ANNUAL NARRATIVE REPORT
Calendar Year 1980

KENAI NATIONAL WILDLIFE REFUGE
Kenai, Alaska

TUXEDNI NATIONAL WILDLIFE REFUGE
(TUXEDNI WILDERNESS)
Chisik Island, Cook Inlet, Alaska

KENAI NATIONAL WILDLIFE REFUGE
Soldotna, Alaska

ANNUAL NARRATIVE REPORT
Calendar Year 1980

NATIONAL WILDLIFE REFUGE SYSTEM
Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR

Review and Approvals

Robert T. Dahle 06/19/81 — Jan E. Rupp 7/14/81

Submitted by — Date — Regional Office — Date

Larry Aumiller 6/26/81

KENAI NATIONAL WILDLIFE REFUGE

1980 PERSONNEL

Permanent

1.	James E. Frates	Refuge Manager	GS-13	PFT	Resigned:8/8/80
2.	Robert L. Delaney	Refuge Manager	GS-13	PFT	EOD:8/10/80
3.	Vernon D. Berns	Asst. RM, Enforcement	GS-11	PFT	
4.	Robert A. Richey	Asst. RM, Oil & Gas	GS-11	PFT	
5.	Linda K. Gintoli	Asst. RM, Recreation	GS-11	PFT	
6.	Theodore N. Bailey	Wildlife Biologist	GS-11	PFT	
7.	Theodore "Al" Johnson	Forester	GS-11	PFT	
8.	Eugene P. Heath, Jr.	Administrative Officer	GS-09	PFT	
9.	Richard K. Johnston	Recreational Planner	GS-07	PFT	
10.	James E. Lewandoski	Asst. Forester	GS-07	PCS	
11.	Leslie G. Blaylock	Administrative Clerk	GS-05	PCS	
12.	James D. Woolington	Biological Technician	GS-05	PCS	
13.	Edward E. Bangs	Biological Technician	GS-05	PCS	
14.	Richard D. Kivi	Equipment Operator	WG-10	PFT	
15.	Patricia A. Fencl	Clerk/Typist	GS-03	PPT	

Temporary

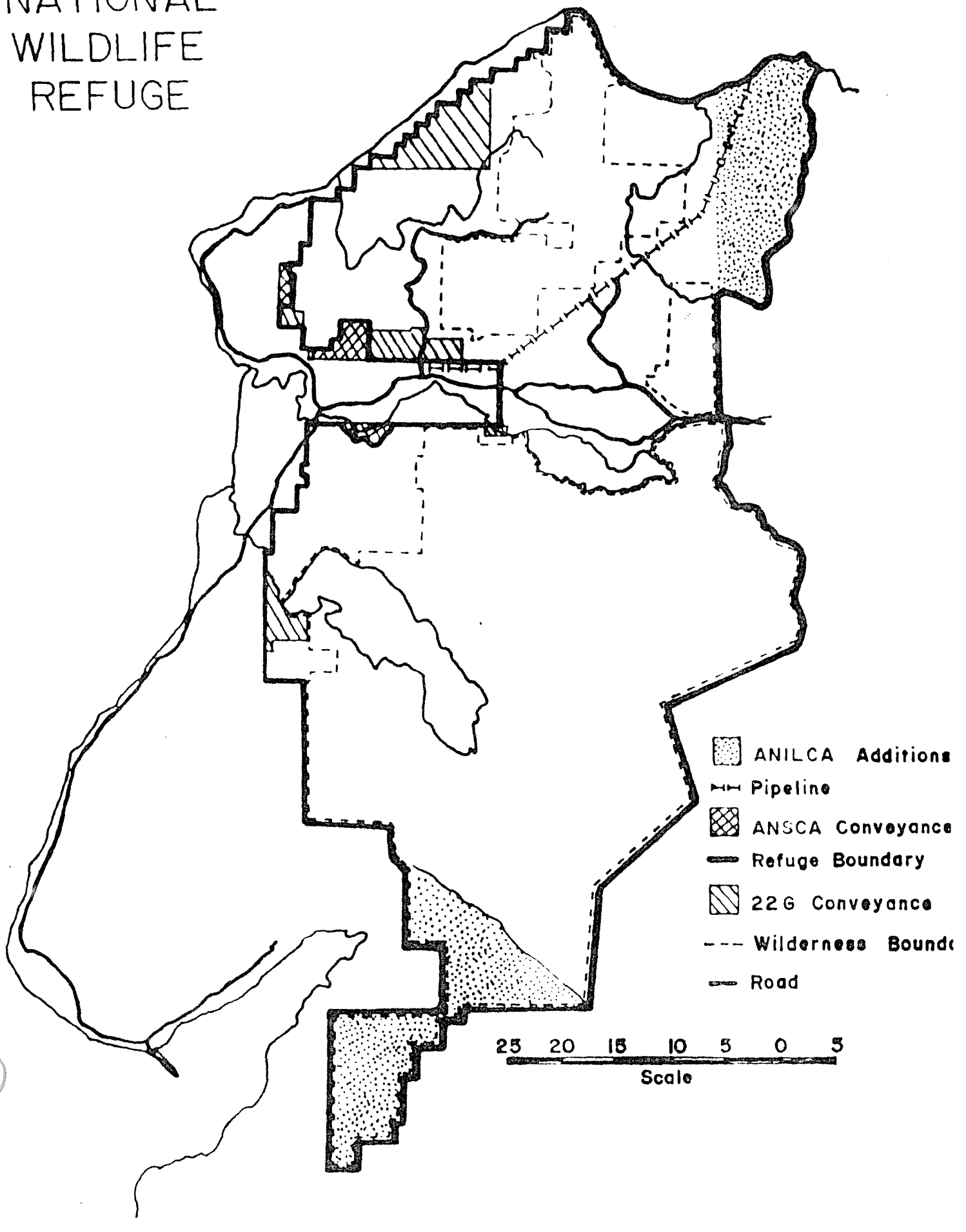
16.	John H. Markel	Laborer	WG-03	EOD:	05/07/79	Term:	05/30/80
17.	Donna Bartman-Stroud	Park Tech.	GS-05	EOD::	05/12/80	Term:	11/14/89
18.	Patricia A. Rost	Park Tech.	GS-05	EOD:	05/05/80	Term:	11/05/80
19.	Mary M. Nash	Janitoress	WG-01	EOD:	10/01/79	Term:	09/29/80

YACC CAMP

20.	Brian P. Canaiy	Group Leader	GS-07	PCS	EOD:	05/11/80

Map # 1

KENAI NATIONAL WILDLIFE REFUGE



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I. GENERAL

A. Introduction

The Kenai National Wildlife Refuge is situated on the Kenai Peninsula in southcentral Alaska. The northern portion of the refuge is only 20 air miles from the State's largest population center, the City of Anchorage. Although a scenic 112 mile drive through the Kenai Mountains is necessary to reach the wildlife refuge via road, commercial commuter aircraft fly into Kenai daily from Alaska's largest city, 60 air miles north.

Located within the center of the Kenai Peninsula and extending 115 miles from Turnagain Arm on the north to nearly the Gulf of Alaska on the south, this refuge encompasses about one-third of the Peninsula. The western portions of the Kenai Mountains generally form the eastern refuge boundary, a common boundary shared with our Chugach National Forest neighbors.

Since the establishment of the refuge on December 16, 1941 under E.O. 8979, these lands have undergone at least two boundary changes and a name change. The original refuge included 2,058,000 acres and among other mandates authorized settlement, location, and other disposition under certain public land laws applicable to Alaska. The refuge at that time was bounded on the northwest from Point Possession to the Kasilof River by the waters of Cook Inlet. A six mile wide strip of land from Boulder Point to the Kasilof River and a six mile strip of land including portions of the Kenai River were open for development. Homesteads, grazing areas, road systems, and other developments occurred in these areas which were eventually excluded from the refuge during a 1964 boundary adjustment. Also excluded were Cook Inlet coastal lands one to three miles inland and considerable portions of the Harding Ice Field, reducing the refuge area to 1.73 million acres.

Passage of the Alaska National Interest Lands Conservation Act (ANILCA) December 2, 1980, not only changed the Kenai National Moose Range to Kenai National Wildlife Refuge but further increased the refuge acreage to 1.97 million with the addition of mostly mountainous regions, an area of approximately 150,000 acres on the extreme south and about 90,000 acres of formerly adjacent forest service lands extreme northeast near the Chickaloon Flats. At the same time the passage of ANILCA, commonly known as "The Alaska Lands Act", withdrew from the refuge 16,535 acres to satisfy the claims of the Salamatof Native Association under the Alaska Native Claims Settlement Act (ANCSA). The now 1.953 million acre refuge has been reestablished and is managed to conserve fish and wildlife populations and habitats in their natural diversity, fulfill international treaty obligations with respect to fish and wildlife, insure water quality and quantity, provide opportunities for scientific research, interpretation, environmental education, and to provide opportunities for fish and wildlife-oriented recreation.

In addition to establishing new boundaries (see map #1), new establishing orders and a new name, 1.35 million acres of KNWR were formally designated as wilderness.

Aerial view of the Harding Ice Field within the Andy Simons Unit of the newly designated Kenai Wilderness. Although refuge acreage increased with passage of ANILCA, a considerable portion of the new additions to the refuge, as well as designated wilderness on existing refuge lands, are non-productive snow, rock, and ice. E. Bangs

Tustumena Lake (77,000 acres) and the Caribou Hills in the background are located within the Andy Simons Unit of the Kenai Wilderness. Tustumena Lake is a year-round means of access to remote portions of the refuge. R. Johnston

B. Climate and Habitat Conditions

This year established records for mildness not recorded during the past 60 years. Although early January provided 20-30 degree below zero temperatures, by January 18, 30-40 degree above temperatures were recorded into February. With few exceptions, temperatures remained mild until spring. Our winter moose density census, usually conducted during March, was postponed due to lack of suitable snow cover.

Cold, clear days with an accumulation of hoarfrost were rare this winter but did present some photographic opportunities.
E. Bangs

Spring breakup came and went early this year mostly due to 40-50 degree temperatures in April. Cool and wet weather conditions as well as high run-off in rivers and streams during May and June from a record snow pack in the Kenai Mountains did not dampen the spirits of numerous recreationists visiting the refuge. The upper Kenai River reached near flood stage at Russian River and Jim's Landing Campgrounds.

Although November-December temperatures were generally below freezing, only a skiff of snow was observed in some locations. The earliest sticking snow during "normal" seasons in the past has been October 15-20. The cooler weather, however, froze over most lakes sufficiently to support ice fishermen and further temperature drops of 25 below zero in December completely ice-covered vast Skilak and Tustumena Lakes by December 20.

It was a surprise to most that the lowest temperature recorded for 1979 fell on the last day of the year, -27 degrees. The highest temperature in December 1980 also fell on the last day, 41 degrees above!!

C. Land Acquisition

1. Fee Title

Nothing to report.

2. Easements

Nothing to report.

3. Alaska Native Claims Settlement Act (ANCSA)

a. Kenai Native Association, Inc. (KNA) - On March 21, 1980, BLM conveyed to KNA 18,083 acres of refuge lands as their entitlement under 14(h)(3) of ANCSA. Most of the conveyed lands are situated on either side of the Swanson River Road at the boundary between and including the Sunken Island Lake area east of the Moose River. Smaller tracts are located near the outlet of Skilak Lake and north of the City of Kenai encompassing a portion of the Beaver Creek Oil Field access road (map #1). This native group is entitled to 18,775 acres, the balance of 692 holdback acres to be conveyed following BLM survey of the conveyance possibly sometime next summer.

These conveyed lands remain within the refuge boundary and subject to the laws and regulations governing use and development of refuge lands under 22(g) of ANCSA. A November 5, 1980 letter from KNA President James R. Schowalter proposed several uses for these lands including commercial timber harvest, an extensive road system, a 480 lot subdivision for KNA members, aircraft landing areas for both land and sea, ski facilities, campground, etc. A formal plan of operation for any of the proposals has not been submitted for staff review.

Negotiations between KNA and FWS regarding possible land exchange continued during the period until passage, December 2, of ANILCA.

We learned on July 25 that Kenai Native Association (KNA) President George Miller had resigned and would no longer represent KNA. George has been a good friend of the refuge for many years and through numerous negotiations and meetings with the staff supported and appreciated refuge concerns.

The refuge staff is reviewing a proposed plan of operation presented by Chugach Electric Association, Inc. to drill an exploratory gas well under agreement with Cook Inlet Region, Inc. (CIRI), owner of the gas, oil, and coal subsurface

resources within the KNA conveyance. Under terms of the plan, already approved by KNA to support such surface disturbance and development necessary to this operation, CIRI objected to any 22(g) constraints. The staff may concur with KNA provided any surface disturbance is within 22(g) parameters.

b. Cook Inlet Region, Inc (CIRI) - Sixteen sections (10,200 ac) of refuge lands to be conveyed to CIRI under P.L. 94-204, Terms and Conditions of Land Consolidation and Management in the Cook Inlet Area, have yet to be conveyed. Both the surface and subsurface estates to those lands may be removed from the refuge.

Under the terms of P.L. 94-204, CIRI would receive up to 9.58 townships of partial subsurface (oil, gas, and coal) estate within the refuge. CIRI, under an agreement with ARCO Alaska, Inc. to conduct a seismographic program for their subsurface estate, has completed more than 200 miles of a 500 plus mile 3 year program.

Negotiations between CIRI and the FWS for possible land exchanges of surface and subsurface for subsurface at other locations were conducted during the period. CIRI submitted a "Kenai National Wildlife Refuge Trade/Settlement" proposal to FWS which was still under review at the end of the year.

c. Tyonek Native Corporation

Nothing to report.

d. Salamatof Native Corporation - Under Section 1432 of ANILCA, Cook Inlet Village Settlement, 16,535 acres of refuge lands were removed from the wildlife refuge to satisfy the Salamatof Native Association's claim to refuge lands under ANCSA. The greater part of this estate included 15 sections around Elephant Lake, 5-1/2 sections north of Kenai, and all refuge land south of the Sterling Strip lying north of the Funny River Road. Under this conveyance, the native group and FWS must mutually select two foot access trails, one on each side of the Kenai River, for providing public access to the river. These two easements shall be posted and maintained by the FWS.

e. Point Possession

Nothing to report.

f. Native Allotments - Bureau of Land Management has notified The Kenai NWR, by an approval letter, for a native allotment (Application AA 8229) of 80 acres to be conveyed within the next 3-4 years following survey, to Mr. George Miller, former KNA president. The Selected area is one mile west of Skilak Lake adjacent Olson Lake, south of the Kenai River.

There is a good possibility additional native allotments may be conveyed from the wildlife refuge.

D. System Status

1. Objectives

The refuge initiated a comprehensive master planning process which, when completed in approximately 2 years, will redefine refuge objectives and management direction for the next 10-20 year period. A series of public workshops were held throughout the Kenai Peninsula and in Anchorage during the fall of 1980 soliciting public opinion prior to initiation of the planning process.

2. Funding

Funds and manpower patterns for fiscal year 1977 through 1981 are shown in Table 1.

Fiscal Year	1977	1978	1979	1980	1981
YACC Camp	N/A	N/A	N/A	1	1
YACC Enrollees	N/A	N/A	N/A	2-10	2-10
PFT Manpower	8	9	9	9	9
PPT Manpower	1		1	1	1
Career Seasonal	2	3	3	4	4
Temporary	7	4	6	5	3
Intermittent	3	3	1	2	0
YCC Staff	7	7	5	0	0
YCC Enrollees	30	30	20	0	0
MB	33,000	43,000	61,000	71,000	92,000
MNMB	198,000	250,000	310,000	296,000	297,000
I&R	139,000	180,600	192,400	191,000	192,000
Exp. for Sale	31,800	32,000	32,000	37,000	49,000
I&R - Fee Area	N/A	N/A	11,750	7,000	7,300
BLHP	N/A	1,300,00		75,000	1,494,500

Station funding increases over the past three years have failed to meet inflationary increases and has resulted in a continuing larger percentage of station dollars obligated for salaries and a dwindling percentage available for operation. This has become an acute problem the past two years with two headquarters sites to maintain and operate.

Staff growth over the past several years has been more on an opportunistic basis than a planned growth. The result has become a staff with only one maintenance person to handle the ever increasing backlog of facility maintenance. Plans will be developed and implemented next year to realign staff functions to reflect the realities of the current and projected refuge budgets.

II. CONSTRUCTION AND MAINTENANCE

A. Construction

In December of 1979, the refuge staff moved from the old Kenai Headquarters to a new $1.3 million Headquarters/Visitor Center, south of Soldotna, Alaska. A large part of the year was spent organizing files, the refuge library, and exchanging old for new furniture as it was received.

In September, a $86,300 contract was fulfilled when Northwest Paving Company added 4 inches of subsurface and 2 inches of asphalt to 52,600 square feet of entrance road and parking area at the new Headquarters Site. This added to the appearance of the headquarters and eliminated mud and sand from being tracked onto the new carpeted floors in the office.

The refuge received funding in October of $1,446,000 for a new maintenance shop, a storage warehouse, a bunkhouse, a flamable fuel building, and a residence. Apparently $126,000 of the funds will be used to contract for Visitor Center displays and exhibits.

An additional $60,000 of the funds were made available to rehabilitate 4 miles of fence at the refuge located Moose Research Center. Contract work was initiated in late December on cutting 1,500, 12 foot posts and moving them to the job site. Next year the posts will be treated and installed.

B. Maintenance

Maintenance efforts were brought to a near standstill during 1980. Due to budget constraints, a maintenance mechanic and three summer laborer positions were not filled. It fell on the shoulders of Dick Kivi, our equipment operator, to see that facilities on the nearly two million acre refuge were kept in some semblence of order.

The new headquarters building and increasing public use demands did not lighten the maintenance requirements. The equipment operator, with the aid of a YACC staff, completed the following maintenance projects: 19 vehicles and 8 pieces of heavy equipment were kept running and in fair condition, two headquarters sites were kept clean and landscaped, large boulders were hauled to six sites to block off road areas and prevent vehicle access, 5 entrance signs on the refuge were replaced, browse to feed 4 moose throughout the year was clipped for the Moose Research Center, 25 miles of road were kept graded, 2 weeks were spent removing downed timber following winter windstorms, gravel was hauled to the aircraft tie-down on Sport Lake, 2 weeks were spent on the canoe system repairing portages, all outhouses were kept cleaned and maintained regularly, and trash removed from roadsides and trails.

Contractors were again used for the removal of trash and maintenance of restrooms at high use areas. Although contract costs increased 200% from 1979, we find this to be the only reasonable method of maintaining our area.

C. Wildfire

1980 was an extremely wet year. Consequently, we had only two small fires and they were extinguished immediately by BLM fire crews.

Fire #7608 started on June 17 from an unattended campfire. When the fire crew arrived, only a stump was burning.

Fire #7635 was initiated on August 10 when a cabin caught fire on private inholding USS 3141. When the fire crew arrived, the cabin was nearly consumed. The crew put out a few burning embers that could have spread. Arson was suspected but no charges were made.

The map (# 3) depicts the location of the 2 fires.

Having only two fires makes 1980 the year with the fewest fires since accurate records have been kept (1957). The most fires recorded were in 1974 when we had 52 fires burning 3,909 acres.

The highest acreage burned since 1957 was in 1969 when 80,932 acres burned. The average for these 24 years is 18.6 per year with an average acreage burned of 4,082.

The following is a summary of the past 10 years of fire history on the KNWR.

Fire Locations - 1980

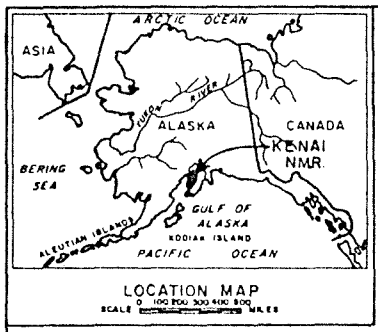
Map #2

KENAI NATIONAL WILDLIFE REFUGE

ALASKA

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



151°00' 30' 150°00'

61°00'

45'

30'

15'

60°00'

45'

152°00' 30' 151°00' 30' 150°00'

760B

763S

COMPILED IN THE DIVISION OF ENGINEERING
FROM SURVEYS BY USGS & BSF&W

PORTLAND, OREGON

SEWARD MERIDIAN

Scale 5 0 5 10 15 20 25 MILES

TOWNSHIP DIAGRAM

MEAN DECLINATION

IR ALASKA 362 408

Year	# Fires	Acres	Average Size
1971	6	1	< 1
1972	16	220	13.8
1973	21	47	2.2
1974	52	3909	75.2
1975	23	120	5.3
1976	16	2	< 1
1977	18	6	< 1
1978	18	75	4.2
1979	9	197	21.9
1980	2	1	< 1

Fire Management - Initial attempts at establishing Cooperative Fire Management planning with adjacent land management agencies were delayed. Reasons for this delay were varied but included the USFS being involved with their own land planning efforts, the Alaska Division of Lands not knowing what lands they had available to manage until the passage of ANILCA, and a general lack of any real fire planning expertise.

The refuge will be reinitiating fire management planning as part of the comprehensive planning process.

III. HABITAT MANAGEMENT

A. Cropland

Nothing to report.

B. Grassland

Nothing to report.

C. Wetlands

In May 1980, a program was initiated to integrate the National Wetland Inventory (NWI) with our computer-based inventory (CVI). This was done to update our vegetative inventory by incorporating wetland information and to provide a base map to facilitate the comprehensive conservation planning process.

NWI maps include polustrine, lacustrine, riverine, esturaine, and masine information. CVI map includes vegetative types, sizes, stocking levels, and volume of both the overstory and understory. These maps were reproduced to the same scale of 1:31,680 (1"+1/2 mile). After making overstory of both maps, new type lines are drawn integrating information from the two systems. Any conflicts that exist in type boundaries are settled in favor of the NWI.

To date, quadrats Kenai C 1 to 4, and B 1 to 4 have been integrated (about 40%). Remaining to be done are quadrats Kenai A 1, 2, 3, and 4; D 1, 2, 3, and 4; Tyonek A 1 and 2; Seldovia B 3; C 1, 2, and 3; D 1, 2, and 3; Seward A, B, C 8.

D. Forest Lands

1. Commercial Timber

The following is a listing of timber sales where action occurred in 1980:

Table 2. Active sales, 1980.

No.	Permittee	Volume	Acres	Exp Date	Status
KN 1-79	Werner	104.8 MBF	32	Breakup 80	Closed
KN 28-77	Moore	164 "	41	Apr 1979	Closed
KN 32-78	Mahan	6.5 "	18	Breakup 80	Closed
KN 22-79	Bame	67.5 "	20	Breakup 80	Closed
KN 27-78	Rumley	78 "	20	Apr 1, 80	Closed
KN 4-80	Knutsen	2.5 "	20	Mar 30, 81	Active
KN 26-80	Meye	360 Cords (180MBF)	20	Mar 30, 82	Active
KN 28-78	Habighorst	200 MBF	40	Breakup 80	Closed
KN 2-80	Habighorst	10 "	3.5	Feb 29, 80	Closed
KN 3-80	Habighorst	105 "	32	Apr 1, 80	Active
KN 5-80	Habighorst	46 "	21	Dec 31, 81	Active
KN 31-80	Bonchard	50 Trees	NA	Dec 31, 80	Closed
KN 32-80	Hawkins	100 Trees	NA	Dec 24, 80	Closed

Of the 1.045 MBF sold on these permits, only 366 MBF was actually harvested on approximately 168 acres. It becomes obvious with only one-third of the timber being harvested from permitted areas that demand for such harvest programs is light. The timber harvest program will be analyzed over the next several months and realigned to more fully reflect current Service policy.

Two young people (Bouchard and Hawkins) in the local community were issued permits to harvest Christmas trees for sale. They had a moderately profitable experience.

The following map #3 indicates the location of timber sales where administrative involvement occurred in 1980.

2. Free Use

The gathering of firewood, houselogs, fence posts, and poles from the refuge continue to be popular activities. In 1980, 543 permits were issued for these purposes. The following is a 5 year summary of the trend in the free use program:

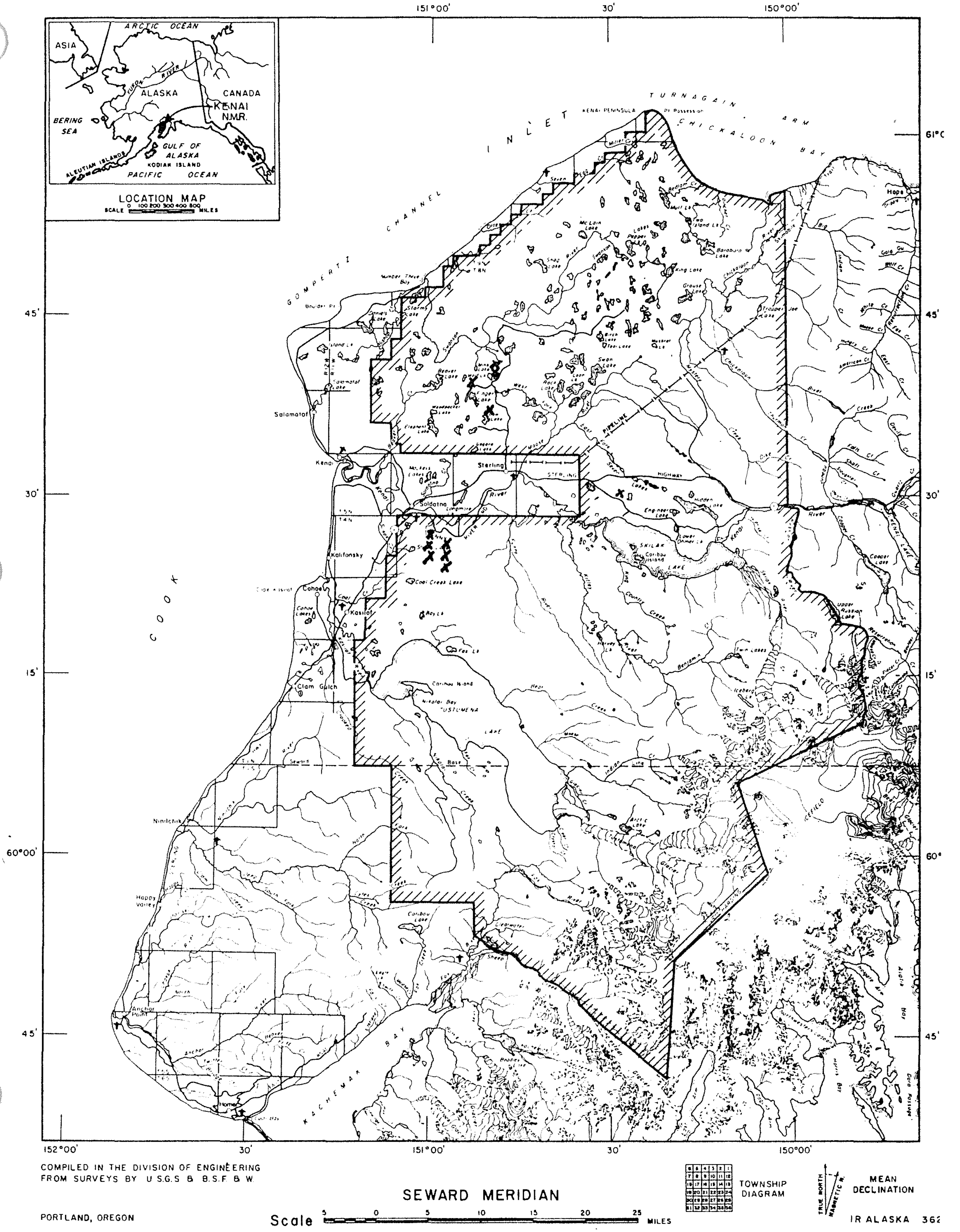
Map #3

Location of Commercial Timber Sales in 1980
KENAI NATIONAL WILDLIFE REFUGE

ALASKA

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



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FROM SURVEYS BY U.S.G.S. & B.S.F. & W.

PORTLAND, OREGON

IR ALASKA 362

Year	# Permits
1976	194
1977	204
1978	411
1979	290
1980	543

In addition to our 5 free use cutting areas, we opened one past timber sale area to fire wood cutting without the need for a free use permit. This was opened for a short term just to achieve clean up of logging slash and non-merchantable trees.

E. Other Habitat

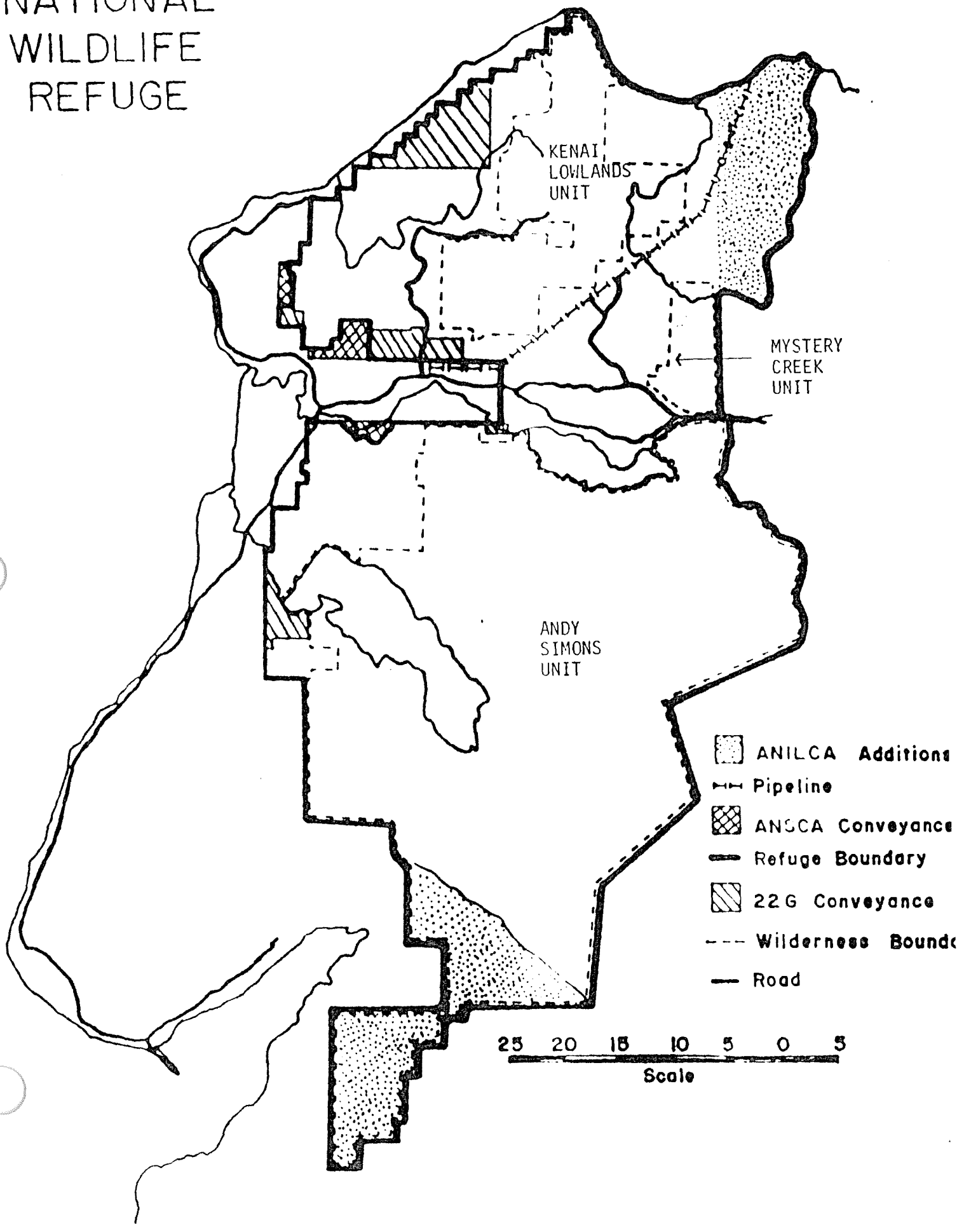
Nothing to report.

F. Wilderness and Special Areas

With the passage of the Alaska National Interest Lands Conservation Act (ANILCA), 1.35 million acres of land in three separate units were designated as formal wilderness. These units will be managed under the provision of the Wilderness Preservation and Management Act of 1964. The three areas designated wilderness will all be referred to as Kenai Wilderness, although for administrative purposes, the three areas may be described as the Andy Simons Unit, the Mystery Creek Unit, and the Kenai Lowlands Unit. (Reference map # 4)

Map # 4

KENAI NATIONAL WILDLIFE REFUGE



September brings fall colors and the first hint of winter to the Benjamin Creek Drainage. Benjamin Creek drains into the Killey River (Andy Simons Unit, Kenai Wilderness).
R. Johnston

A wilderness hunter enjoys the afternoon in the Swan Lake Canoe System, recently designated as Kenai Wilderness, located in the Lowland Unit. R. Richey

Management of the areas will be based on the new extablishing purposes of the refuge and the provisions of the Wilderness Act. There are several provisions of ANILCA which provide exceptions for certain uses of wilderness and lands in Alaska. For example, in certain cases, traditional aircraft use, shelter structures, and tent platforms may be allowed to remain within designated wilderness.

Several lakes within the newly designated wilderness areas on the refuge will remain open to ski and float plane landings. Arctic Lake, seen in the photo, remains frozen 9 months of the year. E. Bangs

ANILCA also sets up a five-year deadline for review of all remaining non-wilderness lands on KNWR for their suitability or nonsuitability for preservation as wilderness. Among those lands to be studied for wilderness suitability is the Indian Creek watershed which was transferred to KNWR from Chugach National Forest by ANILCA. The procedures to be followed for this review will follow Section 3(d) of the Wilderness Act relating to public notice, public hearings, and review by State and other agencies.

Considering the new establishing purposes of the KNWR, that approximately two-thirds of KNWR is now designated wilderness, and the mandate that all additional lands must be studied for wilderness suitability, the focal point of KNWR's immediate direction will likely be wilderness management.

Approximately 850,000 acres of the new Kenai Wilderness' Andy Simons' Unit was previously designated administratively as a Research Natural Area. This area will remain as a refuge research natural area in addition to its overlay of wilderness management.

G. Easements for Waterfowl Management

Nothing to report.

IV. WILDLIFE

A. Endangered and Threatened Species

Efforts to confirm the presence of nesting peregrine falcons on the refuge was limited, primarily because of the time available and poor flying weather. Several reports stongly suggest that either peregrines or gyrfalcons are indeed nesting in these general localities: Tustumena Glacier, Skilak Glacker, Upper Killey River. A ground survey of cliff areas below Tustumena Glacier revealed two apparent nests of raptors but no birds were observed. An unidentified falcon was observed several times in this vicinity in the summer of 1979. If peregrine falcons are confirmed nesting on the refuge, the next step will be an attempt to identify the subspecies.

B. Migratory Birds

1. Waterfowl

a. Ducks - Because of its generally low productivity lakes, the Kenai NWR has not been a major waterfowl production area in Alaska and therefore ducks have not ranked high on the list of wildlife which require needed biological information on the refuge. The only systematic attempt to enumerate ducks on and adjacent to the refuge occurred from 4-21 April on the Kenai River Flats. During this period, up to 400 pintails and 100 mallards were observed per day with Canada and Snow geese. Waterlevels were generally high during the spring and summer and many previously dry bogs and ponds were filled with water. These high water levels should have provided more nesting and escape cover for ducks on the refuge during the 1980 nesting season.

b. Geese - Snow geese were first observed on the Kenai River Flats on 6 April and most had migrated north by 26 April. Only two neck-banded snow geese were observed and of these, only one band was readable (PT 97). Estimated numbers and composition of snow geese observed are shown in Table 3.

Table 3. Numbers and adult:immature ratios of snow geese observed during spring migration, Kenai River Flats, 4-21 April 1980.

Date	Estimated Numbers	Sample		Ratio
		Adults	Immature	Immatures per 100 adults
4/14/80	700-900	53	4	8
4/16/80	400-500	300	45	15
4/18/80	3000-4000	497	72	14
4/21/80	500-700	73	20	27
TOTAL		923	141	15

Estimated numbers of Canada geese observed during the same period on the Kenai River Flats varied from 50-600 geese per day.

c. Trumpeter Swans - A total of 26 nests were located during aerial surveys of 48 areas previously used as nesting areas by trumpeter swans (Table 4). An early brood survey, conducted in mid-July, revealed 79 cygnets in 19 broods for an average of 4.2 cygnets per brood. A late brood survey, in early September, revealed 72 cygnets in 20 broods for an average of 3.6 cygnets per brood. The combined nesting and brood surveys suggested that at least 32 pairs nested on or near the refuge in 1980 and, of these, at least 23 (72%) successfully produced young. Based on the late brood survey, each nesting pair produced an average of 2.2 young in 1980.

Table 4. Trumpeter swan productivity on and adjacent to the Kenai National Wildlife Refuge, Alaska, 1980.

Nesting Location	Nest Located	Cygnets Observed 16-17 July 80	Cygnets Observed 3 Aug 80
Bay Lake	X	5	5
Bear Lake	X	0	0
Beaver Lake	X	6	6
Bishop Creek	No	6	0
Brown's Lake	X	0	0
Camp Island	X	4	3
Cisca Lake	X	0	0
Scenic Lake	X	5	4
Diamond Lake (S)	X	0	0
Donkey Lake	X	4	3
Woodpecker Lake	X	0	0
Finger Lakes	X	0	0
Fox Lake	X	4	4
Harvey Lake	X	3	3
Grey Cliff Lake	X	5	5
Hook Lake	X	4	0
Kenaitze Lake	X	0	0
Kuyugak Lake	X	0	0
Lonesome Lake	X	1	1
Mystery Creek	No	4	4-5
SW Pipeline Road	X	0	0
Pepper Lake	No	4	0
Pollard Lake	X	4	4
Quill Lake	X	0	3
Suneva Lake	No	0	2
Swan Lake	X	4	4
Timberlost Lake	No	0	4
Tony's Lake	X	3	3
Trapper Joe Lake	No	0	2
Two Island Lake	X	3	3
Warbler Lake	X	6	6
Windy Lake	X	4	3
Total	--	79	72

Well-meaning photographers and canoeists often unwittingly disturb nesting birds such as these recently hatched trumpeter swan cygnets. R. Richey

In addition to the productivity surveys, 15 trumpeter swan cygnets were neck banded on 7 different lakes on the refuge (Table 5). Swans banded on the Kenai NWR continue to be observed at Barney Lake in Washington and on Vancouver Island in Canada. Barney Lake, a prime wintering area for Kenai trumpeters is being subjected to intensive development along its shores and the future of this wintering area is in jeopardy. However, there is a movement to proclaim this area as a swan preserve. In addition, Kenai NWR trumpeter swan cygnets have apparently been ingesting lead pellets and several banded cygnets have been reported dying on the wintering grounds from lead poisoning.

The future of some traditional trumpeter swan nesting areas on the Kenai Peninsula and on the refuge is uncertain because of changes in land status and increased interest of surface and subsurface owners in development and gas and oil exploration and production. Currently (1980), 6 (19%) traditional nesting sites are not assured protection because they are off the refuge. One of these sites was included in the recent conveyance of land to the Salamatof Native Village. An additional 2 (6%) nesting locations occur on 22(g) lands recently conveyed to the Tyonek Native Village. Of the remaining 24 locations, 12 (50%) are now included in areas designated as wilderness.

Table 5. Trumpeter swan cygnets banded on the Kenai NWR, August 1980.

Location	Date	Cygnets Observed	Banded		
			Sex	Wt. (kg)	Number
Beaver Lake	8/25/80	6	M	5.0	619-01164 (14UR)
			F	6.5	619-01165 (15UR)
			M	5.0	619-01166 (16UR)
			F	6.4	619-01167 (17UR)
Campfire Lk	8/26/80	4	M	6.4	619-01168 (18UR)
			F	6.2	619-01169 (19UR)
Phalarope Lk	8/26/80	1	M	8.5	619-01170 (20UR)
Quill Lake	8/26/80	2	F	6.4	619-01171 (21UR)
			F	6.0	619-01172 (22UR)
Fox Lake	8/27/80	4	M	8.1	619-01173 (23UR)
Donkey Lake	8/27/80	3	F	6.4	619-01174 (24UR)
			F	6.8	619-01175 (25UR)
Camp Island Lake	8/27/80	3	M	8.5	619-01176 (26UR)
			M	8.4	619-01177 (27UR)
			F	7.2	619-01178 (28UR)

Trumpeter swans prefer to nest on remote lakes on the refuge.
R. Richey

One traditional nesting area (Suneva Lake) was lost in 1980 when the lake drained into Cook Inlet through an eroded bank leaving the nesting island exposed and dry. However, 2 cygnets were later observed in this area suggesting the pair nested nearby. No swans nested at Mink Creek Lake in 1980 and it is hypothesized that the 2 adults, shot on Evook Lake in the fall of 1979, may have been the Mink Creek Lake pair.

2. Marsh and Water Birds

Preliminary results of a study entitled Effects of Canoeing on Common Loon (Gavia immer) Production and Survival conducted by Liz Smith, Colorado State University, indicated that in 1979 an estimated population of 1,668 loons were using the refuge north of the Sterling Highway and that in the canoe system and control lakes productivity was 0.67 and 0.64 chicks per breeding pair, respectively. Preliminary conclusions suggest canoeists may be affecting common loons since twice as many loons nested in control, undisturbed lakes compared to the lakes used by canoeists.

Red-necked grebes commonly nest on lowland lakes throughout the refuge. R. Richey

3. Shorebirds, Gulls, Terns, and Allied Species

Nothing to report.

4. Raptors

A survey of known bald eagle nesting locations revealed 19 active nests, 17 of which appeared successful in producing at least 30 eaglets for an average of 1.6 eaglets per nesting pair (Table 6). Of the 1980 nesting location, 6 (32%) were off the refuge, and 13 (68%) on the refuge. Seven (54%) bald eagle nests on the refuge are now in wilderness areas.

Table 6. Bald eagle nesting locations and productivity, Kenai Peninsula, 1980.

Nesting Location	Nesting	Eaglets
Beaver Lake	Yes	2
Big Indian Creek	Yes	1
Bradley River	Yes	0
Campfire Lake	Yes	2
Camp Island Lake	Yes	2
Clearwater Slough	Yes	1
Fox River	Yes	0
Gene Lake	Yes	1
Kenai River (Lower)	Yes	2
Kenai River (Upper)	Yes	2
Killey River (Lower)	Yes	2
Mink Creek Lake	Yes	2
Moose Creek Lake	Yes	2
Moosehorn Lake	Yes	3
W. Fork Moose River	Yes	2
Russian River	Yes	1
Sheep Creek	Yes	1
Skilak Lake	Yes	2
Swan Lake	Yes	2
	19	30

5. Other Migratory Birds

Spot-mapping surveys were conducted for the second year to determine relative abundance, diversity, and density of breeding territorial birds in approximately 10- and 100-year-old birch dominated vegetation types (Table 7). Twenty-three identified species, excluding waterbirds, were recorded in the 100-year-old forest and 18 in the 11-year-old forest. The three most common species in the 100-year-old forest, yellow-rumped warblers (47%), dark-eyed junco (23%), and Swanson's thrush (8%), accounted for over 75% of all contacts. In the 11-year-old forest, five species, the white-crowned sparrow (38%), alder flycatcher (12%), gray jay (9%), dark-eyed junco (9%), and tree swallow (9%), accounted for over 75% of all contacts. The increase in number

of species observed in 1980 compared to 1979 is attributed to census techniques. The census was initiated earlier in 1980 and resulted in 9 more species in the mature forest and 2 in the 11-year-old burn.

Table 7. Passerine bird contacts during spot-mapping surveys in a 11- and 100-year-old forest, Kenai National Wildlife Refuge. (Contacts include visual observations and recorded vocalizations).

Species	(Headquarters Lake) Mature Forest (app. 100-yr-old)		(Sunken Island) Recent Burn (11-yr-old)	
	Total Contacts	Percent of total	Total Contacts	Percent of total
Blackbird-Rusty	4		2	
Chickadee-Black-capped	1		0	
Chickadee-Boreal	22	2	3	
Creeper-Brown	1			
Flicker-Common	0		2	
Flycatcher-Alder	0		72	12
Flycatcher-Olive-sided	2		0	
Jay-Gray	15		54	9
Junco-dark-eyed	226	23	54	9
Kinglet-Ruby-crowned	48	5	0	
Owl-Great-horned	3		0	
Raven	1		0	
Redpoll	6		15	2
Robin	27	3	9	
Sparrow-Savannah	0		12	2
Sparrow-Song	2		40	6
Sparrow-White-crowned	14	2	235	38
Swallow-Tree	13	2	57	9
Thrush-Swainson's	81	8	6	
Thrush-Varied	9		0	
Warbler-Blackpoll	10		0	
Warbler-Orange-crowned	0		1	
Warbler-Tennessee	1		10	
Warbler-Wilson's	7		0	
Warbler-Yellow	1		9	
Warbler-Yellow-rumped	453	47	28	5
Woodpecker-Hairy	0		3	
Woodpecker-Northern 3-toed	4		5	
Woodpecker-Unid.	12		5	
Unidentified	3		3	
	966		625	

C. Mammals and Non-Migratory Birds and Others

1. Game Mammals

a. Moose - A moose density count was not conducted in 1980 due to poor weather conditions and lack of snow. Spring calf counts were not initiated in 1980 because of a lack of moose in the traditional count area, the Moose River Flats. A trend during the past two years appears to be a decreasing use of the Flats for calving compared to use in the past. In the spring of 1980, so few cows were seen in the Flats that a survey was not attempted.

Poor snow cover throughout October, November, and December, 1980 allowed only a limited moose composition survey. The 1969 Burn area was surveyed on 23 December 1980 and the breakdown of moose seen was 44 bulls, 140 cows, 59 calves, and 9 undentified moose. There were 32 bulls/100 cows, 42 calves/100 cows, and a high percentage of small bulls (48%). This indicates a relatively high calf production and survival. Compared to the rest of 15A where the bulls/100 cows has been around 15 and the calves/100 cows is about 30. In 1.9 hours of flying over the 1969 burn, 252 moose were seen for an average of 132.6 moose seen per hour.

A cow moose with twin calves is often a sign of good range conditions. T. Bailey

The moose harvest was higher in 1980 than in 1979 (Table 8). The increase in hunter success was primarily due to a larger number of yearling bulls in the population. Approximately 70% of the bulls harvested in 1980 were yearlings compared to only 45% yearlings in 1979 (Table 9). The winter of 1979-80 was fairly mild and there appeared to be good yearling survival. The 1969 Burn area is primarily responsible for the increased harvest in Unit 15A. This burn is now starting to produce moose and should result in an increasing population in that vicinity.

Table 8. Breakdown of the moose harvest in the Kenai Peninsula according to the numbers of moose taken and the reported antler size of harvested moose in 1979.

Harvest	1979	1980	% Change
15A	120	159	+33%
15B (W)	28	41	+46%
15B (E)	16	15	- 6%
15C	130	132	- 2%
7	37	24	-35%
Total	331	371	

Table 9. The reported antler size of moose harvested in 1979.

Antler Size	15A	15B(W)	15C	7	Total
< 30"	58	11	58	12	139
31-44	36	10	42	18	106
45-54	21	5	19	7	52
55-60	4	2	4	0	10
60-70	1	0	2	0	3
70+	0	0	2	0	2
Total	120	28	127	37	312

b. Dall's Sheep and Mountain Goat - Dall's sheep and mountain goat surveys were conducted from 25 July to 8 August 1980 using a Piper Super Cub (Tables 10 and 11). Generally both the numbers of sheep (452) and goats (86) seen were down from last year's count of 551 and 159 respectively. The large amounts of wet, heavy snow that fell in the mountains last winter are primarily responsible for the indicated decline in these species. The high number of avalanches last year

apparently reduced the goat population considerably. A goat project, conducted for ADF&G, indicated 20% of the radio collared adults died and 100% of the kids were lost during the winter of 1979-80. A total of 21 7/8 curl or better Dall's sheep rams with an average horn length of 32" were harvested in 1980 and a total of 10 (8 male and 2 female) goats were taken on the refuge. The low harvest of goats was due to the new permit only hunt which went into effect in 1980. In 1979, 85 goats were harvested in Units 15 and 7 (covering most of the Kenai Peninsula) while in 1980 only 28 goats were harvested.

Refuge staff spotting sheep up the North Fork of Indian Creek, Kenai Wilderness. Snow will remain in the upper elevation areas until late July. T. Bailey

Table 10. Dall's sheep survey August 1980, Kenai National Wildlife Refuge.

Count Area	Date	Survey Time (Hrs)	Rams 7/8	Rams -7/8	Unclass Sheep	Lambs	Total
856 Green Lk.	7/25	2 hrs 54 min	14	20	196	53	283
855 Twin Lks.	7/30	3 hrs 02 min	12	15	49	10	86
857 Fox River	8/01	2 hrs 20 min	3	7	46	8	64
858 Sheep Cr.	8/04	2 hrs 40 min	1	3	11	4	19

Table 11. Mountain goat survey August 1980, Kenai National Wildlife Refuge.

Count Area	Date	Survey Time (Hrs)	Goats			
			Adults	Yearlings	Kids	Total
856 Green Lk.	7/25	2 hrs 54 min	--	--	0	3[1]
855 Twin Lks.	7/30	3 hrs 02 min	10	2	3	15
857 Fox River	8/01	2 hrs 20 min	29	3[2]	7	39
858 Sheep Cr.	8/04	2 hrs 40 min	17	5	7	29

[1]At least 3 goats were seen from ground 7/80.
[2]Not complete count of yearlings.

c. Caribou - The number of caribou in the lowland herd was surveyed by ADF&G biologists on 27 October, 1980. Members of this herd have been radio collared by the State and approximately 5 animals still have working radios. This year, 14 bulls, 31 cows, and 11 calves were seen. The ratio of bulls/100 cows was 45 and the ratio of calves per 100 cows was 35. This herd has remained around 50 animals for at least the past 3 years. Because several of the bulls may make the Boone and Crockett record book, a limited 5 permit hunting season has again been proposed by the local game advisory board and supported by the ADF&G. The refuge continues to oppose this hunt on the grounds that there is no apparent harvestable surplus, the animals are tame, and by being located 1/2 mile out of town by the Kenai Airport they are often viewed by the public. The primary calving grounds (off the refuge) are scheduled for State oil lease sales in May of 1981. The herd's old age structure also indicates almost no yearling recruitment.

The large antlered bull caribou, by the Kenai Airport, can be easily approached and viewed by the public. E. Bangs

The upland caribou herd of approximately 250 animals is now on refuge lands since the passage of the Alaska National Interest Lands Act on December 2, 1980. Alaska Department of Fish and Game has radio collared animals in this herd to assist in locating the animals for survey. In October, 1980, after a permit hunt in which 21 animals were harvested, 227 caribou were counted, with 36 bulls and 35 calves seen per 100 cows.

d. Black Bear - A systematic survey of black bears has not been conducted on the refuge by staff members. Alaska Department of Fish and Game researcher Dr. Chuck Schwartz is conducting a radiocollaring study of black bear and estimates a density of 6 bears per 10 square miles over the 1947 Burn lowland forest. The berry crop was low again this year and has apparently caused an increase in bear movement. Black bear sightings were commonly reported and there was an increase in harvest. For the first time since the ADF&G has been keeping records of bear harvest, there were over 200 black bear taken. There were 237 black bears killed on the Kenai Peninsula (Table 12) during the year-round season.

Table 12. Black bear harvest, Kenai Peninsula, 1980.

Unit	15A	15B	15C	7	Unknown	
♂	19	21	50	42	9	
♀	15	22	25	22	3	
Uniden.	3	0	1	5	0	Total 237

e. Brown Bear - The brown bear population remains unsurveyed on the refuge due to the bear's extensive movements and the expenses involved for any type of meaningful survey. The harvest this year was up compared to past years (Table 13), primarily because of increased hunter effort and an increase in bear movement due to a poor berry crop. A large male was killed on the refuge in the Willow Lake crushed area by a moose hunter and the skull was large enough to be listed in the Boone and Crockett record book. This bear had been radio-collared by ADF&G biologists in 1978 and was approximately 18 years old when taken.

Table 13. Brown bear harvest on the Kenai Peninsula, 1979 and 1980.

	Spring		Fall		Total	
1980 Unit 7	3♀	0♂	0♀	0♂	3♀	0♂
Unit 15	1♀	2♂	5♀	3♂	6♀	5♂
1979 Unit 7	--	--	--	--	0♀	0♂
Unit 15	--	--	--	--	2♀	2♂

f. Small Mammals - The annual fall small mammal survey was interrupted this year due to early snow but the general catch rate was lower than that noted in September, 1979 (Table 14).

Table 14. The catch of small mammals on the Kenai National Wildlife Refuge, September 1979 and 1980.

Species	#/100 Trap Nights 1979 (1440)	(Trap nights) 1980 (480)
Red-backed Vole	10.8	6.9
Mask Shrew	4.0	1.8
Vagrant Shrew	1.9	
Total	16.7	8.7

The snowshoe hare cycle appears to be on the upswing with hares being more commonly sighted and hunters becoming more successful. The last high peak in the hare population was reported to have occurred in 1974 so the next high can be expected in the mid 1980's.

g. Beaver - A limited survey of lake beaver was conducted October 3, 1980 in the Swan Lake Canoe System and adjacent area. The area surveyed included those lakes north of the Sterling Highway, east of the Swanson River Road, south of the Swan Lake Road, and west of the Moose River. A total of 22 lodges were seen during the 2 hour and 15 minute aerial survey. Food caches were seen near 17 of the lodges which indicates active lodges. This averages 1.4 active lodges per 10 square miles of the prime lowland boreal forest habitat, or approximately 1 active lodge per 7 lakes or ponds. The beaver population on the Kenai is at a fairly low density compared to more favorable areas in North America. This past year, at least 84 beaver were harvested on the refuge primarily from trappers using aircraft to both find lodges and make sets. This year a proposal was submitted to the game board to reduce the beaver bag limit from 40 to 20 per season.

h. Wolves - Late winter wolf numbers in a 4,693 km^2 study area (Map 5) was estimated at 40 wolves. Estimates for fall and early winter 1980 are unavailable because weather conditions prevented survey activities (Table 15).

Table 15. Kenai Peninsula Wolf Population Dynamics.

	1976-77	1977-78	1978-79	1978-79
Number of Study Packs	3	5	6	6
Study area size	2997 km^2	3699 km^2	3851 km^2	4693 km^2
Total early winter wolf population	46	62	69	89
Early Winter density (wolf/km^2)	1/65 km^2	1/60 km^2	1/56 km^2	1/53 km^2
Total late winter wolf population				
Late winter density (wolf/km^2)	1/88 km^2	1/84 km^2	1/99 km^2	1/117 km^2

From - Quartely Report #15. Wolf-Moose Investigations on the Kenai Peninsula, Alaska. Rolf O. Peterson, James D. Woolington. March 31, 1980.

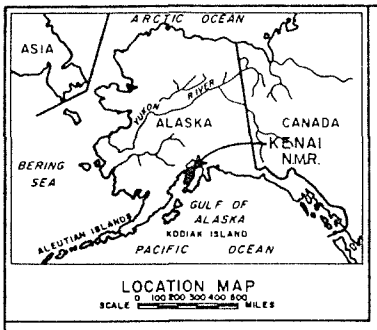
Map # 5

KENAI NATIONAL WILDLIFE REFUGE

ALASKA

UNITED STATES
DEPARTMENT OF THE INTERIOR

FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE



LOCATION MAP
SCALE 0 100 200 300 400 500 MILES

151°00' 30' 150°00'

61°00'

45'

30'

15'

60°00'

45'

Extent of wolf study area:
Area A - 1976-77
Area A + B - 1977-78
Area A + B + C - 1978-79 & 1979-80

152°00' 30' 151°00' 30' 150°00'

COMPILED IN THE DIVISION OF ENGINEERING
FROM SURVEYS BY USGS & BSF & W

PORTLAND, OREGON

SEWARD MERIDIAN

Scale 5 0 5 10 15 20 25 MILES

TOWNSHIP DIAGRAM

MEAN DECLINATION

IR ALASKA 362 408

Preliminary information indicates that easily accessible and heavily harvested packs are not able to replace members at the rate as which they are being lost. Since 1976 the known harvest has increased from 7% to 31% in study packs and is attributed to increased hunting and trapping activity and not an increased wolf population. The Skilak Lake study pack was reduced from 7 wolves (fall 1979) to only the alpha male by spring 1980. A combination of human harvest and disease reduced the Swanson River pack from 10 (fall 1979) to 4 adults and one pup of unknown sex with eventual dispersal of all remaining pack members in early spring 1980. A minimum of 28 wolves were taken on the refuge during the winter of 1979-80 (from harvest reports and State sealing forms).

Cause of death for one of two study wolves, found dead, was diagnosed as distemper by the State Virology - Rabies Unit. The affect of the recent outbreaks of distemper and canid-parvo virus on wolves and free roaming dogs in the Kenai-Soldotna area is unknown.

1. Other Furbearers - Furbearer harvest reports from 93 of 104 permit holders indicate 440 fur animals were taken by spring 1980 (see Table 16).

Despite an increase in snowshoe hares the past few years, lynx populations remain low. Coyote and otter sign indicate no noticeable change but reliable population information remains unknown. Seventy-five recent trapping permit holders indicated only one marten has been taken on the refuge since 1975. Twelve trappers reported seeing marten sign and only 5 actually observed marten. Recent studies in other areas suggest marten may be unable to establish an viable population on the refuge because of habitat conditions. Reports of wolverine remain infrequent and only 2 fox were known to have been taken on the western Kenai Peninsula in the last year.

Table 16. Furbearers reported captured by trapping permit holders on the Kenai National Wildlife Refuge, 1960-80.

YEAR	LYNX	WOLVERINE	COYOTE	WOLF	WEASEL	OTTER	BEAVER	MINK	MUSKRAT	# PERMITS
1960-61	13	1	15	--	1	16	145	42	2	16
1961-62	23	4	30	--	13	19	79	69	0	24
1962-63	28	2	27	--	0	19	109	66	2	28
1963-64	28	1	39	--	6	26	150	83	0	33
1964-65	24	6	11	--	10	3	6	15	0	17
1965-66	17	4	16	--	2	4	17	13	0	16
1966-67	7	4	5	--	35	9	22	45	0	25
1967-68	--	--	--	--	--	--	--	--	--	--
1968-69	18	1	44	--	81	10	14	64	207	22
1969-70	62	3	23	--	35	32	33	82	75	53
1970-71	67	10	30	--	79	9	25	60	29	59
1971-72	181	14	13	--	35	8	23	9	18	61
1972-73	146	8	51	--	4	24	76	48	11	65
1973-74	245	7	58	--	149	26	40	160	334	31
1974-75	162	10	24	1	68	8	6	33	21	52
1975-76	113	6	32	3	16	13	34	25	32	70
1976-77	53	6	25	6	10	7	24	39	8	86
1977-78	43	4	34	13	14	9	19	33	140	86
1978-79	36	3	44	32	7	6	22	25	73	96
1979-80	12	3	64	19	58	17	83	57	127	104

V. INTERPRETATION AND RECREATION

Major I&R activities for 1980 included program planning, campground and recreational facilities maintenance, completion of interpretation display concept plan for new Visitor Center, completion of AWP's, ARM Gintoli was on maternity leave from August through the end of the year and Recreational Planner Johnston was at Glynco for Law Enforcement training from October through the end of the year. Consequently, many requirements of the I&R staff during the fall fell on the remaining staff and the shoulders of our two seasonal Park Technicians, Patty Rost and Donna Bartman-Stroud. We also owe particular thanks to these women for their professional handling of seasonal duties at Russian River, all campground maintenance, public contacts, and even administrative reporting during a year of above average public visitation.

A. Information and Interpretation

1. On-Refuge

Highlighting the Information and Interpretive program on the Kenai has been the completion of our new office with adjoining Visitor Center. Planning for the new Center began in November of 1979 through the assistance of a National Park Service Planner, Don Follows, and YACC assistant Wendy Schoales. Don Follows' detail terminated in April with most of the planning yet to be completed. Final planning efforts were carried out by Kenai staff. After major revision and preparation of a supporting contract document at the Area Office, the Visitor Center plan was ready for mail-out to prospective contractors by late December.

YACC assistant Paul McLaughlin completed the script portion of an audio-visual program to be used in the finished Kenai Visitor Center. A second detailed script was developed for A.O. staff Jo Keller's slide program on Alaskan refuges.

Interpretive programs were also conducted at the Russian River salmon fishing area. The litter incentive program for young people continued and the volunteer services of a local couple were used. Al York presented fireside demonstrations of cleaning and canning salmon, edible plants of the area, and gold panning. The demonstrations were of minimal success as most fishermen preferred to concentrate their time in catching fish. Mr. York has requested the use of a different area next year for his programs.

Other than the five days of voluntary service by Terri Poole of the Anchorage Office, the Sterling Highway Visitor Contact Station was closed for the second year. There are no plans to reopen the station until budgetary constraints allow for additional summer employees to staff the facility.

2. Off-Refuge

An estimated 6,000 responses were given via telephone, mailings, leaflets, and personal contacts to the public on a routine basis throughout the year.

A video-tape program was prepared by the Public Affairs Office on boating safety on Skilak Lake. The 30 and 60 second programs will be aired on Ancohorage television stations during the boating season.

B. Recreation

1. Many of the positive steps taken in 1979 within the recreation program were curtailed during 1980 when staffing was reduced from 6 to 2 employees due to budgeting contraints. Overall recreational use was up slightly from the previous three years. Use figures had remained constant at 140,000 estimated visitation, yet increased in 1980 to 176,000. The increase may be due the the fair early spring weather.

   a. Swan Lake-Swanson River Canoe Routes - Had no Patrolmen throughout the summer beyond trips by present staff on peak weekends. The backcountry registration system continued with an estimated 33% compliance indicating pproximately 3,200 persons used the system as compared to 2,200 in 1979. 1979 was a slow year due to poor weather conditions, while 1980 represented a generally average amount of visitation.

   Since a full time patrolman was not available as originally planned, a backcountry site inventory and impacts monitoring system (Code-A-Site) was not continued. Preliminary usage of the inventory and impacts monitoring was initiated in 1979.

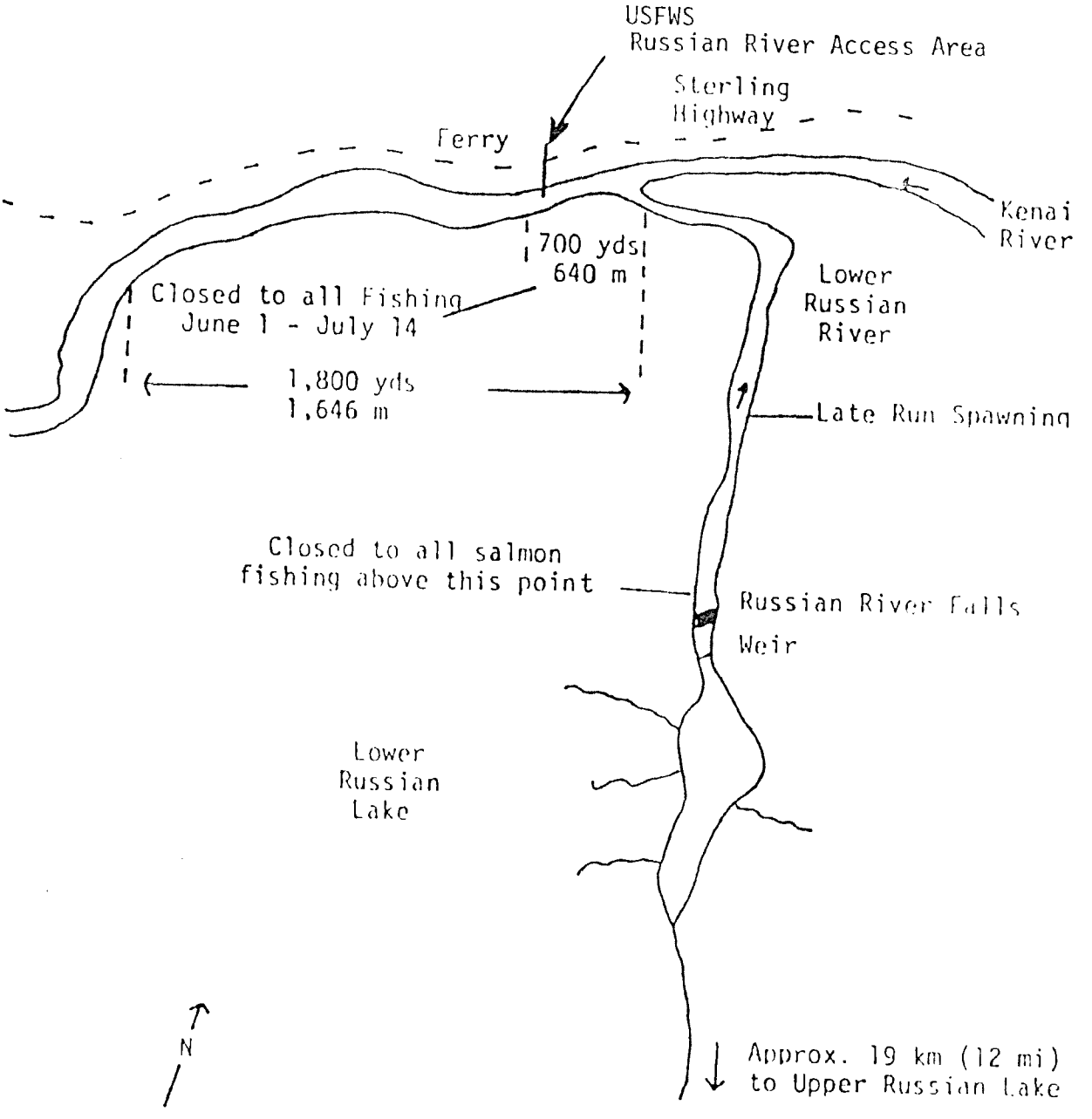
   The Swanson River and Swan Lake Canoe Routes were recommended and accepted as units of the National Recreational Trail System during 1980. These canoe trails to be included in the national system.

   b. Russian River Fishery and Access Area - continued to be an important facility and public use management focal point for permanent I&R staff as well as summer employees (Map # 6).

   Participation in the Russian River fishery was high although lower than the peak participation of 1977 and 1978 (Table 17).

   Alaska Department of Fish and Game creel census indicated effort directed toward early and late run sockeye salmon was 31,430 and 24,900 man-days, respectively. Mean hourly catch rates were higher on weekdays (0.270) than on weekends, (0.210) due to greater congestion on weekends which reduced individual angler efficiency. Seasonal catch per hour was 0.243. This catch rate is the highest recorded since 1965 (Table 18).

Map # 6



Schematic Diagram of Lower Russian River and Kenai and Russian River Confluence (Not To Scale).

Canoers on Spruce Lake in the Recently designated Swan Lake National Recreational Trail and newly designated Kenai Wilderness. (Lowland Unit). Refuge Staff

Table 17. Estimated Sockeye Salmon Harvest, Effort and Success Rates on Russian River, 1963-80.

Year	Harvest			Total Effort (Man-Days)	Catch/ Hour	Census Period
	Early Run	Late Run	Total			
1963	3,670	1,390	5,060	7,880	0.190	6/08-8/15
1964	3,550	2,450	6,000	5,330	0.321	6/08-8/16
1965	10,030	2,160	12,190	9,720	0.265	6/16-8/15
1966	14,950	7,290	22,240	18,280	0.242	6/15-8/15
1967	7,240	5,720	12,960	16,960	0.141	6/10-8/15
1968	6,920	5,820	12,740	17,280	0.134	6/10-8/15
1969	5,870	1,150	7,020	14,930	0.094	6/07-8/15
1970	5,750	600	6,350	10,700	0.124	6/11-8/15*
1971	2,810	10,730	13,540	15,120	0.192	6/17-8/30*
1972	5,040	16,050	21,090	25,700	0.195	6/17-8/21
1973	6,740	8,930	15,670	30,690	0.102	6/08-8/19*
1974	6,440	8,500	14,940	21,120	0.131	6/08-7/30*
1975	1,400	8,390	9,790	16,510	0.140	6/14-8/13*
1976	3,380	13,700	17,080	26,310	0.163	6/12-8/23*
1977	20,400	27,440	47,840	69,510	0.168	6/18-8/17
1978	37,720	24,530	62,250	69,860	0.203	6/17-8/09
1979	8,400	26,830	35,230	55,000	0.136	6/09-8/20*
1980	27,200	33,490	60,710	56,330	0.243	6/13-8/20
1963-79 Mean	8,842	10,099	18,941	25,347	0.173	

* Census period was not continuous during these years due to emergency closures required to increase escapement level.

Table 18. Differences Between Weekday and Weekend Day Fishing Pressure and Rates of Success at Russian River, 1964-1980.

Year	Mean Angler Counts		Catch/Hour		Mean Hours Fished	
	Week-days	Weekend Days	Week-days	Weekend Days	Week-days	Weekend Days
1964	29.6	70.6	0.444	0.209	3.3	3.9
1965	31.7	78.1	0.305	0.223	4.5	5.4
1966	53.2	143.1	0.297	0.183	4.8	5.5
1967	68.9	110.5	0.171	0.100	5.3	5.4
1968	71.5	124.9	0.153	0.107	5.3	5.8
1969	64.5	11.7	0.110	0.074	4.9	5.1
1970	83.5	127.8	0.140	0.100	4.8	4.7
1971	87.9	157.2	0.194	0.189	4.8	5.3
1972	73.3	138.5	0.203	0.187	4.0	4.4
1973	147.1	195.0	0.113	0.088	4.8	5.5
1974	123.8	144.4	0.164	0.085	4.7	5.7
1975	65.0	149.6	0.145	0.136	4.5	5.1
1976	72.5	134.4	0.165	0.161	3.5	4.5
1977	201.7	438.6	0.172	0.164	3.9	4.3
1978	264.1	425.7	0.205	0.191	3.9	4.2
1979	190.6	276.8	0.158	0.117	3.8	3.9
1980	299.1	317.8	0.270	0.210	4.2	4.7
1964-80 Mean	101.8	176.7	0.196	0.145	4.4	4.9

Table 19. Angler Effort Directed Toward Early and Late Run Russian River Sockeye Salmon Stocks, 1963-1980.

Year	Effort (Man-Days)		Effort (Percent)	
	Early Run	Late Run	Early Run	Late Run
1963	5,710	2,170	72.5	27.5
1964	3,980	1,350	74.7	25.3
1965	7,750	1,970	79.7	20.3
1966	11,970	6,310	65.5	34.5
1967	11,460	5,500	67.6	32.4
1968	11,780	5,500	68.2	31.8
1969	12,290	2,640	82.3	17.7
1970	9,700	1,000	90.7	9.3
1971	6,250	8,870	41.3	58.7
1972	12,340	13,360	48.0	52.0
1973	15,220	15,470	49.6	50.4
1974	11,090	10,030	52.5	47.5
1975	5,210	11,300	31.5	68.5
1976	8,930	17,380	33.9	66.1
1977	38,200	31,310	55.0	45.0
1978	51,910	17,950	74.3	25.7
1979	25,670	29,330	46.7	53.3
1980	31,430	24,900	55.8	44.2
1963-80 Mean	14,674	10,673	60.8	39.2

Total weekday and weekend stream counts during the fishery averaged 299.1 and 317.8 anglers, respectively. When compared to historic data these counts indicate numbers of anglers at Russian and Kenai Rivers.

Anglers fished an average of 4.2 hours on weekdays and 4.7 hours on weekends.

Stream counts revealed 51.8% and 40.1% of the anglers fished the confluence of the Kenai and Russian Rivers during the early and late runs, respectively. The early run was one of the largest recorded and the late run was the largest recorded salmon run. The migrational rate of the late run fish was temporarily slowed by Russian River Falls. Late run fish there "held" for a period of time in the Russian River where they were vulnerable to capture by sport fishermen. Large numbers of readily harvestable salmon in Russian River therefore account for the increased emphasis on this section of stream during the late run sockeye salmon fishing (Nelson 80) (For further information of Russian River fishing and/or Russian River Fish Pass, reference 1980 Russian River Fishing Report in refuge files). (Table 19)

A 24-hour traffic counter was installed at the entrance to Russian River during the 1980 season. The counter automatically records the number of vehicles entering the area for each 60 minute block during the day. A total of 22,151 vehicles were counted from June 8 through August 5. The peak number of vehicles recorded in one day was 1.355 cars on June 27. The number of vehicles counted does not particularly indicate number of campers, anglers, or day users, but does indicate an approximate level of activity at the Kenai-Russian River facility. Many prospective visitors would drive through the area and leave if it was full or stay briefly to observe others fishing. There also seems to be a high turn-over at the Russian River facility during a 24-hour period.

With an average person per vehicle of 3.5 persons, an estimated 77,528 persons may have come into contact with the Russian River Access Area between June 8 and August 5. This represents an apparent increase over 1978-1979 only because of improved counting methods. Installation of the traffic counter during 1980 makes 1980 generally more reliable in terms of total activity. The current powered ferry that operates under a Special Use Permit, transported approximately 22,000 visitors during the 1980 summer season.

The area, in its second year as a U.S. Recreation Fee Area, collected a total of $7,336.75.

The Russian River Access Area continued to operate during 1980 under the Interim Management Plan that was initiated in 1979. Based on a detailed analysis, an addendum was added prior to the 1980 season reflecting minor changes that needed to be made.

The Kenai staff continued to meet with U.S. Forest Service personnel in furtherance of cooperative management of the area. Lynn Mitchell, Recreation staff specialist, wrote a draft management plan for the USFS campground and lands involved with the fishery. Kenai staff participated in reviewing and offering input to its finalization. Refuge input generally asked the Forest Service to go slow in any developments that would increase the volume of visitors to the refuge portion of the fishery.

The litter incentive program, initiated in 1979, was again used during 1980 and met with much success. The popular program helped in keeping the area clean and providing positive contacts between staff and visitors. Other litter control measures met with less success. They included the ban on disposable containers on the south side of the Kenai River. Litter continues to be one of the major problems at this area.

Other continuing programs such as the contracted solid waste disposal, walk-in tent camping area, new interpretive exhibits, and increased refuge staff visibility all seem to meet management expectations. However, law enforcement capability at this area continues to be inadequate.

Also instituted during 1980 was a refuge closed area to fishing on the shore adjacent the ferry's docking point on the south side of the Kenai River. This program has improved safety for passengers aboard the ferry. Only minor compliance problems were noted as a result of this closure.

Employees at Russian River continued as in 1979 to be the central asset in improved management and control of the area. Related to this, employees were again temporary housed in the east-central portion of the refuge. This greatly assisted refuge staff availability to the public, even though staffing levels were lower than 1979.

c. Hunter Check Stations - were operated for both sheep hunting and moose hunting seasons. During August, observers were placed at several mountain lakes. This program allows us an exact count on Dall sheep and bears harvested, as well as public contact with a generally difficult to monitor activity. During the September 1-20 moose season, hunter check stations were established on Mystery Creek and Swanson River Roads. Swanson River Road is open year around and Mystery Creek was open only for the period of September 1 - October 20. This program was seemingly popular with the public as well as with various staff. Employees of the check stations asked hunters various questions pertaining to harvest success, where they hunted, other activities engaged, length of stay, previous visits to the refuge area, etc. The

The stations were operated for biological and public use information as well as a subtle law enforcement/public contact took (Tables 21 & 22). Contacts with hunters and other recreationists were informal and pleasant and refuge personnel were able to assist hunting parties in complying with refuge and State regulations.

Twin Lakes within the Andy Simons Unit of Kenai Wilderness is used by fly-in hunters and back packers. Twin Lakes is used as a contact point for sheep hunters who fly in to hunt adjacent ridges. R. Johnston

A preliminary look at the information gathered shows many other recreationists took advantage of the opening of Mystery Creek Road and that many parties were engaged in multiple recreational activities. Table 20 reveals som of the information collected.

Table 20 MYSTERY CREEK - MOOSE CHECK STATION - 1980

Kenai National Wildlife Refuge, Alaska

Dates: Sept.	1	2	3	4	5	6	7
# Hunts	95	33	25	30	19	13	17
# Hunters	170	60	43	56	35	26	36
Hours of Hunt Effort	1,588	492	414	439	197	159	257
# Moose Taken	5	0	2	0	0	1	3
♂ Moose Observed	2	1	1	2	1	2	0
♀ Observed	21	18	22	39	19	8	21
Calves	6	6	5	14	2	2	6
Previous Hunt on KNWR							
Yes	63	33	19	14	9	8	9
No	29	0	6	16	10	5	8
Previous Success on KNWR							
Yes	11	5	1	1	0	1	1
No	80	18	24	29	19	12	16
Road Hunters							
# of Hunts	29	11	17	21	9	3	7
# of Hunters	59	17	30	46	18	7	16
# of Moose Taken (on Road)	0	0	0	0	0	0	0
# of Local Hunters	74	25	18	13	13	9	10
# of Non-Local	20	8	7	15	6	4	7
# of Non-Resident	1	0	0	2	0	0	0

Table 21 SWANSON RIVER ROAD - MOOSE CHECK STATION - 1980

Kenai National Wildlife Refuge, Alaska

Dates: Sept.	1	2	3	4	5	6	7
# Hunts	186	67	90	55	66	91	104
# Hunters	309	116	138	89	61	130	166
Hour of Hunt Effort	1,584	613	964	636	302	476	1,134
# Moose Taken	25	6	4	1	4	7	1
♂ Moose Observed	10	3	1	6	11	4	10
♀ Observed	138	98	77	86	70	16	77
Calves	48	28	32	17	41	53	27
Previous Hunt on KNWR							
Yes	132	49	65	28	38	51	61
No	54	13	25	20	28	26	36
Previous Success on KNWR							
Yes	21	4	13	7	8	9	11
No	165	58	77	41	58	67	87
Road Hunters							
# of Hunts	73	16	26	9	30	37	37
# of Hunters	116	25	46	17	45	59	54
# of Moose taken (on Road)	0	1	1	0	0	0	0
# of Local Hunters	173	59	69	42	50	76	84
# of Non-Local	13	7	18	11	14	14	19
# of Non-Resident	0	1	3	2	2	1	1

d. Trapping - Since the local trapping season overlaps two calendar years, this station is reporting for the 1979-80 trapping season. Seasons and bag limits are established by the Alaska Board of Fish and Game. Permits were issued by the refuge to 105 trappers between October 1979 and April 1980. Permit holders indicated means of transportation while trapping as 40% aircraft, 40% snow-machine, 12% auto, and 8% dog team, skis, or walking. Eighty-four trappers were peninsula residents while 20 were from the Anchorage area, with the number successful, 30 and 2 respectively. Over 50% of trappers reporting that used snowmachines, autos, dogsled, or walking reported success while only 17% of the trappers using aircraft reported catching a furbearer. This last figure may be misleading as many permit holders with aircraft set no traps, the animal with a rifle.

Concern over the increased use of aircraft for "Land and Shoot Hunting" prompted the refuge to temporarily prohibit land-and-shoot trapping on that portion of the refuge north of the Kenai River. While the closure generally met with approval by the trapping public, sufficient pressure was generated that the regulation was withdrawn.

e. Trail Study - Two trips by refuge and HCRS staff were make during the summer to examine sections of a proposed Cross-Kenai Trail connecting the Forest Service Resurrection Trail to the Fox River area south of the refuge. The trail was originally proposed in the 1960's although this is the first time it has come under serious consideration and field examination from various agencies. Provided sufficient data has been collected, a write-up of the field investigations and subsequent recommendations will be completed in 1981.

Refuge Biologist Ted Bailey investigates a Tustumena River crossing during a Cross-Kenai Peninsula Trail Study. The highly fluctuating Tustumena River drains the excess water from Tustumena Glacier and terminates in Tustumena Lake. E. Bangs

Refuge staff set up camp in the Kenai Mountains during a trail investigation field trip. The open nature of the benchland areas of the refuge allow relatively easy off-trail travel. R. Johnston

f. Other I&R staff activities included the operation of 6 campgrounds, 21 access areas, 7 waysides, over 100 miles of hiking trails, an Environmental Education Site, a Y.A.C.C program, and various planning efforts. During 1980, a draft sign plan was developed for the refuge to bring present signing into compliance with the recently completed Refuge Sign Manual. The plan will be finalized and implementation initiated in 1981.

2. Non-Wildlife-Oriented

Boating, non-wildlife-oriented camping, ice skating, cross country skiing, and snowmobiling activities continued with no significant change from previous years. Winter activities normally enjoyed during November and December were not available to the public as rain dominated the weather patterns. The lack of snow precluded opening any of the refuge lands to snowmobiling this winter.

C. Enforcement

The State Fish and Wildlife Protection has provided excellent cooperation in Law enforcement assistance and reporting federal and refuge regulation to our office. Many of the fish or game violations are given to the State for prosecution because they process the case through their court system in only a few days as compared to the Federal System which often takes months. Many of the offenders live in the Kenai area and thus do not have to commute to Anchorage if they wish to appear in court. State fines in most cases exceed the penalty imposed by the Federal Courts.

Law enforcement efforts at this station continue to be far below the level necessary to adequately address the violations which occur. Reconveyance of enforcement authority to staff members who once held that authority, the training of an additional staff member and planned stationing of a law enforcement agent at the Kenai Office in 1981 should greatly aid enforcement efforts in the future.

Violations processed during 1980:

Violation Type	# of Cases	Fine
Fishing w/o license	2	No action
Fishing w/o license in possession (State)	4	1-$500/250 sus 1-Pending 2-Dismiss
Parking in prohibited area	12	$15.00 each
Parking in prohibited area	3	dismiss
Driving off roads	10	7-$100 1-$100/50 sus 1-$100/75 sus 1-$50
Driving off roads	1	Dismiss

Violation Type	# of Cases	Fine
Aircraft landing in prohibited area	2	$100 each
Aircraft landing in prohibited area	1	Dismiss
Aircraft landing in prohibited area	1	Pending
Unauthorized advertisement	1	$50
Cutting wood w/o permit	3	$25 each
Unauthorized boat storage	3	$25 + $90 impound costs
Unauthorized commercial camps	6	3-$100 1-dismissed 2-Remove camp & lose SUP
Shooting cow moose	1	$20,000 bond forfit & 45 days in jail/ 30 suspended

We had expected a big influx of sheep hunters using the refuge in 1980 because of lands in Alaska that were withdrawn for National Parks and thus closed to hunting. Four check stations were set up at lakes where most hunters gain access to the better refuge sheep hunting areas. A total of 20 man days were spent at the check stations checking 30 hunters. Only two sheep were checked and measured. Wet and windy weather the first 10 days of the season, commercial fishing season was only fair and still open, and a general depressed economy were some of the reason suspected for the lack of sheep hunting this year.

Check stations were again established at the Mystery Creek and Swanson River roads during the first week of the moose season. These stations were used as a subtle law enforcement-public contact tool. The stations were very successful in that several reported violations were investigated by enforcement officers immediately rather then several days after the fact. A case which resulted in a fine of $20,000 and 15 days in jail was the outcome of a illegal aircraft assisted cow moose shooting.

Four vehicles were broken into and ransacked on July 22, in the FWS Compound at Kenai. A Polaroid SX 70 camera was taken from a government vehicle, a hunting knife was taken from the glove box of a personal vehicle parked at the residence, a window was pried from the canopy of a truck and a sleeping bag removed. The sleeping bag was found in the bushes nearby. No apprehension resulted from the incidents.

The police reported several breakins had occurred within a few nights of that event; however, none of the stolen articles were recovered.

On November 22, at the New Headquarters Site, a dodge pickup was jacked up and all the tires and rims were removed plus the cab was broken into and the spare tire was taken. The incident was still pending at the end of the year with no leads developed.

VI. OTHER ITEMS

A. Field Investigations

1. Wolf-Moose Predator-Prey Study - Investigators: Rolf O. Peterson and James D. Woolington.

   In 1976, uncertain relationships between the moose population to. increased human pressure, weather, declining habitat, and predation lead to a co-operation Federal-State study of wolves, bears, and early moose calf mortality. Since this time, the refuge staff has been involved with the portion dealing with wolf ecology and wolf-moose relationships.

   The year began with 17 radio-collared wolves in 7 packs which were monitored for activity and predator-prey relationships. During the year, 9 wolves were live-trapped and 6 darted from a helicopter. Of these, 6 were recaptures which prove valuable for long-term information on individual wolves. Eleven radioed wolves from the study packs were taken by hunters or trappers, 2 died of natural causes and 7 are listed as "status uncertain" (either dispersed out of the study area or experienced premature transmitter failure). At years end only 8 radios remained transmitting in 4 study packs. Twenty-one wolf and 3 coyote carcasses, obtained from furtrappers on the refuge, were examined for age, sex, and mophometric information. Nineteen moose carcasses were examined for cause of death, age, sex, and physical condition.

   Research finding are being completed by principal investigator Dr. Rolf O. Peterson at Michigan Technological University and will be incorporated in future management plans.

2. Nutritional Basis for Qualifying the Capacity of the Kenai National Moose Range to Support Moose. Investigators: Wayne Regelin and Dennis Neeker, Denver Wildlife Research Center. Period: 1977-1982.

   Work continued using six captured moose that were raised at the Moose Research Center. These moose have been trained to accept handling and confinement in the respiration chamber for metabolic rate measurements. These and other moose will be used to:

   a. Estimate the quantity of food intake during each season.

b. Obtain activity budgets of free-ranging moose for 24-hour periods each season.

c. Measure the fasting metabolic rate of moose each season.

d. Measure rumen turn-over time each season.

e. Determine rumen volume in different sex and age classes of moose.

Other objectives to develop a carrying capacity model for moose of the Moose Range include:

a. Mapping vegetation types on the Kenai NMR.

b. Sampling each type for estimates of shrub density and standing-crop biomass of herbage and forage.

c. Determine forage preferences of moose throughout the year.

d. To evaluate the nutritional quality of major forage species throughout the annual cycle.

3. Moose Research Center Studies - Investigators: A. W. Franzmann and C. C. Schwartz, Alaska Department of Fish and Game. Period: 1977-1980.

Research continued on the black bear project that was initiated in 1977. Black bears were captured in the vicinity of the Moose Research Center in the spring and monitored throughout the summer and fall. During the winter, bears were drugged in their dens and physiological data collected. Preliminary results suggest black bear avoid open habitat and that this behavior may result in the different mortality rates witnessed among moose calves born in open versus dense vegetation types. Cranberries appear to be the basic food source for black bears on the Kenai Lowlands.

In the fall of 1979, an experiment in moose reproductive biology was started. All bull moose in one Moose Research Cneter pen were removed to allow the cow moose to experience their first estrus period without being bred. A bull was then put into the pen in late October to determine if cows bred during the second estrus period would have late or small calves. Due to lack of time and difficulties in seeing calves, only 1 calf was seen and it was born in July, a full month later than would be normal. Plans were made to continue with the experiment in the fall of 1981 using radio-collars on the cows.

4. Summer Ecology of the Common Loon - Investigator: Elizabeth Smith.

Liz Smith finished the second and last summer of her field work in 1980. She returned to school to finish classwork and write her masters thesis this winter. In a stratified sample of lakes on the refuge, Liz estimated a refuge loon population of 1,668 birds. Territory size for the canoe system loons (6 pair) averaged 40 ha. while territory size was 44 ha. for loons (11 pair) in the control lakes. Nesting success was similar for both study areas but because only half as many loons nested in the canoe system lakes compared to the control lakes, it appears that canoeists do affect common loon production.

5. Willow-Insect-Moose Relationship

A field project was initiated by the staff to measure possible differences in moose browsing preferences of willow in relation to whether a stem had been parasitized by saw flies and a gall formed on the twig. Ten willow stems with galls, and ten without galls were marked and measured in each of 15 separate locations. The measurements taken in October, 1980 will be compared to measurements taken in May, 1981 to determine if insect galls effect moose browsing pressure on willow. Results should be available by June 1981.

Insect galls on willow stems may discourage moose from feeding on paratized stems. E. Bangs

6. Moose Movement and Distribution in Response to Winter Seismological Exploration on the Kenai National Wildlife Refuge, Alaska - Investigators: E. Bangs and T. Bailey. Period: 1980-1982

This project is being conducted by refuge personnel under a grant from Atlantic Richfield Company. The project started in November, 1980 with the capture, and collaring, of 60 moose, 30 in each of two study areas. In the Slikok Lake area, moose are being tracked and observed to assess their response to a 4 month long seismic exploration program being conducted by ARCO for the Cook Inlet Region Corp. In the control area near Finger Lakes, there is no seismic program and moose are monitored there to obtain data for comparison to the Slikok Lake area. The radio-collared moose are tracked from aircraft as often as weather permits. Information from this study should not only determine what effect blasting, helicopters, and human activity have on wintering moose but also provide data on moose migration routes, calving areas, predation rates, habitat selection, and the herd sex and age structure.

Biologist prepares to shoot tranquilizer dart at moose in the Slikok Lake Study Area. G. Lenz, ARCO-Alaska, Inc.

A cow moose looks dazed after being captured and radio-collared in the Finger Lakes Control Area. G. Lenz, ARCO-Alaska, Inc.

7. Fisheries Resource - Investigators: L. VanRay and J. Freidersdorff. A number of lakes on the refuge were investigated for water quality characteristics. Analysis by ADF&G limnologists indicated most sampled lakes were extremely oligotrophic.

   In response to a concern by the refuge staff regarding the impacts of industrial gas emission (nitrous and sulfer dioxides) in the North Kenai Area on refuge lakes, additional water quality analyses were conducted on several lakes. These data were inconclusive, as no obvious trend in the ph of water in the sample lakes was found in relation to distance from the pollution source.

   Index mapping of the refuge streams was intitiated using the STORET system. Numbering and measurements were completed on the Kenai, Kasilof, Swanson, and Chickaloon Rivers.

   A survey of a one-mile section of Mystery Creek by ADF&G and Fisheries Resources personnel suggested that sockeye and king salmon numbers had decreased form the previous year.

   A review of the Tustumena Lake Project (an ADF&G project) was made and suggestions and recommendations made to the refuge manager.

8. Alaska Department of Fish and Game Fisheries Project

Tustumena Lake - Approximately 5 million sockeye fry were planted in Tustumena Lake in 1980 and 14 million eggs were taken from brood stock (8 million-Bear Creek, 6 million-Glacier Falts Creek) in Bear and Glacier Flats Creek. Studies on the productivity of Tustumena Lake continue and include smolt outmigration estimates, peak sockeye escapement counts on seven index streams into Tustumena Lake (Bear Creek, Glacier Flats Creek, Moose Creek, Nikolai Creek, Seepage Creek, Clear Creek, Crystal Creek), limnological sampling, and tow netting to estimate fry abundance in the Tustumena Lake.

Hidden Lake - Although limnological studies of Hidden Lake continued, sockeye salmon fry were not stocked in Hidden Lake 1980 because of hatchery problems. Low water flow and siltation in the hatchery water supply at Crooked Creek Hatchery were mainly responsible for the loss. It is now planned to stock sockeye fry into Hidden Lake after the Trail Lake Hatchery is in production or sometime in 1982 or 1983.

Russian River - High water levels occurred in the Russian River during the 1980 spawning period. Because of this, the Russian River fish pass was opened to enable sockeye to by-pass the Russian River Falls. Although there were some minor problems with the fish pass, spawning sockeye appeared to use the tunnel and by-passed the falls. Other aspects of the Russian River sockeye salmon study include outmigration counts of sockeye smolts, assessment of adult escapement, a creel census, and fecundity investigations.

Fisheries Research - A cooperative study by the USFWS and ADF&G to document spawning areas used by Kenai River king and silver salmon revealed that radio-equipped king salmon moved up the Kenai River and Killey River to the confluence of Benjamin Creek. It appears that major king salmon spawning area is located in this region. The extent and locations of other salmon spawning areas on the refuge will be documented in a report in early 1981.

B. Cooperative Programs

1. YCC

The Kenai did not sponsor a YCC camp this year. Due to activation of a YACC camp on the refuge in 1980 and the refuge involvement in comprehensive master planning the staff concentrated its efforts in those directions. Plans are to reactivate the YCC camp in 1981.

2. YACC

During the first 5 months of 1980, YACC was in action on the Kenai, but without a crew leader. In May, Brian Canaiy was hired as a Group Leader under the Boise Office. Due to budget cuts, the refuge was not able to hire any maintenance people for the summer season and YACC was used in their place. From October 1 to November 12, there were no enrollees on board. Once the hiring freeze lifted, 12 enrollees were hired. There were 9 enrollees working successfully on many different projects at the end of the year.

Work projects performed by YACC enrollees included: clerical assistance, 1100 sh; facility maintenance, 286 sh; lab assistant, 170 sh; recreation assistant, 150 sh; canoe construction, 100 sh; trail maintenance, 578 sh; biological aid, 707 sh; cabin construction, 340 sh; browse clipping for Moose Research Center, 1215 sh; campground maintenance, 832 sh; carpenter/mechanic 885 sh; and receptionist, 1663 sh. Total labor cost of 1980 projects $30,454.12. Estimated cost, had projects been accomplished through refuge staff would have been $57,000. Despite the additional administrative workload, there is little doubt as to the programs value to refuge operations.

3. Alaska Natural History Association

The Kenai National Wildlife Refuge entered into a cooperative agreement on September 4, 1979 with the Alaska Natural History Association (ANHA) to sponsor a branch cooperating association outlet. Titles became available for sale in May, 1980. The Kenai Branch had a low volume, but successful year with twelve titles and seven visual aids for sale at year's end. Start up was a little slow and sales have remained rather modest though interest by visitors seems enthusiastic. As more visitors discover the now Kenai National Wildlife Refuge Headquarters, we expect sales to increase significantly. As part of the visual aid inventory, three slide series were developed for the KNWR, ANHA branch sales. Sales have been modest but the quality of the slide sets and reasonable price is sure to make then quite popular in years to come. The Kenai slide sets are also being make available at the U.S. Fish and Wildlife Service Anchorage Office. A sales display rack was received at Kenai in late August and is now being used to display sales items. The display rack was purchased with BLHP funds.

Approximately 94 ANHA items were sold during 1980. No new titles are proposed for 1981. Present inventories will be kept at adequate levels. Visitors that came in contact with the cooperating association outlet on Kenai NWR numbered approximately 1,000. Visitors were primarily local residents and information seekers. This number should increase significantly when the new location of the Kenai Office becomes known and when interpretive displays are completed. Employee staff hours expended on Association activities were approximately 100 hours and YACC assistance was approximately 200 hours. Because of start up of this new project additional staff hours above what is now required were necessary. Gross sales for Kenai during 1980 were $382.00.

Association activities in conjunction with the Kenai Branch included contributions of funds toward upgrading Kenai National Wildlife Refuge's Headquarters reference library.

Titles purchased with these funds were for staff and public usage. Approximately 25 additional titles are funded for 1981. Eight hundred and twenty dollars were budgeted for 1980 for this project, though only five hundred was actually expended. The library request for 1981 is increased to fifteen hundred dollars. For further information reference ANHA Annual report and/or ANHA report to USFWS Director in refuge files.

4. Special Use Permits

A new tent camp policy was reviewed, and discussed with all the interested commercial operators and then signed off by the Area Director in early 1980. Two camps were phased out because of conflicts with nesting trumpeter swans. The permits of two camps were revoked because of non-use by one permittee and reissued to two other operators. One operator had his permit revoked for not renewing the permit and establishing a second camp on the refuge without a permit. Another permittee had one of his camp permits revoked for non-use as well as a permit cancelled for keeping a boat at a FWS recreation cabin.

Listed below are the permittees and their camp locations:

Anderson, Gary-Big Red's Flying Service, Anchorage
2 tent camps-Two Island Lake

Aregood, Bill-Alaska North Flying Service, Anchorage
1 tent camp-Trapper Joe Lake
1 tent camp-Lower Tangerra Lake

Cogger, Donald-Alaska Air Guides, Ind., Anchorage
3 tent camps-King Lake

Ketchum, L. H.-Ketchum Air Service, Anchorage
2 tent camps-Snag Lake
1 tent camp-McLain Lake
1 tent camp-Wilderness Lake
1 tent camp-Scenic Lake

Klosterman, David-Alaska Bush Carriers, Inc., Anchorage
2 tent camps-Mull Lake
2 tent camp-Bedlam Lake
1 tent camp-Sportfish Lake

Rust, Hank-Rust's Flying Service, Inc., Anchorage
1 tent camp-Bird Lake
1 tent camp-Tangerra Lake
1 tent camp-Sandpiper Lake

Marshal, Lynwood-Alaska Floatplane Service, Inc., Anchorage
1 tent camp-Neckshorta Lake

Willard, Jess-Willard's Moose Camp, Homer
1 cabin-Caribou Hills
Geneo Wheeler-GenKar, Inc., Cooper Landing
Helander, Don-River Riders, Anchorage
Wright, Bill-Alaska Campout Adventures, Anchorage

The above three outfitters were issued special use permits for river float trips and fishing on the Upper Kenai River to Skilak Lake Campground.

Towne, Carleton, Sr., Kenai River Ferry, Anchorage

Mr. Towne has a SUP to operate a ferry boat a the confluence of the Russian River on the Kenai River for sport fishermen during the red salmon season.

5. Oil and Gas

a. Beaver Creek Oil Field - There were no drilling operations conducted within the Beaver Creek unit this year. The Unit Operator, Marathon Oil Company, does not propose further drilling activities unless either a market for the gas develops or continuing geologic studies of the area show further exploration to be warranted. There are at present 6 wells in the Field; 2 producing crude wells, 3 capped gas wells, and one gas well occassionally utilized for gas lift purposes. Crude production this period from both wells 4 and 5 averaged 560 bbls/da. or about 214,500 bbls. for the period. Cumulative production for this Field through November 30, was 2,323,652 barrels of oil. All revenue crude has been tanker trucked from the Field mostly to North Kenai Refineries.

b. Swanson River Oil Field - Crude production not only produces gas but salt water as well. Following separation, water is injected into disposal wells completed in shallow salt water sands. One of two water injection wells (41-33 WD) failed during the period leaving only well 221-33 to accept the average 8,000 B/D for disposal. Failure of the water disposal facilities would shut down field production and cause some anxious moments. Soon after loss of the 41-33 W.D. well, a snubber unit was on the scene to workover this well returning it to operational status. The second water disposal well 221-33 was provided the same attention to insure continued flawless operation. Concern for these water disposal facilities has prompted the Unit Operator, CHEVRON, U.S.A., to request authorization to drill two additional water disposal well in the area.

Continued problems with tubing used to transport waste water necessiatated the installation of new 4-inch fiberglass lines from the T.S. -4 tank setting to 1-33 waste water facilities and from this facility to the 221-33 disposal well. An unusual amount of surface area adjacent the existing road system was disturbed by the contractor during installation of the two lines and will require further restoration next summer.

CHEVRON was given approval to extend the Field airstrip from the present 3,061 feet to 3,500 feet. Although this proposal surfaced five years ago, was approved, and the existing cleared extension area available, it took two aircraft incidents last winter to place proper priorities on the project.

During the same period, an airfield beacon positioned on the adjacent generator building was relocated on a steel tower reaching slightly above treeline and now providing a proper navigational aid to pilots using the facility.

Cumulative oil production for the Swanson River Field through October 31, is 188,878 384 barrels of oil. This represents since first production in 1957 a recovery of 41.8 percent of the estimated 452,000,000 barrels of original oil in place. Current oil gravity is 41.4 API. Daily production in October from 42 wells was 9,812 B/D. This is an 18 percent drop from the daily production in 1979, and represents a combined Field decline form the 38,000 B/D produced in the late 1960's. All crude is shipped from the Field via the Kenai Pipeline Company's 20-mile line to North Kenai facilities.

The Hemlock production zone pressures are maintained by 15 huge gas compressor units developing 38,000 hp. Using 11 injection wells, about 320,000 MCF gas is reinjected daily at nearly 6,000 gpsi.

Propane is also produced as a spin-off of gas recovery operations and sold commercially. Propane sales averaged 7,433 Gal/Da., slowly decreasing because of reduced crude production.

In its present state, the Swanson River Field will continue to yield oil in commercial producible quantities until the 1990's say CHEVERON officials. If the future $5-$11 million drilling program aimed at enhancing production of existing wells is a success, the life of the Field could be extended beyond the year 2000.

The longevity of the Field is dependent upon the proposed workovers to "side-track" 5 existing wells, and consideration to drill two new wells. If the "side-track" operations are successful, additional field work could continue three to five years during workovers of 20-25 wells of the current 63 that are mostly operational. Most wells date from the early 1960's and are in poor mechanical shape. Reworking them has not been economical because of the low price of crude. Deregulation and price increases for U.S. crude now makes this possible.

Workovers are not aimed at increasing the Field's current level of production of about 10,000 barrels per day but rather holding that production steady and increasing the life of the Field. But if this investment fails to pay off, Field crude production can be expected to decline and a shutdown to follow.

c. Seismic Operations - ARCO Alaska, Inc., under agreement with Cook Inlet Region, Inc., and acting as contractor to conduct a three-year seismic program related to subsurface lands conveyed to CIRI under ANCSA, completed this period about 265 miles of the 500-mile program. A 70-man base camp was constructed on an abandoned well pad site in the Swanson River Oil Field. From this camp two crews supported by three helicoptors ferried men and equipment to and from seismic lines and other operational areas generally west and northwest of the Oil Field. No brush was cut, trails or lines constructed, or surface vehicle use utilized, during the 1979-80 season which ended March 31.

Mile-Hi Exploration of Denver is conducting the seismic program. Surface shot points arrays using parallel lines and 72 one-pound charges, connected with 50 grain primacord, all placed on at least 12-14 inches of snow have been found to provide proper and sufficient energy to develop satisfactory subsurface structure formation read-outs. In open areas or those with minimal snow cover, wooden stakes are used to elevate charges to prevent undue surface disturbance.

Aerial view of seismic lines after being shot with 72 one-pound charges and primacord. R. Richey

Closeup of the shot marks. Even the exposed vegetation shows little disturbance. R. Richey

During the 1980-81 season which began November 22, with the P-6 crew staying at the Swanson River camp, two lines were completed for 30 miles before the crew left for Christmas break December 22. Upon their return January 2, this 35-man crew will newly housed at a new camp facility constructed within a gravel pit site adjacent Funny River Road.

The first season (1979-80), 190 miles of the 500+ mile project was completed. During the beginning of the second season (1980-81), 30 miles had been completed and by the end of the second season a total of 460 miles of the 3-year project should be finished. The third season (1981-82) should probably involve only one crew, one camp, and concentrate at several specific but limited locations.

Of several types of seismographic operations conducted on these lands during the past 23 years, this helicopter operation has proved by far the least damaging to surface resources.

C. Items of Interest

Refuge Manager, Jim Frates, resigned in August of 1980 after suffering one or more heart attacks over the past several months. Jim and his family remained in the local area.

The refuge temporary intermittant janitoress position was terminated on 9/29/80 due to lack of funds.

Robert Delaney (and family) transferred from the Kodiak NWR in late August to assume the Refuge Manager position. Bob arrived just in time to enjoy about 3 weeks of beautiful fall Kenai sunshine and dry out from the wet Kodiak climate.

On August 12, 1980, a new refuge manager trainee was added to the Kenai staff. A seven pound twelve ounce girl was born to Assistant Manager, Linda Gintoli and her husband Carmen. Although a Career Development Plan has not been prepared, the proud parents are predicting Odetta will become the first woman president.

D. Safety

There were a number of accidents reported that occured on the refuge during the year. Only two, however, involved FWS employees with four additional accidents from YACC staff.

Employee	
FWS	Stepped in hole and twisted knee
FWS	Strained lower back by working bent over
YACC	Branch struck eye while working
YACC	Strained back while digging ditch
YACC	Cut finger while clipping browse
YACC	Backed vehicle into D-8 Cat
Visitor	Crashed Airplane when approaching Kenai
Visitor	Went through ice on snowmachine and drowned
Visitor	Quick draw activity and received gunshot wound
Visitor	Fell overboard and drowned while docking boat
Visitor	Cut hand with knife when reaching into the camper cupboard
Visitor	Crashed airplane while making turn in mountains
Visitor	Drove vehicle through wooden fence at high speed

Safety Meetings were held throughout the year with individuals from the staff presenting various topics. The following is a listing of topics presented:

January - Winter Driving
February - Cross Country Skiing
March - Boating Safety and Emergency Plans
April - Search and Rescue
May - General Safety and Safety in Bear Country
October - Fire Safety
November - Aircraft Survival

TUXEDNI NATIONAL WILDLIFE REFUGE
(TUXEDNI WILDERNESS)
Chisik Island, Cook Inlet, Alaska

ANNUAL NARRATIVE REPORT
Calendar Year 1980

NATIONAL WILDLIFE REFUGE SYSTEM
Fish and Wildlife Service
U.S. DEPARTMENT OF THE INTERIOR

Alaska Maritime National Wildlife Refuge
Gulf of Alaska Unit
Tuxedni National Wildlife Refuge

The passage of Public Law 96-487 on December 2, 1980 by Congress established several new conservation units and made additions to several existing refuges in Alaska. Tuxedni National Wildlife Refuge was established by executive order #1039 on February 27, 1909 to preserve the area as a breeding ground for native birds. The six acre Duck Island, off the northeast end of Chisik Island, was included as part of the refuge.

A wilderness study was conducted in the mid-60's and wilderness hearings were held on April 20, 1967. The Islands were designated wilderness on October 23, 1980 (P.L. 91-504), excluding approximately 50 acres lying below the 100 foot contour in the north ½ of section 17, T 1 S, R 19 W, S.M. The 50 acres below the 100 foot contour elevation were deleted to accommodate the Shore-based shelter structures used in support of commercial fishing activities occurring aong the shoreline of the Island. This, in effects, was compatability determination to isolate the commercial activities to the north end of the Island.

Two inspection trips were made to Chisik Island in 1980. The first one, on September 11, was aborted, after reaching the Island, because of strong cross winds that would have made a beach landing hazardous. The second trip, on September 23, was conducted via float plane and an inventory of shore-based shelter structures equipment, and boats was completed.

The former Munger structure (reference map #1), which is in the wilderness area, is being used illegally by Richard King. Mr. Munger had a life-time special use permit and upon his termination of its use or his death the heirs had one year to remove the structures or the facilities became the property of hte government. The fishing site was acquired by Mr. Richard King in 1979 from the Munger heirs and he began illegal occupancy of the cabin during the summer fishing season.

Two other illegal shelter structures, both within the wilderness area, exist and the locations are shown on map #1.

Mrs. Oscar Haynes' heirs received fee title to four acres at the northern end of Chisik Islan through a conveyance signed by Secretary of Interior Andrus in January 1981. The Haynes had submitted application for 160 acres as a primary place of residence under the Alaska Native Claims Settlement Act.

At present, there are three Special Use Permits issued for shore-based fishing hselters at the northern tip of Chisik Island. Those under permit are:

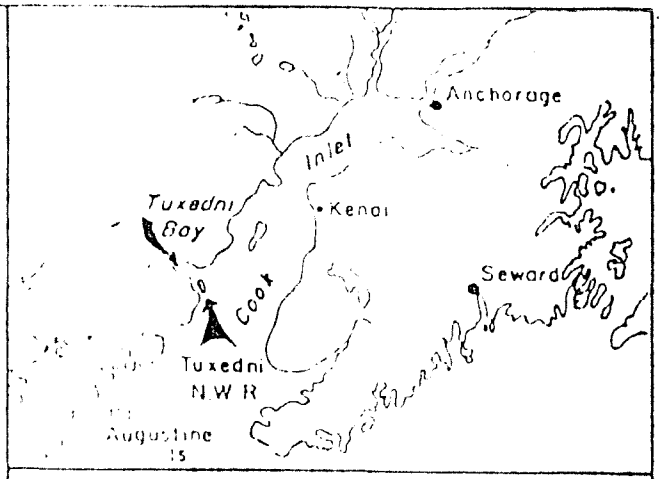
KN 6-80 Harry G. Forquer, Homer, Alaska
KN 15-80 Marvin S. Kistler, Soldotna, Alaska
KN 16-80 Ronald Isaacs, Kenai, Alaska

None of the above permittees are in the wilderness nor are the four acres obtained by Haynes through ANCSA. However, the old Munger cabin and two other unauthorized structures are as shown on map #1.

Map #2 shows the State of Alaska-issued shoreline fisheries leases that exist along Chisik Island. These leases are below mean high tide and not within the jurisdiction of the refuge. These locations indicate the possible impact they have on refuge lands as the fishing season and sea bird nesting period takes place during the same time period.

A procedural paper identifying steps to be taken to bring all the shore-based fishing sites into compliance with refuge policy and law was prepared and will be initiated next season. The political climate that exists at the time of implementation next year is expected to influence the final resolution of this long standing problem.

Map # 1



VICINITY MAP

TUXEDNI BAY

Kistles (Cabin)
Forquer (Cabin)
Haynes (Cabin - two)
Isaacs (Tent)

Tidal Flats

Wilderness

FWS Cabin (Formerly Munger's)

CHISIK ISLAND

DUCK ISLAND

Unauthorized Cabins

Tidal Flats

CHANNEL

Snug Harbor Packing Company

Private Inholding

N

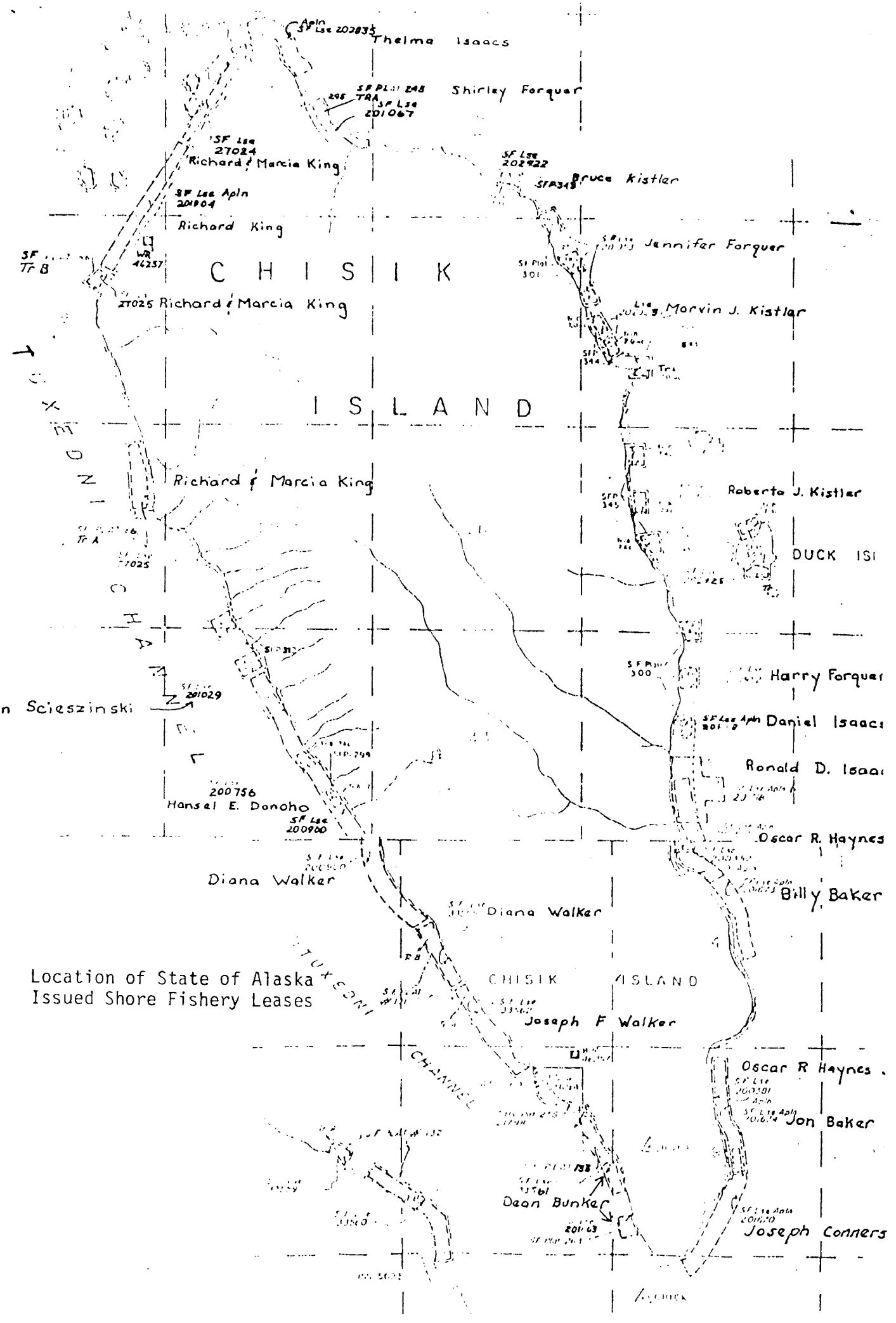
SCALE 0 ½ 1 2 MILES

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF SPORT FISHERIES AND WILDLIFE

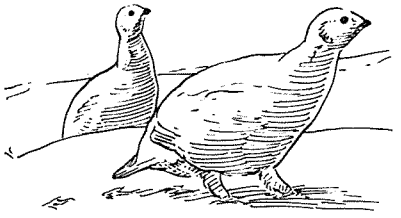
TUXEDNI

NATIONAL WILDLIFE REFUGE

Location of Fish Camps on Chisik Island



Location of State of Alaska
Issued Shore Fishery Leases



BIRDS OF THE KENAI NATIONAL MOOSE RANGE

The Kenai National Moose Range was established in 1941 to ensure the continued existence of this great animal and its habitat. This 1,730,000-acre range is located in the northwestern part of the Kenai Peninsula in south-central Alaska. Headquarters are in the city of Kenai.

The Moose Range extends from Turnagain Arm on the north to the Caribou Hills and Sheep Creek on the south, and from the Kenai Mountains and Chugach National Forest boundary on the east to the homestead area bordering Cook Inlet and the Kenai River.

The area possesses two distinct physiographic features--the Kenai Mountains and the Kenai lowland. The lowland portion, comprising three-fourths of the refuge, was once covered by a large valley glacier, leaving a myriad of lakes in the wake of its retreat. The area is drained by four principal rivers, the Chickaloon, Swanson, Kenai, and Kasilof, the last having its origin in the glaciers of the Harding Ice Field.

Vegetative cover varies in the lowlands from muskeg swamp to a white spruce climax on the drier sites. Stands of birch, aspen, cottonwood, willow, alder, and black and white spruce occur in pure stands and mixtures. The understory is composed of sedges, grasses, lichens, shrubs, mosses, and herbaceous plants. A considerable amount of alpine tundra exists above timberline.

Thousands of waterfowl use the rivers, lakes, muskegs, and mud flats as resting and feeding places in their migrations, with twelve species nesting in the area. Large numbers of shore birds and countless land birds also breed in the area. The rare trumpeter swan, a bird requiring wilderness isolation, nests on the interior lakes.

In addition to the giant Kenai moose, bands of white or Dall sheep and mountain goats may be found in the mountains, with limited numbers of big brown bear and the more abundant black bear distributed throughout the area. Fur animals include the beaver, land otter, lynx, coyote, mink, weasel, wolverine, hoary marmot, red squirrel, and remnant populations of marten, fox, and wolf. Small game includes three species of ptarmigan, spruce grouse, and snowshoe hare.

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Refuge Leaflet 197-R2 · January 1968

All five species of Pacific salmon spawn within the Moose Range, making its waters of great economic importance. Sport fish include rainbow, steelhead, Dolly Varden and lake trout, and silver, king, and red salmon.

Located near Alaskan population centers, the Moose Range provides a much used public area for outdoor recreation. Over 125 lakes are suitable for float-plane operations. Places along lakes and streams near the road system have been developed to provide recreational use by highway travelers. Fishing, hunting, camping, and photography are the main forms of recreation.

Special acknowledgment is given Mrs. Mary A. Smith, Cohoe, Alaska, for the use of her very complete, almost daily records from 1955 through 1962. Much assistance was given by Peter E. Isleib, Anchorage, Alaska, in the form of field work and compiling the list. Critical review was generously performed by Francis S. L. Williamson, Arctic Health Research Center, Anchorage, Alaska. Steven R. Smith, Bureau of Sport Fisheries and Wildlife, Kenai, Alaska, compiled the list.

The list contains 146 regular and 22 accidental or casual species listed separately. Those for which definite breeding records have been obtained are marked with an asterisk. Season and abundance symbols as used herein follow:

S - April-May
S - June-July
F - August-October
W - November-March

a - abundant
c - common
u - uncommon
o - occasional
r - rare
i - irregular

	S	S	F	W
*Common Loon	c	c	c	
*Arctic Loon	c	c	u	
Red-throated Loon	u	u	r	
*Red-necked Grebe	u	c	c	
*Horned Grebe	u	c	c	
*Double-crested Cormorant	u	u	u	
Whistling Swan	c		u	
*Trumpeter Swan	c	c	c	r
*Canada Goose	c	r	c	
Black Brant	r	i	r	
White-fronted Goose	u		u	
Snow Goose	c		r	
*Mallard	c	u	c	r
Gadwall	r	r	r	
*Pintail	a	c	c	
*Green-winged Teal	c	c	c	
*American Widgeon	u	u	u	
*Shoveler	u	r	r	
Canvasback	r		r	
*Greater Scaup	u	u	u	r
Common Goldeneye	c		c	u
*Barrow's Goldeneye	c	c	c	
Bufflehead	u		u	i
Oldsquaw	r		u	i
*Harlequin Duck	u	u	u	i
Common Eider			r	
White-winged Scoter	r	u	u	i
Surf Scoter	r	r	r	
Common Scoter	r	r	r	
*Common Merganser	u	u	c	u

	S	S	F	W
*Red-breasted Merganser	u	u	u	
*Goshawk	c	c	c	c
*Sharp-shinned Hawk	u	u	u	
*Red-tailed Hawk	r	r	r	
*Harlan's Hawk	u	u	u	
Rough-legged Hawk	r	r	r	
*Golden Eagle	u	u	u	
*Bald Eagle	c	c	c	u
*Marsh Hawk	u	u	u	
*Osprey	r	r	r	
Gyrfalcon	r	r	r	r
*Peregrine Falcon	u	r	r	i
*Pigeon Hawk	u	u	u	
*Spruce Grouse	c	c	c	c
*Willow Ptarmigan	c	c	c	c
*Rock Ptarmigan	u	u	u	u
*White-tailed Ptarmigan	c	c	c	c
*Sandhill Crane	c	u	c	
*Semipalmated Plover	u	u	u	
Killdeer	r			
American Golden Plover	u		u	
Black-bellied Plover	u		r	
Surf Bird	r	r	r	
Ruddy Turnstone	r		r	
Black Turnstone	r	r	r	
*Common Snipe	c	c	c	
Whimbrel	u	r	u	
*Spotted Sandpiper	c	c	c	
*Solitary Sandpiper	u	u	u	
*Wandering Tattler	u	u	u	
*Greater Yellowlegs	a	a	a	
*Lesser Yellowlegs	c	c	c	
Pectoral Sandpiper	c		c	
Baird's Sandpiper	r		r	
*Least Sandpiper	c	c	u	
Dunlin	u		r	
*Short-billed Dowitcher	c	c	c	
Long-billed Dowitcher	r			
Semipalmated Sandpiper	r			
*Western Sandpiper	c	r	u	
*Hudsonian Godwit	r	r	r	
Sanderling	r	r	r	
*Northern Phalarope	c	c	u	
Parasitic Jaeger	u	u	r	
*Long-tailed Jaeger	u	r	r	
Glaucous Gull	r	r	r	
*Glaucous-winged Gull	c	c	c	r
*Herring Gull	c	c	c	
*Mew Gull	a	a	c	
*Bonaparte's Gull	u	u	u	
Black-legged Kittiwake	r	r	r	
*Arctic Tern	a	a	u	
Aleutian Tern	r	r	r	
*Great Horned Owl	c	c	c	c
Snowy Owl				r
Hawk-Owl	u	u	u	u
Great Gray Owl	r	r	r	r
*Short-eared Owl	u	u	u	r
Boreal Owl	u	u	u	u
Saw-whet Owl	r	r	r	r
*Belted Kingfisher	u	u	u	i
*Yellow-shafted Flicker	r	r	r	
*Hairy Woodpecker	u	u	u	r
*Downy Woodpecker	u	u	u	r
Black-backed Three-toed Woodpecker	r	r	r	r
*Northern Three-toed Woodpecker	u	u	u	u
*Say's Phoebe	r	r	r	
*Traill's Flycatcher	c	a	a	
*Western Wood Pewee	r	r	r	
*Olive-sided Flycatcher	r	u	r	
*Horned Lark	u	u	u	
*Violet-green Swallow	c	c		
*Tree Swallow	c	a		
*Bank Swallow	c	a	c	
*Cliff Swallow	r	u		
*Gray Jay	c	c	c	c
Steller's Jay				r
*Black-billed Magpie	c	c	c	c
*Common Raven	c	c	c	c
*Black-capped Chickadee	u	u	u	r
*Boreal Chickadee	c	c	c	u
*Brown Creeper	u	r	u	r
Dipper	u	u	u	u
*Robin	c	c	c	
*Varied Thrush	c	c	c	
*Hermit Thrush	c	c	u	
*Swainson's Thrush	c	c	u	
*Gray-cheeked Thrush	u	c	u	
*Golden-crowned Kinglet	u	u	u	r
*Ruby-crowned Kinglet	a	a	c	
*Water Pipit	c	c	c	
*Bohemian Waxwing	c	c	c	r
Northern Shrike	u	u	u	r
*Orange-crowned Warbler	c	c	u	
*Yellow Warbler	u	u	r	
*Myrtle Warbler	a	a	c	
Townsend's Warbler	r	r	r	
*Blackpoll Warbler	r	u	r	

	S	S	F	W		S	S	F	W
:thern Waterthrush	c	c	u		*Slate-colored Junco	c	a	c	
.son's Warbler	u	c	u		*Tree Sparrow	u	u	r	
;ty Blackbird	u	u	u	i	*White-crowned Sparrow	c	c	c	
ıe Grosbeak	u	u	u	r	*Golden-crowned Sparrow	c	c	u	
ıy-crowned Rosy Finch	u	u	u		*Fox Sparrow	c	c	u	
ımon Redpoll	c	c	c	c	*Lincoln's Sparrow	u	u	r	
ıe Siskin	r	r	r	i	*Song Sparrow	r	r	r	
.te-winged Crossbill	u	u	u	u	Lapland Longspur	c		u	
·annah Sparrow	c	a	a		*Snow Bunting	u	u	u	u

Listed below are 22 species that are considered to be of casual or :idental occurrence. These birds have been seen one or more times on : Moose Range or on closely adjacent areas.

	No. of Observations	Season
:at Blue Heron	6	Spring & Fall
)eror Goose	3	Spring
ıe-winged Teal	1	Fall
:opean Widgeon	2	Spring
ıg-necked Duck1/	1	6/11/40
;ser Scaup	1	Spring
ıg Eider	1	4/23/61
ırrow Hawk	2	Spring & Fall
ırp-tailed Grouse	2	Fall
ıck Oystercatcher	4	Summer
.stle-thighed Curlew 2/	1	5/18/1869
)t	5	Fall
:k Sandpiper	4	Summer & Fall
l Phalarope	2	Fall
ıarine Jaeger	3	Spring & Summer
ırning Dove	3	10/24/61
:ous Hummingbird	2	Spring & Summer
l-breasted Nuthatch 3/	8	Spring, Summer & Fall
ıter Wren	2	Fall
:atear	2	Spring & Summer
l Crossbill	2	Winter & Spring
·ris' Sparrow	1	10/24 & 25/60

Gabrielson and Lincoln, 1959. Birds of Alaska, The Stackpole Co., Harrisburg, Pennsylvania. pp. 178.

Gabrielson and Lincoln, 1959. Birds of Alaska, The Stackpole Co., Harrisburg, Pennsylvania. pp. 348 (Bischoff).

Six of the eight observations were made in 1961.