INNOKO NATIONAL WILDLIFE REFUGE

McGrath, Alaska

ANNUAL NARRATIVE REPORT

CALENDAR YEAR 1984

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U.S. Department of the Interior
Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

2. 1. 3.

PERSONNEL

1.	PHILLIP J. FEIGER	REFUGE MANAGER	GS-12/4	EOD 9-20-81	PFT
2.	MIKE F. SMITH	ASSISTANT REFUGE MANAGER	GS-11/4	EOD 6-27-82	PFT
3.	JAMES DEMIENTIEF	PILOT	GS-12/4	EOD 7-5-82	TPT

Review and Approvals

Phillip J. Feiger 3-28-85 — John E Kurtz 4/11/85

Submitted by Date — Refuge Supervisor North Date

4/15/85

Regional Office Review Date

INTRODUCTION

The Innoko National Wildlife Refuge was established on December 2, 1980, when President Carter signed the Alaska national Interest Lands Conservation Act (ANILCA) P.L. 96-487.

According to the Act, "Innoko Refuge shall consist of approximately three million, eight hundred and fifty thousand acres of public lands generally depicted on the map entitled INNOKO NWR dated October 1978.

In general the refuge is approximately three hundred miles Northwest of Anchorage and encompasses most of the Innoko River drainage, extending Westward to the Yukon River.

"The purposes for which the Innoko NWR is established and shall be managed include:

(i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, waterfowl, peregrine falcons, other migratory birds, blackbear, moose, furbearers, and other mammals and salmon.

(ii) to fulfill International treaty obligations of the United States with respect to fish and wildlife and their habitats;

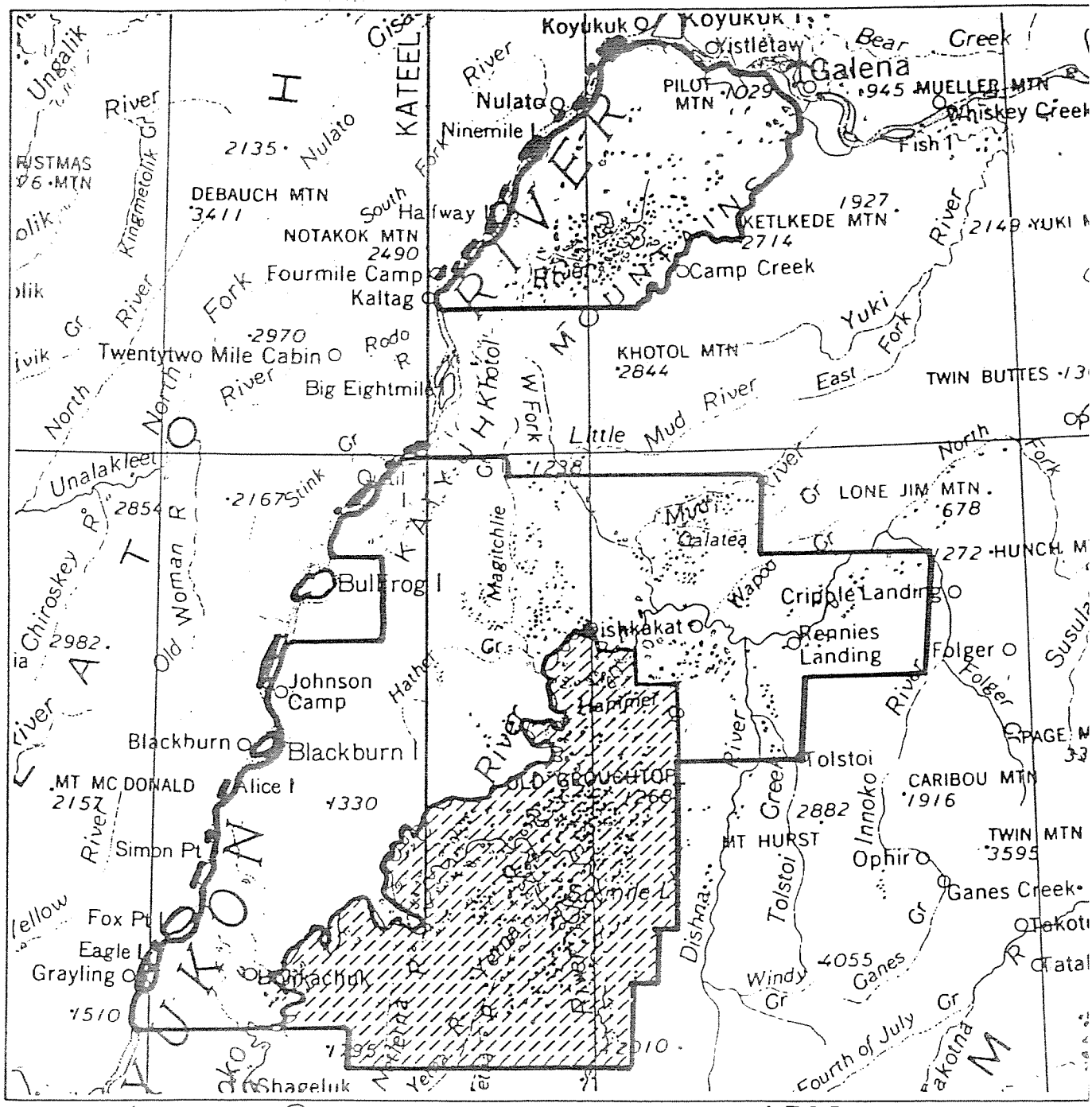
(iii) to provide, in a manner consistent with the purpose set forth in subparagraphs (i) and (ii), the opportunity for continued subsistence uses by local residents; and

(iv) to insure, to the maximum extent practicable and in a manner consistent with the purposed set forth in paragraph (i), water quality and necessary water quantity within the refuge."

As can be seen by the statement of purpose, Congress intended management emphasis to be on diversity of wildlife and habitat rather than focusing on a few types of wildlife. This leads toward ecosystem management. Equally interesting is subsection (iii) which mandates comsumptive uses of the resource as long as the resource is in good condition and it is not inconsistent with International treaties.

INNOKO NATIONAL WILDLIFE REFUGE

PUBLIC LAW 96-487



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B. CLIMATIC CONDITIONS

Interior Alaska weather is typically cold in winter, warm in summer, fairly dry and always changable. This year we experienced all of the above; the high temperature for the year was 80 degrees in June while the low was a chilly -53 degrees in January. Percipitation totalled 15.38 inches and snowfall exceeded 114 inches. Only two months were frost free (June and July), while the temperature failed to get above freezing in February and November.

The high temperatures in March, April, and May were 44,54,and 67 respectively resulting in early snow melting and we did not have flooding along the lower Innoko River as we often do. Such flooding during moose calving results in black bear and moose being forced into the same habitat with predictable results.

With a mountain to cross between McGrath and the Refuge summer storms often disrupt field operations. Having to return to town often to refuel puts us in jeopardy of having crews in the field with their transportation weathered in in McGrath. This happened once this year resulting in one crew spending three extra days in a spike camp.

E. ADMINISTRATION

1. Personnel

Once again lower-pay-itis struck our secretary position. Marty Branscom found she could make more money staying home and sewing dolls. Her replacement Lynda Sheehan lasted six weeks and was hired as school secretary for $4.00+/hour more

than we can pay. It is unfortunate that if a person is intelligent enough to do our work they are also smart enough to know that we are paying poverty wages.

Expanding field work prompted us to attempt to hire two local wildlife biologists using local hire authority but the Regional office decided that the local hire program was not to be used to fill professional positions and our request was denied. By the time a way was found to hire the local biologists both had decided to take jobs which paid much better.

One of the compelling arguements for local hire is that we can get someone acquainted with the hazards of working in Interior Alaska and put them in with crews of volunteers or other inexperienced workers. However we all know that local hire boat operator will not be able to prevent a Ph.D. from California from approaching a cow moose with calf too closely, or from walking into a bog hole.

Fortunately we were able to hire Roger Sleeper as a seasonal biologist GS-7. Roger has a Ph.D. in wildlife managerment as well as good experience in Alaska and did an excellent job for us.

Pilot Jim Demientieff, who is on a local hire temporary appointment was extended for another year.

Assistant refuge Manager Mike Smith, continuing his high quality work, was given an outstanding rating and awarded a quality increase. I,m afraid that one day someone will recognize Mikes ability and offer him a project leader position.

The refuge staffing pattern is:

	PERMANENT	TEMPORARY
FY 84	3	3
FY 83	3	1
FY 82	3	1
FY 81	1	

4. VOLUNTEER PROGRAM

This was our first year in the world of the volunteer. At times it appeared it would also be our last. In the end we counted our blessings and came up with a mixed bag.

Two of our volunteers had never done any real work i.e. dig, hammer, cut trees, haul, etc. One began telling us "I don't roll logs because I don't have good boots." "And I don't operate chain saws because I don't know how." By the time he had told us all of the things he didn't do the summer was

over. His partner,(our volunteers came in pairs) was an excellent worker who we didn't want to lose so we kept trying new task.

Another of our volunteers had a degree in biology and was trying to find which field he was interested in. He wasn"t interested in the field of manual labor; "give me a job gathering data",never mind the fact that before you can gather data from up river you have to haul the boat to the river. In this case also his partner was excellent and, not wanting to loose him, we put up with (and tried to get some use out of) this finicky biologist.

Through the frustration came the realization that two of our volunteers were so good that balanced with their partners we still came out ahead. Never again will we take on volunteers who have not experienced "work".

Our volunteers assisted in breeding pair counts, brood surveys, vegetative sampling, and cabin construction.

In retrospect I suspect we expected too much from our first year in this program. Much of our frustration came from expecting that, without being told everyone would pitch in and do their share of camp chores, physical labor, and all of the things that make living and working in a camp situation pleasant. Now more than ever I appreciate the comradery we had last year. All in all we accomplished more with the volunteers than we could have without them.

5.
FUNDING

We were closer to an operating budget this year than we have ever been. The addition of ARMM funding made it possible to begin vegetative sampling, to modify our brood sampling techniques and to construct a field cabin.

Transportation remains one of the biggest costs of doing business in Alaska. A round trip to the refuge costs $200.00 plus pilots salary. We can haul one drum (55gal.) of fuel in the plane or $3.63 for hauling plus $2.50 purchase price for a per gallon price of $6.13 in the field.

Without ARMM funding we would have had a dismal year, as it turned out we experienced our best year since we were staffed in 1981.

FUNDING LEVEL PREVIOUS FY'S

FY 85	$385,000	Includes $90,000 RPRP
FY 84	$244,000	Includes $80,000 ARMM
FY 83	$180,000	Reduced mid-term to $164,000

FY 82	$244,000	Reduced mid-term to $180,000
FY 81	$10,000	

6. SAFETY

As with all field work in Alaska our routine operations are extremely hazardous. Travel to and from the refuge is by small aircraft on floats or skiis. Wildlife census and law enforcement involves low level flying over rough terrain and all take off and landings are off-runway. On the ground we face walking conditions of deep mud, muskeg, floating bog and heavy vegetation.

Typically a crew is flown to a site to do a survey while the plane departs to ferry another crew to a different location. A rondezvous is planned and the hope is that the plane will return and that those on the ground will make their way to the pick-up point.

Grizzlies, black bear and cow moose with calves add spice to our lives as do sudden changes in the weather which might prevent the plane from returning.

Add a crew of four volunteers, two from Vermont, one from Iowa and one from Illinois, throw in a cabin building project repleat with axes, chainsaws, power winches and a saw mill and anxiety levels skyrocket.

It is no wonder then, considering the many hazards we face, that Managers in Alaska seem prone to heart attacks and grey hair.

Deligence by the entire crew, careful planning and review of each task and even some good luck prevented any accidents in an area where even a small accident can be fatal.

Two close calls did occur which should be used to prevent occurances elsewhere.

One of our volunteers, Bill Wood, did not show up at his assigned pick-up point. Pilot Demientieff and Assistant Manager Smith took off and flew a search in the area and fortunately spotted Bill headed in the wrong direction. At 6'4" Bill should have been easy to see except that he was dressed in camouflage and had fallen through floating bog and so was wet and muddy. Lesson: Orange windbreakers for our crews.

The second incedent occurred when Manager Feiger was dropped off at a cache to pump aviation fuel into cans. The pilot was to return after ferrying a crew, refuel the aircraft, and with Feiger return to McGrath.

Approaching a fuel pump which had been cached Phil was

Before and after (the Manager arrrived)
Visqueen to keep out bugs, Slab wood and a SEAT.

charged by a black bear. There will probably come a time when shouting and flailing with his right hand while trying to draw his service revolver (which was on his left hip) will be humerous to Phil but that time has not yet arrived. At approximately twelve feet the bear broke off the charge and Phil was able to retreat. Two hours later the plane returned and convinced that the bear would have departed, Phil and Jim Demientieff attempted to retrieve the pump.

As they approached the pump the bear again appeared. Her actions convinced Phil that a charge was emminent and the bear was shot. The State Wildlife Protection Officer later charged Phil with "taking a sow accompanied by cubs". After lengthy legal hassels (the kind which can only be enjoyed by lawyers) the matter was settled in Federal Court with the Judge ruling that Phil was immune from State prosecution. He ruled further that no jury could possibly find Phil guilty and directed a verdict of innocent.

Lesson: Better in court than in a cemetary!

One so far unsolvable problem which we are still working on is radio communications.

Distance and mountains necessitate using H.F. radios and as anyone who has used them knows funny things happen with H.F. During June we could talk to McGrath from the field, during July and August we would have to relay through Fairbanks, Bethel, or Yakatat all several times further! At times we could not raise anyone and if we had had an injured person we would have had a serious problem. I can remember worrying about being stuck eight miles from refuge headquarters in Colorado without a radio!

7. TECHNICAL ASSISTANCE

Recognizing that we are not the only agency with budget problems we have tried to assist other Federal and State agencies whenever we could without harming our program. This assistance has normally been by making our plane and pilot available. Normally we only charge for flight time and fuel since we would be paying salary and availability anyway.

Agency	
BLM	Flew snow surveys Flew trespass cabin check
State	DNR: Flew Forester to timber sale area
	ADF&G: Flew Biologist on radio tracking of moose,

bison, and caribou.

Fish & Wildlife Protection:
Transported prisoner.

E. HABITAT MANAGEMENT

1. General

Vegetation mapping using color-infrared (CIR) photos took place from June 21 through Autust 1. This may more appropriately be called a vegetative reconnaissance and mapping of selected areas. We actually did very little classification in this endeavor; rather, we reconnoitered areas which could be seen as distinct by color and/or texture on the CIR photos and fit them into an established classification system. The system we are using is "The 1982 Revision of Preliminary Classification for Vegetation of Alaska" by L.A. Viereck, Dryness and Batten.

Although this work should be helpful in developing the Comprehensive Conservation Plan (CCP) and ground truthing landsat imagery, this is not the purpose for this study. The main purpose is to help clarify wildlife distribution and use patterns on the refuge by recognizing plant communities and drainage patterns in more detail than a topographic map can. We have already found this useful in conducting and interpreting waterfowl brood surveys in July and August.

This summer approximately 25 square miles were visited by field crews and mapped. This includes 8 square miles which were surveyed in conjunction with brood surveys. The 25 square miles provide good reference to about 151 square miles of adjacent habitat by following color patterns on the CIR photo. Additionally, these sample areas which have been mapped are useful in characterizing any other CIR photo on the refuge which has been treated with the same color balance during developing.

Using Viereck's classification system, we were able to identify on the ground and map on the photos, 44 habitat types. (Table 1)

Mapping was done on the black and white 4"=1 mile paper enlargements in the field and copied onto the 1"=1 mile photos in the office. Plant communities were classified to Viereck's level 3 or 4, depending on the color definition provided by the CIR photo. Nine of these plant communities did not fit into an established level 4 classification. These were classified to level 3 and a level 4 description was written in. These descriptions are qualitative rather than quantitative in nature and require additional work before being incorporated into a system such as Viereck's.

Table 1 Vegetation Classification* Summary
Plant Communities Observed in 1984 on the Innoko NWR

1. Forest	A. Needleleaf	1. Closed	J.	White Spruce
			K.	Black Spruce
			-.	Black Spruce-Tamarack
		2. Open	G.	Black Spruce
			I.	Black Spruce-Tamarack
			-.	Tamarack
		3. Woodland	-	Tamarack-Black Spruce
			-.	Tamarack
	B. Broadleaf	1. Closed	D.	Paper birch
			F.	Birch Aspen
	C. Mixed	1. Closed	A.	Spruce-Birch
			B.	Spruce-Birch-Poplar
			D.	Aspen Spruce
			-.	Birch-White Spruce
		2. Open	A.	Spruce-Birch
			-.	Birch-Spruce
2 Scrub	A. Dwarf Tree	2. Open	B.	Dwarf Tree
	B. Tall	1. Closed	A.	Willow
			B.	Alder
			C.	Shrub Birch
			D.	Alder-Willow
		2. Open	A.	Willow
			B.	Alder
	C. Low	1. Closed	A.	Dwarf Birch
			-.	Ericaceous Shrub-Sphagnum Bog
			-.	DwarfBirch-Ericaceous Shrub
		2. Open	B.	Low Willow
			C.	Dwarf Birch-Willow
			H.	DwarfBirch-Ericaceous Shrub Sphagnum Bog
			J.	Ericaceous Shrub-Sphagnum Bog
	3. Gervaceous	A. Graminoid	1. Dry	D. Midgrass-Herb
		2. Mesic	A.	Bluejoint Meadow
			B.	Bluejoint-Herb
			C.	Bluejoint-Shrub
			-.	Short Graminoid-Herb
		3. Wet	G.	Lowland Sedge Wet Meadow
			I.	Lowland Grass Wet Meadow
			L.	Lowland Sedge Bog Meadow
			M.	Lowland Sedge-Moss Bog Meadow
	B. Forb	3. Wet	A.	Fresh Herb Marsh
			B.	Lowand Herb Wet Meadow
			C.	Lowland Herb Bog Meadow
	C. Bryoid	1. Mosses	A.	Wet Moss
	D. Aquatic	1. Freshwater	A.	Pond Lily

*1980 Revision of Preliminary Classification for Vegetation of Alaska: L.A. Viereck, Dryness & Batten

Seasonal Sleeper, And volunteers Tom Smith (C) and Carlos Paez (R) conducting vegetative survey in a Birch, Spruce forest.

Volunteer Bill Wood Taking a well deserved break after a hard days work.

Mapping with CIR photos does not provide the versatility of landsat where a computer can map the entire refuge once an appropriate portion has been sampled. This is one of the major drawbacks of photos. Digitizing plant communities for the entire refuge on CIR photos is too time consuming to be practical. Instead, we have to map a representative sample of the refuge and use these photos as reference to similar areas.

There are many positive aspects of this technique however, as the CIR photos show more detail generally than landsat can. For example water and edge communities are not averaged out as happens with landsat.

CIR photos can be duplicated and enlarged relatively inexpensively compared to a landsat product. Once a "milar" enlargement has been made, black or blue line copies can be printed on a "blueprint" machine for about $0.66 each in Anchorage. These make a very good field map. Since the scale of most CIR photos approximates 1"=1 mile and land forms are easy to see, transfer of information to or from a topo map is easy.

This technique can be accomplished be refuge personnel and the product used by them in the field without need of computers, specialized equipment or special training. A botanical or ecological specialization is useful, but most managers or refuge biologist can recognize the communities described in the "Classification for Vegetation in Alaska" and map these on CIR photos. The CIR photos themselves make a superior field map. We have found them excellent tools in finding our way around bird and moose survey quadrats.

In order that this project be useful to the refuge, the photos, maps, classification key and accompanying data forms will be filed so that they can be readily retrieved. As already mentioned, these mapped and classified photos will be used as keys to the total CIR coverage on the refuge.

This summer we conducted the vegetative reconnaisance in conjunction with building a cabin and surveying waterfowl. Six people worked on the project: four volunteers, one seasonal and ARM Smith. On each survey crew, either seasonal Dr. Roger Sleeper or Smith were in charge in order to have control of our technique. There were, however, problems with this arrangement, too many people with too many other jobs to do. For this study we need to have two people, preferably a plant ecologist or botanist and an assistant, who can spend July and August working solely on this project. This will give them more time in the field gathering data and mapping and more time to properly write up the results.

We will continue this project for the nesxt year or two in

Fire slowly burns around wet areas.

Portion of 37,000 acre fire near the Innoko River that burned for two months.

Dwarf Black Spruce with an understory of Lichen found on raised islands in the muskeg area. These plants burn readily during dry weather.

Patchwork pattern left by fire in the muskeg area.

order to become thoroughly familiar with the plant communities on the refuge and have enough reference areas mapped to cover all plant communities.

3. FIRE MANAGEMENT

We are in our second 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 summer we made great strides towards this goal. Over 50,000 acres were burned, including one fire of over 37,000 acres which burned for about 2 months. The fires skipped around wet areas leaving a patchwork pattern that is most attractive to wildlife when regeneration occurs. The regrowth cycle is most beneficial to moose with new shoots of willow, birch and aspen appearing. Recent studies are showing that even forest dwelling furbearers like marten also benefit from burns as long as some older stands of timber are left within and surrounding the burn. This is the usual case. All predator populations are benefited since the rodent population usually explodes in these burned areas after 2-3 years, when new grasses, forbs and young tree shoots are available.

Our policy of limited fire protection where private land is not affected will improve the habitat on the Innoko and will keep it in its natural dynamic state.

G. WILDLIFE

3. Waterfowl

Waterfowl surveys comprised a major portion of this summer's field work. Waterfowl were not only counted but an attempt was made to link their abundance to habitat.

In 1983 the inventory plan which we adopted at the Regional waterfowl workshop was aimed at linking numbers of birds to surface acres of water. This was found to be insufficient

"Well it looked deep enough!" Manager Feiger and Volunteer Tom Smith bringing the last boat into the Refuge.

Canada geese in Upper Innoko River habitat. Preferred habitat in the upper reaches differs markedly from that in the lower Innoko River.

for our purposes. The problems were discussed at this years waterfowl workshop and we decided to base our surveys on refuge acres, both land and water. The sample units we settled upon were 1 sq. mile sections taken from 1:63,360 topographic maps. All water bodies within the sample quadrats were surveyed using standardized methods. i.e. walking or canoeing each shoreline and counting flushed birds. The data was collected on a lake by lake basis so that waterfowl investigations in Juneau could interpret the data on the basis of birds/water body. For our use the data was described as pairs/ square mile, or broods/square mile (Tables 2&3).

Sample quadrats were not selected randomly this year so no population estimate was attempted. Rather we chose plots in selected areas to help clarify habitat use by waterfowl. The data collected over the last two years should allow us to stratify refuge habitat based on duck use. By sampling in these more concise units we hope to lower the varience of our data and thereby develope a population estimate at a high confidence level with a minimum number of samples. Spring flooding, particularly in the Iditarod River area, prevented survey teams from entering many of the preselected sample quadrats. Only 15 quadrats were censused for waterfowl pairs this spring (Table 2).

Waterfowl Investigations has been conducting an annual spring breeding pair census throughout the State for over 25 years. This is a aerial survey using a specially constructed turbo De Haviland Beaver aircraft. One hundred and nine (109) transect miles of this survey are flown over the Innoko refuge with an additional 67 transect miles flown immediately adjacent to the Refuge in simalar habitat. This is a total of 176 transect miles or 44 square miles in the sample.

This aerial survey is superior to ours in that it covers a greater area in less time and is not hindered by high water conditions as our ground crews are. The only real limitation is that in all the years this survey has been conducted a visibility ratio for the different Alaskan habitats has not been developed due to the difficulty in walking the 16 mile transects in the roadless, boggy wetlands where the transects are flown.

Working with Bruce Conant, who flies these surveys, we are investigating a technique using a helicopter which will allow an observer to fly the same route as the fixed wing aircraft and identify better than 95% of the waterfowl that an observer on foot would see. We have made arrangements to "ground truth" the surveys to estimate our spring population and concentrate our efforts identifying important habitats, conducting brood surveys and waterfowl banding.

Thirty one quadrats of one square mile each were surveyed for

Pintail with brood of 4. Pintails are our most numerous breeder on the Refuge.

Class III brood of GWT. It is often difficult to drive all the birds out of this dense cover in order to count them.

Table 2. Waterfowl pairs observed on 15 one square mile quadrats on the Innoko N.W.R. in June 1984. Quadrats divided into 11 Riverine and 4 Muskeg habitat types.

Species	Riverine Quadrats											muskeg Quadrats				total pairs	pairs /sq.mi.
Pintail	17	10	16	2	16	1					6	11	8			85	182	0.1
Wigeon	26	18	6	15	8			6	6	30	2	4		2	2	125	0.3
G-W Teal	10	3	6	6	1	4	7	2	2	6		6		2		1	56	3.7
Shoveler	6	14	4	14	6	4	2			6	4					2	62	4.1
Mallard	9	2	4	2	2	4			4	9	2	2					40	2.7
Scaup	18	8	24	2		2			4	6	24	4	2				94	6.3
Bufflehead	3																3	0.2
Black Scoter		110									21	12	6	2			34	2.3
Surf Scoter									1			9					10	0.7
Canvasback	2	2															4	0.3
Redhead			2														2	0.1
Goldeneye		2										2					4	0.3
Old Squaw												2					2	0.1
TOTAL	91	59	72	51	33	15	9	8	17	63	45	49	12	4	30		558	37.2
					463								95				558	

Table 3. Number of duck broods by species found on 31 one square mile quadrats on the Innoko NWR, summer 1984. Quadrats grouped by stratum*

	Sample size (sq.mi)	Mal.	Wig.	G.W.T	Shov	Pin	Scaup	Scoter	Unid	Total
Stratum										
1	5									
#broods		8	35	58	45	89	5		5	245
Brd/sq.mi		1.6	7.0	11.6	9.0	17.8	1.0		1.0	49
2	22									
#brood		8	41	34	14	43	13		9	162
Brd.sq.mi		0.4	1.9	1.5	0.6	1.9	0.6		0.4	7.4
3	4									
#brood				1		1		3		5
Brd/sq.mi				0.25		0.25		0.75		1.25
all Strata	31									
# Broods		16	76	93	59	133	17	3	14	412
Broods/Sq.mi		0.5	2.4	3.0	1.9	4.3	0.5	0.1	0.4	13.3

* stratum #1-Quadrats with river connected "puddled" lakes
Stratum #2-Quadrats with Riverine lakes, excluding "puddled" lakes
Stratum #3-Muskeg lakes

Moose are often run across while surveying duck broods. This pair of yearlings were interested but not concerned; male on left, cow on right.

Black bear are common on the Refuge and are encountered often in brood rearing areas where they are sometimes seen pursuing flightless ducks and Geese.

duck broods. These surveys indicated that pintail were by far the most numberous breeder on the refuge with green wing teal second and wigeon third. The fourth, fifth and sixth positions fell to shoveler, scaup, and mallard.

Habitat preference seems most pronounced and probably most critical for ducks with broods rather than for singles, pairs or groups of adults. Breeding pairs were found to be fairly evenly distributed throughout the refuge wetlands in spring, while in summer broods were found to be concentrated in preferred areas. The habitat preferences described below are therefore based mostly on brood surveys.

Surveys conducted in 1983 indicated two basic strata based on numbers and species composition of ducks. The preferred stratum are lakes associated with a river or stream (riverine); the majority of duck broods were found here; These lakes are either directly connected to a stream or are periodically flooded by the adjacent stream. The other stratum are bog or muskeg lakes. These lakes do not benefit from an associated stream and are usually situated in dwarf black spruce/lichen/sphagnum moss communities. Muskeg lakes were shown to be under-represented in dabblers in the spring and had few broods of either dabblers or divers in the summer survey. The few scoters that were encountered did seem to prefer this type of lake, however.

The more exstensive key to duck preference seems to lie in the amount and type of water draw down in summer. The first stratum with 49 duck broods per square mile contains river connected "puddled" lakes. These are normally large lakes which are drawn down in mid summer to become numerous small ponds with short grasses and sedges between water bodies. The second with 9.1 broods per square mile also have drawn down lakes; however they do not puddle but leave a mud shore with short herbaceous growth. These are typically oxbows. The last riverine strata contains lakes that are not directly connected to a river or stream and are not drawn down in summer; this stratum had 6.4 broods per square mile. The muskeg stratum accounted for only 1.25 broods per square mile in 1984.

Table 4 shows the mean, range and total broods counted for 9 possible strata. The range in #8 (river connected "puddled" lakes) is deceivingly wide due to the size of this type of lake. Many lakes are as large or larger than our one square mile plots, but usually only a portion of them falls within the plot. Because of this the data on these very productive lakes is lumped with other less productive lakes in our sample plot. If the "puddled" lakes were handled separately, the variance would probably be much lower. On the assumption that we can statistically handle these very productive lakes separately, three strata were singled out as our best sampl-

Primative camp conditions during rainy weather. This crew, conducting brood surveys, spent 3 additional days waiting for the plane.

The sawmill provided materials for more than the cabin. Manager Feiger keeps feet dry while loading N-709.

Table #4 A comparison of Waterfowl Brood Data Arranged in 9 Possible Strata.
Innoko Refuge 1984

Strata	# sample quadrats	X*	RANGE**	TOTAL BROODS
MUSKEG	4	1.25	-0.2-2.7	5
RIVERINE-ALL LAKES	27	15.07	11.26-18.88	407
RIVERINE-W/OUT CONNECTED LAKES	14	6.4	4.75-8.05	89
RIVERINE-W.OUT CONNECTED DRAW DOWN LAKES	19	17.58	10.88-24.28	334
RIVERINE-W/OUT CONNECTED "PUDDLED" LAKES	22	7.36	5.91-8.81	162
RIVERINE-ALL CONNECTED LAKES	13	24.46	15.53-33.39	318
RIVERINE-CONNECTED DRAW DOWN LAKES ONLY	8	9.125	6.25-12.01	73
RIVERINE-CONNECTED "PUDDLED" LAKES ONLY	5	49.0	16.66-81.34	245
ALL QUADRATS	31	13.29	10.61-16.42	412

* Mean is the same as Broods/Sq.Mi. for these samples
** At 90% Confidence Level

Typical "Puddled" lake in August containing two Wigeon broods. In early spring this was 1 lake extending to the trees in background.

An example of a typical Riverine (river associated) lake Which is not connected by a stream to the River. Horsetail is the dominant emergent.

Muskeg habitat consisting of permafrost soils overlain with Sphagnum moss and lakes of various sizes. Notice raised islands of lichen, ericaceous shrub, and dwarf Black Spruce.

Beauty and the Beast. Wild Rose while esthetically pleasing is also good at tearing clothing, hip boots and hands (and shedding thorns INSIDE boots).

ing units (table 2). Next year we will randomly select within these units.

We haven't as yet produced any evidence to explain why the riverine lakes and particularly those connected to the river are more attractive to ducks with broods. Our observations of vegetative growth and studies conducted elsewhere indicate that there is more primary productivity due to an annual infusion of nutrients from the river; riverine lakes that are not directly connected to a river benefit this way from periodic flooding. The much greater number of broods in the "puddled" lakes may be further explained by the absence of pike, an important predator on ducklings, which move into the river as the lake level gets too low for them.

Goose surveys were mostly limited to recording locations where molting flocks concentrate. The broods in these flocks are normally grouped, so that individual brood sizes were not usually possible to obtain except right after hatching. Flocks of white-fronted and Canada geese numbering from 200-400 each were concentrated on the lower 40 miles of the Iditarod River and the Innoko River near the mouth of the Iditarod. A rough estimate of 40,000 geese of both species were found in this area in late July and early August.

Several goose nests, mostly Canada, were found during waterfowl pair counts. No nesting concentrations were found and possibly do not exist in the Interior as they do on the coast.

4. MARSH AND WATER BIRDS

Breeding pairs of red-necked grebes were found on nearly all sample quadrats. Although most nests were observed in dense horsetail or sedges, lakes of all types appeared to be suitable for these birds. Red-throated and arctic loons are commonly observed on rivers and lakes during waterfowl surveys. Common loons are the least common of the loons on the Innoko and are found mostly on muskeg lakes.

5. SHOREBIRDS, GULLS, TERNS AND ALLIED SPECIES

Lesser yellowlegs are the most common shorebird found in the wetlands of the Innoko drainage. As with last year Hudsonian godwit pairs were commonly seen particularly on muskeg lakes, however no young or nests have yet been found.

6. RAPTORS

Harlans hawk is the most common raptor on the Refuge. Several breeding pairs of bald eagles as well as singles were recorded this year. Osprey were noted in a few locations on the Innoko River. One breeding pair with a nest was observed

again this year up river from our Innoko camp in the same vacinity as lasts years nest. A Swainson"s hawk was observed for the first time on the Refuge in 1984.

7. OTHER MIGRATORY BIRDS

The refuge bird list prepared in 1983 (exhibit I), was revised to add two birds and confirm sightings of 4 species which were on the list but not previously observed on the refuge. The two additions were the ring-necked duck and Swainson's hawk. The confirmations were snow geese, and red-head, ruffed grouse and a yellow-rumped warbler. A brown thrasher was also reported this summer, however this bird would be too far out of its range to accept this sighting without confirmation. The sighting could have been an oriental cuckoo which has a similar color and tail length. Oriental cuckoos have been sighted in Western coastal areas of Alaska.

8. GAME MAMMALS

Moose surveys were conducted in March and again in December of 1984. The March surveys covered the Innoko river from the mouth of the Iditarod to the North Fork and almost all of the Dishna River including that area off the refuge. This is approximately 300-400 river miles. Snow accumulation is usually at its peak at this time of year particularly in the hills. Most moose are therefore found congregating in the river bottoms. We use this opportunity to survey most of the population and estimate calf survival over the winter. Calves made up 26% of the population on the Innoko river while they accounted for only 11.5% on the Dishna river in March of 1984.

The early winter survey in December was difficult to complete due to heavy snows throughout the month which precluded flying the airplane. We had hoped to begin this survey in November and include several new quadrats so that over 120 square miles would be surveyed. The weather never seems to cooperate as in November a lack of snow prevented surveys since the ground must be white to give us the best chance of seeing all the moose. As it is only 2 quadrats of 20 square miles each were completed in 1984 for a total of 40 square miles. Both of these quadrats were along the Innoko River in riverine habitat. Quadrat #1 had 21 calves per 100 cows and 3.35 moose per square mile, while quadrat #2 had 9 calves per 100 cows and 1.45 moose per square mile.

Quadrat #1 was also surveyed in December 1983 and at that time had 21.4 calves:100 cows indicating no change from '83 to '84. The density on this quadrat in 1983 however was only .98 moose/square mile which would on the surface indicate a large increase this year to 3.35 moose/ square mile. It can probably be explained however that heavier snows this year

Exhibit 1

BIRDS OF THE INNOKO NATIONAL WILDLIFE REFUGE- Feb. 1984

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..Shoveler
RB..Canvasback
RB..Red-head
RB..Ring-Neck
CB..Greater Scaup
CB..Lesser Scaup
CB..Common Goldeneye
CB..Barrow's Goldeneye
UB..Bufflehead
UB..Old Squaw
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 (Harlans)
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
CB..Willow Ptarmigan
UB..Rock Ptarmigan*
UB..Sandhill Crane
UM..Black-bellied Plover
UB..Graater 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 Woodpewee

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

CONTINUED NEXT PAGE

CONTINUED

BIRDS OF THE INNOKO NATIONAL WILDLIFE REFUGE - FEB. 1984

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..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..Fow Sparrow
UB..Lincoln Sparrow
UB..Chipping Sparrow
CB..Savannah Sparrow
UB..Golden-crowned Sparrow*
CB..Dark-eyed Junco
CM..Lapland Longspur*
UW..Snow Bunting
CB..Rusty Blackbird
UR..Pine Grosbeak*
UR..White-winged Crossbill*
UR..Hoary Redpoll*
CR..Common Redpoll

Young of the year camp robber who with his parents and siblings spent the summer with us and lived up to his name.

Another neighbor, Hudsonian Red Squirrels are common in the White Spruce forests.

pushed the moose out of the hills down to the river sooner than last year. Regardless of the reason we know that moose are very mobile and until we can survey a much larger sample area in all habitats population estimates or even indices cannot be reliable. What we do know is that presently the moose population on the refuge in one of the highest in the interior. The population appears to be healthy both in size and the number of mature bulls available for harvest.

Wolf numbers in 1984 appeared to be low, still recovering from heavy trapping pressure in '83. Wolf sign was seen regularly this summer in duck brood rearing areas. The deep snow this winter could prove beneficial to wolves and detrimental to moose calves particularly if a hard crust develops which can support a wolf but not a moose.

Black bears are very numerous on the Innoko judging from our frequent encounters with them while conducting breeding pair and brood surveys for waterfowl. Their secretive habits and the dense cover they prefer make it difficult to develop a survey technique to estimate their numbers. One method is to radio collar as many as possible over 2-3 years and use a Lincoln index based on relocations. This is very expensive and time consuming so , although it sounds like fun, we really can't justify the expenditure.

Recent research has revealed that bear are usually more detrimental to moose calf survival in the first few months than, the more customary villan of art and literature, the wolf. Our observations this summer bore this out. During the month of June several bear were seen with moose calf kills. We also noticed a corresponding decline in the number of cows with calves throughout the month. This decline appeared to cease in July possibly when the calves were able to keep up with their mothers who can defend against a bear.

A caribou herd of approximately 3,500 animals has its home range centered in the Beaver Mountains about 20 miles East of the refuge. These animals frequent the refuge mainly in winter to avoid the deeper snow in the mountains. During this time they use the black spruce muskeg lowlands in the wilderness portion of the Refuge. This area is very rich in variety and abundance of lichens for which the caribou will dig through the snow. The winter wind in this flat region usually blows much of the snow away so that depths do not reach the levels of wooded or hilly areas.

Although most of this herd returns to the Beaver Mountains in spring, for the last two summers we have noticed small groups of 5-6 deer still utilizing the area in mid-summer. Most of these have been seen in muskeg habitat about six miles southeast of the mouth of the Dishna River.

Black Bear with moose calf kill on cabin lake. As you can see he didn't want to give up dinner.

Cow with twins across from our saw mill. We saw this cow all summer; she was one of the few that kept both calves.

11. FISH RESOURCES

Test nets were set at various locations and times throughout the Refuge again this summer to sample the fish population. This was done in conjunction with waterfowl surveys, vegetation inventories and cabin building, as no time or personnel were available to do solely fisheries work. Similar to last year our samples showed pike, white fish and cisco to be the most abundant in that order. We also found a strong chum salmon run in July along with a few pink salmon. Th 1982 and '83 the Alaska Department of Fish and Game had a team in the Innoko drainage to inventory sportfish. A list of the fish they found can be seen in table #5. Notably absent on this list are the pink salmon we found this summer. Several more years of sampling will be needed to determine whether there is a weak pink run or if the fish we caught were lost as the State biologist believe.

H. PUBLIC USE

1. GENERAL

Public use on the refuge is low: it consists mainly of subsistence hunting, fishing, and trapping by residents of Yukon River villages and sport moose hunting in September by local and non-local hunters. On the greater majority of the refuge, there is little to no human activity. While the field crew was camping on the refuge from late May through July, only two outside people were seen. These were a couple from McGrath who kayaked down from the Innoko headwaters. They stopped at our camp for a few days where Sally took over the cooking while Ray helped put the roof on the cabin. No other visitors were encountered all summer which indicates we are not ready for a visitors center yet.

Every other year the Iditarod Sled Dog Race, 1,049 miles from Anchorage to Nome, crosses a portion of the refuge. In 1984 the alternative route was used and the refuge wasn't entered.

One cabin permit was transfered from Darryl Olsen to Jim Flemings, the original builder. This cabin is located on the upper Iditarod River.

Another cabin was built in trespass on the Iditarod River near six mile lake. Richard Peters from Holy Cross on the Yukon River, claims he thought he built the cabin on his brothers native allotment. He says that he discovered after the cabin was built that his brothers allotment was somewhere else. Richard has applied for a special use permit based on his subsistence trapping use of the area. We are investigating his claim before proceeding.

8. HUNTING

Beauty from sample net, 10 dog-1 pink.

Iowa boy with first Salmon

TABLE 5. LIST OF COMMON NAMES, SCIENTIFIC NAMES OF FISH FOUND IN THE INNOKO RIVER DRAINAGE.

Common Name	Scientific Name and Author
Alaska blackfish	*Dallia pectoralis* Bean
Arctic char	*Salvelinus alpinus* (Linnaeus)
Arctic grayling	*Thymallus arcticus* (Pallas)
Arctic lamprey	*Lampetra Japonica* (Martens)
Broad whitefish	*Coregonus Nasus* (Pallas)
Burbot	*Lota lota* (Linnaeus)
Chinook salmon	*Oncornynchus tshawytscha* (Walbaum)
Chum salmon	*Oncorhynchus keta* (Walbaum)
Coho salmon	*Oncorhynchus kisutch* (Walbaum)
Dolly Varden	*Salvelinus malma* (Walbaum)
Humpback whitefish	*Coregonus pidschian* (Gmelin)
Inconnu (sheefish)	*Stenodus leucichthys* (Guldenstadt)
Least cisco	*Coregonus sardinella* Valenciennes
Longnose sucker	*Catostomus catostomus* (Forster)
Ninespine stickleback	*Pungitius pungitius* (Linnaeus)
Northern pike	*Esox lucius* Linnaeus
Round whitefish	*Prosopium culindraceum* (Pallas)
Slimy sculpin	*Cottus cognatus* Richardson
Sockeye salmon	*Onorhynchus nerka* (Aalbaum)

Beaver lodge on camp lake, where our cabin was built. Beaver are very abundant in the entire Innoko drainage.

Wall tent which served as pantry, tool shed and warm-up area during cabin construction.

Based on harvest ticket returns approximately 80 moose were harvested from the refuge in September of 1984. One moose that we know of was taken in the November late hunt.

Most hunters encountered upstream of the mouth of the Iditarod River arrive on the refuge by aircraft. Both private and charter airplanes are busy during the month of September operating out of McGrath, Aniak, Bethel and Galena. Downstream from the Iditarod most hunters are villagers from Shageluk and Holy Cross, who use river boats for transportation.

The Innoko is a prime moose hunting area where there is a favorable bull/cow ratio and still a lot of the large bulls that trophy hunters are after.

10. TRAPPING

Trappers operate on the refuge without need of a permit. Trappers presently known to operate on the refuge include 3 or 4 individuals on the middle Innoko River, 2 on the Mud River, 2 on the Iditarod River and 2 on the Dishna. Trappers probably operate to a lesser extent out of the Yukon River villages and Shageluk, on the Innoko River.

Two Holy Cross men, trapping on the Mud River, within the refuge were not located by the charter pilot who was to pick them up for Christmas. Heavy snows prevented a search until after Christmas when Pilot Dementieff located them on the 27th. Both trappers were fine, just further upriver than the pilot had expected them to be.

17. LAW ENFORCEMENT

Enforcement work was concentrated on the moose season, September 5-30th. We worked in conjunction with the State Fish and Wildlife Protection officers. We worked the main Innoko River from the Iditarod River to the Dishna River contacting as many hunters as possible, while Andy Blank, Protection Officer from Aniak, worked the Iditarod River and Larry Henslee, Protection Officer from McGrath, worked the Upper Innoko.

We worked on several wanton waste cases with the same State Protection Officers. One case was made using the Lacy Act and involved a Doctor from Arizona who left a front quarter in the field. The State wrote a citation but the good Doctor allowed as how he would just not return to Alaska. What a surprise it was when the Feds knocked on his door! Surprise and a bill for $6,700!

We are still concerned that same-day airborne hunting infractions are going undetected. The area is so large that our

Manager Phil Feiger making 3-sided logs with our Bumble Bee chainsaw mill. The logs were rafted to the mill.

Two sided log floor joists resting on 2 large creosoted sill logs.

chances of being there when a hunter lands and shoots a moose are very low. Even wanton waste is hard to catch since the ravens will clean a moose carcass in a matter of days, making it impossible to prove the hunter did not remove the meat. This area has traditionally been wide open with few State Officers available to patrol it and no Federal officers prior to refuge status. It is very tempting for a hunter in an airplane to spot and shoot his moose the same day. Our only chance at steming this activity is to show a greater presence so people will think they might get caught. We now have a cabin and a fuel cache on the refuge so we can stay for a while, rather than flying back to McGrath each day. Catching someone in the act of breaking the law is nearly impossible. We hope that by contacting as many hunters as we can we will keep them honest for fear of being caught.

An illegal moose hunting operation based outside the refuge near the mouth of the Innoko was infiltrated by undercover agents of our Law Enforcement division. It was suspected in the past that this individual, from Bethel, had taken quite a few moose from the refuge also. A bust was made this fall, but none of the evidence was acquired on the refuge.

I. EQUIPMENT AND SUPPLIES

1. New Construction

Faced with an urgent need for a field cabin and not enough money to have it built for us we approuched the Regional Engineer and soon had an excellent set of blueprints.

We purchased a "Bumble Bee" chain saw mill, a chain saw winch, assorted hand tools and a pile of materials, and "learning as we went", we built a 16'X 20' cabin out of three sided logs. Materials and transportation came to just under six thousand dollars, the labor was a combination of volunteer and force account working on the cabin between surveys, and the end result is a cabin which should stand for a good many years and is a source of pride to we who built her.

4. EQUIPMENT UTILIZATION AND REPLACEMENT

The last of the three john boats was taken down the Innoko River from Ophir into the Refuge. The trip, of approximately 300 miles, was a good introduction for two of our volunteers. Manager Feiger captained the boat (and more than once ran aground) while ARM Smith arranged for the rest of the crews transportation in to the field.

7. OTHER

Living as we did in tents for the best part of the summer we learned to appreciate noseeum screens. We also discovered

Seasonal Roger Sleeper, on the left, and ARM Mike Smith placing the last row of logs on the walls.

Almost done! Ray Collins, a visitor from McGrath, was pressed into service placing the purlins.

that plastic zippers are not good enough when we open and close the door several hundred times over the course of the summer. While it may be a minor nuisance for a recreational camper, having the screen refuse to close in Alaska is akin to failing to meet your performance standards (especially if your supervisor is staying in that tent). On the other hand HE thought we were just having a good camping trip.

It is impossible to place too much emphasis on the importance of good equipment. Where the failure of boots, rain gear, tents and other everyday items can mean discomfort and annoyance in the lower forty-eight, in Alaska it can mean the difference between survival and a long report written by someone else.

J. OTHER ITEMS

3. CREDITS.

Manager Feiger wrote sections A, B, E, I and Feedback, ARM Smith prepared sections F, G, H, and arranged photo's.

Feiger typed, edited, re-typed, re-edited.....

Photo's were the result of the entire staff and with six cameras clicking it was impossible to keep track of who took what.

Manager and Assistant in conference after days work is over. Phil just can't stop working.

K. FEEDBACK

1. Not to belabor the point each year but once again our GS-4 secretary position became vacant. It is ludicrous when staying home sewing stuffed dolls can bring in more money than working for us. The really sad part is that we all know how valuable this position is. A good secretary builds rapport with folks in the R.O., the finance center, and with our suppliers. Reports are on time when a good office manager curtails back sliders and more biological-management work is accomplished.

Unfortunately in Alaska we pay our secretaries-clerks a salary which qualifies them for food stamps! It is an embarrasment to the Service and disgusting to those of us who for years have tried to bring these professionals the recognition and compensation they deserve.

Everyone who reads this knows that the preceeding is accurate, unfortunately they also know this is a cry in the wilderness which will once again go unheard.

2. We all have heard of instances when our peers have needed support from higher in the organization and we all have heard that politics being what it is you stand alone. When I had my excitenemt with the State (was charged with violating State hunting regulations) I was concerned that the Service would wait to see if I was found guilty before taking a stand.

I knew that I was doing my job, I knew that I was justified, and I also knew that decision makers in Anchorage would decide if I were to stand alone. It was a great relief to me, and should be to all Regional employees that as soon as it was determined that I was acting in the scope of my duties I was given the full support of the government. To give some idea of what this can mean the U.S.Attorney indicated that my defense would have cost $30,000 if I'd had to pay for it myself (I'll think about that if I ever consider filing a frivilous case against someone since the defense can cost more than the penalty).

My point is that the U.S.Fish and Wildlife Service is alive and well even in the Regional Office!