in the project area were comparable to past years. One species which migrates through Kodiak Island, the American kestrel, was observed utilizing the transmission towers for perches.

The pair of golden eagles which nested unsuccessfully in sector 1 during 1983 did not attempt nesting in 1984.

Kodiak NR 84 - "Investigations of the Instream Distribution and Movement of Karluk River Steelhead Trout" (74530-83-01)

The second and final year of an investigation to determine movement and habitat use of adult steelhead in Karluk River was completed in 1984. This project, in addition to determining movement and instream distribution, was also done to determine the susceptibility of Karluk River steelhead to the in-river sport and subsistence fishery. With assistance from Alaska Department of Fish and Game (ADF&G) Sport and Commercial Fish Divisions - Kodiak, adult steelhead were captured as they entered the rivers in the fall of 1982 and again in the fall of 1983. Radio tags were implanted surgically in captured fish and movements were tracked by aircraft from September to July of the next year.

Preliminary analysis of results indicate similar distribution and movement of fish tagged during both years of the study. Approximately 80 percent of the radio-tagged steelhead monitored from November, 1982 to March, 1983, overwintered between river mile (rm) 14.0 and 20.0, and no significant movement was detected. Results indicate the heaviest impact from sport fisheries could occur in November between rm 15.0 and 17.0, and at the same location by the subsistence fishery from November through March. Two general areas of spawning were detected, from rm 5.5 to 7.5 and rm 14.0 to 17.5. Preliminary results from combined data for both years of the

Table 3
Summary of Raptors' Nesting Surveys Within
Terror Lake Hydroelectric Project Area

Species	Year	Survey Sectors Sector 1 Bald Eagle	Sector 2 Bald Eagle	Sector 3 Rough-legged Hawk
No. of Nests (Active/Total)	1980	6/12	2/3	3/3
	1982	7/11	2/3	1/3
	1983	6/15	1/2	0/0
	1984	8/13	2/3	1/4
Average No. of yg./ Active Nest	1980	2.0	0.0	2.0
	1982	1.6	2.0	2.0
	1983	1.7	1.0	0
	1984	1.6	1.0	2.0

Table 4
1984 TLHP Miscellaneous Raptor Observations

Species	No. of Observation Reports	No. Individuals/Observation
Bald Eagle	4	2.3
Golden Eagle	1	1
Rough-legged Hawk	9	1.5
American Kestrel	1	5
Northern Goshawk	1	1

study indicate approximately 45 percent of those spawning adults which enter the system in the fall survive to spawn and return to the ocean. Utilizing kelt counts obtained through an ADF&G wier at the Karluk Lagoon, an estimate of the Karluk steelhead run in 1981 and 1982 would be approximately 3,200 and 9,300 fish, respectively. A progress report on the first year's analysis was submitted in January, 1984, and work on the combined first and second years' data is being analyzed for a final report.

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

This study was initiated in October, 1984, to map and characterize critical overwintering and spawning habitat of adult steelhead and to locate critical rearing habitat of juvenile steelhead. In addition, movement patterns of adult steelhead are being characterized in order to identify locations where major sport fishing is likely to occur and the susceptibility of adults to be caught at these locations.

This study was initiated because: (1) the Ayakulik-Red River steelhead are an extremely valuable refuge resource and there is no information regarding instream distribution, population dynamics, or critical habitat; and (2) since movement and positioning are unknown, the degree and extent these fish are susceptible to an in-river sport fishery must be identified for proper management alternatives.

Two tagging efforts, one in October and one in November, 1984, resulted in the successful capture and radio tagging of only two adult steelhead. Although only approximately 135 adult steelhead had passed upstream through ADF&G's wier in the Ayakulik Lagoon by August, 1984, steelhead abundance in the lower 12.00 miles of river was evident during both tagging efforts Both of the adults tagged in October maintained position at rm 12.00 where they were captured and tagged. As of the end of December, one adult maintained position at rm 12.00 and one had moved downstream to the Lagoon. A third tagging effort is planned for mid-February, 1985.

Kodiak NR 84 - "Ayakulik-Red River Fisheries Habitat Inventory" (74530-84-02)

This study was initiated during the spring of 1984. The goal of the study is to: (1) determine the physical and hydrological characteristics of the Ayakulik-Red River mainstem and major tributary watercourses; and (2) determine adult and juvenile species distribution associated with those habitat characteristics. During 1984 this specific study was incorporated into the 1984 Steelhead Trout (74530-84-01) and programmed 1985 Chinook Salmon (74530-85-02) studies on the Ayakulik-Red River. The results of initial work completed in the spring of 1984 are summarized in Sec. G-11.

Kodiak NR 84 - "Fisheries Habitat Inventory-Afognak Section of the Kodiak National Wildlife Refuge" (74530-84-03)

This study was projected for late August, 1984, with goals similar to the inventory of the Ayakulik-Red River study (74530-84-02). Initiation of this work was suspended in 1984 due to additional involvement of the Refuge staff during the time period projected and the absence of the Refuge Fishery Biologist for flight training.

Float trip on Karluk River to ground truth radio-tagged steelhead locations, April, 1984. 4/84 (84-03) TC

Examining spawned out steelhead adult during survey of East Fork Ayakulik River, May, 1984. 4/84 (84-04) VB

Kodiak NR 84 - "Karluk Lake Sockeye Salmon Studies" (FWS 81410-02) (ADF&G)

This study is a cooperative effort being conducted by the ADF&G and the FWS Seattle National Fisheries Research Center (SNFRC). The major goal of the project is to determine the reasons for the low level productivity of Karluk sockeye and to restore annual spawner returns from current levels of approximately 3-500 thousand to 800 thousand plus spawners in the system. Basically ADF&G is conducting sockeye culture and evaluation studies plus initiating hydroacustic and limnological surveys of Karluk Lake. The FWS through SNFRC-Anchorage is conducting competition and prey studies within the system, paleolinmological studies and sockeye smolt emigration studies. The smolt studies were conducted by Refuge staff during 1983 (74530-83-03). In 1984 lead role for the smolt studies was transferred to SNFRC.

Overall project results for 1984 for some components of the Karluk Lake studies are summarized below:

> During the spring of 1984 a total of 4.8 million sockeye fry was estimated to have emigrated into Karluk Lake as a result of eyed egg plants (12.3 million) during the fall of 1983. Estimated survival from eyed egg plants to fry emergence was 39 percent. In the fall of 1984, 13.2 million eyed eggs were planted in Upper Thumb River from a green egg take of 15.5 million eggs from early run Thumb River stocks. Migrating sockeye from Upper Thumb River were tagged with half-length coded wire tags from April 17 to May 15, 1984. A total of 117,000 valid marked fry were released. This represents 2.4 percent of the egg plant fry marked. Recovery of marked fry in Thumb Lake and waters of Karluk Lake indicate the peak emigration of fry from Thumb Lake occurred from April 20 to May 20. A total of 1.1 million smolt were estimated to have emigrated between May 15 and July 2, 1984.
>
> The results of other components of this cooperative effort are not yet available as data from 1984 is still being analyzed.

In addition, a preliminary report (due in the spring of 1985) from ADF&G-FRED Division on the limnological aspects of the Karluk project will discuss recommendations for artificial fertilization of Karluk Lake to enhance zooplankton production in spring and early summer. Alaska Department of Fish and Game indicates this may result in better growth and survival of sockeye fry in the lake. The FWS is basically opposed to the fertilization concept because predation and competition could be major factors negating any benefit of fertilization for sockeye juveniles and the affects of fertilization on other species besides sockeye is unknown.

Kodiak NR 84 - "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 TLHP on Kodiak Island. The purpose of the study is to assess the magnitude

Surgical implant of radio transmitter in adult steelhead, Ayakulik River, October, 1984. 10/84 (84-05) KR

Assistant Refuge Manager "helping" hard working Refuge Fishery Biologist on Ayakulik River, October, 1984. 10/84 (84-06) TC

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 1983 was completed in March, 1984. Basic objectives so far have been to build a data base from fry and egg deposition sampling and observations on escapement magnitude and distribution. A progress report for work done in 1984 will not be available until March, 1985.

Kodiak NR 84 - "Investigation of Habitat Use and Evaluation of Aerial Surveys of Brown Bear in Southwest Kodiak Island" (74530-83-02)

This investigation is a cooperative effort involving the DWRC and the Refuge.

Brown bears radio-collared in 1983 were opportunistically relocated from January through March, 1984, while they were in winter dens and then monitored at roughly 10-day intervals the remainder of the year. In July, 1984, the sample of study animals was increased with the capture and radio-collaring of 16 adult females and the marking of 18 associated juveniles. In total, 37 adult females have been radio-collared and 40 juveniles have been marked; just over 800 relocations with associated habitat and life history data have been recorded for these animals. Twenty-eight females still carried functional radio-collars at the end of 1984.

In 1984 radio-collared bears departed from den sites from approximately mid-March to mid-June, with most departures (70%) occurring in April and May. Eight of the 1983-84 dens were visited on foot and two others were closely approached by helicopter to collect data on den characteristics and to estimate the error involved in obtaining den elevations from altimeters of fixed-wing aircraft.

Radio-collared bears generally were found in mid-slope habitats during spring, although several family groups remained in or near alpine habitat for 2 to 3 weeks after den emergence. Bears first began feeding on salmon about mid-June when chum and sockeye salmon began moving up Sturgeon River and Dog Salmon Creek, respectively. By July 1 large numbers of bears, including several marked animals, were concentrated along those streams. By late July, bears were intensively fishing for sockeye salmon in tributaries of Karluk, Frazer and Red Lakes.

In July and August aircraft and ground monitoring of radio-collared bears was intensified to gather data on the efficacy of aerial stream surveys. Approximately 20 person-days were devoted to observing and enumerating bears from a camp overlooking the Pinnell Creek drainage (north of Frazer Lake). During the same time period aerial surveys of Pinnell Creek and other streams in the study area were flown. These procedures provided comparative data for ground and aerial counts as well as movements and behavioral data on radio-collared bears. Some of these data were reported in a paper entitled "A study of brown bear sows at Frazer Flats from July 27 to August 5, 1984" by volunteer R. Greg DeBella; the study fulfilled requirements of a credited senior course at Colorado State University.

No. 22, a 19-year-old veteran, is the most wide-ranging of 37 adult females that have been radio-collared to date. For the past two years she has regularly traversed up to 16 airline miles in excursions between the head of Uyak Bay, Dog Salmon Creek, and O'Malley River. 8/84 Photo courtesy of B. Patterson, Flirite, Inc.

Frequent relocations of marked family groups along the East Fork of Ayakulik River identifies that drainage as particularly important brown bear habitat. 7/84 (84-07) VB

Many bears in the southwest portion of the Refuge den in alder cover at low elevations (800 to 1500 ft.). This was the 1983-84 winter den of a radio-collared female and her two-year-old juvenile. 5/84 (84-08) TC

Other bears den in precipitous terrain at high elevations (2500 to 3000 ft.). The excavated tailings in this photo represent at least three separate dens, including one occupied by a family group. A marked family group denned on the backside of this mountain. 12/84 (84-09) VB

Additional evaluation data were acquired during aerial surveys by noting whether observed family groups were marked and by relocating radio-collared bears after surveys were completed. Analysis of these data is in progress.

Radio-collared bears began entering winter dens in the last half of October, but the majority (70%) entered dens between mid-November and mid-December. Two family groups did not enter their winter dens until January, 1985.

Kodiak NR 84 - "Impacts of Construction and Post-construction Operation of the Terror Lake Hydroelectric Project on Brown Bears (Ursus arctos)" (74530-82-03)

This study is one of the mitigation conditions tied to construction of the Terror Lake Dam on the Refuge. It is being conducted by the ADF&G under contract to the Alaska Power Authority (APA). The following summary of 1984 activities is based on a preliminary progress report prepared by Roger Smith, Game Management Unit (GMU) 8 Area Game Biologist and Principal Investigator, ADF&G:

Fifty-three bears were captured during two tagging periods in 1984. The bears included 23 recaptured adults, 14 newly captured adults, 12 newborn cubs and 4 yearling or older cubs. Thirty-five adult bears were equipped with radio collars. Thirty-eight bears carried functional radio-collars as of mid-November, 1984. Mortalities (5), transmitter failures (2), shed collars (1), and lost signals (4) reduced the sample of study animals in 1984.

Movements of radio-collared bears were monitored by weekly tracking flights from March through November. In addition, intensive daily aerial tracking was done incidental to spotting bears during the two 5-day capture operations. Occasional flights were conducted during December through February to verify den locations.

Den sites of radio-collared bears were located, photographed and described; some were revisited by helicopter after the bears had emerged to collect additional data on habitat and den construction.

Progress was made in data analysis and reporting. The 1982 and 1983 maps on movements of each radio-collared bear were entered into a geoprocessing unit, permitting the generation of home range maps by computer. Other attribute data associated with 1983 relocations of radio-collared bears were keypunched and stored on computer tape. The 1984 movement and attribute data are currently being entered into computer format. Analysis of 1983 data and preparation of the 1983 annual report is in progress.

6. Other

Refuge fishery personnel attended several workshops and meetings with the Regional Fishery staff and other Fishery Resources personnel to discuss format and data input into the Regional Fisheries Information Network (FIN) being developed for Region 7. When completed the system should allow the Refuge to store historical and current fishery information on populations and habitat as a data base for management planning of refuge fishery resources.

E. ADMINISTRATION

1. Personnel

Left to right, Back row: 1, 7, 4, 6; Middle row: 9, 8, 13; Front row: 5, 3, 12, 2 - 2/85 (84-10) DM

10 - 2/85 (84-11) DM

Personnel

1. Jay R. Bellinger, Refuge Manager, GS-12, EOD 01-08-84, PFT
2. Kevin Ryan, Assistant Refuge Manager, GS-11, EOD 05-13-84, PFT
3. Michael T. Vivion, Wildlife Biologist/Pilot, GS-12, PFT
4. Donald A. Chatto, Fisheries Biologist/Pilot, GS-11, PFT
5. Dennis C. Zwiefelhofer, Wildlife Biologist/Boat Operator, GS-9, PFT
6. David W. Menke, Outdoor Recreation Planner, GS-9, EOD 08-16-84, PFT
7. Ronny D. Bowers, Maintenance Mechanic, WG-9, PFT
8. Geraldine M. Castonguay, Refuge Clerk, GS-5, PFT
9. Judy K. Tomberlin, Clerk Typist, GS-3, PFT
10. Rasmus G. Anderson, Laborer, WG-2, PPT
11. Edward R. Hajdys, Assistant Refuge Manager, GS-7, PFT
    Resigned 02-10-84 (Not pictured)
12. Eric L. Connell (1985 Volunteer)

Denver Wildlife Research Center - Kodiak

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

Jay Bellinger transferred to Kodiak NWR as the new Refuge Manager from Yukon Delta NWR on January 8. Because of ongoing complex programs at Yukon Delta the Regional Office had Jay commuting between the two Refuges until late March.

Ed Hajdys resigned on February 10.

Gerri Castonguay was promoted to GS-5 on April 15. This station would not run as smoothly as it does without Gerri's invaluable grasp of administrative matters.

Kevin Ryan filled the Assistant Refuge Manager position on May 13. Kevin transferred south from Koyukuk NWR in Galena, Alaska. He's been heard mumbling that he thinks he's died and gone to heaven.

Denny Zwiefelhofer received a much deserved promotion to GS-9 on May 27. Denny's hard working, hard charging manner is an asset to our operations.

Tony Chatto was selected for the Fishery Biologist/Pilot position. Tony is in a training capacity until he meets full qualifications for the pilot section of the job.

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

Table 5
Staffing - 1980-1984

(Number of Employees)

	Permanent			Total
	Full-time*	Part-time	Temporary	FTE
FY 1984	9	1	0	9.5
FY 1983	9	1	0	9.5
FY 1982	8	0	1	8.3
FY 1981	8	0	1	8.2
FY 1980	8	1	1	9.3

*Includes career-seasonals (50-week) appointees.

2. Youth Programs

Three Youth Conservation Corps (YCC) enrollees were employed from June 10 to August 4, 1984. Lisa M. Heitman, Robert H. Lynch and Bryan D. Weisner were exposed to a variety of projects and environmental education. The majority of the work was maintenance in nature and generated some negative feedback from the enrollees. The facilities at this station are new and those that aren't require the types of work that YCC enrollees are unable to do (e.g. use of power tools or in remote areas).

1984 YCC Enrollees. From left to right: Weisner, Lynch, and Heitman. 8/84, (84-10) KR

4. Volunteer Program

The volunteer program is one of the most successful programs to date. We were fortunate to have very good people this year who helped us with a variety of programs.

Three volunteers, R. Greg DeBella (6/5/84-8/20/84), John R. Heine (6/20/84-9/21/84) and Peter F. Bahls (6/20/84-9/20/84) came to us from the "Lower 48" and were involved in the biological program. They assisted with bear, eagle and fisheries projects during the summer field season.

In June one volunteer was recruited to keep the visitor center open on weekend afternoons. In October arrangements were made with the Kodiak Chapter of the Audubon Society to have members volunteer to open the center on Sunday's as part of Audubon's nationwide Adopt-A-Refuge Program. By mid-November nine Audubon members and four other volunteers were helping out on weekends. Monthly training sessions for public use volunteers were conducted starting in December. Volunteers run three showings of weekend wildlife films and operate the sales area as well as answer a variety of visitor questions. In the future, we hope to expand the volunteer program to include diverse duties such as cabin maintenance, photography, and presentations on the Refuge to local organizations.

The tired looks of volunteers Heine, Bahls and DeBella (left to right rear) suggest it has been a long day for both man and beast. One has to wonder, though, how they got so much tattoo ink on the bears and so little on themselves. 7/84 (84-11) DZ

5. Funding

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

The actual operation base funding of 687 K for FY 85 may seem excessive to stations in the "Lower 48". However, due to the high cost of doing business in Alaska, 466 K or 68 percent of this total is required to meet salaries, OAS aircraft charges and other fixed costs. The normal mode of travel for meetings, training, etc. is by commercial air carrier rather than Refuge vehicle. Projected travel will utilize an additional 32 K of the budget leaving only 28 percent available for field operations.

Table 6
Kodiak NWR Funding Levels

Program	Year 1981	1982	1983	1984	1985*
MB-1210	65	100	100	---	
MNB-1220	160	188	322	---	
I&R-1240	48	48	48	---	
WR-1260	---	---	---	475	542
FR-1300 (1360)	95	60	95	125	145**
ARMM	---	---	---	100	108
Totals	368	396	565	700	795

*These figures represent planning totals for FY 85. As of this writing, these totals have already changed to a degree and will undoubtedly continue to change through the first part of the fiscal year. The 1985 Narrative Report will list the final funding allocations.

**This total includes a 20 K new committment proposal for baseline investigations which had not yet been released to the station by the end of the year.

6. Safety

There were two lost time accidents in 1984. On November 8, 1984, Laborer Rasmus Anderson tripped over some 16 mm film cases stacked on the floor behind the counter in the visitor center while vacuuming. Andy twisted his right hip and ankle, fell, and hit his head and shoulder on the wall and floor. Andy is disabled with a hip deformity caused by polio as a child and the injury was to this hip. He had not returned to work at year's end.

On November 23, 1984, Wildlife Biologist/Pilot Vivion experienced a severe spasm in his back while kneeling to secure our aircraft to tiedowns. Mike was in traction for four days and was unable to return to work until December 5, 1984.

7. Technical Assistance

Technical assistance was provided to ADF&G Sport Fish Division in December, 1984, to attempt capture and radio-tag adult steelhead trout in the Buskin River, near the town of Kodiak. Little is known of this stock and the objectives were to identify overwintering and spawning areas.

8. Other Items

In May, 1984 RM Bellinger and FB Chatto met with Bob Bridges who was conducting an evaluation of Region 7's Fishery Resources Program for RD Putz. The main thrust of the meeting centered upon the organizational

structure of the Region's Fishery Program and fishery work on refuges. The Kodiak Refuge Fishery Program was discussed and input was given as to the Refuge's view on how and who should have lead in conducting a refuge Fishery Program.

In June, 1984, the Central Office Fishery Resources (FR) review team accompanied by Region 7's ARD/FFA Nelson and Chief FR Bailey visited the Refuge. During the visit an overview of Refuge FR and the status of the Refuge fishery program was presented to the team. In addition, a meeting was held at Karluk Lake with the SNFRC field personnel to discuss FWS progress and involvement in the Karluk Lake Sockeye Studies (FWS 81410-02). At the conclusion of the Kodiak review the Refuge Fishery Biologist joined the review team and traveled to the Kenai FR station for an overview of fishery projects on the Kenai Refuge and attended the close out session in the RO, Anchorage.

Winston Jacobson from Contracting and General Services in the RO conducted an administrative inspection of the Refuge from June 18 through 20. Several minor discrepancies were found and corrected.

The annual Refuge inspection was conducted July 17 through 19 by Refuge Supervisor, South, Larry Calvert. All Refuge Public Use cabins and the Camp Island administrative site were visited as was refuge headquarters. Maintenance needs were identified at all locations and actions taken accordingly.

F. HABITAT MANAGEMENT

1. General

The Kodiak NWR is for the most part, defacto wilderness. Management is primarily directed toward protection of existing habitat values rather than use of manipulative methods to improve or develop habitat. A brief summary of habitat types is presented in the introduction.

A number of cabins along the coastline are monitored and further development is prohibited to prevent further degredation resulting from human occupancy. No developments (except FWS recreation cabins) have been allowed in the interior of the Refuge, and even long-term camping is prohibited in this area.

The Terror Lake Hydroelectric Project was completed by year's end. Few environmental problems were noted this year, primarily because construction on refuge lands was completed early in the year. Concerns now grow over post construction impacts related to use (and abuse) of project roads and equipment. At least one mountain goat is rumored to have been hauled out for a hunter in a project vehicle this year. There is a very real possibility that the project roads, facilities and vehicles will turn this area into a private road-hunting preserve for Kodiak Electric employees and friends. Federal Energy Regulatory Commission (FERC) license stipulations provide the only prohibition to this kind of activity, and FWS cannot enforce FERC license stipulations. The nearest FERC office is in San Francisco.

These falls on Baumann Creek are typical of the spectacular scenery on the refuge. 6/84 (84-12) DZ

YCC crews pulled alder sprouts from high visibility locations in front of and behind the visitor center and headquarters building. 12/84 (84-13) DM

6. Other Habitats (Aquatic)

Stream surveys to collect baseline data were conducted on the East Fork and mainstem Ayakulik River in the spring of 1984. Refer to Sec. G-11.

9. Fire Management

Work began on a regional fire management plan for the Kodiak Archipelago and the Alaska Peninsula. This is an interagency effort and is designed to designate various suppression strategies on specific areas of the lands involved. The plan is scheduled for completion in April, 1985.

The State of Alaska handles all fire suppression on the Refuge. There were seven fires on Kodiak Island in 1984 which burned a total of 841 acres. Three of these occurred on the Refuge and involved 646 acres.

10. Pest Control

Alder invasion around the Refuge headquarters has been identified by the RO as a problem. Various means of control were explored in 1984 and the YCC enrollees pulled alders close to the office building and around Refuge signs. A more efficient means of mechanical control will be experimented with in 1985.

11. Water Rights

The FWS has identified four fish species (three nationally and one regionally) as Species of Special Interest (SSI). The three national species (chinook salmon, coho salmon, and steelhead trout) and the one regional species (sockeye salmon) all occur on the Kodiak Refuge As part of the strategies in the Regional Resource Plan, the establishment of water rights for refuge systems to protect instream habitat of these species is proposed. The Kodiak Refuge objective (as identified during the CCP process in 1984) will be to maintain instream flows at a level sufficient to support both resident and anadromous fish populations up to maximum historic levels and to maintain aquatic habitat utilized by other wildlife species. During 1984 a priority matrix was developed for refuge streams as candidates for instream flow quantification. This matrix was submitted to the RO for consolidation into Regional priorities.

G. WILDLIFE

2. Endangered or Threatened Species

Wildlife Biologist/Boat Operator Zwiefelhofer transported, via the Refuge vessel Ursa Major, DWRC personnel Doug Forsell and Jeff Kogan to Kiliktagik Island in the Semidi Island group from June 5 through 21 to look for nesting Aleutian geese.

In June, 1982, a DWRC researcher working on northern fulmars observed several small-bodied Canada geese which closely resembled the endangered

Canada goose flushed from nest on Kiliktagik Island in the Semidi Island group. Are they the Aleutian subspecies? 6/84 (84-14) DZ

Kittywake colony in the Semidi Island group. 6/84 (84-15) DZ

Aleutian sub-species on Kiliktagik Island. The purpose of the June, 1984 trip was to determine the size of the nesting population of these geese and collect eggs to be hatched and goslings raised. The goslings were to be placed in a captive breeding facility where blood and tissue samples could be obtained for genetic analysis to ascertain their relationship to the endangered sub-species.

Three days were spent on Kiliktagik Island and 16 nests were located. Most nests were found on or near grass hummocks with a southwest facing aspect. It was estimated that there were 20 to 22 nests which contained four or more eggs. Ten goslings were fledged from the 13 eggs collected and sent to the University of California at Davis where the genetic analysis had not been completed by year's end. Should these geese prove to be Aleutian it would be a previously unknown population some 800 miles east of known nesting locations on Buldir and Chagulak Islands.

3. Waterfowl

Womens Bay, Middle Bay, Kalsin Bay and Narrow Cape are not on the Refuge. Species are reported from these locations because of the uniqueness of their appearance on Kodiak Island or the phenology of their appearance.

Eleven tundra swans overwintered on the upper Karluk River during 1984. Approximately the same number utilized the same area of the river in 1983.

A pair of brant were seen on a small pond at Narrow Cape on January 8. Brant are common spring migrants but rarely seen during the winter.

Early spring weather brought on an early waterfowl migration. Thirty to forty emperor geese were observed in Womens Bay March 17 through 29.

A pair of swans were observed and photographed at Kalsin Bay on April 15. Size and external characteristics strongly indicate that they were trumpeter swans but a positive identification was unobtainable.

In April, Kalsin Bay Lagoon hosted several species uncommon to Kodiak. Four white-fronted geese and four Taverner's Canada geese were observed with approximately 1000 brant on April 23. Twenty-four small bodied Canada geese were observed at the same time. Based on plumage characteristics they may have been the Aleutian sub-species.

A hooded merganser, another rare migrant to Kodiak, was observed in Middle Bay on April 10.

The early spring weather spurred early breeding behavior in the Refuge's tundra swan population. Pairs of swans were on nesting areas and courtship activity was evident by the end of March. A tundra swan nesting survey was conducted on June 2, 8 and 10. The early nesting activity was confirmed by the presence of three newly hatched broods. A follow-up productivity survey of a portion of the nesting areas was flown on August 15. Results of these surveys are presented in Table 7. Nesting populations and productivity were down slightly from 1983 but were comparable to the average since 1980.

Table 7
1984 Kodiak National Wildlife Refuge Tundra Swan Surveys

Date	Birds In					Clutch Size							Birds In		Brood Size						Total Adults	Total Young	Total Birds
	Sng	Pr	Flk	Sng W/Nest	Pr W/Nest	1	2	3	4	5	6	Unk	Sng W/Bd	Pr W/Bd	1	2	3	4	5	6			
June 1984	13	32	4	8	12	-	-	1	3	1	-	15	0	3	-	2	-	1	-	-	87	8	95

Date	Birds In						Brood Size						Total Broods	Total Young	Average Brood Size	Total Birds
	Sng	Pr	Flk	Total Adults	Sng W/Bd	Pr W/Bd	1	2	3	4	5	6				
August 1984*	3	34	8	45	0	10	4	3	0	1	1	1	10	25	2.5	70

* Not all refuge nesting area surveyed

Although Kodiak's fall weather was slightly warmer than normal some wintering waterfowl species arrived in the area nearly two months early.

Flocks of greater scaup, oldsquaw and small numbers of emperor geese were observed in Womens Bay on September 26. Four hundred Steller's eiders arrived on November 4.

4. Marsh and Waterbirds

Great blue herons are rarely seen on Kodiak Island and sightings usually involve a single bird. From early October until year's end, up to four great blue herons were observed around the city of Kodiak and the Near Island area.

5. Shorebirds, Gulls, Terns and Allied Species

Shorebird migrations through Kodiak were also phenologically early in the spring of 1984. Greater yellowlegs arrived on Kodiak on April 14, followed closely by black turnstones on April 20 and semi-palmated plovers and lesser golden plovers on April 23.

Temminck's stint, a rare Eurasian shorebird species, was observed and photographed on Kodiak for the first time on June 12 in Womens Bay.

Black-legged kittiwakes arrived on the breeding colonies on March 4, approximately a week earlier than previous records. A slaty-back gull was observed at Womens Bay on April 4.

A northern fulmar, a pelagic seabird that normally winters on the ocean shelf-break, was found around a local downtown gas station on January 2. The bird was apparently blown ashore by a strong storm on January 1 and was attracted to the station's bright lights. The bird was released a short time later away from the distractions of city life and headed for the open ocean.

On September 30 approximately 1500 gallons of "Bunker C" oil leaked into Womens Bay from the Coast Guard power plant. About 120 partially oiled glaucous-winged gulls were the only birds observed to have been contaminated. Periodic checks of the beaches were made throughout the clean-up process and no dead birds were found.

Due to problems with contracting and the vendor, much needed hull repairs on the Refuge vessel Ursa Major were not completed in time for the winter seabird surveys. West side bays were surveyed via the ADF&G F/V Smolt from February 24 to March 5. East side bays were not surveyed in 1984.

Analysis of the five years' wintering sea bird and sea duck data base was completed and is presented in Table 8. It was found that winter surveys were better than fall surveys for monitoring overall specie population changes. Species which can be considered essentially resident such as loons, cormorants, harlequin ducks, and pigeon guillemots had very consistent densities which did not vary significantly during the five

Table 8
Densities of the most frequently occurring species or species groups observed in five bays of Kodiak Island, 1980 - 1984

Species	Winter				
	1980	1981	1982	1983	1984 a
Loons#	0.47	0.87	0.76	0.85	0.56
Grebes*	0.79	0.63	0.92	1.58	1.45
Cormorants#	5.20	7.13	7.05	6.08	5.12
Goldeneyes*	2.00	2.54	1.97	1.18	3.25
Oldsquaw#	25.37	19.67	12.82	11.51	10.68
Harlequin Duck#	3.24	3.25	3.35	3.01	3.81
Eiders#	3.74	2.87	3.43	5.80	.49
Black Scoters*	10.54	12.18	10.58	12.59	7.55
White-winged Scoters#	7.51	6.56	4.33	6.53	4.57
Surf Scoters#	1.19	1.04	1.18	1.08	1.75
Unidentified Scoters	2.90	0.00	0.00	0.00	0.58
Total Scoters#	22.14	19.78	16.09	20.20	14.45
Mergansers*	0.84	0.53	0.40	0.45	0.96
Glaucous-winged Gull*	1.94	1.95	1.16	3.71	8.75
Mew Gulls	2.61	4.20	4.49	3.23	4.07
Black-legged Kittiwake*	0.14	0.12	11.72	0.46	3.40
Murres*	106.57	49.23	71.95	38.26	31.28
Pigeon Guillemots#	2.51	3.08	2.40	2.26	3.18
Brachyramphus Murrelets*	7.93	4.90	10.29	4.30	9.82
Crested Auklets*	6.99	0.44	0.40	13.82	0.07
Total Birds b*	194.63	122.17	149.84	117.93	102.13

a - data includes only Uyak Bay, Uganik Bay and Kuprenof Straight.

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

* - Densities varied significantly between years, Kruskal-Wallis one-way anova ($p = 0.05$).

- Densities did not vary significantly between years, Kruskal-Wallis one-way anova ($p = 0.05$).

years of data collection. Future population density fluctuations in these species would likely indicate changes in habitat conditions.

Sea duck species such as oldsquaw, eiders, and scoters are not considered resident but also did not vary significantly during the five years. These species probably migrate from the same breeding areas each year to winter in the Kodiak area.

Current plans are to delete the fall surveys and continue the winter surveys on both sides of Kodiak Island. It was hoped to utilize a single monitoring area such as Uyak Bay but analysis of data indicated significant variance of data between sides of the Island. Exploratory oil drilling by SEDCO 712 got underway in the Shelikof Straits in the fall of 1984. The extent of the exploration effort will depend on what is found. Continuation of winter seabird and seaduck data collection will enable more precise monitoring of changes in the marine environment immediately adjacent to the Refuge brought on by the acceleration of offshore commercial development.

6. Raptors

A red-tailed hawk, a new species for Kodiak Island, was observed on April 10 at Middle Bay. This species nests on the Kenai Peninsula but had not been recorded on Kodiak before.

On March 12, an angry Womens Bay resident reported a gyrfalcon had been chasing his prize-winning purebred toy poodle around his yard and he wanted a permit to shoot the bird to protect his dog. Refuge staff advised him to keep the dog inside for a few days as gyrfalcons are migrants on Kodiak and would soon leave. True to form the bird left the area the next day probably thinking the poodle was the strangest tundra hare he'd ever seen.

A dead Peale's peregrine falcon was found floating in Dog Bay Harbor on March 6. Peale's peregrine falcons were observed at Frazer Lake on July 29 and at the Buskin River Lagoon on December 1.

A snowy owl was sighted at Narrow Cape on November 11 and on Long Island on November 17. This far-ranging migrant has been seen sporadically during late fall and winter months in Kodiak.

An American kestrel, another rarely observed raptor, was seen at Kizhuyak River on August 23 and Narrow Cape on November 7.

Several injured raptors were picked up or brought to the Refuge during the year. A male northern goshawk with a compound fractured wing was brought to the Refuge on April 3. The bird was shipped to Dr. James Scott in Anchorage for treatment. Unfortunately, the wing could not be repaired so the bird was placed in a captive raptor breeding program.

A subadult bald eagle was found injured at a Monashka Bay construction site on June 25. The bird was apparently just stunned as the next day the eagle was fully recovered and easily took to wing when the cage door was opened.

An injured golden eagle found at Lake Rose Tead in December was not as fortunate. The eagle was very docile and emaciated when found but did not have any apparent injuries. After several days of no noticeable improvement the eagle was shipped to Dr. Scott who determined that the bird was nearly blind. After a month of rehabilitation at Dr. Scott's facility and a return of approximately 40% of the eagle's sight capability the bird was shipped to the Woodland Park Zoo in Seattle, Washington to hopefully complete his rehabilitation.

Eight dead bald eagles (6 adults and 2 subadults), all of which apparently died of natural causes, were shipped to the Pocatello, Idaho facility on January 23 and December 6.

7. Other Migratory Birds

Unusual passerine sightings during 1984 included: a common (yellow-shafted) flicker on October 6, a palm warbler (first record) October 11 on the Coast Guard Base, an American robin at Kalsin Bay on November 11, and a yellow-rumped warbler November 19.

8. Game Mammals

a. Brown Bear

Brown bear activities in 1984 included the conduct of aerial stream surveys, monitoring of sport and non-sport mortality, input into the Refuge CCP, expansion of the Research/Refuge study effort, and continuation of ADF&G's Terror Lake study. The latter two activities are reported in Sec. D-5.

Surveys

Seven aerial stream surveys were flown between July 30 and August 8. Six of the flights included all five survey routes (Sturgeon River, Red Lake/Frazer Lake Pass, and Pinnell, Connecticut and Dog Salmon Creeks). Low clouds prevented the completion of one survey. The highest number of bears were sighted on Sturgeon River (37%) and Connecticut Creek (35%), with maximum counts recorded on July 30 and 31. Low counts on August 7 and 8 indicated that many bears had moved to mid-slope habitats to exploit a good crop of elderberry. Composition of the counts did not differ substantially from the average of recent years (Table 9). Family units accounted for 49% of the observations and almost half (48%) of those groups had one or more ear-marked individuals.

Results of the surveys and data from radio-tracking flights indicate that bears utilized stream-side habitat of the survey area more extensively this year than in 1983. Notable exceptions were Pinnell and Dog Salmon Creeks in the Frazer Lake drainage, where the sockeye salmon run was dramatically reduced from last year. Our observations and those of ADF&G biologists suggest that bear concentrations at the heads of Uyak, Deadman and Terror Bays also were lower this year than in 1983.

Table 9
Comparison of Aerial Stream Counts
of Brown Bear, 1978-1984

Year	No. of Complete Surveys	Single Bear		Maternal Female		Yearling		Cub		Total No.
		No.	%	No.	%	No.	%	No.	%	
1978	3	63	44	26	18	33	23	22	15	144
1979	2	38	54	12	17	12	17	9	13	71
1980	3	134	65	23	11	41	20	7	3	205
1981	7	169	55	41	13	79	25	21	7	310
1982	7	430	48	150	17	207	23	107	12	894
1983	- No Counts -									
1984	6	186	51	56	15	69	19	56	15	367
Average			51		15		22		11	

Salmon runs in 1984 and provided bears with good fishing opportunities in July and August. 7/84 (84-34) JH

Weather prevented us from conducting any alpine surveys this year even though observers were on day-to-day stand-by status for the last three weeks of July. Poor flying conditions (turbulence and low cloud ceilings) typically plague alpine surveys and this year was a worst case situation.

Mortality

A sport harvest of 131 animals combined with seven non-sport kills produced a total recorded mortality of 138 brown bears on the Refuge in 1984. The sport harvest was the highest recorded on the Refuge since 1974, when 135 bears were taken, and was considerably above the average of recent years (Table 10).

Excellent weather prevailed during the April 1 through May 15 spring season and probably was the major factor responsible for the high kill of 97 bears. The fall season (October 25 through November 30) yielded a harvest (34) that matched the 1983 fall kill.

The harvest on Refuge land included 98 males (71%) and 38 females (29%); seven of the males were record-class animals (skull size $\geq$ 28 in.). The 131 bears taken on the Refuge accounted for 69% of the GMU 8 (Kodiak Island Archipelago) brown bear harvest. Sport harvest guidelines were exceeded in each of the three GMU 8 subunits that include the Refuge plus some non-Refuge land (Table 11).

Table 10
Sources of Brown Bear Mortality on KNWR, 1976-1984

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

1976-1983 Average = 108.4

*Defense of Life and Property.

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

Table 11
Brown Bear Harvest By Subunit

	Harvest Guideline	1984 Harvest
Subunit 3	20	38
Subunit 4	60	69
Subunit 5	30	37
Total	110	144

This year's sport harvest clearly illustrates one of the dilemmas of bear management. Although harvest guidelines were significantly exceeded, parameters of the kill (e.g. sex ratio, mean age and skull size, the take of trophy animals) do not reflect the characteristics usually associated with over-harvested bear populations. Thus, one has to wonder if the guidelines are reasonable or if the harvest parameters are misleading. We won't be able to start answering those questions without an increased effort to learn more about bear harvest characteristics.

Non-sport mortality in 1984 was high for GMU 8 (15 kills) but about average (7) for the Refuge (Table 10). One of the most unfortunate aspects of non-sport mortality is that it often involves family groups. This year six maternal females were killed (two on the Refuge) and 11 cubs were orphaned.

Refuge's Piper Super-Cub (N720) flying low over Pinnell Creek during an aerial survey of brown bear. 7/84 (84-16) VB

Volunteer biologist, Greg DeBella, count and classifies bears from a ridge above Pinnell Creek as part of a study to evaluate the aerial survey technique (see Research and Investigations Section).
8/84 (84-17) VB

Four of seven mortalities on the Refuge were the result of Defense of Life and Property (DLP) actions and three of those can be attributed to deer hunters. One of the animals was an old male (>24 years) that would probably be ranked in the top twenty of the Boone and Crockett records. The problem of conflicts between deer hunters and bears is a serious concern of the Refuge but we have yet to come up with a practical solution.

b. Sitka Blacktail Deer

For the first time in several years late winter snows and weather conditions in early 1984 caused a limited but significant winter mortality of this species. A total of over 38 inches of snow in February combined with cold temperatures stressed wintering deer and caused fairly high fawn and yearling mortality. It appears that adult mortality was fairly low. Furthermore, heavy snows occurred principally on northeastern Kodiak Island. The only weather reporting station on the Island is at Kodiak State Airport but subjective judgements by several observers agreed that snowfall and accumulation were considerably less on the southwest (refuge) end of the Island than near municipal Kodiak. Thus, it is assumed that mortality was lower on the southwest end of the Island.

The ADF&G estimate of the sport harvest of deer in GMU 8 for the 1984 season was 6,225 deer (4,552 males, 1,530 females, 143 sex unknown) of which 2,180 were believed to have been taken on the Refuge. Composition of the Refuge harvest was estimated to be 1,696 males (78%) and 484 females (22%).

By year's end the 1984-85 winter was extremely mild, with virtually no snow.

c. Mountain Goat

Two major changes occurred in mountain goat hunting patterns this year. The ADF&G opened a large area of Kodiak to registration hunts (no limit to the number of permits) which enabled anyone who wanted to hunt to do so in this area (Hunt unit 876, see Figure 5). The result was a major influx of goat hunters in this area compared to the permit areas and a resultant very high overall kill. Total kill in 1984 was 55 goats (32 males, 20 females, 3 sex unknown) compared to 1983's harvest of 15 goats (11 males, 4 females).

Of the total kill, 29 were taken in registration hunt area 876. Distribution of the kill is shown in Table 12.

It is obvious that this level of harvest cannot be supported on a long term basis. Changes are being made to reduce next year's harvest, according to ADF&G.

The other significant change to goat hunting on Kodiak this year was that for the first time an air taxi operator flew hunters into several very small high mountain lakes for goat hunts. The result was that hunters accessed some previously lightly utilized areas. This hunt method undoubtedly increased the goat kill this year. Since aircraft operation into these lakes is extremely marginal at best, this problem may be self-resolving.

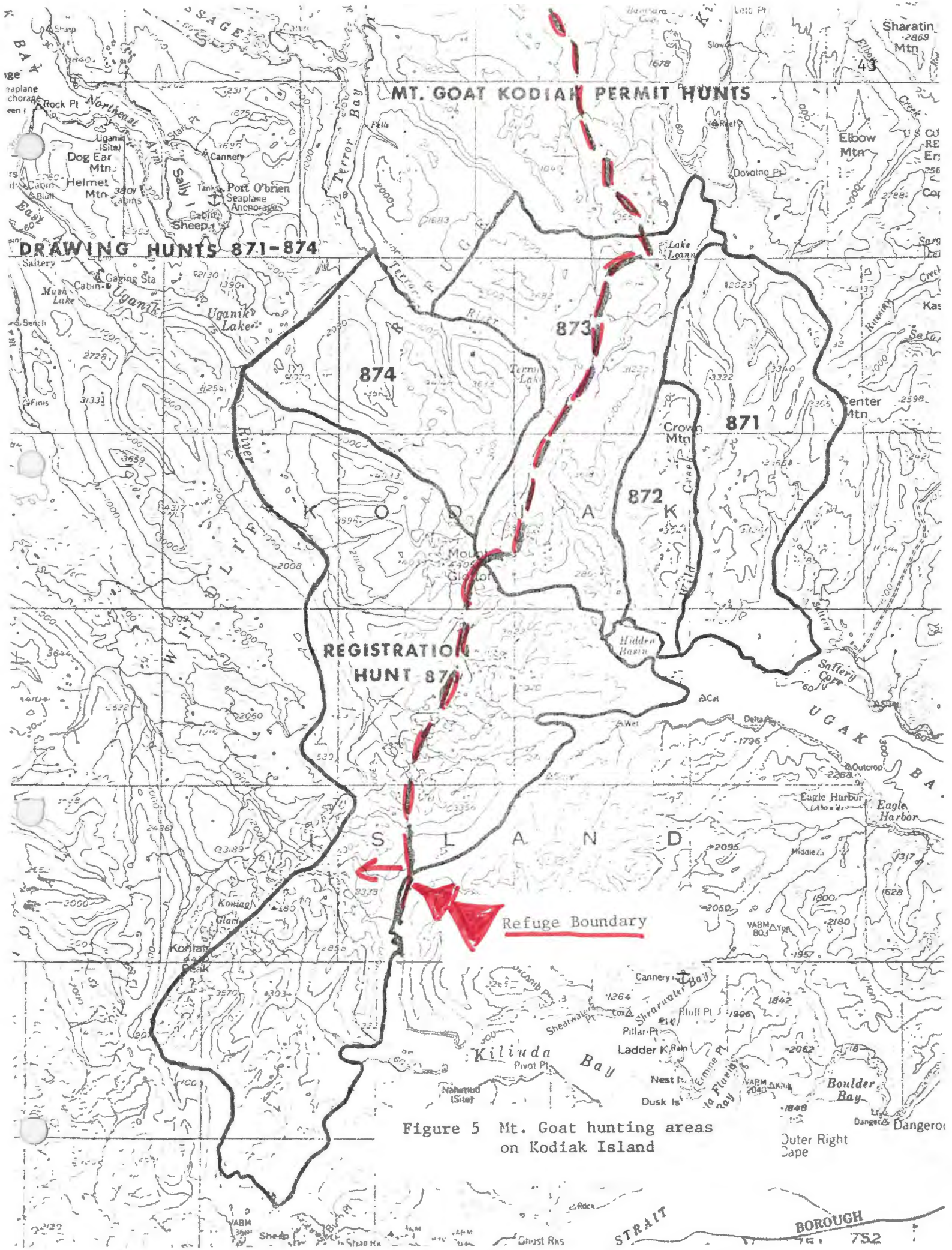

Figure 5 Mt. Goat hunting areas on Kodiak Island

Table 12
Distribution of 1984 Mountain Goat Harvest

	Unit				
	871	872	873	874	876
Hunters afield	13	12	12	3	38
Successful hunters	5	12	7	2	29
Percent success	38%	100%	58%	67%	76%
Males killed	3	6	5	2	16
Females killed	1	6	1	0	12
Sex unknown killed	1	0	1	0	1
Total kill	5	12	7	2	29

d. Reindeer

A complete survey of this species was not conducted this year because of weather and scheduling problems.

9. Marine Mammals

Sea Otter

Sea otter surveys of Shuyak, Afognak, Raspberry, Marmot and Kodiak Islands were conducted between September 11 and October 16, 1984. This survey was a cooperative venture between Wildlife Assistance Division (Anchorage) and the Refuge. A total of 17 hours of Service aircraft time (flown by Vivion) and approximately 4 to 5 hours of air charter time were expended in four days of survey. By year's end no information on survey results had been received from Wildlife Assistance.

10. Other Resident Wildlife

River Otter

All river otter taken in Alaska must be sealed by ADF&G, thus providing the only relatively complete harvest data on any of our furbearers.

In the 1983-84 season a total of 35 river otters was taken by ten different trappers on refuge lands. Sex distribution of the harvest was 19 females, 14 males and 2 sex undetermined. Geographic distribution was Old Harbor-Barling Bay area-16 (14 taken by one trapper); Olga Bay-Horse Marine area-6; Spiridon area-8; Uganik area-5. The total Unit 8 harvest for 1983-84 was 112 otters, compared to 224 for the 1982-83 season. The decrease is undoubtedly a reflection of relatively low prices for otter hides in the last year and one half. Obviously a few effective full time trappers can dramatically influence overall harvest levels and distribution of the harvest. At least one very effective trapper is known to be trapping in the Uyak Bay area this year.

Short-tailed weasels are one of six land mammals known to be native to Kodiak Island. 8/83 (84-18) VB

Successful introductions to Kodiak Island include Sitka black-tailed deer, beaver, mountain goat, and snowshoe hare. Deer wintering in the Cape Ugat area. 3/84 (84-19) DZ

11. Fishery Resources

The Kodiak National Wildlife Refuge provides freshwater habitat for populations of all five species of Pacific salmon, steelhead, rainbow trout, alpine charr, and Dolly Varden. These refuge-based fishery stocks support a viable and active commercial, sport and subsistence (personal use) fishery which is managed by the ADF&G-Commercial Fish, Sport Fish and Fishery Enhancement Divisions 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 1984 commercial salmon catch in the Kodiak area totaled approximately 13.7 million fish worth an estimated ex-vessel value of 24.7 million dollars. The estimated contribution of refuge based stocks was approximately 12.5 million salmon worth approximately 16.3 million dollars (Table 13). Although the overall contribution of refuge stocks harvested in 1984 remained at or near the 1982-83 average of 68.0 percent, the contribution in dollar value was 92.0 percent in 1984 compared to the 1982-83 average of 62.5 percent. The increase in dollar value appears to reflect both an increase in the numbers of sockeye and pink salmon harvested and the generally higher price per pound paid for chinook, sockeye and coho salmon.

Adult salmon escapements to stream and river systems on the refuge were monitored through ADF&G fish wier counts and aerial surveys. Preliminary composite escapement numbers for 1984 are presented in Table 15. Overall escapement into refuge streams was below the 1981-83 average (Table 14) except for pink salmon. The most noteworthy was a decrease of coho escapement of approximately 67 percent from the 1981-83 average.

Escapement for sockeye salmon within the Refuge during 1984 was 3.7 percent below the 1981-83 average (Table 14). In the major sockeye systems only the Ayakulik-Red and Upper Station drainages met or exceeded the minimum escapement goals (Table 16). Sockeye escapement into the Dog Salmon-Frazer drainage was only 18 percent of the minimum established ADF&G goal of 300 thousand fish. Escapement into most minor sockeye systems, except Horse Marine, met or exceeded previous 1982-83 escapements (Table 16).

Sport Fishing

Sport fishing on Refuge streams occurs in late May through July for chinook salmon, rainbow trout, and charr, then again in September through November for coho salmon, steelhead trout, and charr. Although coho salmon and charr 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. Table 17 depicts the known and peak escapement counts on Refuge streams which supported species of major interest to sport fishermen during 1984. Because most of the ADF&G fish wiers on the

Table 13

Estimated numbers, species composition and dollar value of commercially caught salmon by all gear types during 1984 calculated to be of Kodiak NWR origin. (1)

Species	ADF&G Geographical Harvest Districts								Total	Ex-Vessel Value ($)
	Afognak	Uganik	Uyak	Karluk	Sturgeon	Red	Alitak	General		
Chinook	0	786	207	506	196	1,553	290	29	3,567	76,722
Sockeye	434	113,315	19,574	243,386	82,425	420,430	376,746	5,455	1,261,765	6,139,238
Coho	1,594	15,823	3,139	17,627	12,717	32,825	24,060	7,496	115,281	795,129
Pink	14,759	4,149,403	549,813	3,518,237	1,277,846	771,030	433,323	96,042	10,810,453	7,951,898
Chum	774	60,627	26,567	31,642	3,787	9,974	84,663	122,261	340,295	1,327,642
Total	17,561	4,339,954	599,300	3,811,398	1,376,971	1,235,812	919,082	231,283	12,531,361	16,290,629

(1) Data compiled from ADF&G 1984 catch statistics for the Kodiak Management Area. Ex-Vessel values are preliminary projections of actual value.

Table 14

Estimated average annual harvest and escapement values for Kodiak NWR based salmon stocks 1981-83 compared to 1984 values. (1)

Species	Harvest		Escapement		Total Returns	
	Average 1981-83	1984	Average 1981-83	1984	Average 1981-83	1984
Chinook	650	3,567	16,998	14,387	18,040	17,964
Sockeye	606,187	1,261,765	1,195,259	1,151,583	1,801,060	2,413,348
Coho	74,115	115,281	191,131	62,886	259,379	178,167
Pink	4,736,302	10,810,453	1,890,557	3,420,429	6,626,859	14,230,882
Chum	598,307	340,295	358,839	275,267	957,146	615,562

(1) Data compiled from ADF&G 1981-84 catch statistics and peak salmon escapement counts for Kodiak area.

Table 15
Peak 1984 salmon escapement counts in Refuge streams
by ADF&G geographical district and species. (1)

Species	ADF&G Geographical Districts								Total
	Afognak	Uganik	Uyak	Karluk	Sturgeon	Red	Alitak	General	
				54%		45%	1%		
Chinook	0	0	0	7,747	0	6,502	138	0	14,387
		4%		36%		25%	34%		
Sockeye	0	52,000	0	420,268	0	283,215	396,100	0	1,151,583
		13%	1%	20%	6%	19%	12%	13%	
Coho	0	8,135	10,290	12,365	3,940	11,951	7,855	8,350	62,886
	1	12	6	49	1	20	9	5	
Pink	15,000	339,745	209,860	1,672,386	33,180	673,260	313,518	163,480	3,420,429
		7	16		29		40	8	
Chum	0	20,000	43,000	138	80,000	34	110,521	21,574	275,267
Total	15,000	419,880	263,150	2,112,904	117,120	974,962	828,132	193,404	4,924,552

(1) Data compiled from ADF&G 1984 peak salmon-escapement fish wier and aerial survey counts.

Table 16
Sockeye Salmon Escapement to Major and Minor Sockeye Systems on the Kodiak National Wildlife Refuge 1982-1984

River System	Escapement Goal	Actual 1982	Actual 1983	Actual 1984
East Uganik	Unknown	50,000	23,000	40,000
Little	Unknown	11,500	11,000	12,000
Karluk	560,000-900,000	164,407	436,145	420,268
Ayakulik/Red	200,000-300,000	169,562	171,415	283,215
Akalura	Unknown	5,000	3,300	20,350
Upper Station	150,000-250,000	470,732	289,250	319,226
Horse Marine	Unknown	7,500	7,500	3,000
Dog Salmon/Frazer	300,000-400,000	437,474	166,655	53,524

Table 17
Known and Peak Escapement Counts on Refuge Streams Which Supported Species of Major Interest to Sport Fishermen During 1984

River System	King Salmon	Coho Salmon	Steelhead Trout	Charr
Little (3)	Unknown	6,000	Unknown	Unknown
Browns Lagoon (3)	Unknown	Unknown	Unknown	Unknown
East Uganik (3)	Unknown	2,130	Unknown	Unknown
Karluk (4)	7,747	12,365	(1) 55 (2) 2,512	Unknown
Ayakulik/Red (4)	6,502	11,951	(1) 135 (2) 1,306	Unknown
Upper Station (4)	1	3,240	(1) 3 (2) 1	Unknown
Dog Salmon/ Frazer (4)	137	1,340	(1) 2 (2) 80	Unknown
Horse Marine (3)	Unknown	350	Unknown	Unknown
Midway (3)	Unknown	4,300	Unknown	Unknown

(1) Immigrant adults passing upstream through wier

(2) Outmigrant (kelts) adults passing down through wier

(3) Peak aerial surveys only

(4) Fish wier count

Measuring stream flow and spawning gravel during a survey of the East Fork Ayakulik River, May, 1984. 5/84 (84-20) VB

Set net permittee picking nets on west side commercial fishing site, July, 1984. 7/84 (84-21) DZ

ADF&G fish wiers on the major systems are pulled by mid-September and aerial surveys are terminated on the minor systems actual numbers of coho salmon and steelhead trout which continue to enter the system throughout the Fall months is unknown.

Returns of chinook salmon to refuge waters in 1984 provided ample fish for sport fishermen. Escapement for chinook salmon into the Karluk River was approximately 93 percent of the 1976-83 average of 8,290 fish and in the Ayakulik-Red River approximately 52 percent above the 1972-83 average of 4,272 fish (Table 17). Total sport harvest of chinook salmon on both river systems is estimated to be less than 1,000 fish

Counts of steelhead (kelts) migrating downstream during 1984 (Table 17) in both the Ayakulik-Red and Karluk Rivers indicate approximately 2,900 and 5,580 adults, respectively, had entered the systems during the fall 1983/ winter 1984 period. These estimates are derived from extrapolated data gathered during the Karluk River steelhead project (74530-83-01) discussed in Sec. D-5. Total sport harvest of steelhead on both river systems and other minor river systems is estimated to be less than 200 fish.

Sport fishing harvest figures for rainbow trout and charr on the refuge are unknown. Sport fishing guide special use permits issued during 1984 totaled 10, compared to the six permits issued during 1983 (Sec. H-9). Most of the guide activities targeted on chinook, coho salmon and steelhead on the Ayakulik-Red and Karluk River systems, and on coho salmon and rainbow trout on the Uganik River system. The interim sport fish guiding policy adopted by the Refuge in 1983 was modified during 1984. These modifications basically deleted the stipulation that a sportfishing guide must be a licensed State of Alaska Class A, registered or master guide; and each guide must post a bond of liability insurance for his activities on the Refuge (Sec. H-9).

In addition to sport fish guiding permits, three other permits were issued to ADF&G to conduct routine fishery management projects on refuge waters.

To enhance baseline data on one of the two major chinook salmon and steelhead rivers of the Kodiak Refuge, approximately 40 miles of the East Fork and mainstem Ayakulik River were surveyed in the spring of 1984. Data on stream morphometry and flow at 13 selected sites was obtained. In addition, observation of spawning steelhead and redd sites were mapped. Approximately 227 adult steelhead were visually observed, with 84 percent of the observations occurring on rm 0.0 to 7.0 of the East Fork Ayakulik River. One hundred steelhead redds were recorded with 51 percent of the redds being located on rm 2.0 to 5.0 of the East Fork. This is the first documented data that steelhead utilize the East Fork of the Ayakulik-Red River system, and indications are it may be one of the major spawning areas within the drainage.

12. Marking and Banding

In conjunction with the Refuge bald eagle migration and movements study (74530-82-01), a total of 26 juvenile bald eagles were color marked with patagial flags in the nest during 1984. Ten of the 25 were also fitted with radio transmitters.

Sixteen adult female brown bears were marked with color-coded ear tags and received radio collars as part of brown bear studies being conducted on the Refuge by DWRC (Study 74530-83-02). Eighteen juvenile brown bears associated with the 16 adult females were also marked with color-coded ear tags. Details of both studies are presented in Sec. D-5.

H. Public Use

1. General

Total public use on Kodiak National Wildlife Refuge remained similar to recent years with nearly 16,500 refuge visitors and 106,000 activity hours of public use during 1984. Exceptions included increased deer hunting and visitor center use. Competition for use of the Refuge's nine recreation cabins has also increased, particularly during the deer hunting season.

Use of the Ayakulik River during salmon and steelhead fishing seasons increased dramatically. This increase is probably due to the fees now charged by the Koniag Native Corporation for fishing and cabin use on the Karluk River. Land along the Karluk River and two former refuge recreation cabins were transferred to the Karluk Native corporation under ANCSA. The Karluk and Ayakulik Rivers are the only two systems on the Island offering quality fishing for all five species of Pacific salmon and steelhead. A public use inventory procedure was developed in the fall to document levels of use and possible resource problems occurring on the Ayakulik River and other public use activity sites on the Refuge. This procedure will be implemented during the 1985 public use season.

Two very different types of public use are recorded on 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 usually involves the expense of chartering a small aircraft to get to an activity site with visitors spending an average of five to seven days on the Refuge during hunting and fishing trips.

2. Outdoor Classrooms

Just over 300 students and teachers were involved in outdoor classroom activities during the year. Teachers bringing classes to the visitor center are encouraged to use environmental education worksheets prepared by the Refuge staff to supplement information children see in exhibits and films.

6. Interpretive Exhibits/Demonstrations

Use of the Refuge visitor center has increased gradually since the building was opened to the public in 1982. The number of visitors using the center in 1984 increased more dramatically due to the introduction of additional programs (weekend wildlife films) and keeping the building open on weekend days starting in September. Use of the center was up nearly 60 percent in 1984 compared to the previous year.

A large scale topographic relief map has proven to be the most popular and useful display in the center. Other displays feature a variety of natural and cultural history topics about Kodiak Island including weather, geology, marine life, native and introduced mammals, birds, prehistoric cultures, refuge management programs and public use on the refuge.

A variety of refuge, ADF&G, and Chamber of Commerce leaflets and handouts are available at the center. A small sales area was opened in December (Sec. H-18).

New chairs and a video projection unit were installed in the center's small audio-visual room to increase the number of people able to view the Kodiak Island introductory program and scheduled weekend films.

7. Other Interpretive Programs

Beginning in September a series of wildlife films was featured in the visitor center on Saturdays. Due to the popularity, the film showings were also offered on Sundays starting in late November. Nearly 600 visitors viewed the films in 1984. The local chapter of the Audubon Society passed out refuge leaflets and posters at two Christmas bazaars in Kodiak.

8. Hunting

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

Approximately 220 hunters used the refuge during the spring and fall bear hunts in 1984. Bear hunting on the Refuge accounted for nearly 11,000 hours of public use. Sixteen big game guides are registered 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 and a six-month-long hunting season combined with Kodiak's high population of Sitka black-tailed deer attract many hunters to the Island. An estimated 1 400 deer hunters spent nearly 37,000 activity hours hunting on the Refuge in 1984. Harvest levels for deer and bear are reported in Sec. G-8.

Other than a small number of mountain goat hunters using the Refuge, most other hunting on the refuge (i.e. ptarmigan, small game and waterfowl) occur in conjunction with other activities.

9. Fishing

Sport fishing on the Refuge is regulated by the ADF&G. The Karluk, Ayakulik and Uganik Rivers and the interior cabins on lakes receive the bulk of fishing use.

In 1984, some of the fishing pressure for steelhead and chinook salmon shifted from the Karluk to the Ayakulik River due to a user fee charged by Natives on ANCSA conveyed lands along the Karluk.

A public use volunteer program was initiated in the fall of 1984 to keep the visitor center open on weekends. 11/84 (84-22) DM

A small sales area affiliated with the Alaska Natural History Association was opened on December 7, 1984. 11/84 (84-23) DM

Ten sport fishing guides have permits to conduct operations on the Refuge. A maximum of two commercial guides hold permits to set up overnight camps on any given drainage. There are no such restrictions on guides conducting day use trips or non-guided fishermen. Total fishing use on the Refuge was up slightly compared to last year.

10. Trapping

Fourteen special use permits were issued for trapping on the Refuge in 1984. Trapping effort and success remained at a very low level on the Refuge this year. Trapping on Kodiak appears to be primarily a recreational rather than an economic activity both on and off the Refuge.

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 usually occur in conjunction with hunting or fishing trips, the extent of photography and wildlife observation is difficult to document. Part of the public use inventory procedure which will be implemented next year will be to determine the extent of these activities on the Refuge.

17. Law Enforcement

Four citations were written for illegal use of cabins. Most cabin violations occur on ANCSA lands making enforcement a guessing game pending development of regulations governing conveyed lands per ANCSA Sec. 22 (g). As a result of the recent court decision concerning St. Matthew's Island, the status of specific 22 (g) regulations is uncertain (See Feedback Section).

A citation was issued to a trapper for violation of Refuge Special Regulations in that he left his trapping area "trashed out". The individual forfeited $100.00 collateral and was required to clean up the area at a cost to him of $500.00 plus.

Refuge officers assisted Special Agents in a case involving 13 crew members of a U. S. Coast Guard vessel. These individuals purchased raw ivory from people in various locations in western Alaska while on a cruise. The case originated when one of the individuals involved came to Refuge headquarters to register his ivory and volunteered that he had purchased same as did other members of the crew. Due to the fact that the individuals involved and the Coast Guard cooperated fully in clearing up the matter the case was handled civilly instead of criminally and the individuals were allowed to abandon several thousand dollars worth of ivory to the Government.

18. Cooperating Associations

A sales outlet was opened in the visitor center beginning on December 7, 1984. The outlet is affiliated with the Alaska Natural History Association (ANHA) which has many other branches at refuges, parks, and national forests throughout the state. Twenty-four sales items (books, posters, post cards and note cards) were offered for sale in the outlet. Proceeds

Refuge signs with leaflet holders were erected in both local airport terminals and the Marine Highway Vessel Tustumena which serves Kodiak. 11/84 (84-24) DM

Highway signs were erected approximately 1/4 mile from the road leading to the refuge headquarter's visitor center. 11/84 (84-25) DM

from sales will be available to finance interpretive projects on the Refuge subject to ANHA Board of Directors' approval. During the short period the outlet was open just over $260.00 in sales were made.

I. Equipment And Facilities

1. New Construction

Two construction projects took place in 1984. A wareyard was constructed below the bunkhouse and adjacent to the pan abode storage facility. The Refuge "boneyard" will be transferred here in 1985 and will not be visible from the office-visitor center. Funding was from Accelerated Refuge Maintenance Management (ARMM) (Sec. I-8).

Wooden walkways were constructed of local spruce wood for quarters # 3 and # 4 (Real property numbers 980-4 and 980-5). Funding for this project was from 1994 funds (rent return receipts) and was accomplished by Force Account.

2. Rehabilitation

The triplex roof received a much needed rehabilitation in 1984. A new peaked roof was built over the old flat one that leaked mass quantities of water whenever it rained. Additional work included in the $51,583 contract paid from 1994 funds included relocation of security light, burying of electrical lines to the triplex and installation of electrical meter bases.

Rain gutters were replaced on quarters number 1 and 2 (Real property numbers 980-2 and 980-3). These two houses were built by the State of Alaska (See CY 1983 Annual Narrative Report) and they paid for replacement. The replacement gutters appear to be functioning well and are staying attached to the house under snow loading which was a problem with the old gutters.

4. Equipment Utilization and Replacement

The Refuge research and patrol vessel, Ursa Major, underwent extensive hull rehabilitation this year. The work consisted of complete replacement of the stern horseshoe beams from below water line and all or part of the hull planks along the waterline. A set of rolling chocks were installed for additional structural strength and stability. The hull of the Ursa had not been worked on for four years. The absence of numerous small leaks after work was completed attests to the success of the repairs.

Maintenance repairs on the main propeller shaft of the R/V Ursa Major were accomplished in 1984. Repairs included removal and replacement of two intermediate bearings, replacement of the stuffing box packing and gasket, and removal and re-sleeving of the tail shaft assembly. In addition hull zincs were replaced, the rudder was strengthened and flared, the strut bearing was replaced and the shaft assembly and main engine were aligned.

A wareyard was built behind the refuge headquarters complex providing visual screening for equipment storage.
12/84 (84-26) DM

Maintenance Mechanic, Ron Bowers, constructed spruce walkway additions on two refuge residences. 12/84 (84-27) DM

After years of fighting leaking roofs and collapsing ceilings, a new peaked roof was added to the refuge triplex. 12/84 (84-28) DM

Replacement of R/V Ursa Major's stern horseshoe beams and some hull planks, April, 1984. 4/84 (84-29) DZ

Three new vehicles were received in 1984. A Dodge 4 X 2 one-half ton pickup (I 130559) was delivered May 4. A Dodge 4 X 2 - 3/4 ton van (I 140523) was delivered July 27 and a 1 1/2 ton stake truck (I 140525) was received on August 27. These vehicles were new and not replacements.

Miscellaneous equipment and supplies were purchased to outfit the new shop.

6. Computer Systems

A Data General 10 SP desktop micro-computer and associated hardware were purchased by the RO in 1984. The system is scheduled for installation early in 1985.

7. Energy Conservation

The new roof on the refuge triplex (Sec. I-2) will hopefully produce some energy savings. Manually activated timers for the lights and fans were installed in the visitor center restrooms resulting in some energy savings but also leaving one or two visitors in the dark.

8. Other

Kodiak NWR was Annual Work Planned (AWP) for $100,000 of ARMM funds in 1984. Table 18 shows projects identified and amount of funds earmarked for each project as of April 1984 when the "finalized" approved list was received.

Table 18
Planned FY 84 ARMM Projects

	Project	Amount
1.	Rehab triplex housing unit	24 K
2.	Increase field surveillance patrols	10 K
3.	Erect hangar	30 K
4.	Replace truck	10 K
5.	Construct field camp module	12 K
6.	Purchase aircraft propeller	4 K
7.	Vessel hull repair	10 K

In June an engineering estimate for the rehab of the triplex unit came in at 85 K and necessitated reprogramming of funds. Project # 2 and # 5 were reprogrammed and added to Project # 1 to total 46 K for triplex work. The additional 39 K for the triplex was to come from 1994 funding. Additional budget cuts from the RO on June 12 took 18 K from the proposed 30 K identified for Project # 3, hangar construction.

Tracking these funds became very difficult in the waning days of FY 84. ARMM dollars available changed constantly with telephone calls from the RO. Actual projects completed and amounts expended are shown in Table 19.

Table 19
Actual FY 84 ARMM Projects

Project	Amount
Purchase aircraft propeller	4,500
Vessel hull repair	9,700
Vessel auto-pilot	2,400
Hangar (shipment and site preparation)	11,400
Improve drainage and gravel parking areas	6,700
Replace truck	14,000
Rehab triplex	51,300*

*There is confusion as of this writing as to what percentage of the triplex work was funded by 1994 funds and what by ARMM funding as we have received conflicting reports from the RO.

J. OTHER ITEMS

1. Cooperative Programs

Kodiak NWR "houses and hosts" Vic Barnes, a Research Biologist from the DWRC. The bulk of Vic's meager budget comes from the DWRC and is augmented with $20,000 from the Refuge for studies plus all logistical, clerical, etc. support. Both Vic and the Refuge benefit from his research (Sec. D-5) which has practical management application.

On September 30 approximately 1500 gallons of Bunker C fuel oil spilled into Womens Bay from the U. S. Coast Guard Base power plant (Sec. G-5) Part of the area affected is under the jurisdiction of the Alaska Maritime NWR. Refuge staff monitored the spill and clean-up and provided periodic updates to Alaska Maritime NWR and the Regional oil spill coordinator.

A Special Use Permit was again issued to the ADF&G-FRED, Kodiak for chum salmon broodstock egg take from the Sturgeon River. This egg bank is being utilized by ADF&G's Kitoi Bay Salmon Hatchery to establish a broodstock program in Kitoi Bay.

2. Other Economic Uses

Kodiak NWR is mandated by Public Law 96-487, the ANILCA to provide land based support facilities for commercial fishing activities subject to reasonable regulations and consistent with the purposes for which the Refuge was established. As noted in the introduction, the Refuge has over 100 of these sites. This use has the largest single impact on Refuge Resources.

There is a dramatic increase in demand for exploitation of Refuge Resources by such commercial users as guides and outfitters. Two individuals requested permission to sport fish guide in 1983 and over 30 indicated an interest in 1984. This type of demand can be expected to increase as land ownership patterns on Kodiak Island are finalized.

A faulty valve was blamed for a Coast Guard fuel spill in Womens Bay. An estimated 1500 gallons of fuel were cleaned up by a contractor. 10/84 (84-30) DM

A few oiled gulls (120 observed) appeared to have moderate to severe oiling. No other species of oiled birds were detected. 10/84 (84-31) DM

U.S. Coast Guard, Kodiak, assists the refuge periodically with logistical support. Ayakulik River, May, 1984. 5/84 (84-32) VB

Fishery Biologist/Pilot, Tony Chatto, obtained his "wings" and will greatly expand our ability to get the job done during the hectic field season. 9/84 (84-33) DM

A local air taxi operator, Island Air, has initiated the use of "floating cabins" which are anchored in navigable waters. Use of this type of structure immediately adjacent to Refuge lands circumvents Refuge restrictions on building new cabins and impacts Refuge resources. One such cabin was placed off the south end of Uganik Island in late 1984. We are presently trying to determine what agency, if any, has jurisdiction over the structures in navigable waters.

4. Credits

This report is the result of a staff effort. Bellinger wrote Section E-5 and Feedback. Vivion wrote the Introduction, Section F-1, portions of Sections G-8, 9 and 10, and assisted with editing. Chatto wrote Section B, Sections D-1 and 2, portions of D-5, Section D-6, E-7, portions of E-8, Section F-6, F-11 and G-11. Menke wrote all the materials reported under Section H, I-7, and worked up the information packet. Zwiefelhofer contributed to Section D-5, G-2 through G-7, and portions of I-2 and I-4. Barnes wrote portions of D-5 and G-8 and assisted with editing. Ryan wrote Section A, C-2, E-1, E-2, E-4, E-6, part of E-8, Sections F-9 and F-10, Section G-16, I-1, portions of Sections I-2 and I-4, Section I-6, I-8, J-1, J-2 and J-4, and edited. The hard work, that of typing, was done by Castonguay with assistance from Tomberlin.

Sunset - Uganik Passage. Another year fades.
7/84 (84-35) KR

K. FEEDBACK

Alaska Native Claims Settlement Act, Section 22 (g)

Public law 92-203, the Alaska Native Claims Settlement Act (ANCSA) was passed on December 18, 1971. This act provided for the settlement of certain land claims of Alaska Natives and allowed them to select up to 69,120 acres per village corporation from national wildlife refuges. Section 22 (g) of ANCSA states, however, that every patent issued for lands lying within the boundaries of an existing national wildlife refuge shall contain a provision that such lands remain subject to the laws and regulations governing use and development of that refuge.

A 1973 solicitor's opinion advised that the FWS must develop special rules and regulations for 22 (g) lands, as it was not the intent of Congress to impose all the general rules and regulations of the refuge system on private lands (conveyed Native lands).

As Kodiak NWR has the most severe 22 (g) problems (problems outlined in Feedback section of 1983 annual narrative), the Central Office agreed to let us develop 22 (g) regulations this year. The Regional Office, working in consent with the refuge, completed the "Notice of Intent to Promulgate Rules" in late November and submitted it to the Regional Solicitor for review.

Before the review was finished it was placed on hold as a result of a U. S. District Court ruling regarding St. Matthew's Island. In the ruling the judge stated that Section 22 (g) of ANCSA already protected a coastal area on the Yukon Delta NWR from incompatible uses. The tradeoff for a nondevelopment easement in this same area (part of the St. Matthew Island deal) was therefore redundant. In other words, 22 (g) stands as written. After this finding the FWS decided to wait to see if the decision would be appealed prior to writing 22 (g) regulations.

The question is, how long can we afford to wait? At the present time, we have large blocks of land within refuge boundaries in Alaska that have no legal protection (50 CFR Section 36 does not apply to 22 (g) lands) and "things are happening out there" in the interim. We all know how things happen politically and have good reason to believe that incompatible developments that occur or have already occurred during this limbo period will be "grandfathered-in" when we do get regulations on these lands. If an appeal on the St. Matthew Island decision is not filed in the near future we had better get 22 (g) off hold and moving again.

Development will undoubtedly occur more and more at the expense of wildlife if we continue to drag our feet.