

KOYUKUK NATIONAL WILDLIFE REFUGE
GALENA, ALASKA

ANNUAL NARRATIVE REPORT
Calendar Year 1985

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

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KOYUKUK NATIONAL WILDLIFE REFUGE

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Calendar Year 1985



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Refuge Manager

5/9/86
Date

John Hunt
Refuge Supervisor Review

7/7/86
Date

James M. Maguire
Regional Office Approval

7/1/86
Date



3. 2. 1.
Personnel

1. Michael L. Nunn, Refuge Manager, PFT, GS-12/02, EOD 5/26/84.
2. Daryle R. Lons, Assistant Refuge Manager, PFT, GS-11/03, EOD 8/14/84.
3. Michael D. Motschenbacher, Wildlife Biologist/FMO, PFT, GS-9/02, EOD 6/24/84.
4. Colin B. Brown, Refuge Pilot, Nowitna Wildlife Refuge, PFT, GS-12/01, EOD 4/20/84.
5. Cynthia L. Motschenbacher, Clerk-Typist, shared with Nowitna NWR, PFT, GS-4/04, EOD 8/19/84, resigned 9/11/85.
6. Percy Lolnitz, Biological Technician, Temporary, GS-5, EOD 6/26/85, Terminated 12/31/85 (not pictured).

Review and Approvals

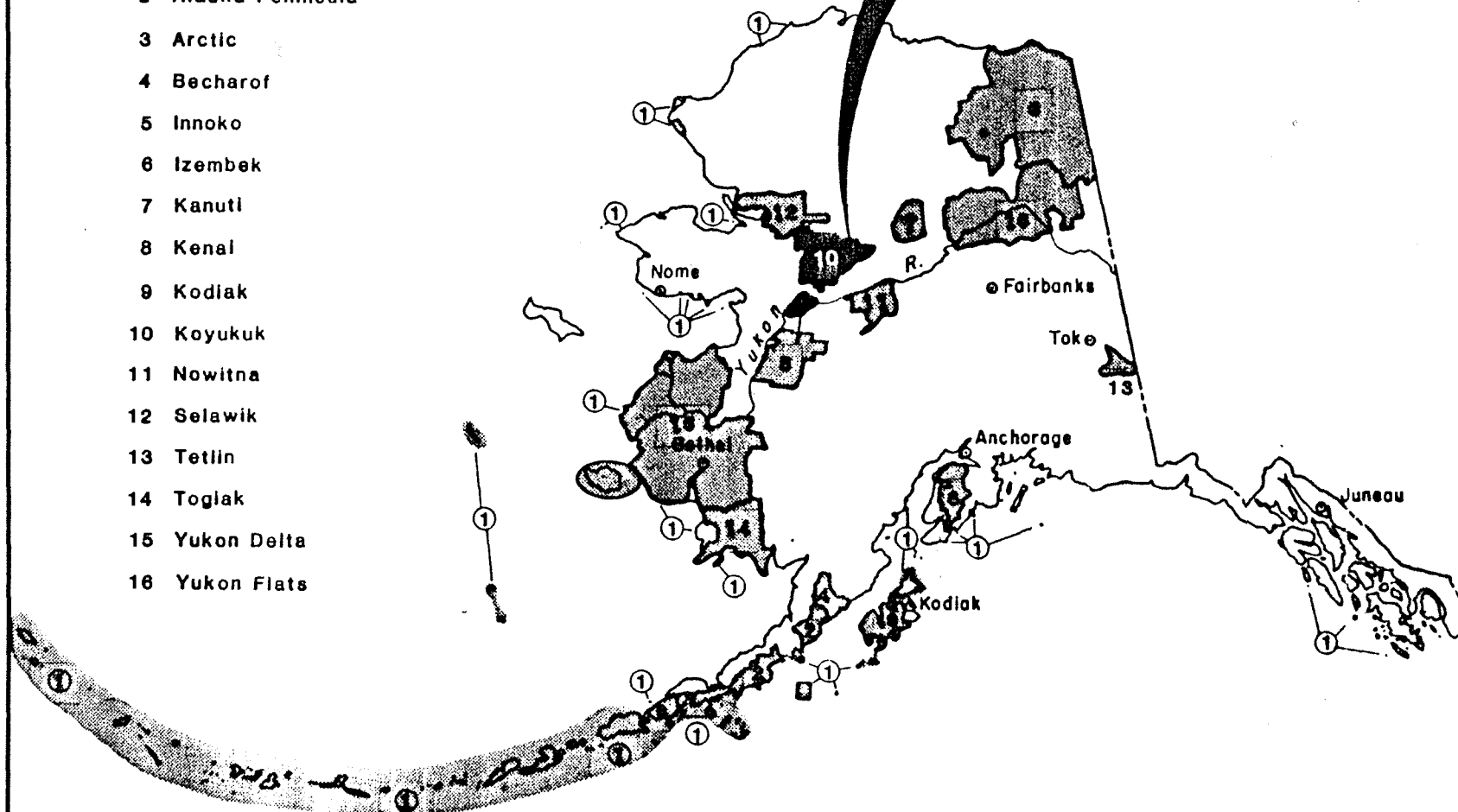
Submitted By/Date

Regional Office Review/Date

NATIONAL WILDLIFE REFUGES IN ALASKA

- 1 Alaska Maritime
- 2 Alaska Peninsula
- 3 Arctic
- 4 Becharof
- 5 Innoko
- 6 Izembek
- 7 Kanuti
- 8 Kenai
- 9 Kodiak
- 10 Koyukuk
- 11 Nowitna
- 12 Selawik
- 13 Tetlin
- 14 Togiak
- 15 Yukon Delta
- 16 Yukon Flats

Koyukuk NWR and
Northern Unit of Innoko NWR



Map 1

Map 2

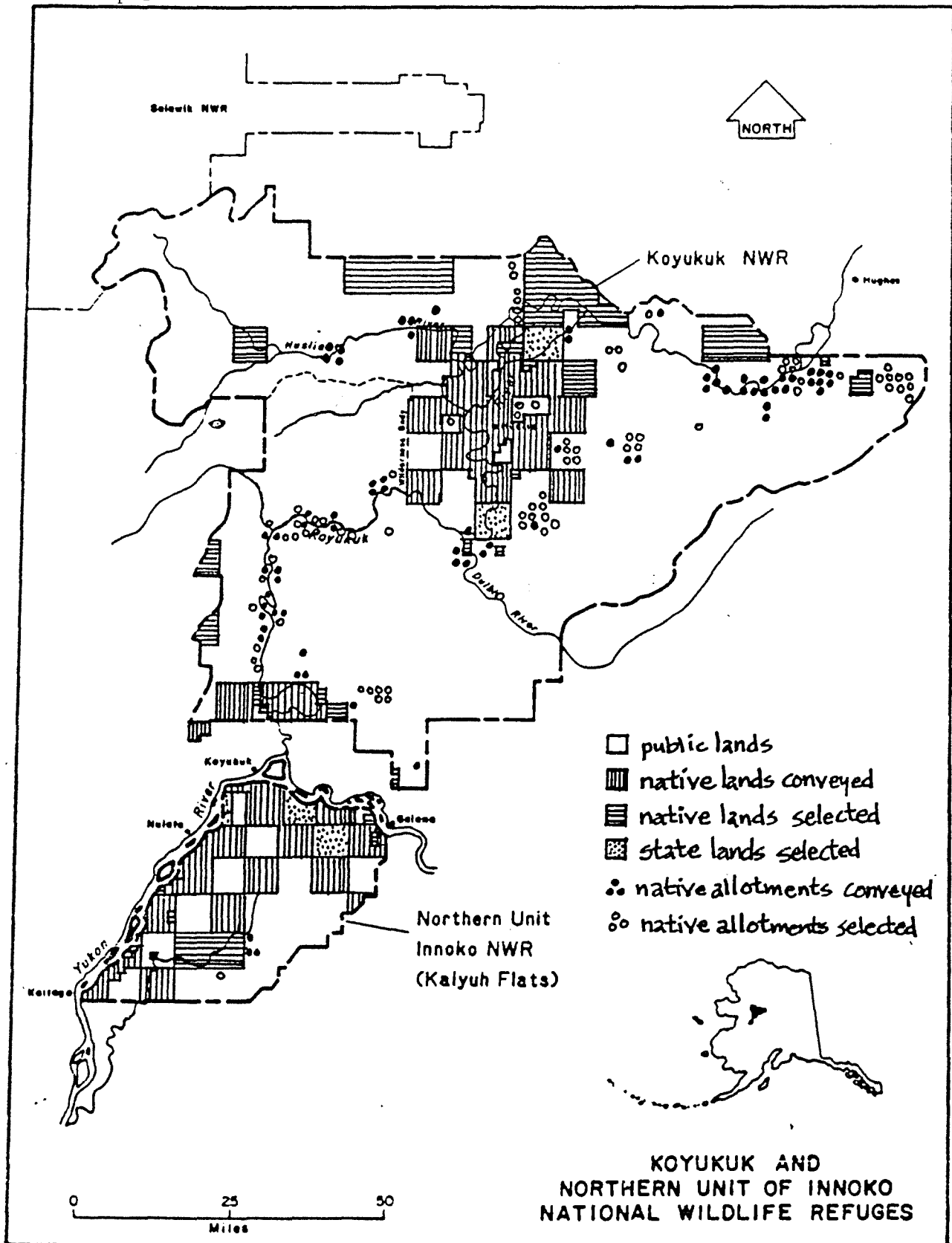


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INTRODUCTION

Koyukuk National Wildlife Refuge was established December 2, 1980 with passage of the Alaska National Interest Lands Conservation Act. Purposes for which the refuge was established are:

1. To conserve the fish and wildlife populations and habitats in their natural diversity including, but not limited to, waterfowl and other migratory birds, moose, caribou, furbearers and salmon;
2. To fulfill the international treaty obligations of the United States with respect to fish and wildlife and their habitats;
3. To provide the opportunity for continued subsistence uses by local residents; and
4. To ensure water quality and necessary water quantity within the refuge.

Koyukuk National Wildlife Refuge is located in west central Alaska, about 270 air miles west of Fairbanks and 330 air miles northwest of Anchorage. The exterior boundaries encompass 4.6 million acres, an area slightly smaller than the state of New Jersey. After the conveyance of native allotments, village and native regional corporation (Doyon, Inc.) lands, the refuge will contain 3.69 million acres.

The refuge is situated in a roughly circular floodplain basin of the Koyukuk River just north of its confluence with the Yukon River. The extensive forested floodplain is surrounded by the Nulato Hills, elevation 1500' - 3000' on the west; the Purcell Mountains and Zane Hills, elevation 3100' - 4000' on the north; the Galena Mountains, elevation 1500' - 3000' on the east and the Yukon River on the south.



Many lakes, sloughs and rivers characterize the refuge. DRL



The Koyukuk River is the dominant natural landmark meandering 370 miles from the north-eastern portion of the refuge to the southwest before it joins the Yukon River. MDM

Koyukuk has also unofficially been delegated responsibility for managing the upper unit of the Innoko NWR (Kaiyuh Flat). This unit consists of 350,800 acres located south of the Yukon River with its eastern upper boundary starting directly across the river from Galena. This unit also established by ANILCA. The majority of the flatland is dominated by a maze of sloughs, creeks, and lakes. The foothills of the Kaiyuh Mountains runs along the southeastern border of the unit.

Vegetation types are typical of the boreal forest or taiga of interior Alaska. White spruce occurs in large pure stands along rivers where soils are better drained. Numerous fires have set vast areas back to earlier seral stages consisting of aspen, birch and willow. Black spruce muskegs or bogs are a dominate feature and develop on the poorly drained soils. Dense willow and alder stands are common along the rivers and sloughs. The most conspicuous characteristic of the vegetation is the complex interspersions of types.

This unique combination of wetlands and diverse terrestrial habitats supports dense moose population (up to six per square mile). This area also supports black bears, wolves, wolverine, lynx, marten, red fox, land otter and beaver; all of vital importance to local subsistence users.

The refuge achieves national and international significance through its contribution to waterfowl populations using all four flyways. Thousands of waterfowl, primarily wigeon, pintail, scaup, white-fronted geese and Canada geese are joined by both tundra and trumpeter swans on the Koyukuk's lush breeding grounds each spring.

Fish abound in refuge streams and lakes supporting subsistence, commercial and sport fisheries.

Refuge headquarters is located in Galena, on the Yukon River approximately 6 miles south of the southernmost portion of the refuge and 110 miles south of the northernmost point. Galena, Alaska was established about 1919 as a supply point for the galena (lead sulphite ore) deposits south of the Yukon River.



Station headquarters, located in "new site" is shared with
Nowitna N.W.R. 1/85 DRL

Galena's population of approximately 800 is bolstered by the approximately 300 military personnel stationed at the Galena Air Base where two F-15 Eagle intercept aircraft are kept on 24 hour alert.

Galena is not a typical Alaskan village. It has advantages of regular air service, modern communications, river access, and such amenities as two general stores, a lumber yard/hardware store, cafe, hotel, health clinic, and a retail outlet for boats, motors, snowmachines, chainsaws and generators.

Management of the refuge for the next several years will consist primarily of field investigations to quantify significant bird and mammal resources by habitat type on a seasonal basis. The goal of this effort will be to learn as much as possible in order to maintain refuge habitats in their present pristine condition in the face of development of lands within and adjacent to the refuge.

A. HIGHLIGHTS

1. We received a new Cessna 185 (shared with Nowitna) in February and a rebuilt confiscated Supercub was assigned to Koyukuk in November.
2. An administrative cabin was constructed.
3. Koyukuk village subsistence study was completed.
4. Waterfowl inventory workshop was held in Galena.
5. Data General computer installed.
6. Last four lots purchased for refuge residences.
7. Fairbanks Fisheries crew completed a fish sampling survey of 22 refuge lakes.

B. CLIMATIC CONDITIONS

The climate of the Koyukuk basin is similar to Fairbanks. The summer sun provides almost continuous radiation and heats valleys which are protected from coastal winds and clouds by surrounding hills. During the winter the sun stays above the horizon for less than four hours. The valleys become cold sinks and temperatures are among the coldest on the continent. Galena, located approximately 125 miles south of the Arctic Circle, has a mean annual temperature of 25.2 degrees Fahrenheit, July mean of 60.1 degrees Fahrenheit and a January mean of -9 degrees Fahrenheit. The frost-free period is normally about 100 days. Temperature extremes range from near 70 below to the high 90's. Ice is present in the lakes from early October to late May. Precipitation averages 14.6 inches, the bulk being in the form of rain in June, July, August and September.

The year started out with January and February being warmer than usual. However, March and early April were colder than normal. The Yukon River started breaking up on May 22 in Galena. Moderate flooding occurred in the area and much of the southern portion of the refuge was inundated.



Galena residents watching the long awaited "breakup" of the Yukon on May 22. SAN

June's weather was fantastic with warm temperatures and clear skies. July was much warmer than normal with many days in the 80's. August and September wet and cool, much to the dismay of many moose hunters. The first frost was on September 5 and over 6" of snow also fell during the remainder of the month. The Yukon froze solid and stopped running on October 26. The weather for the remainder of the year was fairly normal.

Table 1
1985 Weather Summary

Month	Precipitation			Temperature (F)	
	Mean	1985	Snow	Maximum	Minimum
January	.82	.98	14.0	31	-20
February	.81	.86	14.7	33	-46
March	.63	.86	13.6	28	-25
April	.52	.36	5.1	40	-30
May	.59	.16	.4	71	23
June	1.24	2.15	----	73	41
July	2.22	1.01	----	81	45
August	2.76	3.23	----	81	36
September	1.76	3.63	6.3	60	25
October	.81	1.55	5.5	47	-15
November	.90	.77	7.9	34	-23
December	.76	.83	10.2	36	-36
<u>Totals/</u>					
<u>Extremes</u>	13.80				

C. LAND ACQUISITION

1. Fee Title

Refuge owned housing came closer to reality in 1985. Four building lots were purchased in 1985, bringing the total to six. The lots bought in 1985 totaled 2.07 acres and sold for \$35,100. The building lots are listed in table 2.

Table 2. Building lots acquired by the USF & WS in Galena.

<u>Land Owner</u>	<u>Acres</u>	<u>Price</u>	<u>Year Bought</u>
Cecelia Burgett	0.459	10,000	1985
Oren Johnson	0.520	8,100	1985
Tom Johnson	0.570	8,900	1985
Richard Miller	0.520	8,100	1985
Harvey & Hazel			
Strassburg	0.459	7,500	1984
Harvey & Hazel			
Strassburg	0.459	7,500	1984
<u>Total</u>	<u>2.987</u>	<u>50,100</u>	

Six houses are scheduled to be built on the lots in 1986. Three of these houses will be built for the Koyukuk N.W.R. and three will be built for Nowitna N.W.R. which is also headquartered in Galena.

3. Other

Alaska National Interest Lands Conservation Act (ANILCA) increased National Wildlife Refuge System lands in Alaska by 300 percent. These refuges are not large, solid blocks of lands; but, instead are a complex pattern of native, state, private and federal lands. Of the approximately 5,246,900 included in the exterior boundaries of the Koyukuk NWR and northern unit of Innoko, current "official" Fish and Wildlife Service acreage is about 4,086,500. Current land status is shown in Tables 3 and 4. The acreage estimates will change when the land is surveyed and various inholding claims are adjudicated.

ANILCA also provided native corporation with the right to enter into land bank agreements with USFWS. Under such agreements, a native corporation can withdraw portions of its land from development or activity that is not compatible with the purpose of the Koyukuk N.W.R. In addition, the native corporation agrees to manage the subject lands in a manner compatible with the purposes of the Koyukuk N.W.R. and to provide access to the USFWS for the study and monitoring of wildlife habitat. In return, the USFWS will provide technical assistance in managing the subject lands. The withdrawn lands will also have immunity from attachment, adverse possession, and property taxes and assessments.

In 1983, the Gana-A'Yoo Limited Corporation expressed an interest in entering into a land bank agreement with the Koyukuk NWR. This is the first such agreement to be formulated under ANILCA, and discussions continued through 1985 on the specifics of this ground breaking agreement.

Refuge Manager Nunn met with Gana-A'Yoo personnel during March to discuss planning regarding the Land Bank Agreement with the refuge. On July 17, Regional Director Gilmore, ARD Rogers, Jim Gillette (WO Division of Refuges), Keith Goltz and Sharon Allender of the Solicitors Office, and RM Nunn met with Gana-A'Yoo Limited. The meeting went well and final agreement was scheduled to go into effect in the fall.

Refuge Manager Nunn met again with Gana-A'Yoo personnel on December 2 and 20 to discuss inclusion of additional lands in the Alaska Land Bank Agreement. He also met with John Rogers, Bill Mattice, and John Kurtz regarding the agreement while in Anchorage for the Project Leader's meeting. Approximately 20 square miles of additional management lands were agreed to be included in the program as a result of the meetings with Gana-A'Yoo. The agreement is expected to be signed in 1986. Currently, Gana-A'Yoo Limited is planning on entering the majority of its 467,000 acres into the agreement.

Table 3.

LAND STATUS OF KOYUKUK REFUGE AS OF SEPTEMBER 1985

<u>OWNERSHIP</u>	<u>ACRES</u>		<u>% OF REFUGE</u>
FEDERAL	3,735,700		83
NATIVE CORPORATIONS			
- Selections (b)	258,600		6
- Conveyances (c)	373,900		8
REGIONAL NATIVE CORPORATION			
- 14(h)(1) Selections (d)	66,300	Greater than	1
- 14(h)(1) Conveyances	0		0
NATIVE ALLOTMENTS			
- Applications (157)	16,000	Less than	1
- Conveyances (0)	0		
PRIVATE PARTIES (e)			
- Applications (0)	0		0
- Conveyances (2)	(12)	Less than	1
STATE			
- Selections	44,600		1
STATE-NATIVE			
- Selections Conflicting	1,000	Less than	1
<u>TOTAL WITHIN BOUNDARY</u>	<u>4,496,100</u>		<u>100</u>

- (a) Acreages are approximate due to rounding, inaccuracies in information available, and changes in the land status (e.g., relinquishments, invalidations and conveyances of selected land).
- (b) The native corporations have overselected on Koyukuk Refuge. Consequently, some of these selections may be invalidated.
- (c) Conveyances include interim conveyances and patented lands.
- (d) Section 14(h)(1) selection are historic/cemetery sites that have been identified by the regional corporation, Doyon, Ltd. in this case.
- (e) Private inholdings include homestead sites, trade and manufacturing sites, mission sites, native townsites, and headquarter sites.

Table 4.

LAND STATUS OF North Unit OF INNOKO REFUGE AS OF SEPTEMBER 1985

<u>OWNERSHIP</u>	<u>ACRES</u>	<u>% OF REFUGE UNIT</u>
FEDERAL	350,800	47
NATIVE CORPORATIONS		
- Selections (b)	16,700	2
- Conveyances (c)	291,200	39
REGIONAL NATIVE CORPORATION		
- 14(h)(1) Selections(d)	46,300	6
- 14 (h)(1) Conveyances	0	0
NATIVE ALLOTMENTS		
- Applications (50)	5,600	Less than 1
- Conveyances (2)	300	Less than 1
PRIVATE PARTIES (e)		
- Applications (0)	0	0
- Conveyances (2)	(4)	Less than 1
STATE		
- Selections	39,200	5
STATE-NATIVE		
- Selections Conflicting	700	Less than 1
<u>TOTAL WITHIN BOUNDARY</u>	<u>750,800</u>	<u>100</u>

- (a) Acreages are approximate due to rounding, inaccuracies in information available, and changes in the land status (e.g., relinquishments, invalidations and conveyances of selected land).
- (b) The native corporations have overselected on Innoko Refuge. Consequently, some of these selections may be invalidated.
- (c) Conveyances include interim conveyances and patented lands.
- (d) Section 14(h)(1) selections are historic/cemetery sites that have been identified by the regional corporation, Doyon, Ltd. in this case.
- (e) Private inholdings include homestead sites, trade and manufacturing sites, mission sites, native townsites, and headquarter sites.

D. Planning

1. Master Planning

The Comprehensive Conservation Plan (CCP) mandated by section 304 of ANILCA for each refuge in Alaska will serve as our Master Plan. The draft plan is scheduled for completion in 1986. Before developing the plan, the following has to be identified and described:

(a) the populations and habitats of the fish and wildlife resources of the refuge; (b) the special values of the refuge as well as any other archeological, cultural, ecological, geological, historical, paleontological, scenic, or wilderness value of the refuge; (c) areas within the refuge that are suitable for use as administrative sites for visitor facilities...; (d) present and potential requirements for access with respect to the refuge...; and (e) significant problems which may adversely affect the population and habitats of fish and wildlife identified and described...".

To help identify and describe the populations and habitats of the fish and wildlife resources of the refuge, land cover and terrain data were developed cooperatively by the U.S. Fish and Wildlife Service and the U.S. Geological Service.

Using digital Landsat multi-spectral scanner data and digital terrain data 14 land cover and terrain classifications and three water classifications were developed and mapped on the refuge. Using the 17 classifications, Danielle Jerry, CCP Planning Team biologist, worked with refuge staff to develop wildlife habitat models for moose, waterfowl, lynx, marten, caribou, grizzly bear, and black bear. These models were used to generate habitat distribution maps. The maps of moose and waterfowl habitat are shown in Figures 1 and 2. The habitat maps generated from Danielle's models corresponded well with data collected by the refuge staff on annual distribution on the refuge.

The CCP Planning Team for the refuge also worked with refuge staff to develop ten special values for the refuge. These values are early successional habitats caused by a high incidence of lightning caused fires, a diverse system of wetlands, peregrine falcon habitat, the Nogahabara Sand Dunes; salmon habitat, trumpeter and tundra swan habitat, sandhill cranes, traditional Western Arctic Caribou herd habitat, and the subsistence harvest on the refuge.

A study was conducted by the CCP Planning Team and the refuge to determine the subsistence use of the village of Koyukuk. Planning Team leader Norm Olson, worked with biotech Percy Lolnitz to conduct a survey of the households in Koyukuk. The results are reported in section H-8.

Figure 1. Moose habitat model for the Koyukuk NWR and the Northern Unit of the Innoko NWR.

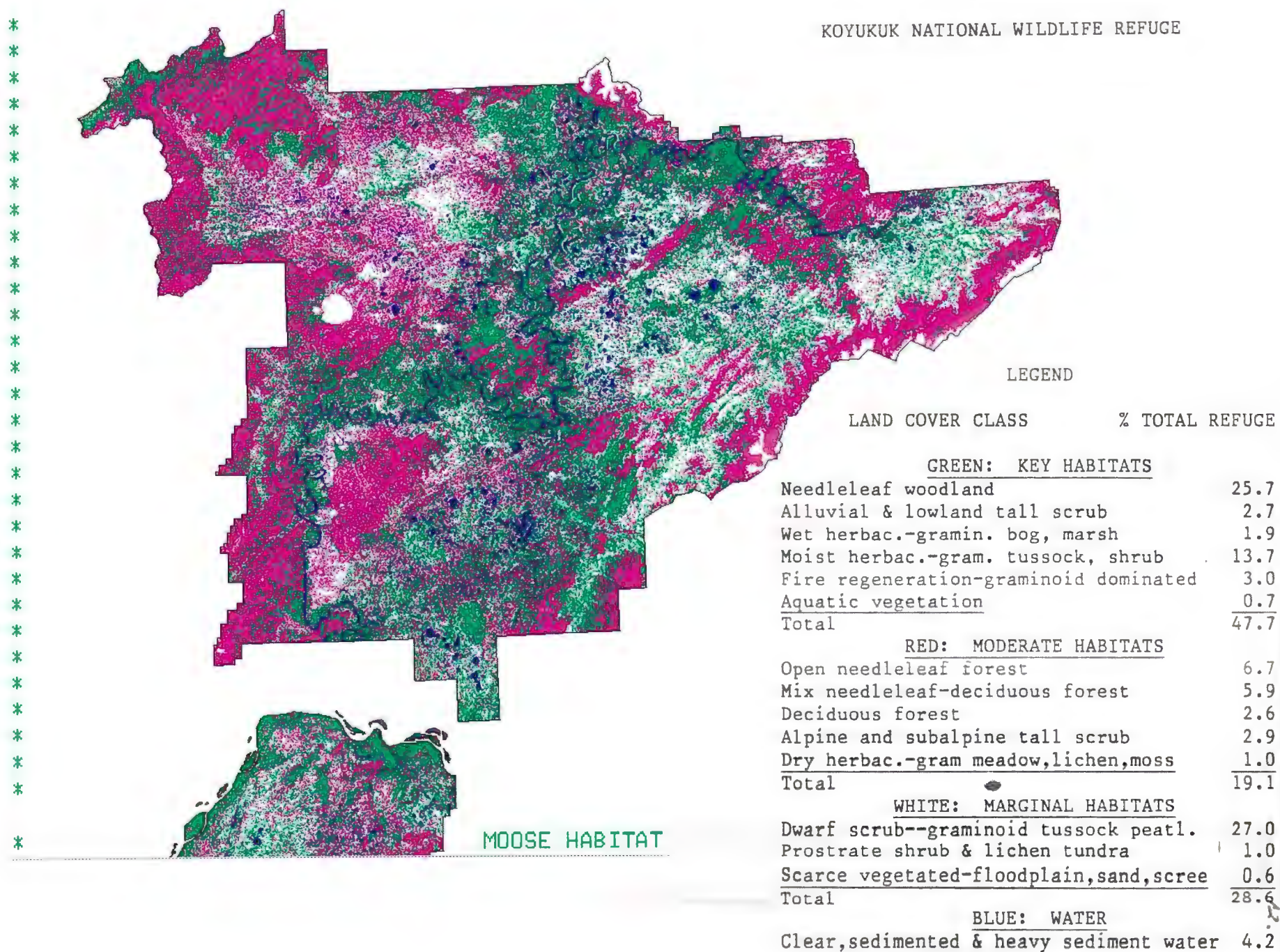
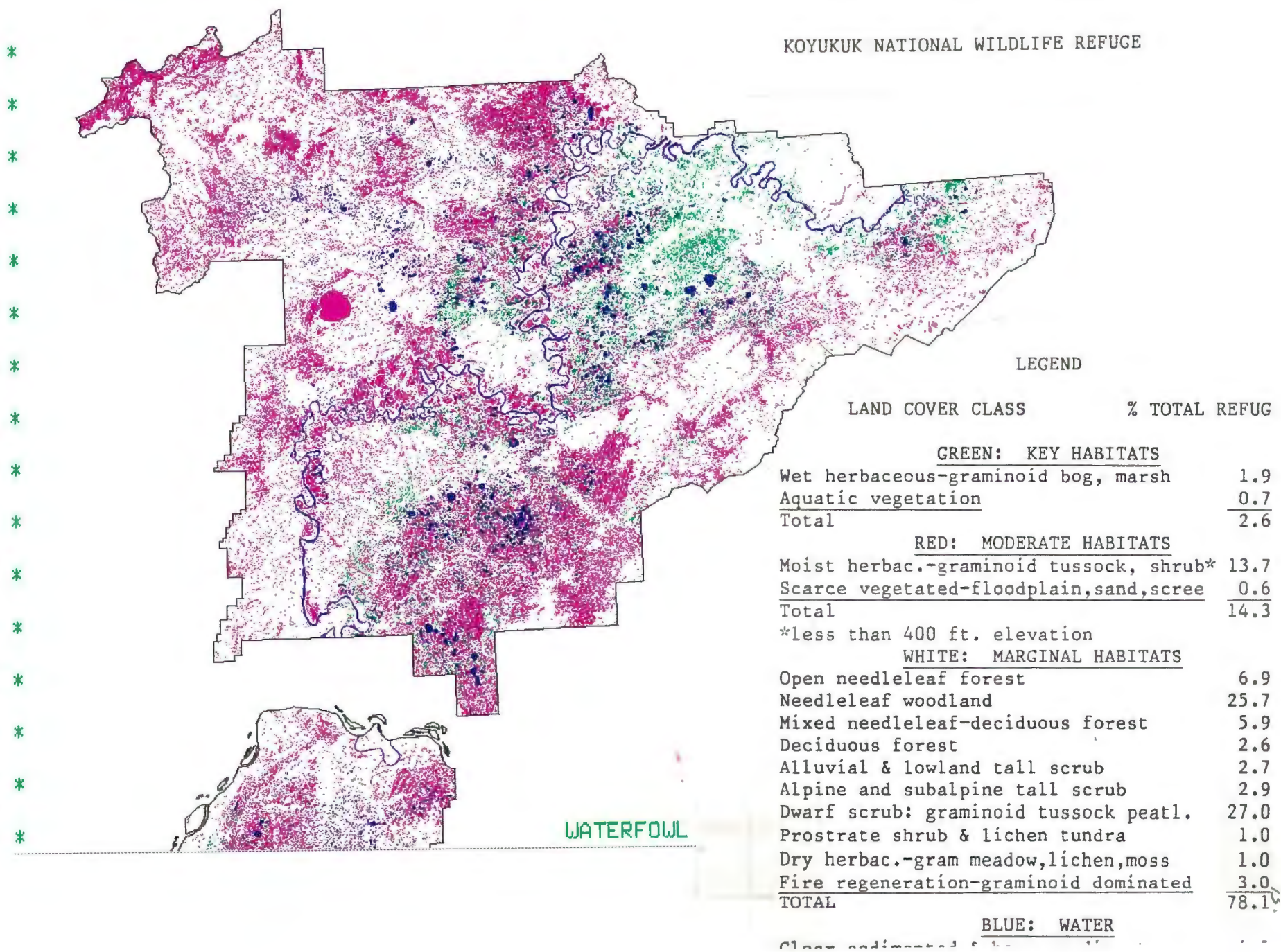


Figure 2. Waterfowl habitat model for the Koyukuk NWR and the Northern Unit of the Innoko NWR.



Several meetings between the refuge staff and the planning team were held throughout the year to discuss the plan and coordinate activities. The following is a list of those meetings:

Galena, 30-31 January, to discuss the Land Sat cover mapping project and the CCP.

Galena, 7-9 May, to define Special Values for CCP.

Anchorage, 26 September, to discuss CCP alternatives.

Galena, 29-30 October, to discuss Land Sat habitat modelling.

5. Research and Investigation

A moose study, in cooperation with ADF&G, started in October 1984, was continued in 1985 (section G-8).

A subsistence harvest study was conducted in the village of Koyukuk (section H-8).

A fisheries study was conducted by U.S. Fish and Wildlife Service fisheries personnel from Fairbanks (section G-11).

E. ADMINISTRATION

1. Personnel

Koyukuk's three permanent staff positions remained filled throughout the year. Cindy Motchenbacher, Refuge Clerk, resigned effective September 11. Cindy was officially assigned to Nowitna NWR but her position was shared with us. Fortunately, Koyukuk received an additional two FTE's during August and we were able to recruit for our own clerk. Unfortunately the recruiting process was rather lengthy and we weren't able to actually fill the position until after the close of the year.

The other approved FTE was for a Pilot/Biologist. Koyukuk and Nowitna have been sharing a local hire airplane pilot, Colin Brown. The recruitment paperwork for the new position was submitted to the Regional Office in September, but was put on hold, primarily due to "grade bulge" problems in the region.

Table 5
Four Year Summary of Manpower

	Permanent Full Time	Permanent Part Time	Shared Permanent Full Time	Temporary	FTE
FY 82	2	0	0	0	2
FY 83	2	1	0	0	3
FY 84	3	0	2	1-Local-H	3
FY 85	5	0	2	1-Local-H	5

3. Other Manpower Programs

Percy Lolnitz, of Koyukuk, was hired under the local hire procedures to assist Planning Team Leader Olson in the subsistence study in Koyukuk.

4. Volunteer Programs

A total of six volunteers helped us out during 1985; Jason Nunn, Tony Motschenbacher, Elliott Motschenbacher and Wayne Sieverding. Each helped out for several days on the cabin project. Helen Lons volunteered for 4 days with swan survey work. Jason Nunn also volunteered a day during our duck brood survey. The refuge received a total of 167 volunteer hours of help and we wish to sincerely thank these folks.

5. Funding

Station funding for the first five fiscal years is shown in Table 6.

Table 6.
Koyukuk National Wildlife Refuge Funding

Programs	FY82	FY83	FY84	FY85	FY86
1210	\$70,000	\$80,000	-0-	-0-	-0-
1220	\$60,000	\$60,000	-0-	-0-	-0-
1260	-0-	-0-	\$290,000	\$315,000	\$360,000
1994	-0-	\$12,000	-0-	-0-	-0-
Totals	\$130,000	\$152,000	\$290,000	\$315,000	\$360,000

6. Safety

Informal safety meetings were conducted throughout the year. All safety material received from the Regional Office Safety Office was reviewed by all employees.

Regional Safety Manager Ginny Hyatt and Freeman Walker, Washington Office Chief of Safety, visited on September 18 during a regional evaluation of Region's safety program. The inspection revealed several "no-no's". Corrections of these noted hazards included: cleaning out the office storage room, installing a light at the office entrance, installing a cover plate on an electrical switch in the furnace room and installing a non-slip runner mat inside the office entrance.

One accident occurred during 1985. ARM Lons injured his knee while operating a snowmobile on March 13. He tore his medial meniscus (cartilage) in his right knee. Corrective surgery was performed in March but unfortunately the cartilage reripped in October. He had the cartilage removed in a second operation in November.

7. Technical Assistance

Biological data pertinent to resident and migratory game was routinely supplied to the Alaska Department of Fish and Game biologist in Galena. It should be noted here that this is a two-way street and the local area biologist is freely providing his data to us and again helped us this summer with our waterfowl brood survey.

8. Other Items

Refuge Supervisor Kurtz visited us on January 23-25 to conduct a station inspection and discuss the idea of complexing Koyukuk and Nowitna refuges as a means of cutting operational costs. This issue supposedly had been put to rest three years ago. John recorded both staff's feelings regarding the pros and cons of complexing. Reasons for not complexing the refuges far outweighed reasons for complexing. We never received any decision in writing, but we are hoping this resurrected dead issue has been laid to rest again and has had a wooden stake driven through its heart.

Jack Hodges, Rod King, and personnel from Selawik, Innoko, Yukon Flats, Nowitna, and Koyukuk met in Galena during April 16-17 for a waterfowl inventory technique workshop. The meeting was very worthwhile. Participating refuges agreed, by the end of two more field seasons, to establish a core set of sample units which would be resampled twice every field season for trend information on both early nesting dabblers and later nesting divers. We also agreed to report information to Jack's office in a standardized format using ducks/water body.

Other people who visited us in Galena during 1985 were:

John Andrew, 11-14 January, to discuss prioritizing potential land exchanges on the Koyukuk NWR.

John Kurtz, 23-25 January, for annual station inspection.

Steve Talbot and Danielle Jerry, 30-31 January, to discuss the LANDSAT cover mapping project and the Koyukuk NWR CCP.

Ruth Johnson, 15-17 April, to teach administrative procedures to the clerk.

Jack Hodges, Rod King, and personnel from Selawik, Innoko, Yukon Flats, Nowitna, and Koyukuk NWR, 16-17 April, for a waterfowl inventory techniques workshop.

Karla Allured, 22-24 April, to install new Data General computer and instruct staff on its use.

Norm Olson, Mike Haase, Danielle Jerry, Mike Evans, Patty Rost, and Gerry Gray, 7-9 May, to define Special Values for the CCP.

Jack Firestone of the Alaska Fire Service, 30 May, to give a presentation on fireline explosives.

Mike Smith, Reed Glesne, Patty Rost, and Eric Nelson, 10 June, to do a lake study on the refuge.

Steve Talbot and Nils Talbot (volunteer), 15-19 July, to initiate aquatic plant collection on the Koyukuk and Nowitna Refuges.

Robert Gilmore, John Rogers, Jim Gillette (Washington Office) Keith Gotz (Solicitors' Office) and Sharon Allender (Solicitors Office) 17 July, to meet with Gana-A'Yoo Limited to discuss the Land Bank Agreement.

Danielle Jerry, 22-26 July, to assist in brood surveys.

John Rogers, John Kurtz, Don Minnich (Washington Office) Garland Purdue (Washington Office) and Bob Richie (Washington Office), 7 August, to conduct programmatic review.

Ginny Hyatt and; Freeman Walker (Washington Office), 18 September, to evaluate the safety program.

Lynn Willheit (Region 4) and Gene Repoff (Region 4), 21-25 October, to evaluate Doyon Lands being considered in a FWS Land Exchange.

Danielle Jerry, 29-30 October, to discuss habitat modelling using LANDSAT.

Refuge staff members received the following training during 1985:

Mike Nunn: L.E. Refresher Course, Feb. 25 - to March 1.
 Qualified with revolver, Aug. 30.
 Project Leaders Meeting, Dec. 10-12.

Daryle Lons: L.E. Refresher, Feb. 25 - to March 1.
 Qualified with revolver, Aug. 30.
 Project Leaders Meeting, Dec. 10-12.
 Data General Microcomputer User Training,
 Dec. 2-6.

Mike Motschenbacher: Arctic Survival Training, Feb. 26-28.
 Basic Incident Command System, Ap. 19.
 Logistic Transition, Ap. 22.
 Intermediate Fire Behavior, May 13-17.

Three Special Use Permits were issued during June, 1985. One permit was issued to ARCO for surface geology work. Two were issued to BLM; one for lakeshore work and the other for allotment surveying.

F. HABITAT MANAGEMENT

1. General

Located 270 miles northwest of Fairbanks in west central Alaska, the Koyukuk N.W.R. lies within a roughly circular basin and connects the floodplain of the Koyukuk River just north of its confluence with the Yukon River. The extensive floodplain is a forested basin surrounded by high hills and characterized by many lakes. The terrestrial vegetation is typical of the boreal forest or taiga of interior Alaska and northwestern Canada.

The most conspicuous characteristic of vegetation on the refuge is the complex interspersed of types. Differences in vegetation cover are caused by soil types, erosion by streams and rivers, permafrost, exposure, flooding and fire. There are four broad vegetation types on the refuge.

Closed spruce-hardwood forests are found mainly along the major water courses and on warm, dry south-facing hillsides where drainage is good and permafrost absent. This type consists of tall to moderately tall stands of white and black spruce, paper birch, aspen and balsam poplar. Under-story species include various willow species, Labrador tea, prickly rose, dwarf and bog blueberry and various cranberry species.

Open, low growing spruce forests are found in the northwestern quarter of the refuge and scattered throughout the central portion. This type is composed primarily of black spruce but is often associated with tamarack, paper birch and willows and locally interspersed with treeless bog. They are found on north facing slopes and poorly drained lowlands usually underlined by permafrost.

Treeless bogs make up the bulk of the vegetation type in the center of the refuge. The vegetation of these bogs consists of various species of grasses, sedges and moss, especially sphagnum. On drier ridges willows, alders, resin birches, black spruce and tamarack are found.

Alpine tundra is found at the highest elevations on the refuge. This is the least abundant vegetation type and is characterized by low mats of white mountain-avens, mat forming herbs and several species of grasses and sedges.

LANDSAT maps of the refuge were developed in conjunction with the refuge comprehensive planning process. It was felt that high altitude satellite photo-imagery providing computerized digital data was the most efficient and least costly means of mapping vegetation on the refuge while meeting planning deadlines imposed by ANILCA.

The digital data provided by LANDSAT is based on spectral reflectance classes. Land cover is differentiated largely by the amount of water in the ground and the percentage of shrubs in the canopy cover.

LANDSAT provides a good broad-brush map of vegetation, is relatively fast to complete, and is easy to update. There are, however, some significant problems with LANDSAT mapping when used to interpret wildlife habitat. These problems include:

LANDSAT is very sensitive to differences in canopy cover, but very insensitive to differences in vegetation height. As a result, deciduous trees and shrubs are difficult to distinguish.

LANDSAT is not sensitive to differences in vegetation types unless the types have different soil and plant water or canopy characteristics. As a result, it is difficult to separate closed deciduous scrub communities or wetlands from damp upland forests. Additional data, such as elevation, may be used to distinguish these types.

Relative diversity of a cover type is difficult to identify with LANDSAT data. LANDSAT "sees" homogeneous classes.

LANDSAT data is recorded in a grid system. The data unit is a small rectangular area called a pixel. The size of the pixel may vary by refuge. On the Koyukuk Refuge pixel size is about 0.6 acres. Habitats are not naturally square so each pixel is actually labelled according to the dominant reflectance value "seen" by LANDSAT. This reflectance value theoretically should translate into the dominant vegetation class on a specific pixel. That value, however, remains only an average.

As a result of these problems, the vegetation mapping for the refuge is generalized. More refined habitat mapping recognizing smaller habitat units may be done later as needed using traditional aerial photo interpretation. Until then the refuge has been mapped on a 1:250,000 scale using the LANDSAT multispectral high altitude imagery.

Fourteen land and three water cover types were used to describe the vegetation on the refuge. These types are described in Table 8. Acreage by cover types for all lands in the refuge, both federal and private, is shown in Table 8.

Table 7. Acreage summary of land classes on Koyukuk Refuge (from U.S.G.S. satellite imagery - LANDSAT).

Land Cover Class	Federal (acres)	Private (acres)	Percentage Total Refuge
Open needleleaf forest	212,380	141,170	6.7
Needleleaf woodland	1,105,050	246,510	25.7
Mix needleleaf- deciduous forest	203,500	106,820	5.9
Deciduous forest	110,860	26,830	2.6
Alluvial & lowland- tall scrub	111,790	31,210	2.7
Alpine & subalpine- tall scrub	131,530	22,300	2.9
Dwarf scrub:graminoid,- tussock, peatland	1,119,030	300,140	27.0
Prostrate shrub & - lichen tundra	39,860	13,710	1.0
Wet herbaceous:graminoid- bog, marsh	78,200	24,380	1.9
Moist herbaceous:gram.- tussock, shrub	589,640	128,070	13.7
Dry herbaceous:gram.- meadow, lichen, moss	40,530	11,010	1.0
Fire regeneration:- graminoid dominated	131,030	24,200	3.0
Aquatic vegetation	28,290	10,260	0.7
Scarce vegetated:- floodplain, sand, scree	24,550	7,760	0.6
Clear water	135,510	53,240	3.6
Sedimented or shallow water	7,790	11,010	0.4
Heavily sedimented water	3,620	7,280	0.2
Total	4,073,170	1,175,910	99.6

2. Wetlands

The rivers in the refuge lowlands are characterized by a low gradient, tortuously meandering course and heavy spring flooding. Flooding during spring is typical and subsidence of the waters frequently continues through much of the summer.



Fall is typically the period of lowest water levels, and many sloughs and creeks that are accessible by boat in summer are too shallow by mid-September. DRL

The rivers, in particular the Koyukuk, carry a heavy silt load at flood stage. An active placer mine on the Hogatza River upstream from the refuge has caused some turbidity in the Koyukuk River below the confluence of the two rivers.

Creeks are typically shallow, slow and meandering with steep banks. Narrow bands of white spruce line the higher banks, while willow and alder thickets predominate in the lower areas.

Lake and pond types include upland basins, ice-formed lakes on the flats, river flooded lowlands, oxbows and bog lakes. Spring runoff, rain and river flooding charge the lakes resulting in variable water depth and shorelines from year to year. Depths seldom exceed 15 feet and are usually much shallower.

Water temperatures in shallow lakes reach 70 and above in midsummer, creating ideal conditions for heavy growth of aquatic plants and invertebrates. Among the aquatic plants, duck weeds are common. Water milfoil, coontail, and smartweed are abundant in some lakes and one more of 12 species of pondweed occur in almost all lakes. Bog lakes usually contain water lilies.

Table 8. Description of cover types mapped on Koyukuk NWR.
Landcover Class--Description

Open needleleaf forest--Black and white spruce dominated areas of at least 25 percent canopy cover are considered needleleaf forests. White spruce grows on moist to well drained sites while black spruce characterizes moderate to poorly drained mineral soils. Deciduous trees like balsam poplar and white birch may be present. Deciduous shrubs are abundant in the understory.

Needleleaf woodland--Forested areas of less than 25 percent canopy cover are considered woodlands. Poorly drained sites are dominated by black spruce with a rich dwarf scrub layer. White spruce woodlands cover lowland well drained sites like stabilized sand dunes. The understory includes abundant lichens. White spruce woodlands are also found near timberline.

Mixed needleleaf--deciduous forest--Similar to above only forest canopy is greater than 25 percent.

Deciduous forest--Two types of broadleaf are found on the Koyukuk, alluvial and birch. Balsam poplar dominates in alluvial forests with an understory similar to white spruce forests. On well-drained lowland and montane sites birch, balsam poplar and aspen dominate. The shrub and forb strata are rich with willow, viburnum, alder, horsetail, fireweed and grasses. White spruce may be found in the canopy or understory in either deciduous forest type.

Alluvial and lowland tall scrub--Found on frequently flooded sites dominated by willow (*Salix* sp.) and in some areas alder (*Alnus* spp.). The shrub layer ranges from 1.5 to 16 feet in height.

Alpine and subalpine tall scrub--Occurs above timberline and is dominated by alder and *Spirea beverdiana*. The understory is mainly composed of blueberry and *Ribes*.

Dwarf scrub: graminoid tussock peatland--Labrador tea, blueberry, tussock graminoids dominate.

Prostrate shrub and lichen tundra--Relatively bare alpine communities, this class is dominated by matted dwarf shrubs, especially white mountain avens (*Dryas*) and including bearberry (*Arctostaphylos* alpine), willow, blueberry and lichens.

Table 8. Continued.

Wet herbaceous: graminoid bog, marsh--A wetland type dominated by graminoid plants, this cover class is periodically inundated with standing or slowly moving water. Surface water level varies seasonally. Graminoid marshes are typically found along lake shores and alluvial sites. Carex aquatilis, and Calamagrostis canadensis are the primary graminoids while Potentilla palustris and Menyanthes trifoliata are the primary forbs. Wet herbaceous also includes string bogs which occur in a net-like pattern of strings (ridges) and hollows in flat, lowland topography.

Moist herbaceous: graminoid tussock, shrub--This vegetation class is a continuum from wet herbaceous. It is less frequently inundated with water and there are fewer graminoids and more shrubs. The species composition is like dwarf scrub-tussock peatland with a shift to dominance of graminoid tussocks (Eriophorum vaginatum) and a decrease in dwarf shrubs.

Dry herbaceous--graminoid meadow. lichen, moss--Further along the continuum, this vegetation class is drier and dominated by Calamagrostis. The shrubs are replaced by lichen and moss. This is found in dried out old oxbows or in burned over dwarf shrub-graminoid tussock types.

Fire regeneration--Areas burned within 10 years that are dominated by grass (Calamagrostis), moss (Polytrichum) and liverworts. Can occur on almost any site, but most are burned over dwarf shrub-graminoid tussock peatland or needleleaf woodland types.

Aquatic vegetation--A rooted, fresh water community structurally supported by water. Yellow pondlily (Potamogeton spp.) are the most important aquatic species.

Scarcely vegetated: floodplains, sand, scree--Includes three vegetation types poorly covered by vegetation. Scree is unstable, steep slopes beneath weathering rocks. It is an open fellfield type which grades into prostrate dwarf shrub tundra. Or scree can be dominated by black lichens. Scarcely vegetated floodplain results from initial invasion of plants into recent river alluvium. Species that commonly colonize are balsom poplar, Epilobium latifolium (river beauty) and grasses.

Clear water--Water containing little particulate matter.

Sedimented or shallow water--Contains some visible sediments.

Heavily sedimented water--Mostly river water holding considerable particulate matter and appearing opaque or milky.



Bog lakes like this one are poor waterfowl production areas
while.....

MDM



Lakes such as this, which are flooded periodically, have
higher waterfowl densities.

MLN

Shoreline vegetation varies with stability of water levels. Lakes which fluctuate with rivers and streams usually are surrounded by dense stands of horsetail. Several species of sedge, bluejoint grass, foxtail and fleabane provide cover on receding shorelines and dry basins. After flooding, sedges and occasionally bluejoint grass survive as emergent vegetation to water depths exceeding four feet. Shorelines of bog lakes vary in character but nearly always contain buckbean, wild calla and various species of sedge. Cattails and burreeds are found in only a few lakes.

Waterfowl use is related to both type and density of aquatic and shoreline vegetation. Preference is given to lakes with abundant submerged pondweeds, water milfoil and coontail and having shoreline vegetation that is moderately dense and interspersed with openings. These are either closed basin type lakes maintained by infrequent flooding and long periods of gradually receding water levels, or lakes connected to river systems that are more frequently flooded but also experience gradually receding water levels.

3. Forests

A general description of forest types is given in Section F-1.

No commercial harvest of timber has taken place in the area since the gold rush days at the turn of the century. However, forest products are extremely important to subsistence users for house logs, firewood, fish wheels and fish drying racks. The regulation requiring a permit to cut trees greater than three inches in diameter has caused much consternation among locals. It is our understanding that this regulation is being changed so that a permit will not be needed for cutting up to 20 trees less than six inches in one location on the northern Alaska refuges.

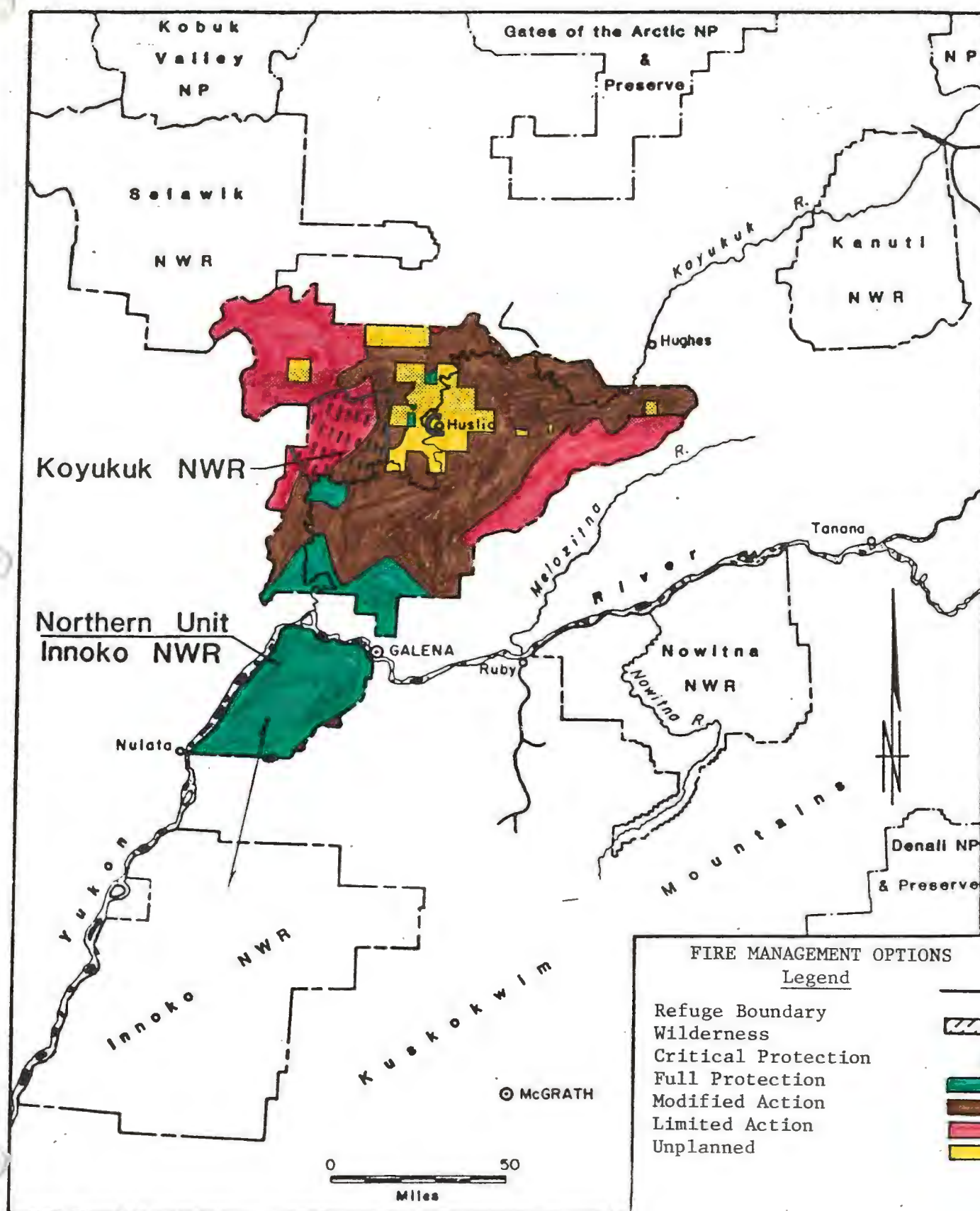
9. Fire Management

During the 1985 fire season, the Koyukuk N.W.R. had five fires burning a total of 48,725 acres (Table 9). The size of the fires ranged from 1 acre to 37,000 acres.

Table 9: Fires on the Koyukuk N.W.R. during the 1985 fire season.

<u>Fire Name</u>	<u>Fire #</u>	<u>Date Discover</u>	<u>Date Declared Out</u>	<u>Number of Acres Bur.</u>	<u>F. Mgt Option</u>
GAL NE 19	B 045	6/14	6/14	1	Full Prot
GAL NE 57	B 079	7/13	8/17	37,000	Lim. Act.
HUS W 23	B 117	7/31	9/05	9,500	Lim. Act.
531044	B 205	8/05	8/13	274	Mod. Act.
				(+132 Native Lands)	
HUS SW 23	B 231	8/06	8/17	1,950	Lim. Act.

Figure 5. Fire management options on the Koyukuk NWR and the Northern Unit of the Innoko NWR.



Fire has been a natural force on the Koyukuk N.W.R. for thousands of years. It is a key environmental factor in this cold dominated system. The fire cycle ranges from 108 years in the lowlands to 197 years in the surrounding hills. Fire removes organic matter, resulting in the warming of the soil, lowering of the permafrost layer and an increase in organic matter decomposition rates.



Fire B 079 lasted more than a month in 1985, burning 37,000 acres in a "limited action" fire protection area. DRL

Fire suppression on the Koyukuk N.W.R. is provided by B.L.M.'s Alaska Fire Service. Initial attack is achieved with smoke jumpers and retardant bombers such as C-119's, DC-6's, and 7's, Catalina PBV's and a Navy version of the B-24, the PB4Y. Helicopters are used to pick up smoke jumpers and to ferry in Emergency Fire Fighter crews as needed.

Fire suppression activities on the Koyukuk N.W.R. are guided by the Alaska Interagency Fire Management plan. Under this plan, refuge land is put into one of four management options; critical protection, full protection, modified action and limited action. Figure 5. shows the fire protection status of land within the refuge boundary. Unplanned land is treated as "modified action" areas that are continually in a critical burning period.

The critical protection option is for those areas where fire presents a real and immediate threat to human safety and physical developments. These areas or sites are occupied areas such as villages and fish camps. The highest priority on the allocation of suppression forces is given to sites in this option.

The full protection option is for those areas designated to receive aggressive initial attack and suppression efforts until the fire is declared out. This option is designed for the protection of cultural and historic sites, high resource value areas which require fire protection but do not involve the protection of human life and habitation. Only fires in the critical protection area receive a higher priority for suppression resources.

The modified action option is designed for those areas that require a relatively high level of protection during critical burning periods but a lower level of protection during the non-critical burning periods when the risk of large, damaging fires is diminished. During the critical burning periods, fires in "modified action" areas receive aggressive initial attack. If a fire escapes initial attack and requires more than a modest commitment to contain it, an Escape Fire Analysis is conducted to determine the level of suppression needed in relation to the values at risk. Lands in this category are suited to indirect attack, the intent being to balance the acres burned with suppression costs. During the non-critical burning period, "modified action" areas do not receive initial attack or suppression; the intent being to reduce suppression costs and achieve resource management objectives through limited fire activity.

The limited action option recognizes those areas where a natural fire program is desirable or the values at risk do not warrant the expenditures of funds. Suppression actions are only to the extent necessary to keep a fire within the management unit or to protect higher priority sites within the area. The careful monitoring of fire behavior and fire weather conditions is essential on all fires in limited action areas.

The interagency fire plan is reviewed for revision yearly by a committee of land managers/owners. Managers may change the management option on any part of agency land at any time between September 30 and April 1 but not during the fire season.

12. Wilderness and Special Areas

The 400,000 acre Koyukuk Wilderness was established by Public Law 96-487 (ANILCA) on December 2, 1980 in accordance with subsection 3(c) of the Wilderness Act (78 Stat. 892). The Koyukuk Wilderness surrounds the geologically unique Nogahabra Sand Dunes and also includes the Three-Day Slough area. Since the Koyukuk area is unglaciated it is theorized that the dunes are wind-blown deposits of sand that originated in glaciated areas to the northeast.

In addition to the dunes, the wilderness area encompasses some of the best habitat on the refuge, with moose densities of up to 6 per square mile recorded in the fall.

G. Wildlife

1. Wildlife Diversity

Baseline data continues to be collected to determine which of the numerous species listed as common and casual to interior Alaska are present on the Koyukuk NWR. Over 110 bird and 30 mammal species are thought to commonly occur as well as three salmon species and numerous fresh water species.

Fifty-nine bird species were recorded during our work this summer, including five species recorded for the first time by refuge staff. First time sightings were recorded for Steller's eider, western sandpiper, black-capped chickadee, gray-cheeked thrush, and common redpoll. These sightings brought the number of bird species documented by refuge staff to 86.

2. Endangered and/or Threatened Species

It is likely that the peregrine falcon is nesting on the refuge; however, this has not been confirmed. There are birds nesting off the southwestern boundary of the refuge near the confluence of the Koyukuk, Yukon River, and further up the Yukon across from the mouth of the Yuki River.

3. Waterfowl

A duck brood survey was conducted in the area within the boundaries of the Koyukuk NWR and the Kaiyuh Flats portion of the Innoko NWR from 16 July to 8 August. Twenty-three one square mile plots were randomly selected within the boundaries of the Koyukuk NWR, and four were nonrandomly selected within the boundaries of the Kaiyuh Flats. The plots were delineated by section lines on USGS topographical maps. According to USGS maps, these plots contained potential waterfowl habitat and were accessible by a Cessna 185 equipped with floats. Five trend area plots of approximately one square mile each were also surveyed. The trend area plots were arbitrarily selected plots located in high waterfowl production areas in the Koyukuk NWR.

Individual plots were censused with binoculars by walking or boating along the water boundaries within the plots. River or sloughs that had unvegetated banks, good visibility, and a low probability of waterfowl use were censused from a Cessna 185 or 207.

The species, size, and age class of observed duck broods were recorded. Broody hens with no observable brood were counted as being a brood. Broods outside of the study plots were also recorded to aid in obtaining brood species, size, and age class data.

To obtain an estimate of the total young birds in the study area, the product of broods/sq.mi, mean brood size, and number of miles of brood habitat was obtained. Brood habitat was determined from 1:250,000 scale USGS topographical maps. Any section of land containing a water boundary from a lake greater than two acres or from a double lined stream was considered to be brood habitat.

One hundred and fifteen duck broods from 11 species were observed (Table 10). An average of 3.26 broods/sq.mi were observed in the Koyukuk NWR and 2.50 broods/sq.mi were observed in the Kaiyuh Flats (Tables 11 & 12). The total estimate of duck young was 74,824 for the Koyukuk refuge and 13,203 for the Kaiyuh Flats. American wigeon, green-winged teal, and pintail were the most common species, comprising 79% of the young.



Scaup are common on the refuge during the summer.

JMN

To aid in detecting duck production changes from year to year, five trend areas were established in 1985, four of which had been surveyed in 1984 (Table 13). These trend areas experienced a 54% decline in duck production. Northern shovelers, green-winged teals, and pintails had the most decline, and mallards had the only increase.

The overall decrease in production is also indicated by the data from random plots. The population estimate for the Koyukuk was 62% lower than last years estimate obtained from nonrandom plots.

The mean hatching dates and mean onset of flying date for each species were determined from the midpoint of each observed broods current class (Table 14). Buffleheads had the earliest hatching date at 29 June and white-winged scoters had the latest at 23 July. The mean onset of flying for the 11 species was 5.8 ± 6.76 days later than last year. This delay was probably due to a later spring this year. The Yukon River at Galena broke up on 22 May in 1985, four days later than in 1984.

Table 10. Size of duck broods observed in the Koyukuk area during 16 July to 8 August 1985

Species	\bar{X}	s	n	Range
American wigeon	5.6	1.99	41	2-10
green-winged teal	6.4	2.70	20	1-10
pintail	5.2	2.16	21	3-10
scaup spp. (a)	6.8	2.33	09	4-11
old squaw	6.6	3.36	05	3-12
goldeneye spp. (b)	5.7	2.52	03	3-08
northern shoveler	6		01	
common scoter	5.3	1.53	03	4-07
mallard	4.3	1.95	10	1-06
white-winged scoter	2		01	
bufflehead	2		01	

(a) Greater and lesser scaup broods could not be distinguished from each other.

(b) Common and Barrow's goldeneye broods could not be distinguished from each other.

Table 11. Estimate of the number of duck young within the boundaries of the Koyukuk NWR during 16 July to 8 August 1985

Broods/sq.mi					Total	Total
Species	\bar{X}	s	n	Range	Broods(a)	Young
American wigeon	1.00	3.000	23	0-13	3,998	22,389
green-winged teal	0.87	2.181	23	0-10	3,478	22,261
pintail	0.57	1.647	23	0-07	2,279	11,850
scaup spp. (b)	0.17	0.491	23	0-02	680	4,622
old squaw	0.17	0.834	23	0-04	680	4,486
goldeneye spp. (c)	0.13	0.458	23	0-02	520	2,963
northern shoveler	0.09	0.288	23	0-01	360	2,159
common scoter	0.09	0.417	23	0-02	360	1,907
mallard	0.09	0.288	23	0-01	360	1,547
white-winged socter	0.04	0.209	23	0-01	160	320
bufflehead	0.04	0.209	23	0-01	160	320
Total	3.26	6.489	23	0-31	13,035	74,824

(a) 3998 square miles of brood habitat.

(b) Greater and lesser scaup broods could not be distinguished from each other.

(c) Common and Barrow's goldeneye broods could not be distinguished from each other.

Table 12. Estimate of the number of duck young within the boundaries of the Kaiyuh Flats during 16 July to 8 Aug. 1985

Broods/sq.mi					Total	Total
Species	\bar{X}	s	n	Range	broods(a)	Young
Pintail	1.50	2.380	4	0-5	1,436	7,467
Green-winged teal	0.50	1.000	4	0-2	478	3,059
American wigeon	0.50	1.000	4	0-2	478	2,677
Total	2.50	4.359	4	0-9	2,392	13,230

(a) 957 square miles of brood habitat.

Table 13. Estimate of the number of duck broods on four trend area plots on the Koyukuk NWR in 1984 and 1985

Species	1984	1985(a)	% change
American wigeon	29	14(18)	-52
green-winged teal	16	2(05)	-88
pintail	7	1(03)	-86
scaup spp.(b)	7	5(05)	-29
old squaw	1	1(01)	0
northern shoveler	11	1(01)	-91
common scoter	0	1(01)	NA
mallard	1	11(11)	+1000
bufflehead	7	0(00)	-100
Total	79	36(45)	-54

(a) Data in parentheses include brood data from a fifth plot not surveyed in 1984.

(b) Greater and lesser scaup broods could not be distinguished from each other.

In conjunction with the duck brood survey, data was also collected on adult ducks.

The number of adult ducks/sq.mi on the Koyukuk NWR and Kaiyuh Flats are given in Tables 15, 16, 17, and 18. The most common adult duck on the Koyukuk NWR was the pintail and on the Flats was the black scoter. Estimating the total waterfowl habitat on the Koyukuk NWR to be 3998 sq.mi. and on the Kaiyuh Flats to be 957 sq.mi., the total adult population on the Koyukuk NWR was $36,662 \pm 12,687$ (SE) (Table 19) and on the Kaiyuh Flats was $6699 \pm 1,645$ (SE) (Table 20.)

Approximately 36% of the adult ducks were accompanied by broods. Pintails, old squaws, and black scoters did not, relative to the other species, produce a high percentage of broods. Green-winged teal and American wigeon produced both a high percentage of broods and a high number of broods. On the trend areas, only 3.5% of the adults had broods (Table 21). The data, however, was heavily weighted by one trend area which contained approximately 1,225 adults, 1,200 without broods.

Table 14 Estimated hatching dates and projected mean dates of onset of flying of duck broods observed within the boundaries of the Koyukuk NWR and Kaiyuh Flats in 1985.

Species	Hatching				Onset of Flying	
	X	s	n	Range	X 1985	X 1984
bufflehead	29 June	--	1	-----	26 August	23 August
pintail	30 June	12	21	2 June-22 July	21 August	23 August
goldeneye spp. (a)	3 July	13	3	20 June-16 July	30 August	3 September
old squaw	6 July	9	5	26 June-16 July	2 September	28 August
American wigeon	8 July	8	43	12 June-21 July	4 September	31 August
green-winged teal	8 July	10	21	22 June-28 July	17 August	5 August
mallard	8 July	12	12	24 June-14 July	2 September	22 August
scaup spp. (b)	14 July	8	9	5 July-27 July	30 August	26 August
northern shoveler	14 July	--	1	-----	10 September	20 August
common scoter	15 July	8	3	7 July-23 July	11 September	12 September
white-winged scoter	23 July	--	1	-----	19 September	15 September

(a) Common and Barrow's goldeneye broods could not be distinguished from each other.

(b) Greater and lesser scaup broods could not be distinguished from each other.

Table 15. Estimate of the number of adult ducks without broods/square mile within the boundaries of the Koyukuk NWR during 16 July to 8 August 1985.

Species	\bar{X}	s	n	Range
pintail	2.22	6.928	23	0-32
American wigeon	0.96	2.458	23	0-09
old squaw	0.96	4.172	23	0-20
black scoter	0.74	3.545	23	0-17
green-winged teal	0.61	1.777	23	0-07
mallard	0.22	0.671	23	0-03
scaup spp.(a)	0.13	0.458	23	0-02
bufflehead	0.04	0.209	23	0-01
northern shoveler	0.04	0.209	23	0-01
Total	5.91	11.797	23	0-40

(a) Greater and lesser scaup were not distinguished from each other.

Table 16. Estimate of the number of adult ducks with broods/square mile within the boundaries of the Koyukuk NWR during 16 July to 8 August 1985.

Species	\bar{X}	s	n	Range
American wigeon	1.00	3.000	23	0-13
green-winged teal	0.87	2.181	23	0-10
pintail	0.57	1.647	23	0-07
scaup spp.(a)	0.17	0.491	23	0-02
old squaw	0.17	0.834	23	0-04
goldeneye spp.(b)	0.13	0.458	23	0-02
northern shoveler	0.09	0.288	23	0-01
common scoter	0.09	0.417	23	0-02
mallard	0.09	0.288	23	0-01
white-winged scoter	0.04	0.209	23	0-01
bufflehead	0.04	0.209	23	0-01
Total	3.26	6.489	23	0-31

(a) Greater and lesser scaup broods could not be distinguished from each other.

(b) Common and Barrow's goldeneye broods could not be distinguished from each other.

Table 17. Estimate of the number of adult ducks without broods/sq.mi within the boundaries of the Kaiyuh Flats during 16 July to 8 August 1985.

Species	\bar{X}	s	n	Range
black scoter	3.75	7.500	4	0-15
American wigeon	0.75	1.500	4	0-03
Total	4.50	7.141	4	0-15

Table 18. Estimate of the number of adult ducks with broods/sq.mi within the boundaries of the Kaiyuh Flats during 16 July to 8 August 1985

Species	X	s	n	Range
pintail	1.50	2.380	4	0-5
green-winged teal	0.50	1.000	4	0-2
American wigeon	0.50	1.000	4	0-2
Total	2.50	4.359	4	0-9

Table 19. Estimate of the number of adult ducks within the boundaries of the Koyukuk NWR during 16 July to 8 August 1985.

Species	Adults Without Broods	Adults With Broods	Total Adults	% Adults With Broods
pintail	8,876	2,279	11,155	20.4
American wigeon	3,838	3,998	7,836	51.0
green-winged teal	2,439	3,478	5,917	58.8
old squaw	3,838	680	4,518	15.1
black scoter	2,959	-----	2,959	00.0
mallard	880	360	1,240	29.0
scaup spp. (a)	520	680	1,200	56.7
northern shoveler	160	360	520	69.2
goldeneye spp. (b)	-----	520	520	100.0
common scoter	-----	360	360	100.0
bufflehead	160	160	320	50.0
white-winged scoter	-----	160	160	100.0
Total	23,628(c)	13,033(c)	36,662(c)	35.5

(a) Greater and lesser scaup were not distinguished from each other.

(b) Common and Barrow's goldeneye were not distinguished from each other.

(c) Rounding error caused the difference between the total number and the column numbers.

Table 20. Estimate of the number of adult ducks within the boundaries of the Kaiyuh Flats during 16 July to 8 August 1985.

Species	Adults Without Broods	Adults With Broods	Total Adults	%Adults With Broods
black scoter	3,589	-----	3,589	00.0
pintail	-----	1,436	1,436	100.0
American wigeon	718	478	1,196	40.0
green-winged teal	-----	478	478	100.0
Total	4,307	2,392	6,699	35.7

Table 21. The number of adult ducks observed on five trend area plots within the boundaries of the Koyukuk NWR in 1985.

Species	Adults Without Broods	Adults With Broods	Total Adults	% Adults With Broods
American wigeon	480	18	498	03.6
northern shoveler	241	1	242	23.0
green-winged teal	190	5	195	02.6
scaup spp. (a)	187	5	192	02.6
bufflehead	82	0	82	00.0
mallard	66	11	77	14.3
pintail	10	3	13	23.0
black scoter	3	0	3	00.0
old squaw	0	1	1	100.0
common scoter	0	1	1	100.0
Total	1,258	45	1,304	03.5

(a) Greater and lesser scaup were not distinguished from each other.

Several surveys of white-fronted and Canada geese were completed on the refuge. A census of 56 6/8 miles of the Dulbi River was conducted from 10-12 July to continue the collection of trend data that was initiated in 1984. Two surveys to obtain total population estimates on the refuge were also conducted in conjunction with the duck brood survey.

The Dulbi River was surveyed using a 19 foot Grumman freight canoe and a 6 h.p. Evinrude outboard motor. Four hundred and twenty-eight adult and 80 young white-fronted geese and 103 adult and 86 young Canada geese were observed. Compared with 1984 data on the Dulbi River, the number of adult white-fronted geese was down 6%, young white-fronted geese was down 66%, adult Canada geese was up 18% and young Canada geese was down 20%.

The comparison between 1984 and 1985 data should, however, be made with some reservations. The study area between the two years was slightly different, the survey was held at a slightly different time of the year due to a late winter, and the hatching dates for the two goose species were different. This year's survey began 7 1/8 miles downstream from last year's starting point and ended 5 4/8 miles downstream from last year's ending point. The 1984 survey was held from 4-6 July and in 1985 it was held 6-7 days later. The late starting date in 1985 was probably more than compensated for by late hatching dates for the goslings. The mean hatching date for individual white-fronted goslings was July 1 +0.4 days (SE), eleven days later than in 1984, and for Canada geese goslings was 6 July +0.04 days (SE), twelve days later than in 1984.

The first of the two survey methods used to obtain goose population estimates on the refuge obtained population estimates using two techniques. One estimate was obtained using simple random sampling and one using stratified random sampling. With the stratified random sampling, the area within the boundaries of the Koyukuk NWR was divided into two strata: Stratum A being the area associated with the river system and Stratum B being the area not associated with the river system. The area associated with the river system was delineated from 1:250,000 scale USGS topographical maps and was defined as including any one mile section which contained a double-lined river or slough, an oxbow lake connected to a river or slough, or Boat Lake. Stratum A1 contained 727 square miles of waterfowl habitat and Stratum B1 contained 3,271 square miles of waterfowl habitat. Ten plots were located in Stratum A1 and 13 plots were located in Stratum B1.

In the second survey method used to obtain goose population estimates for the entire refuge, the area within the boundaries of the Koyukuk NWR was again divided into two strata, A2 and B2. These strata were similar to A1 and B1. The difference was that the area upstream of the refuge cabin on the Koyukuk River was included in Stratum B2, and instead of using sample plots in Stratum A2, Stratum A2 was censused by a pilot and observer from 7-9 August in a Cessna 185 flying at 500 feet over the river and slough corridors, over oxbow lakes and over Boat Lake. The area censused included any portion of waterfowl habitat within 1/4 mile of the waterbodies surveyed. Stratum A2 contained 636 square miles of waterfowl habitat, and Stratum B2 contained 3,362 square miles of waterfowl habitat. Fifteen plots were located in Stratum B2.

The two survey methods gave three very different population estimates for white-fronted geese on the Koyukuk NWR Table 22. The standard errors are so large it is difficult to determine which, if any, estimate is reasonable, though the smaller total estimate of 6,526 seems more accurate since the high density river corridor stratum was censused rather than sampled.



White-fronted geese are more common thanDRL



Canada geese on the refuge.

DRL

Table 22 Estimates of the number of white-fronted geese within the boundaries of the Koyukuk NWR in 1985 using three computation methods.

Classi- fication	Simple Random		Stratified Random		Combination of simple random plots & census area.	
	\bar{X}	SE	\bar{X}	SE	\bar{X}	SE
Adult	40,660	30,891	20,061	13,135	5,857	3,127
Young	4,518	2,924	2,236	1,278	669	448
Total:	45,177	33,131	22,297	13,979	6,526	3,189

Table 23. White-fronted geese per square mile in Stratum A1 and Stratum B1 on the Koyukuk NWR.

	\bar{X}	SE
<u>Stratum A1</u>		
Adult	21.70	17.537
Young	2.40	1.628
Total:	24.10	18.724
Stratum B1		
Adult	1.31	1.071
Young	0.15	0.154
Total:	1.46	1.090

No population estimates for white-fronted geese were obtained on the Kaiyuh Unit because no geese were seen. The lack of geese observed, however, may have been due to the low number of plots sampled instead of a lack of geese present.

No Canada geese were seen on the one square mile plots, but 155 adult and 15 young Canada geese were observed in the corridor on the Koyukuk NWR. Sightability from the air for Canada geese may have been low. When geese were censused on the Dulbi River by boat on 10-11 July 1985, 103 adults and 86 young Canada geese were seen. When the same area was censused by air on 8 August, 40 adults and 9 young were observed. During the next breeding season, we are planning to census the Dulbi River by boat, the same time it is censused by air to develop correction factors for birds not seen from the air.

The difficulty in estimating goose population sizes on the Koyukuk NWR arises from the fact that the geese are not randomly distributed. The density of white-fronted geese in Stratum A1 was 16 times larger than in Stratum B1 Table 23, but even within the strata, the distribution of the white-fronted geese was clumped. In Stratum A2, 24% of all adults and 61% of all young seen were on the Dulbi River. Other concentrations were at Huntington Slough with 18% of the adults, Three-Day Slough with 16% of the adults and 16% of the young, and Boat Lake with 12% of the adults.

Canada geese were also not randomly distributed. All of the Canada geese observed were in Stratum A2. Of the total seen, 39% of the adults and 40% of the young were seen on the Kateel River, 26% of the adults and 60% of the young were seen on the Dulbi River, and 30% of the adults were seen on the Three-Day Slough.

Both tundra and trumpeter swans occur on the refuge. Previously it was thought that only trumpeters nested in the area; however, in 1984 a tundra swan nest with 5 eggs was found on the refuge.



The Koyukuk NWR is near the northwestern edge of the trumpeter swan range.

DRL

To aid in determining the proportion of each species on the refuge, ten swan nests were surveyed. The nests were located in different parts of the refuge in an attempt to identify any range differences between the species. Of the ten nests, nine were tundra swan's and one was unidentified.

An aerial swan survey that did not differentiate between species was conducted from on 2 July and 11 July. All known or suspected swan habitat on two 1:63,360 USGS topographic maps was surveyed from a Cessna 185. The plane was flown between 80 to 120 m.p.h. at altitudes between 500 and 600 feet above ground level. Sixty adult swans, 12 young swans, and six active nests were observed. The mean brood size was 2.4 ± 0.25 (S.E.)

Logistics continues to be the biggest problem in accomplishing waterfowl work. We share a Cessna 185 and pilot with Nowitna and each refuge had the plane three days each week, with the pilot taking the seventh day off. Fortunately, we were able to charter a Cessna 206 on floats when we didn't have the 185.

4. Marsh and Water Birds

Data was collected on grebes, loons, and cranes in conjunction with the duck brood survey. Estimates of the number of grebes, loons, and cranes are given in Tables 24, 25, and 26. The data indicates a dramatic decline in the production of grebes and loons. On the plots sampled in 1984 on the Koyukuk NWR, 11 broods of grebes were observed for an estimated production of 4718 ± 1447 (SE) young and five broods of loons were observed for an estimated production of 1199 ± 547 (SE) young. On the 23 plots sampled in 1985 on the Koyukuk NWR, only three broods of grebes were observed for an estimated production of 670 ± 849 (SE) young (Table 26), and no loon young were observed. On the Kaiyuh Flats, no grebes and no young loons were seen, though one broody pair of common loons was observed.



Lesser sandhill cranes arrive early and stay all summer on the Koyukuk NWR.

JMN

Table 24. The number of grebes, loons, and cranes observed within the boundaries of the Koyukuk NWR in 1985.

Species	Birds/mi(2)				Total(a)
	\bar{X}	s	n	Range	
red-necked grebe	0.83	2.051	23	0-05	3,318
horned grebe	0.17	0.577	23	0-02	680
unident. grebe spp.	0.04	0.209	23	0-01	160
unident. loon spp.	0.43	2.085	23	0-05	1,719
red-throated loon	0.09	0.288	23	0-01	360
Arctic loon	0.09	0.417	23	0-02	360
common loon	0.04	0.209	23	0-01	160
sandhill crane	1.52	4,198	23	0-20	6,077

(a) 3998 square miles of habitat

Table 25. Estimate of the number of grebes, loons, and cranes on five trend area plots within the boundaries of the Koyukuk NWR.

Species	Total
horned grebes	3
red-necked grebe	2
common loon	3
red-throated loon	2
sandhill crane	4

(a) All observed birds were adults.

Table 26. Estimate of the number of grebe young within the boundaries of the Koyukuk NWR during 16 July to 8 August 1985.

Species	Young/mi(2)				Total	% Change
	\bar{X}	s	n	Range	Young(a)	From 1984
horned grebe	0.09	0.417	23	0-2	360	-48
red-necked grebe	0.04	0.209	23	0-1	160	-96
unident. grebe	0.04	0.209	23	0-1	160	+33
Total	0.17	0.491	23	0-1	670(b)	-86

(a) 3998 square miles of habitat.

(b) Rounding error caused the difference between the total number and the column numbers.

5. Shorebirds, Gulls, Terns, and Allied Species

Numerous shorebirds inhabit the Koyukuk NWR. Those species observed in 1985 included semipalmated plover, Hudsonian godwit, greater yellowlegs, lesser yellowlegs, solitary sandpiper, spotted sandpiper, long-billed dowitcher, red-necked phalarope, semipalmated sandpiper, and western sandpiper. Common snipe were abundant and were observed on seven of 27 one-square mile waterfowl survey plots. Mew gulls were numerous on the refuge, with Bonaparte's, glaucous-winged, and glaucous gulls present in lesser numbers. Herring gulls were observed on one occasion. Long-tailed jaegers and arctic terns were also common on the refuge.



Spotted sandpipers are often found in areas not usually thought of as sandpiper habitat.

MDM



Found near lakes throughout the refuge, the range of the arctic tern extends farther north than any other tern. DRL

6. Raptors

The refuge has nesting populations of harrier hawks, merlins, rough-legged hawks, sharp-shinned hawks, northern harriers, red-tailed hawks, goshawks, great horned owls, great gray owls, boreal owls, and hawk owls.



Whooo are you to interrupt my vigil?

DRL

A pair of bald eagles successfully nested along the Koyukuk River in the Three-Day Slough area. One eaglet was observed in the nest.

7. Other Migratory Birds

Numbers and species composition of passerine birds fluctuate with the seasons. Redpoll, common raven, blacked-capped and boreal chickadees, and pine grosbeaks are common winter residents. Species seen in the spring and summer include alder flycatcher, olive-sided flycatcher, tree swallow, gray jay, robin, gray-cheeked thrush, Bohemian wax wing, yellow warbler, yellow rumped warbler, rusty blackbird, savannah sparrow, dark-eyed junco, tree sparrow, white-crowned sparrow, fox sparrow, Lincoln sparrow, and song sparrow.



Savannah sparrows are a common summer resident on the refuge.
DRL

8. Game Mammals

Moose are presently the most important game and subsistence mammal on the Koyukuk NWR. They are found in almost all refuge habitats but are most numerous in the riparian habitat along the Koyukuk River and its major tributaries. Historically, moose arrived in the area where the refuge now exists in the early 1940's and following Federal wolf control efforts, have been abundant during the past 30 years. Average moose densities are estimated to be .5-1.0 moose/sq. mi. for the entire refuge with known densities of up to 6 moose/sq.mi. occurring in optimum riparian habitat.

Three major projects pertaining to refuge moose populations were conducted during the year. A hunter check station was set up on the lower Koyukuk River during the September hunting season. The telemetry initiated in 1984 was continued and aerial moose surveys were conducted in November.

ADF&G Area Game Biologist Osborne has conducted a hunter check station on the Koyukuk River just south of the refuge boundary for the past four years. A total of 70 moose were checked. This compares to a total of 116 moose in 1984.

Information collected at the check station in past years indicates bull moose in the Koyukuk drainage of Subunit 21D have larger antler spreads and attain large spreads at an earlier age than most interior Alaska moose. Age and antler spread data from 72 moose killed in the Koyukuk drainage in 1982 indicated that Koyukuk moose attain the 50-inch average at 4.5 years, 1.25 years earlier than moose in the Nowitna drainage and 1.5 years earlier than moose harvested from Units 12 and 20. The 60-inch average is attained at nine years of age along the Koyukuk. The Koyukuk moose are similar to Seward Peninsula moose with respect to their antler spread and early attainment of the 50-inch average size. This similarity is expected since moose are thought to have emigrated from the Koyukuk area to the Seward Peninsula during the last 30 years.



The moose (at the far end sand bar) decided we were easier to get along with than the mosquitoes back in the brush. MLN

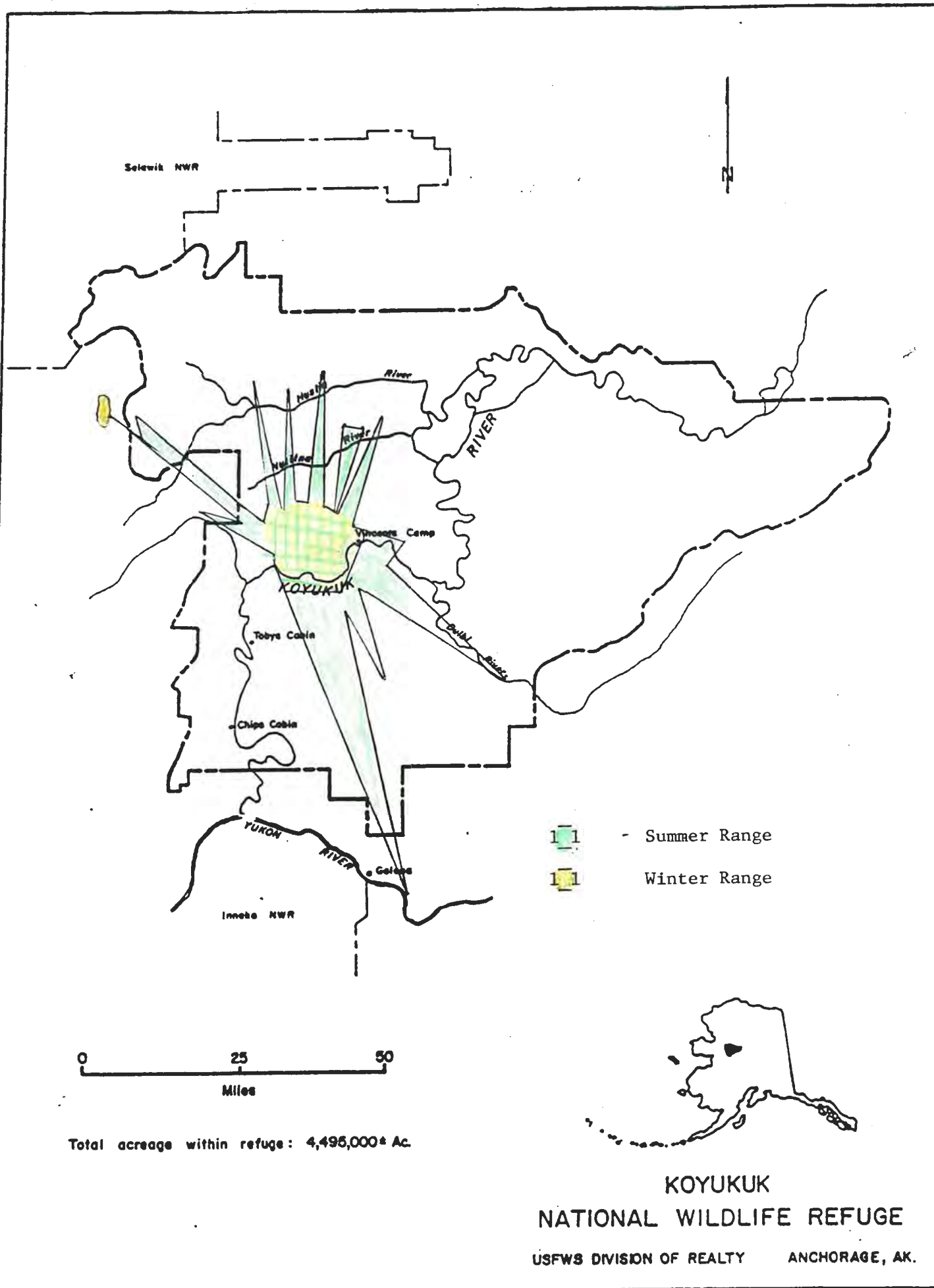
A three year moose telemetry study was initiated in the Three Day Slough area of the refuge in 1984 to investigate: 1). moose movement patterns and distribution on and between ranges, 2). mortality rates and causes, and 3). seasonal habitat use and preferences. The study is a cooperative effort with ADF&G.

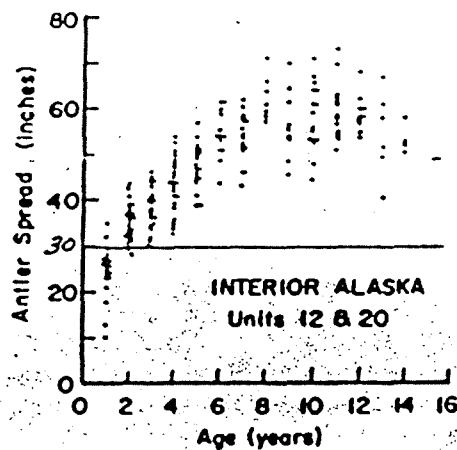
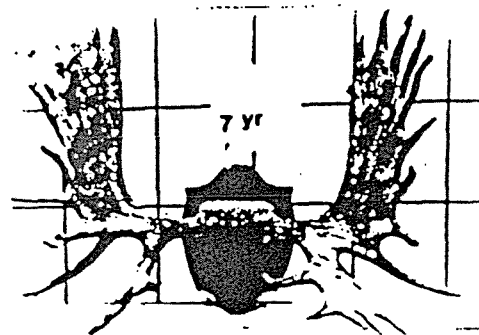
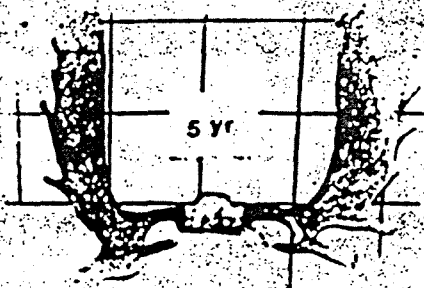
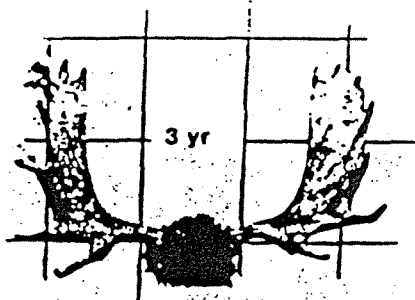
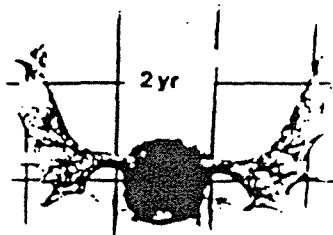
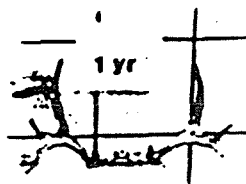
Prior to the initiation of the moose study, it was believed that a substantial portion of the moose were only seasonally utilizing the study area. High concentrations of moose were believed to be in the area from May to December. The first year of the study has shown this not to be the case. From their date of collaring in October of 1984 until June of 1985 the moose showed little seasonal movement. Two bulls traveled 21.5 miles northwest and 9 miles north, respectively. Males moved an average of 4.2 miles and females averaged 3.5 miles. Most of the moose remained in the Three Day Slough area during the course of the complete year. However, several moose made some significant movement during the summer months. However, all but one bull were all back in the general Three Day Slough area by September. The map on the following page depicts moose movement during 1985 (Figure 6.).

To date, 4 mortalities of the twenty collared moose have occurred. As reported in last year's narrative, cow number 20183 was found dead on 16 November, 1985 and possibly died as a result of stress from being captured. Bull number 20124 was found dead during the July 19 relocation flight. Game Biologist Osborne went up the Natlaratlen River on 19 July and recovered the collar. He estimated the moose had been dead for approximately three weeks and thought the moose had been killed by a bear. Two bulls, (20126 and 20131) were harvested during the September season. They were both in the Three Day Slough area at that time.

Since 1981, ADF&G Biologist Osborne and refuge staff have been aerially surveying moose on the refuge using a trend area method developed by the state. Trend areas are 40-60 square miles in size and are comprised of several 12-15 square mile sample units. One-quarter mile wide transects are flown over sample units at 60-80 mph and at elevations of 300-500 feet. When animals are observed, they are circled at low elevations in order to be accurately classified. Classifications include yearlings, medium and large bulls, calves, and cows (Figures 7 and 8).

Eight trend areas were surveyed in 1985 during November and the first day of December. Pilot Mountain Slough, Middle Dulbi River, Dulbi Slough and Treat Island trend areas were surveyed by refuge staff. Kaiyuh Slough, Three Day Slough, Squirrel Creek and Huslia River trend areas were surveyed by ADF&G Biologist Osborne.





Wide variation exists in moose antler spread in each age class as shown by the individual points on the graph.

Typical antlers of yearling moose in Interior Alaska are multiple spikes with little or no palmation and approximately 22 - 30 inches in spread. Well palmated antlers develop during the second year and continue to increase along with their antler spread until age 10 or 11. Antlers appear to decline after the 11th year.

Figure 7, Interior Alaska Moose Antler Development (ADF&G).

MOOSE SURVEY FORM

Page 1 of 1Trend area Sorrels Cr. Sample Unit 1Identifying drainage Little Chena GMU 20BDate 2 Nov. 1982 Pilot/observer Lentsch/HaggstromAircraft type PA-18 Time off 0935 on 1120WEATHER: clouds clear precipitation none temperature +5°F wind 270°@8kts turbulence light

FIELD SUMMARY

moose seen in S.U.

search time (min) Estimated area (mi²) Search effort (min/mi²) Obs. density (moose/mi²)

LIGHT

SNOW AGE AND COVER

SEARCH TIME

TYPE INTENSITY

Bright ☒ High ☐

Flat ☐ Med. ☒

Low ☐

Fresh ☐ Complete ☒

Moderate ☒ Some low veg. ☐

Old ☐ showing

Bare ground showing ☐

Stop time 1058Start time 1000

Remarks

Estimate 6" snow depth

Group no.	Bulls. $\geq 50"$			Cows and calves				Unk sex-age	Total moose	Remarks (e.g. identify groups not inside S.U. boundaries)
	YRLG	MED	LGE	♀/0 calf	♀/1 calf	♀/2 calf	Lone calf			
1	/		/	/					3	
2					/				2	
3						/			3	
4					/				2	
5	/			/					2	
6		/	/						2	
7					/				(2)	not in S.U.
8			/						1	
9		/							1	
10						/			3	
11										
12										
13										
14										
15										
16										
17										
18										
TOTAL	2	2	3	21	31	21	0	0	21	Total Moose Observed
									19	NUMBER MOOSE w/ S.U.

Figure 8. Example of Moose Survey Form.

Overall densities of moose remained high on the Koyukuk during 1985. However, this year's calf crop was very low, probably due to the late spring and flooding. Calves per 100 females was down to 13 with only 9 percent calves in the total herd. Due to this alarmingly low calf production, ADF&G closed the winter moose hunting season in units 21D and 24 by emergency order. See Tables 27 and 28 for complete sex and age ratio and herd composition data.

A small caribou herd, numbering 150-200 animals, wintered in the southeast section of the refuge. This fall, for the first time in twelve years members of the Western Arctic herd migrated through the northern portion of the Koyukuk. Approximately 1000 animals passed through and small numbers spent part of the winter in the northern portion of the refuge.

ANILCA mandated that the Secretary of the Interior conduct an ecological study of barren-ground caribou herds north of the Yukon River and the herds that have been known to migrate between Alaska and Canada. The study, which the Koyukuk NWR is to participate in, will include determination of the seasonal migration patterns, reproduction and mortality rates, composition and age structure, behavioral characteristics, and habitats that are critical to their natural stability and productivity and the effects on the herds of development by man, predation and disease. No firm directives have been received as to when Koyukuk's participation in this study will be initiated.

Black bears are common throughout most of the refuge, although the population has seemed to be declining for the past several years. The refuge staff had several close encounters with black bears during the summer's field work. FMO Motschenbacher observed a cinnamon phase black bear approximately 3 miles southeast of Klymunget Lake.

Grizzly bears are not common on the refuge. They are most commonly observed at higher elevations on the refuge; however, they can be found just about anywhere. We observed one grizzly on the refuge during 1985. Several other grizzlies were observed in the Kateel River area just west of the refuge.

Important furbearers on the refuge include marten, beaver, lynx, wolverine, wolf, red fox, mink, river otter and some coyotes. Little is known about the distribution and population status of these species. Wolf surveys on the Kaiyuh Flats and beaver cache surveys on both units were done for the first time in 1985. A wolf study is planned for 1986.

Table 27. SUMMARY OF MOOSE SURVEYS IN KOYUKUK NATIONAL WILDLIFE REFUGE IN 1985 (Sex and Age Rates)

Trend Area	SU#	Date	Total Moose	Moose Seen per Sq Mi	Search Effort (min./ Sq Mi)	Total Bulls per 100 F	Yrlg Bulls per 100 F	Yrlg Bulls % in Herd	Calves per 100 F ≥2yrs	Calves per 100 F w/Calf	Twins per 100 F w/Calf	Calf % in Herd
Kaiyuh Slough	01	11/13/85	31	2.35	5.08	16	4	3	8	8	0	6
Kaiyuh Slough	03	11/13/85	15	1.21	4.27	75	13	7	13	14	0	7
Kaiyuh Slough	05	11/13/85	26	1.79	4.55	108	42	19	8	14	0	4
Kaiyuh Slough	06	11/13/85	6	0.55	4.13	100	33	17	0	0	0	0
Middle Dulbi Ri	01	11/19/85	2	0.10	3.59	0	0	0	0	0	0	0
Middle Dulbi Ri	03	11/19/85	3	0.16	3.79	0	0	0	50	50	0	33
Pilot Mountain	01	11/15/85	52	3.17	5.67	16	7	6	5	5	0	4
Pilot Mountain	02	11/15/85	30	2.48	6.28	24	10	7	19	21	0	13
Pilot Mountain	03	11/15/85	8	1.07	6.53	300	100	25	0	0	0	0
Squirrel Creek	01	11/22/85	54	3.94	5.69	37	11	7	5	6	0	4
Squirrel Creek	02	11/22/85	24	1.75	4.82	214	57	17	29	67	0	8
Squirrel Creek	03	11/22/85	82	6.17	7.37	79	33	17	17	25	20	9
Squirrel Creek	04	11/22/85	25	2.10	4.20	127	64	28	0	0	0	0
Three Day Slough	01	11/21/85	57	4.25	7.01	43	20	12	20	25	0	12
Three Day Slough	02	11/21/85	80	7.92	5.94	38	4	3	13	14	0	9
Three Day Slough	03	11/21/85	74	5.32	4.82	60	12	7	17	19	0	9
Three Day Slough	04	11/21/85	76	4.81	5.32	24	18	12	25	31	0	17
Three Day Slough	05	11/21/85	106	7.21	6.46	36	5	4	10	10	0	7
Three Day Slough	08	11/21/85	108	7.01	6.17	40	12	7	19	22	18	12
Dulbi Slough	01	11/30/85	104	5.25	8.94	16	6	5	12	13	0	10
Dulbi Slough	02	11/30/85	49	3.22	4.93	26	13	10	0	0	0	0
Dulbi Slough	04	11/30/85	17	0.89	3.85	17	17	12	25	30	0	18
Huslia River Fl	01	11/19/85	54	4.43	6.56	59	13	7	9	11	50	6
Huslia River Fl	02	11/19/85	31	1.97	3.50	87	27	13	20	27	50	10
Huslia River Fl	03	11/19/85	102	6.67	3.66	38	19	13	10	13	0	7
Huslia River Fl	04	11/19/85	33	2.89	4.74	12	8	6	15	17	33	12
Huslia River Fl	05	11/19/85	34	3.40	6.80	62	19	12	0	0	0	0
Treat Island	01	11/24/85	28	3.04	6.63	35	6	4	29	31	0	18
Treat Island	02	11/24/85	60	4.03	6.64	56	14	8	11	13	0	7
Treat Island	03	12/01/85	58	5.00	5.17	31	15	10	18	21	0	12
Treat Island	04	12/01/85	37	2.18	4.65	38	28	19	12	17	0	8
Treat Island	05	12/01/85	74	5.03	6.12	23	10	7	19	21	11	14
All Sample Units Combined:			1540	3.45	5.38	40	14	9	13	16	6	9

Table 28. SUMMARY OF MOOSE SURVEYS IN KOYUKUK NATIONAL WILDLIFE REFUGE IN 1985 (Herd Composition Data)

Trend Area	SU#	Date	Cows										Total Cows	Total Adults	Lone Calves	Total Calves	Unid	Total Moose	Area in SqMi	Time in Min
			Sm Bulls	Med Bulls	Lg Bulls	Total Bulls	w/0 Calf	w/1 Calf	w/2 Calves	w/3 Calves										
Kaiyuh Slough	01	11/13/85	1	2	1	4	23	2	0	0	25	29	0	2	0	31	13.2	67		
Kaiyuh Slough	03	11/13/85	1	4	1	6	7	1	0	0	8	14	0	1	0	15	12.4	53		
Kaiyuh Slough	05	11/13/85	5	6	2	13	11	1	0	0	12	25	0	1	0	26	14.5	66		
Kaiyuh Slough	06	11/13/85	1	2	0	3	3	0	0	0	3	6	0	0	0	6	10.9	45		
Middle Dulbi Ri	01	11/19/85	0	0	0	0	2	0	0	0	2	2	0	0	0	2	19.2	69		
Middle Dulbi Ri	03	11/19/85	0	0	0	0	1	1	0	0	2	2	0	1	0	3	18.2	69		
Pilot Mountain	01	11/15/85	3	4	0	7	41	2	0	0	43	50	0	2	0	52	16.4	93		
Pilot Mountain	02	11/15/85	2	2	1	5	17	4	0	0	21	26	0	4	0	30	12.1	76		
Pilot Mountain	03	11/15/85	2	3	1	6	2	0	0	0	2	8	0	0	0	8	7.5	49		
Squirrel Creek	01	11/22/85	4	9	1	14	36	2	0	0	38	52	0	2	0	54	13.7	78		
Squirrel Creek	02	11/22/85	4	8	3	15	6	1	0	0	7	22	1	2	0	24	13.7	66		
Squirrel Creek	03	11/22/85	14	13	6	33	37	4	1	0	42	75	1	7	0	82	13.3	98		
Squirrel Creek	04	11/22/85	7	4	3	14	11	0	0	0	11	25	0	0	0	25	11.9	50		
Three Day Slough	01	11/21/85	7	6	2	15	28	7	0	0	35	50	0	7	0	57	13.4	94		
Three Day Slough	02	11/21/85	2	12	6	20	46	7	0	0	53	73	0	7	0	80	10.1	60		
Three Day Slough	03	11/21/85	5	14	6	25	35	7	0	0	42	67	0	7	0	74	13.9	67		
Three Day Slough	04	11/21/85	9	3	0	12	38	13	0	0	51	63	0	13	0	76	15.8	84		
Three Day Slough	05	11/21/85	4	13	9	26	66	7	0	0	73	99	0	7	0	106	14.7	95		
Three Day Slough	08	11/21/85	8	14	5	27	57	9	2	0	68	95	0	13	0	108	15.4	95		
Dulbi Slough	01	11/30/85	5	7	1	13	72	9	0	0	81	94	1	10	0	104	19.8	177		
Dulbi Slough	02	11/30/85	5	4	1	10	39	0	0	0	39	49	0	0	0	49	15.2	75		
Dulbi Slough	04	11/30/85	2	0	0	2	9	3	0	0	12	14	0	3	0	17	19.2	74		
Huslia River Fl	01	11/19/85	4	7	8	19	30	1	1	0	32	51	0	3	0	54	12.2	80		
Huslia River Fl	02	11/19/85	4	9	0	13	13	1	1	0	15	28	0	3	0	31	15.7	55		
Huslia River Fl	03	11/19/85	13	13	0	26	64	5	0	0	69	95	2	7	0	102	15.3	56		
Huslia River Fl	04	11/19/85	2	1	0	3	23	2	1	0	26	29	0	4	0	33	11.4	54		
Huslia River Fl	05	11/19/85	4	9	0	13	21	0	0	0	21	34	0	0	0	34	10.0	68		
Treat Island	01	11/24/85	1	3	2	6	12	5	0	0	17	23	0	5	0	28	9.2	61		
Treat Island	02	11/24/85	5	10	5	20	32	4	0	0	36	56	0	4	0	60	14.9	99		
Treat Island	03	12/01/85	6	1	5	12	32	7	0	0	39	51	0	7	0	58	11.6	60		
Treat Island	04	12/01/85	7	2	0	9	22	3	0	0	25	34	0	3	0	37	17.0	79		
Treat Island	05	12/01/85	5	1	6	12	43	8	1	0	52	64	0	10	0	74	14.7	90		
Totals for all selected sample units:			142	186	75	403	879	116	7	0	002	405	5	135	0	1540	446.5	2402		

10. Other Resident Wildlife

Willow and rock ptarmigan occur on the refuge. Willow ptarmigan numbers increased tremendously during the past year. Rock ptarmigan occur at the higher elevations of the refuge. Spruce and ruffed grouse are also common inhabitants of the refuge. Porcupine, short-tailed weasel, muskrat, snowshoe hare, red squirrel and other small mammals may also be found. Little is known about population levels or geographic distribution.



This mama red squirrel decided to move her babies closer to her food cache (our wall tent). MDM

The only known amphibian present is the boreal frog. This species appears numerous in shallow refuge ponds in the southern end of the refuge and may be found throughout the refuge as baseline data is gathered.

11. Fishery Resources

Anadromous species found in the Koyukuk River include chum, chinook, coho, sockeye and pink salmon. Chum salmon, summer and fall runs, and chinook salmon are the primary subsistence fish of the refuge. Coho and sockeye are occasionally found and pink is a rare occurrence.

Fresh water fish present include the Inconnu, or sheefish, and burbot; both of which are important subsistence species. Broad whitefish, round whitefish, Alaska whitefish, least cisco, blackfish, longnose sucker, northern pike, Dolly Varden, and arctic grayling are also reported occurring on the refuge.

A total of 22 lakes were surveyed on Koyukuk NWR during 1985, by Fishery Resources personnel from Fairbanks. This was in conjunction with an ongoing study for characterizing lake fisheries habitat on Interior Alaska National Wildlife Refuges.

A brief summary of data collected for Koyukuk NWR is shown in Table 29. A more detailed report is currently being prepared by Fishery Resources and will be completed by May 1986.

Lakes sampled on Koyukuk NWR during 1985 ranged in size from 70 to 536 hectares and were generally shallow with most lakes exhibiting maximum depths of less than 6 meters. MEI values, (indicating lake productivity) were moderate to high; however, the shallow depths of these lakes largely contributed to the higher MEI values and therefore, misconstrues the index's relation to productivity. Conductivity values alone are perhaps a better indicator of lake productivity for these lakes. Generally, conductivity values less than 100 would indicate low productivity, values 100-200 would indicate moderate productivity and values greater than 200 would indicate high productivity. Most of the lakes surveyed during 1985 had conductivity values of less than 100.

Most lakes exhibited low catch rates of fish (less than 0.5 fish/hr.). Lakes with higher catch rates were generally associated with rivers, where more species were collected. Lake numbers 20 and 21 (Table 1) showed the best potential for sportfishing. These two lakes had high catch rates for northern pike and were deep enough to provide overwintering habitat.

Northern pike was the most ubiquitous species, found in all but one of the lakes. Other common species collected include brood whitefish, humpback whitefish, least cisco, and Alaska blackfish. Ninespine stickleback, longnose sucker and sheefish exhibited very limited distribution.

Table 29a. Locations and acreages of lakes surveyed in 1985.

Lake No.	Lake Location	Surface Area (ha.)
1	Kateel R. C3 3N 8E 10,11	314
2	Kateel R. B3 3S 8E 1	221
3	Kateel R. A3 3S 9E 16	169
4	Kateel R. A2 3S 11E 23	229
5	Kateel R. A3 5S 8E 18	145
6	Kateel R. A3 5S 9E 32	180
7	Kateel R. B3 1N 8E 9	388
8	Kateel R. B4 1S 6E 22,23	237
9	Kateel R. B3 1N 7E 24	222
10	Kateel R. D3 5N 8E 35	74
11	Kateel R. D2 7N 10E 30	123
12	Kateel R. D2 5N 11E 7	115
13	Kateel R. D2 5N 11E 20	70
14	Kateel R. D2 4N 10E 9	115
15	Kateel R. D2 4N 10E 5	72
16	Kateel R. C2 3N 11E 27	78
17	Kateel R. D1 5N 13E 27	212
18	Melozitna C6 3N 14E 2	166
19	Kateel R. C2 2N 10E 7	110
20	Melozitna C6 3N 15E 11,12	438
21	Melozitna C6 4N 16E 32,33	536
22	Melozitna C5 3N 17E 17	197

Table 29b. Physical characteristics of lakes surveyed in 1985

Lake No.	Max. Depth (M)	l MEI	Conductivity (u mhos/cm)	Total Hardness (mg/l)
1	1.5	12.5	100	85.5
2	3.7	11.4	16	34.2
3	1.5	7.5	9	34.2
4	1.5	100.0	80	51.3
5	5.5	20.3	67	51.3
6	4.3	16.9	54	34.2
7	7.9	32.0	64	34.2
8	14.6	23.5	94	63.4
9	11.0	22.9	110	85.5
10	1.5	118.8	95	85.5
11	1.8	22.5	18	17.1
12	5.5	21.8	37	68.4
13	6.4	12.7	33	34.2
14	1.2	91.7	55	68.4
15	2.4	34.3	48	68.4
16	4.3	87.5	140	85.5
17	1.5	117.5	94	51.3
18	1.8	13.1	21	34.2
19	3.4	51.6	98	51.3
20	7.3	104.8	220	153.9
21	5.5	70.8	220	171.0
22	1.5	58.8	47	34.2

1

MEI= Morphoedaphic Index, index of lake productivity calculated by dividing the conductivity by the mean depth.

Table 29c. Characteristics of lakes surveyed in 1985.

		Total Fish		2		
Lake No.	PH	caught/gillnet-hr.		Spec. coll.	by order abund.	
1	7.5	0.367		NOP, ABF, BWF		
2	6.5	0.174		NOP, ABF		
3	6.0	0.226		NOP		
4	7.7	0.200		NOP, ABF		
5	6.5	0.438		LCI, HWF, BWF, NOP, LNS		
6	6.5	1.083		LCI, HWF, NOP, BWF		
7	7.0	0.150		NOP, ABF, LCI		
8	7.0	0.978		NOP, BWF, NSB, SF		
9	6.8	1.354		LCI, HWF, NOP, BWF		
10	7.8	0.072		NOP		
11	6.0	0.574		NOP, BWF, HWF, LCI		
12	6.5	0.525		NOP, BWF, HWF		
13	6.5	0.715		NOP, BWF, HWF, LCI		
14	7.5	0.125		NOP, ABF		
15	7.0	0.167		NOP, LCI		
16	7.5	1.458		NOP, LCI, BWF, ABF		
17	7.8	0.040		NOP, ABF		
18	7.0	0.155		NOP, ABF		
19	7.5	0.966		NOP, BWF, LCI, HWF, ABF		
20	8.0	1.736		NOP, BWF, ABF		
21	8.5	0.350		NOP		
22	6.8	0.405		LCI, ABF, BWF, HWF		

2

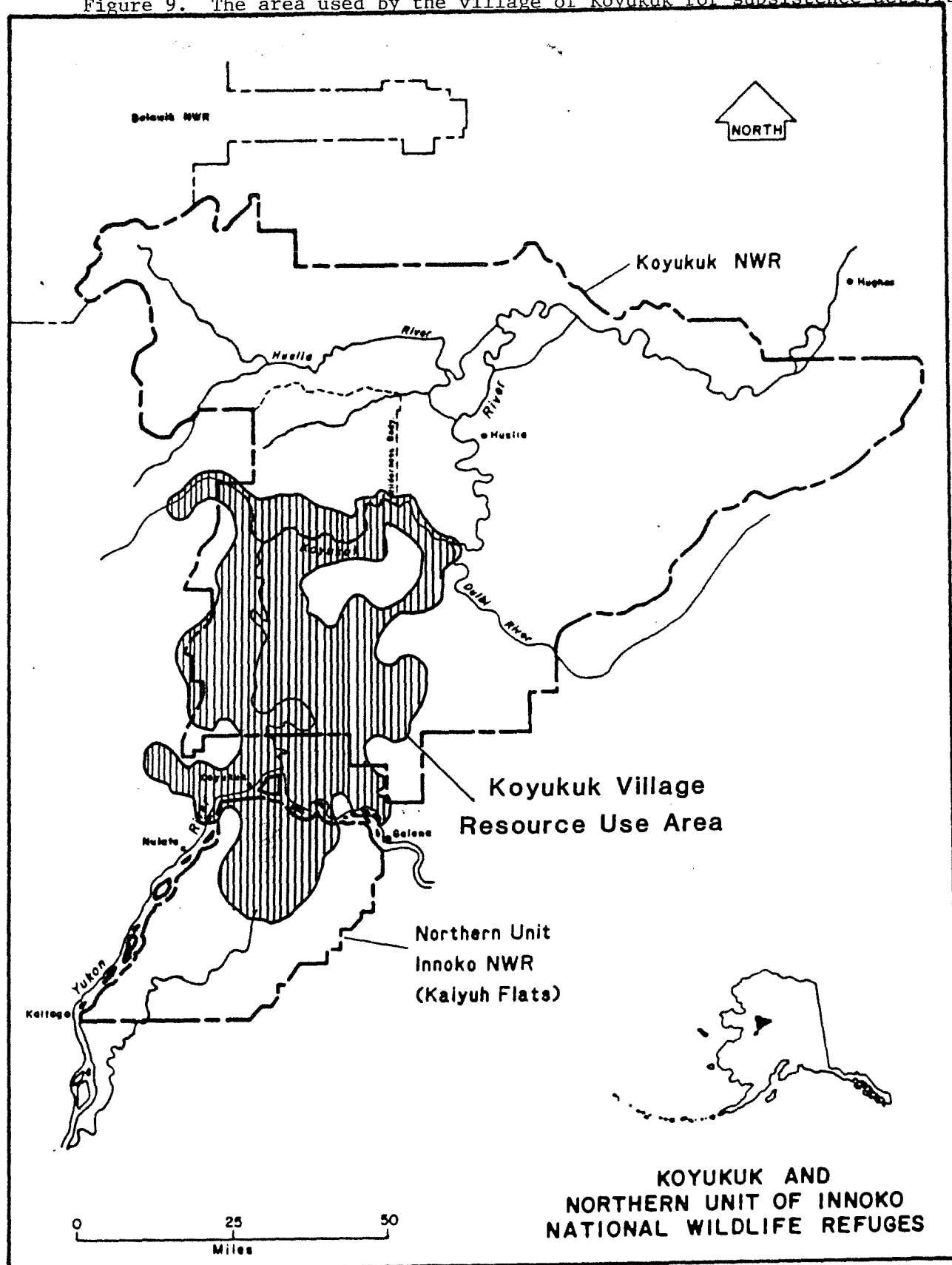
NOP= Northern Pike BWF= Broad Whitefish
 HWF= Humpback Whitefish LCI= Least Cisco
 ABF= Alaska Blackfish LNS= Longnose Sucker
 NSB= Ninespine SF = Sheefish

H. PUBLIC USE

1. General

The major public use is subsistence in nature and conducted by people living near or within the exterior boundaries of the refuge. This includes residents of Galena, Huslia, Koyukuk, and Nulato. In addition to hunting, fishing and trapping, other subsistence activities include berry picking and wood cutting. Sport hunters and fishermen from Anchorage and Fairbanks use the refuge to a lesser degree.

Figure 9. The area used by the village of Koyukuk for subsistence activities.





Sport fishermen asking if these are keepers.

CBB

During the summer of 1985, the Service conducted a study of subsistence activities in the community of Koyukuk. This village of 128 Athabascan Indians is located at the confluence of the Koyukuk and Yukon Rivers. Although the village is located off the refuge, its residents depend on the resources of the refuge for their continued existence (Figure 9) :



The village of Koyukuk, which is located just outside the refuge border, relies on the refuge for subsistence resources.

CBB



Percy Lolnitz, local hire biotech, interviews Margie Dayton as part of the subsistence study of Koyukuk village.

The study was designed with the assistance of the ADF&G Subsistence Division and conducted by a local hire employee from the village. The study used both personal interviews and mapping exercises to describe resource use in the community. Figure 30 shows a map of the resource area used by the community of Koyukuk.

Altogether, the community harvested over 131,300 pounds of useable wild resources during the 1984-85 season, over 76% of which was made up of salmon and other types of fish. This represents a total of 1,026 pounds of useable wild resources for every resident of Koyukuk. The ADF&G Subsistence Division estimates that annual per capita harvest of wild resources vary from a low of 10 pounds in urban Anchorage to a high of 1,498 pounds in Hughes, a village just north of the refuge on the Koyukuk River. According to ADF&G, the median harvest is around 250 pounds.

8. Hunting

Moose and black bear are the major sport and subsistence species hunted on the refuge, however ducks, geese, snowshoe hare, grouse, ptarmigan, sandhill cranes, caribou and brown bears are also taken. While total take for most species is unknown, we are starting to get a feel for the subsistence harvest.



Moose hunting is one of the major recreational activities on the Koyukuk NWR. MLN

The refuge lies within two game management units, 21D and 24 as delineated by ADF&G. Figure 10. gives seasons and bag limits for Unit 21.

Most of the refuge is also covered by the Koyukuk Controlled Use Area established by the Game Board which closes the area "during all open moose hunting seasons to the use of aircraft in any manner for hunting moose, including transportation of moose hunters into or within this area, and the transportation of moose parts to or from this area".

The village of Koyukuk provides an indication of the amount of use of game animals by local residents. During the 1984-85 season, 33 of the 38 households in the village of Koyukuk participated in hunting activities. The community harvest included 52 moose, 8 black bears, together with ducks, geese, hares, and grouse. Total community harvest was over 29,000 pounds of game.

9. Fishing

Fishing resources provide a very important source of protein for local residents. The subsistence study in the village of Koyukuk found that in 1985 20 households harvested over 11,700 summer and 2,200 fall run chum salmon, along with sheefish, whitefish, pike, and king salmon. Total community harvest was over 101,000 pounds of fish.



Fishing provides a valuable source of protein for local residents. MLN

Figure 10. 1985-86 HUNTING REGULATIONS UNIT 21

<u>SPECIES</u>	<u>SEASON</u>	<u>LIMIT</u>
Black bear	No closed season	<u>THREE BEARS;</u> cubs & females with cubs prohibited
Grizzly bear (\$25 bear tag needed, except in 21D) Unit 21B, 21D, & 21E	Sept. 1-Dec. 31 Apr. 1-May 25	<u>ONE BEAR EVERY</u> 4 YEARS; cubs & females with cubs are prohibited
Unit 21A & 21C	Sept. 10-Oct.10 May 10-May 25	
Caribou (harvest ticket needed) Unit 21A, 21B, 21C, part of 21D, & 21E	Aug. 10-Sept. 30	<u>ONE CARIBOU,</u> either sex
Unit 21D, west of Yukon & Koyukuk Rivers	July 1-Apr. 30	<u>RESIDENT: FIVE</u> CARIBOU PER DAY no more than 5 per year to be transported south of the Yukon River

		<u>NON-RESIDENT:</u> FIVE CARIBOU
Moose (harvest ticket needed) Unit 21A Innoko River & upper Novi River	Sept. 5-Sept. 30 Nov. 1-Nov. 30	<u>RESIDENT: ONE</u> MOOSE bulls only
	Sept. 5-Sept. 30	<u>NON-RESIDENT:</u> ONE MOOSE bull only
Unit 21B Novi River	Sept. 5-Sept. 25	bull only
Unit 21C Melozitna River	" " " "	" "
Unit 21D Yukon River (Ruby to Blackburn Island) & Koyukuk to Dulbi River	Sept. 5-Sept. 20 Sept. 21-Sept. 25 Feb. 1-Feb. 10	<u>RESIDENT:</u> bull only either sex either sex registration permit needed from Fish and Game or license vendor
	Sept. 5-Sept. 25	<u>NON-RESIDENT:</u> ONE MOOSE; either sex may be taken only from Sept. 21- Sept. 25.
Unit 21D Yukon River (Above Bear Creek & Bishop Creek	Sept. 5-Sept. 20 Sept. 21-Sept. 25 Feb. 1-Feb. 5	<u>RESIDENT:</u> bull only either sex either sex, registration permit needed from Fish & Game or license vendor
	Sept. 5-Sept. 25	<u>NON-RESIDENT:</u> ONE MOOSE; either sex may be taken only from Sept. 21- Sept. 25.

Unit 21E Yukon River (Paimiut to Blackburn Is.)	Sept. 5-Sept. 25	<u>RESIDENT:</u> bull only
	Feb. 1-Feb. 10	either sex
	Sept. 5-Sept. 25	<u>NON-RESIDENT:</u> ONE BULL
Red fox	Nov. 1-Feb. 15	Two foxes
Lynx*	Nov. 1-Mar. 31	Two lynx
Wolf*	Aug. 10-Apr. 30	No limit
Wolverine*	Sept. 1-Mar. 31	One wolverine
Grouse	Aug. 10-Apr. 30	15 per day
Hare	No closed season	No limit
Ptarmigan	Aug. 10-Apr. 30	20 per day
Ducks	Sept. 1-Dec. 16	10 per day
Geese	Sept. 1-Dec. 16	4 per day
Beaver	No open hunting season	
Marmot	"	"
Marten	"	"
Mink and weasel	"	"
Muskrat	"	"
Otter	"	"

* Must be sealed after season closes.

The summer chum salmon run accounts for the bulk of fish harvested for subsistence. Most are preserved by drying or smoking. King salmon and fall chums are also important but runs are smaller. There is no commercial fishing on the refuge.

Most fish harvested for subsistence are taken in set nets. Fish wheels are not used on the Koyukuk River. Blackfish are taken in funnel traps and burbot are taken with nets or trot-lines set under the ice in the winter.

In addition to being eaten by people, summer chums are also commonly fed to dogs and used as trapping bait.

Sport fishing is usually done in conjunction with hunting trips by non-local residents, however, there is some sport fishing by residents of Galena. Northern pike, grayling and sheefish are the primary species caught.

10. Trapping

Trapping provides an important source of cash for residents of the villages of Hughes, Huslia, Nulato, Kaltag and Galena. Approximately 283 beaver, 49 lynx, 34 wolf, 24 otter and 12 wolverine were taken on the refuge. The total number of marten trapped on the refuge is not known, but marten are the most important fur animal in terms of numbers harvested. The village of Koyukuk alone trapped over 600. Most of the fur is sold, however some is used for the making of hats, mittens, boots, parkas and ruffs on parkas. Beaver are also important as food items.

Traplines are not registered but are generally passed down from generation to generation within a family. Thus, claim for a certain area for trapping is recognized and respected by other local residents and disputes are not common, however they can be very heated when they do occur.

Beaver trapping is treated slightly different from other trapping in that beaver areas are often shared by several people, perhaps because of their importance as a food item.

Snowmobiles are the primary means of transportation for trapping with a few individuals traveling up to 200 miles round trip on the trapline. Dog teams are used by a few trappers and some simply walk their traplines. Marten are taken using pole sets and cubby sets. Beaver are taken with snares through the ice and more wolves are shot than actually trapped.

Under State law, wolves can be taken on a trapping license with the use of an airplane. The airplane must land and the "trapper" must get out of the plane prior to shooting. This is commonly referred to as "land and shoot wolf hunting" as opposed to aerial hunting. Each year in late winter, several land and shoot wolf hunters come to Galena from Anchorage and Fairbanks, much to the consternation of some locals. In addition to wolves, they also take wolverine, fox and lynx. The problem arises in that they do not know where active subsistence traplines are located and conflicts occur. There is also the temptation to shoot while airborne or herd animals into large lakes or openings suitable for landing. The magnitude of harvest by this method is not known.

12. Other Subsistence Activities

Berry-picking and woodcutting are important subsistence activities in addition to hunting, trapping, and fishing. Cranberries, both low and high bush, and blueberries provide the bulk of the berries used. The use of berries by the residents of Koyukuk averaged over a gallon a person in 1985.

17. Law Enforcement

No violations were noted on the refuge in 1985. The taking of moose meat out of season appears to be a common practice in the area, but with seasons as liberal as they are there is really no excuse for it. As mentioned in last year's narrative, aerial wolf hunting could pose a law enforcement problem. This activity typically occurs in late winter or early spring. In accordance with regional policy there was no enforcement of spring waterfowl hunting although it is very common on the refuge. There is really no good opportunity to harvest waterfowl during the season which opens 1 September, since most have left the area by then.

I. EQUIPMENT AND FACILITIES

1. New Construction

A refuge administrative cabin was constructed by refuge staff during 1985. The cabin was an ARMM project with \$21,000 of funds allocated for it. Supplies, equipment, and airplane costs actually totalled approximately \$15,000. The cabin is located on the Koyukuk River at Six Mile Slough just upstream from Hogatsa River. This is in the northern portion of the refuge and is approximately 90 air miles from Galena. The cabin will permit us to do field work in that portion of the refuge where little work has been done to date due to the long travel distances involved.

We started the project in mid-March. We planned on felling the trees and skidding them to the cabin site with a Ski-Do Alpine snowmobile. However, the unusually deep snowfall of last year convinced us to abandon the snowmobile idea and winch the logs to the slough where we could float them down to the cabin site in the summer. We returned the second week of June and spent the next three weeks milling, floating, and winching the logs up to the cabin site. After all of the preparatory work, building the cabin was the fun part and the easy part of this project.



We chartered this Otter to deliver the cabin materials to the site. MDM



ARM Lons "chiselling" an end notch on a wall log.

MDM



FMO/WB Motschenbacher drawknifing a wall log.

MLN



Completed administrative cabin.

DRL

We spent a couple of days in early July getting the foundation and flooring done and then had to again abandon the project to do our waterfowl surveys. We returned in mid-August and got the ridge pole in place when moose season started and annual leave seemed to be in order. We put the roof on the first week of October, just barely beating the onset of winter.

4. Equipment Utilizations and Replacement



A new 24' aluminum river boat with a 150 h.p. Mercury outboard arrived by barge in June. The boat had been purchased with FY-84 funds. The boat is living proof that contracting to the lowest bidder can (and sometimes does) work. We were lucky and ended up with an ideal work boat for the conditions we have on the refuge.

HPL

Pilot Brown flew the Nowitna's (shared with Koyukuk) new C-185 aircraft from Anchorage to Galena on February 9. It is a very good performing 185. The new plane had a few minor problems which have been taken care of. The most interesting one occurred during a flight on April 24. A retaining pin for the rear check cable on the passenger side ski of the plane came out or broke while changing from skis to wheels prior to landing at Galena. The ski came up and struck the strut. It threw the plane into a violent "shimmy", but Brownie was able to make a safe landing.



Koyukuk received this supercub in November. It was a confiscated plane which was rebuilt by OAS. TP



Two new Ski-Doo Tundra snowmobiles and two sleds were purchased during the year.

DRL

Other major equipment purchased during the year included:

1. Five King portable radios
2. Hotpoint electric range
3. Planix 7 digital planimeter
4. Fisher woodstove
5. Arctic woodstove
6. 150 gallon aviation fuel tank and pump
7. Jet unit for 150 h.p. Mercury outboard
8. Weatherport camp building
9. 4.5 and 50 h.p. Mercury outboard motors
10. 17' Grumman square stern canoe
11. Three pair of Minolta Marinav binoculars
12. 44 magnum Smith & Wesson revolver
13. Two Jonsered 520 chainsaws
14. Two Jonsered 630 chainsaws
15. Lewis chainsaw winch
16. Homelight generator
17. Herbarium cabinet
18. Slide cabinet

5. Communications Systems

Another year has gone by and we still do not have a good communications system. We purchased five King VHF 5-watt portable hand held radios during 1985. We received the radios late in the year. They seem to work fine but have limited range. The Regional Office is still working on an agreement with BLM to use their repeater sites located on strategic mountain tops. This system would enable personnel in the field to call long distances using the hand held radios.

J. OTHER ITEMS

3. Credits

Refuge Manager Nunn is responsible for section K and editing the entire narrative. Assistant Refuge Manager Lons is responsible for the Introduction and sections A; B; E; F1-3 and 12; G8 and 10; I 1, 4, and 5; and J2. FMO Motschenbacher is responsible for sections C; D; F9; G 1-7; H; and J3. Refuge secretary White typed the report.

K. Feedback

Significant progress was made in the CCP process this year due to the effect of Norm Olsen and crew. They are to be commended in their continuing efforts to mesh their mission with ours. On several occasions in 1985 they provided assistance that proved to be invaluable in the accomplishment of refuge projects. In particular, Norm's help on the Koyukuk subsistence study and Danielle's habitat modeling project are appreciated.

Planning, in general, is becoming an evermore burdensome component of operating a refuge, primarily due to bureaucratic red tape. It seems that almost no idea can be implemented in the same year that it is conceived. With ARMM and RRP funds comprising over half the refuge budget, this is virtually assured since these processes take at least a year and much of the money is tied to specific tasks. The new study proposal review process also ensures that you "plan" for a project for a year before you can "do" anything. About the only significant action that doesn't take a year to get approved is the chartering of a helicopter - and now that requires 60 days lead time!

Some planning is necessary and good, but I think we've gone overboard. A new refuge program requires more flexibility than we have under the present system. If we weren't required to spend so much time planning we could spend more time doing!



Midnight on the Koyukuk

DRL