REVIEW AND APPROVALS

TETLIN NATIONAL WILDLIFE REFUGE

Tok, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1989

Refuge Manager DATE: 2-20-90

Associate Manager, Refuges & Wildlife DATE: March 15, 1990

Regional Office Approval DATE:

TETLIN NATIONAL WILDLIFE REFUGE
P.O. Box 155
Tok, Alaska 99780

ANNUAL NARRATIVE REPORT

Calendar Year 1989

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

Environmental education is an important program that the Fish & Wildlife Service can provide to the public. Refuge Information Technician Hank Timm leads children during a Nature Day Camp sponsored by the refuge. 7/89, TNWR 89-1, CJP

INTRODUCTION

The Tetlin National Wildlife Refuge was established on December 2, 1980, by an act of Congress (Public Law 96-487) known as the Alaska National Interest Lands Conservation Act (ANILCA). As one of over 400 refuges of the National Wildlife Refuge System located throughout the United States, this refuge like all others is managed to perpetuate its outstanding wildlife values.

The purposes of this ANILCA refuge are: 1) to conserve fish and wildlife populations and habitats in their natural diversity, 2) to fulfill international treaty obligations of the United States with respect to fish and wildlife, 3) to provide for continued subsistence uses by local residents that are consistent with the above mentioned purposes, 4) to ensure, to the maximum extent practical, water quality and necessary water quantity within the refuge, and 5) to provide, in a manner consistent with 1 and 2, opportunities for interpretation and environmental education. This one million acre refuge is located in east central Alaska, adjacent to the Yukon Territory border, directly south of the Alaska Highway and north of the Wrangell Mountain Range. The major physical features include broad flat river basins bisected by rolling hills, extensive marsh and lake complexes, foothill areas of the Nutzotin and Mentasta mountains, and two major glacial rivers which combine to form the Tanana River.

The refuge was primarily set aside because of its unique waterfowl values. It has one of the highest densities of nesting waterfowl in Alaska, and in favorable years produces about 100,000 ducklings to flight stage. As a migration corridor for all types of birds entering and leaving Alaska, the refuge provides habitat for 143 nesting species and 47 migrants. Spectacular migrations of lesser sandhill cranes and both the tundra and trumpeter swan occur each spring and fall. Up to 200,000 cranes migrate through the corridor which makes up about one half of the world's population. The refuge also has its own expanding population of trumpeter swans and provides habitat for the largest nesting concentration of ospreys in Alaska. Bald eagles are common nesters along the major rivers and shorelines of large lakes.

Big game animals include moose, caribou, Dall's sheep, grizzly bear, black bear, and wolf. Nearly 20,000 caribou from the Nelchina and Mentasta herds commonly winter on the refuge while small numbers of the 40-mile and Chisana herds occasionally reach the refuge boundaries. Other mammals include wolverine, lynx, marten, otter, red fox, beaver, muskrat, snowshoe hare, and mink.

Arctic grayling, burbot, lake trout, northern pike, and whitefish are present in refuge lakes and streams. No significant salmon runs reach this far inland, although a small run of chum salmon occurs in late fall and an occasional chinook and coho have been observed.

As an interior Alaska refuge, Tetlin enjoys a continental climate with low annual precipitation (10-14 inches). Daytime summer temperatures often exceed 80 degrees Fahrenheit with nightly lows in the 50's and 60s'. By mid-September, nightly lows are dropping into the upper teens and 20's. Snow can occur at anytime but usually not during June to mid-August. During June and July there is full sunlight and/or twilight around the clock. Winter starts in mid-October and lasts through the end of April. Temperatures from November thru February seldom get above zero and can drop to -70 degrees. This is one of the coldest inhabited places in North America.

As one of only two road-connected Alaskan refuges, Tetlin has the unique opportunity to interact with nearly all the visitors who travel to the state via the Alaska Highway. Visitation has been averaging about 160,000 per year. Access to most of the refuge is by small plane, river boat, or snowmachine. Foot access to the northern portion is available along the Alaska Highway from the Canada border to Gardiner Creek. Stream access for small boats is possible from the highway at Desper Creek and the Chisana River near Northway. Visitors from all of the states and many foreign countries pass along Tetlin's northern boundary every year giving the refuge an outstanding opportunity to provide interpretation about Alaskan habitats and the National Wildlife Refuge System. In June of 1989, the refuge opened its new visitor center near the Alcan border. This attractive log structure is open daily from Memorial Day to Labor Day.

The entire refuge is open to consumptive and non-consumptive uses throughout the year in accordance with federal and state regulations. Primary game species taken include: moose, waterfowl, Dall's sheep, northern pike and grayling. Furbearers are taken by resident trappers who supplement their income with catches of lynx, fox, marten, muskrat, beaver and mink.

Permanent refuge staff includes a refuge manager, assistant refuge manager, fire management officer, outdoor recreation planner, biologist, pilot, and secretary. Facilities include a leased administration office, garage and hangar in Tok; four government residences and a leased house also in Tok; a 1700 sq. foot visitor center near the Alaska/Canada border; a bunkhouse and warehouse at Northway Junction; two campground facilities near Northway; three public use/administration cabins; and one boat ramp.

The present refuge program is concerned with: 1) assembling biological data primarily with regard to waterfowl, moose, and wolves, 2) developing the public use and interpretation programs with special emphasis on opportunities along the Alaskan Highway and environmental education in area schools and communities, 3) enhancing wildlife habitat through the use of prescribed burns, and 4) writing step-down management plans to carry out all the refuge programs addressed in the Final Comprehensive Conservation Plan.

The highest density of nesting osprey in the State of Alaska is found on the Tetlin flats in a 200 square mile area encompassing the northern tip of the refuge and adjacent Tetlin Indian Reserve lands.
7/89, TNWR 89-2, CJP

G. WILDLIFE

H. PUBLIC USE

I. EQUIPMENT AND FACILITIES

J. OTHER ITEMS

A. HIGHLIGHTS

* Record low temperatures and record high barometric pressure readings occur during the year (Section B.).

* 55-year lease agreement signed with the State of Alaska for the refuge to manage two state campgrounds (Section C.3.).

* Fishery Management Plan submitted for public review and initial work is started on Public Use Management Plan (Section D.2.).

* Refuge staff swells from 7 to 23 during the summer season (Section E.1.,E.2., E.4.).

* Exxon Valdez oil spill reaches inland for personnel support (Section E.8.).

* Phase 2 of the water contaminants study is completed (Section F.2.)

* Wildfire and prescribed burn alter climax vegetation habitat on 7500 acres of refuge land (Section F.9.).

* Fire effects studies are continued and new ones are started (Section F.9.).

* Endangered woodland bison are rounded up and returned home (Section G.2.).

* Favorable weather conditions and water levels combine to create excellent waterfowl production (Section G.3.).

* Waterfowl surveys expanded to collect better information (Section G.3.).

* Trumpeter swan population and production hit new highs for the eighth straight year (Section G.3.).

* Nineteen trumpeter swan cygnets neck-collared and a previously neck-collared swan establishes nesting territory (Section G.3.).

* Twenty osprey are collared in a cooperative project (Section G.6.).

* Wolf surveys accomplished with an international effort (Section G.8.).

* Moose surveys indicate continued growth of the refuge herd (Section G.8.).

* Record numbers of caribou winter on the refuge (Section G.8.).

* Nature Day camps are initiated and become an instant success (Section H.2.).

* Construction of refuge's first nature trail begins (Section H.4.).

* New refuge visitor center is opened and dedication ceremonies held (Section H.6.).

* The refuge's new interpretive newspaper receives first place award (Section H.7.).

* An abundance of caribou essentially guarantee meat for the freezer for all area residents (Section H.8.).

* Cooperating association outlet has a 700% increase in sales with the opening of the new visitor center (Section H.18.).

B. CLIMATIC CONDITIONS

The winter of 1989 is well remembered as being the year when major cold records were set throughout the state. The highest barometric pressure ever recorded in North America, 31.85 inches, occurred in Northway on Jan 31. It was the third highest ever recorded in the world. Siberia is the site of the two higher readings. During this period, unofficial temperatures in Tok dropped to -72 degrees Fahrenheit.

Despite the severe weather experienced, there were no problems with any of the refuge facilities, vehicles, or equipment, and no administrative leave was taken by any of the refuge staff. Other than the inability to conduct field work, it was business as usual.

Spring arrived early, with above average temperatures in March and April (Figure 1). Compared to the rest of interior Alaska, Tok enjoyed the best weather of all. The Tanana River at Tok became ice free on April 29. This was the earliest ice out in several years. By the end of April all snow was gone resulting in a rapid rise of local streams. The small lakes were ice free, and the large lakes had opening around the edges. This warm, dry weather developed conditions which were favorable for early forest fires.

The fear of an early wildfire season subsided as June started out rainy and wet. However, by mid-June a warm dry trend was the dominant weather pattern. July was the warmest month of the year, with the mercury rising to 86 degrees. Conditions continued warm and dry through August.

Above normal temperatures were enjoyed throughout the months of September and October, and it appeared as if we were in store for a mild winter season. But we were fooled again as cold weather hit for a three week period in November, with temperatures falling to the -55 degree range. The year ended with above normal temperatures being common during December.

The Federal Aviation Administration maintains a weather station in the Village of Northway. The record high and low monthly temperatures recorded there are presented in Table 1.

Table 1. Record High and Low Temperatures - Northway, Alaska

YEAR	RECORD LOW	MONTH	RECORD HIGH	YEAR
1952	-72	JANUARY	34	1976
1929	-71	FEBRUARY	48	1943
1989	-43	MARCH	50	1966
1944	-42	APRIL	69	1976
1945	4	MAY	88	1947
1947	30	JUNE	91	1969
1986	33	JULY	88	1955
1987	12	AUGUST	88	1976
1983	-6	SEPTEMBER	79	1982
1975	-36	OCTOBER	67	1986
1945	-55	NOVEMBER	40	1954
1956	-64	DECEMBER	39	1985

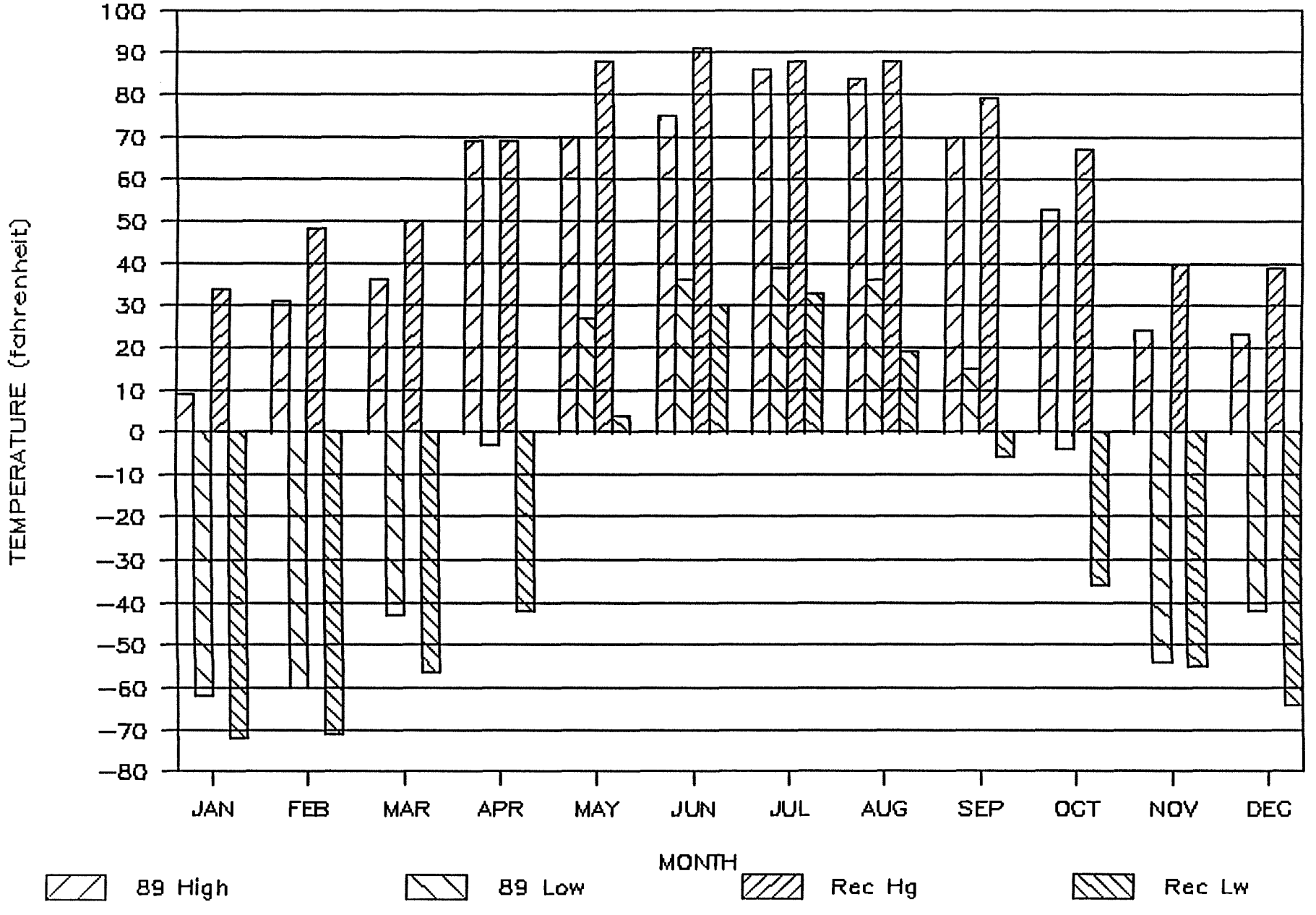
ALL TIME HIGH	91 degrees	June 1969
ALL TIME LOW	-72 degrees	January 1952

Keeping track of low temperatures is a novelty that soon grows old. Readings of -30 degrees Fahrenheit are accepted as the norm, but temperatures of -45 degrees Fahrenheit and colder are hard on everyone and everything. 1/89, TNWR 89-3, DLW

Figure 1.

TEMPERATURES FOR 1989

TETLIN NATIONAL WILDLIFE REFUGE



C. LAND ACQUISITION

2. Easements

Prompted by complaints of public trespass, the refuge staff investigated obtaining an easement across private land to a popular rainbow trout-stocked lake on the refuge. The landowner complained that individuals were crossing his land on foot, and via all-terrain vehicles and snowmachines to gain access to Hidden Lake, located on the refuge near Milepost 1240 of the Alaska Highway. The landowner holds title to property which includes the only dry, upland route between the highway and the lake. A barrier was constructed across the trail by refuge staff to prevent all-terrain vehicle access. All-terrain vehicles are prohibited on refuge lands. Meetings with the landowner and Realty Specialist Mindy Gallagher from the Tanana Chiefs Conference were held to discuss a potential settlement. Ms. Gallagher proposed a $500.00 annual fee to allow public access by foot and snowmachine across approximately 1,500 feet of private property. An issue paper was prepared and submitted to the Regional Office Division of Realty for action. Because of very low land values in the area, the amount of the proposed fee was considered excessive. Negotiations are still underway to arrive at an equitable settlement.

3. Other

As a result of direction provided by the 1988 Submerged Lands Act legislation, the refuge staff worked with regional office specialists to prioritize potential land acquisitions for the refuge. These priorities were then consolidated with regional Fish & Wildlife Service land acquisition priorities. Owners of inholdings and adjacent lands were advised of this prioritization process that the Service was undertaking. Tetlin National Wildlife Refuge priorities ranked high on the regional priority list.

Lease agreements between the Fish and Wildlife Service and the State of Alaska for Lakeview and Deadman Lake Campgrounds were prepared and submitted for public notice. The Refuge took over management of these campgrounds in 1988 under a Memorandum of Understanding between the State and the Service. The 55-year lease agreements provide the Service with more management control and ability to expand and improve the campgrounds to meet public needs. Final approval of the leases was received in late 1989.

D. PLANNING

2. Management Plans.

Work continued on the Tetlin Fisheries Management Plan during the year. In February, Refuge Manager Breeser, together with Fishery Biologists Larry Peterson (Fishery Management Services) and Rodney Simmons (Fairbanks Fisheries), met with members of the State of Alaska Commercial Fisheries, Sportfish, Habitat and Subsistence Divisions. All state concerns were thoroughly discussed and mutual agreements were made upon all points. The draft plan was released for public comment on November 22.

The Public Use Management Planning effort began in 1989 with the solicitation of the public's input (Section D.3.). The plan is scheduled for completion in July, 1990.

The refuge's Safety Plan was updated to include a section on hazardous materials and to include the Office of Aircraft Service's (OAS) Aircraft Pre-Accident Plan and Hazard Map Instructions. The revised plan was approved in November.

Work was begun during December on the development of the station's Office Automation Plan. The plan is expected to be submitted in early 1990.

A major revision to the Refuge Fire Management Plan was prepared during the winter and approved in April.

The Annual Prescribed Burn Plan, which included four separate burn plans totalling 4,260 acres, was prepared and approved in May. The annual plan also included the Refuge Dispatch Plan. The proposed burns included:

NAME	ACRES
Trail Lake	3,000
Tsolmund Lake	1,200
Tahamund Lake	50
Milepost 1243	10

Revised procedures for the trumpeter swan and moose portions of the Wildlife Inventory Plan were submitted to the Regional Office for approval on December 20.

3. Public Participation

The Citizen Participation Program for the Tetlin Refuge Public Use Management Plan was approved in February. The program identifies interests which would potentially be affected by the plan, citizen participation objectives, and the communication techniques to be used during the planning process. In addition, a planning schedule listing the various activities and public input was prepared.

In March, a planning alert was mailed to over 1,000 individuals and organizations who were involved in the refuge's Comprehensive Conservation Planning process and local residents of Tok, Northway, Tanacross and Tetlin. The alert allowed potential participants to choose their levels of involvement in the process. News releases were also sent to local and regional newspapers. A total of 163 responses to the alert was received.

Those individuals who indicated a willingness to become actively involved in the planning process received worksheets outlining the four main public use categories to be included in the plan. Of the 71 sets of worksheets distributed, only 21 responses were received. Comments covered a broad spectrum of feelings, both pro and con, towards public use, the refuge, the Fish & Wildlife Service, and the federal government in general.

A summary of the responses and list of alternatives were distributed to all involved participants. The Draft Public Use Management Plan is scheduled for distribution in March, 1990.

5. Research and Investigations

Summer predation rates of a wolf pack on the Tetlin National Wildlife Refuge, Alaska. A final report was submitted to the regional office for review prior to distribution. Final results of this study await publishing.

Tetlin hazardous waste (water quality) study. A progress report was completed on this study by Elaine Snyder-Conn of Fairbanks Fish and Wildlife Enhancement and RM Breeser. The study area is located within native inholdings on the refuge near Northway. Insignificant levels of aliphatic and aromatic hydrocarbons were found. However, a higher than expected amount of DDE (a derivative of DDT) was detected which prompted a recommendation for an additional study to be initiated.

Impacts of placer mining on the aquatic resources of the Tetlin National Wildlife Refuge. Water and sediment samples were collected from 12 sites and fish samples collected from 5 sites of the 13 identified in the study plan for 1989. Lack of helicopter availability precluded sampling the 13th site. The sample catalog was submitted on October 11. Samples are being held at the refuge pending approval for shipping. The refuge is still awaiting results from the bulk of samples sent in for analysis in 1987 and 1988. Preliminary findings from 1989 field work can be found in Sections F.2. and G.11.

Kennebec fire monitoring. Work on this fire effects investigation continued in 1989 with the completion of winter track counts to monitor the response of small mammals. For details see Section F.3.

Refinement of duck brood surveys for Alaska Region. Considerable progress was made during the year on this project. Consultant Lyman McDonald submitted a final report to the refuges on May 7 following a draft report that was reviewed and discussed at the regional Waterfowl Workshop in Fairbanks on April 18 and 19. Although recommendations were received too late in the season to be fully implemented, an increase in sample intensity was obtained for the 1989 field season (Section G.3.). In October Russell Oates of the Migratory Bird Management Office in Anchorage began organizing all parties involved with the goal of standardizing duck brood production surveys state wide. By the end of the year objectives were drafted, survey areas delineated, working groups organized to tackle specific areas of concern, and an outline of the Standard Operating Procedures developed.

Home range, dispersal, and mortality factors of lynx on the Tetlin National Wildlife Refuge. The proposal for this study was approved and funded for FY90.

E. ADMINISTRATION

1. Personnel

Front Row: 2, 3, 5, Back Row: 1, 6, 7, 4
8/89, TNWR 89-4, LH

PERSONNEL

1. Steve W. Breeser, Refuge Manager, GS 12/3, EOD 1/31/88, PFT
2. Manuel "Bud" Oliveira, Assistant Refuge Manager, GS 11/3, EOD 9/25/88, PFT
3. Terrence J. Doyle, Wildlife Biologist, GS 11/1, EOD 5/29/88, PFT
4. Larry A. Vanderlinden, Fire Management Officer, GS 11/4, EOD 4/24/88, PFT
5. Donald Lee Westenburg, Outdoor Recreation Planner, GS 9/4, EOD 3/2/87, PFT
6. William K. Bohman, Airplane Pilot, GS 12/2, EOD 6/6/88, converted to PFT 11/20/88 Local Hire
7. Melinda J. Rallo, Refuge Secretary, GS 5/2, EOD 4/24/88, converted to PFT 8/14/88 Local Hire

8. Craig J. Perham, Park Ranger, GS 5/1, 1/17/89 - 9/23/89, TFT

9. Elisa Butteri, Biological Technician, GS 5/1, 6/5/89 - 9/30/89, TFT

10. Peter Butteri, Biological Technician, GS 5/1, 6/20/89 - 9/30/89, TFT, Local Hire

11. Lenore Hepler, Park Ranger, GS 6/1, 5/21/89 - 9/11/89, TFT

12. Steve James, Park Ranger, GS 4/1, 6/4/89 - 9/9/89, TFT, Local Hire

13. Joe Spitler, Park Ranger, GS 4/1, 6/4/89 - 9/9/89. TFT, Local Hire

14. Henry Timm, Refuge Information Technician, GS 5/1, 6/4/89 - 8/22/89, TFT, Local Hire

12, 11, 8 8/89 TNWR 89-5, BO

9, 10 8/89, TNWR 89-6, WKB

13 8/89, TNWR 89-7, WKB

14 8/89, TNWR 89-8, Staff Photo

In 1989, there were no permanent staff changes at Tetlin NWR. However, a Local Hire WG-9 Carpenter position was approved for the station. The position will be advertised in early 1990.

Park Ranger Craig Perham began working in January, filling in for Outdoor Recreation Planner Westenburg who was attending Basic Law Enforcement Training at the Federal Law Enforcement Training Center in Glynco Georgia. In June, Craig took charge of the station's YCC program.

Temporary employees and volunteers swelled the ranks of refuge staff from 7 to 23 during the summer months. In May, Park Ranger Lenore Heppler arrived to take charge of the day to day operations at the new visitor center, Steve James and Joe Spitler, Local Hire Park Rangers, began work in early June with Lenore at the Visitor Center.

Biological Technician Elisa Butteri and Local Hire Biological Technician Peter Butteri entered on duty in June. Their primary duties centered on the refuge's fire management program. Local Hire Resource Information Technician Henry Timm hosted nature camps for area youth in June and again in August.

Six staff members received seven performance awards for their outstanding work. In March, Fire Management Officer Vanderlinden received a Special Achievement Award for his quality work as a member of Overhead Teams on the Selawik and Yellowstone fires in FY88. This work was accomplished in addition to performing all his regular duties at the station. Refuge Manager Breeser received a Special Achievement Award in October for developing a team management approach, handling controversial issues, and having excellent public use and fire management programs.

In December, Assistant Refuge Manager Oliveira, Biologist Doyle, Fire Management Officer Vanderlinden, Outdoor Recreation Planner Westenburg, and Secretary Rallo received Special Achievement Awards for their superior performance during FY89. The tremendous growth and quality of the refuge's varied programs is a testimony to everyone's efforts.

Table 2. Tetlin National Wildlife Refuge Staffing FY85-89

FISCAL YEAR	PERMANENT FT	PT	TEMP	TOTAL FTE	YCC	VOL.	LOCAL HIRE
90*	7.0	1	2.0 (7)	9.75	6	8	7
89	7.0	0	2.2 (7)	9.2	4	5	6
88	7.0	0	1.7 (5)	8.7	6	4	4
87	6.0	0	.9 (3)	6.9	5	2	4
86	4.0	0	1.0	5.0	2	1	1

() - number of temporaries
* - proposed

1, 2, 5, and Park Ranger Perham
7/29/89, TNWR 89-9, DLW

2. Youth Programs

1.	Melissa Jimmie	6/5/89 - 7/29/89
2.	Julie Cronk	6/5/89 - 7/29/89
3.	Wendell Gene	6/5/89 - 6/27/89
4.	Gerald Joe	6/5/89 - 6/27/89
5.	Shane Sam	7/5/89 - 7/29/89
6.	Jeffery Albert	7/5/89 - 7/15/89

Despite the lack of funding at the regional level, we have continued to maintain our Youth Conservation Corps program. 1989 was the seventh year that area village youth have been employed in the YCC program. This year, six different youths from Northway and Tetlin Villages participated. Their primary project, under the unyielding leadership of Park Ranger Craig Perham, was the construction of a nature trail at Deadman Lake campground. In addition to this project, the crew carried out maintenance at both refuge campgrounds, the Deadman Lake Day Use Area, all highway pullouts, and at the visitor center. Yes, they were quite busy!

The YCC program has produced several important benefits to the refuge besides the project work carried out. The YCC serves as a great public relations effort with Northway Village. Also, the pride associated with the construction of our interpretive facilities has greatly reduced vandalism. These benefits, combined with the project work completed and the educational aspects of YCC, make it an integral part of our public use program.

4. Volunteer Program

The Tetlin Refuge volunteer program has grown dramatically over the past few years. In 1989, 2,540 hours of volunteer effort were donated to the refuge. Volunteerism has become an essential part of refuge operations, in particular in the public use program.

TABLE 3. Volunteer Hours Donated to the Refuge 1986-1989

ACTIVITY	1986	1987	1988	1989
Maintenance	40			40
Biological support	472	320		
Interpretive programs		640	880	2400
Educational programs			144	100
Administrative support	32		80	
TOTALS	544	960	1104	2540

Student Conservation Association volunteers make up the majority of our volunteer hours. The resource assistant program offered through SCA has been a great way to get qualified and enthusiastic volunteers to our remote location. The Student Conservation Association has also proven cost effective in comparison with other volunteer organizations. This year five Student Conservation volunteers worked on Tetlin Refuge: Les Davison and John Carrera at the Tok visitor center, and Caddie Patterson, Chris Scanlon, and Stacey Dobrzelecki at our visitor center.

Other volunteer efforts from local parents, teachers and friends assisted in the preparation and implementation of several of our environmental education programs such as Nature Activity Day and Nature Day Camps.

Carrera, Scanlon, Dobrzelecki, Patterson and Davison. 8/16/89, TNWR 89-10, BO

5. Funding

The refuge's annual budget has continued to grow as a result of increases in staff and projects. The budgets have proven adequate to accomplish our annual goals. An additional $141,500, $37,500 in 1260 and $104,000 in 1240, was received in FY90 specifically for fire related expenses. Table 4 shows the five year budget history for the refuge.

Table 4. FUNDING HISTORY FOR TETLIN NWR, FY85-89

FY	FTE	1260	1210	1240	1500	8610	TOTAL
90	9.75	717		104		34.5	855.5
89	9.2	585				34.5	619.5
88	8.7	555				36.5	591.5
87	6.9	536	6.0			33.0	575.0
86	5.0	332			18.7+	20.0	370.7

6. Safety

Staff members, both permanent and temporary, are expected to maintain a safety conscious attitude whenever and wherever they are working. This attitude was again demonstrated in 1989 as there were no lost time accidents. This brings our total to 2,822 days without a lost time accident.

Monthly safety meetings are held for all staff, and the topics covered in 1988 included arctic survival, winter driving techniques, aircraft safety, hypothermia, hazardous materials handling, firearms safety, defensive driving and seatbelt use.

Safety related training is of special concern to Alaska refuges. The remoteness of most stations demand that all employees be equipped to handle all types of emergency situations which may arise. In January, Assistant Refuge Manager Oliveira, Fire Management Officer Vanderlinden, and Pilot Bohman attended Arctic Survival Training at Eielson Air Force Base in North Pole, Alaska. This training introduces the students to the realities of being stranded in an isolated location during the long Alaska winters. The final three days of the one week course are spent in the field where students learn the basics of staying alive. While taking part in the outdoor classroom portion of the class, the temperatures plummeted, reaching -60 degrees in the town of North Pole. This was by far the coldest class in over five years. The Tetlin "happy campers" survived in fine style, and Vanderlinden received the "Polar Bear" award for being the outstanding member of his element.

In June, the refuge held a week long Employee Orientation/Safety Training for all staff members. The training was held in cooperation with the Steese/White Mountain District of the Bureau of Land Management. Up to 26 federal employees attended the various sessions on the following topics:

1. Refuge Administrative Procedures
2. Hypothermia
3. Bear Safety
4. Boating Safety
5. Aircraft Safety
6. Defensive Driving
7. CPR Training
8. First Aid Training
9. Safe Materials Handling
10. Shotgun/Rifle Training

The instructors included Service employees, Bureau of Land Management employees, and contractors (CPR and First Aid). Special Agent Mark Webb's Shotgun/Rifle Training was particularly well done.

Shotgun training provided staff members with the basic safe firearm handling techniques. 6/16/89, TNWR 89-11, CJP

All refuge fire extinguishers were inspected during the year. In addition, canned smoke was purchased, and all smoke detectors were tested. Replacement smoke detectors were purchased for four inoperative ones.

A flammable materials cabinet was purchased in November.

In October, Fire Management Officer Vanderlinden prepared a memo on uniforms and submitted it to the uniform committee requesting that uniform components be offered by the contractor that can be worn under nomex clothing (100% cotton, 100% wool), and suggested that nomex clothing be carried as well. According to current safety regulations, anyone involved in special purpose flights or fire management activities must wear nomex clothing or coveralls. None of the Class C uniform components currently available can be worn under nomex, since the components are invariably either permaprest treated or synthetic blends. We hope this problem is solved soon.

7. Technical Assistance

During the year, the refuge staff provided considerable expertise to a wide variety of local and regional groups. These contacts included:

a. Wrangell-St. Elias National Park/Preserve for trumpeter swan, moose, wolf, and caribou monitoring.
b. Alaska Department of Fish and Game for management and enforcement of moose, caribou, and wolves. We also gave recommendations on season and bag limits for several wildlife species.
c. Northway Natives, Inc. on land exchange, enforcement, and land status.
d. Tetlin Native Corporation on wildlife and subsistence uses.
e. Gateway School District on hunter safety and outdoor classroom site selection.
f. Tok Fish and Game Advisory Committee on game and fish populations and refuge operations.
g. Alaska Interagency Visitor Center Committee on the development of an interagency interpretive stop at the Alaska-Yukon border.
h. Alaska Department of Natural Resources on fire planning and land exchanges.
i. Alaska State Troopers on law enforcement.
j. U.S. Customs and Immigration on importation and Federal Game Laws.
k. Waterfowl Investigations - Juneau, on waterfowl populations in the Upper Tanana Valley.
l. Department of Defense on the effects of the Back Scatter Radar on local wildlife populations.
m. Tok Chamber of Commerce on the Tetlin NWR "I&R Program" and Back Scatter Radar impacts.
n. Bureau of Land Management - for advice on conducting duck brood production surveys.
o. University of Missouri graduate student Kent Vanhorn, visited the office on July 24 to discuss brood survey procedures as it relates to the work he is doing for research on the Yukon Flats NWR.

Randi Anderson, Bureau of Land Management Co-op Student, visited the refuge on July 7 to discuss brood survey procedures and to participate in one of our brood counts prior to conducting one for BLM.
7/89, TNWR 89-12, WKB.

8. Other Items

In January, Wildlife Biologist Danielle Jerry and Biological Technician Greg McClellan from the Division of Realty spent two days in Tok gathering information from the refuge staff as part of a land prioritization process.

Regional Safety Officer Ginny Hyatt visited the refuge in March to inspect our facilities. No major problems were found, and recommendations received were incorporated into our program.

Seven individuals from the Regional Office including Assistant Regional Directors John Rogers (Refuges & Wildlife) and Bruce Batten (Public Use) and Associate Manager George Constantino (Refuges & Wildlife) were on hand for the August 16 dedication ceremonies for the Tetlin National Wildlife Refuge's Visitor Center (Section H.6.). Immediately following the ceremonies, Rogers and Constantino conducted a station "mini review". The refuge staff and Regional Office representatives discussed refuge programs and direction, and all were treated to a seminar on convection columns put on by Fire Management Officer Vanderlinden while at the Jatahmund Lake Administrative Cabin (Section F.9.).

Assistant Regional Director Rogers and Associate Manager Constantino enjoy the view and interpretive panel at one of the highway interpretive pullouts.
8/16/89, TNWR 89-13, BO

The EXXON Valdez oil spill caused a short term manpower reduction for the refuge as Assistant Refuge Manager Oliveira and Fire Management Officer Vanderlinden assisted in the clean up efforts. Oliveira served eleven days in the Seward Operations Center serving as the wildlife biologist cataloging dead wildlife and filling in for the project leader when needed. Vanderlinden spent 14 days as the Planning Section Chief on an Interagency Incident Command Team in Kodiak. The team provided support for National Park Service and Fish & Wildlife Service information gathering activities relating to the spill.

Biological Technicians Peter and Elisa Butteri spent 19 days as members of an interagency fire suppression crew assigned to fires in Idaho and Montana in August. In September, Vanderlinden, Butteri and Butteri assisted the State of Alaska in a suppression effort on a 300 acre fire on the Tetlin Indian Reservation. Vanderlinden functioned as incident commander, Elisa Butteri as timekeeper, fire dispatcher, and firefighter, and Peter Butteri as timekeeper, firefighter, and helispot manager trainee.

In February, Fire Management Officer Vanderlinden assisted Region 1 as an instructor for S-390, Intermediate Fire Behavior, at Boise, Idaho. The course emphasized refuge examples and applications, and had attendees from Regions 1, 2, 6 and 7.

Wildlife Biologist Doyle spent most of May in Blair, Nebraska attending the Basic Refuge Academy. Overall it was an excellent session. Most presentations were very good and there were many practical exercises. Of greatest value was having the opportunity to get to know the 32 other folks from refuges across the country.

In July, Assistant Refuge Manager Oliveira travelled to Washington, DC to participate on the Refuge Management Information System (RMIS) committee. The committee is attempting to develop a series of reports which are more streamlined than their predecessors, and are relevant to the needs of the field, Regional Offices and Washington.

F. HABITAT MANAGEMENT

1. General.

The need persists for development of a vegetation map for the refuge with a greater degree of accuracy than exists with the LANDSAT-derived product that was prepared during the Refuge Comprehensive Conservation Plan process in 1984. Draft copies of National Wetlands Inventory vegetation maps for the refuge at 1:63360 scale were obtained in 1989 which are of some utility. It would be useful to obtain vegetation map overlays at 1:63,360 scale based on Viereck's vegetation classification scheme for interior Alaska. A zoom transfer scope was borrowed from the regional office in late 1989 which will be used to begin developing some useful vegetation map products for the refuge.

2. Wetlands.

Water levels on the refuge were within normal ranges during 1989. Rainfall and glacier melt occurred gradually enough through the summer to result in only minor flooding along the lower Chisana River.

Contaminants work continued on the refuge in 1989. Water and sediment samples were collected at 12 sites and fish were collected at 5 sites in September to complete Phase 2 of the refuge placer mining water contaminants study. Sample water parameters are presented in Table 5. The sample catalog for the remaining samples, to be tested for heavy metals, was submitted to Fairbanks Fish and Wildlife Enhancement for approval.

WB Doyle collecting water samples for the placer mining contaminant study. Although no placer mining activities are currently taking place on the refuge, they are occurring on tributaries off refuge which are part of the refuge watershed. 9/89, TNWR 89-14, WKB.

Table 5: Water quality parameters on the Tetlin National Wildlife Refuge, 1989.

Sample ID	Conductivity (mS/cm)	pH	Alkalinity (mg/L)	Hardness (mg/L)	Turbidity (NTU)	Total Settleable Solids	Total Suspended Solids (mg/L)	Location	Date Collected
1-WP-89-1	0.215	8.18	73.8	90.8	232.5	0.05	24.5	Nabesna River	09/29/89
1-WP-89-2	0.211	8.26	74.9	91.2	247.5	TRACE		"	"
1-WP-89-3	0.218	8.34	76.3	91.2	237.5	"		"	"
2-WP-89-1	0.325	8.43	97.9	159.5	66.0	TRACE	30.0	Stuver Creek	09/08/89
2-WP-89-2	0.325	8.45	98.5	166.8	55.1	"		"	"
2-WP-89-3	0.327	8.50	98.2	168.4	55.5	"		"	"
3-WP-89-1	0.244	8.29	62.9	118.0	0.55	NONE	1.0	Alder Creek	"
3-WP-89-2	0.248	8.29	62.9	118.0	0.26	"		"	"
3-WP-89-3	0.253	8.28	63.2	117.8	0.50	"		"	"
4-WP-89-1	0.201	8.34	89.3	106.4	2145	0.5	1300	Chisana River	"
4-WP-89-2	0.201	8.36	90.3	109.2	1900			"	"
4-WP-89-3	0.201	8.41	88.1	109.6	1995	0.7		"	"
5-WP-89-1	0.310	7.84	116	157.6	5.5	NONE	0.0	Mirror Creek	09/27/89
5-WP-89-2	0.309	7.89	126.2	158.4	2.1	"		"	"
5-WP-89-3	0.312	7.77	123	158.8	2.0	"		"	"
6-WP-89-1	0.1929	7.95	82.4	92.0	4.20	"	0.0	Scottie Creek	09/21/89
6-WP-89-2	0.1927	7.98	82.6	94.8	2.93	"	2.0	"	"
6-WP-89-3	0.1935	7.95	82.6	96.3	3.70	"	0.0	"	"
7-WP-89-1	0.1994	7.53	60.3	95.6	2.00	"	2.5	Desper Creek	"
7-WP-89-2	0.1992	7.52	60.5	94.0	1.50	"		"	"
7-WP-89-3	0.1993	7.57	60.4	95.6	1.38	"		"	"
8-WP-89-1	0.1100	7.59	47.0	54.8	2.80	"	0.0	Gardiner Creek	"
8-WP-89-2	0.1098	7.56	47.5	54.4	2.78	"		"	"
8-WP-89-3	0.1094	7.54	47.3	56.0	2.90	"		"	"
9-WP-89-1	0.236	8.27	100.2	113.6	375	TRACE	142	Moose Creek	09/14/89
9-WP-89-2	0.234	8.29	100.0	115.2	330	"		"	"
9-WP-89-3	0.234	8.25	100.0	115.6	335	"		"	"
11-WP-89-1	0.256	8.42	98.4	133.6	0.62	NONE	0.0	Upper Cheslina	09/29/89
11-WP-89-2	0.260	8.63	98.1	128.8	0.51	"		"	"
11-WP-89-3	0.265	8.48	97.9	131.6	0.31	"		"	"
12-WP-89-1	0.258	8.48	98.8	130.0	0.85	"	0.0	Lower Cheslina	"
12-WP-89-2	0.266	8.30	99.1	133.2	0.69	"		"	"
12-WP-89-3	0.266	8.26	100	132.4	0.47	"		"	"
13-WP-89-1	0.260	7.76	100	120.0	275.0	0.1	168	Tanana River	09/27/89
13-WP-89-2	0.263	7.71	98	119.6	212.5	0.1		"	"
13-WP-89-3	0.262	7.68	102	120.8	220.0	0.1		"	"

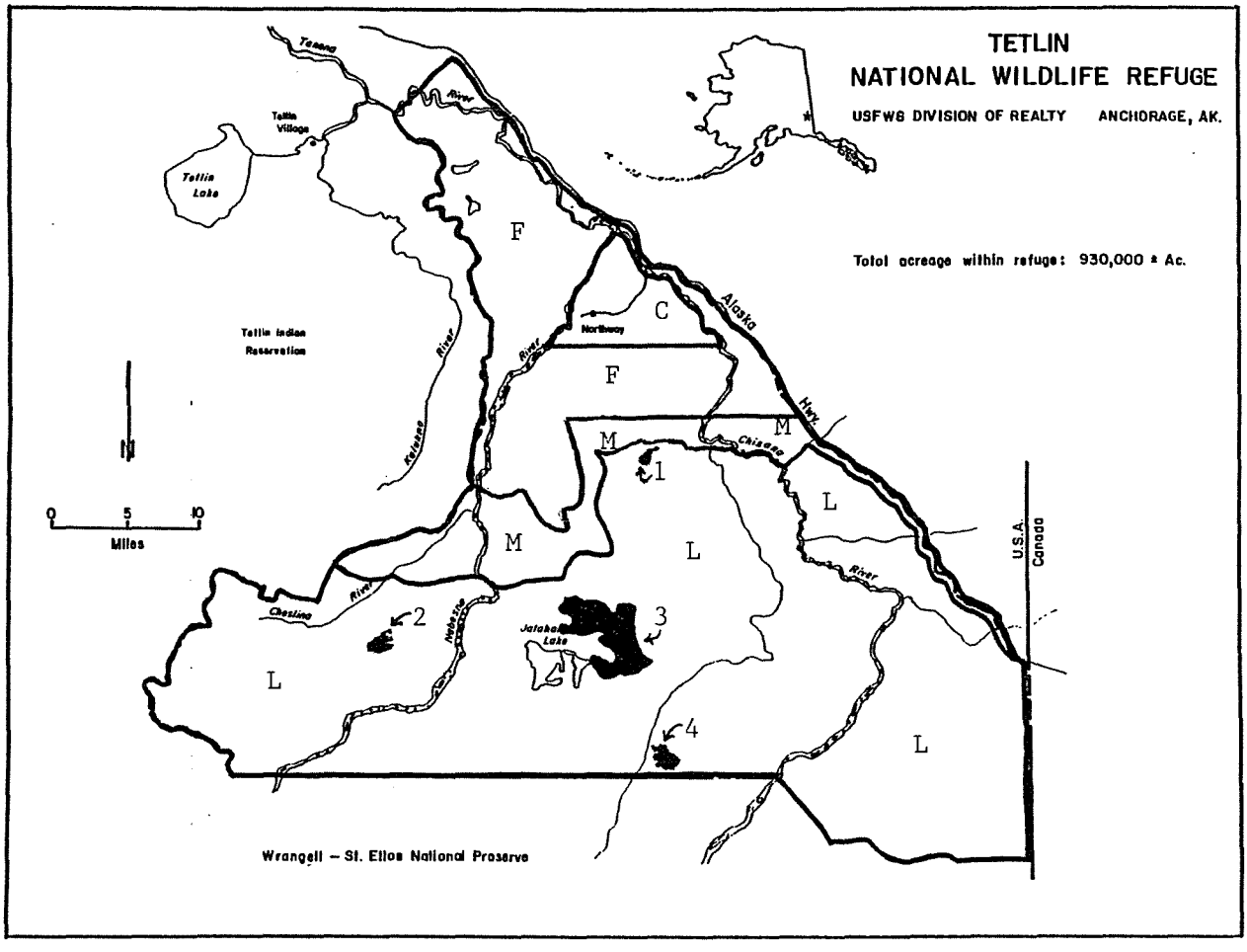
9. Fire Management.

Wildfire Activities.

Wildfire management activities on the refuge continue to take place within the scope of the Fortymile Interagency Fire Management Plan. This is one of fourteen interagency plans which cover all of the fire-prone acreage in Alaska. These plans provide for a range of suppression responses to wildfires. The plans specify which areas receive which type of response.

There are four designated response zones--critical, full, modified and limited. Inhabited and developed areas are designated as critical response zones and receive the highest priority of protection from wildfires. Undeveloped privately owned lands and areas with high resource values that require fire protection are designated as full response zones and also receive aggressive suppression action. Modified response zones serve as buffers between full response and limited response zones. Fires occurring in modified response zones may only receive low intensity suppression action such as indirect attack. After a designated date late in the fire season each year, modified response zones normally convert to limited response. Remote areas where values at risk do not justify the expense of aggressive suppression or where fire has been identified as a benefit by the land manager (such as wildlife habitat enhancement or maintenance of a natural vegetation mosaic) are designated as limited response zones. Fires in these zones may only receive a monitoring response. A monitoring response is appropriate only as long as the fire in question does not threaten to encroach into higher priority areas or does not cause major smoke problems. Monitoring is considered a suppression response. Monitoring activities include detailed mapping of the fire perimeter, mapping of fire fuels in the path of the fire, measuring and describing current fire behavior, developing predictions of fire behavior and fire spread based on observed and predicted weather, identification of any resources which may potentially be threatened by the fire, and providing recommendations for future action. Approximately one half of the refuge is designated as limited response. A map showing actual designations is presented in Figure 2.

Figure 2. Map showing suppression response zones, wildfires, and prescribed burns discussed in this section.



KEY: [1]Tsolmund Lake Prescribed Burn (1986,1988)

[2]Trail Lake Prescribed Burn (1989)

[3]Kennebec Burn (1982)

[4]Stuver Creek Burn (1989)

C--Critical Response Zone

F--Full Response Zone

M--Modified Response Zone

L--Limited Response Zone

In Alaska, the Bureau of Land Management has been given authority to provide suppression services for wildfires occurring on Department of Interior lands per 910 DM Chapter 3. The Bureau of Land Management, Alaska Fire Service basically serves as a fire department for the Bureau of Land Management, Bureau of Indian Affairs, Fish & Wildlife Service, and National Park Service. Land managers retain the ultimate responsibility for all fire management activities occurring on their respective lands. This approach reduces duplication and redundancy of suppression resources. The State of Alaska has entered into a cooperative agreement with Bureau of Land Management to provide suppression services for some federal lands in Alaska in exchange for Bureau protection of some state lands. This aligns protection services with locations of state and federal suppression resources such as field stations and headquarters. Tetlin National Wildlife Refuge is in one of the areas for which the State of Alaska provides fire suppression services. This arrangement requires close cooperation between the refuge, the State of Alaska and the Alaska Fire Service. It works largely due to the successful development of the Interagency Fire Management Plans, and involvement by a Multi-Agency Command Group during critical periods of the fire season.

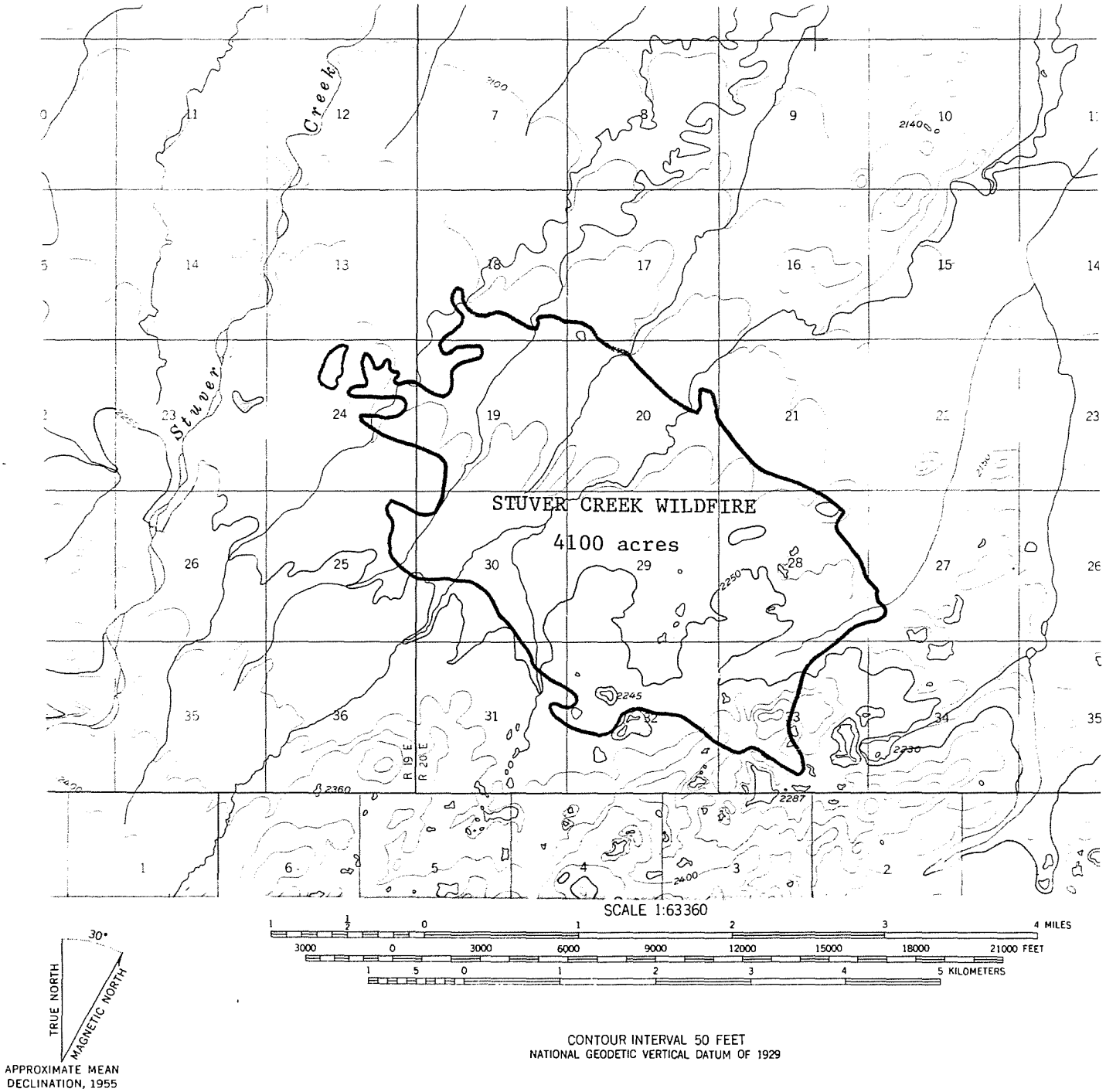
Despite dry conditions through June, July and much of August, only two wildfires occurred on the refuge during the 1989 fire season. Lightning activity was minimal. Quite often, cumulus clouds started building on the refuge then moved to the east into Canada before they started producing lightning.

A lightning storm which passed over the refuge on July 10 did start one fire just south of Stuver Creek in the remote south central portion of the refuge. This fire was located well within a limited suppression response zone. Dry fuels and windy conditions resulted in the fire spreading to over 3000 acres in the ensuing three days. By the end of July, the Stuver Creek Fire had grown to 4100 acres. FMO Vanderlinden periodically monitored and mapped this fire throughout the rest of the summer. The fire continued to smolder until it was officially declared out September 20, but did not undergo any additional increases in acreage. The Stuver Creek Fire clearly underscored the positive aspects of Interagency Fire Management Plans in effect in Alaska. Monitoring costs of this fire totalled $3,500. A conservative estimate of initial attack costs on this fire would have exceeded that amount tenfold. In addition, the fire left many unburned inclusions and burned with varying degrees of intensity in open black spruce forests, providing an excellent opportunity for wildlife habitat enhancement in an area that hadn't burned for many years.

An aerial view of the Stuver Creek Fire the day after it was started by lightning.
7/89, TNWR 89-15, WKB

One man-caused fire occurred within refuge boundaries on September 6 which was suppressed by State Division of Forestry personnel. This 1/4 acre fire was located on a native allotment along Moose Creek in the vicinity of Northway. Since the fire was located in a full suppression zone, aggressive suppression action was initiated.

Figure 3. Map showing the perimeter of the Stuver Creek Fire.



Prescribed Fire Activities

Prescribed Burn Plans were prepared and approved for four prescribed burns in 1989: the Mile 1243 Prescribed Burn, the Tsolmund Lake Blackline Prescribed Burn, the Tahamund Waterfowl Habitat Enhancement Prescribed Burn, and the Trail Lake Prescribed Burn. The Trail Lake Prescribed Burn was the only one accomplished.

The Mile 1243 Prescribed Burn Plan was carried over from 1988. The objective of this 8 acre burn was to provide a roadside interpretive opportunity for visitors to the refuge to better understand the beneficial effects and uses of fire on the refuge. This burn was not ignited because prescription criteria were not met early in the year and personnel required to accomplish the burn later in the year were not available.

The Tsolmund Lake Blackline Prescribed Burn is part of a project that has been underway since 1986. The objective of this 1700 acre burn is to continue the firebreak blackline work accomplished in 1986 and 1988 (1600 acres previously burned) to reduce the likelihood of fire starts which occur in the southern limited and modified suppression response areas of the refuge from spreading into full and critical suppression response areas in the northern portion of the refuge. This burn was not carried out because the burn boss was occupied with other fire activities.

The Tahamund Waterfowl Habitat Enhancement Prescribed Burn Plan was prepared in 1989. The purpose of this burn was to provide improvements to waterfowl habitat by removing dead graminoids in dry lake beds and along lake margins to increase vegetative production of new shoots utilized by waterfowl, recycle nutrients, and open up areas on or adjacent to waterbodies where dead graminoid vegetation is accumulating. This 600 acre burn was not accomplished because fuel moisture prescription criteria were not met.

The Trail Lake Prescribed Burn Plan was prepared in 1989. The purpose of this 3,600 acre burn was to enhance wildlife habitat and increase ecological diversity by allowing fire to set back successional stages of black spruce, remove dead and decadent vegetation, further develop the vegetation mosaic present, and increase vegetative growth and diversity. Prescription criteria were met on July 21, and Unit 1 of this burn was ignited on July 21. 150 acres were initially burned.

Are we having fun yet?? Fire Management Officer Vanderlinden and Biological Technician Peter Butteri igniting the Trail Lake Prescribed Burn. 7-89, TNWR 89-16, WKB

A lakeside view of the Trail Lake Prescribed Burn. 7-89, TNWR 89-17, LAV

Drip torches are the most common firing tool utilized on the refuge.
7/89, TNWR 89-18, WKB

The Trail Lake prescribed burn was located in a remote area of the refuge within a limited suppression response zone and surrounded by natural barriers, so it was allowed to continue to smolder and grow in size with daily monitoring. 300 acres had been burned by August 5.

Concentrations of deadfall in the White Spruce/Black Spruce Woodland portions of the burn produced high fire intensities during ignition which ultimately exposed mineral soil. 7-89, TNWR 89-19, LAV

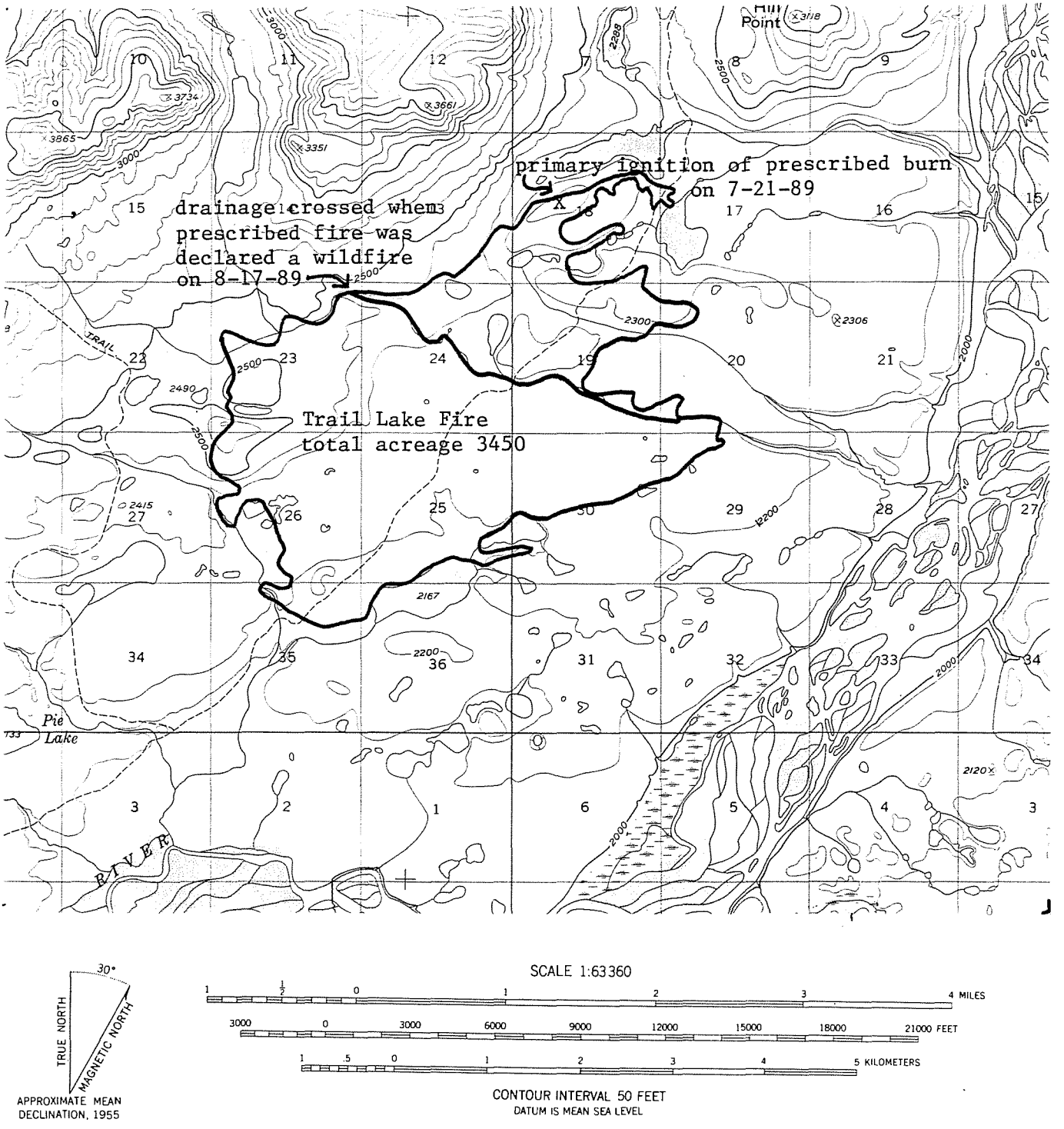
The cumulative effect of a week of unusually warm and dry weather resulted in a significant flareup on August 17. The burn unexpectedly exceeded the prescription delineated in the plan by jumping a creek used as a burn boundary, and had to be declared an escaped fire that evening. By August 18, the total fire size was 3400 acres, of which 750 were within the prescribed burn boundary.

A stunning view of the Trail Lake Prescribed Burn on August 18 from Jatahmund Lake. This was a textbook example on a very dry no-wind day when the power of a fire overrode environmental conditions resulting in unpredictable and erratic fire behavior. 8-89, TNWR 89-20, LAV

An Escaped Fire Situation Analysis (EFSA) was prepared by the Refuge Fire Management Officer. Since the fire was well within a limited suppression response zone and posed no immediate threats to any permitted cabins, inholdings or adjacent landowners, a monitoring response was initiated as determined in the EFSA. Some hotspot work was performed by Vanderlinden, Butteri and Butteri to limit spread of the fire on one flank in late August. No subsequent significant increases in acreage resulted. The Trail Lake Fire was declared out on October 18 at 3400 acres after a series of snowstorms squelched the few lingering smokes. The total cost of this fire for ignition, monitoring and suppression activities, was $5,600. While embarrassed by having to declare a prescribed burn an escaped fire, FMO Vanderlinden was nonetheless pleased with the results of the burn.

FMO Vanderlinden contemplating his options on the dock at Jatahmund Lake during the evening of August 18, when the Trail Lake Prescribed Burn exceeded it's prescription. 8-89, TNWR 89-21, WKB

Figure 4. Map showing the final perimeter of the Trail Lake Fire and prescribed burn boundary that was compromised.



Fire Effects Studies

Fire effects studies which continued or were initiated in 1989 included fire effects data collection on the Kennebec wildfire, which has been ongoing since 1982, fire effects data collection on the Tsolmund Lake Prescribed Burn site (burned in 1988), and pre-fire and post-fire data collection on the Trail Lake Prescribed Burn site (burned in 1989).

Kennebec Burn Studies. Most of the data collection on the Kennebec Burn, including vegetation response, photo points, small mammal trend plots, passerine bird survey, soil slippage and water quality, is now on a three year cycle and comes up next in 1990. Winter track counts and a moose survey within the burn are done annually. Furbearer utilization of the burn area is of the most interest regarding data on winter track counts, since trapping is an important subsistence activity on the refuge, and subsistence opportunities are mandated by law to be provided on the refuge.

WB Doyle investigating a set of marten tracks during a track count on the Kennebec Burn black spruce transect.
3/30/89, TNWR 89-22, LAV.

Winter track counts were accomplished on burned and unburned transects in three different vegetation types in early winter, mid-winter and late winter. Results are presented in the tables which follow. Each transect consists of ten 0.1 mile segments totalling one mile. Burned and unburned transects for each vegetation type intersect at the burn perimeter and generally run perpendicular to it.

Table 6. Early winter track counts from the Kennebec Fire Study Furbearer transects in 1988-89.

Species	11-21-88 Black Spruce		12-5-88 Mixed Forest		12-6-88 Tundra	
	unburned	burned	unburned	burned	unburned	burned
Wolf	0	0	0	0	1	0
Lynx	2	0	1	3	0	1
Fox	2	2	0	0	5	1
Wolverine	0	0	0	0	0	0
Marten	1	0	1	0	1	1
Otter	0	0	0	0	0	0
Mink	0	0	0	0	0	0
Short-tailed Weasel	11	5	1	2	2	2
Least Weasel	1	0	0	0	0	0
Snowshoe Hare	138	59	83	68	34	8
" (trails)	(104)	(34)	(89)	(129)	(53)	(16)
Red Squirrel	0	0	3	3	0	0
" (trails)	(5)	(0)	(3)	(2)	(0)	(0)
Microtines, Shrews	8	9	5	4	8	70
" (trails)	(0)	(0)	(1)	(0)	(0)	(0)
Grouse	5	28	0	1	10	2
" (trails)	(0)	(0)	(0)	(0)	(0)	(0)

Table 7. Mid-winter track counts from the Kennebec Fire Study Furbearer transects in 1988-89.

Species	2-15-89 Black Spruce		2-16-89 Mixed Forest		2-17-89 Tundra	
	unburned	burned	unburned	burned	unburned	burned
Wolf	0	0	1	0	0	0
Lynx	0	0	6	14	0	0
Fox	0	0	0	2	3	4
Wolverine	0	0	0	0	0	0
Marten	0	0	0	1	0	0
Otter	0	0	0	0	0	0
Mink	0	0	0	0	0	0
Short-tailed Weasel	0	5	7	3	0	0
Least Weasel	0	0	0	0	0	0
Snowshoe Hare	67	5	209	163	25	4
" (trails)	(16)	(6)	(92)	(109)	(22)	(5)
Red Squirrel	17	0	22	19	0	0
" (trails)	(6)	(0)	(0)	(3)	(0)	(0)
Microtines, Shrews	9	1	2	11	14	0
" (trails)	(1)	(0)	(0)	(0)	(0)	(0)
Grouse	0	0	0	0	8	22
" (trails)	(0)	(0)	(0)	(0)	(0)	(2)

Table 8. Late winter track counts from the Kennebec Fire Study Furbearer transects in 1988-89.

Species	3-29-89 Black Spruce		3-29-89 Mixed Forest		3-29-89 Tundra	
	unburned	burned	unburned	burned	unburned	burned
Wolf	0	0	0	0	0	1
Lynx	0	0	3	3	0	0
Fox	0	4	0	1	10	7
Wolverine	0	0	0	0	0	0
Marten	4	0	0	0	0	0
Otter	0	0	0	0	0	0
Mink	0	0	0	0	0	0
Short-tailed Weasel	2	1	0	2	0	0
Least Weasel	1	4	0	0	0	0
Snowshoe Hare	48	14	98	86	34	7
" (trails)	(26)	(5)	(59)	(36)	(13)	(1)
Red Squirrel	9	0	23	0	1	0
" (trails)	(0)	(0)	(4)	(2)	(0)	(0)
Microtines, Shrews	5	2	7	6	8	6
" (trails)	(0)	(0)	(0)	(1)	(0)	(0)
Grouse	0	0	0	1	5	12
" (trails)	(0)	(0)	(0)	(0)	(0)	(2)

The aerial moose survey of the entire Kennebec Burn area, normally completed in October, was not accomplished in 1989 due to weather and aircraft scheduling problems. Past surveys from 1982-1988 indicate the area including the burn does not appear to be significantly utilized by moose in October and November, primarily because the area is isolated from traditional rutting areas where bulls and cows are congregated at that time of the year. In 1990, an aerial survey for moose in the Kennebec Burn will be performed once a month from October through March to determine when moose utilize the burn area most during the winter period. Future survey timing will be adjusted based on that finding.

Tsolmund Lake Burn Studies. The studies underway on the Tsolmund Lake Burn are for the most part associated with monitoring requirements to determine if burn objectives were met. Vegetation composition data was collected from two transects established before the 1988 ignition of the burn. Post-burn data was collected in 1989 on these transects and will continue in subsequent years. The acreage burned thusfar on the Tsolmund Lake Burn has been of light to moderate intensity. Seeds and root systems of many herbaceous plants and shrubs survived intact, resulting in fairly rapid vegetative regeneration in the burned areas.

Trail Lake Burn Studies. The studies underway on the Trail Lake Burn are also associated with monitoring requirements to determine if burn objectives were met. Vegetation composition data were collected on three transects established before the burn was initiated in 1989. The burn did not reach two of the transects. Initial post-burn data was collected on the transect that was burned. The burn intensity ranged from light to moderate over most of the burn area to severe in some isolated pockets.

A comparison of pre-fire and post-fire vegetation composition is presented in Table 9 for transects on the Trail Lake Burn and Tsolmund Lake burn.

Biological Technicians Peter and Elisa Butteri tallying post-fire vegetation composition data on the Tsolmund Lake Prescribed Fire Site. This unit was burned in 1988. The low intensity of the burn readily killed black spruce but allowed for rapid regeneration of sedge tussocks. Shrub birch and willow are also coming back quickly. 7-89, TNWR 89-23, LAV

Table 9. Pre-fire and post-fire occurrence of plants on three prescribed burn vegetation transects.

PLANT SPECIES year sampled>	Black Spruce Woodland[1] 88 -	Black Spruce Woodland[1] 89 +	Open Low Mixed Shrub Tussock Tundra[2] 88 -	Open Low Mixed Shrub Tussock Tundra[2] 89 +	Open Mixed Broadleaf/ Needleleaf Forest[3] 89 -	Open Mixed Broadleaf/ Needleleaf Forest[3] 89 +
Cyperaceae spp	X		X	X		
Equisetum arvense	X			X		
Equisetum pratense					X	
Feathermosses (Hylocomium spp)	X	X	X	X	X	
Geocaulon lividum	X	X			X	
Goodyera repens					X	
Gramineae spp	X	X	X	X	X	X
Lichens (Cladonia spp)	X		X		X	
Mertensia paniculata					X	X
Pedicularis labradorica				X		
Potentilla fruticosa			X	X		
Pyrola graniflora			X			
Pyrola secunda	X			X	X	
Alnus crispa					X	
Andromeda polifolia				X		
Arctostaphylos rubra	X	X	X	X		
Arctostaphylos uva-ursi	X	X	X	X		
Betula glandulosa			X	X		
Betula nana			X			
Chamaedaphne calyculata	X		X			
Empetrum nigrum	X		X		X	
Ledum decumbens	X	X	X	X		
Ledum groenlandicum	X	X	X	X	X	X
Linnea borealis					X	X
Rosa acicularis	X	X			X	X
Rubus chamaemorus	X	X	X	X		
Salix spp	X	X	X	X	X	X
Vaccinium oxycoccos	X		X			
Vaccinium uliginosum	X		X	X		
Vaccinium vitus-idaea	X		X	X	X	
Viburnum edule					X	
Betula paprifica	X		X	X	X	
Picea glauca					X	
Picea mariana	X		X		X	

KEY (-) indicates pre-fire occurrence
(+) indicates post-fire occurrence
"Occurrence" means new live growth present

[1]Tsolmund Lake Prescribed Burn--transect burned in 1988
[2]Tsolmund Lake Prescribed Burn--transect burned in 1988
[3]Trail Lake Prescribed Burn--transect burned in 1989

Biological Technicians Peter and Elisa Butteri locating a sampling point on the Trail Lake Prescribed Burn. Photo 89-19 on page 34 was taken in the same area during the burn. A windstorm in August leveled many of the shallow-rooted white spruce that were burned on this south-facing slope.
9-89, TNWR 89-24, LAV

Willow shoots sprouted from roots that survived in the Trail Lake Prescribed Burn only six weeks after this particular area was burned. 9-89, TNWR 89-25, LAV

Unburned inclusions and ragged perimeters commonly occurring on wildfires and prescribed fires in Alaska promote habitat diversity and enhance the "edge effect". 9-89, TNWR 89-26, LAV

G. WILDLIFE

1. Wildlife Diversity

More than 170 species of birds use the refuge (see enclosed bird list) as well as 44 species of mammals, 15 species of fish, and one species of amphibian (wood frog). No reptiles are found on the refuge. The location of the refuge places it at the northern range of a number of bird species not found in other areas of Alaska. In addition the refuge is located in the main migration path of birds entering and leaving from the interior part of the state. In contrast, the extreme winter weather sends most birds winging south leaving only about 25 resident avian species.

2. Endangered and Threatened Species

There is only one endangered species found on the refuge, the American peregrine falcon (Falco peregrinus anatum). While peregrines are not known to nest on the refuge, they do feed on the refuge during migration. A peregrine falcon was seen in the Northway area on September 22 by Refuge Manager Breeser, Assistant Manager Oliveira, and Biologist Doyle.

The two woodland bison that appeared along the Alaska highway during the summer of 1988 continued to frequent the highway between Tok and the Canada border. However, what was at first a novelty became a nuisance when the 2 male bison began knocking over buildings, killing dogs, and running cars off the road. Of the various alternatives considered the most palatable seemed to be for the Canadians to come up and take their bison back! So on May 4, refuge staff, together with personnel from the Alaska Departments of Fish & Game and Transportation, and the Yukon Territory Department of Natural Resources, took part in the first (and hopefully last) Tetlin Refuge buffalo roundup. The two wood bison were darted, and after a considerable amount of tugging and pulling, loaded into a waiting horse trailer, and taken back to the area of their release in the Yukon Territory the following day. There has been no sign of them returning, yet.

The great Alaskan bison roundup took place when members of the Yukon Territory came up May 4 to tranquilize and haul the bison back to Canada. Here one of the tranquilized bison is examined and the radio collar replaced prior to loading in a horse trailer. 5/89, TNWR 89-27, WKB.

Phase two of the great Alaskan bison roundup was getting the bison in the horse trailer! After much pulling and tugging they both made it in. What's more amazing is that some time during the trip back to Canada the bison were able to switch places in the trailer!
5/89, TNWR 89-28, WKB.

The State of Alaska's threatened and endangered list includes 30 plant species. Although none of these have been identified on the refuge there are three which can be found within a 150 mile radius of the refuge. These are: Aster yukonensis, Smelowskia borealis villosa, and Thlaspi acticum.

During the year no active management was done for any of these animal or plant species.

3. Waterfowl

1989 was the earliest spring for waterfowl since the refuge was established. Not only was the habitat ready before the birds arrived, the birds also arrived early. Warm temperatures and little precipitation produced ideal conditions for waterfowl throughout the summer, unlike other parts of the state that experienced severe flooding during the nesting season.

This year was a transition year for the refuge waterfowl survey work. A final report was received by Lyman McDonald, a contracted biometrician from the University of Wyoming, reviewing the current waterfowl production work on refuges across the state and making recommendations for change to enhance these surveys. His primary recommendations included an increase in sample size and implementation of a randomized sample selection in order to obtain a more precise estimate of waterfowl productivity on the refuge.

A randomized sample of clusters of waterbodies was re-selected on the refuge with about half requiring the use of a helicopter for access. This type of random selection was considered unfeasible for the 1989 field season as we did not have the money for a helicopter. In addition all helicopters in the state were being used for the Exxon Valdez oil spill. Therefore we were limited to surveying areas accessible to a floatplane or boat.

An increase in sample size was made by selecting some clusters that had been surveyed in 1987 as part of an effort to further define waterfowl productivity strata on the refuge, and secondly from randomly selected clusters that were floatplane or boat accessible. Six additional clusters of waterbodies were chosen to increase the sample of lakes in each strata to that recommended in Lyman McDonald's report.

Several modifications were made to the existing survey in 1989. Minor modifications were made to the existing 11 clusters, excluding lakes that couldn't be walked around completely and walking completely around all remaining survey lakes. The final brood tally combines the July and August survey, eliminating duplicate broods and broods that moved onto the cluster since the first survey. While the elimination of duplicate broods was done previously, the elimination of broods moving onto the surveyed waterbodies significantly decreases the number of broods in the final tally. An estimate of the total number of young produced on the refuge is obtained using actual brood sizes and not by multiplying the average size of a class III brood by the number of breeding pairs estimated to have produced a brood as used previously. Brood size of broody hens was not determined as it had been previously from a table of standard sizes. Finally, for population estimation purposes, areas of waterbodies were estimated using the software ARC/INFO.

In addition a decision was made to forgo the June breeding pair survey in favor of a third brood survey occurring midway between the normal early and late survey. The results of this third survey would help determine if it is feasible to conduct one survey to depict brood production accurately.

The refuge staff conducted an on ground brood survey on 189 waterbodies in 17 clusters distributed across the refuge. This years count was conducted from June 28 to August 11.

Ten clusters of lakes have been surveyed each year since 1983. The trend in number of duck broods produced on these lakes is given in Table 10. In 1989 the number of broods counted on these 10 clusters increased 70% from 1988 and 36% from the 6 year average. Dabbler broods remained about the same as average but increased 42% from 1988. Green-winged teal, northern shoveler and American wigeon were down from the long term average. Divers were up 87% from 1988 and up 67% from the 6 year average. All diver/sea duck species, except bufflehead, were up from both 1988 and the 6 year average. Ring-necked ducks, surf scoters and white-winged scoters showed especially high productivity in 1989.

Over 34,000 ducklings were estimated to have been produced on the Tetlin NWR in 1989 (Table 11). This estimate is the highest on record, up 79% from 1988 and 44% from the 6 year average. Divers made up most of the increase. All diver/sea duck species were up significantly from both 1988 and the long term average. Dabblers did not fare so well. All dabblers except northern pintail were down from 1988 and all were down from the long term average. This trend is somewhat different from that on 10 clusters.

While 1989 had the lower coefficients of variation overall compared to other years they weren't nearly as low as hoped considering the number of lakes sampled increased by 75%. In many cases lower coefficients of variation were achieved for species on years with nearly half the survey intensity. Thus it seems that the precision of the estimate is severely influenced by the distribution of birds in a given year. Based on Lyman McDonald's simulation of 1988 data, the coefficient of variation of total dabbler broods for 17 clusters of 11 waterbodies should be 23.3 in actuality it was 25.1. For divers the predicted coefficient of variation was 21.8 and the actual 33.1.

A detailed report on the duck production work is available from the refuge.

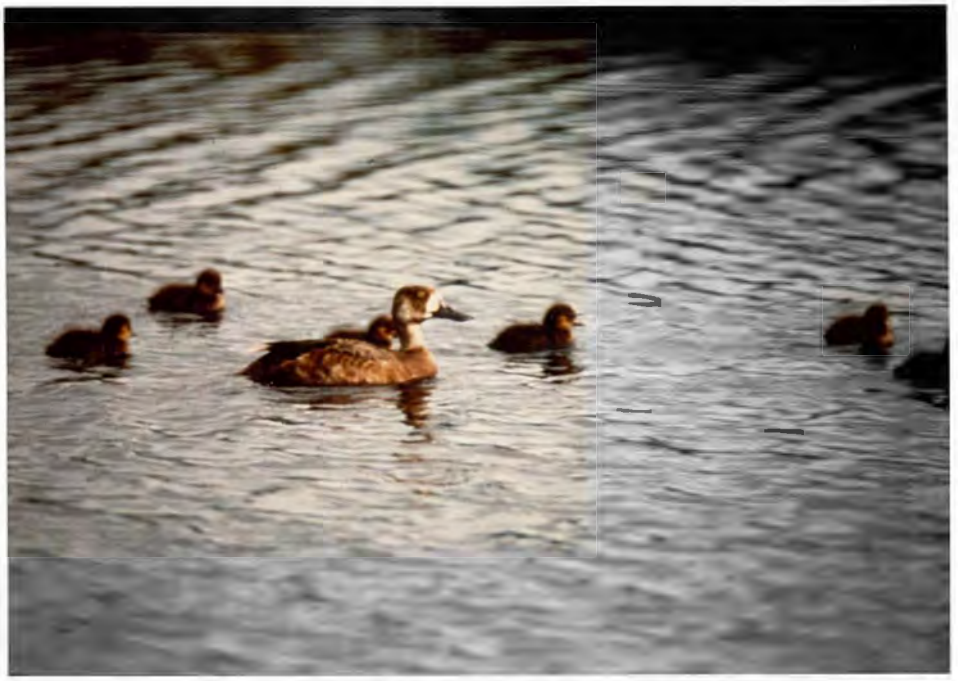
WB Doyle presented 2 papers on duck production work at the Alaska Bird Conference and Workshop held March 20-22, 1989 in Fairbanks Alaska. The papers were entitled "The use of one versus two brood surveys to estimate duck brood production in Alaska" and "Logistical and statistical efficiency of brood production surveys conducted by the U.S. Fish and Wildlife Service in Alaska".

Table 10: Number of broods tallied on 10 clusters, Tetlin NWR, Alaska, 1983-1989. Tallied broods are the reconciled results of a July survey for dabblers and an August survey to maximize for diver broods. Any broods that might be duplicate, or moved onto the cluster after the first survey, are deleted. Broods on lakes not surveyed in 1989 were deleted from prior years.

Species	1983	1984	1985	1986	1987	1988	Average 1983-88	1989	% change from ave	% change from 1988
Green-winged teal	19	4	13	19	16	9	13.3	11	-17.5	22.2
Mallard	13	13	6	5	6	7	8.3	11	32.0	57.1
Northern pintail	5	2	1	10	5	1	4.0	5	25.0	400.0
Blue-winged teal	0	1	2	0	0	0	0.5	0	-100.0	0.0
Northern shoveler	0	3	0	2	2	0	1.2	1	-14.3	INF
American wigeon	10	17	4	19	9	9	11.3	9	-20.6	0.0
Total dabblers	47	40	26	55	38	26	38.7	37	-4.3	42.3
Canvasback	5	8	1	3	1	4	3.7	5	36.4	25.0
Ring-necked duck	11	3	10	2	4	2	5.3	17	218.8	750.0
Scaup spp.	25	17	28	15	10	20	19.2	30	56.5	50.0
Surf scoter	0	0	0	0	0	4	0.7	7	950.0	75.0
White-winged scoter	12	4	7	8	3	4	6.3	11	73.7	175.0
Scoter spp.	0	0	0	0	5	0	0.8	2	140.0	INF
Goldeneye spp.	4	2	3	1	5	4	3.2	4	26.3	0.0
Bufflehead	15	13	10	11	11	7	11.2	8	-28.4	14.3
Total divers	72	47	59	40	39	45	50.3	84	66.9	86.7
Total ducks	119	87	85	95	77	71	89.0	121	36.0	70.4

Table 11. Estimated number of ducklings produced, and coefficient of variation (CV), on the Tetlin NWR, 1983-1989. Calculations based on an unstratified cluster sample. Brood counts based on an early count timed to maximize number of dabbler broods and a late survey timed to maximize number of diver broods. Counts are reconciled to eliminate duplicate broods and broods moving onto sample waterbodies after the early survey.

Species	1983	1984	1985	1986	1987	1988	Average 1982-88	1989	% change from ave	% change from 1988
Green-winged teal	3147 (53.8)	2163 (49.5)	2675 (49.4)	3894 (48.7)	3928 (31.1)	2477 (38.3)	3047.3	2329 (30.2)	-23.6	-6.0
Mallard	3186 (45.3)	2635 (50.0)	826 (54.0)	1377 (42.7)	1486 (54.7)	1274 (52.8)	1797.3	1191 (54.1)	-33.7	-6.5
Northern pintail	1377 (58.6)	118 (79.5)	197 (102.3)	3894 (46.2)	1168 (42.7)	672 (76.9)	1237.7	873 (46.5)	-29.5	29.9
Blue-winged teal		747 (60.2)	0	0	248 (81.3)	0	165.8	0	-100.0	0.0
Northern shoveler	79 (102.3)	629 (64.0)	708 (102.3)	1219 (83.3)	1238 (88.4)	0	645.5	26 (100.5)	-96.0	INF
American wigeon	2911 (52.1)	4523 (44.1)	1534 (75.1)	4641 (58.6)	2371 (49.4)	2937 (39.6)	3152.8	2144 (34.6)	-32.0	-27.0
Total dabblers	10700 (44.6)	10815 (41.2)	5940 (54.8)	15025 (43.4)	10439 (44.9)	7360 (34.8)	10046.5	6563 (25.1)	-34.7	-10.8
Canvasback	1259 (65.9)	2360 (84.5)	236 (88.8)	551 (56.9)	106 (101.7)	495 (101.7)	834.5	1641 (104.9)	96.6	231.5
Ring-necked duck	3658 (37.4)	1062 (79.7)	2675 (63.0)	433 (75.9)	1097 (59.5)	212 (88.7)	1522.8	5240 (26.5)	244.1	2371.7
Scaup spp.	8142 (51.7)	4483 (37.6)	10541 (67.5)	4720 (55.6)	4034 (37.6)	6511 (53.8)	6405.2	11725 (40.3)	83.1	80.1
Surf scoter	0	79 (102.3)	0	0	0	1026 (73.3)	184.2	1085 (56.7)	489.1	5.8
White-winged scoter	3147 (34.4)	708 (51.0)	1573 (60.8)	2989 (34.8)	495 (73.1)	1345 (57.1)	1709.5	3546 (76.1)	107.4	163.6
Scoter spp.	0	0	0	0	778 (103.5)	0	129.7	159 (99.5)		INF
Goldeneye spp.	1141 (106.2)	669 (66.3)	393 (56.2)	197 (102.3)	1628 (32.0)	566 (60.4)	765.7	1905 (39.5)	148.8	236.6
Bufflehead	3579 (54.5)	2242 (80.9)	1298 (62.2)	2163 (63.7)	1628 (37.0)	1451 (43.4)	2060.2	2143 (32.3)	4.0	47.7
Ruddy duck	39 (102.3)	0	0	0	0	0	6.5	0	-100.0	0.0
Total diver/seaduck	20965 (42.3)	11603 (41.4)	16716 (58.0)	11053 (37.5)	9766 (25.3)	11606 (41.1)	13618.2	27444 (33.1)	101.5	136.5
Total ducklings	31665 (40.4)	22418 (39.1)	22656 (55.6)	26078 (38.8)	20205 (31.4)	18966 (35.1)	23664.7	34007 (29.4)	43.7	79.3



Scaup are the most abundant breeding duck on the Tetlin refuge. In 1989 the estimated production was 11,725. 8/86, TNWR 89-29, RLB.

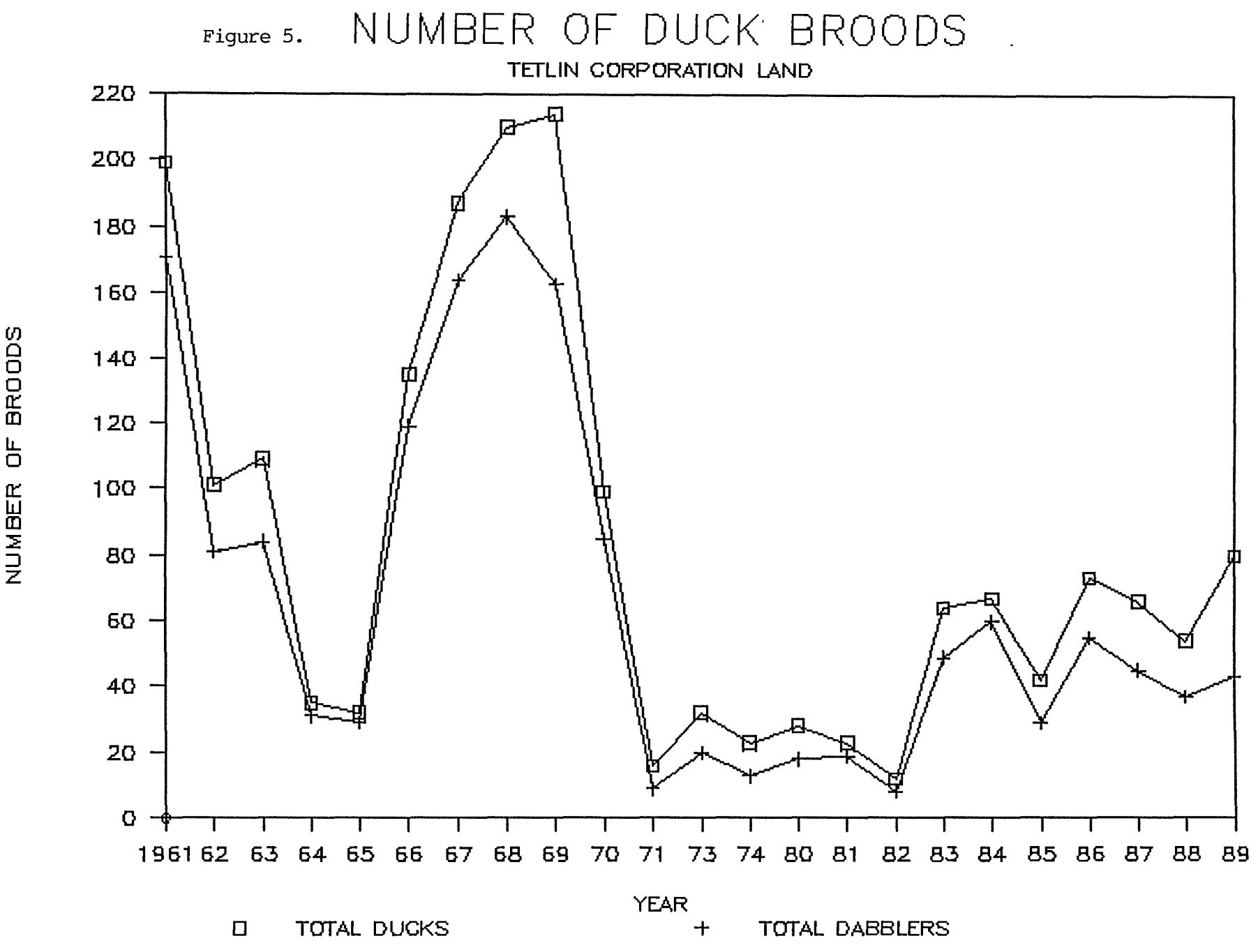
Four lakes located near Tetlin Village have been surveyed for broods in 23 of 29 years since 1961. These counts are conducted on or about July 15 of each year and therefore are orientated towards dabblers. Butterfly, Island and Old Albert Lakes are canoed around while Gasoline Lake is walked. The Migratory Birds office conducted the survey through 1985 but because of declining budgets were unable to continue. Since 1986 refuge staff have taken over the responsibility of surveying the lakes.

The annual duck brood count on Dathlalmund (Butterfly), Gasoline, Island and Old Albert lakes, was conducted on July 17 by Biologist Doyle and Manager Breeser. This years brood count was the highest since 1970 (Table 12). The high count can be attributed to the high proportion of diver broods this year (Figure 5). Diving duck broods made up 45 percent of the total count, the highest proportion ever recorded. Diving ducks typically nest later than dabbling duck species; but because of the early spring they have nested earlier than in most years. Because this survey is done on or about July 15 each year the early nesting divers are better represented this year than in others. The dabbling duck broods are up from 1988 but remain about the same as the 10 year average.

Table 12 Number of broods counted on Dathlalmund, Gasoline, Island, and Old Albert Lakes, from 1961 to 1989 Tetlin Corporation Land, Alaska.

Species	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	Average (n=28)	1989	% change from ave	% change from 1988
Green-winged teal	42	30	27	19	16	66	101	103	85	44	4		8	10						9	12	3	20	22	15	30	29	18	22.9	19	-17.0	5.6
Mallard	34	14	23	2	3	9	13	13	10	12	2		3							1	1	2	4	2	3	2	5	4	4.1	6	47.4	50.0
Northern pintail	19	18	11	4	3	8	21	21	17	12	1		2							2		1	7	11	1	4	4	3	4.8	4	-15.8	33.3
Northern shoveler	2	1					1	7	4	6	2									0			4	6	2	7	3	1	1.5	3	95.3	200.0
Gadwall																				0								2	0.1		-100.0	-100.0
American wigeon	74	18	23	6	7	36	28	39	47	11			7	3						6	6	2	14	19	6	12	4	9	10.2	11	8.1	22.2
Unidentified dabbler																									2				0.1		-100.0	INF
Total dabblers	171	81	84	31	29	119	164	183	163	85	9		20	13						18	19	8	49	60	29	55	45	37	43.6	43	-1.3	16.2
Canvasback	14	18	14	2	3	6	9	16	7	12	6		8	9						6	1	4	4	2	3	3	2	1	4.2	9	113.6	800.0
Lesser/greater scaup	14	2	11	2		10	14	11	44	2	1		4	1						4	3		11	5	4	6	6	4	5.1	10	95.8	150.0
White-winged scoter																										0	0	1	0.0	1	2700.0	0.0
Goldeneye spp.																										2	0	2	0.1	4	2700.0	100.0
Bufflehead																									6	7	13	9	1.3	12	860.0	33.3
Total divers/sea ducks	28	20	25	4	3	16	23	27	51	14	7		12	10						10	4	4	15	7	13	18	21	17	10.8	36	234.9	111.8
Unidentified duck																														1	INF	INF
Total ducks	199	101	109	35	32	135	187	210	214	99	16		32	23						28	23	12	64	67	42	73	66	54	54.3	80	47.3	48.1

Figure 5.


NUMBER OF DUCK BROODS
TETLIN CORPORATION LAND
NUMBER OF BROODS
220
200
180
160
140
120
100
80
60
40
20
0
1961 62 63 64 65 66 67 68 69 70 71 73 74 80 81 82 83 84 85 86 87 88 89
YEAR
TOTAL DUCKS
TOTAL DABBLERS

Canada geese do not nest on the Tetlin Refuge in any substantial numbers. Estimates of 30-50 nesting pairs have been made from incidental observations. On July 9, Biologist Doyle observed a group of 50 young with several adults along the Chisana River in the Gardiner Creek flats. The refuge is an important migration route for both Canada and greater white-fronted geese that migrate to and from the state.

Trumpeter Swans

While the Upper Tanana Valley has long been recognized as an important migration route for tundra and trumpeter swans, the occurrence of breeding trumpeter swans is relatively new. The first documented nesting occurred in 1982 when there were 3 broods. Since that time the total number of swans as well as number of nests and cygnets has increased dramatically.

In 1989 a nest survey was conducted on June 22. Twenty-two active swan territories were located containing 18 nests and 4 broods. Of the 18 nests located in June, 5 did not have broods within 5 miles of the nest location during the late summer survey. Assuming that these 5 nests or broods failed results in 72% nest success.

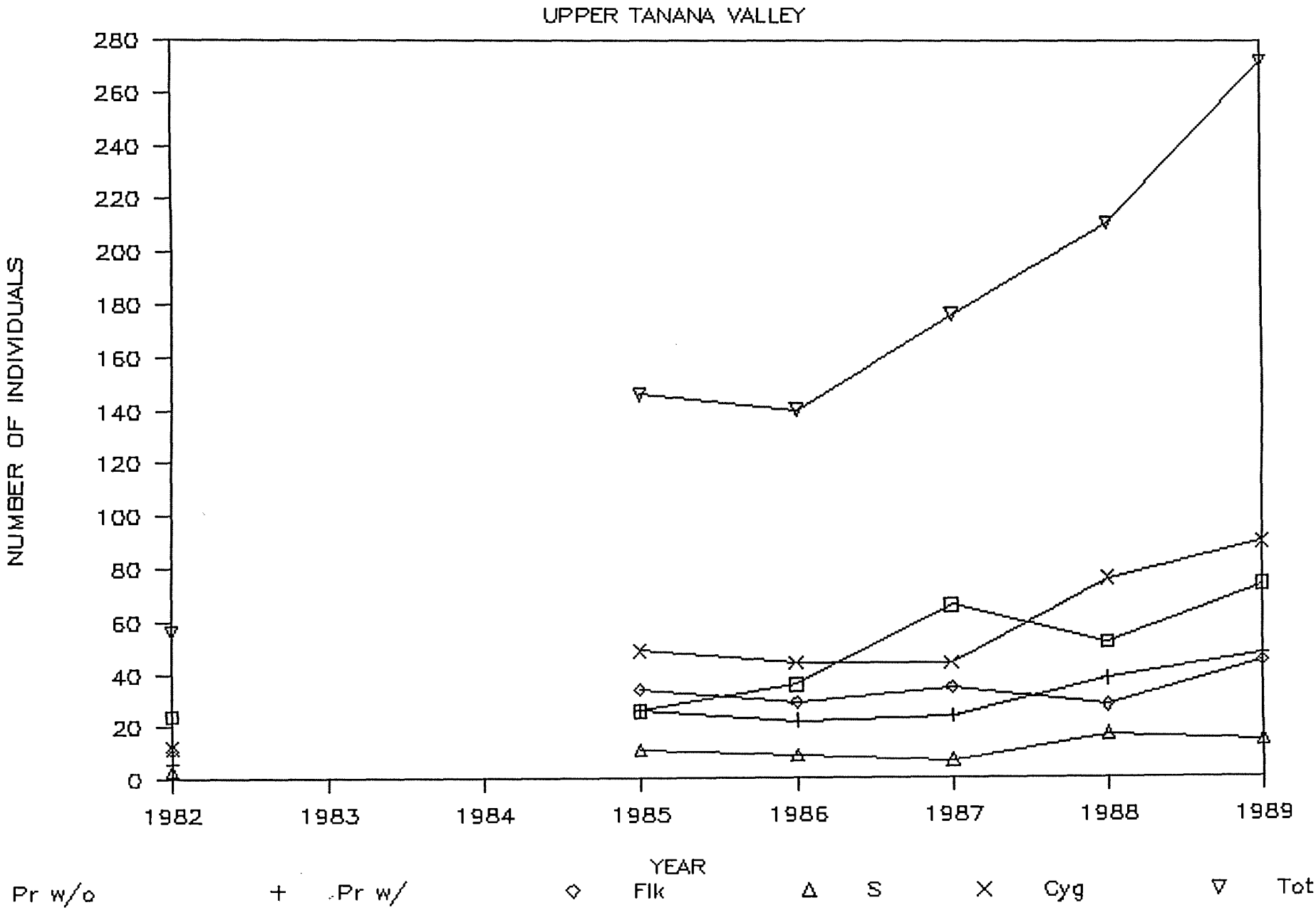
Productivity surveys were conducted from August 23 to September 1, 1989. Portions of 14 1:63:360 scale USGS Quadrangle Sheets were surveyed. The 272 swans counted during the late summer survey represents the highest number of swans yet recorded in the upper Tanana Valley and a 28.9 percent increase from 1988 (Table 13 and Figure 6). All segments of the population increased except the number of singles. Cygnets continue to make up the highest proportion of the population followed by pairs without cygnets. This is further indication of future growth of the population.

Cygnets were captured and collared to help understand the movements and establishment of swans into previously unoccupied habitat as well as the migration and wintering movements of the population. Rod King (Migratory Birds-Fairbanks) came out to the refuge on September 2 to help us get started in this capture effort. A total of 19 cygnets from 7 broods were captured and collared in 1989. Locations and collar numbers are shown in Figure 7. Entire broods were collared except for the brood which contained 23AK and 25AK. In this case two other cygnets were present but escaped capture.

Table 13:Number of trumpeter swans recorded during a late summer census of the Upper Tanana Valley, Alaska, 1982, 1985-1989.

Group	1982	1985	1986	1987	1988	1989	% change from 1988	% change from 1982
Pairs without cygnets	24	26	36	66	52	74	42.3	208.3
Pairs with cygnets	6	26	22	24	38	48	26.3	700.0
Flocked birds	11	34	29	35	28	45	60.7	309.1
Single birds	3	11	9	7	17	15	-11.8	400.0
Cygnets	12	49	44	44	76	90	18.4	650.0
Total swans	56	146	140	176	211	272	28.9	385.7
Average brood size	4.0	3.8	4.0	3.7	4.0	3.7	-7.5	-7.5

Figure 6. NUMBER OF TRUMPETER SWANS, LATE SUMMER



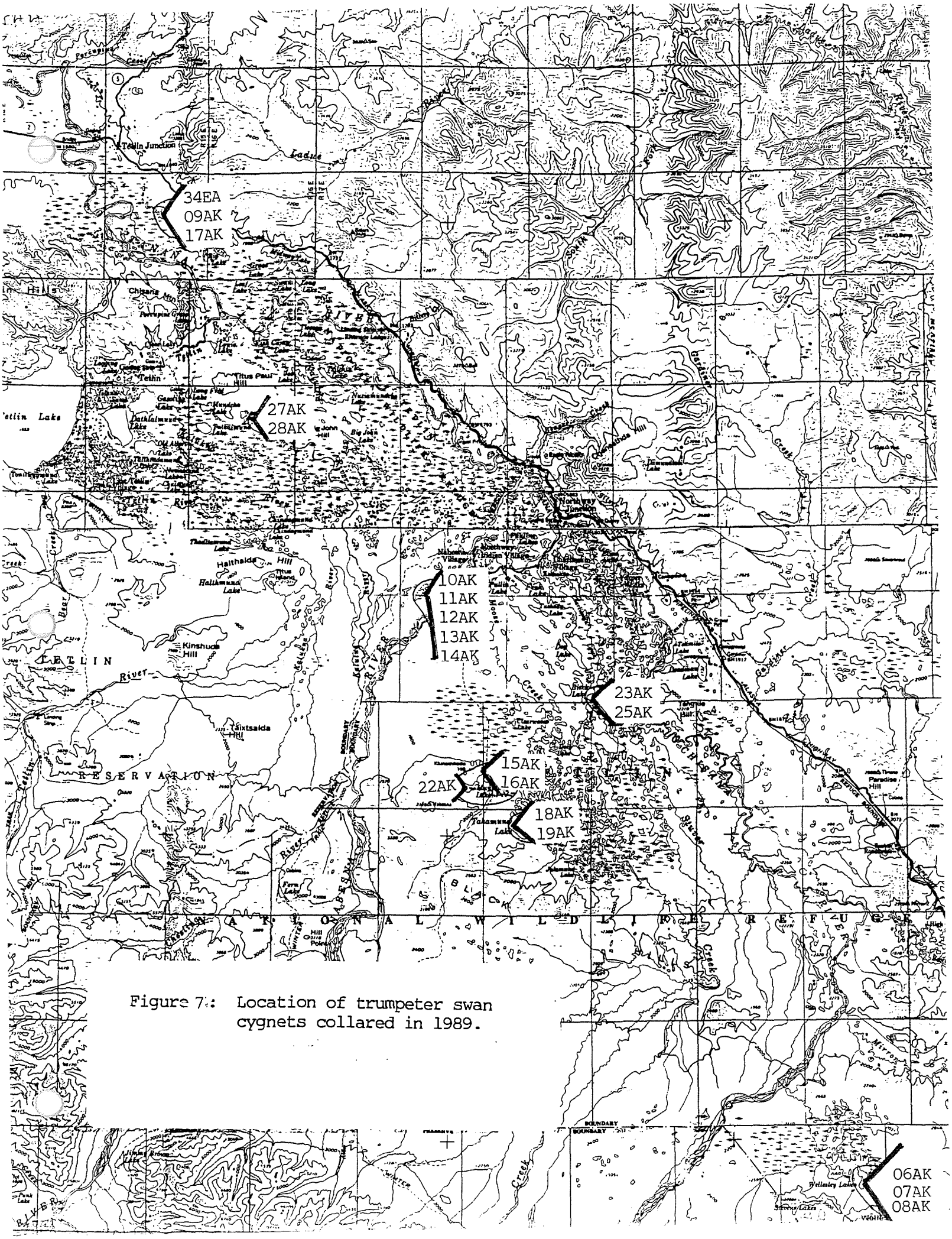


Figure 7.: Location of trumpeter swan cygnets collared in 1989.

Rod King (right) Migratory Birds-Fairbanks, assists Biologist Doyle in collaring a trumpeter swan cygnet.
9/2/89, TNWR 89-30, WKB.

A trumpeter swan brood successfully collared and released. A total of 19 cygnets form 7 broods were collared in 1989. Future sightings will help us understand migration and wintering movements and expansion into vacant habitat. 9/2/89, TNWR 89-31, WKB.

An assessment of trumpeter swan brood survival was obtained by comparing broods seen during early and late summer surveys, and by conducting opportunistic flights over broods during other activities, primarily swan capture. Between the early and late summer surveys there were at least two cases of brood mortality. One brood that had four young on 22 June had two on 23 August and another that had three in 26 July had one on 30 August. Nineteen broods were rechecked for up to four weeks after the late summer survey. There was no loss of young from the 71 cygnets that were checked.

A collared swan seen south of Tetlin Junction was identified as 34EA, a male captured north of Tok on 29 August, 1983 as a flightless juvenile. Observations of a collared swan attempting to nest have been made on this lake the past two years. This was the first successful nesting attempt; raising two cygnets, both of which were collared in 1989.

The first flight capable cygnets were observed on 18 September. However two broods missing when checked on 13 September are believed to have been flight capable and departed before that date.

A detailed report on the trumpeter swan inventory work is available from the refuge.

In addition to our resident trumpeter swans a substantial number of interior trumpeters and coastal and interior nesting tundra swans pass through the refuge to and from their wintering grounds.

4. Marsh and Waterbirds

There are nine species of marsh and water birds that occur on the refuge (see enclosed bird list). Horned grebe and pacific loon are the most common breeders followed by red-necked grebe.

A small number of sandhill cranes nest on the muskeg flats between Northway and the Big John Lake area. However, during fall migration, up to one half of the entire world population of lesser sandhill cranes (some 200,000 birds) pass through the area.

Several American coots with young were seen on the adjacent Tetlin Reservation on July 17. A sora rail was heard on the refuge by Biologist Doyle on July 19. The Upper Tanana Valley is one of the few places in the state where these species can be found.

Pacific loons are one of the most abundant marsh and water birds on the Tetlin refuge. TNWR 89-32, C24, Staff Photo.

5. Shorebirds, Gulls, Terns and Allied Species

While some 26 species of shorebirds occur on the Tetlin Refuge, most are migrants passing between wintering and breeding grounds. The most abundant breeding shorebird is the lesser yellowlegs which can be found in abundance nearly everywhere on the refuge. Common snipe are of lesser abundance but widely distributed while spotted sandpipers are common along watercourses. Mew and Bonaparte's gulls are commonly found on the refuge as well.

The common snipe is one of the most common breeders of the shorebirds, terns, and allied species group.
TNWR 89-33, IIIG-3, Staff Photo.

6. Raptors

Some 13 species of hawks and 6 species of owls are known to occur on the refuge (see bird list in Information Packet). Bald eagles are common nesters on the refuge.

A survey was conducted on June 7 to determine raptor nest occupancy on the refuge. Thirty-two of the 80 historic nest locations were located. Of these 59% were occupied which is considered low (Skip Ambrose, pers comm). One possible reason for the low occupancy rate is multiple nest structures within the same territory being missed by the survey. Occupied nests included twelve bald eagle, five osprey, one red-tailed hawk, and a common raven.

The northern portion of the refuge and the adjacent Tetlin Native Corporation land supports the highest density of nesting osprey in Alaska. In 1989, the Alaska Department of Fish & Game located 33 osprey nests in the Upper Tanana River Valley. Twenty-four of those were occupied for a 73% occupancy rate. All nests were found in an area of about 200 square miles. Productivity for the year was about average (Table 14).

Table 14. Osprey productivity for the Tetlin Native Corporation and the Tetlin NWR, 1983-1989 (from Hughes 1984, 1985, 1986, 1987, 1988, 1989).

Year	Occupied Nests	Nests w/ Young	Young Produced	Young Fledged	Productivity[1]
1983	7	4	9	9	1.29
1984	17	8	15	13	.76
1985	19	8	15	11	.58
1986	25	15	34	32	1.28
1987	26	13	25	23	.88
1988	23	15	-	31	1.44
1989	24	14	-	25	1.04

[1] Young fledged per active nest.

Biologist Doyle and Park Ranger Perham assisted Alaska Department of Fish and Game Biologists John Wright and Jeff Hughes in banding osprey and bald eagles on Tetlin Native Corporation land and adjacent refuge lands on July 31 and August 1. Twenty young osprey were banded and 4 addled eggs retrieved.

Over the past 6 years 104 young osprey have been banded in this area. There have been 2 recoveries, both from dead birds found the same year they were banded. In 1983 a bird was found near Roseville, California and in 1986 a bird was found on the southwest coast of Mexico less than 2 months after it was banded.

An additional 2 bald eagle young from the area were banded by the Alaska Department of Fish and Game in 1989.

Fire Management Officer Vanderlinden spotted a Bald Eagle in Tok on January 23 flying east in -35 degree weather. A small number of bald eagles winter near Delta.

The refuge hosts six species of owls, the most common of which are the great horned, boreal and northern hawk-owl. Great horned owls are seen and heard occasionally throughout the area during the year. A boreal owl was heard calling along Wellesley Creek on March 30, at Moon Lake on April 7, and one was seen near Deep Lake in July. Northern Hawk owls were seen near the mouth of Scottie creek on March 30 and at milepost 1247 on the Alaska Highway September 22. Two great grey owls were seen September 27 at milepost 1329 on the Alaska Highway.

The refuge and adjacent Native Corporation lands host the densest nesting population of osprey in the state of Alaska. In 1989, twenty young osprey were banded including this one. 7/89, TNWR 89-34, CJP.

7. Other Migratory Birds

We have maintained arrival dates for spring migrants during the past 8 years (Table 15).

A red-breasted sapsucker was found dead near Tok on April 8 and brought to the University of Alaska Museum for their collection. This was the first interior Alaska record for this species. Coincidentally, Bonnie Harvey, a local resident took photos of a red-breasted sapsucker at her home at about the same time.

Table 15: Arrival dates of selected migratory birds in the Upper Tanana Valley, 1982-1989.

Species	1982	1983	1984	1985	1986	1987	1988	1989	Average
Snow bunting	3/10	3/26	3/13	3/16	3/13	3/7	3/4	3/19	3/14
Bald eagle	4/9	4/7	3/29	3/16	2/19	3/24	4/13	3/29	3/27
American tree sparrow	3/13	4/25	4/16	4/26	3/31	3/17	-	4/28	4/9
Northern harrier	-	4/18	4/6	4/12	3/27	3/31	4/13	4/15	4/9
Red-tailed hawk	-	4/24	4/27	4/4	4/10	3/24	-	4/3	4/10
Canada goose	-	4/10	4/13	4/14	4/15	4/13	-	4/15	4/14
Dark-eyed junco	-	4/25	4/18	4/23	4/20	3/28	4/20	4/23	4/18
Lapland longspur	-	-	4/30	4/4	4/21	4/20	4/30	4/15	4/20
American robin	5/4	4/25	4/20	4/21	4/16	4/28	4/20	4/24	4/24
Sandhill crane	4/30	4/23	4/26	4/27	4/26	4/28	-	4/29	4/27
Yellow-rumped warbler	5/6	4/26	4/27	5/1	5/3	5/1	5/4	4/27	5/1
Ruby-crowned kinglet	-	-	4/28	5/4	5/3	4/27	5/4	4/28	5/1
Common snipe	5/3	-	4/20	5/2	5/7	5/8	5/2	5/6	5/3
Violet-green swallow	5/2	4/24	5/5	5/7	5/8	5/3	5/4	4/28	5/3
Swainson's thrush	-	-	5/15	5/20	5/15	5/20	-	5/15	5/17

8. Game Mammals

Wolves

A wolf survey was conducted February 19 to the 24 in cooperation with the Yukon territory and Alaska Department of Fish and Game. The survey was conducted approximately 15 miles on either side of the Alaska/Canada border from the crest of the Nutzotin Mountains north to the Ladue River. Survey conditions were poor. It had been some time since the last snow, and caribou had used the area heavily. Although few wolves were seen, minimum estimates of the size of wolf packs were obtained for an area of which little is known.

Several radio equipped wolves were followed through the year. The alpha female of the lick Creek pack remained within her traditional territory. In the first half of the year there were two members in this pack. During the summer, up to four animals were seen and the presence of puppies was suspected but not confirmed. From October through December three wolves were seen in the Lick Creek pack.

The beta female from the Lick Creek pack moved into the Bear Creek pack territory in 1988. Four wolves were seen in this pack the first two months of 1989, 1 - 2 wolves were seen during February through October and four wolves, of which two were puppies, were seen the remainder of the 1989.

A two year old male from the Lick Creek pack was seen alone near the headwaters of the Nabesna River on April 26.

A two year old male from the Lick Creek pack which had joined another pack near the headwaters of the Copper River, was killed by a trapper near Copper Lake on February 22 and the radio collar returned.

Two other radio collared wolves from the Lick Creek pack (780 and 1340) left the country during the summer of 1988 and have not been heard from since.

Other information about the distribution and abundance of wolves on the refuge consists of miscellaneous observations. The current status of wolves on and adjacent to the refuge is shown in Table 16 and Figure 8.

Table 16: Estimated pack sizes of wolves on and near the Tetlin National Wildlife Refuge, 1985-1989. Counts based on radio collared packs (*), miscellaneous observations and track counts ().

Pack name	1985	1986		1987	1989		
	Fall	Spring	Fall	Spring	Count	Date	Coloration
Cheslina River	14	9	15	15*	13	2/89	Gray
Lick Creek	7	5	9	9*	3*	12/21/89	Gray
Central	6	6	6	6*	3	3/1/89	Gray
Black	-	-	6	2*	(2)	2/21/89	Black
Big John	2	2	6	6	(6-7)	12/89	?
Big John II	-	-	(2)	-	-		
Scottie Creek	(5)	(5)	-	-	(2)	3/89	Gray/black
Tetlin River	16	13	16	7*	5-6	1989	Gray/black
Carden Lake	5	(5)	(3)	-	4	11/2/89	Gray
Wellesley Mtn	(7)	(7)	(12)	(12)	2	2/21/89	Gray
Upper Nabesna	-	(17)	-	-	17	12/11/89	Black/Gray
Bear Creek	-	-	-	-	4*	12/20/89	Gray/black
Clearwater	6	6	6	4	(4-6)	11/2/89	Gray
Total (minimum)	68	75	69	61	65-69		

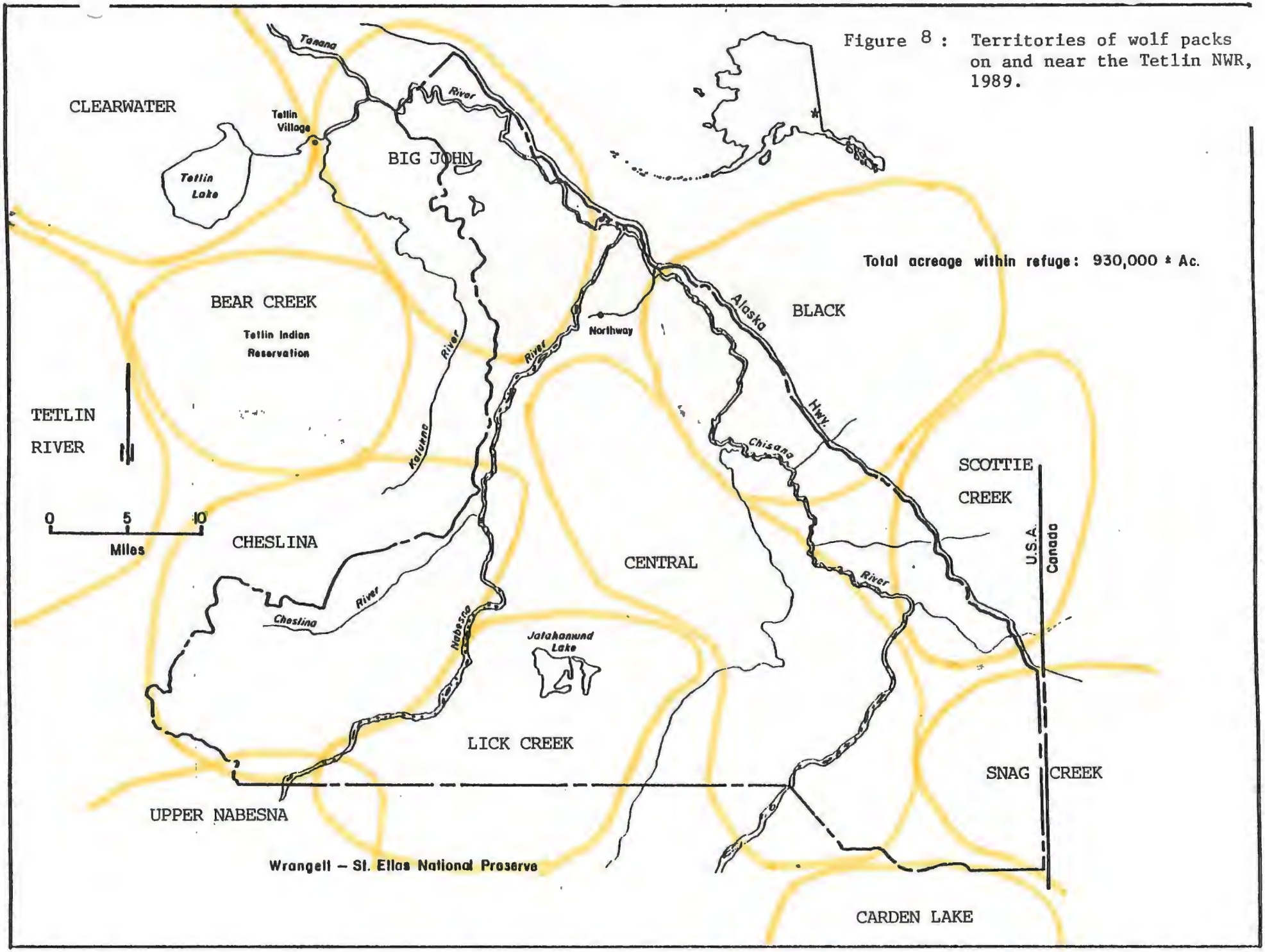


Figure 8 : Territories of wolf packs on and near the Tetlin NWR, 1989.

It is very difficult to get an accurate estimate of the number of wolves in the area without having radio marked packs. Our wolf surveys since 1987 have been made more on an opportunistic basis, mainly due to the fact that packs were no longer radio collared. The difficulty in recent years has been confounded by the large number of caribou wintering on the refuge and obscuring wolf tracks. We plan on monitoring the packs more closely in the future by radio collaring a member or two from each pack. Two wolves out of the Bear Creek pack were captured and equipped with radio collars on December 7. The Bear Creek pack was relocated again on December 20 within a few miles of the capture site. The effort to radio more packs will continue in CY90.

Wolves are distributed across the refuge but their sparse distribution and obliteration of tracks by caribou have made them difficult to enumerate. Efforts are underway to place a radio collar in each pack to help us obtain better information about their numbers.
TNWR 89-35, Refuge Photo

Moose

The refuge provides substantial summer and late winter moose habitat. The higher elevations above 3,000 feet also serve as rutting and early winter habitat. The exchange of animals between the refuge and other areas in Game Management Unit (GMU) 12 is known, but not in any detail.

Trend counts are conducted annually during two times of the year. Moose are recorded during the trumpeter swan survey which is conducted in late August and provides a measure of moose before they move into the rutting area. Late fall/early winter counts are conducted in subalpine areas of the Kalukna, Cheslina and front range of the Nutzotin Mountains. These areas provide the highest concentration of moose in the basin during the post rutting period.

The fall survey was flown 2-3 November, 1989. Four hundred ninety-five moose were recorded during the fall survey representing the highest number yet recorded (Table 17, Figure 9). Calves per 100 cows was 39.7, second only to the 1988 ratio. Yearling bulls per 100 cows was 22.4 also second only to the 1988 ratio. Bulls per 100 cows was 90.2.

Significant increases in the calf ratio have occurred in 1987 and 1988 (X^2=6.48 and 5.06 respectively). Yearling bull ratios increased significantly from 1987 to 1988 following the calf increase from the year before. Bull ratios have been relatively constant except for a significant increase in the bulls from 1987 to 1988 (X^2=6.61).

The question was asked whether the survey conducted in late summer could be used as a predictor of the fall survey. Regression was run using late summer ratios as a predictor for the ratios for all fall survey units combined and the Cheslina/Kalukna units alone. The best r square value obtained was .19. Late summer surveys are not good predictors of late fall/early winter surveys. Because of the migratory nature of moose in the Tetlin Northway flats, we are essentially sampling two different populations in the summer and winter.

Calf ratios and indicators of yearling recruitment are encouraging indicators of future growth of the moose population on and near the Tetlin refuge. The presence of caribou in the area as well as a reduction in wolf numbers has no doubt served to reduce wolf predation on moose. The high ratio of bulls to cows indicates that the bulls are in no danger of being over hunted. This is not surprising considering the large expanse of inaccessible moose range.

A detailed report on the moose inventory work is available from the refuge.

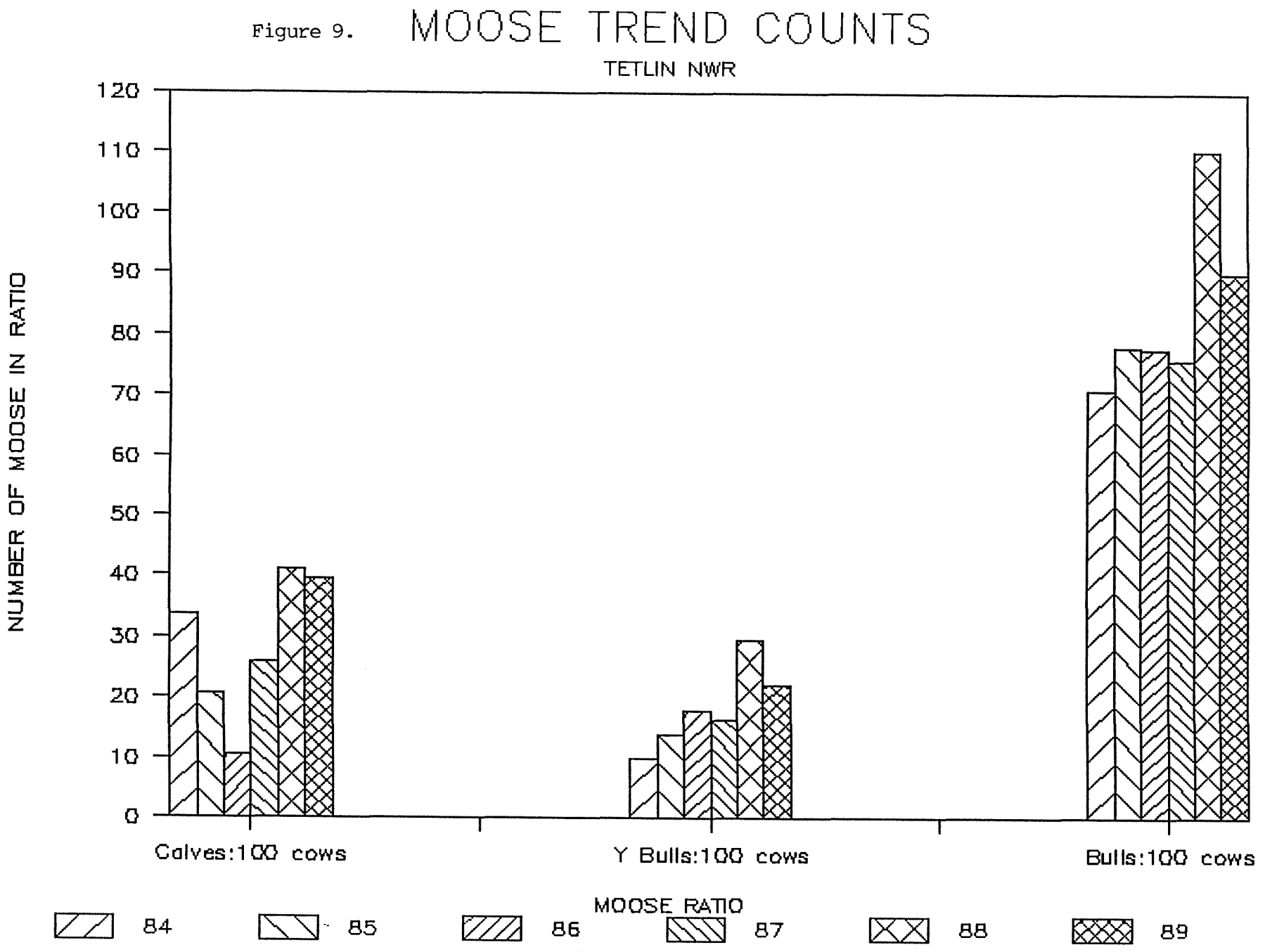
Table 17. Moose counts in trend areas on and adjacent to the Tetlin NWR, Alaska.

Parameter	1981	1982	1983	1984	1985	1986	1987	1988	1981-1988 Average	1989	% change from 1988	% change from average
Total Moose	122	147	180	305	171	179	425	459	248.5	495	7.8	99.2
Cows	57	84	92	149	86	95	211	182	119.5	214	17.6	79.1
Adult Bulls	40	35	60	91	55	57	125	147	76.3	145	-1.4	90.2
Yearling Bulls	9	17	8	15	12	17	35	54	20.9	48	-11.1	129.9
Calves	16	11	20	50	18	10	55	75	31.9	85	13.3	166.7
Calves:100 cows	28.1	13.1	21.7	33.6	20.9	10.5	26.1	41.2	24.4	39.7	-3.6	62.8
Y Bulls:100 cows	15.8	20.2	8.7	10.1	14.0	17.9	16.6	29.7	16.6	22.4	-24.4	35.0
Bulls:100 cows	86.0	61.9	73.9	71.1	77.9	77.9	75.8	110.4	79.4	90.2	-18.3	13.6
Survey date	19 Nov	18-20Oct	18-23Nov	29Oct-6Nov	31Oct	24Nov-3Dec	3-25Nov	27Oct-7Nov		2-3 NOV		
Drainage surveyed	N	K,CHE	K,CHE,N	K,CHE,N	K,CHE	K,CHE,N	K,CHE,N,CHI	K,CHE,N,CHI		K,CHE,N,CHI		
Survey conditions	Good	V Good	Fair	Good	V Good	V Good	Excellent	Excellent		Excellent		

Drainage codes

K = Kalukna
CHE = Cheslina
N = Nabesna to Chisana
CHI = Chisana to border

Figure 9.


MOOSE TREND COUNTS
TETLIN NWR
NUMBER OF MOOSE IN RATIO
120
110
100
90
80
70
60
50
40
30
20
10
0
Calves:100 cows
Y Bulls:100 cows
Bulls:100 cows
MOOSE RATIO
84
85
86
87
88
89

Six collared cows, tagged over four years ago, were tracked periodically to assess production, and determine whether the calving and rutting areas were the same as in previous years. In early June there were five calves including two sets of twins, the highest number of calves for our radioed sample of cows. All five calves were alive at the end of the year. The timing and movements of these cows have been essentially identical from year to year.

An attempt was made to conduct a stratified moose survey of the Tetlin/Northway flats in November, 1989. Considerable work was spent setting up the survey by refuge staff and Dale Haggstom of the Alaska Department of Fish and Game. The survey was finally called off just before Thanksgiving because poor weather conditions pushed the survey back so late that reliable identification of bulls could not be obtained because of antler drop. At least we'll be ready for next year.

The Chisana portion of the moose browse utilization survey was accomplished on May 17-19. Snowshoe hare clippings were also documented.

Caribou

Numbers of caribou utilizing the Tetlin NWR have increased dramatically in the last two years. Portions of four different herds winter on or near the refuge.

The 40-Mile herd is generally found north of the refuge during the winter but some members range as far south as Midway Lake. This herd has been expanding and currently numbers about 22,000.

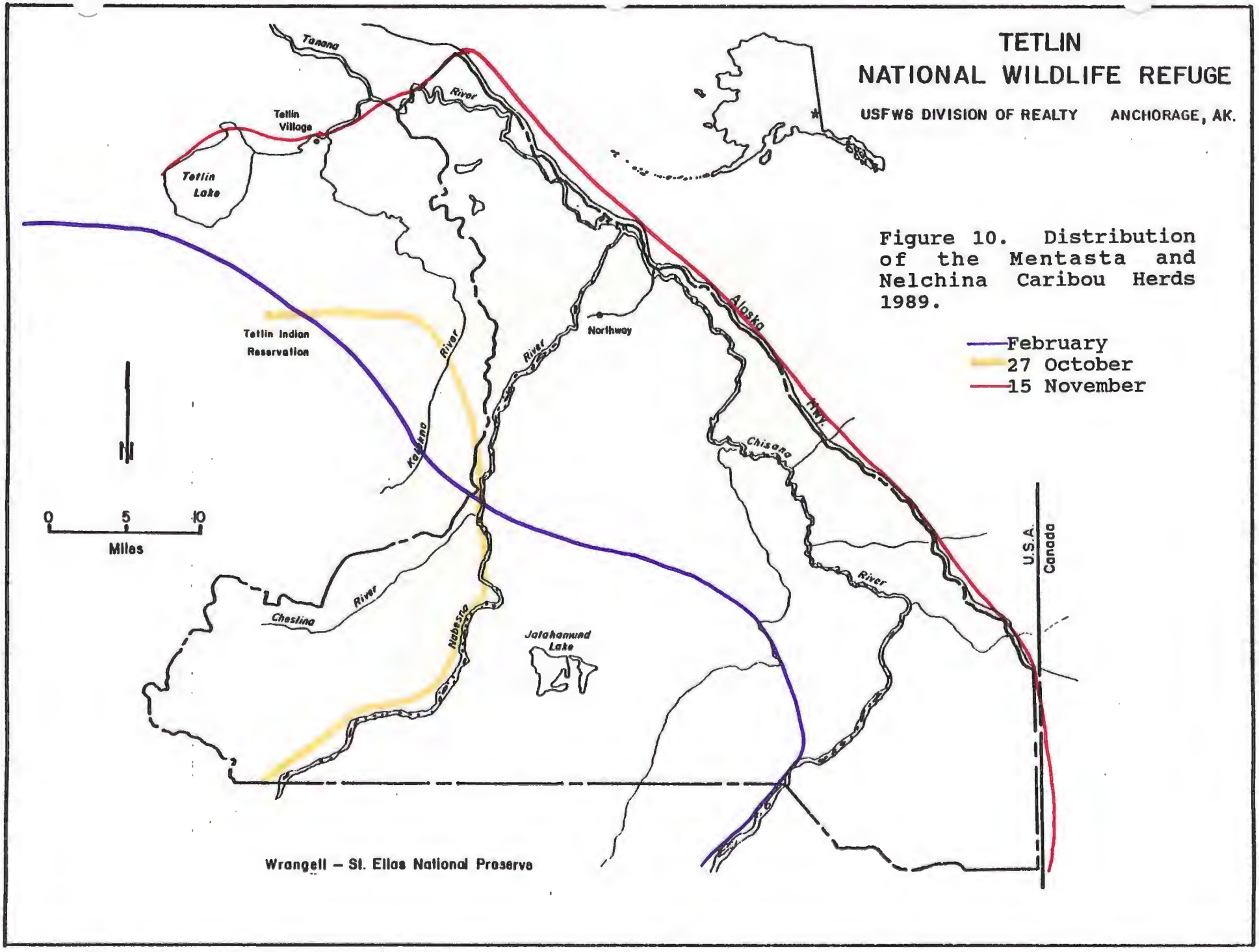
The Chisana herd is a small herd numbering about 2000 spending most of it's time in the upper Chisana River/White River drainages. In February, 1989 and December, 1989 some animals from this herd moved north into the Carden Lakes area, south of the refuge. From February through April, one collared animal spent time in upper Stuver Creek mixing with members of the Mentasta and Nelchina herds.

The Mentasta herd summers in the Mentasta and Wrangell mountains west of the refuge and generally moves onto the refuge in the winter. Some animals summered in the Upper Cheslina in 1989. This is a relatively small herd numbering about 2500.

Finally, the Nelchina herd has been expanding in numbers and range. They currently number approximately 40,000.

Although caribou are hard to find during the summer they have become increasingly abundant on the refuge during the winter. Members from both the Mentasta and Nelchina herds have frequented the refuge during recent winters. 2/89, TNWR 89-36, WKB.

Figure 10 shows the distribution of caribou from the Mentasta and Nelchina caribou during 1989. The February 1989 distribution was also the maximum extent of caribou during the winter of 1988-89. Most animals were concentrated south of the Black Hills and gradually moved off the refuge between February and April. Caribou from the Nelchina and Mentasta herds began moving back onto the refuge the week of October 23. By October 27 several hundred were on the refuge as far east as the Nabesna River but south of the Cheslina River and by mid November an estimated 20,000 caribou extended across the entire refuge in small groups of ten to twenty.


TETLIN
NATIONAL WILDLIFE REFUGE
USFWS DIVISION OF REALTY ANCHORAGE, AK.
Figure 10. Distribution of the Mentasta and Nelchina Caribou Herds 1989.
February
27 October
15 November
Tanana River
Tetlin Village
Tetlin Lake
Tetlin Indian Reservation
Kechumstuk River
Northway
Alaska Hwy.
Chisana River
U.S.A.
Canada
Nabesna River
Chesina River
Jatahonwud Lake
0 5 10
Miles
Wrangell – St. Elias National Preserve

Radio collared members of the Nelchina and Mentasta caribou herds were located in cooperation with the Alaska Department of Fish and Game. Several mortalities of radioed animals occurred on and near the refuge. A Mentasta animal died west of Jatahmund lake probably before February 10. The radio was not equipped with a mortality switch and was not recognized as a mortality until the herds left the refuge in the spring. Apparently the animal died of natural causes because when the collar was retrieved, the animal was completely intact. Another Mentasta animal was on mortality mode February 19 near Stuver creek just south of the refuge. The collar was retrieved on September 4 with the aid of a State of Alaska Forestry helicopter used for fire reconnaissance. By the time the collar was retrieved there was not enough left of the animal to determine the cause of death. A Nelchina animal was on mortality mode in November and the collar retrieved December 22. The collar was under two feet of snow separate from the caribou so that the cause of death could not be determined.

Being a biologist or a pilot isn't all glamor. Here Pilot/Biotech Bill Bohman expresses his opinion on the condition of this caribou from the Mentasta herd which apparently died from natural causes just west of Jatahmund Lake. 6/89, TNWR 89-37, TJD.

Grizzly Bear

The grizzly is one of the most important but least understood members of the refuge ecosystem. Grizzlies occur throughout the entire refuge, but are found in higher numbers in the foothills and mountains. No bears were radio collared during the year.

Two of the transects for the annual bear population trend survey were completed May 17-19 but poor tracking conditions negated the validity of results.

Black Bear

No estimate of population composition or total numbers is available for the refuge. Black bears exist in higher numbers in the northwestern and central portions of the refuge than they do in the foothill areas to the south.

Dall's Sheep

Sheep are found only in the extreme southwestern portion of the refuge in the Mentasta Mountains. No surveys were conducted this year but a mild winter should not have reduced the population estimated at 125.

10. Other Resident Wildlife

Snowmachine track counts are conducted along a 40 mile transect into Wellesley Lake. The transect is divided into 20 segments of varying lengths. Transects have been difficult to complete because of poor trail conditions. Four segments were completed March 30, 1989 and 13 segments were done December 28, 1989. Table 18 compares counts from 1989 to the same segments done the winter of 1987-88.

Table 18 : Track counts from the Wellesley Lake snowmachine transect. In late winter segments 9-12 were conducted both times. In early winter segments 1-7 and 20 were conducted both times.

Species	Late Winter		Early Winter	
	3/30/89	2/10/88	12/28/89	12/30/87_
Wolf	0	2	2	0
Lynx	4	0	1	0
Fox	29	10	37	29
Wolverine	0	0	0	0
Marten	8	0	6	21
Otter	3	10	2	6
Mink	5	1	3	51
Short-Tailed Weasel	36	0	71	118
Least Weasel	4	0	0	0
Snowshoe Hare Tracks	223	11	29	31
" (trails)	(63)	(46)	(34)	(60)
Red Squirrel tracks	12	0	3	3
" (trails)	(7)	(0)	(0)	(7)
Microtines and shrews	16	0	9	0
Grouse	28	0	14	8
Moose	10	10	0	14
Caribou	0	0	lots	11

One of the major reasons the Wellesley snowmachine transect is so difficult to complete is because of open water and overflow on the Chisana River portion of the transect. Here ORP Westenburg takes the plunge in -30 temps.
TNWR 89-38, Staff Photo.

The following observations are based on general field observation with additional input received from public contacts.

Snowshoe hare

Hare populations appear to continue to maintain moderate levels as in the last several years. A big increase is expected in the near future but seems to be stalled each year.

Grouse

Populations are similar to those in 1988 following an increase after several years of low numbers.

Spruce grouse are one of the most abundant members of the grouse family on the refuge. Other species include ruffed and sharp-tailed grouse, willow and rock ptarmigan.
TNWR 89-39, IIIE-6, DS.

Lynx

Lynx populations appear to be at lower levels than what would be expected from the hare density. Consequently the trapping season in the area was shortened from four months to two months for the third season in a row. The percentage of kittens in the harvest for GMU 12 has decreased from a high of 32% in the 1987-88 season to 21% in the 1988-89 season indicating that the population may be on the decline again, never reaching a high.

Red Fox

Fox have increased with the highest population found in the best waterfowl production areas in the northern third of the refuge.

Marten

Marten populations remain at low levels throughout most of the refuge, and at moderate levels in the southeastern portion.

Wolverine

At one time considered a common animal throughout the refuge, the wolverine is now primarily found in the foothills and mountainous areas where access is limited.

River Otter

Although not common, characteristic sign of this wetland furbearer can be found throughout the refuge.

Beaver

Beaver can be found throughout the refuge with a large concentration in the Scottie-Desper Creek area.

Muskrat

Muskrat populations remained at about the same level in 1989 as in 1988, after a drastic decline from the winter of 1987-88.

11. Fishery Resources

Fish were sampled as part of the refuge placer mining contaminant project. Table 19 shows the number of each species taken at each location. Fish samples will be tested for a variety of heavy metals.

A tagged burbot was caught at the mouth of the Kalutna River on September 29. This fish was tagged by the Department of Fish and Game on September 29, 1986 on the Tanana River, 24 miles downstream.

A silver salmon was caught in a fish net at Northway in September.

Table 19: Fish captured on the Tetlin National Wildlife Refuge. Placer mining study, 1989.

Location	Dates	Species	Number	Disposition
Moose Creek	9/14/89-9/15/89	Northern Pike	6	6 sacrificed for tissue
		Alaska Whitefish	3	3 sacrificed for tissue
		Burbot	1	1 net mortality
Gardner Creek	9/22/89	Arctic grayling	12	5 sacrificed for tissue 7 released
		Longnose sucker	1	1 released
Desper Creek	9/22/89	Northern pike	15	5 sacrificed for tissue 10 released
Scottie Creek	9/22/89	Alaska whitefish	25	5 sacrificed for tissue 10 net mortality 10 released
		Arctic grayling	6	4 released 2 net mortality
		Longnose sucker	3	3 released
		Northern pike	2	2 released
Tanana River	9/29/89	Burbot	7	5 sacrificed for tisue 2 released

Burbot such as this one were captured and tissue samples taken for heavy metal analysis as part of a refuge study investigating the impact of placer mining on refuge waters. 9/27/89, TNWR 89-40, TJD.

12. Wildlife Propagation and Stocking

Rainbow trout have been stocked at Hidden Lake along the highway by the Alaska Department of Fish and Game. No stocking took place in 1989.

16. Marking and Banding

Nineteen trumpeter swan cygnets were captured and marked with visual neck collars and aluminum leg bands. See section G3 for more details.

The alpha male and a puppy from the Bear Creek pack were captured in December using a helicopter and immobilized with M-99. The capture work was done by Danny Grangaard of the Alaska Department of Fish and Game through a Cooperative Agreement because of problems the local helicopter pilot had getting Office of Aircraft Services certification. Both wolves were equipped with radio collars to monitor pack dynamics.

What's wrong with this picture? It's an amphibious plane in a non-amphibious situation! Gusty winds on takeoff forced Rod King to abort take off, unfortunately we ran out of lake! Fortunately, there were no injuries, and the plane was towed back into the water without damage.

9/2/89, TNWR 89-41, WKB.

A brood of trumpeter swans waits patiently to be banded. This brood ran up on shore and was easy to catch, since they didn't move when approached. Unfortunately they still have lots of energy and can put up quite a fuss when it comes time to process them. 9/89, TNWR 89-42, WKB.

H. PUBLIC USE

1. General

What an exciting year! On June 12, 1989 the Tetlin National Wildlife Refuge Visitor Center opened to the public. With the completion of this long anticipated project, the refuge's public use program has reached a multi-dimensional maturity, making it one of the most visible programs in the region. Table 20 demonstrates the program's diversity.

One of a kind! The Tetlin NWR Visitor Center.
8/89, TNWR 89-43, DLW

The Tetlin Refuge has a unique attribute making it a key location for information and education efforts in this region - primarily, road access! The refuge is one of only two road accessible refuges in Alaska. The Alaska Highway is the northern boundary of the refuge for approximately 65 miles, providing an excellent opportunity for interpretation of the Tetlin and other refuges in Alaska. As the first contact for highway travelers to Alaska, we serve an important statewide orientation role. Our public use program is concentrated along the highway corridor. The Alaska National Interest Lands Conservation Act mandated information and education as one of the five primary purposes of this refuge.

TABLE 20. Summary of Public Use activities on the Tetlin NWR in 1989

ACTIVITY	# VISITS	ACTIVITY HRS
Interpretation		
Tetlin NWR Visitor Center	18,374	9,187
Tok Headquarters	500	250
Wildlife Films - Tok APLIC	9,424	4,712
Ak Hwy Interpretive Stations	67,091	16,773
Tiaga Trail	400	400
	(95,789)	(31,322)
Environmental Education		
Teachers	110	91
Students	1,244	3,667
	(1,354)	(3,758)
Non-consumptive Recreation		
Wildland/Wildlife Observation	67,091	67,091
Photography	33,545	16,773
Picnicking	4,025	4,025
Canoeing, Rafting, Boating	100	800
Camping	7,843	94,116
	(112,604)	(182,805)
Consumptive Recreation		
Hunting	1,500	9,000
Fishing	1,482	3,164
Trapping	108	648
Other Subsistence Activities	100	500
	(3,190)	(13,312)
TOTALS	212,937	231,197

*Cooperating Association Sales = $14,585
*Volunteer Hours = 2,540
*News Releases = 28

Traffic along the Alaska Highway is always heavy in the summer months, peaking in July. The number of travelers entering Alaska via the Port of Alcan was up slightly from 1988 and the number entering from Poker Creek (Top of the World Highway) was down slightly from 1988. Most highway travelers pass along the northern refuge boundary twice, on their way in and on their way out of the state. Table 21 shows the visitation along the highway for the past five years.

TABLE 21 Visitation along the Alaska Highway 1985-1989

Year	Enter via Poker Creek	Enter via Port of Alcan	Total
1985	20,105	128,182	148,287
1986	19,768	119,256	139,024
1987	24,332	96,606	120,938
1988	29,374	106,602	135,976
1989	25,050	109,132	134,182

Additions to the public use program in 1989 were; completion and opening of the new visitor center, development of a four page natural history newspaper the "Tetlin Passage", the recipient of a national award, and receipt of a $5,000 development fund proposal from the Alaska Natural History Association to develop a book featuring the Tetlin National Wildlife Refuge, Wrangell St. Elias National Park, Kluane National Park (Canada), and Kluane Game Sanctuary (Canada).

2. Outdoor Classroom - Students

In 1988 the refuge began a series of summer Nature Day Camps for area youth. These non-residential camps have proven to be very popular and a highly successful way to carry out the refuge's environmental education mandate. This year the camps were conducted under the leadership of Refuge Information Technician Hank Timm. In 1989, six different camps were conducted, accounting for nearly 400 student days and 2052 activity hours (Table 22).

Refuge Information Technician Hank Timm conducts nature camp. 6/89, TNWR 89-44, CJP

TABLE 22. 1989 Nature Day Camps - Tetlin NWR

CAMP	DATE	# STUDENT DAYS	# ACTIVITY HRS
Tok K-3	June 12-16	145	580
Mansfield	June 19-21	120	720
Northway K-6	June 22-23	25	100
Tok 4-6	June 26-30	74	444
Adventurer	August 1-3	9	108
Northway K-6	August 7-8	25	100
TOTAL		398	2052

The Tanacross/Mansfield camp had an interesting international and cross cultural flavor. Tanacross Village was hosting 12 students from Hokkaido, Japan who were participants in this camp in addition to the village youth. The Tanacross students had visited Japan in 1988 in an international exchange. This camp proved that environmental appreciation and understanding goes beyond language and cultural barriers!

Nature Activity Day has quickly become the feature spring event for environmental education here. This annual activity day is held on the Saturday prior to National Wildlife Week and serves as a kickoff event for the week's activities ahead. A total of 65 students from around the Alaska Gateway School District attended this special event (390 activity hours) based on the National Wildlife Week theme of predators. The volunteer effort of parents, teachers and friends made this event possible.

The annual National Wildlife Week classroom blitz takes refuge staff to every school and nearly every classroom in the Alaska Gateway School District. Over 20 presentations were given to 350 students accounting for 500 activity hours. Numerous other special classroom activities were conducted through the year by Outdoor Recreation Planner Westenburg and Park Ranger Perham, accounting for 421 student visits and 525 activity hours. In addition to meeting the refuge's environmental education goals, these classroom hours are another powerful public relations and communication tool in the area villages.

Park Ranger Craig Perham gets an excited response during a National Wildlife Week classroom visit. 3/89, TNWR 89-45, WKB

The refuge completed its third year of the four year chum salmon planting project in the Tok River. This project is being carried out by Tok school students in cooperation with the Alaska Department of Fish and Game and refuge staff. By all indications, the transplants look successful and the students may begin to see early returning salmon in the fall of 1990. What an outstanding educational experience this project has been for all involved.

3. Outdoor Classrooms - Teachers

Outdoor Recreation Planner Westenburg, assisted by regional Environmental Education Specialist Janet Ady presented three sessions at the district wide teacher in-service in October.

*Alaskanized Resource Education: An introduction to Alaska specific environmental education materials

*Awareness to Action: Using natural resource education material to promote community and political action

*Junior Naturalists: An opportunity for individualized instruction

Our most popular teacher project is our annual environmental education resource packet which is prepared for all district teachers each fall. This packet is a comprehensive list of all the media resources, environmental education curriculum, reference materials and hands-on materials such as furs and skulls that are available in our library. This easy to produce packet has resulted in a great deal of teacher participation.

4. Interpretive Foot Trails

The primary project of the YCC program this year was the construction of Tiaga Trail, a 3/4 mile loop nature trail at Deadman Lake campground. This project will be completed in 1990 and will serve as an outdoor classroom site as well. Planning has begun to stabilize and sign two other trails (Hidden Lake and Border Ridge) as hiking trails.

Taiga Trail, a 3/4 mile loop nature trail is under construction at Deadman Lake Campground. 7/89, TNWR 89-46, CJP.

5. Interpretive Tour Routes

The Alaska Highway serves as the northern boundary of the refuge for approximately 65 miles. In addition to substantial private tourist traffic, several major tour companies travel this section of highway via motorcoach as part of their Alaska tours.

Several major tour companies travel the Alaska Highway utilizing refuge interpretive facilities. 7/89, TNWR 89-47, DLW

The refuge has developed a model interpretive highway tour route along the highway. The route is bounded on each end by the Tetlin National Wildlife Refuge Visitor Center near the Alaska/Yukon border and the Alaska Public Lands Information Center in Tok. Along the route, six roadside interpretive exhibits have been installed at pullouts and several more are planned for 1990. These pullouts are very popular rest stops and the exhibits are a welcome attraction. The recently reconstructed Alaska Highway provides many excellent scenic vistas and occasional opportunities for wildlife observation. The Tetlin Passage includes a milepost natural history guide for highway travelers. An audio tour cassette tape is planned for the tour route in the near future.

Signs such as these mark the refuge boundaries along the Alaska Highway. 8/88, TNWR 89-48, DLW

TABLE 23 Visitors Entering Alaska via the Alaska Highway by Month in 1989

MONTH	VISITORS	MONTH	VISITORS
January	2,246	July	29,406
February	1,901	August	18,902
March	3,131	September	7,394
April	5,212	October	3,457
May	10,436	November	2,783
June	21,900	December	2,364
TOTAL			109,132

6. Interpretive Exhibits/Demonstrations

Imagine a perfect day in interior Alaska - clear blue skies, 75 degrees, no wind and no mosquitoes. Now picture sitting out on the deck of a new log building looking out over a beautiful wetland basin at the snow covered mountains in the distance. That's how it was August 16, 1989 for the dedication of the new Tetlin Visitor Center. A host of Regional Office dignitaries were on hand including the key note speaker Assistant Regional Director (Refuges & Wildlife) Dr. John Rogers. Who would of guessed there are so many details to think about when having a dedication. The ceremony came off without a hitch, except getting a late start, which is really quite a miracle when you consider the ground to air to ground logistics between the visitor center and Anchorage. We were quite proud of the polish and shine everything and everyone on the refuge showed. No one even guessed that most of the crew had been up till the wee hours of the morning the two previous nights installing the last of the exhibits or that Refuge Manager Breeser had been up since 5:00 am that day washing and waxing vehicles. Everybody should have to do this, at least once!

The Tetlin NWR Visitor Center dedication was held on August 16, 1989. 8/89, TNWR 89-49, WKB.

The exhibits and signing at the visitor center were fabricated by Wilderness Graphics of Tallahassee, Florida. Wilderness Graphics continues to provide high quality products in a "user friendly" manner. The feedback received is that our exhibit package is the highest quality, most timely and least expensive visitor center done by the Service in this region. The exhibits are built around the trapper cabin theme of the center. In addition to the natural and cultural history of the Tetlin, they provide an orientation to the National Wildlife Refuge System in Alaska.

In a short, 90 day season, June 12 to September 11, the center received 18,374 visitors. A doubling of traffic volume during the 1990 season is expected.

The visitor contact area at the headquarters in Tok is also a popular stop for tourists to the area. Approximately 500 visitors came to the office in 1990.

The refuge actively cooperates in the Tok Alaska Public Lands Information Center by providing two seasonal volunteer employees. This busy center had 45,662 visitors in 1989. Approximately 90 percent of this traffic comes during the months of June, July and August.

The refuge sponsors wildlife movies at the Alaska Public Lands Information Center in Tok.
6/88, TNWR 89-50, CJP

The summer wildlife movie programs at the Tok Alaska Public Lands Information Center were highly successful again this year. Attendance was up from 1988 but still not as high as in 1987 when evening movies were offered. At a spring public meeting, the Tok Chamber of Commerce reaffirmed its opposition to evening showings, feeling the evening programs compete with private businesses by taking away tourists and their dollars. Therefore, our daytime schedule remained.

TABLE 24 Annual Attendance at FWS Wildlife Movie Programs - Tok Alaska Public Lands Information Center

YEAR	# SHOWS	ATTENDANCE	AVG. ATTEND	ACTIVITY HRS
1987	324	10,682	33	5,341
1988	597	8,467	14	4,234
1989	634	9,424	15	4,712
TOTALS	1555	28,573	18	14,287

Six roadside interpretive pullout displays are currently in place.

Milepost 1227 - Corridors for Passage
Milepost 1229 - The Greatland and its People
Milepost 1243 - The Changing Landscape
Milepost 1252 - Solar Basin
Milepost 1269 - Highways of Water
Milepost 1273 - Ponds are not Forever

Roadside interpretive displays are a popular attraction with Alaska Highway travellers. 8/88, TNWR 89-51, DLW.

7. Other Interpretive Programs

Refuge Remarks, a regular column in Tok's bi-weekly newspaper, the Mukluk News, completed its third volume this year. These 24 news releases remain an effective means of relating refuge happenings to the area public.

The Tetlin Passage, a four page natural history newspaper for the refuge was completed and printed in May. This challenge grant project was written by members of the Upper Tanana Natural History Association, produced by the Alaska Natural History Association, and printed with Fish & Wildlife Service challenge grant funding. The Tetlin Passage received a first place award in the 1989 National Association for Interpretation-Interpretive Communication Awards competition. Yes, the Tetlin Refuge can compete with the big kids, as Yellowstone National Park was second and a Forest Service newspaper received third place in this category. A 1990 insert is being prepared with Alaska Natural History Association funding.

At the annual meeting of the Alaska Natural History Association in December, the refuge was awarded a $5,000 development fund grant. This money which we hope will be matched with Fish & Wildlife Service challenge grant money, is for the development of a full color natural history book featuring four adjacent conservation units in this area; Tetlin National Wildlife Refuge and Wrangell St. Elias National Park in Alaska, and Kluane National Park and Kluane Game Sanctuary in the Yukon Territory, Canada.

8. Hunting

The entire refuge is open to hunting in accordance with state regulations. Although hunting pressure is usually light, due primarily to the lack of access to the refuge's interior, some hunting does occur in the vicinity of the Alaska Highway, Northway Village, and along navigable bodies of water.

Late in 1989 the Alaska Supreme Court ruled that the designation of subsistence users by rural and non-rural criteria was unconstitutional. Therefore, most winter subsistence seasons were halted. Although this had little immediate impact on the refuge, the long term implication is that if the state doesn't find another means to regulate subsistence versus sport hunts, the federal government will have to implement our own set of regulations to provide subsistence opportunities.

The refuge currently has three special use permitees for hunting guide and charter operations. Only one of these permittees actively hunts the refuge. He reported a harvest of four Dall's sheep and three moose in 25 days effort in the Cheslina and Stuver Ridge areas. A statewide guide and charter policy is being developed, and the refuge is currently under a moratorium disallowing any additional permitees until the policy is complete. Since the policy is not expected till late summer, 1990, our current permittee situation is expected to be maintained through the coming year.

Most hunters visiting the refuge are in pursuit of waterfowl, and their efforts are presently confined to Fish Lake, Desper - Scottie Creek, Tenmile - Stuver Creek, and the Kalutna River areas. Pressure is usually light, rarely exceeding 50 hunters per day. On opening day, refuge law enforcement officers had to work hard to find hunters on the Fish Lake complex. The absence of the one usual guiding operation, owing to his arrest in 1988 and prison sentence in 1989 for waterfowl violations, greatly reduced the airboat traffic.

A move was initiated by some Northway residents to ban airboats in the area. Our support was sought, but the land around Northway is private, and the state has jurisdiction over navigable waters. The issue has faded with the onset of winter and discussions of a compromise are in the wind.

Sufficiently high water levels provided easy access to refuge wetlands, but hunting pressure remained characteristically light. Alaska's bag limits remain substantially more liberal than those "outside" at eight ducks a day for this area. The most common species in the bag were mallard, pintail, shoveler and green-winged teal.

The "non enforcement" policy regarding spring subsistence harvest of migratory waterfowl appears to have had little effect on spring activity.

Big Game

Moose are the primary target of big game hunters on the refuge. Most activity occurs along major lakes and rivers. Access is via float planes, boats and on foot. Road hunting along the Alaska Highway is very popular among the residents of Northway. Although no precise means for documenting harvest exist, it is felt that it has remained unchanged from recent years. The area's reputation for low moose populations is a major factor in the limited number of hunters.

The overabundance of caribou on the refuge again this winter provided an alternative for subsistence meat diets. A late season for caribou to the north of the Alaska Highway brought out a few subsistence hunters. Most locals had already taken a caribou along the Taylor Highway earlier in the fall. Alaska Department of Fish & Game issued 152 special subsistence permits to residents of Tetlin and Northway Villages for caribou. For the most part, if you wanted a caribou, you had one.

The Tok area is well known for its Dall's sheep. The refuge itself is of lesser acclaim, but non-permit areas such as the refuge highlands are of increasing interest to hunters.

Both black and grizzly bear are hunted on the refuge, but they are primarily taken incidental to other big game hunts.

9. Fishing

Subsistence fishing for whitefish and burbot continues by villagers on Moose Creek, the Kalutna River, and the Chisana River. Local sport fishermen utilize Jatahmund Lake, American Wellesley Lake, and the Scottie-Desper Creek areas.

Non-local sport fishing occurs primarily along the Alaska Highway, with the majority of use coming from visitors who stop at anything that looks like a stream crossing. Fish stocks, primarily grayling, have been overharvested or depleted in accessible areas. Fly-in sport fishing occurs on Jatahmund Lake, American Wellesley Lake and Takomahto Lake. Fisherman usually report that the scenic qualities and the wilderness experience are more appreciated than the fishing success which is sometimes as low as one or two fish per person per day. The stocked rainbow trout fishery at Hidden Lake is receiving increased use, both by locals in the winter months and non-locals in the summer.

10. Trapping

Subsistence trapping is carried out on refuge lands by local residents only. Although a significant amount of trapping occurs in areas within the boundaries of the refuge, much of it occurs on private lands, and is centered around the village of Northway and the lands to the northeast. Seven trappers make long line snowmachine trips into the central portions of the refuge, and two airplane trappers harvest fur animals in the more remote southern sections.

Primary furbearers captured include muskrat, marten, red fox and lynx. Prices started to level out and drop slightly on marten and lynx, with $70 - $90 averages being paid on marten, with a high of $140, while lynx were averaging $250 - $400 with a top price of $800. Red fox, although being plentiful, experienced sharp price drops, and were only bringing an average of $20. Muskrat populations continue to fall, due mainly to freeze out. Most muskrats are trapped in the spring at "push-ups" or feeder houses. This normal process was hampered by the presence of a large number of caribou in traditional trapping areas which totally destroyed the push-ups. Apparently, caribou relish the aquatic plants which muskrats push up on the ice because they totally destroy or consume each feeder house present on a lake.

Beaver occur in moderate densities throughout the refuge, but little trapping effort takes place for this species. Beaver are generally trapped when they are prime in March or April which makes it difficult because the ice is so thick. Current low pelt prices discourage most trappers from spending their time to harvest this animal. What few beaver are taken are usually trapped by natives who then tan them and sew the hides into artifacts for sale.

Table 25 gives a refuge perspective on furbearer harvest.

Trapping is still looked upon as an integral part of life to the Alaskan lifestyle, and is still an important economic activity for many rural residents.

Table 25. Furbearer Harvest and Population Characteristics on Tetlin National Wildlife Refuge During the Winter of 1987-1988

SPECIES	ESTIMATED HARVEST	POPULATION CHARACTERISTIC	AVERAGE MARKET VALUE
beaver	20	increasing	$ 600
muskrat	1000	stable	2,000
marten	350	stable	26,000
mink	15	stable	450
fox	60	increasing	900
lynx	20	stable	5,000
wolf	4	stable	600
wolverine	2	decreasing	300
river otter	2	decreasing	150
TOTAL			$36,000

11. Wildlife Observation

The Alaska Highway provides limited opportunities for wildlife observation. Several locations along the highway are excellent areas for viewing waterfowl. Increased visitation to the state, coupled with the development of our interpretive facilities, has certainly resulted in increased wildlife observation. It is estimated that 25 percent of all Alaska Highway travelers participate in wildlife/wildland photography, and that another 50 percent actively pursue wildlife/wildland observation. The number of non-consumptive recreational users canoeing, rafting and boating on the refuge is experiencing a modest increase. These uses are estimated at 100 user days per year and 800 activity hours.

13. Camping

The refuge operates two campgrounds, Deadman Lake and Lakeview. We assumed management of these two sites in 1988 from the Alaska Division of Parks under a Memorandum of Understanding. The 55 year lease agreement for their management was finalized in late 1989. Now that the lease is in place, planned upgrades at both sites can begin.

The refuge's two campgrounds receive heavy use throughout the summer months.
6/88, TNWR 89-52, DLW.

Deadman Lake has 16 campsites and Lakeview has eight. Throughout the summer months these small campgrounds are filled to capacity. They account for 6500 refuge visits and 78,000 activity hours annually.

In addition to the campgrounds, there is substantial overnight use by recreational and other vehicles at the roadside pullouts. It is estimated that one percent of highway travelers overnight at undesignated locations along the refuge's boundary.

14. Picnicking

There is one official picnic area located along the Alaska Highway. It is currently under the management of the State of Alaska Department of Transportation but it is maintained by refuge staff through an informal agreement. This and other roadside pullouts are popular picnic areas, as approximately three percent of highway travelers use the sites for this purpose.

15. Off-Road Vehicling

Although permitted on designated trails by virtue of the Alaska National Interest Lands Conservation Act, the refuge is closed to off-road vehicles. Limited off-road vehicling does occur, however, during the hunting season along drainage bottoms. This is allowed because the state has jurisdiction below mean high water mark of all navigable waters. Little or no resultant damage occurs from this limited use.

During the summer of 1989 we were asked to place a barrier and post notices at the trailhead to Hidden Lake to curtail off-road vehicles. The trail crosses private property and all terrain vehicle activity had seriously damaged the trail. The barrier was installed, and as a result several comments against this enforcement of regulations were received, but primarily from locals who had never even been down the trail. Negotiations with the landowner for an access easement are currently under way. The trail remains open to snowmachine use in winter months, as well as foot traffic throughout the year.

17. Law Enforcement

It was a quiet year for enforcement on the Tetlin. The absence of one key charter operation in the Northway area made a huge difference in waterfowl activity. Outdoor Recreation Planner Westenburg received Law Enforcement authority this spring bringing the number of refuge officers to three, as Refuge Manager Breeser and Assistant Manager Oliveira enjoy the pleasures of this duty. Breeser and Oliveira attended spring refresher at Marana, Arizona, and all three officers qualified (barely) in Fairbanks this fall.

Most enforcement activities are of a preventative nature through information dissemination and high profile during the hunting season. As in past years, waterfowl hunting parties in the more heavily utilized areas were contacted, and given regulations and time tables. Any regulation changes were also discussed. This practice has been found to be extremely useful in gaining compliance. For the fourth year in a row, shooting started an stopped at legal hours which is quite an accomplishment compared to historical hunting practices in the area. It did not matter that opening day had fog so thick you couldn't see the end of your shotgun.

As law enforcement officers, we are still dealing with a spring subsistence waterfowl season that is technically illegal by law, but is allowed under regional policy. Although a status quo seems to be being maintained, someone will undoubtedly test us on this one. The current situation creates a no win scenario for us as professional managers, and generally pits natives against non-natives. Given the current status of waterfowl populations, the continued practice of allowing a spring hunt is extremely hard to justify biologically, even if it is based on cultural and traditional values.

18. Cooperating Associations

The Alaska Natural History Association Sales Outlet completed its fifth year of operation at the refuge. The opening of the new visitor center took the Tetlin outlet to a new level of operation this year. Sales increased almost 700%, from just over $2,000 in 1988 to $14,585 this year. With the opening of the visitor center, most inventory was moved from our headquarters in Tok to the center. Limited items were kept at the office to meet the demand there. During the winter months when the visitor center is closed, the office outlet remains open.

The major challenge this year was keeping inventory on the shelves. A few weeks after opening the new center in June, the inventory was completely sold out! Some quick stock transfers from the Tok Alaska Public Lands Information Center and some reorders kept us open with limited stock throughout the summer.

Sales volume is expected to increase sharply again next year. Factors influencing this will be having adequate stock on hand, operating a full season at the visitor center, and increased use of the center by tour bus traffic.

1988 sales revenues were used to produce the Tetlin Passage, a four page natural history newspaper. A total of 80,000 copies were printed and 30,000 distributed in 1989. At the annual Alaska Natural History Association board meeting, the Tetlin Refuge was awarded a $5,000 development fund grant to begin work on a natural history book for this area. Sales for the period from 1985 to 1989 are shown in Table 26.

Sales at our cooperating association outlet skyrocketed this year with the opening of the new refuge visitor center.
8/89, TNWR 89-53, WKB

TABLE 26. 1985 - 1989 Sales - Tetlin NWR Alaska Natural History Association Outlet

YEAR	SALES	% INCREASE
1985	875	-
1986	1,122	28
1987	1,131	-
1988	2,240	100
1989	14,585	700

I. EQUIPMENT AND FACILITIES

1. New Construction

The Tetlin Visitor Center was built in 1988 and accepted in December of that year by the Division of Engineering. However, minor corrective measures were needed including the replacing of the sod roof, re-installing the carpeting, touch up painting, and a general cleaning - both inside and outside. In addition, negotiations between the Regional Office and the contractor resulted in the refuge paying an additional $5,000 and the Regional Office $10,000 so the contractor could bring the parking lot down to grade, and gravel the area. The contractors work was completed in May, 1989.

The exhibits for the center arrived in bits and pieces from the contractor, Wilderness Graphics. This was due to the lateness of the package being awarded. The displays were installed as they arrived, and the refuge staff worked several long evenings and weekends to set the displays in place prior to the June 12 opening of the center.

The visitor center's water system was a source of headaches throughout the year. Originally drilled in 1988, the well was capped for the winter. The driller returned in the Spring, and attempted to "develop" the well. After one day of moderate flow, the well went dry. It is assumed that a fissure opened during the development process allowing the water to escape.

The driller returned and brought the well down another 200 feet before hitting a vein of sufficient water. The well developed and the center had water which was welcome after three weeks of watering the sod roofs of the center and cache by hand. Unfortunately the water contains a high amount of suspended solids which render it unsuitable for drinking. Plans are underway to develop a filtration system that is both functional and cost effective to correct this situation.

2. Rehabilitation

New furniture and room partitions for the Northway bunkhouse made the building "more liveable" for the four summer residents in 1989. The final touches, floor insulation and a building skirt, will be installed in early 1990.

The warehouse, located adjacent to the bunkhouse in Northway, received insulation and new metal siding. The combined efforts of Fire Management Officer Vanderlinden and Biological Technicians Elisa and Peter Butteri saved the refuge from paying a contractor to complete the job. A final outside door will be installed in June.

3. Major Maintenance

The refuge's super cub, N3685Z, was sent to Anchorage in January to be re-skinned. The aircraft came to the refuge in 1988 from King Salmon where it had been confiscated and forfeited by its previous owner. The plane's fabric was in deplorable shape, and the new skin was sorely needed. In addition, the contractor installed long range fuel tanks which have added two hours of flying time to the craft. The contractor finished the work in April, but the plane was returned several months later when it was discovered that he incorrectly installed the leading edge on the aircraft's wings. After two weeks in the shop, the super cub was returned to the refuge.

During the time N3685Z was in Anchorage, the Office of Aircraft Services, loaned the refuge and Arctic Tern which was the property of the National Park Service. Equipped with wheel/skis, the Tern required a much longer take off area than the supercub, and this made for a few white knuckled takeoffs from refuge lakes.

Our "loaner" Arctic Tern provided staff with decent transportation while the super cub was being re-skinned.
2/90, TNWR 89-54, WKB

The refuge's super cub re-skinned, painted and looking pretty. 4/89, TNWR 89-55, WKB

One problem that has plagued the super cub since we received it in 1988 is the inadequate heating system. The Office of Aircraft Services is required to supply aircraft which have "adequate" heating systems. They contend that the aircraft's system is adequate. However, what may be adequate in Anchorage is a far cry from it in Tok where temperatures are considerably colder. The Regional Office is currently negotiating with the Office of Aircraft Services to have the problem corrected.

Throughout the fall months and into the winter of 1989/90, the refuge residence on "C" Street has been experiencing problems with its heating system. The problem baffled local repairmen, as the furnace would run one day and not the next. The fuel line was constantly being bled to evacuate air from the line, and finally, compressed air was injected into the line to free it of any debris, if present. This was all to no avail, as the problem persisted. The fuel tank, all 500 gallons of it, was pumped out, and the fuel replaced, and as a last ditch effort, a new above ground 500 gallon tank and line was installed until weather conditions permit us to dig up the inground tank. Although it still experiences periodic problems the furnace is now operating with a higher degree of reliability than before, much to the happiness of the residents of the home.

4. Equipment Utilization and Replacement

The refuge received a new Ford Aerostar Van in June. The vehicle was sorely needed because staff and program increases had left us without sufficient transportation for everyone. We have requested an additional vehicle for the upcoming field season.

In December, the refuge's copy machine was replaced. The Canon PC 24 had served the refuge faithfully, but it could not keep up with the increasing volume of paper that the staff generates. It's replacement, a Xerox Model 5028, has document feed, a sorter, and other features not available on the Canon.

Additional equipment received during 1989 included a Fax machine, part of a region wide order, a .375 H&H rifle for use as bear protection when working in the field, and a 16mm movie projector for use at the visitor center.

5. Communications Systems

Two King/Bendix radios were received and installed in refuge vehicles.

6. Computer Systems

No new computers were received in 1989. However, a Logical Connection which ties the three refuge computers to the station's laser jet printer was purchased and installed.

8. Other

To guard against a possible freeze-up in the refuge residences, four electric generators were purchased. A local electrician was hired to install outlets in each garage which were connected to the electrical circuits for the furnace, kitchen outlets and a light bank in the living room area. This will allow us to have electricity supplied to vital areas in each household, and will save the refuge from having to replace cracked pipes in the event of a power outage during the long winter season. Work on this project is scheduled to be complete in January, 1990.

J. OTHER ITEMS

1. Cooperative Programs

The Tetlin Alaska Natural History Association Outlet completed its fifth year of operation at the Tok headquarters building. In June, a second outlet was opened at the Tetlin Visitor Center. The public's response to the outlet was nothing short of phenomenal, with gross sales jumping from $2,240 in FY88 to $14,585 in FY89.

The cooperation with the National Park Service in the Wrangell-St. Elias National Park/Preserve continued in 1989. In the agreement, the refuge and park staff exchange data and use of facilities, and meet at least once per year to discuss mutual problems such as permitting, cabins and off road vehicle violations.

In January, the refuge signed an agreement with the Tetlin Native Corporation to allow Fish and Wildlife Service entry onto corporation lands for the purpose of conducting wildlife surveys.

A cooperative agreement between the refuge and the State of Alaska, Department of Fish & Game (ADF&G) was signed in December to allow for the transfer of funds for helicopter rental. Currently, there are no Office of Aircraft Services (OAS) approved helicopters in the Tok area. The agreement allows us to accomplish work in remote areas utilizing personnel from ADF&G and a local helicopter.

2. Other Economic Uses

Six Special Use Permits were issued for nine cabins on the refuge. These cabins are maintained for subsistence hunting and trapping, and in one case for a guiding business. An additional permit was issued for the erection of a subsistence tent frame. Two permits were issued for guiding purposes, and one was issued for an air taxi operation on refuge lands.

An access permit was written to allow a rural business to lay plastic pipe over refuge land to draw water from a nearby lake.

4. Credits

This report is the product of a total team effort.

STAFF	SECTION
Refuge Manager Breeser	Introduction,A,H10,K
Assistant Manager Oliveira	D1-4,6,E,J
Biologist Doyle	D-5,G
Fire Management Officer Vanderlinden	C,F
Outdoor Recreation Planner Westenburg	H1-9,11-19
Pilot Bohman	I
Secretary Rallo	B,L

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K. FEEDBACK

Compatibility: Do We Know What It Means

Too often we work with terms that don't have a black and white definition. Terms like subsistence, navigability, traditional uses, and compatibility are every day phrases that are commonly used by us and the general public in Alaska. When we combine these terms with descriptive words like significant, sufficient, reasonable, detrimental, materially and adversely, we are really getting into a grey zone. Certainly there is a good argument that can be made that terminology like this can work to our benefit because it gives us plenty of latitude in making decisions. However, on the reverse side of the coin, it also gives other interests an arguable point.

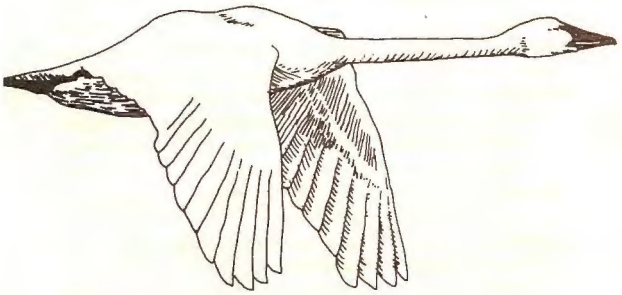
Webster's Dictionary defines compatible as - capable of living in harmonious, agreeable, or friendly association with another or others. The Refuge Manual (5RM 20.6) defines a use to be compatible if it will not materially interfere with or detract from the purposes for which a refuge was established. Are these two definitions the same? Yes - No - Maybe?

I believe we all realize that a compatibility test applied for a certain use in one area would probably get a different result if it were applied to the same use in another area. This is the way it should be, but it certainly doesn't clear up what is compatible. Does the public understand how a use can be allowed on one refuge and not allowed in another? Sometimes.

It is obvious that refuge managers disagree with what compatibility really means. In quoting from a 1988 Wilderness Society survey, when managers were asked to select one or two phrases that best define compatibility, 64% of the refuge managers questioned selected "does not adversely affect the refuge fish, wildlife, or habitats", and 32% selected "contributes to achieving refuge purposes". The phrase that probably best described compatibility, "is not detrimental to achieving refuge purposes", was selected by 50% of the refuge managers questioned.

I am not trying to be facetious about this, nor do I have a better alternative to handling uses that are occurring or may occur. All I am trying to point out is the problem that managers (this manager anyway) face in making decisions in dealing with terms that are open ended. I am confident that the great majority of all decisions at the field level protect wildlife and habitat as first priority. Our Service Mission Statement may give us the clearest direction - "To provide, manage, and safeguard lands and waters to meet people's needs...associated with wildlife... and (these) lands are protected, enhanced and made available to the public for observation and limited use.

Birds



of the TETLIN National Wildlife Refuge, Alaska

General Notes

Loons—Grebes—Swans
Geese—Ducks

Hawks—Eagles—Falcons
Grouse—Cranes—Rails

Plovers—Sandpipers
Jaegers—Gulls—Terns

Doves—Owls—Kingfishers
Woodpeckers—Flycatchers—Larks
Swallows—Jays—Chickadees—Dippers

Thrushes—Kinglets—Pipits
Waxwings—Shrikes—Warblers
Blackbirds—Sparrows—Finches

Field Notes

BIRDS OF THE TETLIN NATIONAL WILDLIFE REFUGE

The Tetlin National Wildlife Refuge occupies about 700,000 acres of the Upper Tanana River Basin. Locally this area is called the Tetlin-Northway Flats. It is well-known for bird habitat, serving not only as an important breeding ground but also as an essential migration stop along the route between Alaska and wintering areas in the Lower-48. Some of the more significant species which pass through the area are: sandhill cranes, trumpeter swans, white-fronted geese, Canada geese, wigeon, green-winged teal, mallards, pintails, blue-winged teal, northern shovelers, and scaup (both lesser and greater). Large numbers of other birds also use this same corridor on their migration routes including bald eagles, red-tailed hawks, marsh hawks, arctic loons, golden plovers, and numerous small passerine species including warblers, thrushes, and sparrows.

Most of the refuge is composed of a mixed coniferous-deciduous forest interspread with lakes, streams, and bogs. Several mountainous areas are also present. The most extensive habitat type is the black spruce forest. Other vegetative types include: deciduous forest, riparian woodlands, and a mixed riparian coniferous forest dominated by white spruce.

During spring migration it is common to see blackpoll warblers, ruby-crowned kinglets, and Wilson's warblers moving through the lowland forests on their way to breeding locations. Ducks, geese, swans, cranes, and shorebirds also share the refuge's varied water habitats much in the same manner. Riverine habitats afford nesting habitat for many species such as Canada geese, wigeon, and spotted sandpiper. Lakes, bogs, and streams are used for feeding, nesting, and cover, depending upon the species.

USING YOUR CHECKLIST

This leaflet lists all species which could be observed on the refuge at some time during the year.

The abundance of each bird is designated by season:

c — common (certain to be seen in suitable habitat)
u — uncommon (present, but not certain to be seen)
o — occasional (seen only a few times during a season)
r — rare (seen at intervals of two to five years)

Birds known to nest in the region have a asterisk after their name.

Seasonal appearances at Tetlin are listed by the columns:

Sp — April–May
S — June–August
F — September–October
W — November–March

General Notes

Loons—Grebes—Swans Geese—Ducks

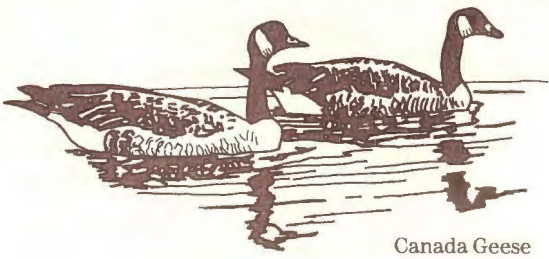
Hawks—Eagles—Falcons Grouse—Cranes—Rails

Plovers—Sandpipers Jaegers—Gulls—Terns

Doves—Owls—Kingfishers Woodpeckers—Flycatchers—Larks Swallows—Jays—Chickadees—Dippers

Thrushes—Kinglets—Pipits Waxwings—Shrikes—Warblers Blackbirds—Sparrows—Finches

Field Notes



Canada Geese

	Sp	S	F	W
_____ Common Loon*	o	o	o	
_____ Arctic Loon*	c	c	u	
_____ Red-throated Loon*	o	o	u	
_____ Red-necked Grebe*	u	u	u	
_____ Horned Grebe*	c	c	o	
_____ Western Grebe	o	r	r	
_____ Tundra Swan	u	o	u	
_____ Trumpeter Swan*	u	u	u	r
_____ Canada Goose*	u	u	u	
_____ Brant	r	r		
_____ Greater White-fronted Goose	u	o	u	
_____ Snow Goose	o		o	
_____ Mallard*	c	c	c	o
_____ Gadwall	o	o	o	
_____ Northern Pintail*	c	c	c	
_____ Green-winged Teal*	c	c	c	
_____ Blue-winged Teal*	u	u	u	
_____ Northern Shoveler*	c	c	c	
_____ American Wigeon*	c	c	c	
_____ Canvasback*	u	u	u	
_____ Redhead*	o	o	o	
_____ Ring-necked Duck*	u	u	u	
_____ Greater Scaup*	u	u	u	
_____ Lesser Scaup*	c	c	c	
_____ Common Goldeneye*	u	u	u	
_____ Barrow's Goldeneye*	u	u	u	
_____ Bufflehead*	c	c	c	
_____ Oldsquaw*	u	o	o	
_____ Harlequin Duck*	u	u	u	
_____ White-winged Scoter*	c	c	u	
_____ Surf Scoter*	u	u	u	
_____ Ruddy Duck	o	r	r	
_____ Common Merganser*	o	o	u	
_____ Red-breasted Merganser	o	o	o	

Arctic Loon

Loons—Grebes—Swans
Geese—Ducks

Hawks—Eagles—Falcons
Grouse—Cranes—Rails

Plovers—Sandpipers
Jaegers—Gulls—Terns

Doves—Owls—Kingfishers
Woodpeckers—Flycatchers—Larks
Swallows—Jays—Chickadees—Dippers

Thrushes—Kinglets—Pipits
Waxwings—Shrikes—Warblers
Blackbirds—Sparrows—Finches

Field Notes

Marsh Hawk

	Sp	S	F	W
_____ Northern Goshawk*	u	u	u	o
_____ Sharp-shinned Hawk*	u	u	u	
_____ Red-tailed Hawk*	u	u	u	o
_____ Swainson's Hawk	o			
_____ Rough-legged Hawk	u	o	u	
_____ Golden Eagle	u	o	u	
_____ Bald Eagle*	c	c	c	u
_____ Northern Harrier*	u	u	u	o
_____ Osprey*	u	u	u	
_____ Gyrfalcon*	u	u	u	
_____ Peregrine Falcon	o	o	o	
_____ Merlin*	u	u	u	
_____ American Kestrel*	u	u	u	
_____ Spruce Grouse*	c	c	c	u
_____ Ruffed Grouse*	u	u	u	u
_____ Willow Ptarmigan*	u	u	u	u
_____ Rock Ptarmigan*	u	u	u	u
_____ White-tailed Ptarmigan*	o	o	o	o
_____ Sharp-tailed Grouse*	u	u	u	u
_____ Sandhill Crane*	c	u	u	
_____ Sora	r	r		
_____ American Coot*	o	o		

Spruce Grouse

Field Notes:

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_____

Hawks—Eagles—Falcons
Grouse—Cranes—Rails

Plovers—Sandpipers
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Doves—Owls—Kingfishers
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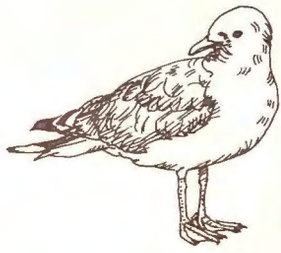
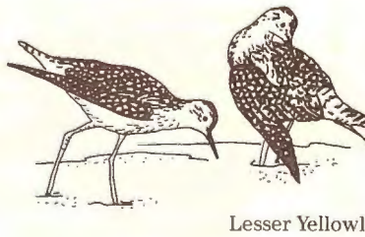
Field Notes



Mew Gull

		Sp	S	F	W
____	Semipalmated Plover*	c	c	u	
____	Killdeer*	o	o		
____	Lesser Golden Plover*	u	u		
____	Black-bellied Plover	o	o		
____	Hudsonian Godwit	r			
____	Whimbrel	u	o		
____	Upland Sandpiper	o	o		
____	Greater Yellowlegs	r	r		
____	Lesser Yellowlegs*	c	c	u	
____	Solitary Sandpiper	u	o		
____	Spotted Sandpiper*	c	c	u	
____	Wandering Tattler*	u	u	o	
____	Ruddy Turnstone	r			
____	Red-necked Phalarope*	u	u		
____	Common Snipe*	c	c	c	
____	Long-billed Dowitcher*	u	u		
____	Surfbird	o	o		
____	Semipalmated Sandpiper	u	o		
____	Western Sandpiper	r	r		
____	Least Sandpiper*	u	u		
____	White-rumped Sandpiper				
____	Baird's Sandpiper*	u	u		
____	Pectoral Sandpiper	u	o		
____	Dunlin	r			
____	Stilt Sandpiper	r			
____	Buff-breasted Sandpiper	r			
____	Long-tailed Jaeger*	u	u		
____	Glaucous Gull	r	r		
____	Herring Gull	u	o		
____	Mew Gull*	c	c	u	
____	Bonaparte's Gull*	u	u	o	
____	Arctic Tern*	u	u	o	



Lesser Yellowlegs

Field Notes:

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Plovers—Sandpipers
Jaegers—Gulls—Terns

Doves—Owls—Kingfishers
Woodpeckers—Flycatchers—Larks
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Thrushes—Kinglets—Pipits
Waxwings—Shrikes—Warblers
Blackbirds—Sparrows—Finches

Field Notes

Hawk Owl

	Sp	S	F	W
_____ Rock Dove	o	o		
_____ Mourning Dove	r	r		
_____ Great Horned Owl*	u	u	u	u
_____ Snowy Owl	r		r	
_____ Northern Hawk-Owl*	u	u	u	o
_____ Great Gray Owl*	r	r	r	r
_____ Short-eared Owl*	u	u	o	
_____ Boreal Owl*	u	u	u	o
_____ Rufous Hummingbird	r			
_____ Belted Kingfisher*	u	u	o	
_____ Northern Flicker*	c	c	u	o
_____ Yellow-bellied Sapsucker	o	r		
_____ Hairy Woodpecker*	u	u	u	u
_____ Downy Woodpecker*	u	u	u	u
_____ Black-backed Woodpecker*	r	r	r	r
_____ Three-toed Woodpecker*	u	u	u	u
_____ Say's Phoebe*	u	u		
_____ Alder Flycatcher*	c	c	u	
_____ Hammond's Flycatcher*	c	c	u	
_____ Western Wood-Pewee*	u	u	o	
_____ Olive-sided Flycatcher*	u	u	o	
_____ Horned Lark*	c	u	o	
_____ Violet-green Swallow*	c	c	o	
_____ Tree Swallow*	c	c	o	
_____ Bank Swallow*	u	u	o	
_____ Cliff Swallow*	c	c		
_____ Gray Jay*	c	c	c	c
_____ Black-billed Magpie*	u	u	u	u
_____ Common Raven*	c	c	c	c
_____ Black-capped Chickadee*	u	u	u	u
_____ Siberian Tit*	o	o	r	r
_____ Boreal Chickadee*	c	c	c	c
_____ Red-breasted Nuthatch*	r	r	r	r
_____ Brown Creeper	r	r	r	r
_____ American Dipper*	u	u	u	u

Cliff Swallow

Field Notes:

_____

_____

_____

_____

_____

Doves—Owls—Kingfishers
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Thrushes—Kinglets—Pipits
Waxwings—Shrikes—Warblers
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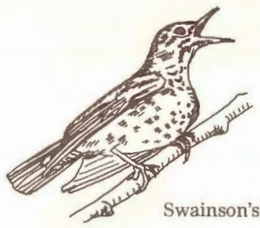
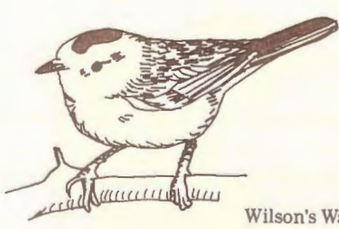
Field Notes



Swainson's Thrush

	Sp	S	F	W
____ American Robin*	c	c	u	r
____ Varied Thrush*	u	u	u	
____ Hermit Thrush*	u	u	u	
____ Swainson's Thrush*	c	c	u	
____ Gray-cheeked Thrush*	u	u	u	
____ Mountain Bluebird*	o	o		
____ Northern Wheatear*	u	u	o	
____ Townsend's Solitaire*	u	u	o	
____ Arctic Warbler*	u	u		
____ Golden-crowned Kinglet	r	r		
____ Ruby-crowned Kinglet*	u	u	r	
____ Yellow Wagtail		r		
____ Water Pipit	c	u	u	
____ Bohemian Waxwing*	u	u	u	o
____ Northern Shrike*	u	u	o	
____ European Starling	r	r		
____ Tennessee Warbler	r	r		
____ Orange-crowned Warbler*	u	u	o	
____ Yellow Warbler*	c	c	o	
____ Yellow-rumped Warbler*	c	c	o	
____ Townsend's Warbler*	u	u	o	
____ Blackpoll Warbler*	u	u		
____ Northern Waterthrush*	c	c	o	
____ Wilson's Warbler*	c	c	o	
____ American Redstart	r	r		
____ Yellow-headed Blackbird	r	r		
____ Red-winged Blackbird*	o	o	r	
____ Rusty Blackbird*	c	c	u	
____ Common Grackle	r	r		
____ Brown-headed Cowbird	r	r		
____ Savannah Sparrow*	c	c	u	
____ Dark-eyed Junco*	c	c	c	o
____ American Tree Sparrow*	c	c	c	o
____ Chipping Sparrow*	u	u	u	
____ White-crowned Sparrow*	c	c	u	
____ Golden-crowned Sparrow*	u	u	o	
____ White-throated Sparrow	r	r		
____ Fox Sparrow*	c	c	u	
____ Lincoln's Sparrow*	c	c	u	
____ Lapland Longspur*	c	u	u	
____ Smith's Longspur	r	r	r	
____ Snow Bunting	c	u	u	o
____ Pine Grosbeak*	u	u	u	u
____ Rosy Finch*	u	u	o	
____ Hoary Redpoll*	c	o	u	c
____ Common Redpoll*	c	c	c	c
____ Pine Siskin	r	r	r	
____ White-winged Crossbill*	u	u	u	u



Wilson's Warbler

Thrushes—Kinglets—Pipits
Waxwings—Shrikes—Warblers
Blackbirds—Sparrows—Finches

Field Notes

Osprey

FOR INFORMATION WRITE:

Refuge Manager
Tetlin National Wildlife Refuge
P.O. Box 155
Tok, AK 99780
Telephone: (907) 883-5312

U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH & WILDLIFE SERVICE

Tetlin National Wildlife Refuge

Visitor Information

Introduction

The Tetlin National Wildlife Refuge was established by the Alaska National Interest Lands Conservation Act (ANILCA) on December 2, 1980. As one of nine new Alaskan refuges established by ANILCA — the refuge was officially recognized as a national treasure.

Tetlin Refuge is one of more than four hundred units of the National Wildlife Refuge System managed for wildlife and its habitat. The refuge objectives for Tetlin include: conserving fish and wildlife populations in their natural diversity, providing opportunities for local subsistence users, and providing opportunity for interpretation and environmental education.

Recreation

Recreational opportunities on the refuge include wildlife observation, hiking, boating, trapping, hunting, camping, and fishing. River rafting is a growing activity on the Chisana and Nabesna rivers. It is advisable to check with refuge personnel prior to a visit for more detailed information.

Access

The Alaska Highway provides access along the northern border of the refuge. Foot access is possible along the highway from the Canadian border to Gardiner Creek and at other points. Small boat access is possible from the Alaska Highway at Desper creek and from the Northway Road at the Chisana River bridge. The Chisana River site will accommodate large boats — up to 18 feet. Charter planes are available in Tok and Northway as well as Fairbanks and Anchorage. Riverboats are also available at Tok and Northway. There are no designated roads or trails for motorized vehicles on the refuge

Hunting and Fishing

Ducks and moose attract most hunters while northern pike and grayling are the most popular sport fish. The deeper lakes generally support pike while most streams support grayling. Information on hunting and fishing is available from the refuge office in Tok or the Alaska Department of Fish and Game. (Address: ADF&G, Tok, Alaska, 99780; or 1300 College Road, Fairbanks, AK, 99701).

Camping

Camping is allowed throughout the refuge. The best summer campsites are riverbars and ridges where insects are less of a problem. Choose sites carefully and be prepared for possible flooding. Dry wood is usually available on river bars or in spruce stands.

- Please "pack out what you pack in." Properly dispose of refuse by burning combustible items and pack out the rest. Fill in firepits and latrines.
- Supplies for camping as well as gas, food, and lodging are available in Tok and Northway, Alaska, and Beaver Creek, Canada.

Weather

In June and July daytime temperatures often exceed 80° F with nightly lows to 40° F. By mid-September daytime temperatures of 45° F and night-time temperatures of 25° F are common. Weather can change rapidly. Snow can occur anytime – sometimes as early as August.

For Your Outdoor Safety and Comfort

- The refuge is generally without trails which makes travel on foot difficult. Some trails appear on maps but they are not identifiable on the ground. Maps and a compass are necessary for an extended trip. Topographic maps are available from the U.S. Geological Survey in Anchorage or Fairbanks and from private sources in Tok.
- Leave a travel plan describing your trip with friends and do not forget to notify them when you return.
- Standard precautions should be taken to avoid unwanted encounters with bears. Make noise when hiking or walking. Keep a clean campsite and store food outside of tents out of bear reach. Do not bury garbage or debris. Burying garbage encourages animals to dig it up and seek other campsites as sources of food.
- Boil or chemically purify water before drinking. Giardiasis, a waterborne intestinal disease is common in Alaska.
- Mosquitoes are famous in Alaska and are a problem in the summer. Be prepared with mosquito netting and/or repellent.

FOR MORE INFORMATION:

Refuge Manager
Tetlin National Wildlife Refuge
Box 155
Tok, Alaska 99780 Telephone: (907) 883-5312

UNITED STATES DEPARTMENT OF INTERIOR
FISH AND WILDLIFE SERVICE

As the Nation's principal conservation agency, the Department of the Interior has basic responsibility for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better, United States – now and in the future.

BUY DUCK STAMPS
SAVE WETLANDS FOR WILDLIFE

GPO 1986 694-838

Private Lands and Cabins

- Large acreages within the refuge have been conveyed to Native corporations and individuals. If you use private lands be sure to ask for permission. If you are uncertain as to land status contact refuge personnel.
- Cabins are scattered throughout the refuge. Their contents are essential to trappers and subsistence users. Cabins or contents should be used **only** in an emergency. If you are forced to use a cabin or its contents notify refuge personnel so supplies can be replaced. Failure to replace supplies could cost the life of a trapper or subsistence hunter.

Educational Opportunities

An interagency visitor center in Tok offers wildlife displays and trip planning information. In addition, the refuge staff offers interpretive programs for visitors and assistance to schools and other groups interested in outdoor classroom experiences.

Wildlife

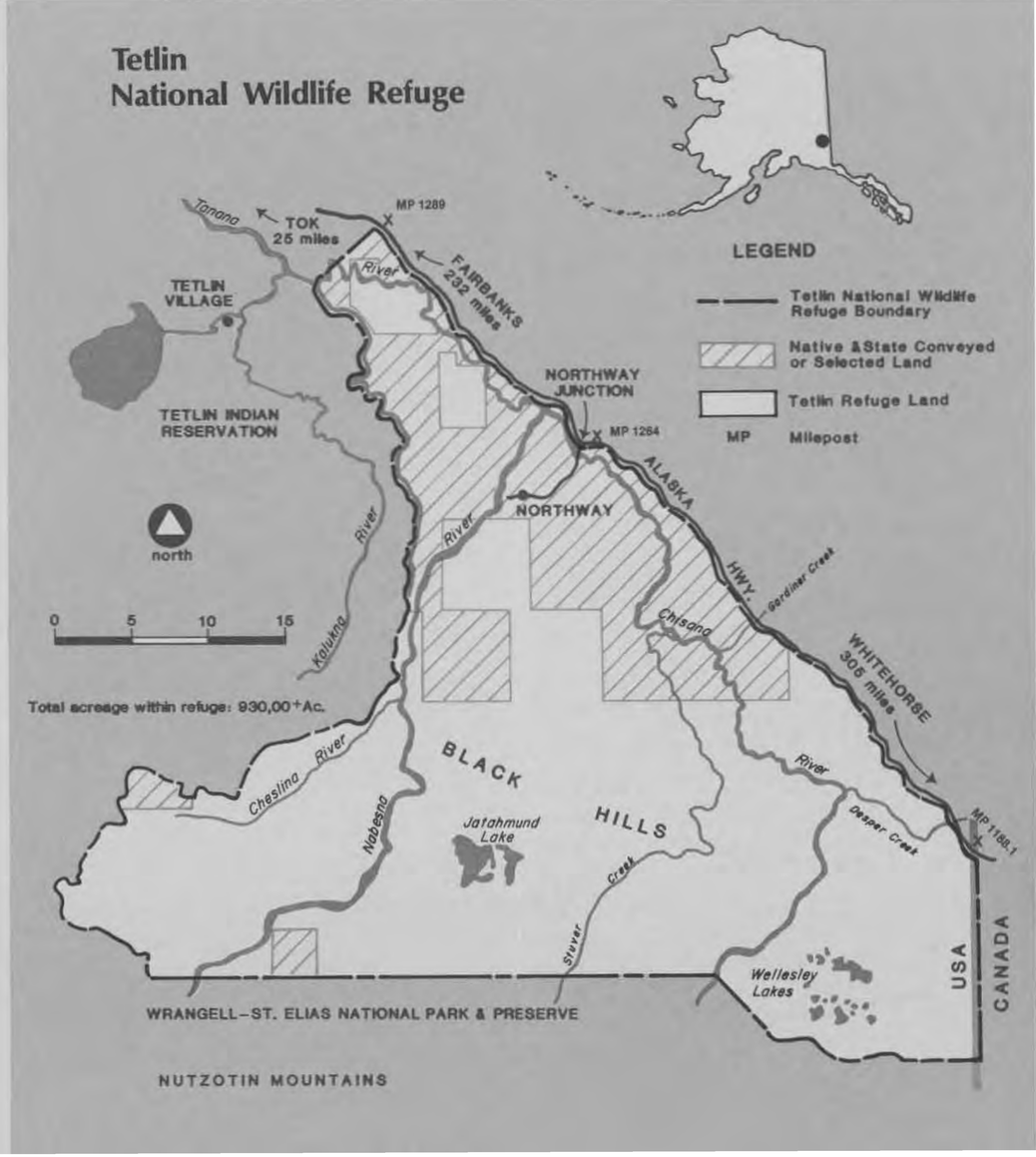
BEARS are unpredictable and should always be considered dangerous particularly sows with cubs. Both black and grizzly bear are found on the refuge. Precautions mentioned earlier for traveling in bear country should be followed.

MOOSE cows are dangerous animals when they have calves. Keep a respectable distance. Never get between a cow and her calf.

BEAVERS AND MUSKRATS and their lodges occur on some of Tetlin's ponds, lakes, and steams. A quiet observer can watch these animals go about their work.

BIRDS are fascinating to observe. More than 150 species of birds may be found on the refuge. Waterfowl, especially ducks, are plentiful. Eagles and ospreys may be observed. Watch, take pictures, but please do not disturb them.

Tetlin National Wildlife Refuge



THE TETLIN PASSAGE

TETLIN NATIONAL WILDLIFE REFUGE 1989

Welcome to the Great Land

by Steve Breeser

Welcome to the Great Land—Alaska, and welcome to the Tetlin National Wildlife Refuge. Alaska is great not only in its size, resources, and people, but also in its unspoiled natural ecosystems—most of which haven't changed since humans first settled this harsh environment. The federal government and the state government have set aside millions of acres of land for the express purpose of protecting and preserving the natural bounty that currently exists for the enjoyment of you and all future generations.

One of these natural areas that was set aside in 1980 was the Tetlin National Wildlife Refuge. For 65 miles, from the Alaska-Yukon border to Midway Lake, the northern boundary of the refuge is the Alaska Highway. The Tetlin is one of 16 wildlife refuges that occur in Alaska. This refuge is one of the smallest, encompassing about 1 million acres, while some of the larger refuges are almost 20 million acres. That's larger than many of the states in the "lower 48."

This area was set aside primarily for the conservation of a nationally significant waterfowl production area. However, because of its size and varied habitat, it provides important habitat for many other migratory birds, as well as furbearers, big game, and fish. The river valleys, foothills, and mountains contain moose, caribou, Dall sheep, grizzly bear, black bears, wolves, wolverine, bald eagles, golden eagles, trumpeter swans, and many other species.

Chisana River Flats near Northway Junction. *Photo courtesy of Tetlin NWR.*

There are two distinctions that set the Tetlin aside from most other refuges in the state. First, this refuge and the Kenai Wildlife Refuge are the only two National

Continued on back (page 4)

History Around the Tetlin

by Kris Thorsrud

Historic exploration and settlement of the upper Tanana region began in the late 1800s. Previously, during Russian and European exploration of Alaska in the 1700s, the upper Tanana was isolated from explorers and missionaries. In the 1870s, trader Leroy McQuesten traveled through Alaska's eastern Interior, making contact with resident Athabaskan Indians and the few individual white gold seekers. In 1885, Lt. Henry T. Allen, Second U.S. Cavalry, and party made their way north from the Copper River area through Tetlin and on to the Tanana and Yukon Rivers, recording the first official exploration in this area. In 1898, the U.S. Geological and Geographical Survey sent an expedition up the White River and over to the Tanana River via Snag and Mirror Creeks. In the early 1900s, white traders—Captain Northway, Herman Kissler, Ted Lowell, Milo Hadjdukovitch among others—established trading posts along the banks and mounts of the Nabesna, Chisana, Tetlin, and Tanana Rivers. These frontier entrepreneurs played an essential role in the settlement of Alaska's eastern Interior. They helped expand trade routes, and introduced local Athabaskan people to tools, food, and methods not seen before.

In 1913, the Chisana Stampede attracted thousands of gold seekers. Individual stampeders traveled the land, coming in contact with the local people, wildlife, and geography of the land.

In the early 1900s, the Athabaskan Indians began the change from a semi-nomadic hunting and gathering lifestyle to a village-based way of life. The 1920s brought the first boat motor to the villages: the 1960s brought snowmachines.

In 1942, the Alaska-Canada Military Highway was completed. This project, spurred on by World War II, opened up the upper Tanana region to development more than any preceding event. Since the opening of the Alaska Highway, settlement and development of Alaska's eastern Interior has steadily progressed.

Historical hunting and fishing sites are located throughout Refuge lands. Tetlin Lake, Gasoline Lake, and Butterfly Lake

Cabin at Moose Creek.
Photo courtesy of Tetlin NWR.

were some of the many regularly used sites for duck hunting. Prominent hills provided excellent lookout sites for moose and caribou. Fish camps were located along the banks of the area's rivers. Remnants of winter beaver camps, muskrat trapping camps, and caribou fences can still be found throughout the Refuge. Pack and foot trails wind their way across the Nutzotin Mountains, to the White River from Mentasta to Tetlin, to Chisana, and north to the historic

Continued on back (page 4)

Why are many visitors similar to rocks in the Tetlin National Wildlife Refuge? They come from "down South"!

GEOLOGY

by Stephanie Hoag

Geologists think of Alaska as a giant jigsaw puzzle made up of many "terranes" or pieces that have moved in at different rates from different places. The ancient core of Alaska is a relatively small part of the state that lies north of here, between the Yukon and Porcupine Rivers. As you drive along the Alaska Highway, you are driving on the piece known as the Yukon Crystalline Terrane. It extends from Nenana and Fairbanks eastward into Canada, and is bounded on the north by the Titina Fault near the Yukon River, and on the south by the Denali Fault. This piece of crust originated hundreds of miles south of the present position, then slid northward along the Titina Fault until it became welded into place alongside Alaska's ancestral core.

Most of the rocks in the Yukon Crystalline Terrane are schists, and you may see that type of rock on the north side of the highway just past Northway Junction. The rocks you see along most of this section of highway, however, are more recently formed granitic rocks. They were created as molten lava pushed up the overlying rocks and cooled slowly underground.

As you enter Alaska and drive toward Northway, you are following the Denali Fault, which lies to the south of the highway. You can spot the fault by looking for sections of a north-facing bluff. It is one of Alaska's largest faults and extends westward past Mt. McKinley. The land on the south side of the fault has slowly moved westward in relationship to the northern side. In very recent years there has not been much movement along the fault, but it is estimated that the land has moved as much as 753 feet since the last ice age ended about 20,000 years ago. While this seems very slow, it can add up over geologic time. Sixty million years ago, if Mt. McKinley has

Continued on back (page 4)


Anemone

Wildflowers Along the Alcan

A Drive Through Evening Primrose Lane

by Jim Sisk


Labrador Tea

Spring and summer in Alaska is brief and the growing season for plants is compacted into a few short months (May-September). The majority of wildflowers bloom from late May to mid-August and, for the highway traveler, provide a colorful foreground to the majestic views of distant rivers and mountains. The diversity of wildflowers is not as great in Alaska as in warmer climates, but the blooming season is short and most species are in bloom at the same time. Very early travelers will find only the willows, alders, and a few sedges in blossom in April.

A traveler on a trip through the interior of Alaska during the period of May through June will find many of our most beautiful flowers providing a blue and white carpet with enough pink and yellow highlights to draw attention. One of the earliest showy plants found along the highway is the Pasque flower (*Anemone patens*), a low-growing, blue to purple buttercup that often pushes up through the remaining snow to bloom. A white cousin of the Pasque flower that blooms at the same time but prefers mossy areas in light shade is the Northern Anemone (*Anemone parviflora*). This buttercup has spreading white petals that have a bluish tint on the back. Another light blue flower of the June roadside is Showy Jacob's Ladder (*Polemonium pulcherrimum*), a


Alpine Blueberry

member of the Phlox family. This plant is many branched with divided leaves and the large flowers are in clusters at the end of the short branches.

A stop and short walk back from the disturbed areas adjacent to the highway will allow sightings of many plants in bloom during June. In low and wet areas, the drooping pink globes of the Bog Rosemary (*Andromeda polifolia*) grace the edges of ponds and wet tussocks. Arctic Sweet Coltsfoot (*Petasites frigidus*) also blooms in the low and wet areas. The blossoms appear before the leaves and are white to pinkish in clusters at the top of bare stalks one to two feet tall. The bright yellow Marsh Marigold (*Caltha palustris*) can also be found on the edges of small ponds. Two orchids can be found in wet areas: the single blossoms of Northern Lady's Slipper (*Cypripedium passerinum*) are white, as are the clustered spike of flowers on Hooded Ladie's Tresses (*Spirnathes romanzoffiana*). On top of the tussocks between the ponds, a shrub with clusters of beautiful white and fragrant flowers can be


Fireweed

identified as Labrador Tea (*Ledum palustre*). The leaves are dull gray above and covered with brownish hairs on the in-rolled underside. Another member of the Heath family occurs in the same area. The shrub with tough grayish leaves and small white drooping globes for flowers is Leatherleaf with the unique Latin name *Chamaedaphne calyculata*! In late June suitable ponds will float the huge yellow blossoms of the Water Lily (*Nuphar polysepalum*). The magenta Bog Laurel (*Kalmia polifolia*) and the Bog Blueberry (*Vaccinium uliginosum*) will also be found in these low moist to wet areas. Ripe blueberries may be picked in late August in these same areas.

The pea family provides the traveler with some of the showiest roadside flowers in Alaska. The pink to red Licorice root (*Hedysarum alpinum*) and red-flowered Northern Sweet-vetch (*Hedysarum mackenzii*) are interspersed with the blue Arctic Lupine (*Lupinus arctica*) and the purple Showy Crazyweed (*Oxytropis splendens*). The drooping Bluebells (*Mertensia paniculata*) of the Borage family can be found blooming along the edge of the forest.

As June wears on into July, the roadsides in some areas become a true **Evening Primrose Lane**. The two species of Fireweed (*Epilobium angustifolium* and *E. pilobium latifolium*) provide a profusion of tall spikes and low clumps of magenta along the disturbed roadside areas. The Prickly Rose adds its pinks on tall spiny stems to the scene. The pale but striking yellow of flowers that seem to have no stem and can be seen on steep banks and dry meadow areas belong to the Alaskan Poppy (*Papaver alaskanum*). Short walks into the forests or down into the bogs and wet areas will allow you to encounter many more beautiful and striking flowers. June and July are the months when the great majority of plants bloom in Alaska.

For information about wild flowers, their identification and uses, you can stop at the Visitor Information Center in Tok and inquire about the availability of field guides, resident experts, or management agencies with in-depth information about vegetation habitats, photography, and locations for field trips. Observing and learning about wildflowers is quite inexpensive and can be a very rewarding experience for the Alaskan traveler. We sincerely hope you have a pleasant and rewarding experience along this **Evening Primrose Lane.**

Be a Bird Detective

Adapted from the game by John Warden

Birds are fascinating to observe. More than 150 species of birds may be found on the Tetlin Wildlife National Refuge. Songbirds, shorebirds, and waterfowl, especially ducks, are plentiful during the summer months. Can you identify some of the birds you may see on the refuge by their color or markings, where they live, what they eat? Why not try your luck at the following game and find out?

How to Play

Each bird has four clues to help you find the right answer. Start at the top and read only the first clue. Fill in the answer if you know it. If you are unable to identify the bird on the first clue, proceed to the second clue, then the third clue, and finally the fourth clue. If you are still not able to identify it, proceed to the next set of clues.

Scoring is based on identifying the birds in the fewest number of clues. The object is to get the highest number of points by totaling all the individual sets of clues when you finally have the correct answer. For example, if you identify the bird on the first clue, you would score 4 points. If you did so on the second clue, you would get 3 points. You'd get 2 points for the third clue, 1 point for the last clue, and no points if you couldn't find an answer.

BIRD A

4. I eat about 20 pounds of aquatic vegetation a day, like tubers and seeds.
3. I am known by my loud, "French horn-like" call.
2. I am the world's largest member of the waterfowl family and the emblem of the Tetlin National Wildlife Refuge.
1. My lifelong mate and I have all-white plumage and our young are called cygnets.

Who am I? _____

Score:

BIRD B

4. I spend the entire year in Alaska and can be seen in the coldest day of winter with my wedge-shaped tail and shaggy throat feathers.
3. I have more than 30 distinct vocalizations, but am well known for my deep resonant "KAW."
2. I am fairly smart, as birds go, and so are my cousins—jays, magpies, and crows.
1. I am the largest songbird and all-black bird in the world.

Who am I? _____

Score:

BIRD C

4. I can be found in the spruce-birch forests throughout Alaska.
3. My sole winter food is spruce needles and on fall mornings you can see me by lake shores, streams, and roads finding grit to grind the needles in my gizzard during winter months.
2. The rusty-orange band at the top of my dark-brown tail sets me apart from my relatives.
1. I am also called by names like Franklin's grouse, Spruce hen, and Fool's hen.

Who am I? _____

Score:

BIRD D

4. I swim low in the water and have a daggerlike bill.
3. When alarmed, I prefer diving for safety instead of flying and can stay underwater more than a minute.
2. I am a sleek-looking bird with a dark head and body, white striped breast, and white speckles on my back.
1. I make a yodelling call on my breeding grounds along lakes in Alaska.

Who am I? _____

Score:

BIRD E

4. I prefer shallow marshes or mud flats when looking for food which usually are insects, mollusks, and small seeds of aquatic plants.
3. I am the smallest duck (about the size of a pigeon) in Alaska and one of the swiftest fliers.
2. The drakes of my species are extremely colorful, they have a cinnamon-red head, green eye stripe and their speculum (the middle feathers in the wing) is green.
1. I am also called a common teal and greenwing.

Who am I? _____

Score:

See back page (page 4) for scoring and answers to "The Bird Detective."

OBSERVING WILDLIFE
Along the Alaska Highway

by Terry Doyle

As you travel along the Alaska highway you may be surprised by the lack of wildlife. But if you look carefully you will see many bird species, and perhaps a beaver or moose.

Most wildlife species are secretive in nature and not easily seen. This is understandable because for many of these species their life depends on it. Species that live off of other species are called predators, the species they live off of are called prey. Most species are prey to some predator and so it becomes important to be secretive when danger threatens.

On the other hand it is in the predators interest to also be secretive so they can sneak up on their prey so that they can survive. It is a constant battle for both the prey and the predators to survive. No wonder it can be so hard to find some species!

Some people seem lucky and see different wildlife species almost without trying. But if you want to rely on more than luck you must begin to think like the wildlife.

One of the first things to think about is a home. Most wildlife species have very specific homes or habitats that they live in. For instance it is much easier to find a moose in a patch of thick brush along a waterway than it is in a thick spruce forest. That is because moose feed on a combination of shrubs and aquatic vegetation during the summer but rarely feed on spruce. On the other hand, as its name implies, the spruce grouse is found in spruce forests, not in open tundra. Getting to know wildlife habitats can become a hobby which lasts a lifetime.

A second factor to consider when trying to view wildlife is the time of day. Almost all wildlife species are most active in the early morning just after sunrise and in the early evening just before sunset. During the middle of the day, when humans tend to be most active, is actually the worst time to try and find wildlife because that's when wildlife species are least active. There are some species such as owls and flying squirrels which are active at night, called nocturnal.

Bull Moose.

Common Loon. Photo by John Gavin.

Moose track.

A third thing to consider when trying to view wildlife is the season. Almost all species of wildlife have seasonal movements and activity patterns. Birds for instance, migrate thousands of miles between wintering and breeding grounds. The best season to view birds in this area is the breeding season of May and June. It is during this season that most birds are actively singing and displaying and can be most easily found. It is also the time of year when birds are most brightly colored. Through July and August birds become more secretive and less colorful. Some species of birds become more visible as they begin to group up in preparation for fall migrations. August is a good time to see migrating greater white-fronted and Canada geese, September is a good time to see migrating sandhill cranes and October an excellent time to see migrating trumpeter and tundra swans. Mammals also make seasonal movements but their movements are more specific to the individual species than are birds.

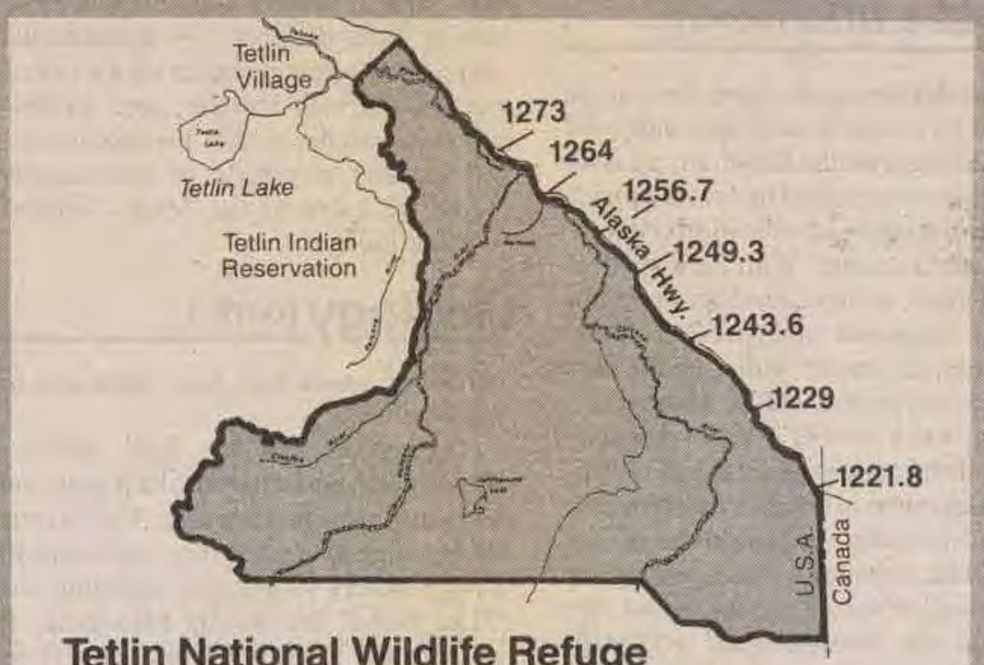
There are 192 bird species and 44 species of mammals that occur on or near the Tetlin National Wildlife Refuge. But you only have a day in the area to see wildlife, not a lifetime. In the map below are some spots near the highway that support a large number of species or are a reliable place to conveniently see a particular species.

There are various interpretive and picnic pulloffs along the road where songbirds and small mammals may be found. Bald eagles can often be found flying along the highway paralleling the Tanana River.

Although there is no guarantee of finding a particular species at any one time, you can greatly increase your chances of finding wildlife by checking habitat in the correct season at the right time of day.

ALASKA HIGHWAY
Milepost Guide

Milepost	Look for:
1221.8	U.S. Customs
1223	Tetlin National Wildlife Refuge entrance sign. The small trees in this area indicate permafrost—permanently frozen soil below the ground.
1223.4	This wetland area, the Scotty and Desper Creek bottoms, are productive waterfowl habitat.
1224.5	Highway Lake interpretive exhibit (under construction). Note the beaver lodge at the east end of Highway Lake.
1225.6	Desper Creek. A small boat ramp provides access to the refuge for canoes and other small boats.
1226	Arctic loons can often be seen in these marshes.
1226.5	Aspen, balsam poplar, and paper birch can be found along these hillsides. The predominant hill to the south is Airs Hill.
1227.9	*Corridors for Passage* interpretive exhibit.
1229	Tetlin National Wildlife Visitor Center.
1231	The large lake to the north is appropriately named, Island Lake.
1238	Note the stabilized sand dunes in this area, visible at numerous road cuts.
1240.2	The vertical culverts along the road are an attempt to prevent the permafrost from thawing.
1243.6	*The Changing Landscape* interpretive exhibit.
1244	The rugged mountains visible to the north are the Mentasta Mountains, part of the Alaska Range.
1246.7	Gardiner Creek bridge. Grayling fishing is best here in early spring and late fall.
1249.3	Deadman Lake Campground. Refuge waterfowl information, camping, fishing, and nature trail (under construction).
1250.2	Picnic area.
1252	*Solar Basin* interpretive exhibit.
1253	The hills ahead are known as the Tetlin Hills. Peninsula and Yarger Lakes are visible just to the south of the highway.



Tetlin National Wildlife Refuge

1256.2	Look for bank swallow nests on the north side of the highway.
1256.7	Lakeview Campground. Camping, waterfowl information and viewing.
1258	Eliza Lake is visible to the south of the highway.
1263.5	The Chisana River (shoe-san'-ah) parallels the highway for approximately five miles.
1264	Northway Junction.
1269	*Highways of Water* interpretive exhibit. About 100 yards upstream from the point the Chisana and Nabesna Rivers join to form the Tanana (tan'-nah-naw) River.
1273	*Ponds are not Forever* interpretive exhibit.
1284	Tetlin National Wildlife entrance sign.
1289	The large lake to the south of the highway is Midway Lake.
1301.7	Tetlin Junction.
1303.3	Tanana River bridge.
1309.3	Tok River State Campground.

Swan Songs

Photo courtesy of Tetlin NWR.

Alaskan Songs
THAT CAN HELP PASS THE TIME

Twinkle, twinkle Northern Lights,
sparkle in the arctic night.

Up above the clouds so high,
blue-green ribbons in the sky.

Twinkle, twinkle Northern Lights,
shimmer in my dreams tonight.

(TUNE: "Twinkle, Twinkle, Little Star."
Music traditional from France;
used as early as 1765)

Oh, give me a home
Between Fairbanks and Nome
Where the moose
and the caribou play
Where nothing will grow
'Cause it's covered with snow
From June to the following May.

Home, home in the snow
Where it's mild
when it's forty below
But the sun shines for me
By the great Bering Sea
In the life of the gay sourdough.

(TUNE: "Home on the Range," c. 1873)

When it's springtime in Alaska
And it's forty-five below
All the Eskimos go barefoot
Because they like the snow.

All the polar bears get sunburned
And the seals all lose their hair
When it's springtime in Alaska
And it's forty-five below up there.

(TUNE: "When It's Springtime in the Rockies,"
c. 1929)

Alaskan Words
You May Not Know

compiled by Dennis Rogers

In your travels through Alaska this year you may stumble upon some obscure Alaskan words that you may not be familiar with. Below is an "Alaskan Dictionary" with some words you may hear this summer. Hopefully, by using this list you will be able to understand the 49th state a little easier.

Alcan—the Alaska Highway, formerly the Alaska-Canada Highway
Alpine—elevated slopes above the treeline
Aurora Borealis—the northern lights; streams of light ascending in fan and ribbon shapes from the northern horizon caused by the ejection of charged particles into the magnetic field of the earth
Babiche (BAH-BEESH)—strips of semi-tanned caribou or moose hide
Boreal—subarctic
Bush—any part of Alaska not accessible by road
Cabin Fever—depressed state of mind blamed on cold, dark, winter weather when people are housebound
Cache (CASH)—a small, elevated structure for food storage
Calving—the breaking off of a piece of ice from a glacier
Cheechako (CHEE-CHAK-KO)—a newcomer, tenderfoot, greenhorn
Dene—the Athabaskan people
Diamond Willow—one of five species of willow where a fungi is thought to cause diamond-shaped patterns in the wood
Fish Wheel—a device turned by the current of a river, scooping fish into a holding box
Fjord—a narrow inlet flanked by steep cliffs
Husky—any sled dog
Lower 48—the 48 contiguous United States
Monitor—a large nozzle used to direct water into a hillside in hydraulic mining
Moraine—a glacial deposit of debris
Mukluks—native boots made from animal skins
Muskeg—a grassy bog or swamp where little can grow except for black spruce, dwarf birch, and other shrubby plants
Nunatak—a mountain peak poking out of an icefield
Outside—local term used by Alaskans to refer to anywhere out of the state
Pemmican—dried, pounded meat mixed with flour, molasses, and suet
Permafrost—permanently frozen ground
Pingos—low, rounded mounds created by frost action, rising from the tundra
Placer (PLAS-SIR)—a deposit of sand or gravel containing particles of gold
Poke—a small bag of gold dust
Potlatch—a feast for the dead and an elaborate ceremonial display at which valued gifts are given to prove wealth or attain prestige
Skookum—strong, active, a go-getter
Sluice—a long inclined trough with grooves or riffles on the bottom where gold is caught and dirt and rocks are washed through
Sourdough—an old timer
Taiga (TIE-GAH)—subarctic land of stunted coniferous trees
Tundra—a treeless vegetation of mosses, lichens, herbs, and dwarf shrubs in arctic and alpine areas
Tussock—a tall clump or tufu of growing grasses or sedges held together by a dense root system

Great Land (cont.)

Wildlife Refuges in the state that can be reached by a road system. Secondly, the Tetlin, along with the Kenai are the only two that were mandated by law to provide for interpretation and education concerning the environment. With these distinctions in mind, we have developed a visitor center, numerous interpretive stops, campgrounds, nature trails, and a very friendly interpretive staff to assist you.

There are a number of other purposes for which the refuge was set aside, including conservation of entire ecosystems in a natural diversity, international treaty obligations, subsistence uses, and water quality—all of which are important. We feel that the environmental education purposes may be the most important of all because it is you, as the nation's public, that will be deciding the future of these natural wonders that still exist. We hope you enjoy your visit and leave Alaska a more informed conservationist. Have fun!

History (cont.)

Fortymile and Klondike gold regions. Trails also connected with southern routes, allowing contact with people in the Copper River area, southern Yukon and northern British Columbia, and southeast Alaska.

Even today with roads, electric power, running water, and television, the eastern Interior remains in the beginning stages of historic understanding. Contact among Canadian, Coastal, and Interior peoples traces trade and travel routes across Refuge lands to beyond, linking a vast expanse of land and customs more similar than different. A tremendous source of information exists for the casual readers, curious traveler, and professional researcher within the mountains, valleys, and riverbeds of this unique region we know as the Tetlin National Wildlife Refuge.

Geology (cont.)

existed, it would have been right next to Tok!

During the last Ice Age, glaciers flowed north out of the Alaska Range, but never quite reached this area. The Tanana River valley, being ice-free, was home to a huge variety of animals including our "State Fossil" the Woolly Mammoth. It was cut off from the North American continent by ice, but was attached to Russia via a land bridge formed as ice caused the sea level to drop. Meltwater stream flowing northward from the Alaska Range glaciers laid down blankets of sandy silt throughout this area. Cold winds blowing over the drying river beds picked up the dirt and created great clouds of silt that settled as thick deposits called "loess." The heavier sand was separated out by the winds and it moved along the ground forming immense sand dunes. You can see these dunes along the Alaska Highway before you come to Northway, and also along the first part of the Taylor Highway.

The Bird Detective
SCORING & ANSWERS

Answers to the Bird Detective

Bird A – Trumpeter Swan
Bird B – Common Raven
Bird C – Spruce Grouse
Bird D – Common Loon
Bird E – Green-winged Teal

Scoring Summary

First clue	4 points
Second clue	3 points
Third clue	2 points
Fourth clue	1 point
No answer	0 points
Wrong answer	0 points

Add up all your individual clue scores to arrive at a total score. Then review the ratings below to see how you did overall.

Bird Ratings

Points Scored	Rating
18–20	King Eider
14–17	Emperor Goose
10–13	Common Loon
5–9	Least Flycatcher
Below 5	Blue-footed Booby

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Alaska Natural History Association

The Alaska Natural History Association is a nonprofit organization whose purpose is to support educational and scientific programs of land managing agencies in Alaska. ANHA assists with the National Park Service, U.S. Forest Service, U.S. Fish and Wildlife Service, Alaska Division of Parks and Outdoor Recreation and the Interagency Visitor Centers in Alaska. Public memberships are available to those who are interested in the goals and purposes of ANHA. Members receive a 15% discount at all of the Alaskan sales outlets and at many visitor centers in other states.

Upper Tanana Natural History Association

This publication is made possible in part by the outstanding volunteer efforts of the membership of the Upper Tanana Natural History Association. UTNHA is a nonprofit educational organization dedicated to promoting awareness and understanding of the natural, cultural, and historic resources of the upper Tanana area. Membership is available to any interested persons. Please write: UTNHA, P.O. Box 263, Tok, Alaska 99780 for more information.

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