

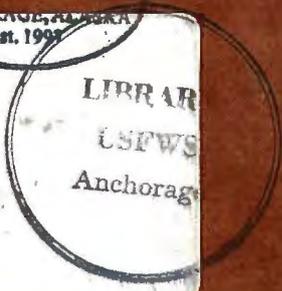
KODIAK NATIONAL WILDLIFE REFUGE

Kodiak, Alaska



ANNUAL NARRATIVE REPORT

Calendar Year 1982



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US FISH & WILDLIFE SERVICE--ALASKA

U.S. Department of the Interior

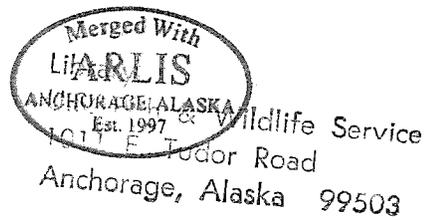
Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

NR 2

KODIAK NATIONAL WILDLIFE REFUGE

Kodiak, Alaska



ANNUAL NARRATIVE REPORT

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

Personnel

Refuge Staff

1. Charles H. Strickland, Refuge Manager, GS-12 PFT (EOD April 12, 1982)
2. Robert H. Stratton, Refuge Manager, GS-12 PFT (Transferred January 30, 1982)
3. Michael T. Vivion, Assistant Refuge Manager/Pilot, GS-12 PFT
4. Harvey A. Heffernan, Jr., Assistant Refuge Manager, GS-9 PFT
5. Edward R. Hajdys, Assistant Refuge Manager, GS-7 PFT
6. Donald A. (Tony) Chatto, Fishery Biologist (Mgt.), GS-11 PFT
7. Dennis Zwiefelhofer, Biological Technician, GS-7 CS
8. Judith A. Barnett, Administrative Clerk, GS-4 CS (EOD April 4, 1982)
9. John Cossick, Vessel Master/Maintenanceman, WG-10 CS
10. Paul Banyas, Biological Aide, GS-3 CS (May 17, 1982 to September 13, 1982)
11. Rasmus Anderson, Maintenance Helper (CETA) (EOD December 6, 1982)

Denver Wildlife Research Center - Kodiak

1. Victor G. Barnes, Jr., Research Biologist, GS-12 PFT (EOD June 18, 1982)



Review and Approvals

 3/3/83
Submitted By Date

20 3/25/83  3/29/83
Regional Office Review Date



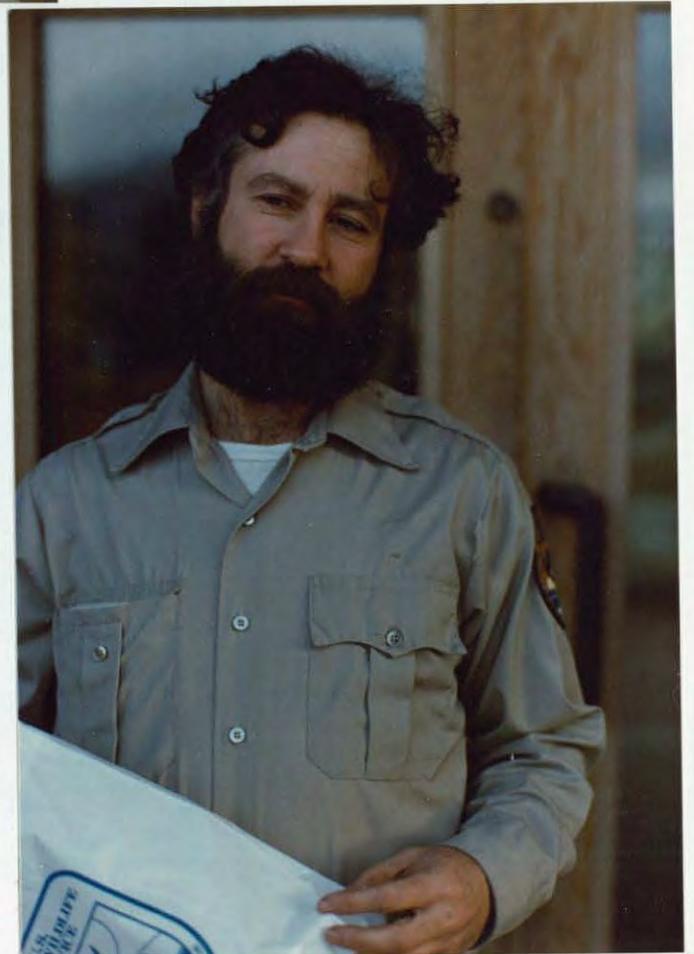
Refuge Manager Charles Strickland



Assistant Refuge Manager/Pilot Mike Vivion



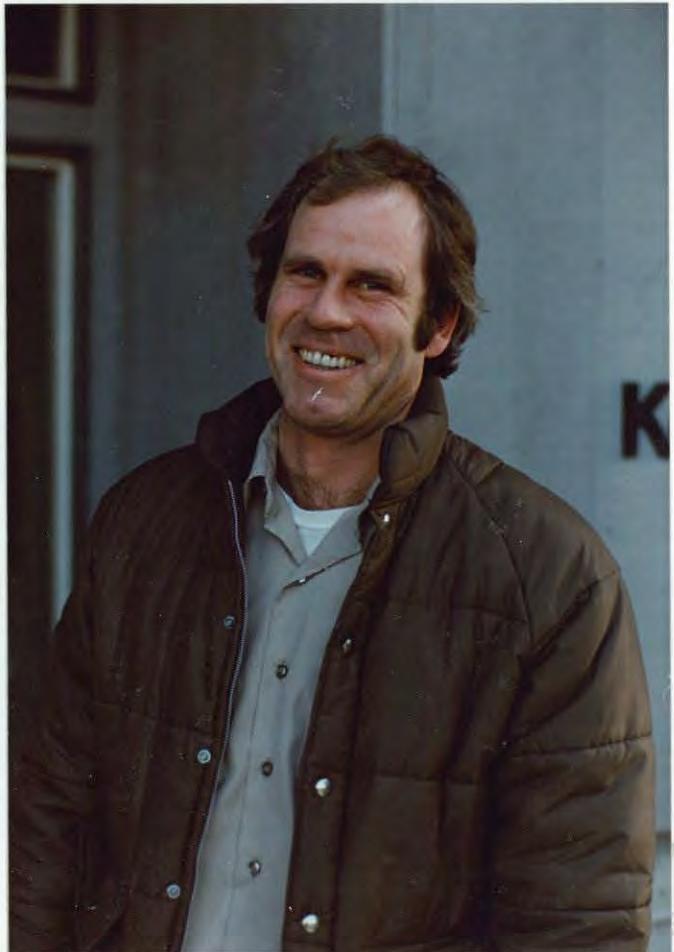
Assistant Refuge Manager
Harvey Heffernan



Assistant Refuge Manager
Ed Hajdys



Biological Technician Denny Zwiefelhofer



Fishery Biologist Tony Chatto



Research Biologist Vic Barnes



Administrative Clerk Judy Barnett



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Biological Aide Paul Banyas

Vessel Master/Maintenanceman Cossick can be seen on page 56

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K. FEEDBACK

A. HIGHLIGHTS

Construction began on the Terror Lake Hydroelectric Project, bringing the first major environmental disturbance to the Kodiak NWR. (Sec. F-1)

Construction of much needed shop, residences and bunkhouse facilities was nearly complete by year's end. (Sec. I-1)

Visitor Center displays were installed and the center dedicated by Deputy Director Eugene Hester. (Sec. H-6)

A near total berry crop failure was one result of cool, wet weather. (Sec. G-8)

For the second year in a row, a deer hunter was mauled by a brown bear. (Sec. E-3)

A dramatic new bear concentration appeared on the Dog Salmon River. (Sec. G-8)

An eagle movements study was begun. (Sec. D-5)

Addition of an amphibious de Havilland Beaver greatly increased our transportation capabilities. (Sec. I-4)

B. CLIMATIC CONDITIONS

Weather conditions on Kodiak during 1982 were notably wetter and cooler than usual. January began the year with snow, then slush, then rain and wind followed by a nearly two week seige of below zero weather in February, at which time Karluk Lake froze over for the year. Although Karluk freezing in late February is not particularly novel, the fact that it remained ice covered until the first week of May was. Late (but rotten) ice cover hampered some bear hunting parties as well as our annual fuel haul to Camp Island.

A storm on April 14 dumped eleven inches of wet snow on Kodiak, causing some difficulty in travel and an unknown mortality in the Island deer population.

Snowshoeing over
Refuge Headquarters
April 14. HH



The notably wet and cool summer weather resulted in a near total failure of the berry crop on Kodiak this year.

From mid-July through August, precipitation slacked off and allowed a considerable amount of field work to be accomplished in this brief but active field season.

September re-established the high precipitation trend with ten inches.

Winter began early with snows in October but November and December were relatively warm but extremely wet and windy. The .8 inch of snow recorded in December occurred on Christmas Eve and barely lasted through Christmas Day. A summary of weather observations for 1982 follows from the National Weather Service, Kodiak:

	<u>Snowfall (Inches)</u>	1982 Total <u>Precip.</u>	Longterm Average <u>Precip.</u>	<u>Temperatures (°F.)</u>	
				<u>Max.</u>	<u>Min.</u>
January	14.20	9.22	5.01	46	14
February	3.00	4.50	4.89	34	- 8
March	1.40	1.99	3.85	46	14
April	11.00	3.60	3.81	52	25
May	.25	5.55	4.35	67	30
June	---	7.29	4.12	63	37
July	--	3.81	3.54	76	39
August	--	2.23	4.30	70	43
September	--	10.10	6.11	63	33
October	5.70	2.90	6.28	58	25
November	2.40	7.58	5.41	49	19
December	<u>.80</u>	<u>13.49</u>	<u>5.03</u>	47	15
Totals	38.75	72.26	56.70		

D. PLANNING

1. Master Plan

In August the Refuge staff was notified that the Refuge Comprehensive Planning (mandated by ANILCA) schedule for Kodiak had been moved up and that Comprehensive Planning will now begin in approximately March of 1983. Planners Clint Brown and Pete Jerome paid a preliminary visit to Kodiak in December to brief the staff on the planning effort and to make contacts in the community for data gathering efforts. Refuge staff began mapping data for planning purposes.

All other planning efforts have been held in abeyance until the Comprehensive Planning effort is underway.

5. Research and Investigations

Kodiak NR82 - "Seasonal Movements and Habits of Kodiak Island Bald Eagles" (74530-1)

Introduction

Extensive nesting and breeding studies have been done on the Kodiak Island bald eagle breeding population. These studies determined productivity rates and described nesting behavior for the adult bald eagles nesting on Kodiak Island. Approximately 200 breeding pairs of bald eagles nest on the Refuge each year. The areas of maximum use have been mapped, giving current and past nest locations used by breeding bald eagles.

Eagle activity outside the breeding season has been treated only in a limited fashion. No information is available on the seasonal fluctuation or movements of the bald eagle population. This portion of the bald eagles' life history has not been well documented, particularly in Alaska.

The mid to late winter concentration of bald eagles around the Kodiak State Airport has become an increasingly acute problem for aircraft using these facilities. A knowledge of the year-round habits and movement patterns of eagles wintering in this area would provide information on how this problem might be alleviated.

Information regarding subadult bald eagle movements is also needed to determine what differences may occur in winter habits and movements between subadult and mature eagles in the four years prior to reaching maturity. Although immature eagles are always present in the municipal Kodiak area during winter, their numbers are never as high as the productivity of the bald eagles nesting on Kodiak indicates they should be. The survival rate of this non-breeding portion of the population has been only estimated on Kodiak and should be better defined. Any differences in the migratory habits of subadults as compared to adults should be documented to establish an understanding of present winter activity areas and to determine if separate areas are used by different age classes.

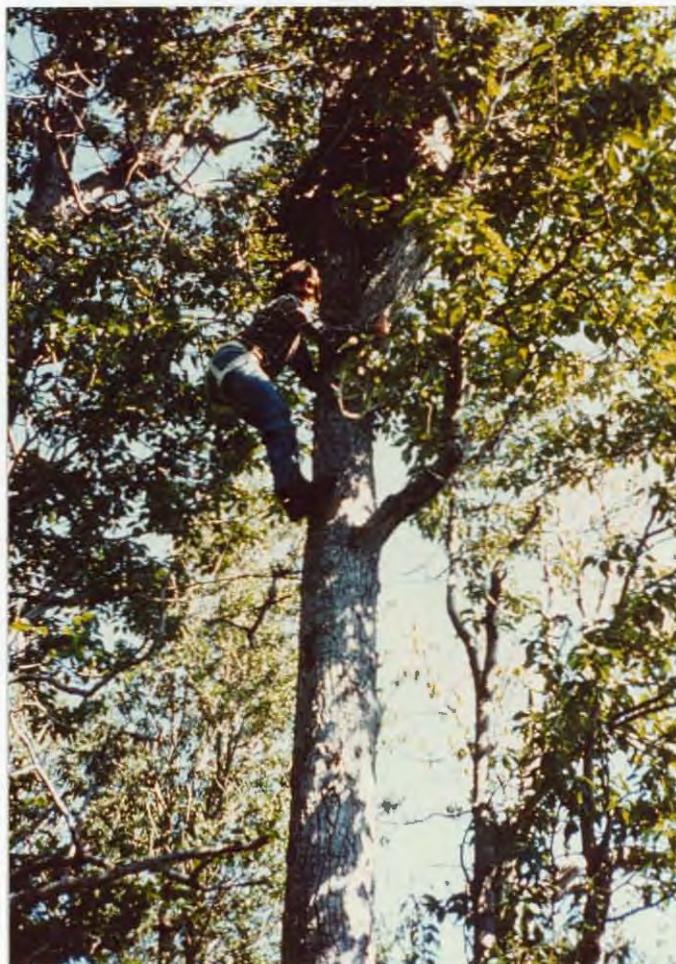
Information and results gathered in the course of study will be used to improve the quality of management decisions concerning environmental or ecological impacts on Kodiak Island's bald eagle population by economic growth and development. The additional knowledge gained by this study combined with past nesting and productivity records could make the bald eagles on Kodiak Island the most thoroughly documented eagle concentration in Alaska.

Methods

This study will be carried out in two phases over an eight year period. This schedule is mandated by the five year period required for bald eagles to reach maturity. The first phase of the study (five years in length) will be devoted to the visual marking of bald eagles with patagial wing markers, colored leg bands, and standard FWS aluminum leg bands. During the first winter of the study, five bald eagles will be instrumented with radio packages in the Chiniak Bay area. This small number will permit evaluation of telemetry techniques

for this study, as well as determine cost/benefit ratios. Instrumented sub-adults will also be patagial marked. Captured adults will be judged for telemetry suitability and will either be instrumented (without patagial markers) or released unmarked.

The study commenced with the marking of 18 fledglings in the Karluk Lake and Uyak Bay areas from July 16 to August 5. Marking the eaglets consisted of placement of two florescent green patagial markers with black code numbers, a blue acrylic leg band with white code numbers on the left leg, and a standard FWS aluminum No. 9 riveted band on the right leg. Exact marking locations are indicated on the map on page no. 8. A total of 10 eaglets were marked around Karluk Lake from 6 different nests. The remaining 8 fledglings were marked in Uyak Bay from 5 nests.



Unfortunately not all the nests were as accessible as this one. BA Banyas seen here on the way up. DZ



Eaglet K01 modeling his new decorations. DZ



K01 about 2 months later approximately 400 yards from the nest. DZ

Ages of the marked eaglets were estimated at the time of banding and ranged from 7 to 13 weeks. Eaglets marked from the coastal habitat in Uyak Bay were on the average 3 or more weeks further along in development than the eaglets in the interior freshwater habitat around Karluk Lake. Several of the coastal eaglets flew from the nest while the tree was being climbed and had to be retrieved. Two of the eaglets kept right on flying and were last seen winging over the horizon.

Results and Discussions

The differences in ages in the fledglings may be attributed to the late spring as the ice did not leave Karluk Lake until after the first week in May. The Thumb Lake eaglets were the oldest that were marked around the Karluk Lake which also supports this theory as Thumb Lake was ice-free 2 to 3 weeks earlier than Karluk.

Problems encountered during project initiation were minimal. Inability to get into several active nests because of large nest overhang plus the breaking of several acrylic leg bands when they were placed on the birds were the most troublesome. The broken bands cause disruptions in the sequence of codes placed on the patagial markers and the acrylic bands. Three eaglets have different code numbers on the patagial markers than the acrylic leg bands because of this. See Table No. 1 for all banding data collected during project initiation.

An overflight of all the nests from which eaglets were marked on September 8 revealed 7 of the marked birds still in the nest or nest tree. Only 2 of the eaglets marked in Uyak Bay were still in the nest with the remaining 5 from the Karluk Lake group. Apparently, eaglets with a wing chord measurement of less than 38 cm when marked are not likely to leave the nest until approximately mid-September.

A total of 10 different sightings of marked birds in the Karluk Lake area was received from Alaska Fish and Game and FWS Fisheries Research personnel. Observation reports were received from August 18 to December 30. No observation reports of bald eagles marked in Uyak Bay have been received. Staff personnel will continue to monitor marked birds remaining in the Karluk Lake area as long as they are present.

Table No. 1

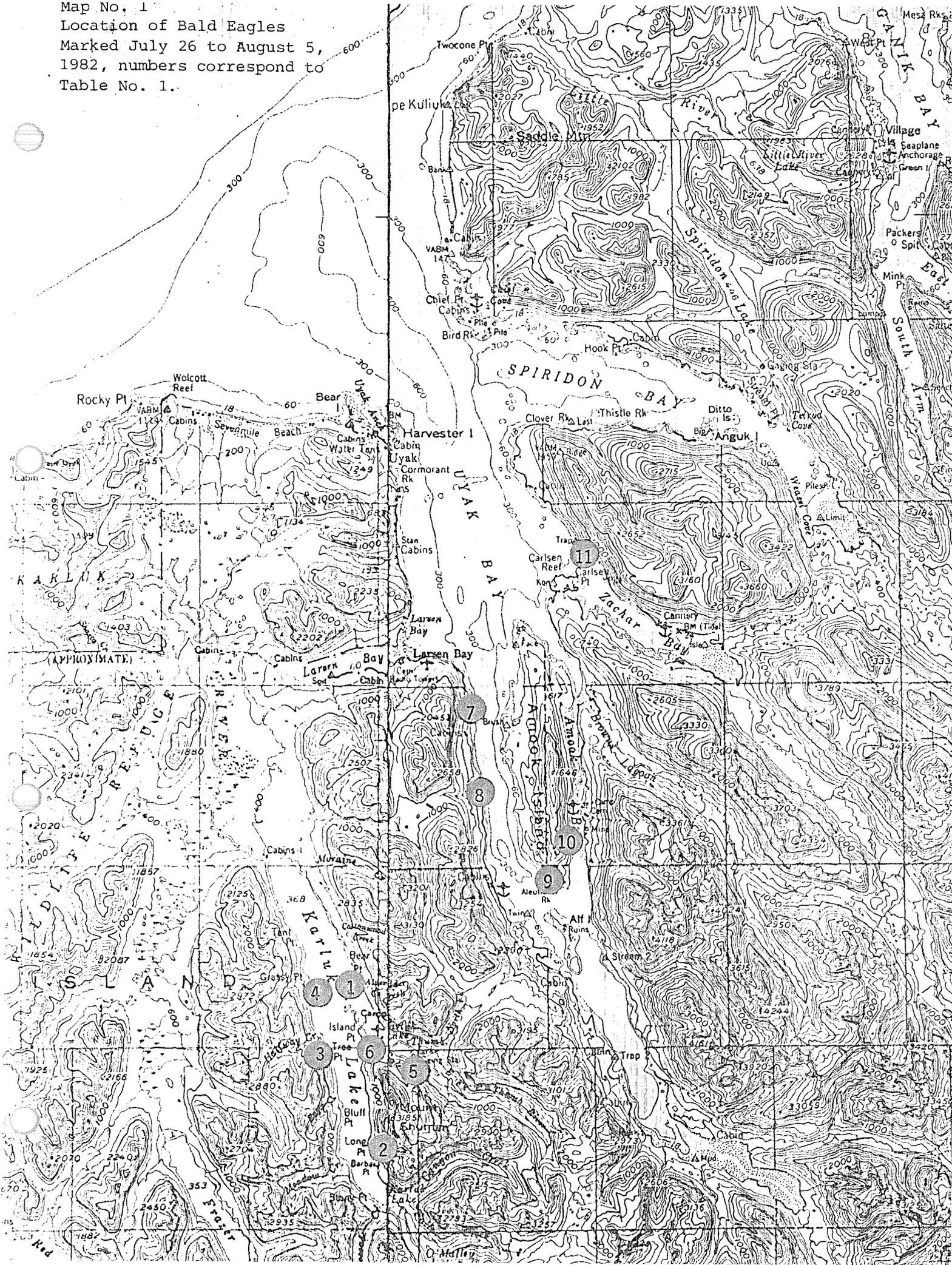
BALD EAGLETS MARKED AND BANDED ON KODIAK NWR - 1982

<u>Date</u>	<u>Map No. & Location</u>	<u>FWS Band #</u>	<u>Patigial Marker Code</u>	<u>Acrylic Band Code</u>	<u>Wing Chord</u>	<u>Tarsus Length</u>	<u>Tarsus Width</u>	<u>Exposed Culmen</u>	<u>Total Culmen</u>	<u>Novo Width</u>	<u>Est. Age</u>
7/26	1. Karluk Lake (Bear Lagoon)	629-13501	K01	K01	25.7cm	11.1cm	1.4 cm	4.1 cm	5.55cm	1.7 cm	7 weeks
7/27	2. Karluk Lake (Long Pt)	629-12502	K02	K03 ¹	27.6cm	10.9cm	1.4 cm	4.0 cm	5.1 cm	—	7 weeks
7/27	3. Karluk Lake (Halfway Cr)	629-13503	K04	K04	26.3cm	11.3cm	1.5 cm	4.35cm	5.25cm	1.7 cm	8 weeks
7/27	3. Karluk Lake (Halfway Cr)	629-13504	K05	K05	25.4cm	11.5cm	1.6 cm	4.4 cm	5.3 cm	--	8 weeks
7/27	4. Karluk Lake (Grassy Cr)	629-13505	K06	K07 ¹	37.5cm	11.7cm	1.6 cm	4.5 cm	5.9 cm	--	11 weeks
7/27	4. Karluk Lake (Grassy Cr)	629-13506	K08	K08	39.7cm	12.5cm	1.7 cm	5.0 cm	6.4 cm	--	11 weeks
7/27	4. Karluk Lake (Grassy Cr)	629-13507	K09	K09	40.6cm	11.6cm	1.5 cm	1.5 cm	4.7 cm	--	11 weeks
7/29	5. Karluk Lake (Thumb Lk)	629-13508	K10	K10	48.3cm	12.3cm	1.6 cm	5.3 cm	6.9 cm	--	12 weeks
7/29	5. Karluk Lake (Thumb Lk)	629-13509	K11	K11	46.0cm	11.8cm	1.4 cm	4.8 cm	6.0 cm	--	12 weeks
7/30	6. Karluk Lake (Island Pt)	629-13510	K12	K12	37.0cm	11.5cm	1.4 cm	4.45cm	5.6 cm	1.45cm	8 weeks
8/3	7. Uyak Bay (West side Bay)	629-13511	K13	K13	40.0cm	12.8cm	1.5 cm	5.3 cm	6.6 cm	1.6 cm	10 weeks
8/3	8. Uyak Bay (West side Bay)	629-13512	K14	K14	44.4cm	11.3cm	1.5 cm	4.9 cm	5.8 cm	1.7 cm	11 weeks
8/3	8. Uyak Bay (West side Bay)	629-13513	K15	K16 ¹	44.4cm	11.6cm	1.6 cm	5.0 cm	5.8 cm	1.55cm	11 weeks
8/3	9. Uyak Bay ² (S. tip Amook Bay)	629-13514	K17	K17	52.1cm	12.4cm	1.5 cm	5.4 cm	6.7 cm	1.45cm	13 weeks
8/4	10. Uyak Bay (Amook Pswy)	629-13515	K18	K18	35.6cm	11.0cm	1.55cm	4.7 cm	5.8 cm	1.55cm	10 weeks
8/4	10. Uyak Bay (Amook Pswy)	629-13516	K19	K19	35.9cm	11.2cm	1.45cm	4.5 cm	5.8 cm	1.6 cm	10 weeks
8/5	11. Uyak Bay (Across CarlsewPt)	629-13517	K20	K20	50.8cm	11.2cm	1.6 cm	5.0 cm	6.1 cm	1.5 cm	13 weeks
8/5	11. Uyak Bay	629-13518	K21	K21	52.7cm	12.0cm	1.7 cm	5.5 cm	6.4 cm	1.8 cm	13 weeks

¹ Acrylic bands of corresponding code to patigial markers broke during bend placement. The next numbered code (in the sequence) patigial marker not used in order to match codes on remaining birds.

² Nest mate flew from nest and was not marked.

Map No. 1
 Location of Bald Eagles
 Marked July 26 to August 5,
 1982, numbers correspond to
 Table No. 1.





Only one nest contained three young. DZ



Note the difference in development between this eaglet from the Thumb Lake nest and the other eaglet pictured. DZ

Kodiak NR82 - "Raptor Observations Associated with Terror Lake Hydroelectric Project" (74530-2)

Introduction

Potential impacts on raptors by construction of the Terror Lake Project (Figure 1) were identified in a study by the Arctic Environmental Information and Data Center. The two species of raptors found to be most abundant and nesting in the Project area were bald eagles (*Haliaeetus leucocephalus*) and rough-legged hawks (*Buteo lagopus*), which utilize different habitat types within the Project area.

Due to bald eagle nesting and feeding habitat preferences, the greatest potential for Project related impacts will be activities centered around construction and operation of the Project's main camps and jetty on Kizhuyak Bay. Possible exceptions are the nest site located on Buskin Lake (within the transmission corridor) and those foraging and nesting areas located along the lower portions of the Terror River and inner Terror Bay areas. Construction activities in these areas are expected to be minimal and thus the potential for adverse impacts should be minimal.

Impacts affecting rough-legged hawks should be limited to those caused by construction of the dam and access road. The loss of foraging habitat caused by inundations may cause long-term detrimental effects on individuals of these species by reducing their available food supply.

The objectives of this study are twofold:

1. Determine profound changes in reproductive rates.
2. Determine profound changes in use of feeding ranges.

The study will continue throughout project construction.

Methods

Two different aircraft were employed to conduct aerial nesting and productivity surveys. USFWS owned and piloted PA-18 was used to survey bald eagle nesting habitat in the Kizhuyak and Terror Bay/River areas plus the power corridor. The rough-legged hawk nest survey was accomplished by a Project-leased Bell 206 helicopter and pilot. The observer for both surveys was a member of the Kodiak Refuge staff. Surveys were flown at heights of 200 to 500 feet above ground level (AGL).

Nest status (active or inactive) was determined by presence or absence of an adult bird in an incubating stance on the nest.

Bald eagle nest surveys were initiated on May 28 with a follow-up productivity survey of previously active nests on August 9.

The rough-legged hawk nesting survey occurred on June 22. A follow-up of the one active rough-legged hawk nest was done from the ground with a 45X spotting scope on July 1 to establish the number of young in the nest.

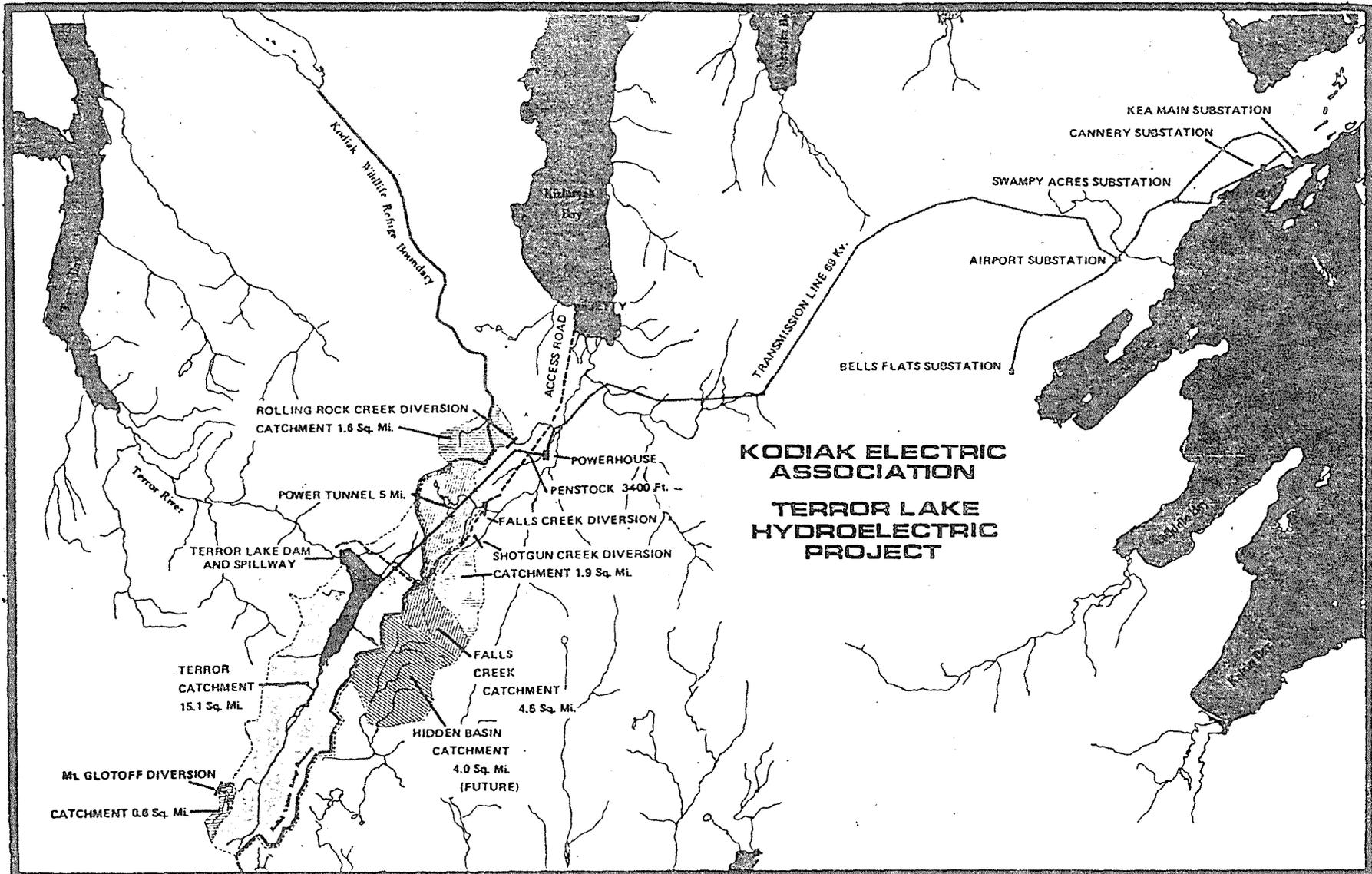


Figure 1 Location of Proposed Terror Lake Project

A foot survey was accomplished on June 3 in the lower Kizhuyak River valley to document possible food and prey species. A similar foot survey was done in the upper portion of the upper Terror River valley which will be inundated to determine possible prey species found in this area.

Results and Discussions

Two raptor species, bald eagle and rough-legged hawk, were found nesting within the TLHP area during the 1982 field season survey period. A total of 14 bald eagle nests and 4 rough-legged hawk nests were found in the area. Fifteen eaglets were produced from nine active bald eagle nests with only two rough-legged hawk chicks hatched from the single active rough-legged hawk nest. A comparison of the AEIDC 1980 survey and results of the 1982 study are illustrated in Table No. 2.

TABLE NO. 2

<u>1980 SURVEY RESULTS</u>					
<u>Survey Sector</u>	<u>Raptor Species</u>	<u>Total Nests</u>	<u>No. Inactive</u>	<u>No. Active</u>	<u>Total No. Young Fledged</u>
Kizhuyak River/ Powerline	Bald Eagle	12	6	6	12
	Rough-legged Hawk	--	--	--	--
Terror River	Bald Eagle	3	1	2	0
	Rough-legged Hawk	--	--	--	--
Terror Lake Basin	Bald Eagle	--	--	--	--
	Rough-legged Hawk	3	0	3	6
<u>1982 SURVEY RESULTS</u>					
<u>Survey Sector</u>	<u>Raptor Species</u>	<u>Total Nests</u>	<u>No. Inactive</u>	<u>No. Active</u>	<u>Total No. Young Fledged</u>
Kizhuyak River/ Powerline	Bald Eagle	11	4	7	11
	Rough-legged Hawk	1	1	--	--
Terror River	Bald Eagle	3	1	2	4
	Rough-legged Hawk	--	--	--	--
Terror Lake Basin	Bald Eagle	--	--	--	--
	Rough-legged Hawk	3	2	1	2

It is of interest to note that the bald eagle nest located adjacent to the staging area, which is exposed to the most disturbance and activity, has fledged two young in both 1979 and 1980. The nest's status for 1981 is unknown, but in 1982 the nest was again active fledging a single eaglet. Although measured as being 343 feet from the nearest source of disturbance by WAES (Western Alaska Ecological Services) Project Monitor and EBASCO personnel, it has been subjected to a continuous variety of noise and activity associated with initiation of a project this size, including airplane/helicopter landings and take-offs, large diesel generators, heavy earth moving equipment, plus a camp population of 100 or more personnel during the critical nesting periods. The upcoming 1983 nesting season will establish just how much disturbance this particular pair of bald eagles will tolerate as 1982 escalated activity to a fevered pitch in the jetty camp. However, by virtue of the documented disturbance already tolerated by this pair, they cannot be considered a "normal" pair of nesting bald eagles.



The bald eagle nest can be seen in the background over the right end of the brown trailer; taken during initial camp set-up. DZ

Three rough-legged hawk nests were located in the Terror Lake Basin in 1982 with only one being active. The single active nest was in approximately the same vicinity as successful 1980 rough-legged hawk nest; this was the only 1982 nest site having this distinction. All the other 1982 nest sites are in areas different from the 1980 nesting sites.

The single 1982 active nest was located on a steep cliff adjacent to Terror Lake less than 500 feet from the soon to be completed dam site.

The remaining two nests were located on the west side of the upper Terror River valley in steep ravine cuts made by streams flowing into the upper Terror River valley. Neither nest was active in 1982.



The single active rough-legged hawk nest site is located on the cliff in the middle of the picture. The end of the dam will be immediately to the left of the cliff. DZ

Foraging and Feeding Range Results

A foot survey of the lower portion of Kizhuyak River valley and delta was conducted on June 3 to document species available to raptors as a food source. Located during the survey were:

<u>Common Name</u>	<u>Genus Species</u>
Northwestern crow	Corvus caurinus
Black-billed magpie	Pica pica
Mew gull	Larus canus
Glaucous-wing gull	Larus glaucescens
Whimbrel	Namenius plraeopus

<u>Common Name</u>	<u>Genus Species</u>
Pigeon guillemot	Cephus columba
Common merganser	Mergus merganser
Pelagic cormorant	Phalacrocorax pelagicus
Common goldeneye	Bucephala clangula
Green-wing teal	Anas carolinensis
Varied thrush	Ixoreus naevius
Fox sparrow	Passerella iliaca
Golden-crowned sparrow	Zonotrichia atricapilla
Tundra vole	Microtus oeconomus
Snoshoe hare	Lepus americanus
Beaver	Castor canadensis
Sitka-blacktail deer (available as carrion)	Odocoileus hemionus sitkensis
Dolly Varden trout	Salvelinus spp.

Nearly all of these species were found to be prey used by bald eagles in a food habit study of nesting bald eagles conducted by Grubb and Hensel on the Kodiak NWR during the years 1963, 1967, and 1968.

No observations were conducted in the Terror River valley to document possible prey species available since the same habitat conditions prevail in this sector as the the Kizhuyak River and inner bay areas, all of the same species would occur in the Terror River/inner bay sector.

Terror Basin

A foot survey on July 1 of the upper Terror River valley was made to observe feeding and foraging activities of rough-legged hawks nesting in the Terror Lake basin. Possible prey species observed were as follows:

<u>Common Name</u>	<u>Genus Species</u>
Willow ptarmigan	Lagopus lagopus
Fox sparrow	Passerella iliaca
Dipper	Cinclus mexicanus
Black-billed magpie	Pica pica
Common redpoll	Acanthis flammea
Common goldeneye	Bucephala clangula
Tundra vole	Microtus oeconomus

According to A. C. Bent in "North American Birds of Prey" rough-legged hawks rarely feed on birds of any species but prefer small rodents and mammals, so only tundra voles can be considered as a positive food species.

All specie observations were within the project inundation zone.



Late June rough-legged hawk habitat conditions along the access road. The pass into the Terror Lake basin can be seen at the end of the road. DZ

Kodiak NR82 - "Investigation of the Instream Distribution and Movement of Karluk River Steelhead Trout" (74530-3)

As part of the Kodiak NWR development of a data base on Refuge based anadromous fish populations and habitat, a steelhead trout study was initiated in the fall of 1982. Very little is known regarding steelhead stocks on the Refuge and current monitoring is through sport creel census and subsequent scale analysis. In addition, a percentage of the adults which overwintered (kelts) are counted passing through ADF&G fish wiers in the Karluk and Red Rivers. Generally, Refuge based steelhead populations start entering streams in early or mid-September, overwinter, and move back out in May and June of the following year. Although some age and growth data is available, the numbers of adult spawners entering in the fall, spawning ground locations, length of time on the spawning grounds, and general distribution of spawners through the winter is unknown. Fishing pressure on these stocks occur in both the fall and spring and the current emphasis is on Karluk stocks.

As a result, the 1982 Karluk study was initiated to address two main objectives:

1. Delineate where steelhead overwinter by quantitatively establishing in-and-out migrant adult steelhead movements, seasonal positioning, and spawning areas.
2. Determine to what extent Karluk stocks may be susceptible to in-river subsistence and sport fishing pressure.

Due to the location of the Karluk drainage (Figure 2), the most feasible method of tracking steelhead movement was to radio-tag adults as they enter the system at the Karluk Lagoon and monitor their movements via aircraft throughout the winter and spring months. Between late September and early November, ten radio transmitters were surgically implanted interperitoneally into adults captured. A surgical implant was preferable to an esophageal implant since steelhead tend to regurgitate the tags. A green spaghetti tag supplied by ADF&G-SF Division was utilized as a secondary external mark on instrumented fish.



Radio tagging adult steelhead trout. TC

Initial attempts to instrument adults as they enter the system were partially successful. The first tagging effort was during the week of September 22 at the Karluk Lagoon, where five fish were successfully tagged. Although we were able to capture and tag the number of adults desired at the time, there seemed to be a definite lack of adults in the Lagoon. A one-day coho salmon fishery operated in the Lagoon September 20, with approximately 16 seiners participating, and some steelhead were reported to have been taken incidental to the fishery. This harvest could have accounted for the lack of adults in the Lagoon. Or, it could be due to a quick upstream movement by those steelhead which enter the system at that time of year.

In a subsequent follow-up effort during October at the Karluk Lagoon, only one adult was captured and radio-tagged, despite a substantial seining effort in the Lagoon and River terminus. Contacts with the guide at the Karluk Lodge and local Native fishermen indicated there had been very few steelhead present in the Lagoon since our initial effort in late September. As a backup, a trip was taken to the Karluk Portage, river mile 15.5, and an additional four fish were radio-tagged during the first week in November. Although initial migration data on these four fish would be missing, aerial monitoring of those instrumented fish previously tagged in the Lagoon indicated most of the steelhead were concentrated in the Portage area.

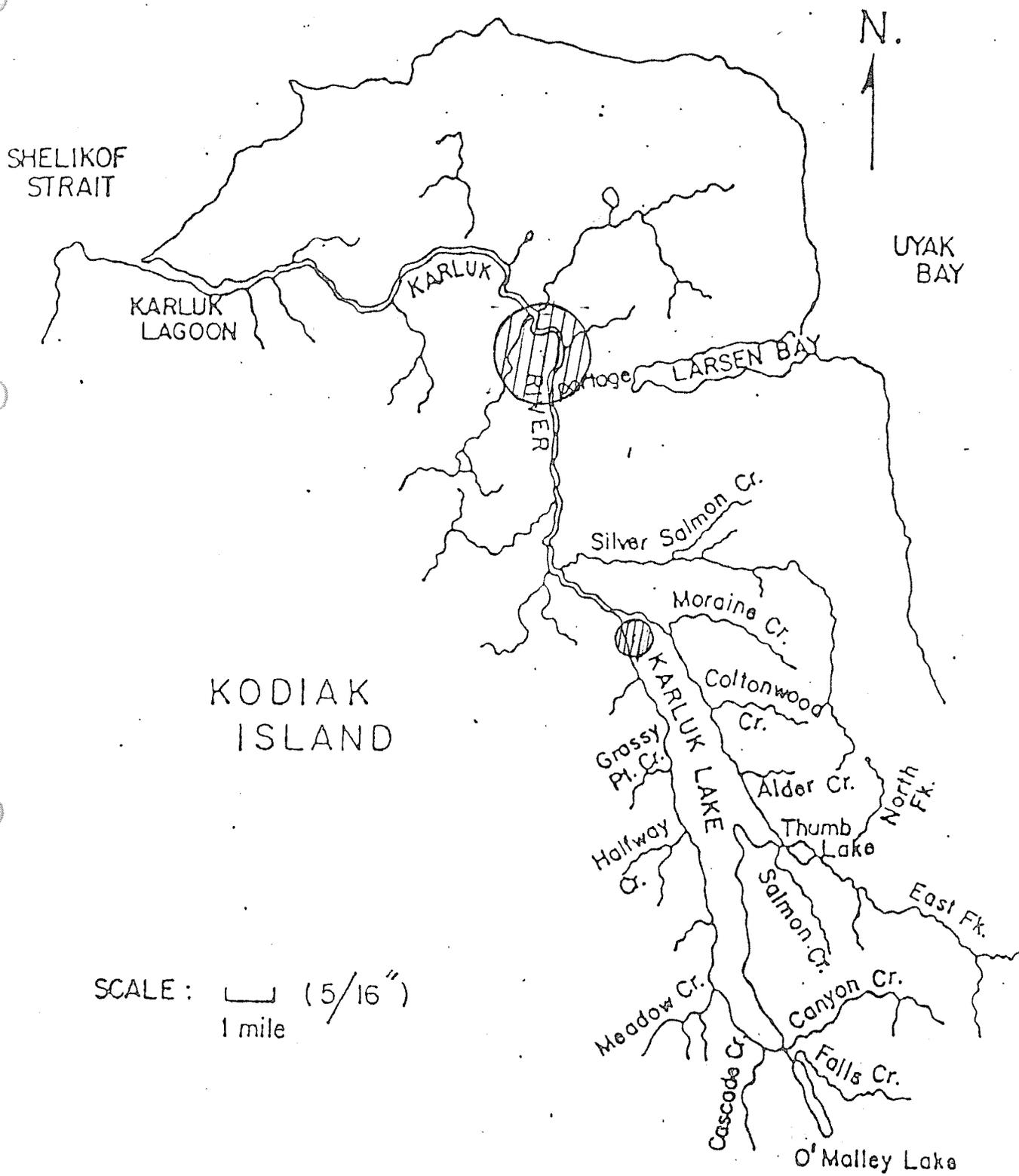


Figure 2 Karluk River/Lake on west side Kodiak Island. Circles indicate location of radio tagged steelhead trout, November, 1982.

Bi-weekly aerial monitoring to date indicates that nine instrumented fish are presently within or immediately downstream of the Karluk Portage area, river mile 12.5-17 (Figure 2). Although there has been some variation in movement of individual fish, they are generally remaining in this area. One adult has moved upstream from the Portage nine miles into the northern end of Karluk Lake. Although we are observing cohesive movements of 90 per cent of the tagged fish, it is still early to draw any conclusions.

It is anticipated that this study will be conducted for a minimum of two years and adjustments made in methods during the fall of 1983 in response to information gathered during the winter of 1982 and spring of 1983. In addition, tagging efforts will be initiated in the fall of 1983 on steelhead adults entering the Red River system.

Other FWS management oriented research on the Kodiak NWR during 1982 was targeted on the red salmon stock of the Karluk Lake/River system. Historical data shows that for its size, Karluk Lake was the largest producer of sockeye salmon in the world. Early studies have ranked the Karluk system second only to the Chignik system on the Alaska Peninsula in the primary productivity and first in density of spawners per unit of lake area compared to other Alaska sockeye systems. The commercial catch from the late 1800's to the early 1920's ranged between 1 and 4 million fish annually. A counting weir was installed in Karluk River in 1921 allowing determination of the total escapement. These counts ranged from 0.5 to 2.5 million during the 1921 to 1952 period and declined to 0.1 to 0.5 million from 1954 to the present (Figure 3). Unfortunately, for several unknown reasons the Karluk stock, in comparison to other major sockeye systems on Kodiak, has not responded to management efforts directed towards rebuilding the total run size. Basically, the production in the form of adult returns in any given year (escapement and harvest) does not reflect those brood year escapements. Analysis of historical data by research personnel of the SNFRC has led to the conclusion that an upper level historic "stability" region (stock-recruit analysis) for Karluk red salmon has collapsed and has been re-established at a much lower level (Figure 3). Subsequently, in 1982 a project was initiated to examine the hypothesis that the continued depression of Karluk stocks was due to compensatory mortality and/or loss of lake productivity.

A paleolimnetic core sample was taken at Karluk Lake in August 1981 by Refuge personnel and analyzed by the SNFRC. Results of the analysis are presented in a 1982 report entitled "Some Observations on the Trophic History of Karluk Lake". Although the core was not analyzed for nitrogen and phosphorus due to thawing during shipment and is not layered, radio carbon dating is being done by the Institute for Quaternary Research at the University of Washington. Some conclusions reached regarding the analysis are:

1. Karluk Lake has had a fairly constant productivity, as indicated by diatoms, over time.
2. During one time period, the lake was very entrophic and the dominant diatoms during that period were ones which occur in situation where decomposition of organic matter is occurring.
3. Productivity of the lake appears to be independent of the number of spawning sockeye salmon over a wide range, though the one very entrophic period may have been caused by the passing of some threshold numbers of spawners.

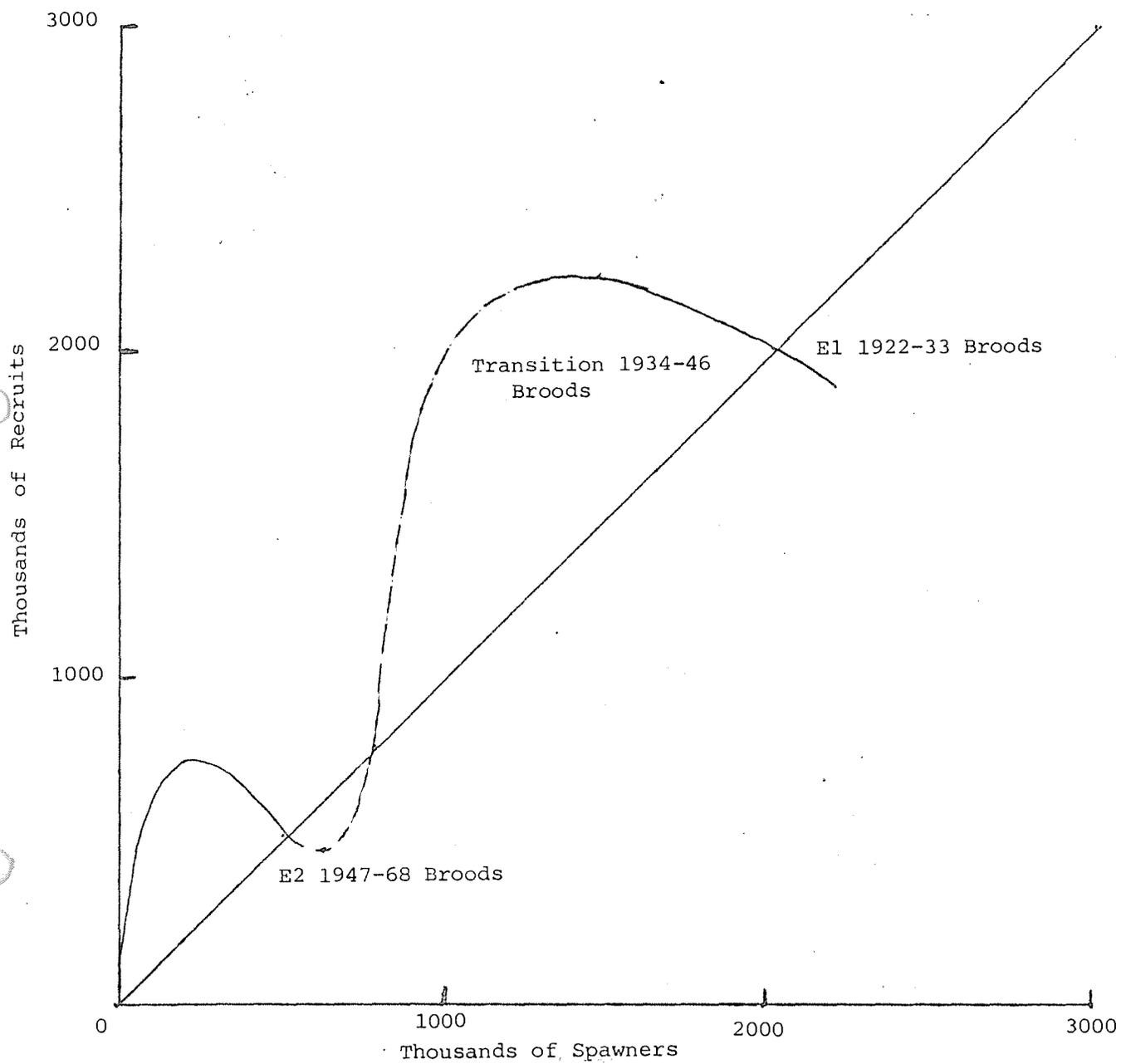


Figure 3. Proposed stock-recruitment relationship for Karluk red salmon 1922-1968. E1=Historical equilibrium, E2=Present equilibrium (redrawn from McIntyre 1980).

The report recommends that once radiocarbon dates become available from the 1981 core, more work should be done to relate the trophic history of the Lake to management recommendations.

During 1982, an additional four core samples were obtained from Karluk Lake by research personnel, and analysis by the SNFRC will hopefully be completed in 1983.

To examine depensatory mortality of the Karluk sockeye, the ANFRC-AFS stationed field personnel at Karluk Lake from May through October. The lake was systematically seined and trapped for collection of fish that were potential predators of juvenile red salmon. Sticklebacks were also collected to provide basic information for studies of salmon competitors. Data from the 1982 investigation are presently being analyzed by SNFRC personnel in Anchorage.

Biochemical genetic analysis of Karluk Lake red salmon by SNFRC continued during 1982 and combined preliminary results from previous years work to date indicate a significant genetic difference between the early and late Karluk stocks but no significant difference within early or late stocks spatially separated on the spawning grounds.

E. ADMINISTRATION

1. Personnel

Kodiak was without clerical staff from January 1, 1982 until April 4, 1982 after the departure of Margaret Jamison. Although ARM Heffernan did an outstanding job of filling in as temporary clerk, the entire staff (particularly Heffernan) breathed a sigh of relief when Administrative Clerk Judy Barnett entered on duty April 4, 1982. Judy has done a remarkable job of learning the FWS system and getting our "books" back into shape.

In January Assistant Refuge Manager/Airplane Pilot Mike Vivion was promoted to GS-12 following an OPM decision relating to dual function pilots.

With just over a year in Kodiak, Refuge Manager Bob Stratton transferred to Mark Twain NWR on January 30, 1982.

After five years in Bethel, Alaska as Manager of the Yukon Delta NWR, Charles Strickland arrived in Kodiak to assume the duties of Refuge Manager for the Kodiak NWR. Charles brought with him extensive Refuge Management experience and immediately tackled some of the thornier problems of the Kodiak Refuge. Charles arrived in Kodiak April 12.

On June 18, 1982 Research Biologist Victor G. Barnes arrived in Kodiak to establish a Research program here. Although not assigned to the Refuge staff per se (Vic is assigned to Denver Wildlife Research Center), Vic has done an excellent job of dovetailing the Research and Refuge functions on Kodiak.

Assistant Refuge Manager Ed Hajdys successfully completed the nine-week law enforcement training program in Glynco, Georgia on June 28, 1982.

Mike Vivion received an sustained special achievement award and associated cash award on October 29, 1982.

On December 6, 1982 Rasmus Anderson joined the Refuge staff as a Maintenance Helper/Janitor under the CETA program. "Andy" has provided much needed custodial services for the new Headquarters facility and also provides assistance in maintenance tasks to Maintenance man Cossick.

By year's end, Vessel Master/Maintenance man John Cossick had accepted a transfer to the Monte Vista NWR in Colorado. John's transfer will be effective in March of 1983, to permit completion of winter seabird surveys.

The following chart displays staffing levels of Kodiak over the past six years:

	<u>Full-time*</u>	<u>Part-time</u>	<u>Temporary</u>
1982	8	0	1
1981	8	0	1
1980	8	1	1
1979	8	1	2
1978	7	1	2
1977	4	1	0

*Includes Career-Seasonal (50-week) appointees.

The GS-3 Clerk-Typist position which was vacant through 1982 will be filled in 1983 to staff the Visitor Center.

2. Funding

The chart below displays Kodiak NWR funding in thousands of dollars by program for a seven fiscal year span:*

	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
MB-1210	31	42.0	87	68.0	65	100	100
MNB-1220	131	181.4	180	160.0	160	188	322
I&R-1240	12	40.0	40	40.5	48	48	48
FR-1300	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>95</u>	<u>60</u>	<u>95</u>
Totals	174	263.4	307	268.5	368	396	565

*All the above figures are original AWP figures; several were modified after the fact.

The increases displayed for FY83 are aimed at maintaining a viable operational program while still supporting our dramatically increased base level expenditures.

Fiscal Year 83 will bring the addition of our new shop building, two new residences, bunkhouse, and associated upkeep and utility costs, thus increasing our base level spending.

In addition, the comprehensive planning effort for Kodiak was accelerated, so that planning is now scheduled for March, 1983. Although planning will be primarily funded by the Region, additional significant expenditures of Refuge funds are likely to occur.

The usual problem of operating under continuing resolution for the first three months of the year has caused some new-start projects to be delayed but fortunately most of our major projects occur later in the year.

In summary, for the first time in several years, Kodiak NWR is reasonably funded. Our base costs including personnel costs are covered and ample funds remain to conduct a basic level field operation. As we get back into field operations and when new facility maintenance is required for the entire fiscal year, funding will again be critical. In particular, the addition of the research function at Kodiak will require considerable funding to conduct a reasonable program.

It must also be noted that cuts often occur late in the fiscal year. These can be particularly crippling to the station with a high base level cost of operations such as Kodiak has become.

3. Safety

A station safety inspection was conducted by Regional Safety Officer Ginny Hyatt on September 22.

Dennis Fignon of Eagle River was mauled by a brown bear while deer hunting near the mouth of Zachar Bay on December 18. This is the second deer hunter mauled in the past two years over a deer carcass. Earlier this year (late October) a sow with cubs was shot near the head of Zachar over a dead deer; the hunter was uninjured. However, Fignon was not so lucky. Fignon's statement to Roger Smith, ADF&G, related that he and his hunting partner were approaching a deer shot and left about 1 1/2 hours earlier when they topped out on a steep ridge. The bear, who was 10-20 yards away, charged immediately. Fignon only had time to fall forward where he was bitten and batted for a few seconds until his hunting companion reached the ridge top and shot the bear, who then charged the shooter. In the ensuing action, the wounded bear was shot again by Fignon's companion and then by Fignon himself. The bear then ran downhill and died.

Fignon was bitten in the head, shoulder, and hip. He was able to hike to the beach and contact the Coast Guard via a fishing boat. That evening he was evacuated by helicopter to Kodiak and remained in the hospital for two days. The other members of Fignon's hunting party returned to the kill site the next day. They found that the bear had consumed most of the deer and covered the remains in the two hours or less time span after the deer was killed and the hunters returned. The bear was a mature sow in good condition.

F. HABITAT MANAGEMENT

Habitat management on Kodiak consists primarily of managing large areas of de facto wilderness in the interior and regulating human use along the coast line. The set-net salmon fishery causes a variable number of structures along the coast each year. Generally, over 100 sites are fished under Refuge Special Use Permit on Refuge land. Over 70 of these sites have cabins, with the remainder of the sites occupied by tent frames.



Refuge vessel crew returns to the Ursa Major after a set-net site inspection on Uganik Island. JC

Administration and law enforcement duties connected with limiting the habitat degradation caused by these sites consumes large amounts of staff time and operations funds each year.

Implementing the Alaska National Interest Lands Conservation Act (ANILCA) has complicated matters. ANILCA changed cabin and temporary structure laws which required new policy and implementing regulations. Developing these was not an immediate or easy process and during the interim numerous questions arose that had to be resolved since the permit process continued. Much more effort and staff time was spent on permit matters in an effort to decrease the inevitable confusion. Public hearings on the new policies and their rules will follow in 1983 and after the dust settles, hopefully, routine will prevail, if such a term can ever be applied to this subject.

The very lucrative salmon fishery of the past few years has made an already politically sensitive management problem (fish sites) more so by the investment represented in each site. Congressional inquiries are a way of life in the administration of set-net sites.

The largest single impact on Kodiak NWR habitat during the year (and in history) was begun on March 16 when construction commenced on the Terror Lake Hydroelectric Project. The construction company arrived at the head of Khizhuyak Bay (off Refuge) and set up camp with a bald eagle tree "next door" - and then asked for an exception to the 1,000 foot minimum distance required by license conditions. Several other actions during the year followed the economic benefit/expediency rule without environmental input, especially before a full time FWS project monitor was assigned to the project in July. Kodiak Refuge staff had been advocating a full time monitor since the project began.

The first action taken by the construction crew was to begin the road. By late June, the Refuge was no longer roadless and by mid-August the road was drive-able to the damsite. Dam construction began immediately.

Problems associated with construction over and above those accruing naturally from the project include: numerous deviations from the Environmental Impact Statement; occasional, sometimes serious, turbidity in the Khizhuyak and Terror Rivers due to improper settlement facilities; a seven-month period before garbage incinerators were installed (the licensing agreement stated these would be installed before occupancy); and others. A few reports of bears or goats being harassed by helicopters have reached us, but have been impossible to followup.

In November, the camp work force numbered approximately 250, with 150 being housed on the Refuge at the Terror Lake (upper) camp. As the year ends, the work force is reduced due to lowered construction activity caused by weather.

12. Wilderness and Special Areas

At the close of 1982, the fate of the Mt. Glottof Research Natural Area (RNA) still hangs in the balance. The Kodiak Electric Association continues to pursue the political paths which may enable them to construct a diversion facility within the RNA which will channel water into the Terror Lake Hydroelectric Project. The water gain from this single project appears trivial - - and the cost/benefit ratio very slim.

The Mt. Glottof RNA was established in 1975 to protect the unique summer alpine brown bear feeding areas studied by Atwell et al in the 1970's.

G. WILDLIFE

3. Waterfowl

Observations of uncommon or unusual (to the Kodiak area) waterfowl species are reported most often during the spring-fall migratory periods. Kodiak's mild wet climate tends to lengthen migratory periods, in some instances through the entire winter. The first Kodiak winter record of a smew occurred on January 3 in Women's Bay during the annual Kodiak Christmas Bird Count.

During January, a local Kodiak resident reported that 150 to 200 emperor geese were wintering in the Isthmus Cove area of Kalsin Bay. Refuge personnel reported observing 60 emperors in the same vicinity on April 18. Four emperors were seen in the Kiavak Bay area on April 15-25 by Andy Runyan, a local bear guide.

Assistant Refuge Manager Vivion observed 6 white-fronted geese in Kalsin Bay on April 17. Also seen in the same vicinity were 230 black brant, and a single tufted duck was sighted in Women's Bay on the return trip to town.

Several groups of hunters reported a flock of 20 Canada geese near Mary's Island in Women's Bay on October 14 and 15. Four emperor geese were with the flock of Canadas.

For the past three years, a flock of seven Canada geese has wintered in the Zachar Bay area of the Refuge. This year the flock finally increased. Nine were seen by Refuge personnel on November 11.

Due to funding cuts whistling swan nesting surveys were not done during 1982 but are planned for the 1983 field season. Counts along the upper Karluk River were done in conjunction with other field studies whenever possible. Extensive Potamogeton sp. beds make this a favored feeding area. Five whistling swans were sighted in a small pool of open water in this vicinity on January 19 and 25. Some whistling swans are thought to winter on Kodiak Island. Observations have been made in every month of the year except February.

A new Refuge record for total whistling swans observed in one area occurred on April 5 with 102 tallied on the upper Karluk River by staff personnel. Previous high counts (90-97) occurred during fall (October-November) migratory periods with spring high counts averaging approximately half of fall counts. Eighty-nine swans were counted on October 29 during a tracking flight to locate radio-tagged Karluk River steelhead trout.

4. Marsh and Water Birds

All four species of loons (Common, Arctic, Yellow-billed, and Red-throated) have been observed in the Kodiak Island Archipelago with common and red-throated species the only confirmed nesters. Total numbers are small enough that all species are considered uncommon.

During winter seabird surveys, 100-200 loons (all species) are normally tallied. The east-side bays of Kodiak Island accounting for the majority of this number. Kiliuda Bay, Kaiugnik, and Natalia Bays having wintering flocks of 10 to 50 birds.

5. Shorebirds, Gulls, Terns, and Allied Species

A solitary whimbrel was flushed by Biological Technician Zwiefelhofer from the Kizhuyak River tidal flats on June 6 while conducting raptor foraging observations.

A flock of approximately 300 rock sandpipers was observed in Kiliuda Bay on December 9 in the vicinity of Ladder Island.

Several observations of sooty shearwaters (November 11, 12, and December 9) were made during winter seabird surveys of Refuge bays. Sooty shearwaters are common in Kodiak waters in summer but normally are found offshore over the continental shelf break during the winter months.

Wintering pelagic seabird surveys were conducted aboard the Refuge vessel *Ursa Major* for the fourth year. The purpose of these surveys is to obtain baseline data which will form the basis for future monitoring efforts of the Refuge ecosystems. West side bays were surveyed from November 9 to November 16. The east side of Kodiak Island was covered from December 4 to December 12. A total of 241 transects was completed with 20,378 total birds counted. This is down from the 4-year high count of 25,547 in 1981 but comparable to 1979 (20,650) and 1980 (16,382) counts. Surface sea water temperatures averaged approximately 1.5 to 2.0° C. colder during the 1982 surveys than in past years. A summary of the 1982 survey data is presented in Table No. 3.

Table No. 3 1982 PELAGIC SEABIRD SURVEY DATA

<u>Survey Area</u>	<u>Surface Area</u>	<u>No. Transects</u>	<u>Km² Area Surveyed</u>	<u>% of Total Area Transects</u>	<u>Total Birds Counted</u>	<u>Birds/Km²</u>	<u>Est. No. Birds in Survey Area</u>
Uyak	305	64	53.12	17.0	3,852	72.52	22,100
Uganik, Terror Bays	277	54	44.82	16.0	3,966	88.49	24,500
Whale Pass/ Afognak Straits	82	11	9.17	12.0	3,973	433.26	35,500
Eastern Stikalikak Straits/ Kilūida Bay	287	45	37.50	13.1	3,644	97.20	27,900
Western Sitkalidak	327	50	41.10	12.6	2,409	58.61	19,200
All Areas		241	200.30		20,378	101.70	129,200

Figure 4 BIRD DENSITIES OF COMPLETED KODIAK
SEABIRD SURVEY TRANSECTS

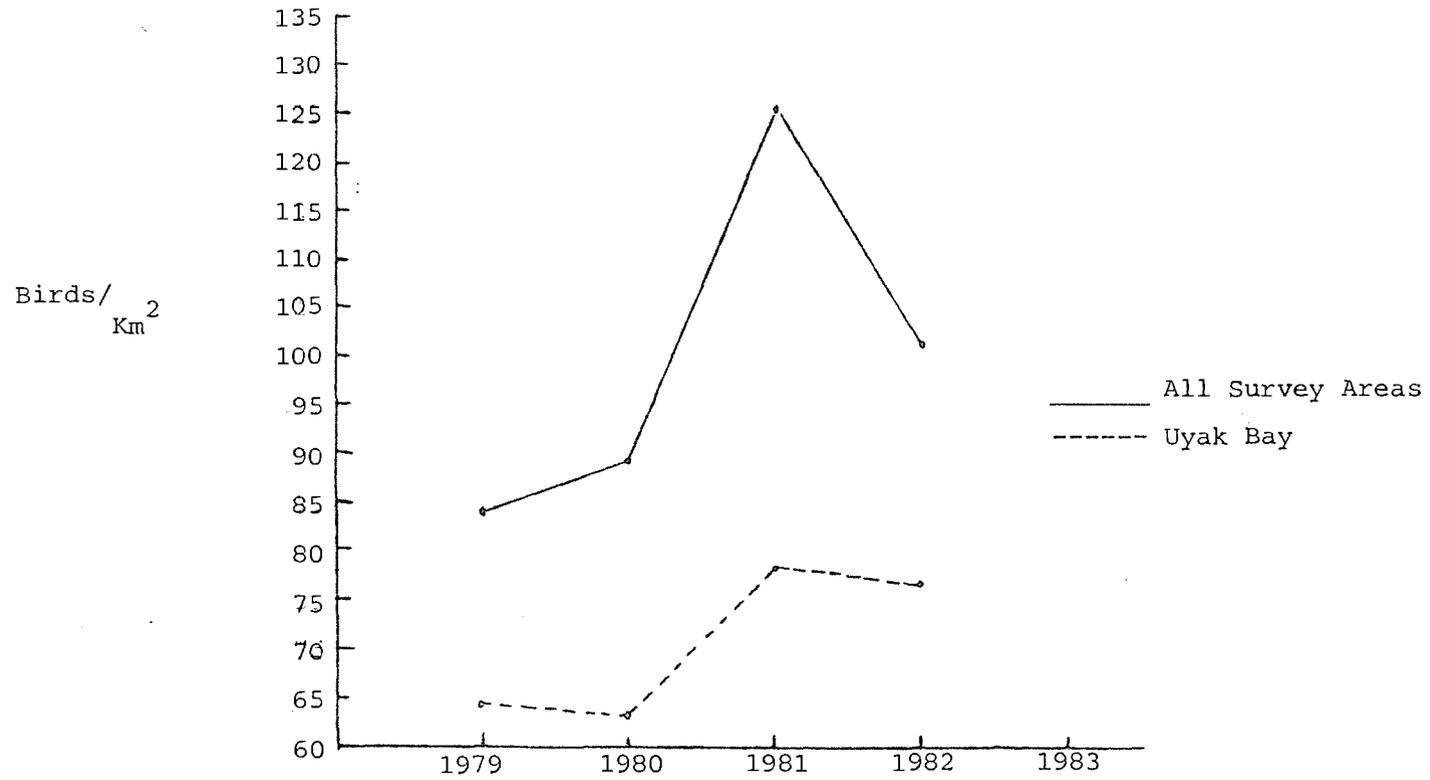


TABLE 4 KODIAK ISLAND FALL SEABIRD SURVEYS 1979-82

TOTAL BIRDS AND MEAN DENSITIES OF COMPLETED TRANSECTS

<u>Survey Area</u>	<u>1979</u>		<u>1980</u>		<u>1981</u>		<u>1982</u>	
	<u>Total Count</u>	<u>Mean Density Birds/Km²</u>						
Uyak	3,793	64.0	3,439	62.50	4,173	78.2	3,852	72.5
Uganik, Terror Bays	4,181	84.5	2,105	47.10	4,192	97.1	3,966	88.5
Whale Pass/ Afognak Straits	4,426	334.3	3,859	311.00	10,855	697.6	3,973	433.3
Eastern Sitkalidak Straits	4,701	103.3	4,313	108.82	3,920	105.8	3,644	97.2
Western Sitkalidak Straits	3,549	93.3	2,666	75.83	2,407	67.2	2,409	58.6
All Areas	20,650	84.2	16,382	89.40	25,547	103.5	20,378	101.7

Whale Pass/Afognak Straits again had the highest total number of birds counted (3,973) and mean density (433.26 birds/km²) of any of the surveyed areas. The presence of two skiffs of deer hunters along the shoreline is believed to have inflated the number of birds occurring in the transects. Many birds were flushed from along the shoreline and moved into the middle of the channel prior to the start of the count.

Although down slightly for the second consecutive year, Eastern Sitkalidak Straits/Kiluida Bay area had the second highest mean density with 97.20 birds/km². Also for the second year, Western Sitkalidak Straits had the lowest mean density of 58.61 birds/km².

A comparison of the 1979 to 1982 mean bird densities and total birds counted for all the Kodiak survey areas is presented in Figure No. 4.

It appears that mean densities of the Uyak Bay area reflect trends and fluctuations found in the results from all Kodiak survey areas. Although not shown, several species such as grebes, cormorants, mures, scoters, goldeneye, harlequin ducks, and pigeon guillemots appear to be relatively stable in numbers from year to year. The frequency of occurrence of these species in Uyak Bay are similar to the total Kodiak survey area (see Table No. 4). Indications are that the aforementioned species in the Uyak Bay area have potential for use in long term monitoring of Kodiak Island wintering seabird populations. An additional year of data will be collected before any extensive analysis will be attempted.

6. Raptors

During FY83 "Bicentennial Year of the American Bald Eagle", the entire Refuge was surveyed to determine the nesting bald eagle population. The survey was completed in the Refuge Super Cub (N720) piloted by ARM/Pilot Vivion with Biological Technician Zwiefelhofer acting as observer. Approximately 27 hours of flight time was expended on May 13, 15, 19, 20, and 25.

A total of 387 nests was tallied with 194 active and 193 inactive nests. Of the 194 active nests, 124 were tree nests and 70 were located on the ground (cliffs, sea stacks, etc.), while the inactive nests consisted of 162 tree nests and 31 ground nests. Four hundred and one adults and 32 sub-adult bald eagles were also counted during the survey. Two immature golden eagles were also observed, one on the Karluk River and the other in the pass between Viekoda/Terror Bays.

A late cool spring delayed initiation of nesting in the interior portions of Kodiak Island causing an increased use of coastal habitats.

The follow-up productivity portion of the nesting survey was not done.

The initiation of a long awaited bald eagle migration and movements study also occurred in FY82. More on this study can be found in the research portion of this report.

Ten dead bald eagles were found and reported to Refuge personnel during 1982. Five whole carcasses were recovered with the remaining dead birds consisting mostly of feathers and skeletal remains. Three of the specimens were shipped

to the National Wildlife Health Lab in Madison, Wisconsin for necropsy in an attempt to discern cause of death. The probable cause of death of two of the eagles was diagnosed as electrocution, which is highly unlikely. One eagle was found at least 15 miles from the nearest source of electricity while the other was approximately 2 miles from an electrical source. It is clear that diagnosing a probable cause of death in many cases is not an easy task particularly when specimens are not fresh which is the usual case. All other bald eagle carcasses and remains were shipped to Pocatello, Idaho.

The Terror Lake Hydroelectric Project area which is partially located on Refuge lands was surveyed for nesting raptors in accordance with FERC licensing requirements. The results can be found in the research portion of this report.

Four immature golden eagle sightings were made on Kodiak Island during 1982 in addition to the two seen during the bald eagle nesting surveys. Two of these were observed in the Terror Lake Project area on July 21 and September 8 by FWS personnel. Another was observed on Whale Island in Marmot Bay by Ron Painter, a local deer hunter, on October 2. The fourth observation was made in Karluk River Lagoon by staff personnel radio tagging steelhead trout on October 21 to 25.

A short-eared owl was observed near the Karluk Lake outlet on May 19 while conducting bald eagle nest surveys.

7. Other Migratory Birds

Several large flocks of wintering pine siskins have been seen this fall. The first, a flock of 200, was observed on October 9 near the Buskin River Headquarters site. Both observations were by staff personnel.

8. Game Mammals

a. Brown Bear

General

Kodiak NWR has a major responsibility for the welfare of Kodiak Island's renowned brown bears. Information gathered from management surveys, research, and communication with the public and other resource management agencies is used by Refuge personnel to assess and administer human activities that impact bear habitat. The following are highlights of 1982 bear-related activities and observations on the Refuge.

- High numbers of bears were observed during population trend surveys as well as by persons on foot. In the fall, numerous sightings and a high incidence of bear/human conflicts raised speculation that a near total berry crop failure caused bears to range widely in search of food. One animal chose to get close to the action and spent several days roaming around the Refuge Headquarters complex.
- The sport harvest of bear was slightly above average and mortality from non-sport causes was excessive. Total mortality (118) on Refuge land was the highest recorded over the past seven years.

- An Alaska Department of Fish and Game (ADF&G) biotelemetry study was initiated to assess impacts of the Terror Lake Hydroelectric Project on bear.
- A bear research project, administered by the Denver Wildlife Research Center, was established.

The bear research position represents a new approach to improved management of brown bear on Kodiak NWR. Objectives of the position are twofold: 1) develop a brown bear research program directed at management needs of the Refuge, and 2) interact closely with the Refuge staff and function in an advisory capacity to the Refuge Manager. The project was initiated in mid-June and subsequent activities included establishment of an office at Refuge Headquarters, acquisition of equipment, familiarization with and participation in Refuge activities, review of reports and data in Refuge files, and establishment of communication lines with cooperators.

The direction and objectives of a bear management and research program for Kodiak NWR are still in the formative stages, although some needs and priorities are apparent. These include analysis of bear survey data together with evaluation of aerial survey techniques employed by the Refuge, summary and analysis of bear harvest data, research aimed at a better understanding of habitat use in key areas of the Refuge, and increased cooperative work with Alaska Department of Fish and Game.

Surveys

Aerial surveys this year were characterized by generally good weather and high counts of bear (Table Nos. 5 and 6). Those two aspects certainly are related, because good weather allowed completion of many flights. However, we also observed a high number of bear per flight.

Three complete and two partial aerial surveys of the Uganik and Uyak alpine areas were conducted from July 31 to August 12. The average count for complete surveys was 83 bear. The proportions of cubs (34%) and yearlings (12%) sighted were comparable to those recorded during an intensive study of the Uganik area in 1973-75 (cubs, 35%; yearlings, 15%). By August 12, most bears had departed the alpine habitat.

Bears concentrated along salmon-spawning streams in high numbers and for an unusually long period of time in 1982. The first notable concentration occurred in early July on a segment of Dog Salmon Creek where rock islands restrict movement of sockeye salmon. An overflight on July 12 revealed 21 bear in an area of roughly one acre. Reports from other observers suggested that more than 30 bear were feeding at the site. This is the first year such a large gathering has been noted in that area and it could indicate the development of a new feeding pattern. The sockeye run in Dog Salmon is man-made and has reached high levels in recent years (see section on Fishery Habitat). Maybe the bears are starting to catch on to the easy pickings.

TABLE NO. 5 COMPARISON OF AERIAL STREAM COUNTS
OF BROWN BEAR, 1978-1982

<u>Year</u>	<u>No. of Complete Surveys</u>	<u>Single Bear</u>		<u>Maternal Female</u>		<u>Yearling</u>		<u>Cub</u>		<u>Total No.</u>
		<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	
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	151	17	207	23	107	12	894
Means			51		16		23		10	

TABLE NO. 6 COMPARISON OF AERIAL ALPINE COUNTS
OF BROWN BEAR, 1978-1982

<u>Year</u>	<u>No. of Complete Surveys</u>	<u>Single Bear</u>		<u>Maternal Female</u>		<u>Yearling</u>		<u>Cub</u>		<u>Total No.</u>
		<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	<u>No.</u>	<u>%</u>	
1978	1	40	29	30	22	24	17	44	32	138
1979	1	20	22	22	24	18	20	30	33	90
1980	2	87	52	27	16	32	19	20	12	166
1981		----- No Counts -----								
1982	3	94	33	60	21	35	12	96	34	285
Means			35		20		16		30	



Bears on Dog Salmon Creek. TC

Stream surveys, flown along traditional routes between July 20 and August 19, provided almost 900 bear observations (see Table No. 5). The bulk of the sightings were recorded in 7 complete surveys that yielded an average count of 102 bear. Family groups accounted for 52% of the sightings this year, compared to 45% and 34% in the 1981 and 1980 surveys respectively. The aerial surveys together with other observations indicated that heavy bear use along streams extended from mid-July into the first week of September. The prolonged feeding on salmon may have been related to poor berry production.

Although no quantitative data were gathered, the very distinct lack of berry production this year was noted by nearly everyone. Even red elderberry, which is normally a major producer of bear food, was dramatically low in production this year.

The precise extent of the bear's reliance on berries is not known except that the bears do extensively exploit this food resource. Some researchers believe berries to be coequal in importance with salmon in the bear's diet. In any case, several unusual behavioral modifications in bears this year were speculated to have been the result of the lack of berry production.

During August 3 to 5, an observation camp was established on a ridge above Connecticut Creek to collect ground-truthing data for aerial surveys. As weather permitted, ground observers made one count per hour. For three sets of data where a ground count was made less than one hour preceding an aerial count, the average sightings were 18 and 20 for ground and air counts, respectively. However, over the three day span, the ground observers were able to

identify approximately 30% more bear than could be determined from the aerial counts (see Table No. 7).



Observation camp on Connecticut Creek. EH

Mortality

Documented bear mortality on Kodiak NWR in 1982 was 118 and just one more than that recorded in 1981 (see Table No. 8). Sport harvest (108) accounted for 92% of the mortality on Refuge land. The female component of the harvest, a statistic often used to indicate population stability, was 31%. This compares favorably with the 1976-81 average of 36%. As a general rule, increasing levels of female kill are regarded as an indication of overharvest.

The 1982 spring bear season extended from April 1 to May 15 and produced a Refuge harvest of 76 animals. This kill represents a 16% decline from the 1981 spring harvest. The high 1981 kill was due in large part to exceptionally good hunting weather, whereas 1982 experienced a more typical wet and cold spring and a correspondingly lower kill.

Thirty-two bear were killed on Refuge land during the 1982 fall season (October 25 to November 30), compared to 25 for the same period in 1981. Bear hunters enjoyed better than average weather this fall.

Table No. 7 Minimum number of brown bear observed in ground
and aerial counts along Conneticut Creek, August
3 to 5, 1982.

	<u>Single Bear</u>		<u>Maternal Female</u>		<u>Yearling</u>		<u>Cub</u>		Total
	No.	%	No.	%	No.	%	No.	%	
Aerial	8	30	5	19	8	30	6	22	27
Ground	11	31	7	19	10	28	8	22	36

Table No. 8 Sources of Brown Bear
Mortality on KNWR, 1976-1982

<u>Year</u>	<u>Sport</u>	<u>Sources</u>		<u>Total</u>
		<u>DLP</u>	<u>Other*</u>	
1976	88	-	2	90
1977	98	3	-	101
1978	106	2	-	108
1979	99	3	2	104
1980	101	5	1	107
1981	112	3	2	117
1982	108	7	3	118

*Includes unknown causes and accidental study mortalities.

Harvest levels were within quota guidelines established for two of the three ADF&G management subunits that include most of Kodiak NWR. However, it should be noted that in April 1982, the Alaska Board of Game raised the quota for subunit 4 from 55 to 60. Otherwise, the quota for subunit 4 also would have been exceeded in 1982. Current subunit quotas and their respective 1982 sport harvests are as follows:

	<u>Quota</u>	<u>Sport Harvest</u>
Subunit 3	20	17
Subunit 4	60	58
Subunit 5	<u>30</u>	<u>33</u>
Total	110	108

It is important to recognize that the above harvest figures do not take into account 10 non-sport mortalities that occurred in the three subunits.

Non-sport mortality and especially the defense of life and property (DLP) kill, reached a dangerously high level in 1982. One DLP occurred at a cannery, another in Old Harbor village, two at tent or cabin sites, and three were attributed to deer hunters. Some DLP's are unavoidable, but many are caused by careless action on the part of humans. Deer hunters, for example, create a serious problem by leaving their kill and then returning to find that a bear has claimed the carcass. Refuge and ADF&G biologists are presently considering ways of preventing the DLP situation from getting out of hand.

Cooperative Work

Refuge personnel assisted the ADF&G during two capture and tagging operations associated with the Terror Lake Hydroelectric Study. Seventy-six bear were handled, including 46 that were fitted with radio-transmitters. We also accompanied State biologists on several field trips as part of the study. We expect this research to provide valuable data on bear ecology in the northeast sector of Kodiak Island. By year's end, a report had not yet been completed, hence the absence of this study in Section D-5.

Frequent discussions were held with ADF&G biologist regarding the scope and direction of the Refuge's bear research project, sport harvest development, and other bear related matters.



State and Refuge biologist marking brown bears
for the TLHP Study. VB

b. Sitka Blacktail Deer

The Refuge deer population remained at a very high level through 1982 and probably reached a new overall high. Very little overwinter mortality was noted, although heavy snowfalls occurred in April. Beach surveys conducted by ADF&G along 21 miles of shoreline in northern Kodiak areas and on other islands tallied only 6 carcasses. Refuge staff noted no mortality along several beaches flown incidental to other duties. Very few reports of weak or dead deer were heard from the public and most of these were from off-refuge areas. Additionally, deer observed by ADF&G during aerial surveys on northern Kodiak Island in April and May appeared in good condition, as did those observed during Refuge flights. However, since deer were seen from late winter through spring at elevations up to the alpine, it seems possible that some animals were caught by the late heavy snowfalls. These mortalities would probably go unknown on Kodiak unless many animals perished. No incidents of this type are known for this year, but we speculate that under certain conditions, significant deer mortality could occur.

Qualitatively, fawn survival during the spring appeared good. Numerous fawns were seen during flights on the Refuge during midsummer. Hunter killed deer examined along the west side in late October - early November showed large amounts of body fat. As of late December, deer are still found at altitudes up to the alpine, reflecting the mild winter experienced so far. Overall condition in animals taken remains excellent.

Hunting mortality for 1982 is not well known at this time since the season extends through January 31. Hunting effort has shown another large increase this year by hunters from throughout Alaska and it appears that the kill will likewise be substantially increased.

During the 1981-82 season, a telephone survey of local residents by ADF&G provided the only harvest data available. They estimate for Unit 8 (the entire Kodiak archipelago) extrapolated from 144 hunting license purchasers (6% sample) resulted in 3,190 deer composed of 74% males and 26% females. Further, local residents "probably comprised about half the hunters afield and they probably took about half the kill. . .". The statewide questionnaire used in 1980-81 estimated 5,347 deer. Using this figure as a basis and assuming that hunting pressure from mainland Alaska increased while the local effort remained the same, as shown by the telephone survey, ADF&G estimated the 1981-82 kill at 5,500 to 6,000 deer. This figure maybe conservative, based on the number of mainland hunters we talked to and knew of during the season. Approximately half, or 2,250 to 3,000, of these deer are estimated to be from the Refuge.

ADF&G estimates the 1982-83 season currently in progress has perhaps 25% more mainland hunters than 1981-82. Thus, if success rates remain similar, 2,800 to 3,750 deer will be taken by January 31 on the Refuge.

Better information should be available for the 1982-83 season than for the 1981-82. The ADF&G Unit 8 Biologist has prepared a harvest survey which is being distributed by local charter services and other means in the Kodiak area in an effort to gather data on mainland hunters. Very preliminary results from just over 100 questionnaires indicate a 3 deer average among successful hunters -- the same as the telephone survey done in 1981-82. Thus, indications are that increasing the bag limit from 5 to 7 deer over much of Unit 8 and most of the Refuge may not greatly affect overall kill. The 1982-83 kill will be fully reported in the 1983 narrative when survey data will be available.

Although the deer kill has increased substantially each year during the past 5, the population continues upward in most areas. Only in those local areas near some Refuge cabins and at a few other easily accessible areas on the Refuge has any effect been noted in the population. Cost and difficult access prevent hunting in many areas. If the relatively mild, snow free winters continue, the deer population will continue to increase. There is no way to effectively manage the deer population through hunting on most of the Refuge area.

In response to the increased population, deer seasons and bag limits have been raised steadily in Kodiak. The Refuge bag limit has gone from 4 in 1980 to 7 over most of the Refuge at present (see Map No. 2). The current season is August 1 through January 31 of the following year for antlered deer and September 15 through January 31 for antlerless deer.

c. Mountain Goat

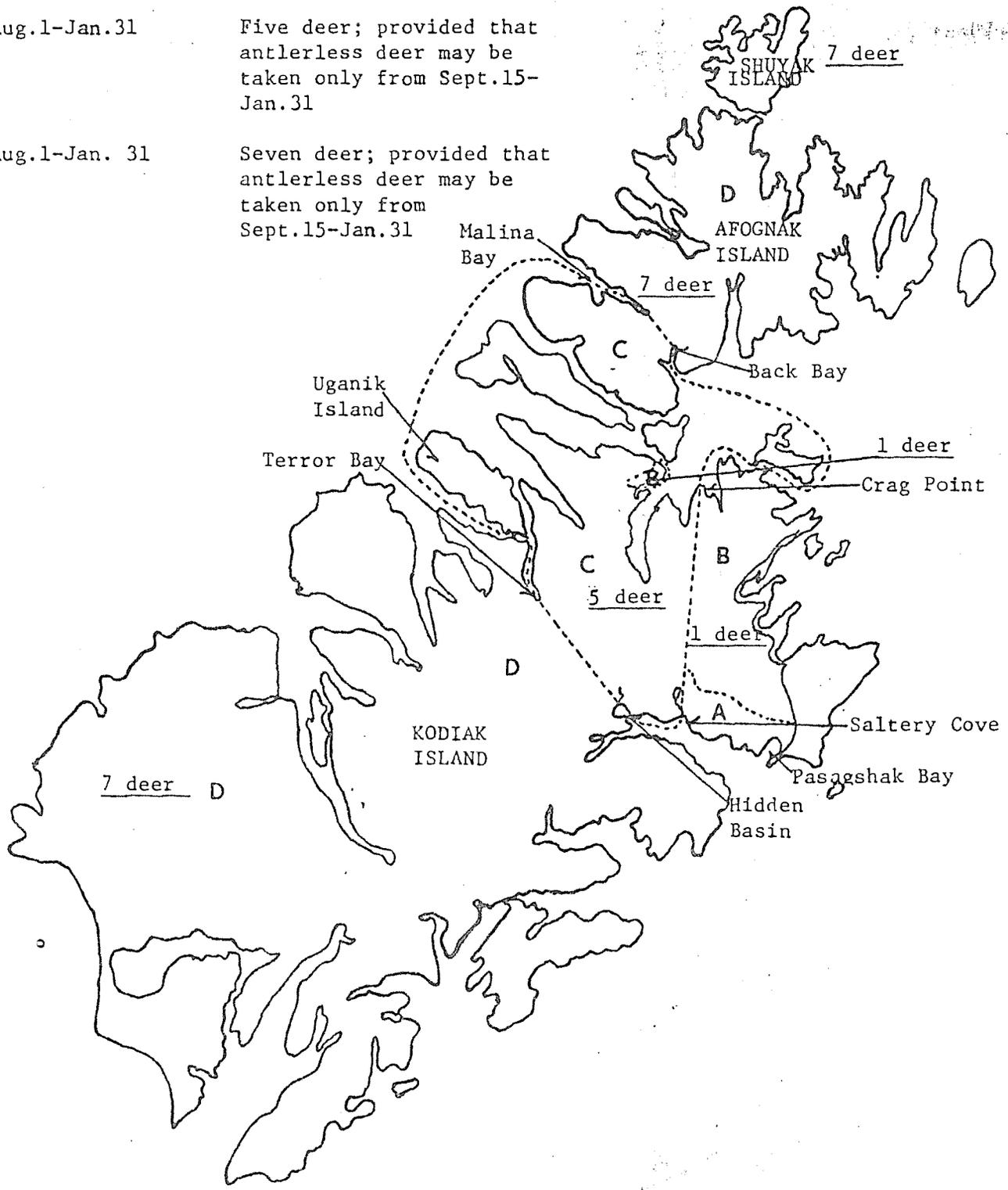
The mountain goats introduced into the Crown Mountain area in 1952-53 continue to spread over the Refuge, though most of the population still exists in off-Refuge areas. Goats have been reported by various persons from areas ranging as far south as Kaiugnak Bay on the east side and Uyak Bay on the west side. Refuge and ADF&G staff have seen goats near the head of Uyak Bay and between Kiliuda and Midway Bays. The largest group consisted of 13 adults and 7 kids seen near the head of Uyak Bay. If the current expansion continues, all suitable habitat on the Refuge may in time be occupied.

A Aug. 1-Jan. 31 One deer provided that antlerless deer may be taken only from Oct. 1-Oct. 31

B Aug. 1-Oct. 31 One deer provided that antlerless deer may be taken only from Oct. 1-Oct. 31

C Aug. 1-Jan. 31 Five deer; provided that antlerless deer may be taken only from Sept. 15-Jan. 31

D Aug. 1-Jan. 31 Seven deer; provided that antlerless deer may be taken only from Sept. 15-Jan. 31



Alaska Department of Fish and Game regulations effective in the fall of 1982 increased the number of goat permits from 36 to 57 in the four hunt units on Kodiak Island. One permit area boundary was also extended to include more area, predominately on the Refuge, on the south. The ADF&G Area Biologist's prediction is that the kill will eventually be increased from 10 to 17-20 animals by these changes.

The exact goat kill on the Refuge is impossible to determine for this year since hunt units "straddle" the Refuge boundary and kill locations were not mapped precisely. Overall, 14 animals consisting of 7 males, 6 females, and 1 of unknown sex were taken in Unit 8. The maximum possible Refuge kill was 6 - 2 males, 3 females, and 1 of unknown sex. The probable kill was 5 or less.

d. Roosevelt Elk

Reports of elk sightings continued to come in from residents in Larsen Bay, Zachar Bay, and other west side areas. Apparently, the "3 to 7" animals reported last year remain. No kills are known to have taken place this year and reported numbers remain in the same range. No information is available for the Afognak portion of the Refuge.

e. Beaver

Beaver continue to inhabit most of the available habitat on the Refuge, including some alpine lakes and streams which appear very marginal. Although no extensive surveys were flown in 1982, incidental observations indicate that no major changes occurred in the population.

Very little trapping effort was reported. Access is difficult in most places and fur prices remained extremely low. Refuge trapping reports show 4 trappers took 22 beaver during the year.

f. Otter

Otter are found throughout the Refuge in suitable habitats. Population density is known only from trapping records, thus, the areas with good access near saltwater bays appear to have the greatest populations.

Otter are probably the most susceptible furbearers on Kodiak to trapping pressure. Since fur prices and effort during the past few years have been relatively high, Game Management Unit 8 has been divided by ADF&G into 25 subunits to better monitor the take. Thirteen of these subunits lie on the Kodiak Island portion of Kodiak NWR and one subunit includes the Afognak addition. As is usual, these areas are marked by bays and physical features, not political boundaries. Therefore, subunits do not exactly correspond to the Kodiak NWR boundary.

All otter must be sealed, therefore harvest figures are relatively complete. Otter sealed for the Refuge area during the 1981-82 fur season include 85 males, 76 females, and 2 of unknown sex for a total of 162. This is down 11.5% from the 1980-81 take of 183.

Otter prices fell considerably before the 1982-83 trapping season began, therefore, the kill is expected to be lower.

Efforts by both Refuge staff and ADF&G are currently underway to better characterize the otter population from trapper supplied skulls. An aging technique based on skull characteristics is being evaluated as specimens become available.

g. Red Fox

Found in all its color phases, the fox is common throughout Kodiak NWR and numerous in many areas. Incidental observations in the field and reports indicate normal fox populations. No diseased animals were seen or reported this year. Rabies has never been documented on Kodiak Island.

Red fox are taken by both traps and gun, with many animals taken by rifle. Refuge trapping reports show a total of 88 fox on the Kodiak Island area and 17 on the Afognak area for a total of 105 on Kodiak NWR. This is undoubtedly a very conservative figure.

h. Reindeer

Reindeer were introduced for husbandry in 1924 and herded until about 1970 when the herd consisted of about 1,500 animals. The herd has declined and now consists of an estimated 300 to 400 animals.

A reindeer survey was flown on January 19 in de Havilland Beaver N765. All suitable habitat between Grant's Lagoon and Olga Bay was covered. A total of 202 animals was seen. Sex and age classification was not possible but several of last year's calves were identified. This is somewhat of a change since previous surveys have not discovered any calves, indicating very poor calf survival.

Currently, reindeer are hunted under ADF&G regulations which give a 365 day no bag limit season. Number of animals killed by hunters in 1982 is not known.

9. Marine Mammals

Although very few marine mammals occur on the Refuge lands, at least 15 species occur in adjacent waters. Sea otters are present in sizeable numbers in several areas including Viekoda Bay, along the Shelikof Strait side of Uganik Island, and commonly along the shorelines of the Afognak addition and Ban Island.

Harbor seals and Stellar's sea lions, Dall and harbor porpoises, along with grey, minke, humpback, and fin whales have been frequently seen during boat trips. Less frequently seen are killer whales, the Pacific blackfish, and other cetacean species are also listed as occurring here, but were not recorded in 1982.

During winter seabird surveys conducted this year near Kodiak, Afognak, and Raspberry Islands, 8 species of marine mammals were encountered. Since these surveys are not designed to count marine mammals, the numbers shown in Table No. 9 probably do not represent relative abundance in these waters. Further information on survey procedures is found under the marine bird category.

TABLE NO. 9
MARINE MAMMALS ENCOUNTERED DURING 1982 SEABIRD SURVEYS

<u>Species</u>	<u>No. Observed</u>
Stellar's sea lion	29
Sea otter	166
Harbor porpoise	46
Dall's porpoise	61
Killer whale	19
Fin Whale	6
Grey Whale	16

11. Fishery Resources

Introduction

The freshwater fishery habitat of Kodiak NWR encompasses over 300 streams and 270 lakes, some of which provide important spawning and/or rearing habitat for eight species of native salmonids. These include: king salmon (Onchorhynchus tshawytscha), coho salmon (O. kitsutch), chum salmon (O. keta) pink salmon (O. gorbuscha), red salmon (O. nerka), alpine charr (Salvelinus aplinus), Dolly Varden (S. malma), and rainbow/steelhead trout (Salmo garidneri).

Management of the Kodiak fishery resources historically was by the Bureau of Commercial Fisheries, but after Statehood in 1958, the State of Alaska assumed full management responsibility for all fishery resources in the State. Management of the Kodiak salmonid resources is conducted by the Alaska Department of Fish and Game (ADF&G), Commercial Fish (CF) and Sport Fish (SF) Divisions. In addition, the ADF&G Fisheries Rehabilitation, Enhancement and Development (FRED) Division, established in 1972, has on-going projects targeted for enhancement of sockeye stocks on the Kodiak NWR.

The Commercial Fishery

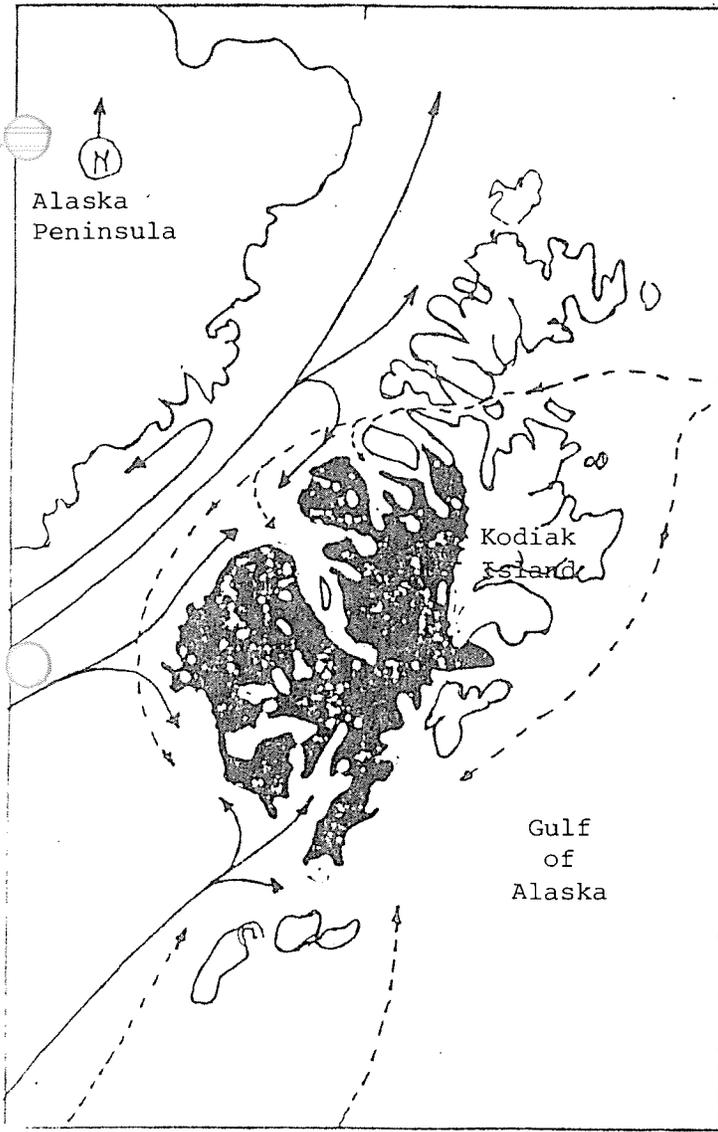
Refuge fishery resources contribute to the support of a broad based Kodiak area commercial salmon fishery having a preliminary estimated total value to fishermen in 1982 of approximately 17.5 million dollars. The dominant commercial species in dollar value and numbers listed in descending order are: pinks, reds, chum, coho, and king salmon.

Commercial fishing gear included purse seines, beach seines and set gill nets in the headland, bay, and inlet waters on Kodiak Island. General migration patterns of adult red and pink salmon around Kodiak with corresponding harvest areas near the Refuge are illustrated in Figure 5.

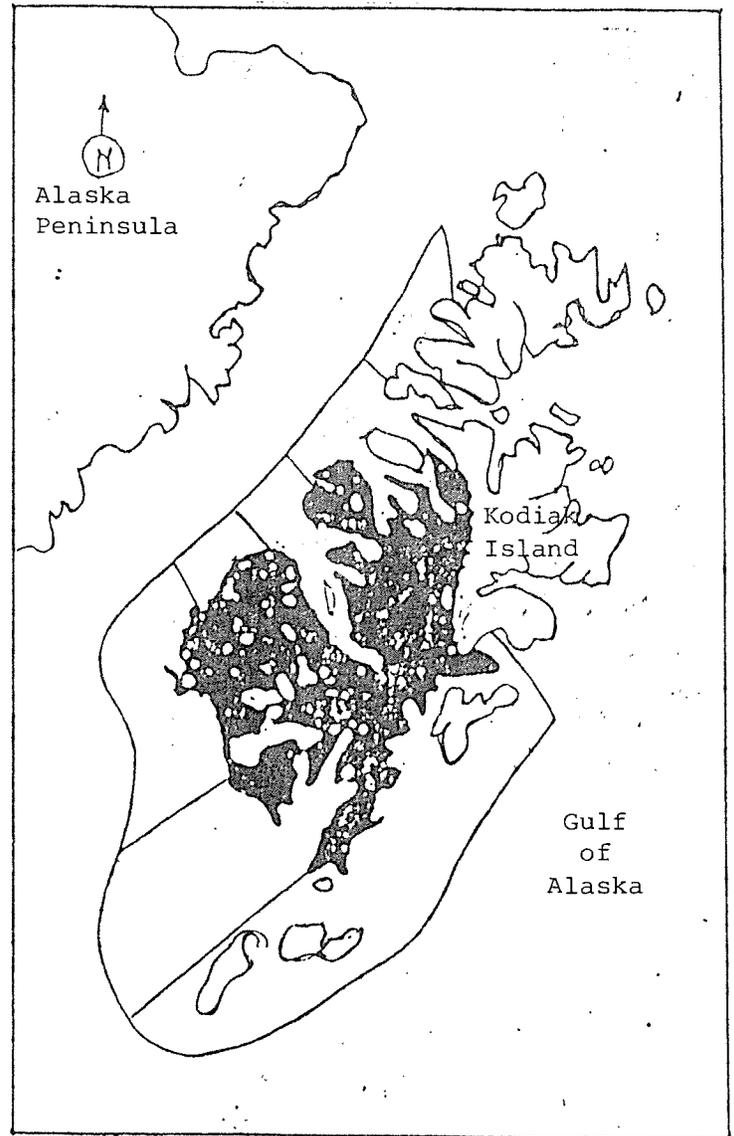
The preliminary ADF&G-CF estimate of total salmon harvest in the Kodiak area by all gear types from June through July 1982 is approximately 10,891,952 fish (see Figure 6) with an ex-vessel value of approximately 17.5 million dollars. Estimated Refuge based salmon stock harvest during this period was approximately 7,432,618 fish with an estimated ex-vessel value of 11.68 million dollars (see Table No. 10). Refuge stocks in 1982 contributed approximately 68 and 67 per cent of the total numbers and ex-vessel value respectively, of the area-wide Kodiak harvest. It was projected that the pink salmon return to Kodiak streams in 1982 would be substantial. However, an increase of only 13 per cent over the 1981 pink harvest was noted for 1982 (see Table No. 11) due to a strike by predominately purse seiners from July 11 to July 31 which resulted in excessive pink salmon escapement into some of the major systems such as the Karluk where approximately 2.23 million pinks flooded the system.

Adult salmon escapements to stream and river systems on the Refuge in 1982 were monitored through ADF&G-CF Division wier counts and aerial surveys. Preliminary composite escapement numbers are presented in Table No. 11.

The species specific catch-to-escapement ratios computed for Refuge based stocks in Table No. 11 are for illustrative purposes only and do not reflect true values since escapement figures are a composite of known data on some streams and peak counts on others. Overall, salmon escapements during 1982 into most streams met or exceeded desired ADF&G minimum goals for all species except



A.



B.

Figure 5. A) Hypothetical ocean migration patterns of some red (solid lines) and pink (dashed lines) salmon stocks destined for spawning areas on the Kodiak NWR.

B) ADF&G statistical commercial salmon fishing areas where Refuge based salmon stocks are harvested.

Kodiak NWR is defined by dark shading.

Table No. 10 Estimated numbers, species composition, and value of commercially caught salmon by gear type during 1982 calculated to be of Kodiak NWR origin.

PURSE SEINE BEAR									
ADFLG STATISTICAL HARVEST AREAS									
SPECIES	251	253	254	255	256	257	258	TOTAL	EX-VESSEL VALUE (\$)
KINGS	0	93	35	67	270	30	10	513	3880
REDS	373	24301	3791	33276	133131	64183	3332	284807	1416915
COHO	1068	23107	3660	11201	3944	17475	16810	78073	510374
PINK	4811	643273	100260	886733	2271268	346777	266602	4519724	3708004
CHUM	315	153153	77529	3782	23535	76874	198255	535445	1482810
TOTALS	7367	844129	185275	937059	2452168	505339	487225	5418562	7121983

SET NET BEAR									
SPECIES	251	253	254	255	256	257	258	TOTAL	EX-VESSEL VALUE (\$)
KINGS	ERROR	0	0	0	0	0	0	0	1680
REDS	0	92602	77949	99	34	409694	0	580453	2908052
COHO	0	9413	9633	13	79	11874	0	31014	126504
PINK	0	581446	451136	237	958	139545	0	1173342	1004079
CHUM	0	48167	75702	8	193	2227	0	126377	371248
TOTALS	ERROR	731708	614520	354	1264	563340	0	1911186	4411563

BEACH SEINE BEAR									
SPECIES	251	253	254	255	256	257	258	TOTAL	EX-VESSEL VALUE (\$)
KINGS	0	0	3	0	0	0	0	3	15
REDS	0	212	135	91	258	1438	69	2203	13119
COHO	71	3293	157	220	19	244	301	4325	14872
PINK	908	8198	6808	1601	24989	35079	813	78396	65042
CHUM	0	13368	1106	2	0	2469	998	17943	22895
TOTALS	999	25071	8209	1914	25266	39230	2181	102870	145963

COMPOSITE SUMMARY ALL BEAR		
SPECIES	NUMBER	EX-VESSEL VALUE (\$)
KINGS	516	3575
REDS	867463	4338086
COHO	113412	631750
PINK	5771462	4777145
CHUM	679763	1906953
TOTAL	7432610	11679509

(1) ... DATA COMPILED FROM ADFLG PRELIMINARY 1982 CATCH STATISTICS / EX-VESSEL VALUES PRELIMINARY PROJECTIONS OF ACTUAL VALUE.

Karluk River red salmon where total escapement was only 36 per cent of the desired minimum season goal of 160,000 adults.

Table No. 11 Estimated catch/escapement for Kodiak NWR based salmon stocks in 1981 and 1982.¹

<u>Species</u>	<u>1981</u>			<u>1982</u>		
	<u>Catch</u>	<u>Escapement</u>	<u>Approx. Ratio</u>	<u>Catch</u>	<u>Escapement</u>	<u>Approx. Ratio</u>
King	667	15,615	1:23	516	7,952	1:15
Red	337,834	1,159,431	1:3	867,463	1,316,273	2:3
Coho	40,596	38,347	1:1	113,412	464,412	1:4
Pink	5,095,643	235,536	20:1	5,771,462	4,070,690	3:2
Chum	<u>509,363</u>	<u>271,845</u>	2:1	<u>679,765</u>	<u>429,175</u>	3:2
Total	5,984,103	1,720,774		7,432,618	6,288,502	

¹Data compiled from ADF&G preliminary 1982 catch statistics.

Sport Fishing

The major recreational sport fishery for salmonids on the Refuge targets on king, coho salmon, and steelhead trout stocks on the Karluk and Red River systems and to a lesser extent the Uganik River system. The sport fishery within the Refuge during 1982 occurred primarily on the Karluk River for king salmon in June through August and coho salmon/steelhead trout in September through November.

During 1982, a cooperative creel census by ADF&G and the Refuge was conducted on the Karluk system. A Refuge seasonal aide spent most of July in the Portage area. In addition, a voluntary log book was placed in the Karluk Portage recreational cabin for steelhead fishermen during November. Preliminary angler use and sport harvest estimates compiled by ADF&G-SF for the 1982 season are presented in Table No. 12.

Table No. 12 Sport fish harvest estimates for Karluk River during 1982.¹

<u>Location</u>	<u>Dates</u>	<u>Kings</u>		<u>Coho</u>		<u>Steelhead</u>	
		<u>Kept</u>	<u>Released</u>	<u>Kept</u>	<u>Released</u>	<u>Kept</u>	<u>Released</u>
Lagoon	5/31-8/20	-	-	-	-	28	117
	8/24-9/24	-	-	286	4787	-	28
Portage	6/12-7/15	434	1187	-	-	-	10
	10/2-11/1	<u>-</u>	<u>-</u>	<u>2</u>	<u>158</u>	<u>51</u>	<u>518</u>
Total		434	1187	288	4945	88	673

¹Preliminary 1982 ADF&G estimates.

The 1982 escapement into the Karluk River was 7,490 kings and 14,902 coho salmon. Although the king salmon count is accurate, the wier count of coho salmon on the Karluk does not reflect the total number of spawners because a majority entered the system after the wier was removed in mid-September. The 1982 escapement of king salmon was 96 per cent of the 1976-81 average. The count of king salmon into the Red River system in 1982 is not accurate due to the ADF&G wier being washed out during the peak of the king immigration. Total escapement of steelhead trout into both system is unknown.

Guide service activities for sportfishermen on the Refuge during 1982 appeared to be on the increase compared to previous years. Most of the major guide activities were concentrated on the Karluk River and targeted on king salmon. One of the major guide activities on the river during 1982 centered around a French based operation which set up camp on the Karluk River in 1982 under special use permit from both Koniag Inc. and the Refuge. Estimates for the number of king salmon caught and released by this one guide in 1980, 1981, and 1982 on the Karluk was 201, 408, and 472 adult spawners respectively. Although these figures represent a relatively small portion of the available fish, this is only one group on the river and additionally substantial numbers of sport fishermen camp in both the Karluk Portage and the Karluk Lagoon. Although the Karluk Lagoon is off Refuge lands, the impact is still directed towards Refuge based king salmon stocks. Anglers and guides operating in the Karluk Lagoon have expressed a desire to expand or relocate their activities into other systems to avoid some of the overcrowding occurring at both the Portage area and the Karluk Lagoon. The main interest has centered around the Red/Ayakulik River system which, because of difficult accessibility to its terminus for pick-up, receives substantially less use at the present time.

Fishery Habitat

In April, 1982, subsequent to the Memorandum of Agreement among the Terror Lake Hydroelectric Project (TLHP) licensee, US FWS, and ADF&G, a work plan for "Evaluating the Effects of Water Temperature Regime Changes on Timing of Salmon Fry Emergence, Evaluating Salmon Egg and Fry Survival, and Evaluation in Salmon Escapement Magnitude and Distribution" was initiated by the ADF&G-CF Division.

The purpose of the study is to assess the magnitude of change, if any, in pink and chum salmon populations of the Terror and Kizhuyak Rivers from pre-project through post-project construction. Although construction is scheduled to take three years, a total of six years of study is anticipated. A companion study entitled, "Kizhuyak/Terror River Pink Salmon Homing Study" was proposed by ADF&G-FRED Division in September, 1981 but was not incorporated into final study agreements in 1982 due to funding considerations.

In February, the Kodiak NWR provided to the Regional Office comments concerning fishery resources in relation to the TLHP Erosion Control Plan. Although efforts are being made to reduce the incidence of construction related siltation into the Terror River, heavy rains during the first week of September, 1982 resulted in the separator-aggregate plant sediment-control-dike being washed out and high silt levels were observed in the Terror River. The ADF&G-CF Division subsequently sampled the lower Terror River for abnormal silt accumulation and possible excess mortality of incubating pink salmon eggs. Results are still pending.

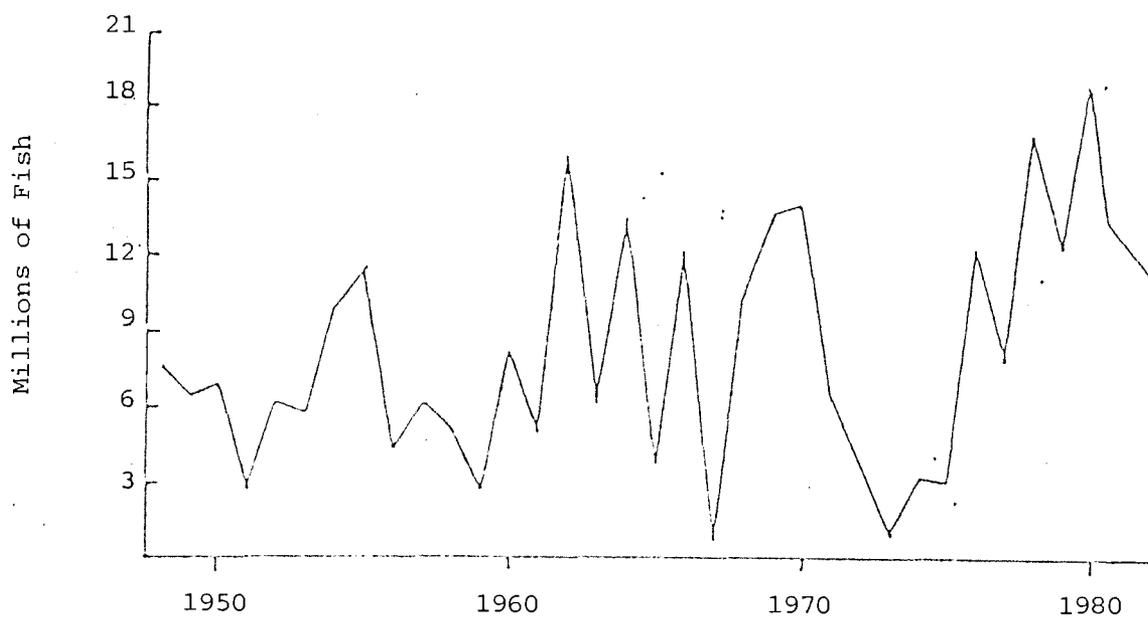


Figure 6. Kodiak Area Commercial Salmon Catch Through 1982

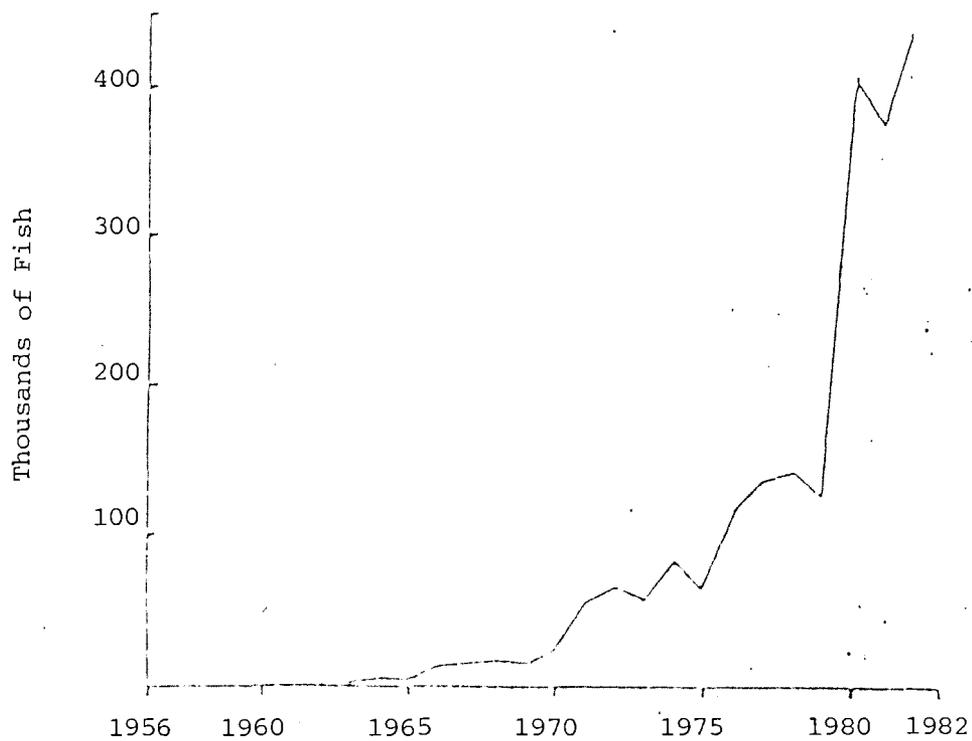


Figure 7. Red Salmon Escapement 1956-1982, Frazer Lake, Kodiak Island

Construction on the TLHP is proceeding at a fairly rapid rate and during the week of November 22 the Terror River was successfully diverted through a temporary concrete outflow conduit to facilitate dam construction.

During 1982, the Refuge provided comments on feasibility studies for two small scale hydroelectric projects scheduled for the villages of Larsen Bay and Old Harbor. Both projects will involve diversions and penstocks located on Refuge lands. Fishery habitat for Dolly Varden may be affected by occasional dewatering after the projects are completed, but due to the large socio-economic benefits which will be generated and the relatively minimal upstream habitat loss, neither project was opposed by the Refuge.

As part of the Refuge Comprehensive Planning Process and to continue fishery habitat mapping in 1982, all significant anadromous fish streams on the Kodiak Refuge, including the Afognak unit have been mapped on an overlay, and corresponding data is in the process of being entered into a classification matrix utilizing an Apple III computer. All existing habitat information is being entered along with historical and present data on species composition.

The fishery habitat on the Refuge is basically pristine and no man made alterations, with the exception the TLHP, have affected natural streamflows. Anadromous fish returns to Refuge streams are basically influenced by environmental factors and the commercial fishery. The exception on the Kodiak NWR is the recent past few years' return of red salmon to the Frazer Lake/Dog Salmon River system. In 1962, the Frazer Lake fishway was constructed to allow access of red salmon into the Frazer Lake drainage. Estimates by the ADF&G-FRED Division indicated a rearing potential in Frazer Lake of approximately 60 million fry. Egg, fry, and adult red salmon transplants coincidental with harvest restrictions from 1971-77 resulted in the establishment of one of the largest runs of red salmon within the Refuge. Current adult red salmon escapement has been in excess of 400 thousand fish (Figure 7).

Fishery Rehabilitation and Enhancement

During 1982, fishery rehabilitation and enhancement projects on the Refuge were conducted by the ADF&G-FRED Division. The main project emphasis is targeted towards the depressed Karluk Lake red salmon stock. The Karluk Lake system at one time, in the early 1920's, produced an annual commercial catch of between 1 and 4 million red salmon. Recent years' escapement have been less than 300 thousand adults (Figure 8) with a commercial catch below 100 thousand fish.

The FRED Division's Karluk project has thus far centered around the hypothesis that the Thumb River system was at one time the most highly productive component of the Karluk system and if efforts are directed towards rebuilding that component rehabilitation of the entire Karluk red salmon stock will be successful.

The major elements of the project involve: 1) capture of adult sockeye brood stock as an egg source with subsequent artificial incubation of fertilized eggs to the eyed stage, 2) eyed egg plants at selected areas in the Thumb River system of both early and late run egg takes, 3) monitoring the magnitude of the subsequent emergent fry migrations to determine survival, and 4) enumeration of outmigrant sockeye smolts from Karluk Lake utilizing sonar gear.

The 1981 egg take was approximately 4.0 million eggs. Seventy-three per cent were from the early Upper Thumb and 27 per cent were from the late Lower Thumb

River broodstock. Subsequent emergent fry population estimates in the spring of 1982 indicate approximately 70.2 per cent of the early and 41.5 per cent of the late run egg plant survived to the fry stage. This is a dramatic increase in survival over the estimated 18.5 per cent early and 23.8 per cent late calculated during the 1981 emergent fry enumeration. In addition, approximately 0.4 million eggs from the 1981 brood year were held over through spring of 1982 and reared directly to the fry stage as a feasibility test. In April 1982, approximately 175,000 fry were certified disease free and released into the Thumb River system.

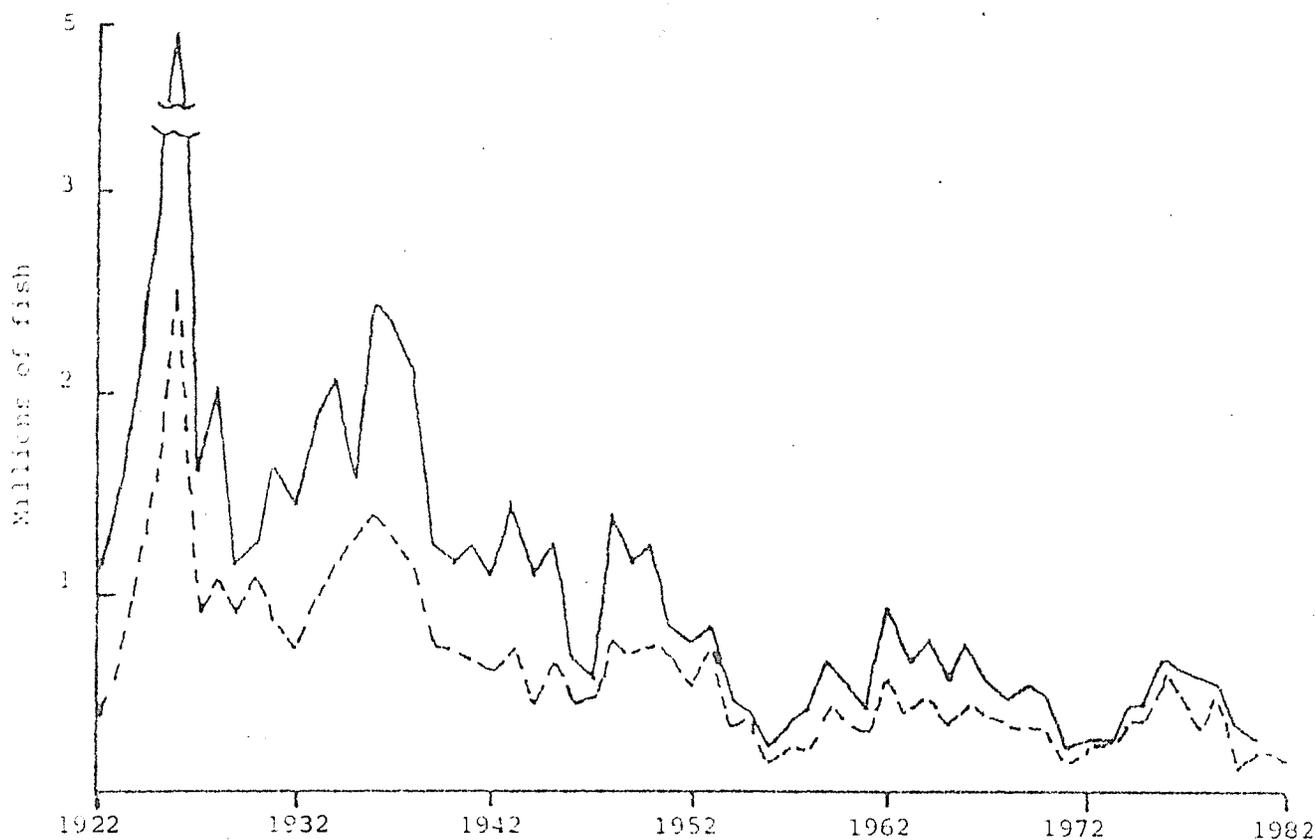


Figure 8. Estimated total run (solid line) and escapement (dashed line) for Karluk Sockeye Salmon from 1922 to 1982. (Adapted from McIntyre - 1980)

During the 1982 season, approximately 13.5 million eggs were taken, of which 9.2 million early and 0.8 million late run eyed-eggs were planted. In addition, 1.5 million late run eyed-eggs are being retained in incubators over winter to the fry stage. Due to a large escapement of approximately 2.3 million adult pink salmon into the Karluk system by August 1982, a request by the ADF&G-FRED Division to construct a temporary fish wier on the Upper Thumb River was granted. The request was based on the potential negative impact to the stability of the existing natural wild red salmon redds and the wier was proposed for exclusion of pink access to the Upper Thumb River.

The enumeration of outmigrant red salmon smolts from Karluk Lake, by ADF&G-FRED yielded an estimated 0.8 million smolts of variable age class. Comparable estimates of outmigrations for 1979, 1980, and 1981 were 1.0, 1.6, and 2.6 million respectively. Although it was anticipated some marked smolt from previous egg plants in 1979 and 1980 would be evident in sampling the 1982 smolt outmigration, none were detected.

The 1982 efforts concerning enhancement and rehabilitation of Refuge based fish stocks were earmarked by numerous "issue" papers which resulted in a cooperative agreement between the FWS and ADF&G concerning the Karluk Lake rehabilitation efforts. An "Option Decision Document" concerning the ADF&G Karluk Lake Sockeye Project was prepared by the Refuge and submitted to the Regional Office. In addition, a paper entitled, U. S. Fish and Wildlife Service Concerns Regarding the Karluk Lake Sockeye Project, was prepared jointly by the Refuge Fisheries Biologist and Project Leader, Anchorage, which was eventually sent to the ADF&G Commissioner and the Director of FWS. As a result, in 1982 a cooperative agreement between ADF&G and FWS was completed which basically provided the framework for initiation of a joint effort between the Kodiak NWR, Fishery Research (SNFRC-AFS) and ADF&G-FRED Division to work cooperatively in the rehabilitation of the Karluk Lake red salmon resource, through the development of an 8-year stepdown plan. In late 1982, the Project Leader, SNFRC-AFS, with input from the Refuge and the ADF&G-FRED Division, drafted a "Karluk Lake Sockeye Salmon Restoration Stepdown Plan" which was agreeable to all agencies. The main focus of the plan will encompass the four objectives listed below:

1. Determine the reason(s) for the decline of the Karluk Lake red salmon run.
2. Determine if the return of adults to the Thumb River system can be increased.
3. Determine if Thumb Lake can be optimized for fry rearing.
4. Review all studies and restoration efforts and make decisions concerning any future work (all agencies).

It is anticipated that in the spring of 1990, all agencies or parties will meet and discuss ramifications of past work and make decisions about any future work.

16. Marking and Banding

A brown bear marking program was undertaken by the State in conjunction with the Terror Lake Hydroelectric Project (see Section G-8).

Bald eagle fledglings were also marked and banded this year. See Section D-5 for more detail on this project.

Adult steelhead were radio tagged and marked in conjunction with a management research study on the Karluk River. See Section D-5 for details.

No other banding or marking was accomplished this year.

H. PUBLIC USE

1. General

With only one major exception, public use levels on the Kodiak NWR remained similar to recent years' levels with normal growth. The one significant exception was the continuing dramatic increase in deer hunting use. Numbers of participants in this activity nearly doubled over 1981 according to cabin use data and preliminary information from air taxi operators.

On certain sites on the Refuge, levels of use may exceed high quality standard levels for short periods. Manpower, funding, logistics, and political considerations have to date combined to preclude any significant control over these short term impacts but as public use continues to increase, these areas will be further scrutinized.

With the opening of our new visitor center this year, a new facet has been added to our program, with interpretive programs a more realistic project.

6. Interpretive Exhibits/Demonstrations

The new visitor center display materials arrived in Kodiak and were installed by Chris White Design (a subcontractor to Color Ad Inc.).

On August 25, the visitor center was officially and formally dedicated and opened to the public at an open house. Dr. Eugene Hester, FWS Associate Director, was the keynote speaker and the affair was also attended by Regional Director Keith Schreiner and several local dignitaries.



To date, visitor use of the visitor center has been light but will undoubtedly increase as its presence becomes more widely known. Additionally, the transportation "hub" of Kodiak is rapidly shifting from the boat channel (five miles from the Refuge headquarters) to Kodiak State Airport, which is a half mile from the new visitor center.

The visitor center will also provide a useful and unique learning tool for school groups. To date little of this type activity has been conducted here.

Unfortunately, shortly after installation, several of the display items began to display mechanical problems. The relief topographic map split down the center and several of the rotating box displays delaminated. Also, the water in the rotating wheel began to grow unidentified small organisms. One attempt by the contractor to repair these problems failed but by year's end efforts continued to get the displays back in proper order. Hopefully the displays will be repaired by the spring influx of visitation.



Refuge personnel examining relief topo map in Visitor Center. Left to right: Strickland, Cossick, Barnes, Chatto. MTV

8. Hunting

Hunting seasons and bag limits are set by the Alaska Department of Fish and Game. The entire Refuge is open to hunting. Species hunted include: brown bear (permit only), Sitka blacktail deer, mountain goat (permit only), reindeer, fox, ptarmigan, snowshoe hare, and waterfowl.

Bear hunting use was estimated at over 20,000 activity hours. The total number of permits issued was 176 (109 spring and 67 fall permits). Typically, bad spring weather put many hunters to the test. The fall hunt was also normal - either rain or snow or both (see Wildlife Section for more detail).

Kodiak's reputation for being the place in Alaska to hunt deer became more widespread which resulted in a level of use about twice that of last year. The increase from a five to a seven deer bag limit over most of the Refuge did nothing to lessen this reputation. However, the harvest estimate by ADF&G did not increase much over the 3,000 estimated last year. Lack of snow seemed to be the answer since many deer stayed at the higher elevations away from the majority of hunters. The results of an ADF&G survey will not be known until Spring, 1983.

Refuge staff estimates that deer hunters expended approximately 160,000 activity hours during the 1982 season on the Refuge.

All other species hunted comprise a minor portion of the total use. Mountain goat hunting occurs primarily off-refuge. Most small game hunting (ptarmigan, hare, fox) occurs in conjunction with other activities.

9. Fishing

The greater part of the sport fishing activity on the Kodiak NWR takes place on the Karluk River. Much of this is due to the world-wide reputation of the Karluk River plus the fact we have two recreation cabins on the River. The River has sizeable runs of four species of salmon plus steelhead. Heaviest use is during June-July for king salmon and October-November for steelhead.

No complete use level data was obtained but Refuge personnel feel pressure is still increasing on the Karluk River, especially from guiding operations.

All other cabins sustained summer use from fishing almost double that of 1981. The economy does not seem to be affecting this particular group of people's ability to recreate. Many visitors did not care what kind of fish were available or how good the fishery was. They were more interested in "getting away" for a few days.

For more information on the fishery, see Section G-11 of this report.

10. Trapping

Only 13 permits were issued for the 1982-83 season as compared to 28 for 1981-82. Low fur prices are probably responsible for the decline.

Reported catch for the 1981-82 season was 105 fox, 57 otter, and 16 beaver. The 1982-83 report will not be available until May, 1983.

Beaver numbers are thought to be increasing, possibly having an effect on some salmon streams. Low fur prices offer no incentive to trap any significant numbers.

12. Other Wildlife Oriented Recreation

Just about everyone who visits the Refuge brings their camera. However, we are noting a dramatic increase of visitors who come to visit strictly to photograph wildlife and scenery. To date, we have had no incidents with photographers and bears. With the aforementioned increase, possibilities of conflicts become more possible.

To avoid incidents, the staff will monitor levels of use more intensively and attempt to educate users when possible.

17. Law Enforcement

Hunting and fishing camps were visited as the opportunity arose during the year. Violation notices were issued for:

Illegal use of cabin	2
Commercial operation w/o SUP	1
Violation of SUP conditions	3
Unplugged shotgun	2
Use of helicopter on Refuge	1
Jet boat on Refuge	1

Increased surveillance can probably be cited for the increase in detected violations during 1982.

I. EQUIPMENT AND FACILITIES

1. New Construction

This year marked a continuation of the BLHP construction of a new headquarters complex on the Buskin Beach Road, approximately 5 miles from Municipal Kodiak.

On April 3, 1982, Contract No. 81-5213, Contract for Maintenance Facilities, was awarded to Petroleum Specialties, Inc. of Anchorage, Alaska. The bid amount was \$288,888 to construct a 30 by 80 foot shop/storage building adjacent to the Office/Visitor Center completed in 1981. Completion date is estimated as February 17, 1983. This facility is one of the most needed additions at Kodiak, since trying to conduct routine vehicle, boat, engine, etc. maintenance outdoors in Kodiak's climate is a hopeless endeavor. The new facility will have two heated bays, a warm workshop space, small office, vehicle lift, and two unheated bays for storage. A small separate oil storage shed and auto gas facilities are also included.



New shop nearing completion. HH

The bid for the second 1982 construction project at Kodiak was awarded on approximately June 25, 1982 for construction of two houses and a bunkhouse. The bid was awarded to King, Harness, and Oien of Anchorage for \$518,822. Contract completion date is April 21, 1982 but at year's end it appears construction will be completed by late January, 1983.

The two houses are identical and are similar in floor plan to Kodiak Quarters No. 2, completed in 1978. The houses are approximately 1,200 square feet plus attached heated garage (single car) and have three bedrooms and two baths.

After the extremes that Region 7 Engineering went to in efforts to make the Headquarters/Visitor Center "blend in" and "aesthetically pleasing" including a sod roof, it is quite unfathomable why the same people chose to make the roofs and trims of the nearby quarters and bunkhouse burnt orange. Though they somewhat resemble a Howard Johnson's, the houses should be quite comfortable and will provide much needed lodging for employees in future.



Initial construction work on new quarters. MTV



The nearly-finished product. HH

Just as welcome will be the new bunkhouse. This structure is essentially a four bedroom house with two full baths and a large common living area. Addition of this facility will enable us to more fully utilize seasonal employees and volunteers in our programs by providing lodging in town. Previously, any seasonal help had to be housed in the field or on the M/V Ursa Major, which does not provide adequate accommodations. Further, when the vessel was in use, seasonals had to be moved to the field, even if more important work needed to be done in town. The new bunkhouse will very comfortably house eight personnel.

Another major contribution of the bunkhouse will be to provide housing to transient FWS personnel, thus saving the government a portion (50%) of the current \$103 per day Kodiak per diem.

Completion of the above described facilities will complete BLHP construction for Kodiak.

As reported in last year's narrative, Quarters No. 1 in Kodiak lies on the center line of the State proposed Near Island bridge, construction of which is slated to begin in spring of 1983. In addition, the bridge approach will virtually abut Quarters No. 2 and will probably eliminate any reasonable access to this BLHP funded house constructed in 1978.

Since it appeared that politics would dictate our giving up our property to the bridge right-of-way in the end, FWS elected to inform the State that they would be issued a right-of-way upon the customary lease payment and after they

(State) constructed two new replacement houses at our new administrative site. The new houses would be built to FWS specifications. It appeared by year's end that the State would agree in principal to this. No final determination has been made at this writing.

3. Major Maintenance

A summer windstorm removed a substantial portion of roofing paper from the main cabin at Camp Island field headquarters, necessitating immediate repairs. A Beaver-load of 15 pound felt paper and 90 pound asphalt roofing was flown to Camp Island and the Refuge crew stripped the roof down to bare wood, inspected the roof for condition (which was excellent) and recovered the roof with all new materials.



Camp Island reroofing. JC

The Little River Lake recreational cabin was also reroofed this year with tarpaper instead of shingles.



Little River recreational cabin reroofed. JC

Although no single major maintenance project was conducted on the M/V Ursa Major this year, a 48-foot wood-hulled boat is always a major maintenance item unto itself. Boat Operator/Maintenanceman Cossick conducted a progressive maintenance program on the vessel to keep it in top operational condition throughout the year. The 1935 vintage vessel will be hauled in FY83 to check the condition of her planks and repair some known deficiencies caused by her heavy recent work load.

4. Equipment Utilization and Replacement

On January 16, ARM/Pilot Vivion ferried de Havilland N-765, an amphibious Beaver to Kodiak for reassignment. This aircraft will replace the Cessna 185 at Kodiak. The Beaver combines year-round amphibious capability with superior cargo capability, making it a superb aircraft for Kodiak's program. Its only significant drawback is the high availability and flight rates charged by OAS for this aircraft. At present, the aircraft's capabilities are well worth the additional costs.



Loading 55 gallon drums of fuel from Ursa Major to N-765 during annual fuel haul. JC



de Havilland N-765 touching down at Camp Island. SC

In late fall N-765 was equipped with a radio telemetry antenna system consisting of three-element yagi antennas mounted on each wing lift strut. The installation was approved for use by OAS until FAA certification can be completed. This installation currently permits radio location of instrumented steelhead. Bald eagle and brown bear telemetry projects will commence in 1983.



Mounted antennas on N-765. MTV

On October 1, Vivion ferried Piper Super Cub N-720 to OAS, Anchorage, where it is being rebuilt this winter, including new fabric, dope and interior. This is the first major work the aircraft has required since it was purchased new in 1969.

Research Division acquired an Apple III micro-computer, printer, and associated software. The equipment is being used for storage, retrieval, and basic analysis of biological data and is also being used to complete basic bookkeeping tasks.

5. Communication Systems

A new Sunaire ASB-500 HF/SSB radio was installed in de Havilland N-765. This digitally tuned radio provides outstanding long range communication on virtually any HF frequency.

The HF base station antenna system was fenced by State Parks Division during the construction of the new Buskin Beach State Park.

J. OTHER ITEMS

2. Items of Interest

This was the year of the VIP tours of Kodiak NWR. Numerous dignitaries paid visits to Kodiak including but not limited to the following folks:

Honorable Don Young	Congressman from Alaska
Don Hoedel	Undersecretary of the Interior
Bill Horn	Deputy Undersecretary of the Interior
Vern Wiggins	Special Assistant to the Secretary for Alaskan Affairs
Robert Jantzen	Director, US FWS
Dr. Eugene Hester	Deputy Director, US FWS
Keith Schreiner	US FWS Regional Director, Region 7
Dr. Ron Skoog	Commissioner, Alaska Department of Fish and Game

Some of the above visited Kodiak more than once in 1982. In addition, a delegation of six Congressional Aides to members of the Senate Merchant Marine and Fisheries Committee were provided a tour of Kodiak.

3. Credits

This report is a staff effort.

Barnes prepared the section on brown bear, Chatto the fisheries section and fisheries portion of the research section, Hadjys wrote the sections on climatic conditions and public use, Heffernan wrote the habitat section and the section on mammals. Zwiefelhofer prepared the sections on migratory birds and the eagle research sections. Vivion wrote the rest and edited and organized the entire report. Judy Barnett and Gerri Castonguay typed and organized it.

K. FEEDBACK

As previously mentioned in this report construction began this year on the Terror Lake Hydroelectric Project. For the reader's information an aerial photographic tour of the project follows. All photos were taken in July by Vivion. Photo numbers are keyed to the project map following.



1. Landing jetty and staging area and access road going up Kizhuyak River Valley.



2. View of Main Camp, Kizhuyak River, and Bay looking downstream.



3. Kizhuyak River, access road (main camp to left), and Terror Lake access road. Note major slides and evidence of "trial and error" engineering on left (first attempt at access road).



4. Terror Lake access road (Falls Creek crossing), Falls Creek, Falls Creek diversion access road. Main camp to left, Terror Lake to right.



5. Terror Lake access road near summit.
Terror Lake is beyond the gap in
right center.



6. Inlet (south) end of Terror Lake, show-
ing road crossing and settling ponds.
Upper Camp is just left of photo. Road
top center leads to aggregate plant.



7. Aggregate plant and outlet of Terror Lake.
Dam will cross low saddle in center of photo
and will raise lake elevation 100 plus feet.



8. Outlet of Terror Lake showing first stages
of stripping dam site.

Enough said.

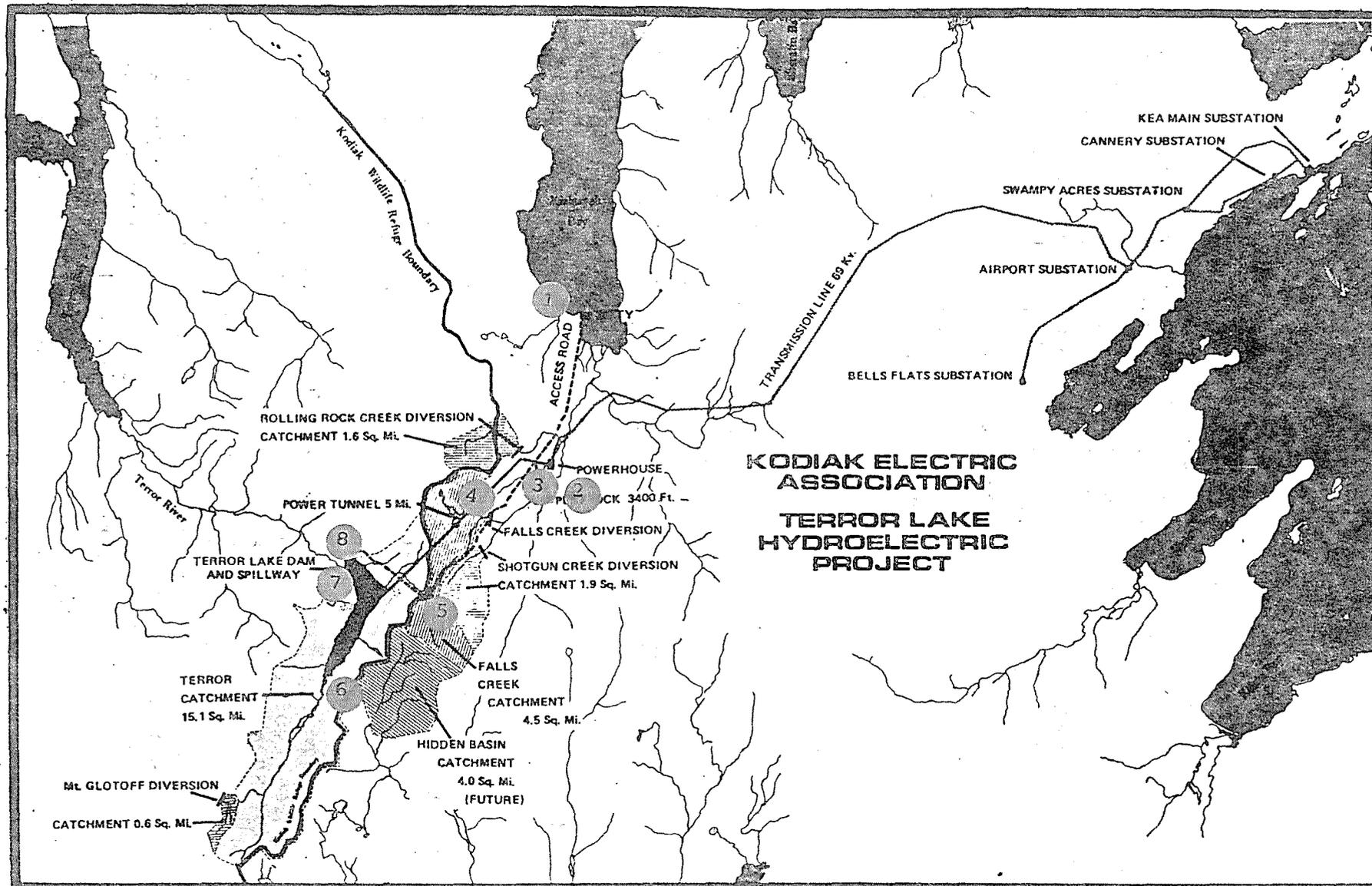


Figure 2-1. Location of Proposed Terror Lake Project (Source: Applicant).