INNOKO NATIONAL WILDLIFE REFUGE

McGrath, Alaska

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1985

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Personnel

1.	Phillip J. Feiger - Refuge Manager	GS 12/4 EOD 9-20-81	PFT
2.	James Demientieff - Pilot	GS 12/4 EOD 7-5-82	TPT
3.	Patricia A. Martin - Secretary	GS 5/8 EOD 5-6-85	PFT
4.	Mike F. Smith-Assistant Refuge Manager	GS 11/4 EOD 11-21-82	PFT

Review and Approvals

Phillip J. Feiger 3-15-86 — Submitted by — Date

John E Hoots 7/7/86 — Refuge Supervisor North — Date

7/7/86 — Regional Office Review — Date

A. HIGHLIGHTS

The cabin didn't float away!

Severe late winter snow affects moose survival

Flooding creates inland sea

Fisheries resources group samples lakes

Mosquitoes!

B. CLIMATIC CONDITIONS

With over three feet of snow on the ground at the beginning of the year the potential for a disastrous year for moose was evident. Additional snowfall in Janauary soon had moose wading through chest-deep snow in order to feed. For those unfamiliar with the length of a mooses' legs, chest-deep for a moose is chest-deep on a human.

The normal warm weather in March and April which settles the snow and makes browsing easier for moose didn't occur, and not until Memorial Day was there a substantial melting. At that time the thermometer climbed into the 70's and the resulting run-off created flooding conditions over much of the Innoko and Iditarod river flood plains. Spring flooding is normal near the confluence of the Innoko and Iditarod rivers but this year the run-off created a lake approximately fifty miles long and twenty miles wide. With the Yukon river also in flood, there was no place for the water to go and it was not until early July that the area around the Iditarod river was above water.

D. PLANNING

1. Master Plan

Comprehensive Conservation Plans, required by the act which established the refuge, will take the place of master planning. The planning process for Innoko NWR was started in October when the first scoping meetings were held in local villages. The first process is to ask those persons affected by the refuge what their concerns are. Those comments are considered when the actual planning is done.

Snow level at refuge cabin in December 1985. Much more snow fell before winter was over.

Refuge cabin in early June after flood water had dropped about one foot. Once it receded, the water mark was 41 inches on the inside wall.

Refuge cabin is partially hidden by trees at center of photo. Flood waters rose until our lake had engulfed the entire area. June 1985.

Flooding also threatened our main office in McGrath, as can be seen from this aerial view (May 1985). The ice jam was fortunately upstream from town and, once it broke, did not jam below town.

E. ADMINISTRATION

1. Personnel

In the past we tried to fill our secretary position using the local hire authority granted by ANILCA and have found that the salary does not compare with private sector. In an attempt to have the position filled for at least one year at a time we advertised through normal hiring procedures hoping to find someone (a wildlife bilolgist perhaps?) who wanted competetive status badly enough to work as a secretary for a year.

We selected Patsy Martin for the GS-4 secretary position. Patsy has a master's degree in wildlife ecology and has worked in the past on special studies for the FWS. In August, Patsy was promoted to GS-5 through accretion of duties and, in recognition of her abilities and desires, was offered the chance to develop moose management strategies for the refuge.

Two facts became immediatly apparent: 1) we have plenty of work for a junior assistant manager, and 2) secretarial work plus biological work makes a heavy load.

We have submitted the paper work to advertise for a Refuge Manager (Trainee), GS-5 full performance 7 reasoning, that 1) we need to have junior assistants coming up through the ranks in Alaska if we are ever going to fill project leader positions with people who were raised and\or went to school here, and 2) when our secretary position is vacant it would be better to have a GS-5 or 7 professional doing clerical work, rather than a GS-11 or 12.

A temporary botonist GS-9 was hired to take charge of our vegetation mapping program. John DeLapp was hired and proved to be an excellent choice. By the end of the summer, we had over 200 mounted specimens in our herbarium, all of the vegetative communities had been visited and classified, and work was begun on deliniating vegetative types on color infra-red photos, John was converted to an intermittant position and will be picked up in the summer of 1986 to complete vegetation mapping of the entire refuge.

Temporary biologist Roger Sleeper was rehired to assist in waterfowl production surveys. Roger collected raptor nesting information this year for the first time giving us more than casual data on this wildlife form.

Seasonel hires were rounded out by the local hire appointment

of Robert (Bobby) Winkleman who was hired as a GS-5 Bio.Tech. Bobby is a McGrath resident currently enrolled in the University of Alaska as a wildlife biology major. We have hopes of converting Bobby to a cooperative student appointment.

The refuge staffing pattern is:

FY 85	permanent	3	temporary	4
FY 84		3		3
FY 83		3		1
FY 82		3		1
FY 81		1		

2. Funding

Thanks to Accelerated Refuge Maintenance Management (ARMM) and Resource Problems and Related Projects (RPRP) funding additions to our inadequate O & M budget, we were able to have our best year ever in the field.

Several large projects were accomplished this year which will have long lasting influence on our management. Water quality analysis sampling was accomplished in the major watersheds entering the Refuge, ground truthing of the CIR photos was essentially completed, and Landsat ground truthing was accomplished.

Five-year Funding Level Comparison

Year	O&M	ARMM	RPRP	Total
1985	233,600	86,400	65,000	385,000
1984	164,000	80,000		244,000
1983	180,000	(Reduced to 164,000)		164,000
1982	244,000	(Reduced to 180,000)		180,000
1981	10,000			10,000

3. Safety

With the transfer of two HF radios from Tetlin NWR and two portable HF radios from the RO, we finally had the ability to communicate between spike camps, the field headquarters and the office in McGrath. The addition of a radio in the manager's residence made after-hours communication possible in case of an emergency.

Four hand-held CB radios were also received from the RO, but as it turned out, these would only work if the two parties could see one another, in which case hand signals would do

Seasonal botanist DeLapp introduced the crew to cappuccino this year with his portable steamer, thus earning the name "The traveling Cappuccino Man."

Part of the summer field crew (From left to right): Volunteer Joan Hardesty, Fish Tech. Martha Spencer, Vol. Jan Johnson, Seasonal Roger Sleeper, Vol. George Weaver, ARM Mike Smith, Fish Tech. Eric Nelson and Fisheries Supervisor Ried Glesne.

the same job.

In large part, safety in the field is a product of good planning and employee attitude; employee attitude is largely based upon maturity and experience. The payoff was a summer without any incidents, even though the work environment was potentially hazardous.

4. Volunteer Program

The volunteer program in 1985 was very successful. Seven volunteers donated over 2,000 hours of labor from June through September (Table 1). Over 70% of this work involved waterfowl brood surveys and banding. Other work accomplished with the help of volunteer labor included vegetation classification and mapping, a water quality study, identification and mapping of historical sites and construction of a log storage and tool shed.

F. HABITAT MANAGEMENT

1. General

Vegetation mapping and classification using high-altitude, color-infrared (CIR) photos continued this year. Botanist John DeLapp was hired in May to take over this project. The main purpose of this project is to help clarify wildlife distribution and use patterns on the refuge by recognizing plant communities in more detail than a topographic map or LandSat imagery can offer. This work will serve as a baseline for any other resource-oriented project on the refuge.

The refuge has completed CIR stereo-pair coverage of the refuge at a scale of 1:60,000 or about 1":mile. To accomplish the task of classifying the vegetation from the photos, areas which can be seen as distinct colors or texture on the photo are reconnoitered and an attempt made to fit them into an established classification system. The system we are using is the 1982 Preliminary Classification for Vegetation of Alaska by Viereck, Dyrness and Batten. DeLapp is also making up a key to these photos so that anyone can use them, even if they have little knowledge of the refuge and Interior plant communities.

DeLapp has also begun collecting and pressing plants for our station herbarium. The collection is well along, with over 200 specimens mounted and labelled, but it is presently housed in cardboard boxes, until we find an office large

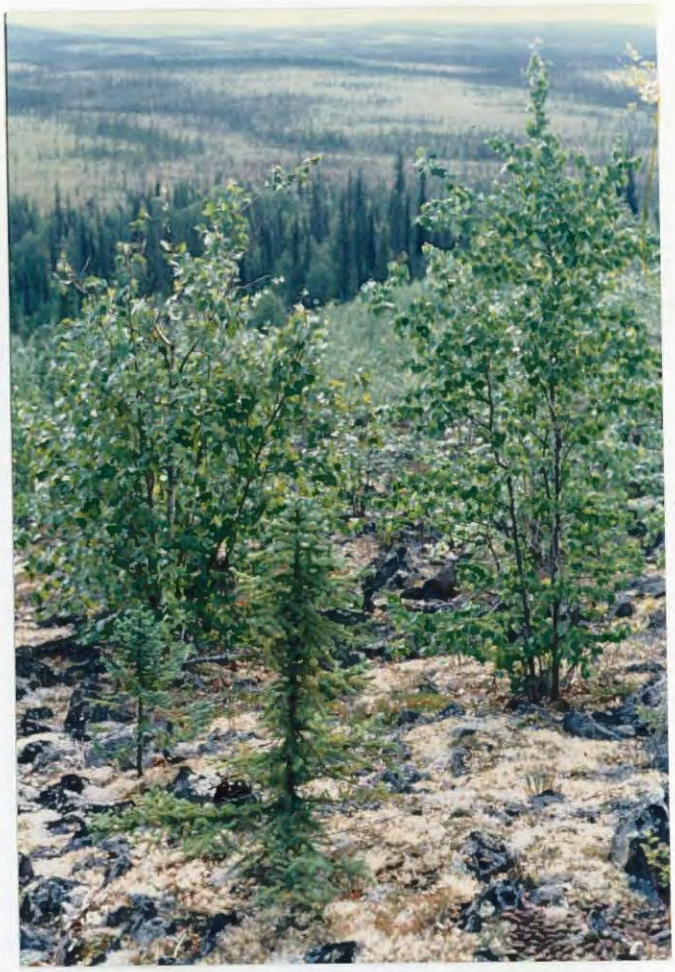
Table 1. Volunteer names, credentials, work assignments and number of days worked in 1985.

Volunteer	Credentials	Work Assigned	Days Worked
Jan Johnson	Biology Major-Cal-Poly San Luis Obispo, CA-Condor work experience	Waterfowl & raptor survey & banding	60
George Weaver	Biology Major-Oregon State University-Waterfowl work experience	Waterfowl & raptor survey, banding, water quality study	50
Joan Hardesty	Wildlife Biol.-Indiana Dept. of Natural Resources	Waterfowl survey, banding, water quality study, report writing & construction	80
Natalie Hill	Biology Major-Village school teacher; Point Hope, AK	Waterfowl survey	20
David Loveland	Chief-Div. of Planning & Public Participation, Bureau of Air & Water Quality; Washington, DC-Water quality expert	Water Quality	20
Ray Collins	Rural Education Coordinator-McGrath, AK	Historical Survey	14
Sally Collins	Editor & publisher Kusko Courrier; McGrath, AK-Local history chronicler	Historical Survey	14

Total Hours Volunteered 2064 = 51.6 work weeks or almost 1 full year!

A mosaic of vegetative habitats such as these on Hammer Creek are easliy mapped on a larger scale using color infrared, high-altitude photography.

Sedge-grass wetlands and connected lakes along the Iditarod River make prime waterfowl habitat.



Timberline on the Innoko at under 1,000 ft. Only a few peaks are more than 1,000 ft. on the refuge.

Upper Innoko River above the North Fork. One of the few rock outcroppings along the river on the refuge.

Grassland and willow complex on the Iditarod River. Crew in background is returning from a goose banding drive.

Landsat ground-truthing crew that visited the refuge in early September, 1985. Left to right: Pilot Ed Gunner, Carl Markon (EROS Data Center), Steve Talbot (Botanist, RO), and Steve Prisley (EROS).

enough to house a cabinet. Right now, if we found a corner to put an herbarium cabinet in, we would not have room to open the door.

2. Wetlands

Innoko wetlands though protected by refuge status, still can be degraded by upriver pollutants. We are particularly concerned with the placer mining operations on the upper Innoko and Iditarod Rivers and the Tolstoi drainage. There is also a potential hazard on the upper Little Mud River from an Anaconda experimental operation which may not go into production for several years.

With these possible impacts on our refuge wetlands, we began a water quality study this year to determine to what extent our impacted streams are polluted and to get baseline data on those that are not yet tainted by human endeavors.

Operational sampling guidelines were prepared for us by Rod Simmons, a placer mining contaminant specialist with our Ecological Services office in Fairbanks. Water quality parameters were collected at 21 different sites. These parameters included turbidity, settable solids, suspended solids, alkalinity, hardness and pH. Conductivity was supposed to be recorded but our meter never functioned correctly. Water samples were collected for heavy metal analysis, both total and dissolved metals, at 19 sites. Sediment samples were gathered at 11 sites and 11 fish collected at 3 sites for analysis of heavy metal concentrations.

The general water quality parameters were recorded in the field and sent to Rod Simmons for his interpretation. The water, sediment and fish collected for metals analysis were sent to a laboratory under contract to Patuxent. We have not received any results yet.

We were lucky to attract Dave Loveland as a volunteer this summer. He is a scientist with the Bureau of Air and Water Quality, Washington, DC. He had no problem figuring out the equipment and collecting the samples along with training our other volunteers to do the same. Unfortunately, Dave could only give us 3 weeks, which would have been sufficient if our streams had not been at flood level in June. It was necessary to repeat several stations at lower water levels in August. Volunteer Joan Hardesty took over as chief water quality technician after Dave left us in July.

ARM Mike Smith conducting water quality analysis on the upper Mud River.

Portion of 37,000-acre 1984 burn. Four, permanent, vegetative transects are located in this area with easy access.

Mud River fire one year after the burn in black spruce habitat. Understory of horsetail and a few scattered willow shoots.

The same burn at the same time as the above photo, but in paper birch habitat. Regrowth is more diverse than black spruce, but horsetail still predominates in the first year, probably due to roots buried in the moss so that they are protected.

Rod Simmons was able to join our crew for a few days in late June. Rod helped take samples on the Innoko and Dishna Rivers and evaluated our program.

We hope to complete our baseline sample collection in FY86, when the water levels should be lower.

9. Fire Management

We are in our third year of operation under the Kusko-Illiamna fire management plan. The lead agency in this plan is the BLM as they have the fire fighting responsibility on the refuge and the northern half of the State. Under this plan, most of the refuge has been placed in a limited protection zone. This means that no initial strike will be made against any fire in this zone. Only those portions of the refuge adjacent to private Native Corporation land have been placed in the full protection zone, where an attempt is made to extinguish all fires.

Lightning-caused fires are an important means of natural habitat management in the Interior. This process of setting back succession has been slowed considerably in the last 30 years by BLM fire fighters. We are trying to return to the natural regime as much as is possible and safe for ourselves and our neighbors.

This year, due to the flooding and generally-moist ground, less than 3,000 acres burned in 7 recorded fires in late July and early August (Table 2). All were caused by lightning strikes. This compares to over 50,000 acres burned by lightning-caused fires in 1984.

During public meetings in the villages in Shageluk, Holy Cross, Anvik and Grayling for the Comprehensive Conservation Plan (CCP) a lot of concern was aired involving fire planning. The villagers are naturally reluctant to support a let-burn policy since fire fighting is a major source of summer's income. Another question that was brought up was that, although fire may be beneficial to moose, what will it do to marten? Marten is the most important furbearer in this region. Studies so far are not conclusive on what effect fires have on marten and should be investigated to further clarify our fire management plans.

Four permanent transects were established by Delapp and clerk Martin in a 37,000-acre, 1984 burn. The transects were 0.1 hectare plots with 25 one-meter-square plots. The number of stems of each understory and canopy vascular plant species

Table 2. Fires on Innoko National Wildlife Refuge, 1985.

BLM Fire Number	Acres Burned	Map Name	Dates Discovered/out	Attacked?	Fire Management Option
B091	5.0	Iditarod D-5	07-20/07-23	No	Limited
B099	800.0	Iditarod D-4	07-28/08-05	Yes	Limited
B136	3.0	Ophir D-6	08-01/08-16	Yes*	Full
B136	1000.0	Ophir A-6	08-01/08-16	No	Limited
B139	650.0	Ophir A-4	08-02/08-16	No	Limited
B218	500.0	Ophir D-3	08-06/08-16	No	Limited
B219	4.0	Ophir C-6	08=06/08-16	No	Limited

*Cabin under permit was threatened.

were estimated. Relative density, importance values, and relative covers were estimated for all species. The plots will be sampled annually for the first five years and then less frequently thereafter. Wildlife use along the transects will be recorded by mapping the intersection within the transect of small mammal trails and burrows and large game trails. Scats will be recorded. Bird use will be censused each June with breeding bird census methods.

G. WILDLIFE

1. Waterfowl

The waterfowl season in 1985 on the Innoko National Wildlife Refuge was not a good one. Record winter snows and a late break-up caused severe flooding on all drainages in the refuge. A planned helicopter breeding pair survey to ground truth the annual, spring, fixed-wing, breeding pair survey was cancelled on the lower unit of the Refuge due to the flooding. The survey was to have taken place in the first week of June. By mid-June, adjacent lakes, meadows and low-lying timbered areas were still flooded. The Iditarod River from the mouth at the Innoko River to the confluence with the Yetna and portions of these two adjacent rivers remained flooded until mid-July. The areas of the most severe flooding happened to coincide with the best duck brood-rearing and nesting habitat. The only low areas not flooded were the black spruce/sphagnum muskeg habitats which are not drained by any streams. Although snow melt caused a slight rise in the water level of these areas, they did not receive any runoff from the upland watersheds. It should be remembered, however, that the very processes that periodically cause these "bust" years are also the processes that continually set back succession and keep the marsh habitat as valuable as it is to waterfowl.

Breeding Pair Survey

The spring breeding pair survey, conducted by personnel from Waterfowl Investigations in Juneau, was completed on 1 June 1985. The survey showed an overall 41.3% decline in ducks from 1984 to 1985. Most species reflected these lower spring numbers, with the notable exception of green-wing teal and oldsquaw (Table 3). Although this apparent lack of birds was observed by random aerial surveys in June and by brood counts in June and July, numbers and proportions of species in the spring survey do not always accurately reflect the numbers and proportions of birds which nest on the Innoko NWR.

Table 3. Comparison of 1984 and 1985 population indices from Stratum 5 (Innoko National Wildlife Refuge) of the annual spring waterfowl breeding population survey.

Species	Population			
	1984	1985	Difference	Percent Difference
Mallard	24.7	13.2	-11.5	-46.5
American wigeon	45.1	18.4	-26.7	-59.2
Green-winged teal	10.3	14.7	+ 4.4	+42.7
Northern shoveler	10.1	5.9	- 4.2	-41.5
Northern pintail	106.3	71.9	-34.4	-32.4
Scaup spp.	29.1	8.5	-20.6	-70.7
Ring-necked duck	0.6	0.6	0.0	0.0
Goldeneye spp.	16.2	10.2	- 6.0	-37.0
Bufflehead	2.5	--	- 2.5	-100.0
Oldsquaw	1.0	2.0	+ 1.0	+100.0
Scoter spp.	4.2	2.9	- 1.3	-30.9
Red-breasted merganser	3.1	0.3	- 2.8	-90.3
Total	253.2	148.6	-104.6	-41.3

Iditarod River drainage in early June. Ice still remains on one lake and entire basin is flooded.

Iditarod River channel is marked only by trees lining what used to be the banks. Waterfowl were hard pressed to find a dry spot to rest and moose were seen knee-deep in water with land miles away (June 1985).

The Innoko River in late July. Flood water in old river channels was still slowly receding.

All the water was a boon to mosquitoes, as George Weaver's backside demonstrates.

Mallards were the fourth most-abundant species in the 1984 and 1985 spring surveys, but did not breed in the same proportions in either year, based on numbers from brood counts. Oldsquaw have also been seen by the Juneau personnel and Refuge staff in the spring, but have never been observed with broods on the Innoko NWR. It would not be presumptuous to assume that some birds counted in the spring survey are merely passing through, perhaps on their way to the coastal breeding areas. Judging from the low 1985 spring counts on Innoko NWR and higher counts on other refuges (Selawik and Yukon Flats), many birds that would normally have nested on the Innoko NWR continued on to greener pastures (and drier wetlands) due to the flooding.

Brood Surveys

Brood surveys began on the Innoko NWR in 1983. Sampling was done the first season on the basis of lake groups, which were chosen in varying riparian and muskeg habitats. The sample areas were expected to give information on waterfowl use and habitat preference on the Refuge. Population estimates or indices at this point were not anticipated. Observers walked around each water body, recording the number and species of waterfowl broods, as well as other wildlife present. The area sampled was approximately 15 sq. mi.

In 1984, the basic sample unit was changed to 1-square-mile topographic sections of wetland habitat. These were selected on the basis of being good waterfowl areas or representing habitat types or locations where information was lacking. The sampled area was 31 sq. mi (31 sections) and was concentrated along the Innoko and lower Iditarod Rivers for logistical reasons. The shift in 1984 to sample areas of land and water, rather than only water bodies, was to facilitate future selection of random samples and extrapolation of brood density to the entire refuge.

The 1985 sample consisted of randomly-drawn sections. Townships were randomly selected using computer-generated numbers. Then a section in the township was randomly selected in the same manner. If the section contained surface water and was accessible by boat or float plane (within 1 mi.), it was included; otherwise, it was rejected and the process was repeated from the first step of selecting a township. Townships were selected with replacement. Fifty sections were selected to ensure that enough sample areas would be available because all may not be as accessible as the map would indicate. A target of 34 sections was selected because that represented 1% of the acreage in the Innoko

portion (Stratum 5) of the Alaska-Yukon Waterfowl Breeding Population survey. If more than 34 areas can be sampled within the time frame, more will be selected.

By 1987, Innoko NWR is to be conducting early and late brood surveys of the same sample areas. This would mean a minimum of 68 sample site visits. Each sample takes an average of 4-5 hours to complete, including transportation. Considering present crew size, logistics and a waterfowl banding program that is conducted concurrently, 34 sections may be near the maximum number of areas that can be sampled, although we plan to attempt more. Thirty square miles were completed in 1985.

Brood Production 1985

As already mentioned, spring 1985 revealed flood conditions over most of the refuge. Some of the best duck production areas on the lower Iditarod River were flooded into July, leaving little area for nesting. Brood surveys began on July 9 and were completed on August 7.

Duck Production

The production data were broken into 3 strata, as in 1984. Duck brood production in 1985 was much lower than in 1984, with 30 broods counted in 1985 and 412 in 1984. Part of this difference can be attributed to the new random sampling areas being different from 1984 and probably more representative of the refuge. The most important factor contributing to the lower number of observed broods however, must be attributed to the flooding. The broods that were observed indicate that they were a product of delayed or renesting in 1985. Back-dating the broods to a hatching date based on age classes supported this hypothesis of later hatching dates in 1985.

In 1985, an attempt was made to more thoroughly describe the lakes within the sample areas. We hope that an analysis of this may help us discover what particular attributes (i.e. plants, nutrients, drainage, etc.) are most attractive to ducks. A lake description form was developed and used on all sample areas in 1985 (Exhibit 1). This was, unfortunately, a poor year to begin this project because most lakes were well above the mean water line, some merged with each other, and brood observations were scarce. It does serve as a flood condition description of these lakes which will be revisited next year, we hope under better conditions, when a comparison can be made both in habitat change and number of broods observed.

Exhibit 1. Lake sampling form.

Lake description for brood surveys (1985)

Plot#___ Lake#___ Observers_____ Date_____ Acreage_____

Average depth_____ Conductivity_____ MEI_____ pH____

Lake Type*:____ Water Level:____ 1.flood; 2.high; 3.average; 4.low; 5.dry

Pudling extent:___ Enter actual # 0-20, or A.20-30, B.30-50, C.)50

Shoreline:___ 1.Abrupt(dirt bank); 2.Abrupt(veg.); 3.Steep; 4.Shallow.

Vegetation % cover to nearest 10%, shoreline to center of lake:

Emergent_____ Floating_____ Submerged_____

Vegetation % cover to nearest 10%:

Waterline + 1m	Inland to 50m	Community
_____	_____	Forest ()25% cover,)3 meters high)
_____	_____	Tall Shrub ()25% cover, 1.5 - 3 meters ht.)
_____	_____	Low Shrub ()25% cover, 0,2 - 1.5 meters ht.)
_____	_____	Tall Graminoid ()0.2 meters ht.)
_____	_____	Low Graminoid
_____	_____	Tall Forb ()0.2 meters ht.)
_____	_____	Low Forb
_____	_____	Moss
_____	_____	Bare Ground

% Cover of Major Plants to nearest 10%

Water area	Shoreline + 1m	Inland	Plants
_____	_____	____	Grass
_____	_____	____	Sedge
_____	_____	____	Sphagnum Moss
_____	_____	____	Lichens
_____	_____	____	Ericaceous Shrub
_____	_____	____	Marsh five-finger - Potentilla
_____	_____	____	Buckbean - Menyanthes
_____	_____	____	Horsetail - Equisetum
_____	_____	____	Mare's Tail - Hippurus
_____	_____	____	Yellow Pond Lilly - Nuphar
_____	_____	____	Pondweed - Potamogeton
_____	_____	____	Willow - Salix
_____	_____	____	
_____	_____	____	
_____	_____	____	
_____	_____	____	
_____	_____	____	

* Lake Types: 1.Riverine; 2.Riverine Drawdown; 3.Riverine Puddled; 4.Muskeg.

Goose Production

Geese on the Innoko NWR may have had a worse production year than the ducks. Unlike the ducks, many of whom appeared to leave the refuge for other nesting areas, the geese (white-fronted and Canada) remained but most did not produce young.

Brood sightings of geese were recorded to obtain information on distribution and numbers. Goose concentration areas were similar to last year: The Iditarod River, oxbow lakes off the middle and lower Innoko River, and the Mud River. A total of 18 white-fronted and 10 Canada geese broods were recorded in 1985. This number would have represented only 1 brood flock in 1984. As with the ducks, the areas normally containing the largest geese concentrations were under water until mid-July. This was mainly in the lower Iditarod area where about 20,000 molting geese, many with broods, were seen in 1983 and 1984.

5. Shorebirds, Gulls, Terns and Allied Species

An attempt was made this spring to document hudsonian godwit nesting on the refuge. We observed what appeared to be territorial pairs on several lakes in 1983 and 1984. A lake where two pairs were observed in the past two years was chosen and clerk Patsy Martin and volunteer Jan Johnson were dropped off with Patsy's black labrador June 28. In 5 days they were nearly driven crazy by the worst mosquito crop in memory, due to the flooding, but found no active godwit nests. Six birds were observed and followed, and one bird was seen sitting on an empty nest bowl. Nesting may have been interrupted by predation from the large numbers of gulls (Bonaparte's, herring and mew) that were present.

6. Raptors

A raptor nest survey was conducted this year as a by-product of boat and airplane trips for waterfowl and water quality surveys. Most of the Innoko River and portions of other rivers on the refuge were surveyed. When nests or raptors were observed, an effort was made to stop and observe for 10-15 minutes to ascertain if an active nest was present. Active is defined as a stick nest with an adult sitting in it, with young in it, or with adults acting defensive at a nest site. All observations were made from ground level, primarily from boats, but a few while on foot. During subsequent trips through the same area, an effort was made to

again observe the identified nests.

Twenty-five active nests were found (Fig. 1). The extent and intensity of observations are also depicted in Figure 1. Upland areas received very little search effort. All nests were found in riparian plant communities, which were dominated by white spruce and paper birch or quaking aspen.

Red-tailed (Harlan's) hawk was the most common raptor along the riverine corridor. Twelve nests were found: 8 in white spruce trees and 4 in paper birch trees. All nests were on the river. Two nests were in birch trees leaning over the water.

Young were observed in 6 nests. The observations from ground level limited the production estimates. Two nests had 2 young, 1 nest had 1 young, and 3 nests had at least 1 young. The fledging period was the last half of July.

Six osprey nests were found. All nests were in white spruce and one was on a lake rather than a river. Two osprey nests had 2 young near fledging, and another nest had a single young. Fledging dates for the nests with 2 young were late August and mid-September.

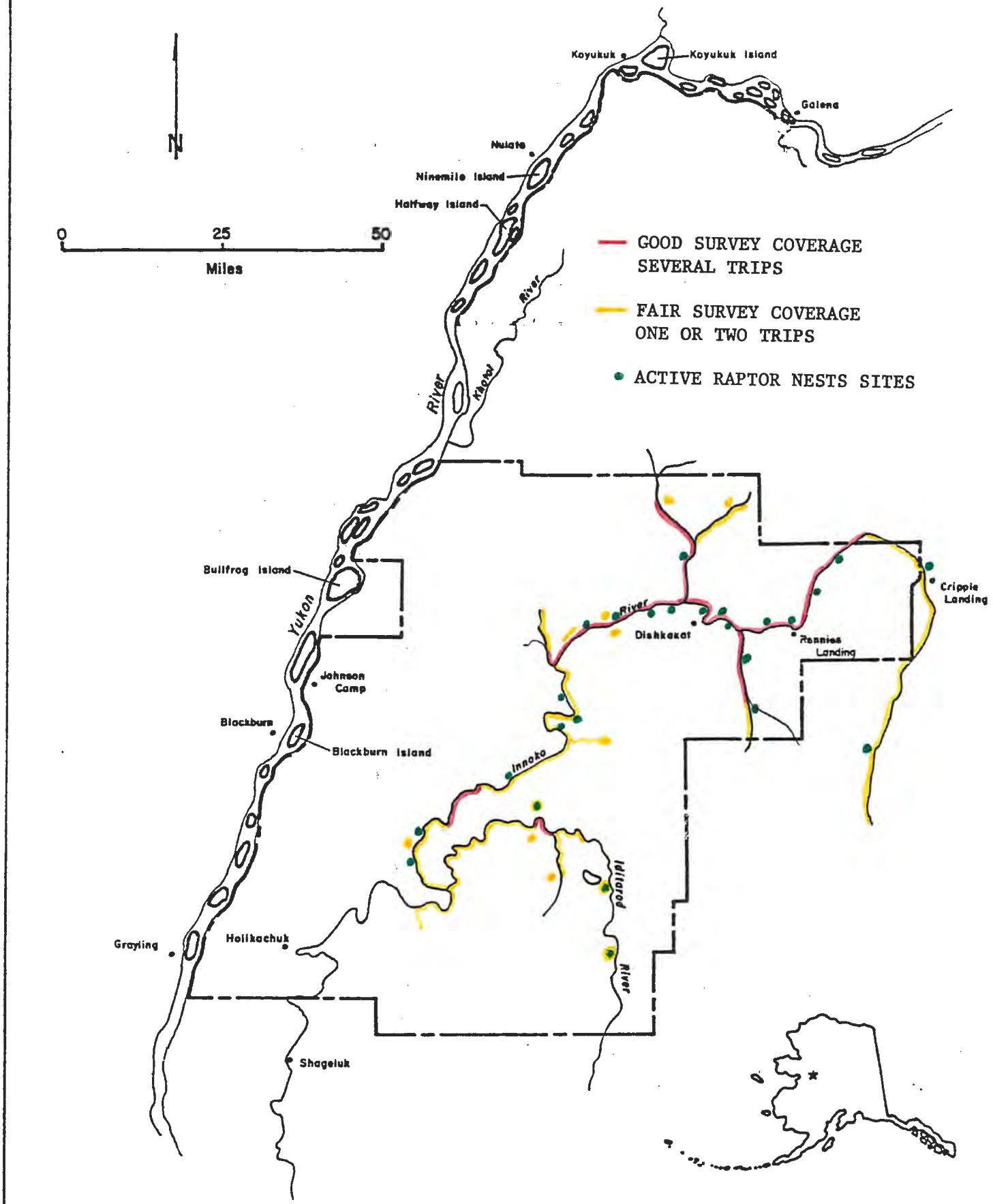
Five bald eagle nests were located. Four were in white spruce trees along the rivers, and the fifth in a paper birch tree near a lake. Two nests had single fledged young and another nest had at least one young. Fledging occurred during the first half of August.

A great gray owl was observed on a nest on June 16. A juvenile hawk owl was seen on June 17 on the refuge cabin lake. Three raven nests were also observed. A peregrine falcon was perched in a spruce tree along the upper Innoko River hills on June 14. Another peregrine falcon was seen harrassing shorebirds in a slough off the Innoko River in August. One active nest was recorded on the upper Innoko, but the identity of the raptor was not discernible.

Forty-one inactive stick nests were also seen. Twenty-six were in white spruce trees and 15 in paper birch trees. These stick nests were a variety of sizes and in various states of repair. Multiple observations were obtained of raptors in some areas. This may indicate a nest in the general area. However, only nests actually observed were recorded.

A disabled great horned owl was picked up in McGrath by Smith and Martin. It was in apparent good health, but had flown

Fig. 1. Raptor nest survey, summer 1985.



INNOKO
NATIONAL WILDLIFE REFUGE

Total acreage within refuge: 3.8 million

USFWS DIVISION OF REALTY ANCHORAGE, AK.

into a chain link fence at the State fire camp, and injured a wing. It was sent into Anchorage for veterinary care. An injured hawk owl was brought into the office by a local trapper. It was missing one leg, but it could perch and seemed healthy, so it was released.

7. Other Migratory Birds

The refuge bird list was revised again this year to confirm sightings of 11 birds that were assumed present on the refuge, but had not yet been observed. These were: northern goshawk, sharp-shinned hawk, snowy owl, three-toed woodpecker, black-backed woodpecker, olive-sided flycatcher, Say's phoebe, northern shrike, orange-crowned warbler, Wilson's warbler, and white-winged crossbill (Exhibit 2).

8. Game Mammals

Moose

A cooperative moose study was initiated with Bureau of Land Management (BLM) and the Alaska Department of Fish and Game (ADF&G) in 1985. The study will be conducted on the southern portion of the refuge and adjacent lands to determine movement and distribution patterns, habitat use, densities, sex ratios, etc. for the population. The moose of the area provide an important subsistence and recreation resource, and knowledge of their population parameters and habits is necessary to ensure proper management.

Thirty-five moose will be radio-collared in March 1986 and monitored for the life of the collars (approximately 3 years). Intensive density surveys will be conducted in November 1986.

ADF&G flew a moose survey in the refuge on 14 and 15 November. In 5 hours 40 minutes of survey time along the Innoko River from Grouch Creek to Rennie's Landing, they counted 193 bulls, 198 cows and only 6 calves (Pegau, pers. comm.). The extremely low calf productivity was attributed to the late winter and severe flooding during calving season. Several surveys were planned for the refuge, but aircraft mix-ups, lack of snow, and icing conditions kept postponing the work until mid-December. By that time, the bulls had started to shed their antlers. The surveys were postponed until prior to radio-collaring in March.

Clerk Martin summarized ADF&G's 1983 and 1984 harvest data for the 2 subunits on the refuge. It is difficult to

Exhibit 2. Birds of the Innoko National Wildlife Refuge, February, 1986

UB..Common Loon
CB..Arctic Loon
CB..Red-throated Loon
CB..Red-necked Grebe
UB..Horned Grebe
UB..Tundra Swan
UB..Trumpeter Swan
CB..Canada Goose
CB..White-fronted Goose
RM..Snow Goose
CB..Mallard
CB..Pintail
CB..Green-winged Teal
UB..Blue-winged Teal
CB..American Wigeon
CB..Northern Shoveler
RB..Canvasback
RB..Redhead
RB..Ring-necked Duck
CB..Greater Scaup
CB..Lesser Scaup
CB..Common Goldeneye
CB..Barrow's Goldeneye
UB..Bufflehead
UB..Oldsquaw
UB..Harlequin Duck
UB..White-winged Scoter
CB..Surf Scoter
CB..Black Scoter
*RV..Common Merganser
UB..Northern Goshawk
UB..Swainson's Hawk
UB..Sharp-shinned Hawk
CB..Red-tailed Hawk
*UB..Rough-legged Hawk
*UB..Golden Eagle
UB..Bald Eagle
UB..Northern Harrier
UB..Osprey
RBW.Gyrfalcon
RM..Peregrine Falcon
*RM..Merlin
*UB..American Kestrel
CB..Spruce Grouse
UB..Ruffed Grouse
UB..Willow Ptarmigan
*UB..Rock Ptarmigan
UB..Sandhill Crane
UM..Black-bellied Plover
UB..Lesser Golden Plover
CB..Semipalmated Plover
UB..Greater Yellowlegs
CB..Lesser Yellowlegs
CB..Solitary Sandpiper
*UB..Wandering Tattler
UB..Whimbrel
CB..Hudsonian Godwit
RV..Marbled Godwit
*UM..Ruddy Turnstone
UB..Spotted Sandpiper
*UB..Semipalmated Sandpiper
CB..Pectoral Sandpiper
CB..Least Sandpiper
CB..Long-billed Dowitcher
CB..Common Snipe
CB..Red-necked Phalarope
UB..Long-tailed Jaeger
RV..Pomarine Jaeger
UM..Herring Gull
UB..Glaucous Gull
UB..Glaucous-winged Gull
CB..Mew Gull
CB..Bonaparte's Gull
CB..Arctic Tern
UB..Great Horned Owl
RMW.Snowy Owl
CB..Northern Hawk Owl
UB..Great Gray Owl
CB..Short-eared Owl
*UB..Boreal Owl
CB..Belted Kingfisher
UB..Northern Flicker
UB..Downy Woodpecker
UB..Three-toed Woodpecker
UB..Black-backed Woodpecker
UB..Hairy Woodpecker
UB..Olive-sided Flycatcher
UB..Western Wood-pewee
UB..Say's Phoebe
*UM..Horned Lark
CB..Violet-green Swallow
CB..Tree Swallow
CB..Bank Swallow
UB..Cliff Swallow
CR..Gray Jay
*RB..Black-billed Magpie
CR..Raven
CR..Black-capped Chickadee
*RR..Siberian Tit
CR..Boreal Chickadee
*CB..Arctic Warbler
UB..Ruby-crowned Kinglet
UB..Hermit Thrush
UB..Gray-cheeked Thrush
CB..Swainson's Thrush
CB..American Robin
CB..Varied Thrush
*UB..Water Pipit
CB..Bohemian Waxwing
UB..Northern Shrike
CB..Orange-crowned Warbler
CB..Yellow Warbler
CB..Yellow-rumped Warbler
UB..Blackpoll Warbler
CB..Northern Waterthrush
CB..Wilson's Warbler
CB..Tree Sparrow
CB..White-crowned Sparrow
UB..Fox Sparrow
UB..Lincoln Sparrow
UB..Chipping Sparrow
CB..Savannah Sparrow
*UB..Golden-crowned Sparrow
CB..Dark-eyed Junco
*CM..Lapland Longspur
UM..Snow Bunting
CB..Rusty Blackbird
UR..Pine Grosbeak
UR..White-winged Crossbill
*UR..Hoary Redpoll
CR..Common Redpoll

Abundance

C Common
U Uncommon
R Rare
* Not yet observed on Refuge.

Status

B Breeding only in summer.
R Resident Year around-breeding
W Winter resident. Non-breeding.
M Migrant
V Vagrant, Casual or accidental

Jan Johnson at Godwit Lake trying to eat with a head net on to avoid mosquitoes.

ARM Smith with broken-winged great horned owl which was shipped off to Anchorage for rehabilitation.

determine the accuracy of information from the harvest tickets because some locations, antler sizes, etc. may be incorrect. Therefore, figures may be slightly inaccurate, but some trends were apparent.

Total harvest on the refuge increased from 43 in 1983 to 118 in 1984. An increase of similar magnitude is anticipated for 1985, but figures are not yet tabulated.

In the southern subunit, no fly-in hunting is permitted; most upstream moose are harvested by fly-in hunters. Harvested upstream moose had significantly larger mean antler size than moose from downstream (Paired-sample t-test; a=0.05). The difference is probably related to hunter selectivity. Mean antler size was slightly lower in both subunits in 1984 than in 1983, but the difference was not significant (Paired-sample t-test; a=0.05).

Almost all of the hunters in the southern unit were from Alaska. Many of them were from Bethel and areas on the Yukon River delta. A much larger proportion of the upstream hunters (31% upstream vs. 3% downstream) were from areas outside Alaska.

A proposal was submitted to the RO proposal review committee to radio collar some moose in the upstream area so the populations could be compared with concurrent data. The proposal was not approved for FY86. It was re-submitted for FY87.

10. Other Resident Wildlife

Black bears were noticeably absent this year on the refuge. They were regularly encountered during waterfowl surveys in 1984, but only 2 or 3 were seen this year. It was most likely due to the extensive flooding this spring which, at first, physically drove them from the lowlands, and then retarded or eliminated berry production. Moose calf production was also very low this year, and moose calves are a sought-after food source of bears in June.

11. Fisheries Resources

As part of a study to characterize and classify lake fisheries habitat for all Interior Alaska refuges, Fisheries personnel from the Fairbanks Fishery Resource Station surveyed 17 lakes on the refuge.

General physic-chemical parameters for Innoko lakes indicate

that these waters are shallow and relatively unproductive. Gill net catch rates were very low, particularly in those lakes without river connections. Northern pike was the most ubiquitous species, found in all but two of the lakes. Other species commonly found included broad whitefish, humpback whitefish and least cisco. These were collected in greatest abundance from lakes with river connections. It was observed that midsummer dissolved oxygen levels in some lakes (particularly oxbow lakes) were approaching lower limits of suitability for fish.

The above work sampled only a very small portion of the refuge. As time and funds permit additional lakes will be sampled as will all of the major streams.

16. Marking and Banding

Waterfowl Banding

A waterfowl banding program was initiated in 1985. This was an experimental year, at best. The best goose drive areas were under water, so alternate sites were located. An attempt was made to lure ducks into traps with no success. Twenty-nine ducks were banded by running them down; and 127 geese were banded, half in drives and the other half by hand capture. The first goose drive began July 26 and the last banding was done August 8 when most ducks and geese were already flying. Only 9 white-fronted geese were banded and these were all in family groups. The non-breeders and failed breeders had already molted. Many flightless groups of Canada geese were encountered and these were practically all failed or non-breeders, as no young were with them.

Non-breeding white-fronted geese were flying a full 2 weeks, at least, before non-breeding Canada geese finished the molt. Breeders seemed to show no difference, but were so few that this observation may not be accurate.

Standard measurements were taken on all adult geese to determine subspecies. This was particularly important for the Canada geese, as we are not certain whether they are the B. canadensis taverneri, or the B. c. parvipes race. We hope to capture more birds next year.

The measurements were given to Cal Lensink in the RO. His preliminary analysis yielded the following results:

> "Although I want to look at some of the smallest and largest individuals more closely and also check for possible differences between geese caught in

White-fronted goose preparing to depart after being banded, measured, weighed and having her privacy invaded.

Volunteers Johnson and Weaver and local hire Winkleman applying a band to a white-fronted goose.

ARM Smith with American wigeon during banding

Volunteer Weaver with eclipse male northern shoveler.

> brood and molting flocks, the data for AHY males indicates that they are probably all B. c. taverneri. This is the subspecies that nests on the Yukon Delta rather than the one (B. c. parvipes) which is supposed to nest in interior valleys."

Next year, we will have to be observant in order to catch the molt at the proper time to allow about 2 good weeks of goose banding. We may have to have separate periods for breeders and non-breeders if 1985 is a good indication. We will also try trapping ducks again in 1986, but we will bait in more locations and earlier. Those bait stations most heavily used by ducks will become our trapping stations. These can be run for a month or more since they will catch flighted or flightless birds.

H. PUBLIC USE

1. General

Public use of the refuge is generally limited to trapping and moose hunting. Except for the adjacent villages, access is limited to small aircraft and, without spectacular white water and sport fishing, there is nothing to attract large numbers of people.

9. Hunting

Both subsistence and sport hunting of moose are important uses on the refuge. Residents of Anvik, Grayling, Holy Cross and Shageluk hunt primarily by boat both along the Yukon River boundary and upstream on the Innoko and Iditarod Rivers. The importance of the refuge as a base for subsistence hunting varies depending upon the availability of moose closer to the villages. We will be conducting a study to determine the area of the refuge used by the moose which support the subsistence hunting. As one of the purposes of the refuge is to support continuing subsistence uses, management strategies may be different where subsistence hunting is important.

Sport hunters generally come from outside the area and arrive by float-equipped aircraft which the villagers perceive as a conflict. However, the majority of the sport hunting takes place well away from the area hunted by subsistence hunters.

With hunters coming from all directions, it is hard to get a good handle on who is doing what, but it appears that the

number of private recreation hunters was lower this year, while the number of hunters brought in by outfitters and air taxi operators increased. The extremely high water early in the year moved moose away from the rivers and heavy rainfall in August and September again flooded the rivers making hunting very difficult. General observations were that antler size was smaller, probably as a result of stress from the severe winter and prolonged flooding.

10. Trapping

Trapping is a way of life in Alaska, and as such, is considered to be a subsistence activity, even though a good trapper in a good area with good markets can realize several thousand dollars from the winters work.

Lest the reader think there is an incongruity here, consider that for many village residents, the income realized from the sale of furs is the only cash available. With gasoline at $3.00/gallon and milk at $5.00/gallon as comparative prices, very few trappers can purchase all of their families needs as a result of their trapping income. Through such activities as cutting firewood, raising gardens, putting up fish, hunting and making their own equipment and clothing, most subsistence users are able to reduce cash outlay enough to make ends meet at a basic standard of living.

Considering the importance trapping plays in the local economy, we must not make frivolous decisions which could devastate someone's life.

17. Law enforcement

Most refuge enforcement work is concentrated on the moose season 5-30 September. This year, the refuge aircraft was in Anchorage for a 100-hour inspection during the first week of the hunting season. Completing work on the cache, water quality collecting and putting up duck traps, outboards and boats took precedence to enforcement this year. Only a few camps were visited to check hunting licenses and kills, but aerial surveys were flown to locate camps and observe hunter activity. State Fish and Wildlife Protection officers Andy Blank from Aniak and Larry Henslee from McGrath effectively covered moose season enforcement on the refuge. Andy patrolled the lower and middle Innoko and the Iditarod Rivers and Larry took care of the upper Innoko River.

I. EQUIPMENT AND FACILITIES

1. New Construction

We did not move in to our new residence on October 1 as we had expected. In fact, it does not look too promising for October 1986 either. As with everything the government tries to do, "We will build no house before its' time." In the mean time, rent on the leased residency increased to $12,000; money we would rather spend somewhere else.

The need for additional storage prompted us to begin construction of a shed adjacent to the field cabin. What started to be a small shed finally became a 12' x 16' building with windows and shelves. Once again, the chainsaw mill proved to be a good investment as all construction material was produced on site. A few more wall logs and a permanent roof will complete this much-needed facility.

4. Equipment Utilization and Replacement

Two twenty-foot long, modified-"V" hull jon boats were purchased and taken down the Innoko River into the refuge. These boats are very stable work platforms and the modified-"V" handled waves much better than our flat bottom boats.

All of the outboard motors stored in the field were flooded, and year-end money was used to purchase five additional Mariners. So far all of the submerged motors are working well, but we expect the experience to shorten their usefulness.

Two Michicraft, eleven-foot, square-end canoes were purchased to be used during field surveys and proved to be of poor design. The canoes are very wide and, while increased stability and safe load resulted, they are about as maneuverable as an inner tube. Two Sea Gull (British) 3 hp motors were obtained for the canoes and proved to be about as useful as the canoes. When they run, they are noisy and slow.

Five hand-held radios which will be compatible with the fire service radio network were ordered, but not received by year's end.

The YACC Dodge 4x4 pickup has given us enough trouble that a replacement was ordered.

N709, a 1965 Cessna 180 airplane which served us well, was replaced in September by a brand spanking new C-185. N735HB

Area in front of cabin. It was dry by August and was used for temporary seasonal housing and storage of building materials.

Refuge cabin was swamped out in late June after water had receded. Left to right: Clerk Patsy Martin, seasonal botanist John DeLapp and ARM Smith's wife, Barbara.

Camp along the muddy Innoko River in June while bringing boats into the refuge.

New boats, motors and canoes (2 of each) were delivered to the refuge cabin over a 235-mile float trip down the Innoko River.

will fly faster, carry more and start better in cold weather, but only time will tell if it will be as faithful.

5. Communications Systems

As reported in Safety and Equipment sections, we finally got our radio system working. We were able to communicate with the field almost all of the time, and when we could not, other stations graciously relayed for us.

J. OTHER ITEMS

1. Cooperative Programs

The State of Alaska subsistence division began a survey of subsistence uses in the villages adjacent to the refuge. A cooperative agreement was prepared whereby the refuge would hire a GS-5 BioTech and provide funds for support services. The State researcher was to supervise the worker and pay travel and per diem.

Unfortunately, bureaucracy was more than the agreement could survive. It seems that the State controllers office could not figure out how to accept Federal money and use it to pay travel expenses for a Federal employee. We did get as far as hiring an individual who quit the same day to take a construction job.

On a more successful note, discussions with BLM and ADF&G led to a cooperative study plan which will result in collaring and tracking moose in and adjacent to the refuge.

K. FEEDBACK

1.
Well here we go again! In 20+ years I've observed that like other natural phenomenon the FWS operates in predictable cycles. Very lean years (funds and manpower) produce a decline in the natural resources and facilities on refuges. This stimulates public interest which leads to congressional interest which leads to increases in funds and manpower.

Activity increases on refuges, facilities are replaced or repaired, equipment replaced, new faces appear and begin to take on the sheen of refuge folks, and the public, satisfied they have saved us, begins to shift their interest toward another crisis. As public interest wanes congress questions the amount of travel, or number of employees, or some other popular ill and the administration reacts.

Since congress has been sensitive to stonewalling (the practice of not spending funds as allocated by congress) other means of answering the concern are brought into play. Since the largest budget item is salaries personnel ceilings are restricted and hiring dries up. As lower graded employees resign or are promoted the average grade level goes up and another ill (grade bulge) is born.

When hiring has been restricted for a while the next most obvious ill becomes travel. Travel is normally done more by higher graded employees and as the shift toward a higher percentage of higher graded employees occurs it follows that a higher percentage of employees are traveling. This leads to criticism and travel restrictions to force dollar savings. Mandatory travel for such activities as law enforcement and pilot training begin consuming major chunks of the limited travel allocation and discretionary travel for refuge management is reduced.

As FTE's (number of personnel), travel, vehicle purchases, and fuel allocations are reduced the remaining limited management resources are shifted towards activities which directly affect the natural resource and we "get by" or "make do" as best we can. In other words facilities and equipment are patched and repaired only to the extent needed to be functional and not a penny more.

Employees are "patched" also. We tell them "these are lean times", and expect (know) that, because of their dedication extra hours and often "out of pocket" expenses the resource will be taken care of (at least as much as humanly possible).

Unfortunately this effort is not enough and morale, facilities and natural resources deteriorate until public interest is stimulated which leads to congressional interest which leads to increases in funds and manpower.

The sad part of all of this is that we can never replace the resource which was lost nor are our employees ever again quite as unselfishly dedicated after they see that this is a declining repetition.

We spend our careers going through these cycles knowing that, because of artificial limitations such as personnel ceilings and travel allocations, we cannot make the most efficient use of limited funds. We try hard but the high point in the cycle is not as high as was the last peak and we become pessimistic.

Rather than placing artifical limits such as FTE's or travel allocations in an attempt to reduce spending, why not just reduce the budget and let the manager decide how to make the best use of it? With this flexibility, we could at least minimize our losses and for those who don't believe in our good judgement, remember the project leader is still accountable.

2.

"Why don't you have Alaskans for refuge managers?" we are asked. Indeed why don't we?

Because it is impossible, or nearly so, for someone raised and educated in Alaska to get hired on refuges. We do not have junior level (GS-5/7/9) professional positions in the region. Therefore we do not have any jobs Alaska graduates can take. Unless an Alaskan is willing to leave the State for an entry level position, and stay out until qualified for GS-11 or above there is almost no chance of hiring people with roots in Alaska. This being the case we will be perceived as an organization of transients like all other government agencies. We will also never be as efficient as we should be because we spend a lot of time teaching new people how to function in Alaska.

The solution? We must establish junior level refuge manager and biologist positions. As a bonus we could solve our grade bulge problem at the same time.

A casualty of a river trip-a new 30 hp Mariner blew the gears out both sides of the lower unit when the prop struck a rock.