TETLIN NATIONAL WILDLIFE REFUGE

TOK, ALASKA

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ANNUAL NARRATIVE REPORT

Calendar Year 1983

U.S. Department of the Interior

Fish and Wildlife Service

NATIONAL WILDLIFE REFUGE SYSTEM

INTRODUCTORY MAP INDEX TO COMMON GEOGRAPHIC TERMS USED IN THIS NARRATIVE REPORT.

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1 4 2

1. F. David Stearns, Refuge Manager, GS-12/6
2. Steven W. Breeser, Assistant Refuge Manager, GS-11/2
3. Linda R. Jefferson, Clerk-Typist, GS-4/1, Resigned 5/20/83
4. Pamela G. Albert, Clerk-Typist, GS-4/1, EOD 10/2/83

US FISH & WILDLIFE SERVICE--ALASKA
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Review and Approvals

Regional Office Review Date

Submitted By Date

Regional Office Review Date 4/12/84

INTRODUCTION

The Tetlin National Wildlife Refuge was established by the Alaska National Interest Lands Conservation Act of December 2, 1980. As one of over 400 units of the National Wildlife Refuge System, the refuge is managed to perpetuate its outstanding wildlife values. The ANILCA objectives are: 1) conserve fish and wildlife populations in their natural diversity; 2) provide opportunity for subsistence use; and 3) provide opportunity for interpretation of environmental education. The 950,000 acre refuge is located in eastern Alaska, adjacent to the Canadian border and south of the Alaska Highway. The major physical features include rolling black spruce hills, hundreds of small ponds, lakes and glacial rivers.

The refuge has a very high density of nesting waterfowl. Annual duck production exceeds 90,000. It's habitat for waterfowl is especially important when drought displaces birds from Canada. As a migration stop for all types of birds entering and leaving Alaska, the refuge provides habitat for 143 nesting species and 47 migrants. Sandhill cranes nest in the refuge with as many as 300,000 cranes moving through the refuge each fall. Other large birds using the refuge include loon, grebe, osprey, bald eagle, and three species of ptarmigan.

Caribou from the Chisana, 40-Mile, and occasionally the Mentasta herds winter on the refuge. Both grizzly and black bears can be found using the area. Other common mammals include moose, wolf, wolverine, lynx, coyote, red fox, Dall sheep and marten. An occasional mountain lion also strays into the area from Canada.

Arctic grayling, whitefish, lake trout and northern pike swim in the refuge's lakes and streams. No significant salmon runs are found here, although a few chum salmon run up the Chisana and its tributaries.

As an interior Alaska refuge, Tetlin's daytime summer temperatures often exceed 80°F with nightly lows of 40°F. By mid-September nighttime lows drop to 45°F or occasionally 25°F. Snow can occur anytime after August 20th. During June and July there is full sunlight or twilight around the clock. Winter temperatures drop to -70°F! It is one of the coldest places in North America.

As one of the two road-connected Alaskan refuges, the Tetlin NWR has the Alaskan Highway along 70 miles of the Northern boundary. Foot access is possible virtually all along the highway from the Canadian border to Gardiner Creek. Stream access for small boats is possible from the highway at Desper and Scottie Creeks and at the Chisana River Bridge near Northway. Approximately 150,000 visitors pass Tetlin's north boundary each year. This provides an outstanding opportunity for this mass of visitors to see an excellent example of the NWRS.

Hunting, Fishing and River Rafting

The refuge is open to hunting, fishing, camping and trapping in accor-



#1 - The Pickerel Lakes provide a scenic foreground for the Nutzotin Mountains in the southern part of the refuge. 82-Ia-98SWB

dance with Federal and State Regulations. The most sought game species include moose, northern pike, lake trout, Dall sheep and grizzly bear. Furbearers are sought by over 30 resident trappers who supplement their income with catches of lynx, fox, marten, muskrat, beaver and mink.

The present staff includes the Refuge Manager, Assistant Refuge Manager, Fire Management Officer and clerk. In the near future an interpretor, wildlife biologist, and two biological technicians plus seasonal laborers will be hired to assume active public-use, protection, and habitat management programs.

The total budget continues to be pitifully small considering the magnitude of the refuges mandates and the opportunities in I & R, fire management, and wildlife habitat management. The FWS funding in FY 83 amounted to about 17¢/acre!

The present refuge program is concerned with assembling baseline data for the Comprehensive Conservation Plan and doing limited enforcement. Present facilities include, 4 residences, 2 public use/administrative cabins, a summer substation, and two boat ramps. Hunting, fishing, wildlife observation, and trapping are the primary uses accounting for 75% of the 10,000 visitor-days Tetlin accomodates yearly.

A million dollar state operated visitor center in Tok provides the FWS with a rare opportunity to contact many of the 150,000 visitors in the area each year. Hopefully I & R will become an important refuge function in the near future.



#2 - The year started literally with a bang when the grocery store 25 feet to the east of our office burned to the ground. Exploding shotgun, rifle, and pistol ammunition made the fire-fighting hazardous.

83-IVa-3SWB

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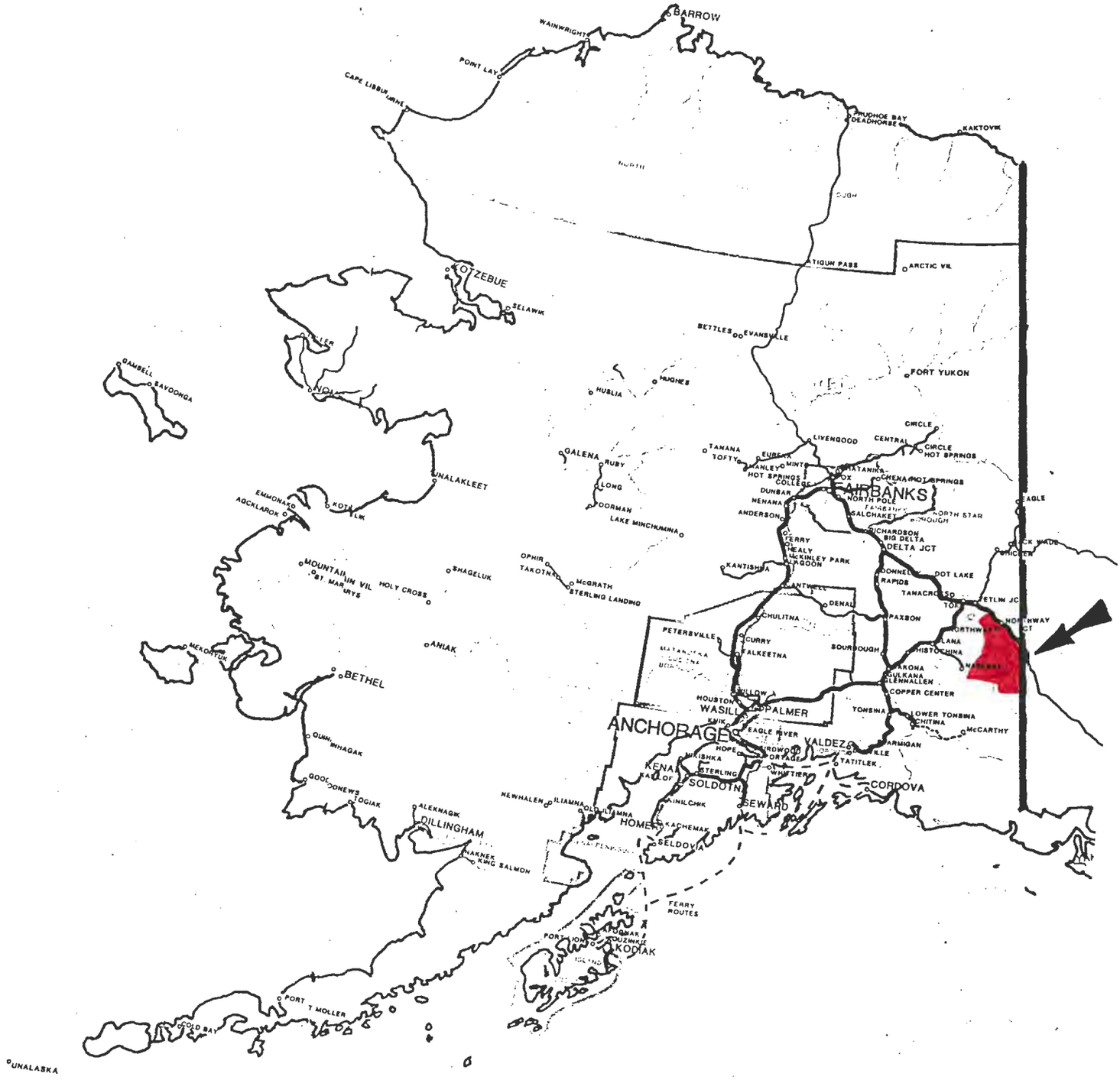
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Tanacross
Airport
Tana West Base
Pumping Sta
Tana East Base
BM 1652
BM 1637
Tok
Landing Area
R13E
R14E
R15E
R16E
Tetlin Junction
Bridge
BM 1680
Neuberger
EAGLE TRAIL
Eagle
BM 1756
R12E
R11E
Tok River
Tetlin Hills
INDIAN RESERVATION
TETLIN
YUKON
Clearwater Camp
Clearwater
HIGHWAY
Landing Area
Log Cabin
Log Cabin Lake
Tetlin Lake
Tetlin River
Tetlin Junction
Willow Lake
Big Lake
Grass Lake
Lark Lake
Swan Lake
Long Lake
Chisana Mtn
Porcupine Creek
Logging Camp
Island Lake
Sand Lake
Gasoline Lake
Long Trail Lake
Titus Paul Hill
Mundcha Lake
Dathlalmund Lake
Tuttlamund Lake
Old Albert Lake
Kaluking Lake
Tetlin Village
Chisana River
Chisana
Riverside Lake
Fish Camp Lake
Tetlin
Nuzlamundchu Lake
Big John Hill
Big John Lake
Radio Facility
Chamaddha Hill
Dammundlati Lakes
Northway Junction
Northway Village
Nabesha Village
Northway Indian Village
Charlieskin Village
Kathakne
Elton Lake
Pullen Lake
Fish Lake
Tushady Lake
Bog Lake
Birch Lake
Campground
Pipeline
Gravel Pit
Tetlin Lake Campground
Deadman Lake
Gardiner Campground
BM 1917
Gardiner Creek
Meiklejohn Pass
Mineral Lake
Little Tok River
Mice Creek
Bear Creek
Thadithanumé Lake
Halthalda Hill
Titus Island
Halthmund Lake
Kinshuda Hill
Kaluking River
Moose Creek
Tuck Creek
Tetlin River
Taixtsalda Hill
Landing Strip
Bear Lake
Fern Lake
Tetlin Junction Boundary
Reservation Boundary
Tetlin Refuge Boundary
Tetlin National Wildlife Refuge
Tsolmund Lake
Klunathkada Hill
Mundthag Lake
Tahamund Lake
Jatahmund Lake
Takomahto Lake
Clearwater Lake
Fish Lakes
Deer Lake
Tenmile Hill
Paradise Hill
Cabins
Seaton Roadhouse
Scottie Creek
Island Lake
High Cache
Scottie Creek Lodge
Border Air Trading Post
Scottie
U.S. Customs
Mirror Creek
Airs Hill
Wellesley Lakes
Stevens Lakes
Wellesley Mountain
Alaska Highway
Alaska Yukon
Mentasta Mountains
Noves Mountain
Peggy Lake
Chalk Creek
Big Grayling Lake
Raven Lake
Soda Lake
Platinum Creek
Boulder Hills
Devils Mountain
Devils Mountain Lodge
Gillam Lake
Funk Lake
Windy Lake
Jimmy Brown Lake
Pickerel Lake
Pit Lake
Antler Creek
Nutzotin Mountains
Wrangell St. Elias National Preserve
Refuge Boundary
Winter Trail
Trail
Pack Trail
Boundary
Ridge
Mountains
Creek
River
Lake
Hill
Point
Cabin
Cabins
Landing Strip
Campground
Gravel Pit
Radio Facility
Cemetery
Church
Graves
Ruins
Spr
Sauerkraut
Slaper
BM 2073
BM 1854
BM 1793
BM 1808
BM 1756
BM 1680
BM 1652
BM 1637
BM 2186
BM 1917
T. 18 N.
T. 17 N.
T. 16 N.
T. 15 N.
T. 14 N.
T. 13 N.
T. 12 N.
T. 11 N.
T. 10 N.
T. 9 N.
T. 8 N.
15'
45'
30'
63°00'
69°00'00" W.
3 200 000 FEET
CANADA
UNITED STATES
SNAG JUNCTION 33 MI.
HAINES JUNCTION 208 MI.

A. HIGHLIGHTS

The staff continued to define some of the basic relationships that make it what it is. Data gathering for moose, sheep, caribou, furbearers, fisheries, small mammals, waterfowl, fire effects and passerine birds was a major effort. Vegetative mapping, herbarium collection and wildlife habitat use were also a focus for many of our activities.

Fire management, wildlife inventory and comprehensive management planning was again the thrust for most of our planning work.

An add-on appropriation of 1.01 million dollars to construct four, single-family dwellings was a real boost to our living standard and will result in better management in the days to come. Construction will begin in May and end in October, 1984. The parcels of land are now purchased. The decision to live in town instead of on a government compound was a good move to all concerned.

The clerk-typist position is now filled and we are hopeful the incumbent, Mrs. Pam Albert, will out last her predecessor.

Radio tracking information gained from ling cod, wolf, and moose will extend our knowledge of these species.

The subsistence interviews done by YCC in the summer has proved useful in determining the subsistence uses of refuge resources. Seventy-two households were contacted.

Working relations with locals continues to be good in spite of enforcement of migratory bird regulations. Advisory boards of Fish and Game support the refuge.

B. CLIMATIC CONDITIONS

The last half of the 1982-83 winter was a period of near normal percipitation and snowfall. The snowpack was also approximately normal. See Table 1. This situation coupled with warm temperatures, resulted in an easy winter for wildlife. Losses of sheep, moose, and caribou were very low.

The spring and summer, as Table 1 shows, were wet and a little cooler than normal. This wetness translated into a very low fire danger, few fires, and a longing on the part of "Tokites" for some blue sky.

In spite of the cool, wet weather for short periods during the spring and summer, the general trend was warmer; encouraging an early Tanana River ice-out. The one day earlier break-up May 5 was not indicative of the warmer spring. Refuge lakes and ponds were ice-free 2-5 days before they were in 1982. Although this difference is small, a significantly larger number of breeding waterfowl stopped on the refuge this year as compared to 1982.

Table 1. Climatic Conditions-1983, Tetlin National Wildlife Refuge*

Month	Temperature (F°)						Precipitation (Inches)		Snowfall (Inches)		Snowpack (Inches)
	High	Normal	Record	Low	Normal	Record	1983	Normal	1983	Normal	1983
January	10	-10	34	-60	-27	-72	.67	.41	11.0	6.7	19
February	23	2	39	-45	-20	-71	.31	.33	6.5	4.8	24
March	40	21	50	-25	-09	-56	.08	.20	0.5	3.2	13
April	65	39	70	-07	12	-31	.10	.29	1.7	3.3	0
May	85	56	85	22	32	2	.29	.79	1.0	.3	0
June	84	66	91	34	44	31	2.93	1.95	0.0	Tr	0
July	79	69	88	43	47	34	3.19	2.61	0.0	Tr	0
August	73	63	88	30	42	25	1.64	1.76	0.0	.1	0
September	61	51	75	-06**	31	-06	1.62	1.05	1.0	1.2	1.7
October	52	30	58	-02	12	-36	.16	.54	0.5	6.8	3
November	12	5	42	-26	-09	-51	.12	.37	2.0	6.0	2
December	14	-08	31	-42	-24	-64	.17	.34	1.7	6.2	4
Totals	-	-	-	-	-	-	11.28	10.64	25.9	38.6	-

* Data from the Northway Weather Station
** Record monthly temperature

In relation to wildlife, the wet summer probably had little effect on most species except for the mortality of some shorebirds. The wet weather did result in flooding along both the Chisana and Nabesna Rivers. This flooding occured in late May or early June. It probably forced some of the bears off gravel bars and into different foraging areas and forced some ground nesting birds to new sites or into abandonment. The silver lining to the matter was that we had fewer insects than normal. Late summer was cool with the record low for September set at -6°. The year ended with moderating temperatures and light precipitation. At years end we had .64 more precipitation than average.



#3 - NPS & FWS staffs took advantage of a nice spring to float the Nabesna River. 83-Id-12SWB

C. LAND ACQUISITION

1. Fee Title

As part of a construction project, four new residences and three "lots" will be purchased in Tok. Since one of the houses may be idle for a short time, one parcel will contain two houses while the remaining two houses will be placed on individual lots. The total acreage is expected to be about 15 acres and will be within a mile of the center of town so that the staff can be part of the community. This arrangement is thought to be much better than putting all the houses in a military type compound such as we now have with the BLM housing. No other fee title land was purchased during the year.

Several of the owners of refuge inholdings are now willing sellers, however, the lack of funds for acquisition prevents the Service from gaining control of these parcels. Two tracts control critical access routes to the refuge. Tracts at Scotty and Desper Creeks must be acquired if access to the southeast part of the refuge is to be reasonable.

2. Easements

Two access easements have been sought to provide boat access to the southeastern part of the refuge. These easements are where Scotty and Desper Creeks cross the Alaska Highway and will be taken if fee title acquisition is not possible.

Another easement is also needed near the Chisana boat ramp to provide a ten-car parking area. The use of native lands for parking during the September waterfowl season resulted in at least one pickup being broken into with the loss of personal property. Threats of additional reprisals were heard if "Tokites" continued to use private property for parking.

3. Other

A prioritized list of refuge inholdings was submitted to the R.O. for consideration should any funds or staff days become available for land trades or acquisition. Hopefully, in time all of these parcels will come into Federal management or at least be under management agreements.

The status of refuge inholdings is changing very rapidly and on a given day it is difficult to determine if a native allotment or a native selection has been conveyed or is still under our interim management. It is a full time job to track all of these transactions and not expend effort "managing" tracts that have been conveyed.

D. PLANNING

1. Master Plan

The work on the Refuge Comprehensive Conservation Plan continues at a near zero pace. The team assigned to work on the RCCP has been reorganized two more times that we know of. The present completion date is set for November 1985.

Some work on the vegetative, mineral, and water inventory is done. The mineral narrative looks good, however, the rest is unacceptable. We have field checked both the vegatation map and the water map to find both products contain gross errors. Subsequent revisions are only moderately improved. We are hopeful that one of the major planning products will be a good vegetative-habitat map. Without this foundation all of the planning and many of the operational decisions will be misusing funds and manpower.

2. Management Plans

In connection with the comprehensive planning effort a wildlife inventory

plan is being drafted. The inventory plan will set out in one document a priority listing of techniques and support requirements for a meaningful approach to monitoring the refuge's resources. Techniques were also drafted to evaluate the effects of the Kennebec fire.

The wildlife inventory plan will deal with; moose, fisheries, bear, Dall sheep, caribou, waterfowl (including swans), passerine birds, furbearers, raptors, shorebirds, small mammals, and the three grouse species. The outcome of the comprehensive plan may alter the priority of some of the inventories, however, this can be easily accommodated. The full implementation of the procedures will require an additional two people (a biologist and part-time biological technician).

The 40-Mile Fire Management Plan is complete and awaits the RD's signature. When this regional plan is implemented it will mean that about 50% of the refuge will receive initial attack to prevent fires from destroying occupied houses, and other structures while fires in the rest of the refuge will be only monitored. A detailed refuge fire management plan will also be written to allow a natural fire regime within the limited suppression areas.

3. Public Participation

Formal solicitation of local public opinion was sought concerning the planning process (after the team was reorganized the third time) and again in regard to building four new houses in Tok. Both solicitations were carried out without any adverse comments.

National level representatives for conservation organizations were also contacted by the R.O. planning staff to solicit their concerns for management of the refuge since this was not done 18 months ago when local comments were gathered. Again no significant comments were received.

4. Compliance with Environmental Mandates

The only action requiring environmental clearances was the construction of the Jatahmund Lake cabin. Since the ground surface was not disturbed an archeological investigation was not required. However, a Section Seven consultation was completed with a "no effect" determination.

It was determined by the Regional Office that the construction of our four new residences would not require environmental clearance since these lots were on the market for the construction of houses and would be developed by someone in any event.

5. Research and Investigations

No formal research projects were conducted on the refuge during the year. There were, however, several management type investigations in operation on the refuge. These will be discussed under the appropriate species including osprey, wolf, and bald eagle.

E. ADMINISTRATION

1. Personnel

The attractive pay scale for Alaska's state employees resulted in our clerk, Linda Jefferson, leaving the refuge for a state job at four dollars more per hour. This was our loss since Linda had done a good job and was just getting her feet on the ground. Often the FWS winds up being a training ground for the state office staffs. In the long run the FWS would be ahead if our clerks were paid about the same as their counterparts in the state government.

The second major personnel action was to secure the Fire Management Officer position for the refuge. This position will be a boost to O & M efforts in terms of helping with the field work, report writing and law enforcement. We are hopeful that even though the person is responsible for fire in the interior that a portion of his time will be available for normal operations.

The search for an interpretor continues. We are hoping to have a temporary I & R person on the staff by May of 1984 to "sell" the NWRS, Alaska Refuges and Tetlin NWR.

Table 2. Tetlin NWR Staffing, including YCC & Local Hire

	Permanent	Temporary
FY 1983	2.6	0.0
FY 1984	3.6	2.0
FY 1985*	4.6	2.0

*Planned Staffing Levels in FY 84.

2. Volunteer Programs

During the year we received no volunteer work but as it turned out we needed little with the YCC program. This program will be used in FY 84.

3. Funding

The FY 83 funds were much improved over FY 81 and 82. It still seems that our field operation is woefully under funded when one considers the amount of land and the complexity of the operation. One of the real high points of the year was a "late commer" in the form of a 1.01 million dollar special appropriation obtained for Tetlin by a supplemental funding recommended and pushed by Larry Calvert and Senate Appropriation Committee Clerk, Fred Knowels. This money will be used to construct four new houses since our present housing is being phased out. See Table 3 (page 7).

Table 3. Funding History For Tetlin National Wildlife Refuge

			Dollars by Sub-Activity			
FY	FTE	1260	1210	1220	1240	Total
1981	0	N/A	10,000	10,000	0	20,000
1982	1.0	N/A	75,000	55,000	10,000	140,000
1983	2.6	N/A	83,000	55,000	10,000	148,000
1984	3.6	270K	0	0	0	270,000

4. Safety

Regular safety meetings were held. Survival in arctic conditions was stressed throughout the year. Even with seven people in the field during the summer we had no lost time accidents or injuries. Safety is a normal part of station operations, but even at that, many of the jobs we do are highly dangerous such as low level survey, flying at -30° and doing field work at cold temperatures.

Most of the people who have been in the field in Alaska are aware that an active safety program will reduce the opportunity for things to go wrong but it can not prevent 100% of the accidents. All we can do is cut the chances as far down as possible.

5. Technical Assistance

The refuge staff provided technical assistance to the following organizations:

1) Tok Fish and Game Advisory Committee, (Subsistence activities, swan studies, fisheries studies).
2) Slana Fish and Game Advisory Committee, (information on trapping and permit requirements).
3) Tetlin Village, (Subsistence uses in the refuge, and trapping information, and CCP updates).
4) Northway Village, (Subsistence uses in the refuge, cabin administration data).
5) State Fish and Game Subsistence Division, (Regional subsistence survey data collected on the refuge).
6) Forty Mile Interagency Fire Planning Team, (Resources objectives for Tetlin NWR and suppression need for private inholdings, and a clerk for the team meetings).
7) FWS Waterfowl Investigations - Juneau, (Waterfowl census and swan production).
8) Alaska Department of Fish and Fame, (Caribou distribution and numbers on the refuge).
9) FWS - Ecological Services - Fairbanks (Alcan Highway Realignment impacts).
10) ADF&G (Black bear tagging, moose census, wolf census, ling census).
11) Tetlin Village (Nesting waterfowl trend data).

F. HABITAT MANAGEMENT

1. General

Land cover and terrain mapping for the refuge is being done by the comprehensive planning team using LANDSAT photo imagery. These data have been digitized and cover units have been developed. Ground checking at various points on the refuge by staff have turned up several inconsistencies which should require a complete re-analysis of just how good this type of data really is. It is imperative that the amount of time and money which is being spent on this process turn out a usable and reliable vegetation map.

An accurate vegetative map is essential for sound decisions regarding wildlife population estimates and also for fire management. Presently, fire management in the form of prescribed burns and managed wildfires is the only major tool which we have for altering habitat to benefit wildlife. The refuge staff continues to collect vegetative composition data regarding various habitat types. The composition will be helpful in compiling the complete "picture" of each type. In conjunction, a herbarium is being started to catalog refuge plants. During the 1983 field season, over 200 specimens were collected and mounted.

2. Wetlands

The Tetlin refuge encompasses a large portion of a major wetland basin known as the Tetlin-Northway Flats. This area is recognized as one of the most important waterfowl nesting areas in the state. The area also serves as an important overflow area for displaced prairie pothole waterfowl during periods of drought.

Because LANDSAT imagery cannot adequately delineate wetland basins, temporary personnel dot counted wetland acreages using inch to the mile quadrangle maps that had been corrected with color IR aerial photos. This procedure indicated that there is at least 65,144 acres of wetlands on the refuge. This figure is minimal since it excludes small streams and the glacial waters that flow into the Nabesna River, Chisana River, and Stuver Creek. Until more exact data can be acquired, this acreage will be used, not the 27,600 acres "seen" by LANDSAT.

Our wetland complexes vary in size, depth, chemistry, and stream association. In fact, these differences are great enough so that the refuge can be separated into waterfowl productivity units. Many of the isolated lakes and ponds in spruce habitats are very sterile and thus of low value to most waterfowl. Conversely, those lakes which are associated with major stream drainages or are directly connected are nutrient-rich and highly productive. Surprisingly, this year we found that the most productive lakes are in the northwestern portion of the refuge. These lakes are actively growing as evidenced by spruce trees extending out into the lake from recent bank subsidence. The soil in this area is a silty loess. Water levels in all basins and streams were one to two feet below normal in the spring. This was due to a dry summer and fall in 1982 with very little run-off from snow melt. These conditions per-

sisted until nearly the end of June. From mid-June until mid-August, rainfall recharged all basins and caused flooding along the main river courses, especially in the Northway area. At freeze-up, most streams were still above average and lake basins in many instances were overflowing.

In a continuing effort to gather baseline data on refuge resources, a number of lakes and streams were sampled to describe water chemistry and fish populations. This information is presented in the Fisheries Resources section.



#4 - The upper Cheslina is a rutting area for several hundred moose. 82-Ia-95SWB

Some observed effects of fire on stream drainages, wetlands, and water chemistry will be discussed under Fire Management (F.9).

3. Forests

Forested lands cover almost the entire refuge, the exceptions being rock outcrops, tussock tundra, glacial riverbeds and alpine areas. Most of the black spruce areas are underlain with permafrost and have poor drainage. Those sites which have good drainage are vegetated with white spruce, birch and aspen. No habitat management was done on the forested areas during 1983.

6. Other Habitats

An assessment of the physical resources of the Tetlin NWR was prepared by

regional geologist Phil Bigsby during the year. A summary of his report follows since it obviously has relevance.

Refuge lands have developed during the past 200 million years. Four distinct land additions have been identified. The most recent occurred 90 million years ago. The interfaces of these "blocks" are major faults. Two of these faults, the Denali and Totschunda, show recent movement. The refuge is an eroding uplifting sector. This uplift is caused by the Wrangell and Alaska mountain-building activity. The refuge, therefore, does not contain basin-type sediments, or oil and gas. Most of the refuge landforms, waters, and suface deposits are a result of glaciation. Two glacial periods have effected the refuge, the earlier being the "Black Hills" and the most recent, the "Jatahmund Lake." The difference in moraine topography between these two periods indicate a long interval.

A secondary result of glaciation was the formation of sand dunes. Although now revegetated, the dunes are easily recognized near Northway and Big John Hill.

Nine soil associations have been identified on the refuge. All are incipient mineral soils and the dune ochrepts are potentially suitable for cultivation. The very few igneous rock formations in the refuge give little opportunity for metallic minerals or metal deposits, although some gold has been discovered. Fossils have also been found in the prominent vertical-standing slabs of Devonian age marble in the upper Cheslina River.



#5 - The monolith outcrops of marble lend a unique touch to this area. 83-Ib-4SWB

Earthquakes are probable, and perhaps imminent, on or near the refuge since it is near active strands of two major continental fault systems.

9. Fire Management

The refuge is included in the 40-Mile Fire Management Plan. A major effort in 1982 and 1983 went into the rewrite of this plan to put it into the same format as the Tanana-Minchumina Plan. A cooperative fire planning team that consisted of members from U.S. Fish and Wildlife Service, Bureau of Land Management, Bureau of Indian Affairs, Alaska Department of Fish and Game, Alaska Department of Natural Resources, National Park Service, Doyon, Inc., and Ahtna Inc., and others met in the refuge office to formulate the plan. The major revision was to revise the suppression levels. Detailed fire suppression maps had to be constructed covering approximately 20 million acres. Fire management unit maps were developed at two scales showing management options, cultural features and land status. In addition to providing a meeting place for the team, the refuge performed all the secretarial and mailing tasks. RM Stearns participated as the U.S. Fish and Wildlife Service Representative.

Fire attack functions were changed from four response levels to four fire management options which left suppression response up to the land manager in two options. The management options are:

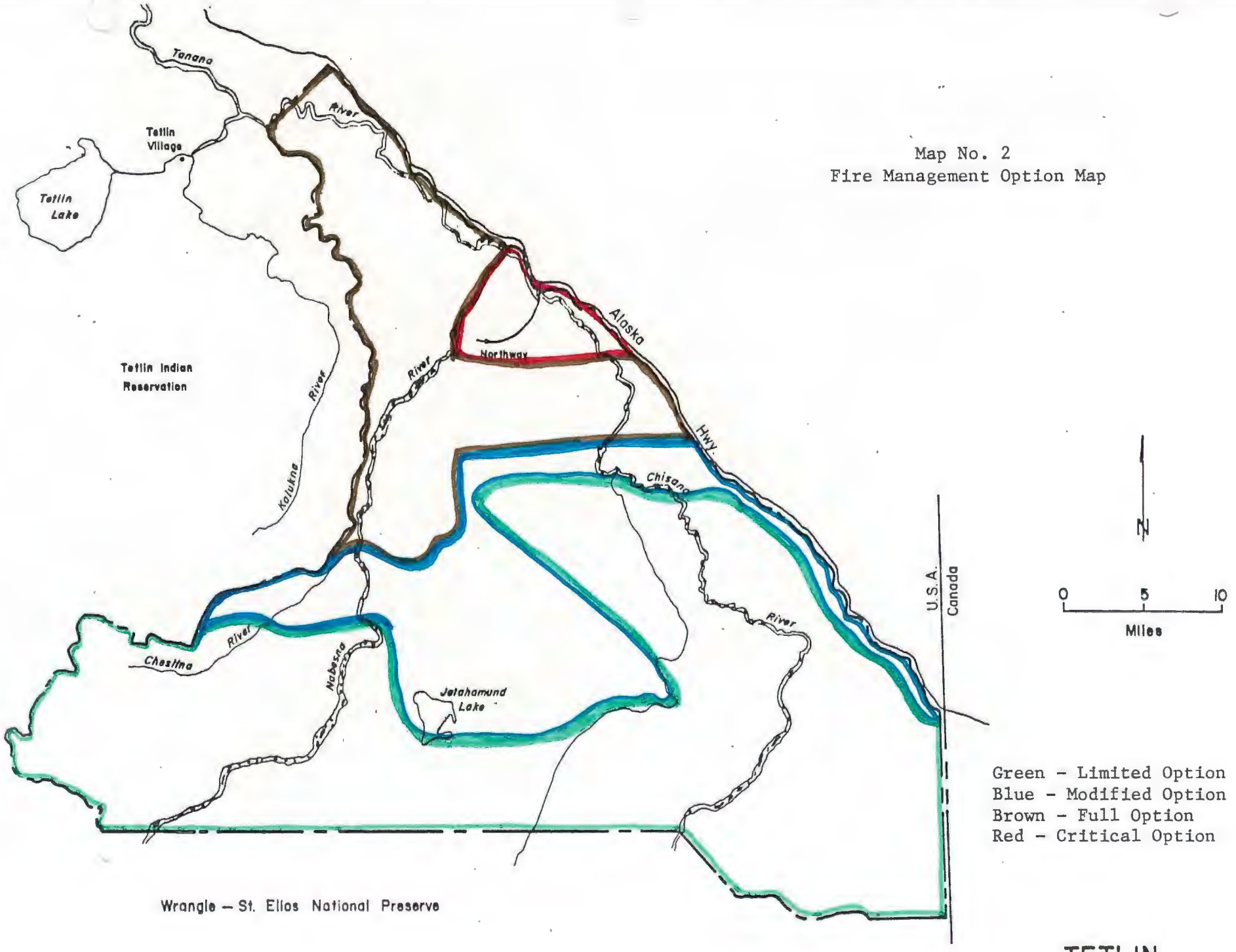
1) Critical Protection - will receive immediate and aggressive initial attack adequate to obtain control of the fire.
2) Full Protection - will receive similar protection as critical areas, only critical fires will take precedence.
3) Modified Protection - will receive maximum detection coverage. However, once a fire is detected and plotted and the land manager is identified, an aggressive initial attack will be carried out unless written notice has been received from the land manager to discontinue. Fire starts after a pre-determined cut-off date will not receive initial attack but will be monitored.
4) Limited Action - will receive routine detection flights. Fires detected in this area will not receive initial attack. Monitoring procedures will be initiated.

With these criteria, we now have more latitude to make fire a part of the ecosystem. One condition of the plan that we really can not agree with is that no significant impacts will occur. It seems to us that a federal action of this magnitude would have many major effects. See Fire Management Option Map page 12 .

The Kennebec fire that burned approximately 20,000 acres of land in the Black Hills area during the summer of 1982 provided an opportunity to study the effects of fire upon plant and animals in the Alaskan Interior.

Procedures developed to study responses of vegetative and animals include:

1) Fall moose quadrat sampling
2) Snap-trap lines for small mammals
3) Passerine bird transects



Map No. 2
Fire Management Option Map

Green - Limited Option
Blue - Modified Option
Brown - Full Option
Red - Critical Option

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4) Vegetative quadrats
5) Photo points to record vegetative responses
6) Soil movement and water quality
7) Furbearer inventory trends

Since these studies deal with the area surrounding the Kennebec fire, the data will be included in this section.

Three "all-purpose" transects and control areas have been established in the three major habitats that were burned; monotypic black spruce forest, mixed forest, and tussock tundra. These transects form the basis for most of the study procedures along with selected photo points. Other sites sample moose density, soil slippage on burned slopes and analysis of water quality. (See Map No. 3)

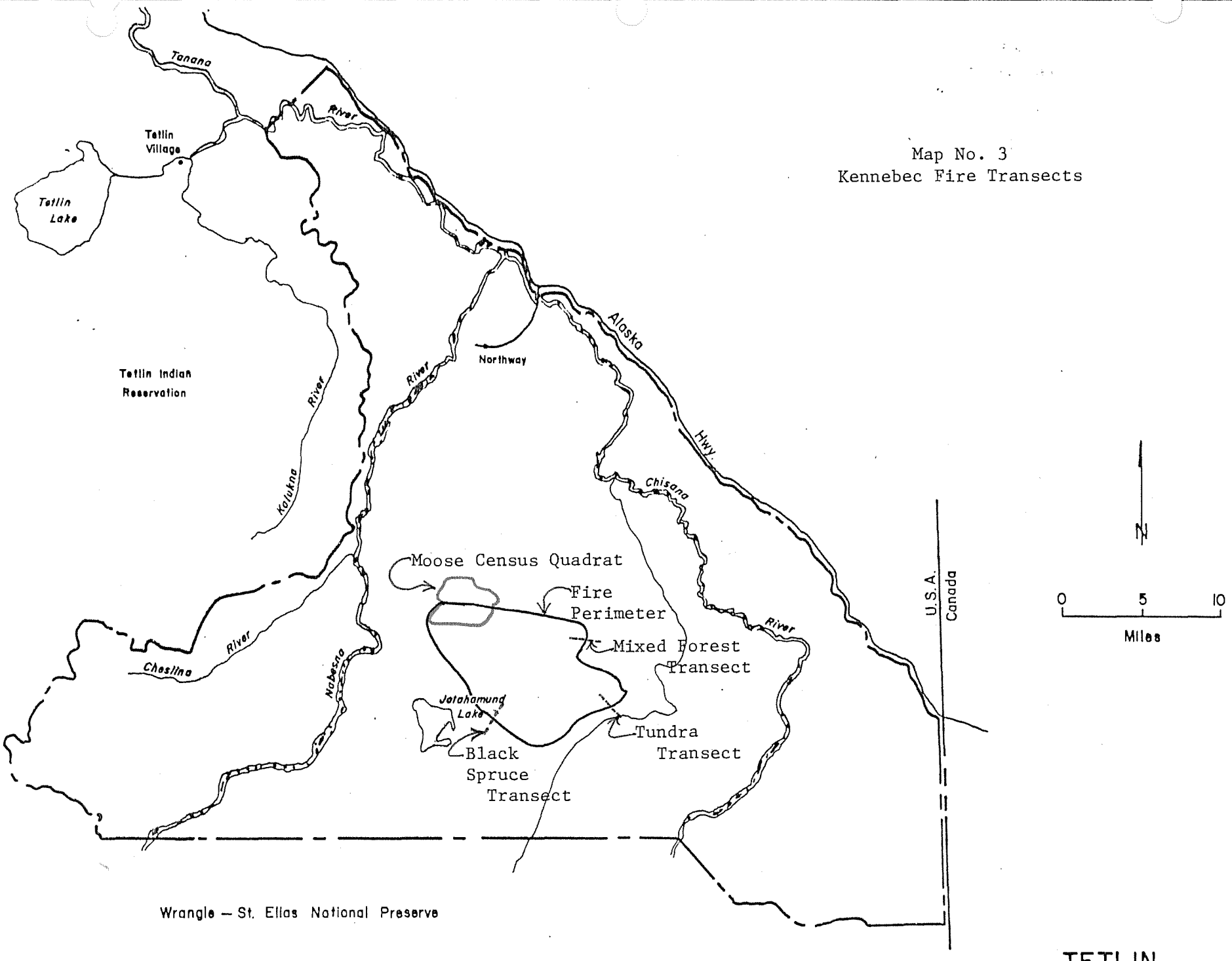
The moose quadrat covers approximately 27 square miles of both burned and unburned forest lands in the northwestern portion of the fire area. The quadrat is intensively sampled, i.e., complete coverage, by supercub in the late October or early November following a fresh snowfall. To date no moose have used the burned area, partly due to the lack of summer and winter food.

Small mammal populations are being monitored in the burn and control areas by using snap traps placed at one-tenth mile intervals along the transects. Three traps are set at each location and are left for 24 hours. Literature indicates twelve species of microtines and shrews inhabit this area. The 1983 "catch" accounted for only one species, the northern red-backed vole (Clethrionomys rutilus).

Table 4. Small Mammal Population - Kennebec Fire

Transect	# of Traps	# of Trap nights	# of Animals Caught	# of Snapped traps
Tundra - Control	30	30	1	1
- Burned	30	30	0	1
Mixed Forest				
- Control	30	30	2	2
- Burned	30	30	3	2
Black Spruce Forest				
- Control	30	30	4	6
- Burned	30	30	1	0
Totals	180	180	11	12

Passerine bird populations undergo dramatic changes when fire occurs. In the case of the Kennebec fire, mature forest and its accompanying bird species will be replaced by a subclimax wildlife-forest system.



Map No. 3
Kennebec Fire Transects

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While establishing the transects, some of the insectivorous bird species were already capitalizing on an unknown insect just-under the bark of the burned spruce trees. A number of common flickers (Colaptes auratus), downy woodpeckers (Picoides pubescens) and northern three-toed woodpeckers (Prcoides tridactylus) were observed feeding on these grubs.

A circular plot sampling procedure to determine the change in species composition and population levels was also established in the burn area following the procedure developed by Reynolds, Scott, and Nussbaum (Condor, 1978).

Time and fiscal constraints cause us to carry out our bird population studies about two weeks later than the optimum period. The data gathering may not truely depict the levels of the early nesting species. In addition, the sampling scheme is not extensive enough to collect adequate observations except for the most numerous species. The number of individual species counted, however, will be valuable for comparison from year to year.

Table 5 indicates that the total avian population on all three transects was reduced by about one-half in the burn area.

The vegetative characteristics of the three types adjacent to and in the fire were gathered by obtaining data from thirty plots along each transect, spaced at one-tenth mile intervals. Coverage by species in each of 30 plots was sampled along each transect. Table 5 gives the mean cover data by species.

The change on the tundra transect was not nearly as great as on the forest lines. This is primarily a result of fire intensity. The tundra, with much less fuel burned cooler and thus many plants are only charred or burned to the rootcrown with no harm to the rootstock. Many of the plant species had greened up a few weeks after the fire. In the forests, where fire intensity was the greatest, there were drastic reductions in most plant species with many being completely eliminated.

Although it is too early to determine how the vegetation will restructure itself on the burn, a few first year observations can be made:

1) It appears the tundra will re-establish itself to preburn condition in a relatively short period of time. The one distinct change will be the absence of scattered black spruce. The fire effectively killed these trees.
2) In the forested transects, first year response of grasses has been excellent on certain sites. Willow sprouting has been excellent from all rootstocks, especially in wetter areas. In those areas where the fire burned to mineral soil, there was little evidence of any revegetation except for some Equisetum spp. Basal sprouting of birch was noted in most areas of the burn, indicating a relatively cool burn. See Table 6.

Table 5. COMPARISONS OF BIRD DENSITIES - KENNEBEC FIRE

SPECIES	TUNDRA TRANSECT				MIXED FOREST TRANSECT				SPRUCE TRANSECT			
	BURNED		CONTROL		BURNED		CONTROL		BURNED		CONTROL	
	No. Observed	Birds/Km^2	No. Observed	Birds/Km^2	No. Observed	Birds/Km^2	No. Observed	Birds/Km^2	No. Observed	Birds/Km^2	No. Observed	Birds/Km^2
WHITE-CROWNED SPARROW	22	146.8	23	182.4	-		2	*	-		5	*
DARK-EYED JUNCO	7	*	12	82.9	19	154.6	20	118.0	14	87.9	17	157.6
SWAINSON'S THRUSH	1		2	*	-		10	18.0	1	*	7	
COMMON SNIPE	-		2		-		1					
GRAY JAY	-		1		5	*	5		3		4	
OLIVE-SIDED FLYCATCHER	2		-		3		5		1		1	
MARSH HAWK	1		-									
LESSER YELLOWLEGS	1		-						2		1	
DOWNY WOODPECKER					3		-		2		-	
ROBIN					1		11	58.8	6		3	
SPRUCE GROUSE					-		7					
YELLOW-RUMPED WARBLER					-		2		6		6	
RUSTY BLACKBIRD									4		-	
BONAPARTE'S GULL									-		6	
RUBY-CROWNED KINGLET									-		3	
FOX SPARROW									-		1	
TOTALS	34		40		31		63		39		54	
ALL SPECIES/Km^2		152.5		271.1		237.1		443.8		226.2		444.4

* UNLESS AT LEAST 10 INDIVIDUALS WERE COUNTED, DENSITIES WERE NOT COMPUTED

Table 6

VEGETATION COMPOSITION (%CROWN COVER) ON THE KENNEBEC FIRE

SPECIES	TUNDRA TRANSECT			MIXED FOREST TRANSECT			BLACK SPRUCE TRNSECT		
	CONTROL x̄+	BURNED x̄	% CHANGE B VS C	CONTROL x̄	BURNED x̄	% CHANGE B VS C	CONTROL x̄	BURNED x̄	% CHANGE B VS C
Cottongrass/Eriophorum spp.	31.65 (27)	22.00(28)°	-30.5	0	0	0	5.83 (5)	.10 (1)	-98.3
Labrador Tea/Ledum palustre	6.83 (28)	3.67 (25)	-46.3	5.77 (23)	.33 (6)	-94.3	7.23 (21)	.53 (11)	-92.7
Lowbush Cranberry/Vaccinium vitis	9.00 (27)	3.33 (20)	-63.0	11.67 (25)	.73 (13)	-93.7	14.70 (20)	0	Absent
Alpine Bearberry/Arctostaphylos a	2.50 (12)	.33 (2)	-86.8	2.40 (10)	0	Absent	2.33 (9)	0	Absent
Blueberry/Vaccinium uliginosum	6.17 (21)	3.50 (18)	-43.3	5.17 (15)	T (4)	-99.9	9.57 (23)	.53 (23)	-94.5
Sphagnum Moss/Sphagnum Spp.	19.50 (30)	19.00 (28)	-2.6	34.65 (24)	6.83 (12)	-80.3	17.16 (26)	5.11 (14)	-70.2
Lichens/Cladonia spp.	2.67 (11)	1.17 (6)	-56.2	5.50 (10)	2.67 (6)	-51.5	15.72 (22)	.03 (1)	-99.8
Reed Bent Grass/Calamagrostis spp.	.17 (4)	.67 (8)	+294.1	T (4)	T (4)	-	.07 (4)	.10 (5)	+42.9
Crowberry/Empetrum nigrum	.50 (4)	0	Absent	2.50 (14)	0	Absent	4.47 (13)	0	Absent
Wintergreen/Pyrola spp.	T (1)	T (1)	-	.17 (3)	0	Absent	.30 (3)	T (1)	-99.9
Carex/Carex spp.	2.83 (9)	4.17 (13)	+47.3	.50 (11)	0	Absent	1.07 (8)	0	Absent
Horsetail/Equisetum spp.	T (2)	T (5)	-	.33 (10)	.07 (10)	-78.8	.17 (4)	1.17 (23)	+588.2
Potentilla/Potentilla spp.	T (2)	0	Absent	0	0	0	0	0	0
Lupine/Lupinus arcticus	.17 (2)	0	Absent	T (2)	0	Absent	0	0	0
Violet/Viola spp.	0	T (1)	slight increase	0	0	0	0	0	0
Coltsfoot/Petasites spp.	1.17 (12)	2.33 (22)	+99.1	.33 (8)	0	Absent	.27 (4)	.17 (2)	-37.0
Bluebell/Mertensia peniculata	0	0	0	T (1)	0	Absent	0	0	0
Cloudberry/Rubus chamaemorous	0	0	0	T (2)	T (1)	-	.07 (1)	.17 (2)	+142.9
Bog Laurel/Kalmia polifolia	0	T (2)	slight increase	0	0	0	.33 (1)	.07 (2)	-78.8
Rose/Rosa acicularis	0	0	0	0	.07 (2)	slight increase	0	0	0
Bedstraw/Galium spp.	0	0	0	0	0	0	0	T (1)	slight increase
Fringed Fleabane/Erigeron glabellus	.17 (2)	0	Absent	.17 (2)	0	Absent	.80 (7)	.93 (2)	+16.3
Bog rosemary/Andromeda polifolia	0	0	0	0	0	0	.17 (1)	0	Absent
Fescue/Festuca altaica	0	0	0	.17 (3)	0	Absent	.13 (6)	.33 (12)	+153.8
Unknown Grasses	0	0	0	0	0	0	.33 (2)	0	Absent
Ash	0	20.67 (22)	-	0	68.21 (30)	-	-	84.87 (30)	-
Litter	15.00 (30)	18.83 (30)	+25.5	30.67 (26)	18.26 (23)	-40.5	18.48 (30)	5.73 (16)	-68.9
Bare soil	.17 (1)	0		0	2.83 (3)	slight increase	0	.17 (1)	slight increase
Water	1.50 (6)	.33 (2)		0	0	0	.80 (3)	0	Absent

* First growing season after fire + average % covered 0 = Frequency of Occurrance



#6 - Kennebec Fire, first year, mixed forest transect 1982. 82-IVb-148SWB



#7 - Kennebec Fire, second year, mixed forest transect 1983. 82-IVb-159SWB

Table 7. RANKING OF VEGETATIVE SPECIES BY PER CENTAGE OF GROUND COVER - KENNEBEC FIRE

	TUNDRA		MIXED FOREST		BLACK SPRUCE	
SPECIES	UNBURNED	1st YEAR BURNED	UNBURNED	1st YEAR BURNED	UNBURNED	1st YEAR BURNED
Cottongrass	1	1			6	7
Sphagnum Moss	2	2	1	1	1	1
Lowbush Cranberry	3	6	2	3	3	Absent
Labrador Tea	4	4	3	4	5	4
Blueberry	5	5	5	T	4	4
Carex	6	3	8	Absent	9	Absent
Lichens	7	8	4	2	2	9
Alpine Bearberry	8	10	7	Absent	8	Absent
Coltsfoot	9	7	8	Absent	13	6
Crowberry	10	Absent	6	Absent	7	Absent
Reed Bent Grass	11	9	T	T	16	7
Lupine	11	Absent	T	Absent		
Fringed Fleabane	11	Absent	9	Absent	10	3
Wintergreen	T	T	9	Absent	12	T
Horsetail	T	T		5	14	2
Potentilla	T	Absent				
Violet		T				
Bog Laurel		T			11	8
Festuca altaica			9	Absent	15	5
Bluebell			T	Absent		
Cloudberry			T	T	16	6
Rose				5		
Bedstraw						T
Grass # 2 *					11	Absent
Andromeda polifolia					14	Absent

*Unidentified plants will be classified in 1984

In addition to the herbaceous cover estimates, estimates were also made for shrubs and small trees(under four meters). Ten plots were read along each transect using a circular plot with a 11.2 foot radius. This data is intended to portray the shrub composition. The sample size is very small so the data will only give us a general indication of shrub response.

Table 8. Percent ground cover of shrubs and small trees, Kenebec Fire

	Tundra		Mixed Forest		Black Spruce	
Species	Control $\bar{x}$*	Burn $\bar{x}$	Control $\bar{x}$	Burn $\bar{x}$	Control $\bar{x}$	Burn $\bar{x}$
Dwarf Birch (Betula nana)	7.5 (10)+	5.2 (10)			2.0 (3)	
Gray leaf Willow (Salix glauca)	4.0 (10)	8.0 (9)	4.5 (7)			.3 (1)
Shrubby Cinquefool (Potentilla fruticosa)	T (1)		2.0 (2)			
Black Spruce (Picea mariana)			21.5 (9)			
Green Alder (Alnus crispa)				.4 (4)		
Little tree Willow (Salix arbursculoides)					7.6 (7)	
White Birch (Betula papyrifera)				1.0 (2)		T (3)

+ frequency of occurence in sample.

A series of photo points has been established at various locations around the fire to pictorially record the regrowth of vegetation at yearly intervals. Photo points were also established at locations where human disturbance altered the habitat. These photo points will not only record vegetative regrowth but will also document what effects man's fire suppression activities have on the landscape, especially in areas of permafrost.

The vegetative regrowth photo points are on vegetative transects. Other areas photographed include fire line construction across drainages, fire line explosive (FLE) lines crossing muskkeg areas, foot trails, campsites, and helipads.

Beginning in the summer of 1984, we will begin studies on soil slippage areas along south facing slopes in the burn.

Table 9.
KENNEBEC FIRE TRACK COUNTS*

SPECIES	TIME PERIOD	TUNDRA				BLACK SPRUCE				MIXED FOREST			
		CONTROL		BURN		CONTROL		BURN		CONTROL		BURN	
		82-83	83-84	82-83	83-84	82-83	83-84	82-83 **	83-84	82-83	83-84	82-83	83-84
MOOSE	November								2				
	January	3			2						1	1	
	March												
RED FOX	November					1	2	1	2		1		13
	January					1	3				6	1	
	March					1		1				2	
Coyote	November												10
	January												
	March												
LYNX	November	1		1				1					1
	January						1				1		
	March					3		2				1	
RED SQUIRREL	November		2				19			5	30 + 2T	3	
	January						7 + 2T		1	10 + 1T	18 + 20T	1	
	March					8			1	22 + 2T		22	
WEASEL Spp.	November	1	2	1	5	1	6		19	1	9		7
	January	15	20	12	18		14		14	23	7		
	March	7		1		7		3					
MARTEN	November	1	1						28	6	1	5	14
	January	7	7	5		3			1	16	41	3	1
	March	2		1						10			
SNOWSHOE HARE	November					6 + 3T	43+55T	1 + 2T	1		5+11T	1 + 1T	5+4T
	January	3		1		3	24+36T						
	March	1				4 + 10T							
MICROTINE AND SHREWS Spp.	November	4	94	1	80		163	1	77	10	108	5	60
	January	6	108	8	154	6	68		11	9	44	1	3
	March	2		7		7		72		5		220	

* Tracks and/or trails within 10 feet of transect lines
** Burn transect in black spruce forest was not done in January 1983
T Trails

Table 10.
COMPARISON OF TRACKS COUNTED, 1982-1983, KENNEBEC FIRE*

SPECIES	TUNDRA									BLACK SPRUCE**									MIXED FOREST								
	CONTROL			BURN			DIFFERENCE 83-84			CONTROL			BURN			DIFFERENCE 83-84			CONTROL			BURN			DIFFERENCE 83-84		
	82-83	83-84	% change	82-83	83-84	% change	B	C	% change	82-83	83-84	% change	82-83	83-84	% change	B	C	% change	82-83	83-84	% change	82-83	83-84	% change	B	C	% change
MOOSE	3	0	-100	0	2	+100	2	0	+ 100	1	2	+100	0	2	+100	2	2	-	0	1	+100	1	0	-100	0	1	-100
RED FOX	0	0	-	0	0	-	0	0	-	0	0	-	1	2	+100	2	0	+100	0	7	+ 100	1	3	+1300	13	7	+46
COYOTE	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	10	+ 100	10	0	+100
LYNX	1	0	-100	1	0	-100	0	0	-	0	0	-	1	0	-100	0	0	-	0	1	+100	0	1	+100	1	1	-
RED SQUIRREL	0	2	+100	0	0	-	0	2	-100	0	19	+ 100	0	0	-	0	19	+100	16	70	+338	4	0	-100	0	70	-100
WEASEL SPP	16	22	38	13	23	+77	23	22	+4	1	6	+500	0	19	+100	19	6	+68	24	16	-33	0	7	+100	7	16	-129
MARTEN	8	8	-	5	0	-100	0	8	-100	0	0	-	0	28	+100	28	0	+100	22	42	+91	8	15	+ 88	15	42	-180
SNOWSHOE HARE	3	0	-100	1	0	-100	0	0	-	9	98	+989	3	1	-67	1	98	-9700	0	16	+100	2	9	+350	9	16	-78
MICROTINE AND SHREW SPECIES	10	202	+1920	9	234	+2500	234	202	+14	0	163	+100	1	77	+7600	77	163	112	19	152	+700	6	63	+950	63	152	-141

* Based on total tracks counted for November and January survey only
** Based on total tracks counted for November survey period only



#8 - Soil Slippage on the Kennebec Fire. 83-IVb-169SWB

The only winter study being conducted in the fire is a track count of animals using the burn. There are three counts conducted; November, January, and March. The transects are walked following a fresh snowfall. Tables 9 and 10 portray the findings of this activity.

As can been seen from Table 9, an increase of population levels for almost all species over last year occurred. This increase is particularly evident for snowshoe hares and microtine rodents. Red squirrel activity also appears to be up, but since this species is temperature dependent and last years temperatures were much colder, it is likely the increase is temperature related.

It appears that marten moved into the burn in the Black Spruce transect. This may be a result of prey accessibility even though prey numbers are lower here, since the burn provides much less escape cover.

Caribou were not encountered on the study area this year. Last year, however, they were very common in the Black Spruce transect, making it very difficult to find any tracks except theirs. Their presence caused the cancellation on one count because they had completely wiped out all tracks.

G. WILDLIFE

2. Endangered and/or Threatened Species

The only endangered species found on the refuge is the American Peregrine

Falcon (Falco peregrinus anatum). These birds are observed in small numbers during spring and fall. Our field work has not revealed any active nests but there have been reports of nesting along the Alaska Range and around Tetlin Lake.

Active falcon nests are being monitored along the Tanana River within close proximity to the refuge, so the potential for nesting may exist on the refuge.

3. Waterfowl

The return of waterfowl to the Tok area was first noted on April 10 when a small flock of Canada geese was observed. This was approximately one week ahead of last year and coincided with the earlier spring we were experiencing.

A major swan and goose migration passed through the refuge on 4/23 and 4/24. The first trumpeter swans were noted on 5/5.

Returning waterfowl found the refuge more suitable this year. Last year, because of a late spring the only open water was in the main river channels.

Although water levels were low, nesting sites were abundant and many of the early nesting species started nesting a week to 10 days earlier than in 1982. Excellent nesting conditions continued through late June when heavy rains and glacial meltwater caused moderate flooding along the Nabesna and Chisana Rivers. By examining brood data it is obvious that this flooding had little effect upon the nesting success.

The water may have been the factor which caused a significant increase in waterfowl production on the refuge. The total pairs counted on seven transects in 1982 and 1983 were almost identical (279 in 1982 - 277 in 1983) but the brood - pair index went from .217 to .695).

From field observations it is apparent that the refuge is not a primary nesting ground for geese. The only geese which do nest are Canadas and they are present only in small numbers. River trips in late May and early June revealed approximately 20 pairs of geese, however, only one group of 40 goslings was seen in the Gardiner Creek Flats. Another 30 geese were observed upstream from Gardiner Creek in late July.

Locals reported substantial numbers of nesting geese successfully raising broods along the Chisana River less than 10 years ago. One person could recall seeing 15-20 broods in a 30-mile stretch of river between Northway and Gardiner Creek Flats. Poaching, may, indeed be a factor here.

Ten waterfowl transects were established to gather data on nesting populations and production. These 10 transects cover 97 bodies of water and streams, totaling about 1160 wetland acres. This acreage represents about 2% of the refuge wetlands.

On the ten transects surveyed, there were 383 duck pairs observed and 266 broods tabulated. During two brood counts broods observed during the second count were corrected for possible duplication. See Table 11.

These figures produced a brood/pair index of .695, which is more than three times that in 1982.

Table 11. Waterfowl
Pair and Brood Observations , 1983

Species	Number Pairs	Number Broods
Lesser Scaup	120	62
White-winged Scoter	64	19
Green-winged Teal	45	53
American Wigeon	43	30
Mallard	36	25
Ring-necked Duck	23	17
Bufflehead	21	24
Shoveler	11	7
Goldeneye (C & B)	8	8
Canvasback	5	12
Pintail	3	8
Oldsquaw	3	0
Blue-winged Teal	1	0
Ruddy	0	1
Totals	383	266

It is evident from Table 11 that our pair counts may not be adequately censusing the early nesting species such as canvasback and pintails. Presently we cannot afford to run an extra pair count to pick up the early nesters.

Lesser Scaup is the most numerous nester. Similar to what was found in 1982, they comprised almost one-third of the total paired birds and were nearly twice as abundant as the next most common specie.

Table 12. Waterfowl Production - Tetlin NWR, 1982-1983

Species	% Pairs		% Broods		% Production	
	1983	1982	1983	1982	1983	1982
Lesser Scaup	31.3	25.7	23.4	22.1	28.6	26.0
Green-winged Teal	11.8	13.4	19.9	14.3	20.5	13.1
White-winged Scoter	16.7	13.4	7.1	15.9	6.6	13.4
American Wigeon	11.2	11.4	11.4	12.7	10.7	14.0
Mallard	9.4	11.7	9.4	12.7	8.4	12.7
Ring-necked Duck	6.0	6.6	6.4	0	5.6	0
Bufflehead	5.5	6.6	9.0	9.5	7.9	8.7
Shoveler	2.9	2.1	2.6	1.6	2.1	1.6
Goldeneye (C & B)	2.1	2.1	3.0	0	2.6	0
Canvasback	1.3	1.8	4.5	4.8	3.9	4.3
Pintail	.8	3.8	3.0	4.8	2.6	4.2
Oldsquaw	.8	0	T	0	T	0
Blue-winged Teal	.2	1.4	T	1.6	.5	2.0
Ruddy	T	0	.3	0	T	0

The more "normal" '83 nesting season was evidenced by most broods reaching class II and class III status during the second count. Last year, the majority of the broods were still in Class I status during the second count. Even during a normal production season, many of the ducklings are not fully fledged before duck season opens on September 1. Bag checks this year revealed many flightless ducks.

Based on the paucity of data that we have, 1983 could be regarded as an excellent production season, especially considering the productivity rate of .686. Production was estimated at 85,720. This was 340% above the 1982 production of 25,160. In 1983 the refuge produced 1.5 ducks per wetland acre.

Table 13. Waterfowl Production by Species - 1983

Species	Production	Young/Adult Ratio
Canada Goose	120*	--
Lesser Scaup	24,380	1.19:1
Green-winged Teal	17,610	1.81:1
American Wigeon	9,130	1.82:1
Mallard	7,180	1.54:1
Bufflehead	6,760	1.48:1
White-winged Scoter	5,670	.44:1
Ring-necked Duck	4,790	1.73:1
Canvasback	3,390	1.67:1
Pintail	2,260	1.67:1
Goldeneye (C & B)	2,250	2.5:1
Shoveler	1,770	1.82:1
Blue-winged Teal	450*	unknown
Oldsquaw	40*	unknown
Ruddy	40*	unknown

* Estimates

R.M. Stearns assisted Bruce Conant, Waterfowl Investigations - Juneau, with brood counts on the Tetlin Indian Reservation. Four trend areas have been censused in this area for the past 17 years. The total brood count of 64 was up 433% over that in 1982 when the lowest count ever recorded was found.

Fall migration of waterfowl never really materialized. We did observe a substantial movement of white-fronted geese the last week of August. A late September cold front which moved into the area on the 23rd dropped temperatures to -6° F and completely froze the refuge waters. Strong northwesterly winds also probably helped push the birds out.

The trumpeter swan population on the refuge was assessed during the year. Complete coverage of the refuge for the purpose of locating trumpeters was accomplished with the aerial search of the two remaining 7.5 minute quadrangle maps. During 1982, the other seven quad maps were flown.



#9 - The "180" cub was our workhorse. 83-Ie-10SWB

The flights this year revealed three more pairs of swans, one with five cygnets one-quarter mile from the western boundary.

Although 1982 pair sites were not rechecked this year, we knew of 18 pairs compared to 15 last year. Of the 18 pairs counted, five occurred on the refuge with one producing five cygnets. The other 13 pairs produced four broods of five each and one brood of six. Total cygnet production was 26. This compares to 12 last year when a larger area was censused.

The refuge, working in conjunction with Rod King, Migratory Bird Biologist - Fairbanks, neck-collared and banded 13 cygnets from three broods. An entire brood of five cygnets was banded just southwest of Landing Lake on the refuge, and four each out of two broods of five just north of Tok. The birds were fitted with blue neck collars with white numerals. The numbering is sequential from 24 EA. to 37 EA. We are hoping to establish arrival and departure dates, migration corridors, and wintering areas.

All of the family groups were located after banding to assure that the family bonds had been re-established. We found no abandonment. The young birds were banded on 8/29. Based on the length of the ninth primary, the cygnets still had about three weeks before fledging, indicating a fledging date of September 20th.

An aerial survey the day prior to the September cold snap revealed the /

two groups of cygnets north of Tok were still present. The group on the refuge was not found and we assume that they migrated.

A confirmed sighting was obtained on this family of swans on 1/10/84 by M.J. Chutter of the British Columbia Division of Fish and Wildlife. The whole family (two adults and five cygnets) was on Vancouver Island near Klaklakama Lake. This sighting now gives us some understanding of trumpeter movements from this area. Also, a single cygnet from one of the families banded north of Tok, was sighted at the mouth of the Qualicum River on Vancouver Island. The cygnet was seen on 1/17/84, again by M.J. Chutter. It was in a group of 27 adult trumpeters and one tundra swan. The rest of the cygnets have not yet been accounted for.

One report from a resident of Tanacross placed a collared swan on the Tanana River during the September storm. He thought he could see the numbers one and two but was not sure.

It has become obvious through this banding program that all the environmental factors have to be in favor of the swans or they can not successfully raise a clutch in this region. Because it takes so long for trumpeters to reach flight stage they only have a grace period of 10-14 days.

During 1984 we hope to continue the banding program and also radio-collar some adults to give us a better understanding of the movements to wintering areas. We will also be able to determine if the cygnets successfully migrate.

Two trumpeters were radio-collared in an area about 300 miles northwest of the refuge. These birds have been tracked through British Columbia into Washington state. Collared swans 500 miles to the southeast of the refuge, conversely have shown up in the Tri-state Flock in Montana and Idaho.



#10 - Rod King was a big help in our swan collaring.
83-Ic-17SWB

4. Marsh and Waterbirds

Loons and grebes are counted in conjunction with the waterfowl transects. Arctic loons nest in high densities while only a few common loons were noted. A total of 17 pairs of arctic loons were observed on the transects while only a single pair of common loons was seen. No broods were observed with the common loons but five single-chick arctic loon broods were observed. The total number of pairs of arctic loons seen in 1982 was 30. Estimated production was 280 and 20, respectively, for the arctic and common loons.

Horned grebes and red-necked grebes are both common nesters on the refuge. Fifty pairs of horned grebes seen on the transects was significantly higher than the 30 found last year. The four pairs of red-necked grebes seen were two fewer than in 1982. Production was estimated to be 5,460 and 340, respectively, for horned and red-necked grebes.

Sandhill cranes are infrequently present on the refuge throughout the summer. We have not observed any nesting on the refuge but pairs have been observed during the summer at various locations. Local people indicate that some production does occur in the Northway area. The refuge provides a migratory stop for cranes both in the spring and in the fall. The Ten-mile Lake area appears to be an important staging area.

6. Raptors

Nest data continues to be collected on the northern bald eagle and the osprey. Both species nest in significant numbers on the refuge. One primary nesting area, especially for ospreys, is located just to the west of the refuge on the Tetlin Indian Reservation.

The first returning bald eagle was seen in the vicinity of Big John Lake on 4/7. The first incubating eagle was noted on 5/3 in the Scottie Creek area.



#11 - Osprey is an important raptor on the Refuge.
78-IIh-7STA

During 1983, the following information was collected on eagles and ospreys:

1) The bald eagle nest in a large spruce in the Eliza Lake area apparently blew down.
2) An active eagle nest was found along the east bank of the Nabesna River about seven miles south of Northway.
3) An active osprey nest was found along the east bank of the Nabesna River near Pickerel Lakes.
4) A bald eagle nest was found along the west bank of the Chisana River opposite the mouth of Mirror Creek.
5) A bald eagle nest was found along the northwest shore of American Wellesley Lake.
6) An osprey nest was found along the west shore of Big John Lake.

All observations of known raptor nests on and adjacent to the refuge are shown on Map 4.

Non-game biologists from the ADF&G were given permission to carry out a banding project on the refuge pertaining to the abundance and productivity of ospreys in interior Alaska. Their time in the field was limited so they concentrated their efforts in the area of known nesting. The majority of their work was carried out on the Tetlin Indian Reservation.

Fifteen osprey nests were checked during the study. Ten of these were located on the Reservation and five on the refuge. Seven of the nests were found to be active with four producing young. Two of the nests contained three young, one had two, and one nest had one bird. Productivity for the seven nests averaged 1.3 young/nest. Five young osprey in two nests were banded in the Tetlin Indian Reservation.

Six lake perimeters were surveyed on the refuge for osprey nests, these were Tlocogn, Fish Camp, Tlechegn, Tsilchin, Nuziamundcho, and Big John. An active nest was found on Tlocogn but no young were fledged. Two inactive nests were found on Nuziamundcho and two on Big John.

All 15 nests were in spruce trees. The trees had a dbh ranging from 16 to 20 inches and a total height ranging from 45 to 65 feet. All of the nests were located less than 300 feet from a lake and all of the nest trees had broken tops.

The refuge area will be surveyed for additional nests. The use of a volunteer will be made in 1984 for this purpose.

7. Other Migratory Birds

The refuge provides important nesting habitat for large numbers of passerine bird species. Some work has been initiated on the birds in conjunction with the Kennebec fire studies (See section F.9). Other studies will begin during FY 84 to better assess these populations in other portions of the refuge.

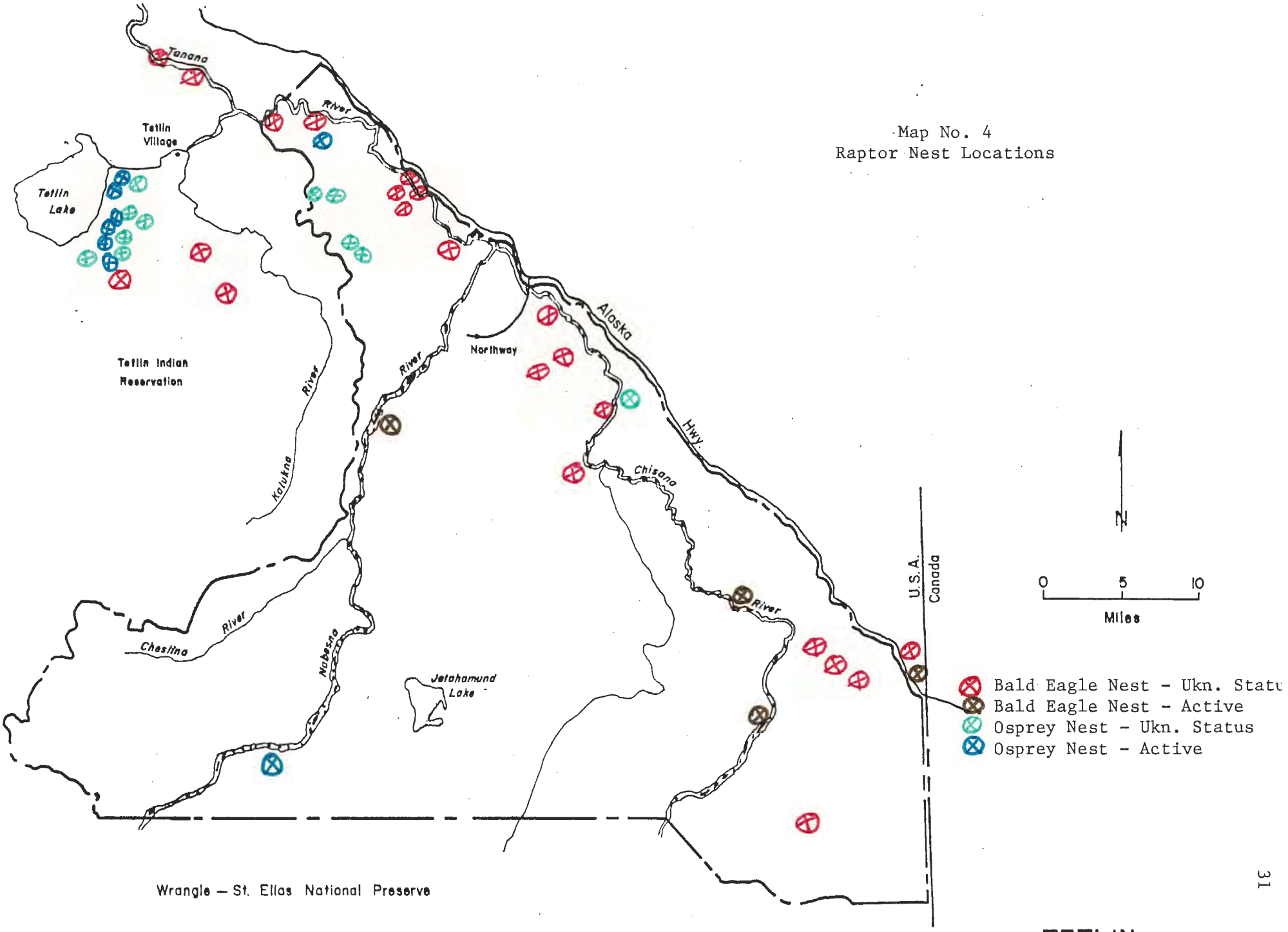

Map No. 4
Raptor Nest Locations
Tanana
River
Tetlin Village
Tetlin Lake
Tetlin Indian Reservation
Kalukna River
River
Northway
Alaska Hwy
Chisana River
U.S.A.
Canada
Chesina River
Nabesna
Jatahamund Lake
Wrangle — St. Elias National Preserve
N
0 5 10
Miles
Bald Eagle Nest - Ukn. Statu
Bald Eagle Nest - Active
Osprey Nest - Ukn. Status
Osprey Nest - Active
TETLIN
NATIONAL WILDLIFE REFUGE

Table 14 - Arrival Dates of Selected Migratory Birds, 1982 - 1983

Species	Arrival Date 1982	1983
Robin	5/4	4/25
Snow bunting	3/10	3/26
Tree sparrow	3/13	4/25
Yellow-rumped warbler	5/6	4/26
Violet-green swallow	5/2	4/24

8. Game Mammals

Black Bear. Very little is known about the status of the black bear within the refuge. Frequent aerial sightings and observations of tracks along rivers and lake edges indicate at least a moderate density. Most bears are small, seldom exceeding six feet in length.

R.M. Stearns accompanied ADF&G personnel during a spring black bear tagging operation near Tok. Four bears were radio-tagged. The largest of these was a five and one-half foot male that weighed 158 pounds. This will be an on-going study to determine home range and population density. Since this area is similar to the refuge, we hope to utilize the information for the refuge black bear population estimates.

The bear population, both black and grizzly, is an important part of the ecosystem. We know they are involved with moose mortality. Studies on moose by refuge personnel and ADF&G biologists should help clarify their role.

Grizzly Bear. Few observations were made on grizzly bears. Our most frequent observations are during browse work in May and June. At this time the larger sandbars along the Nabesna River, Chisana River, and Stuver Creek show ample evidence of their digging ability.

As is the case with black bears, the interior grizzlies are quite small, seldom exceeding seven feet in total length. Three grizzlies were reported near the village of Northway during the fall. Their presence created quite a concern and kept many people out of the forest including a number of trappers. One grizzly was shot near the village but it was unknown whether it was one of the three that were observed earlier.



#12 - This bear charged the helicopter. 83-IIIi-73SWB

Caribou. Animals from the Nelcina and Mentasta herds were present on the refuge until mid-April when they returned to the south side of the Alaska Range. The refuge cooperated with the ADF&G by monitoring radio-collared animals. The ADF&G paid for the flight time. Most of the information collected was presented last year.

In talking with a long-time resident of Chisana, he stated that 1983 was the first time he had seen caribou east of Chisana River.



#13 - Caribou can make a million tracks like these on Takomahto Lake. 83-IIIi-69FDS

We estimated 3,000 caribou south of the Black Hills and about 2,000 on the north side. The caribou kept extending their use-area to the north, south, and east until late March. By mid-April, all had departed from the refuge.

No evidence of animals from the 40-Mile herd to the north or the Chisana herd to the south was observed on the refuge.

A small number of animals (30-50) from the Mentasta herd have apparently moved back onto the refuge this winter. An aerial survey in late December disclosed tracks along the Nabesna River near the mouth of the Cheslina River.

Dall Sheep. Sheep are found only in the extreme southwestern portion of the refuge in the Mentasta Mountains. The habitat is mostly a north aspect so the sheep are probably present only during the spring, summer, and fall. No inventories have recently been carried out.

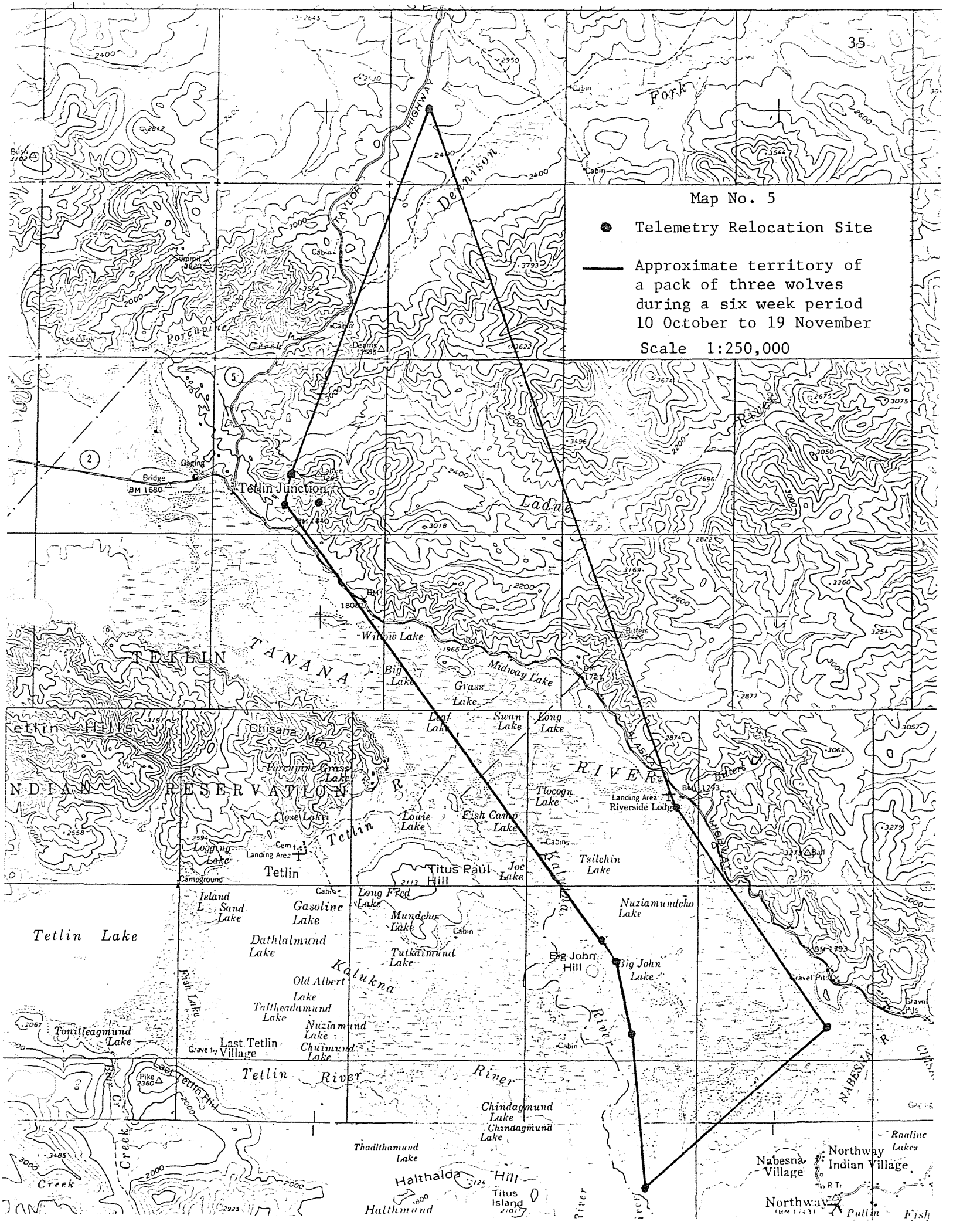
Wolf. Wolves are a very controversial animal in the Tok area. There is always a continuous dialogue going on as to the "benefits" of wolf control. The refuge position is usually quite different from that of the local ADF&G biologist. The former being con and the latter being pro.

A complete inventory of wolves has never been conducted on the refuge. Past censuses by ADF&G indicate there are at least six packs that have territories occupying parts of the refuge. These packs range in size from ten to three individuals.

A pack of three, one of which was radio-collared, have recently established a territory in the northwestern portion of the refuge. With the approval of the refuge, a wolf pup was radio-collared by ADF&G near Fish Camp Lake, after this small pack was discovered on a moose kill. The tagging was done in September when the small pup weighed only about 35 pounds.

Refuge and ADF&G personnel relocated the animal nine times before he was captured by a trapper on November 19, approximately 18 miles north of the refuge. See Map 5. The animal was dispatched before the trapper noted the collar. At capture the animal was in good shape and was estimated to weigh 55-60 pounds. During the six week period the animal was collared, the pack had a minimum territory size of 432 square miles.

The pack was observed on two moose kills during this six week period. An attempted kill on a cow-calf moose pair was also observed during this time. In this near miss, the moose were bedded down and the wolves actually ran right past them before they got up. The two adult wolves then pursued the moose for about 100 yards only to break off the chase. The three wolves then regrouped and trotted off in the opposite direction.


Map No. 5
Telemetry Relocation Site
Approximate territory of a pack of three wolves during a six week period 10 October to 19 November
Scale 1:250,000
Tetlin Junction
Gaging Sta
Bridge
BM 1680
Porcupine Creek
Taylor Highway
Dennison Fork
Ladue River
Ladue
Willow Lake
Big Lake
Midway Lake
Grass Lake
TETLIN
TANANA
Tetlin Hills
INDIAN RESERVATION
Chisana Mtn
Porcupine Grass Lake
Close Lake
Logging Lake
Cemetery
Landing Area
Tetlin
Campground
Tetlin Lake
Tetlin R
Louie Lake
Fish Camp Lake
Titus Paul Hill
Joe Lake
Leaf Lake
Swan Lake
Long Lake
Alaska Highway
Tlocogn Lake
Landing Area
Riverside Lodge
Tsilchin Lake
Cabins
Butters Cr
Island Lake
Sand Lake
Gasoline Lake
Long Fred Lake
Mundcho Lake
Dathlalmund Lake
Tutkalmund Lake
Old Albert Lake
Taltheadamund Lake
Nuziamund Lake
Churimund Lake
Kalukna River
Nuziamundcho Lake
Big John Hill
Big John Lake
Gravel Pits
Tonitleagmund Lake
Fish Lake
Last Tetlin Village
Grave Yd
Last Tetlin Rd
Pike
Tetlin River
Chindagmund Lake
Thadlthamund Lake
Halthalda Hill
Halthmund
Titus Island
Nabesna River
Nabesna Village
Northway Indian Village
Northway
Pullin
Fish
Raaline Lakes
Creek
Cabin
Camp
Summit
Butte
Mtn
Hill
Lake
Pond
Cr
River
R

Hopefully, we will soon be able to collar additional animals and more clearly define their territories. Until that time, wolf control will be a cloudy issue.

Moose. Because moose are the most important big game animal for sport hunting and subsistence uses, a considerable amount of time is expended in gathering data on this species.

Moose populations in and around the refuge are judged to be low by all estimates. Populations are in the neighborhood of .2 to .5 moose per square mile of habitat. We have however an interesting moose/habitat association occurring in this area. During late winter, spring, and summer, the majority of moose can be found in the refuge lowlands. During fall and early winter, there is a mass movement of moose into the sub-alpine areas of the Mentasta and Nutzotin Mountains. There are a few exceptions to this movement but generally the movement occurs refuge-wide.

Herd classifications are made during this fall period when the moose gather in rutting aggregations. The two most important rutting and and wintering areas associated with the refuge moose are in the headwaters of the Cheslina River and the headwaters of the Kalukna River. Other nearby areas which support smaller groups are the upper drainages of Lick Creek, Stuver Creek, Edge Creek and the Chisana River. These areas are all located within the Wrangell - St. Elias Park adjacent to the refuge's southern boundary.

Just why moose populations are at such a low level is a matter of much discussion. A significant amount of time has been spent analyzing the browse impact on preferred species throughout the refuge. With the possible exception of the winter range in the headwaters of the Cheslina River, about 70% of the available browse is not being utilized. (In the Cheslina River, 50% of the total available browse is not being utilized while 70% of the preferred browse, Salix alexensis, is utilized). So, it appears that food is not a limiting factor.

Access by hunters during the present season severely restricts the harvest on the major moose ranges, so hunting is not now much of a factor.

This leaves us with a number of other factors including predation, poaching, and some sort of moose-habitat relationship factor we have not yet discovered. Poaching does not seem to be a factor with the exception of the immediate vicinities of the villages, Alaskan Highway, and portions of the mainstream rivers. Predation is an unknown. Studies to be conducted by the refuge and ADF&G include neonatal calf mortality and adult movement patterns. These studies planned for FY-84 and 85 should begin to give us better insight into the status and factors affecting moose on the refuge.

Classication counts are normally flown in late October. In 1984, no snow precluded any survey until a month later. Snow conditions were not optimum even then. At this time, there was some dispersal of animals from the rutting areas. The main count areas turned up similar population numbers

we assume these were minimum numbers due to their dispersal.

Table 15. Moose Classification
Cheslina and Kalukna River Drainage

Year	1983	1982
Date Flown	11/18	10/18 & 20
Total - Moose	140	147
Cows	73	84
Calves	14	11
Bulls	53 (8)*	52 (17)*
Calves/100 Cows	19.2	12.9
Bulls/100 Cows	72.6	61.2
*Yearling Bulls/100 Cows	11.0	20.2
Moose/Hr	25.5	32.6

*Number of yearling bulls

Table 16. Moose Classification
North Face (Nabesna River to Chisana River)*

Year	1983	1981
Date Flown	11/23	11/19
Total - Moose	40+	122
Cows	19	57
Calves	6	16
Bulls	15 (0)**	49 (9)**
Calves/100 Cows	32	33
Bulls/100 Cows	79	86
**Yearling bulls/100 Cows	0	16
Moose/Hr	14.8	45.2

* Data supplied by Dave Kelleyhouse, ADF&G
\+ Many of the moose had already migrated to lower elevations.
** Number of Yearling Bulls.

From Table 15 it can be seen that total surveyed moose remained essentially the same between 1982 and 1983. Calves/100 cows increased by 49% but the yearling recruitment decreased by 46%. Since "net" recruitment is indicated by percent of yearling bulls, the decrease may be a result of the lateness of the count. It appears to us that the herd is maintaining itself at a low level with some signs (calves/100 cows) of a slight increase. The one thing we do have to be concerned about is that we may be working with an old population. Recruitment is very important in the next few years if the herd is going to make a turn-around.

Planned studies on calf mortality will give us information necessary to

make management decisions. Depending on what the study shows, we may be able to influence survival. Also, the adult movement study will give us information concerning use-areas. We will be able to establish whether the populations are migratory and how much time they spend in critical habitats.

It is impossible to tell at this time, but the refuge may have a normal moose population even though it seems very low. Local hunters remember the high populations of the late 60's and early 70's but these may have been artificially high, resulting from all the predator control by the federal government. These levels may never be reached again especially on refuges, since they are mandated to manage for diversity.

Browse utilization studies were expanded this year to sample more of the known moose range. Twenty-four transects were analyzed. Five of these are located on the primary refuge winter range. The other areas are riparian moose range.

With the exception of one transect, where the most utilized browse species was balsam poplar (Populus balsamifera), all the preferred species were willow. Out of the 23 transects where willow was preferred, 17 had felt-leafed willow (Salix alexensis), three had Barclay willow (Salix barclayi) two had unknown willows and one had little tree willow (Salix arbusculoides) as the preferred browse species.

TABLE 17 MOOSE BROWSE UTILIZATION - 1983

	% Utilization of all species				% Utilization of most favored species						
TRANSECT #	No use	Low use	Med use	High use	% of sample	No use	Low use	Med use	High use	Favored species	Location
1	63	21	14	2	49	51	33	14	2	S. arbusculoides	Kalutna mouth
2	77	9	4	10	14	43	7	14	36	S. alexensis	North refuge - Tanana River
3	97	3			3	67	33			"	Eliza Lake & Chisana River
4	94	4	2		9	78	11	11		"	Stuver Creek & Chisana River
5	75	14	9	2	15	27	20	40	13	"	Gardiner Creek Chisana River
6	79	8	2	11	14	36	14	7	43	S. spp.	Scottie Creek & Chisana River
8	74	5	5	16	47	45	10	11	34	S. alexensis	West Fork of Lick Creek
10	89	3	4	4	10		30	30	40	"	North Refuge- Tanana River
11	86	6	5	3	47	70	13	11	6	S. Barclayi	Mid-Kalutna Riv.
13	91	3	3	3	38	79	8	5	8	"	Kalutna Headwaters
14	73	9	1	17	14		14		86	S. alexensis	Black Hills & Nabesna River
15	61	10	7	22	34	20	9	15	56	"	Cheslina Mouth
16	47	17	17	19	58	26	14	27	33	"	Cheslina headwaters
17	42	8	7	43	68	23	6	9	62	"	"
18	48	19	12	21	84	39	22	14	24	"	Mid-Cheslina Riv.
19	46	13	18	23	58	40	8	19	33	"	"
20	74	16	9	1	72	65	20	14	1	S. Barclayi	Jahatamund Lake
21	14	8	14	64	61	6	5	10	79	S. alexensis	Mid-Stuver Creek
22	97	1		2	5	60			40	"	Mirror Creek Chisana River
25	87	7	6		23	87	13			P. balsamifera	South Black Hills Nabesna River
26	78	5	6	11	52	65	8	11	15	S. alexensis	Jct. Alder Creek & Lick Creek
27	89	5	3	3	5	20	40		20	"	Wellesley Lake- Chisana River
30	63	20	14	3	100	63	20	14	3	S. spp	Arrowhead Lake Scottie Creek
31	85	6	5	4	43	74	5	12	9	S. alexensis	Ellis Hill & Stuver Creek
Total %	72	9	7	12	38	46	14	12	28		

Table 18. Moose Browse Utilization
Cheslina River Wintering Area

Transects	% Utilization of All Species			
	No Use	Low Use	Moderate Use	High Use
15-19	49	13	12	26

Transects	% Utilization of Salix alexensis**			
	No Use	Low Use	Moderate Use	High Use
15-19	30	12	16	42

** Salix alexensis was the preferred browse species present and represented 60% of all samples.

Willow species, primarily Salix alexensis, provide the majority of forage in the winter for moose. Almost all of the shrub species of willow are browsed except gray-leaf willow (Salix glauca). The only place this specie was utilized at all was in the Cheslina drainage. However, it is commonly found throughout other habitats. Other shrub species that received light browsing included balsam poplar and green alder (Alnus crispa). These species are also present in almost all habitats. Observations show that Betula papyrifera is browsed, sometimes heavily, when it is present. Only one transect at Pickerel Lake has this species.

By looking at Table 17, it is evident that the forage available to moose is not being over utilized refuge-wide. What effect the moderate to heavy usage that is occurring in the headwaters of the Cheslina has on the moose herd is unknown at this time. Browse "hi-lines" and hedging are particularly evident both from present and past use. It appears that the moose move out of this area before the critical late winter stress period starts in February and March. More data will be needed to determine the importance of this area to moose.

10. Other Resident Wildlife

With the exception of studies on the Kennebec fire little work is done except for general observations on most of these species. Some of these observations are of importance, however.

Grouse. Spruce grouse in particular seem to be on the increase. More sightings were made along the Alaskan Highway this year then last. Populations still remain at low levels. Ruffed grouse, sharp-tailed grouse, and all ptarmigan species remain at very low levels.

Fox. Red fox and its color phases, the cross and silver, have shown a dramatic population increase this year on the refuge. The northwestern portion of the refuge, the Northway area, and that area adjacent to the lower Chisana River have high populations.

Snowshoe hare. Hares are increasing in scattered pockets throughout the refuge. The areas around Northway and Takomahto Lake have moderate populations.

Small microtine rodents and shrews. These animals are apparently responding from an early, heavy snowfall during the winter of 82-83 and a dry summer season during 1983. Populations are very high throughout the refuge especially along vegetated lake margins and lowland tundra areas.

Otter. Sightings of land otter activity have increased substantially over the last year. All the main-stream rivers have otter activity as well as most of the larger lakes.

11. Fishery Resources

Because of financial constraints, field investigation of lakes and streams accomplished only one-third of the stated goals. Seventeen lakes were tested for water quality and presence of fish. Most of the lakes were sampled in conjunction with waterfowl pair counts. Experimental gill nets were placed in selected lakes with the use of a super cub on floats. The nets were left for approximately five hours and picked up after the pair transects were completed. At that time, water chemistry analysis was done.

The time and effort being expended at this time will give only superficial data regarding water chemistry and fish populations. Very small fish and bottom dwelling species such as the burbot are not now being adequately sampled.

To date 36 lakes have been gill netted while 41 lakes and streams were tested to determine water chemistry. Generally, all of the lakes whether large or small that are stream connected have populations of northern pike. Many have whitefish. A few large lakes that look capable of supporting fish were found to be void of fish. All of these lakes were land-locked. There are some exceptions like Takomahto and Jatahmund Lakes, but most unconnected lakes are barren.

Table 19 indicates that the average size of northern pike is quite small. This may be a result of our sampling technique, since we are using small mesh gill nets. Also, most of the lakes sampled were small in size. In all of our sampling, the largest northern pike caught was under 10 pounds. We did receive scale samples from pike that were estimated to be 15 to 20 pounds. These fish were taken in the Scottie Creek drainage. Scale samples from 1982, a sample of over 200 fish, showed that the average pike weighted two and a quarter pounds and was seven years old.

Table 20 portrays some interesting chemical data regarding Fish Camp, Big John, Section 10, Nuziamundcho, and Tsilchin Lakes. These are all located in the northwestern portion of the refuge in the area where our highest waterfowl production occurs. All five of these lakes are very alkaline in nature with higher than normal conductivity readings for this area. Just what the relationship is between these chemical properties

Table 19. Fisheries Survey Data, Tetlin NWR, 1983

Lake / stream	Size	Location T	R	S	Date	Species	Sample Size	$\bar{x}$ Length cm	$\bar{x}$ Weight gr	Sampling method
Fire Camp	32 ac.	12	18	24	6/10	N. Pike	9	27.4	213.3	EGN*
Weed	70 ac.	11	19	2	6/10	N. Pike	1	49.0	900.0	"
						Whitefish	7	37.9	818.6	"
Fish	70 ac.	12	19	21	6/10	N. Pike	2	51.0	1070.0	"
						Whitefish	7	41.3	1164.3	"
Square	122 ac.	12	19	11	6/10	None	-	-	-	"
Mundthag	205 ac.	12	18	25	6/10	N. Pike	7	25.4	157.1	"
Three	70 ac.	9	22	33	6/10	N. Pike	2	117.5	2460.0	"
						Whitefish	1	30.5	400.0	"
Winter	83 ac.	9	22	32	6/10	N. Pike	4	44.3	647.5	"
Snag	77 ac.	8	23	27	6/10	Grayling	2	12	28.4	"
Cloud	70 ac.	8	23	19	6/10	None	-	-	-	"
Short	32 ac.	9	22	15	6/10	None	-	-	-	"
Fish Camp	180 ac.	16	17	19	6/14	None	-	-	-	"
Big John	397 ac.	15	17	22	6/14	None	-	-	-	"
Section 10	122 ac.	15	17	10	6/14	None	-	-	-	"
Nuziamundcho	563 ac.	15	17	4	6/14	None	-	-	-	"
Tsilchin	218 ac.	16	17	32	6/14	None	-	-	-	"
Hidden	29 ac.	12	22	28	8/3	R. Trout	5	20.4	128.	"
Hidden	29 ac.	12	22	28	11/23	R. Trout	2	28.0	298.	Pole
Triangle	77 ac.	12	19	20	6/10	None	-	-	-	EGN
Kalutna River	-	16	16	24	8/25	N. Pike	2	50.8	1133.0	Pole
						Grayling	3	30.7	311.7	"

* Experimental Gill Net

Table 20. Water Chemistry Data, Tetlin NWR, 1983

Lake	Location T	R	S	Date	Total Acid (gr./gal) (Ca CO)	Alka. (Ca CO) (gr./gal)	Carbon Dioxide (Mg/L CO_3)	T. Hard. (Ca CO) (gr./gal)	PH	Temp. (°C)	Cond. (UMHOS)	Salinity	Secchi (Feet)
Fire Camp	12	18	24	6/10	1	3	15	2	6.5	10	8	0	-
Weed	11	19	2	6/10	3	4	45	4	7.5	12	13	0	-
Fish	12	19	21	6/10	2.3	-	35	5	7.5	12	13	0	-
Square	12	19	11	6/10	3	12	45	10	9.0	11	20	0	-
Mundthag	12	18	25	6/10	2	-	10	2	7.0	11	11	0	-
Winter	9	22	32	6/10	3	3	15	3	7.5	13	5	0	5
Snag	8	23	27	6/10	6	4	30	-	8.0	13	6	0	2
Cloud	8	23	19	6/10	7	2	35	-	6.5	14	2	0	-
Short	9	22	15	6/10	2	3	10	3	7.0	16	4	0	-
Fish Camp	16	17	19	6/14	1.3	10	20	9	9.5	15	235	.1	-
Big John	15	17	22	6/14	1.3	7	20	7	9.0	15	165	0	-
Section 10	15	17	10	6/14	2.3	11	35	10	9.0	14	270	.1	-
Nuziamundcho	15	17	4	6/14	1.3	11	20	10	9.5	14	241	.1	-
Tsilchin	16	17	32	6/14	2	10	30	10	9.0	14	237	.1	-
Takomahto	10	18	25	6/23	4	2	20	1	7.5	22	31	0	-
Hidden	12	22	28	8/3	1.3	2	20	2	7.5	18	40	0	-

and waterfowl production is not known at this time. It may well be related to the encouragement of invertebrates by the more basic water. All are rather large lakes with clear water, adequate depth, and submergent vegetation. None of them contain fish, probably since these lakes are not stream-connected.

The refuge staff has investiaged Hidden Lake, which is located on refuge lands about one mile south of the Alaska Highway and five miles east of Gardiner Creek. The lake was stocked with fingerling rainbow trout by the Fisheries Division of ADF&G in the summer of 1982. We did not learn about this stocking until the spring of 1983 when we went to the Department with a study proposal to research burbot!

Although rainbow trout are not indigenous to the refuge, Hidden Lake is a closed system so there is little chance of escapement. Just why the lake was stocked is questionable. It lies a mile off the highway system, most of the trail travels through muskeg, there is no pull-out for cars available along the highway, it is located 30 miles from Northway and over 70 miles from Tok.



#15 - The Hidden Lake trail made by ADF&G ORV use.
83-Ia-194SWB

Refuge personnel sampled the lake on August 3rd with an experimental gill net. Twelve rainbows were caught in a four hour period. The fish were found to be in excellent condition averaging 20.4 cm (8 inches) and 128 grams (4.5 ounces).

The lake was resampled on 11/23 with set lines. Two fish were caught

that averaged 28 cm (11 inches) and 298 grams (10.5 ounces). These fish were also in excellent shape with considerable fat.

Scale samples from all of the sampled pike, grayling, and whitefish were sent to the fisheries office at Fairbanks for aging. We have not yet received that information.

A reconnaisance flight to locate salmon spawning areas (late run chums) was carried out on 9/30. All of the clearwater tributaries of the Tanana, Nabesna and Chisana Rivers were examined. No salmon were found in 1983 in any waters. Historical data, however, indicates that small numbers of salmon do spawn in refuge waters. The refuge may look into the possibility of establishing some more significant runs.

A research project was started in October to study the movements of burbot in refuge waters. The study was developed to gain data on the life history of this fish which is a major subsistence species for the area. The refuge is cooperating with Mike Smith, FWS Fishery Resources - Fairbanks, and Jim Reynolds - Cooperative Fisheries Unit Leader at the University of Alaska - Fairbanks.

Eleven fish ranging in size from three pounds to 14 pounds were captured at four different locations with the use of baited hoop nets. The fish were anesthetized and implanted with radio transmitters.



#16 - Jim Reynolds, fish doctor, in action. 83-Ic-29 FDS

The fish were held overnight to insure that they recuperated from the operation. All of the fish appeared in good shape when they were re-

leased. Early movements were all downstream for about three weeks (one fish moved 41 miles downstream). Three of the eleven fish have remained in a stationary location for almost four months. These are presumed to be dead. However, some of the other fish have remained in one area for up to a month at a time before making any movement.

Literature indicates that burbot spawn between mid-January and mid-March in small tributary streams that have gravel substrates. We have found only one fish that has moved into a tributary stream. The rest are still located in mainstream rivers. These rivers however, contain extensive gravel bars and may be usable for spawning. We will hopefully be able to determine spawning locations in the spring of 1984.

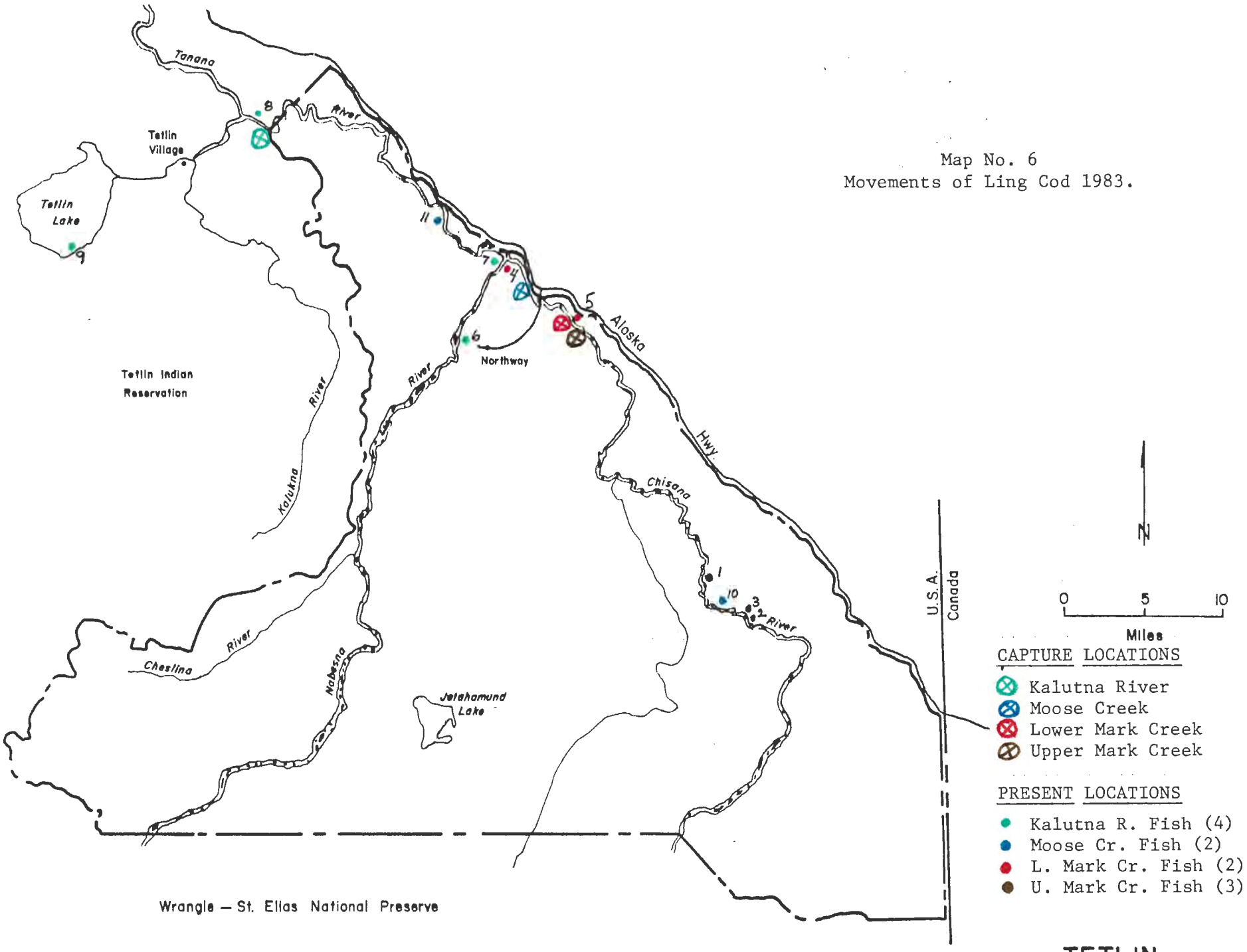
Burbot are thought to be rather sedentary but we have recorded movements of 43 and 78 miles for individual fish. One fish moved 63 miles upstream in 13 days!



#17 - ARM Breeser with a good ling catch. 83-Ic-22FDS

Six fish are still actively moving. The majority (4) of these fish are from 20-30 miles upstream of their capture point.

Map 6 depicts the capture points and the present locations. One fish moved 21 miles up the Nabesna River but turned around and was last located at the mouth of the Nabesna. Table 22 gives locations for all the fish from 10 relocations. Some 1984 data are included. Another 8-12 fish will be implanted in mid-May. The results of this study will be published upon completion.



Map No. 6
Movements of Ling Cod 1983.

TETLIN
NATIONAL WILDLIFE REFUGE

Table 22. Burbot Relocation Data, 1983-4

Capture Location/ Fish #	DATES 10/14	10/24	11/3	11/16	11/28	12/9	12/28	1/10	1/31	Remarks
Upper Mark Creek										Released 10/5
#1	26.5↓	3.5↓	.5↓	5.5↑	-	14↑	5↑	5↑	13↑	12 miles upstream of release site
#2	2↓	-	6↑	5↑	.5↑	7↑	14↑	0	0	Last located 30.5 miles upstream of release site
#3	1.5↓	.5↓	-	2↑	-	-	28↑	1.5↑	-	31.5 miles upstrea of release site
Lower Mark Creek										Released 10/5
#4	5↓	-	-	-	-	-	-	-	-	5 miles below release site presume dead
#5	-	-	-	-	-	-	-	-	-	At Release site presumed dead
Kalutna River										Released 10/5
#6	17↓	19↓	5↓	63↑	11↑	2.5↓	6.5↑	0	0	Last located 36.5 miles upstream of release site.
#7	1.5↓	1↑	.5↑	-	-	15↑	36↑	1↑	21↓	31 miles upstream from release site
#8	.5↓	-	1↓	-	1.25↑	-	.75↓	.5↑	-	.5 Miles downstream from release site
#9	2↓	-	-	0	0	0	0	18.5↑	2↓	At juction of Tetli Lake and inlet of Tetlin River
Moose Creek										Released 10/6
#10	.25↑	.25↑	-	2↑	-	-	13.5↑	6↑	-	22 Miles upstream from release site
#11	5.5↓	4.5↓	-	-	-	-	-	-	-	10 miles below release site presumed dead

↑ Upstream movement in miles from previous location
↓ Downstream movement in miles from previous location
- No movement from previous location
0 Did not locate

H. PUBLIC USE

1. General

The Tetlin Refuge is the first part of Alaska that visitors see when they enter by auto via the Alaska Highway. Since the highway parallels the northern boundary of the refuge for 65 miles, it provides an excellent opportunity to interpret the Tetlin National Wildlife Refuge and the National Wildlife Refuge System in Alaska. This is one of the best opportunities that Alaskan refuges have to educate a very receptive audience for the benefit of the National Wildlife Refuge System. It should be a very high public use priority of the Tetlin Refuge to act as an example of Alaskan refuges and to promote the public understanding of refuge management in Alaska.

8. Hunting

Big Game. Contrary to 1982, the moose harvest on the refuge was rather low. During the 1982 season about 15 animals were harvested. Only five were reported during this season. These estimates are only a rough index and are heavily influenced by public attitudes.

The cold, snowy weather during early September was a factor in reducing the 1983 harvest since most hunters did not pursue moose during the bad weather.

The sheep harvest was again low with only four animals being taken. The success ratio for reporting sheep hunters was 50%.

A subsistence caribou hunt was established for the area that includes the refuge. Since nearly none of the wintering animals entered the area no hunting took place. It is unlikely that much of a hunt will ever develop since caribou do not winter in the refuge except during severe winters.

The bear hunting, as in the past, was done in relation to other hunts or to kill bears that threatened life and/or property. Two grizzly bears were shot, one near Takomahtò Lake and one near Northway. Both were involved with human conflicts and paid the ultimate price. Black bears were hunted for similar reasons. Total harvest for both species was near 20 with most of the take related to human-bear conflicts.

Waterfowl. Unlike 1982, the 1983 waterfowl production was excellent and thus provided an abundance of targets for waterfowlers.

The activity was centered around the opeing weekend and freeze-up. During the opeing week about 40 hunters were hunting the refuge. Success was good. Several things were obvious from the field contacts: 1) Most hunters had no idea of what species had been taken, 2) Most hunters had no idea of what the regulations were or what the bag limits were and 3) All of the hunters were very surprised to see a "Game Warden." Many of the locals had never been checked in their life!

Our waterfowl success questionnaire was again mailed out to 19 local duck hunters before the season. We received only one reply while last year the response was nearly 100%. We suspect it was a silent protest to our "busting" a local for waterfowl violations, although we can only guess. A telephone survey of the locals as well as field bag checks indicate that pintails, mallards, green-winged teal, wigeon, and lesser scaup were the most common species in the bag. We also checked blue-winged teal, gadwall, shoveler, bufflehead, and white-winged scoter. No geese or cranes were known to have been taken on the refuge although many passed by.

9. Fishing

As a result of the subsistence study and field observations we now know that the use of the refuge fish resources is generally related to the place of residence. For example, residents of Tetlin fish for ling and pike by boat in the Kalutna and Tanana Rivers near their confluence. In contrast, out-of-town fisherman use fly-in transportation to catch pike or lake trout near Jahatmund or Wellesley Lake. The most use, however, is probably 100-500 visits made by the people of Northway when they fish for pike and ling in Moose Creek, Mark Creek, Ten Mile Lake, and the Chisana River. Whitefish are used very little on the refuge at the present time.

Detrimental fishing pressure is not present, except in the Scottie-Desper Creek area where the large northern pike attract enough fishermen to cause concern for the older age-classes of this species. Once these old fish (20+ years) are lost it will be nearly impossible to re-establish them in the population. Thus, we intend to monitor this population closely. The same situation may also be present in some of the ling population since this species is long-lived and is under some fishing pressure.

10. Trapping

Like most activities, trapping tends to rise and fall depending upon the chances of success. Thus, in 1983 the refuge trappers were encouraged by two factors; more fox, and lynx as well as by generally better fur prices. Three of the more active trappers so far have taken about 100 fox, 20 lynx and a smattering of marten, wolf, wolverine, coyote, and otter. As near as we can determine from SUP's and snow-mobile trails, about 11 trappers are active this year. There additionally is another three to five more that also trap but just near Northway and only with a very few traps on short lines.

Muskrat populations are at least double those of 1982 which has encouraged the local 'ratters. Only two serious beaver trappers work the refuge, not denting the supply of this species.



#18 - This trapping cabin has a goat skull afixed which makes us speculate that some of the goats just south of Tetlin may have entered the refuge. 83-If-66SWB



#19 - This 'rat camp will be cleaned up by the users or will be cleaned up by the refuge with the bill sent to the users. 83-If-77SWB

15. Off-Road Vehicling

One ORV permit was issued to a miner in Chisana. The permit allowed him to "walk" his two crawler tractors to the Alaska Highway via Chisana River Ice and private lands to transport some building materials back to his residence in Chisana. Warm weather and poor ice prevented the operation.

No other ORV use was noted but several old trails appeared to have been used during the year.

17. Law Enforcement

The enforcement program continues to be an item of concern here. With selective enforcement (subsistence vs. non-subsistence), the staff appears to the public as a highly "selective" enforcer of game laws. We hope that basic resource considerations such as overharvest and taking of breeding pairs will soon be the driving force in this area. However, following the directions we now have, field contacts were made on a high percentage of waterfowl hunters during the "regulated" season. Several things were evident including the facts that all contacted hunters had "duck" stamps, state hunting licenses and plugged shotguns! Some parties may have been over their field possession limits but we could not find any excess birds. It was somewhat of a shock to us to check a party of five hunters with 100 ducks and still be 200 under their possession limit! This is due to a 30 bird possession limit on "regular" ducks and a 30 bird limit on "sea ducks" (which include white-winged scoters). The scoters are a favorite of the native people here in the Interior. We saw several parties with canoes full of ducks and when checked turned out to be legal!

The only NOV written was to a "Tokite" for shooting horned grebes. Several reported big game "violations" were investigated but no cases were made. The lack of cases is probably a function of being in the field for just a few weeks each year and then only with two people.



#20 - The Tetlin Indian Reservation posted 1100 of these signs all over the country. Several showed up as much as six miles inside the refuge. The "misplaced" signs were taken down. 83-If-80SWB



#21 - Tetlin Village. One of two villages using the refuge. 83-If-63SWB

18. Youth Programs

Three YCC enrollees were hired to help with O & M activities as well as to conduct subsistence interviews in Northway and Tetlin. All three people did good jobs and were very productive. The lack of supervisory time was a real problem and was only partially offset by assigning various folks to help. The village council presidents, the refuge manager and the Tanana Chiefs staff all helped. The ARM did most of the O & M YCC supervision. This fractured direction worked fair but would have been much better if the funds for a group leader were available.



#22 - Ken Crane, YCC enrollee, helped paint the Northway Guard Station. 83-Id-17SWB

Thirty households in Tetlin and 42 households in Northway were given extensive subsistence questionnaires. This was done to determine when the various refuge resources were used by residents of the two communities. The results were good.

Inferences about these data will appear in a separate report. In general, however, we found that both communities used the same resources during the same time of the year and that accessible game, fish, berries and wood products were all used to substantial degree. Moose, rabbits, caribou, ling, pike, whitefish, grayling, all types of berries, and firewood were the most sought items. The enrollees were involved in this data collection since they were established members of the communities.

I. EQUIPMENT & FACILITIES

1. New Construction

The only significant building done this year was the construction of a log cabin that is badly needed to cut air charter costs and travel time to and from the Kennebec fire study area. Using volunteer labor, and some inexpensive building materials we managed to put up the shell very inexpensively. As funds become available we will add appurtenances such as stairs, a stove, etc.



#23 - The Jatahmund Lake Cabin. 83-If-82SWB

We are in the process of completing house plans for four new houses made possible by an $1,010,000 addition to our budget. These three bedroom units are due to be completed in August of 1984. The remaining construction need is for an office-warehouse complex. This unit hopefully will be built in FY 85 or 86.

2. Rehabilitation

The rehab of the two Northway boat ramps has been postponed again in favor of a micro-computer. The realty backlog in the regional office was responsible for this reprogramming.

The Northway guard station bunkhouse is scheduled for rewiring which will be completed in the summer of 1984.



#24 - The old Seaton Roadhouse litter will require some rehabilitation. 83-If-91SWB

4. Equipment Utilization and Replacement

Our need for a good riverboat continues to go unfilled. Even though we have requisitioned a new boat, the chances are we may wind up with a used unit from another refuge - not a good deal!

We also have been mandated to produce a wildlife inventory plan to provide essential information for management decisions. The aircraft charter required by this plan will exceed our funding. Without a service aircraft to reduce costs we will be forced to gather less data. Hopefully we will soon get a service aircraft.

J. OTHER ITEMS

1. Cooperative Programs

The refuge staff maintains close contact with the 40-Mile Game and Fish

Advisory Committee by attending all of their meetings. We attempt to keep this group advised about what we are doing and why. To date this group and the Slana Advisory Committee have both supported our position on wolf control as well as special use cabin permits, guiding permits and refuge master planning. Lacking local government, these two groups provide a reasonably good community "pulse" for the refuge staff.

Additional cooperative efforts have been made by ARM Breeser with the Boy Scouts of America. This community service is appreciated by many and does much in a conservative community to give the Service and the refuge good public relations.

RM Stearns served as chairperson for Science section of the Gateway School District Learning Fair. Cooperation in this effort and in the YCC program has helped to integrate the refuge into some of the community affairs.



#25 - ARM Breeser drafted his family to help remove the old wire from Tetlin Reservation. 83-Ie-5SWB

As was reported previously, the Tetlin Indian Reservation permanent waterfowl transects were again censused by the FWS. During our contacts with the village president we learned that in 1964 a waterfowl study had been conducted on the area. As a result, a quarter of a mile of wire netting had been left after the end of activities, which was a "problem" to the Tetlin residents. Upon hearing this we agreed to remove the fence. Being short of help we enlisted Jim King, Bruce Conant, and ARM Breeser's family to pull up the wire and remove it. The folks in the Tetlin village were glad to get their 22 year "problem" solved.

2. Items of Interest

The passing of Charles Strickland was a sad event to all of us in Alaska. He leaves behind a legacy to protect this nations wildlife resources to the best of our abilities. This we will attempt to do. We were privledged to have known and worked with Charles.

The Refuge received a nice pat on the head when a certificate of recognition was received by Tetlin for an outstanding ANR among the new Alaskan refuges.



#26 - ARM Breeser accepted the ANR award for the staff. 83-Id-17FDS

ARM Breeser was given a special achievement award for his work in developing a waterfowl trend-census technique for Tetlin NWR that was subsequently used by several other Alaskan refuges. His extra efforts are paying dividends in good data.



#27 - RM Stearns gives ARM Steve Breeser a check and special achievement award for his work in waterfowl census techniques. 83-Id-19STA

3. Credits

The ANR was written by both ARM Breeser and RM Stearns. Since we do not have a clerk, God only knows who will type this mess.

K. FEEDBACK

1. The High Cost of No Clerks

Over the past two years here in Alaska we have seen and read a tremendous amount encouraging government thrift. This is good. During this same two years we have also seen our "backbone" (the clerk-typists) come and go like the rush hour traffic. Most are promoted into higher paying jobs in state or private sectors. The Federal government acts as a trainer for these essential folks. Between clerks we have GS-9, 11 or even 12's doing the same work, often less efficiently at very much higher hourly rates. When a replacement is found we endure the inefficient training period in expectation of getting a good productive person in a few months. Most often the highly productive months are fewer than the training period since others outside of Federal Service "steal" our trained clerks. And so the cycle is complete - with lost time, poor production and high costs per unit of output.

I submit that if the Federal Government can put a man on the moon, conquer polio, and give away billions of dollars, it surely also should be able to pay it's clerks and clerk-typists a competitive wage. The Fish and Wildlife Service has a large number of capable people in both personnel management and administration. I believe that one of the most universal benefits to the FWS will be obtained when these people recognize this as a huge, wasteful problem that is not impossible to correct. We in the field will get the job done. It is up to the personnel and administration functions to help us do it efficiently.

2. Inspections

At the risk of being over run with inspectors, the following observation is offered concerning administrative inspections.

During a twenty year exposure to this type of activity one pattern emerges. Administrative inspections are either made to confirm the suspicion that a unit is operating outside the guidelines or to satisfy a directive to contact a specific unit. During this type of visit a real opportunity for helpful guidance and constructive criticism is often lost. It seems better to approach inspections with the philosophy that every unit will have both strong and weak points and that we all are part of a single activity that should operate as a team. If, in the opinion of those doing the inspection, a particular unit is not in need of a visit it should be omitted and avoid the waste of everyone's time. To show a visiting person or persons various aspects of an operation with only boredom as a comment seems to be a poor practice.



#28 - With resources like this we all should be happy to work in Alaska. 82-Ia-98SWB