

ANNUAL NARRATIVE REPORT


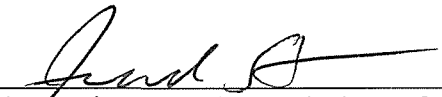
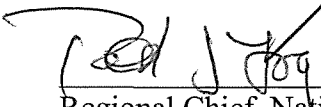
2003

KOYUKUK NWR
NORTHERN UNIT, INNOKO NWR
NOWITNA NWR

KOYUKUK/NOWITNA NATIONAL WILDLIFE REFUGE COMPLEX

Galena, Alaska

REVIEW AND APPROVALS

 _____ Complex Manager	 _____ Supervisor, Northern Alaska Refuges
<u>5/18/05</u> Date	<u>7/28/05</u> Date
 _____ Regional Chief, National Wildlife Refuge System - Alaska	
<u>8/31/05</u> Date	

INTRODUCTION

This Annual Narrative Report is for the Koyukuk, Northern Unit of Innoko and Nowitna Refuges. These three refuges are administered collectively as the Koyukuk/Nowitna Refuge Complex. Narrative items common to all three units are discussed in the Koyukuk and Northern Unit of Innoko report. Any additional events are reported in respective sections.

The **Koyukuk National Wildlife Refuge (NWR)** is located in west central Alaska, about 270 air miles west of Fairbanks and 330 air miles northwest of Anchorage. The exterior boundaries encompass 4.6 million acres, an area slightly smaller than the state of New Jersey. This refuge lies within the roughly circular floodplain basin of the Koyukuk River. The extensive forested floodplain is surrounded by hills, 1500' - 4000', on the north, east, and west, and the Yukon River to the south.

The Koyukuk NWR was established December 2, 1980 with passage of the Alaska National Interest Lands Conservation Act (ANILCA). The Refuge was established and is managed for the following purposes:

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



Nogahabara Sand Dunes, Koyukuk NWR

The Refuge contains 400,000 acres of designated Wilderness surrounding the 16,000 acre Nogahabara Sand Dunes, one of only two active dune fields in Alaska. Access to the Refuge is by boat, aircraft, or snowmobile.

The **Northern Unit of the Innoko NWR** (known locally as the Kaiyuh Flats) encompasses 750,800 acres. Located south of the Yukon River, its northeastern boundary is directly across the river from the town of Galena. The Innoko Refuge was also established by ANILCA and is characterized by wide, lowland interlaced by sloughs, creeks, and lakes. The gently rolling foothills of the Kaiyuh Mountains along the southeastern border rise to 2,000 feet. Only the first purpose for the Innoko Refuge differs from the Koyukuk Refuge.

Innoko National Wildlife Refuge in March

This purpose is:

1. To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, waterfowl, peregrine falcons, other migratory birds, black bear, moose, furbearers, and other mammals and salmon.



Vegetation types of the Koyukuk and Northern Innoko units are typical of the boreal forest or taiga of interior Alaska. The lowland boreal forest of spruce, birch, and aspen gradually merges with tundra vegetation near 3,000 feet. Black spruce bogs with poorly drained permafrost soils are a dominant feature of the area. Large pure stands of white spruce can be found along rivers where soils are better drained. Dense willow and alder are common along the rivers and sloughs. Winter ice scours sand bars which promotes a lush regrowth of vegetation each year. Over vast areas numerous fires have set back vegetative succession to earlier serial stages consisting of aspen, birch, and willow. The most prominent characteristic of these refuges is a diverse mosaic of the vegetation types.

Perhaps the greatest value of the Koyukuk Refuge is its productive breeding areas used by waterfowl from the four migratory flyways. Thousands of waterfowl, primarily wigeon, pintail, scaup, white-fronted geese and Canada geese are joined by both tundra and trumpeter swans on the Koyukuk's lush breeding grounds each spring. Refuge streams and lakes also sustain large fish populations that support subsistence, commercial, and sport fisheries. King, coho, summer chum, and fall chum salmon migrate up the waters of the Yukon River and its tributaries, including the Koyukuk River. These fish are important in the region's subsistence and financial economies.

The **Nowitna National Wildlife Refuge** was created on December 2, 1980 with the passage of the ANILCA. Purposes for which the Refuge was established are:

1. To conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, trumpeter swans, white-fronted geese, canvasbacks and other waterfowl and migratory birds, moose, caribou, marten, wolverine and other furbearers, salmon, sheefish, and northern pike;
2. To fulfill international treaty obligations of the United States with respect to fish and

wildlife and their habitats;

3. To provide the opportunity for continued subsistence uses by local residents;
4. To ensure water quality and necessary quantity within the Refuge.

The Refuge lies approximately 200 miles west of Fairbanks in the Central Yukon River Valley. It comprises 2.1 million acres of forested lowlands, hills, lakes, marshes, ponds, and streams. The Nowitna River, a nationally designated Wild River, drains the Refuge from south to north. The lowlands along this river are prime waterfowl production and migration habitat. The river and its tributaries support king and chum salmon runs, a large pike population, and one of the three known resident sheefish populations in the state. The Yukon River, which forms the northern boundary of the Refuge, has a salmon fishery of international significance and is an important transportation corridor. The Refuge's very productive marten habitat prompted specific reference in ANILCA to its outstanding furbearer value. Other species of interest common on the Nowitna are moose, wolves, black and grizzly bears, beaver, wolverine, lynx, and several species of raptors including nesting bald eagles.



Nowitna National Wildlife Refuge

Major programs of the Complex include resource inventory, management related research, subsistence management, wildfire management, and information education programs. Field investigations collect baseline data and quantify fish, bird, mammal, and habitat resources. An information and education program that stresses communications with the eight villages in or near the Complex is vital to the management of these natural resources.

In 2003 the Complex staff had: 13 permanent, 3 temporary, and various volunteer positions. Facilities include a leased office and cold storage facility, three administrative cabins, nine government residences, and several smaller cold storage buildings.

The Koyukuk/Nowitna Refuge Complex headquarters is in Galena, a village located on the Yukon River. Galena was established about 1919 as a supply point for the mining of galena (lead sulphite ore) south of the Yukon River. Galena serves as a transportation hub for nearby villages. More like a town than a village, Galena has the advantages of direct air service to Fairbanks, modern communications, river access, two general stores, a K-12 school, and health clinic. The population of Galena is approximately 700 and includes approximately equal numbers of Alaska Natives and non-Natives. Many Galena residents depend on a subsistence lifestyle of fishing and hunting. The U.S. Air Force, commercial airlines, and general aviation jointly use the Galena Airport. The U.S. Air Force Base formerly supported two F-15 Eagle interceptor aircraft, but the entire base was put in "caretaker" status as of October 1, 1993.

INTRODUCTION

TABLE OF CONTENTS

A. HIGHLIGHTS

B. CLIMATIC CONDITIONS

C. LAND ACQUISITION

1. Fee Title.....Nothing to Report
2. Easements.....Nothing to Report
3. Other.....Nothing to Report

D. PLANNING

1. Master Plan Nothing to Report
2. Management Plan..... Nothing to Report
3. Public Participation..... Nothing to Report
4. Compliance with Environmental and Cultural Resource Mandates 11
5. Research and Investigations..... 11.
6. Other Nothing to Report

E. ADMINISTRATION

1. Personnel12
2. Youth Programs Nothing to Report
3. Other Manpower Programs..... Nothing to Report
4. Volunteer Program.....13
5. Funding15
6. Safety16
7. Technical Assistance.....17
8. Other17

F. HABITAT MANAGEMENT

1. General18
2. Wetlands20
3. Forests21

4. Croplands	Nothing to Report
5. Grasslands	Nothing to Report
6. Other Habitats	23
7. Grazing.....	Nothing to Report
8. Haying.....	Nothing to Report
9. Fire Management	24
10. Pest Control.....	Nothing to Report
11. Water Rights	Nothing to Report
12. Wilderness and Special Areas.....	25
13. WPA Easement Monitoring.....	Nothing to Report

G. WILDLIFE

1. Wildlife Diversity	29
2. Endangered and/or Threatened Species	29
3. Waterfowl	30
4. Marsh and Water Birds	39
5. Shorebirds, Gulls, Terns and Allied Species	39
6. Raptors	39
7. Other Migratory Birds.....	39
8. Game Mammals	43
9. Marine Mammals	Nothing to Report
10. Other Resident Wildlife	45
11. Fisheries Resources.....	46
12. Wildlife Propagation and Stocking.....	Nothing to Report
13. Surplus Animal Disposal	Nothing to Report
14. Scientific Collections	Nothing to Report
15. Animal Control	Nothing to Report
16. Marking and Banding	47
17. Disease Prevention and Control.....	Nothing to Report

H. PUBLIC USE

1. General.....	48
2. Outdoor Classrooms – Students.....	52
3. Outdoor Classrooms - Teachers.....	Nothing to Report
4. Interpretive Foot Trails	Nothing to Report
5. Interpretive Tour Routes.....	Nothing to Report
6. Interpretive Exhibits/Demonstrations	53
7. Other Interpretive Programs	54
8. Hunting	55
9. Fishing.....	62
10. Trapping.....	64
11. Wildlife Observation.....	Nothing to Report

12. Other Wildlife Oriented Recreation.....	Nothing to Report
13. Camping.....	Nothing to Report
14. Picnicking.....	Nothing to Report
15. Off-Road Vehicling.....	Nothing to Report
16. Other Non-Wildlife Oriented Recreation.....	Nothing to Report
17. Law Enforcement.....	65
18. Cooperating Associations	67
19. Concessions.....	Nothing to Report
20. Subsistence.....	67

I. EQUIPMENT AND FACILITIES

1. New Construction	74
2. Rehabilitation.....	75
3. Major Maintenance	76
4. Equipment Utilization and Replacement	76
5. Communications Systems.....	77
6. Computer Systems	77
7. Energy Conservation.....	Nothing to Report
8. Other	77

J. OTHER ITEMS

1. Cooperative Programs.....	81
2. Other Economic Uses.....	Nothing to Report
3. Items of Interest.....	Nothing to Report
4. Credits.....	84

K. FEEDBACK

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A. HIGHLIGHTS

The highlight of the year was the celebration of the Refuge Centennial, and our station's unique way of bringing the message to this part of bush Alaska. Centennial activities included a public unveiling of a display of Pleistocene artifacts from Nowitna and Koyukuk NWRs and a refuge "open house on the road" that traveled to all the surrounding villages. We had some great visits with village folks. We also completed a new Nowitna NWR brochure and revised the refuge websites.

Personnel changes: Melanie Hans was selected as the GIS wildlife biologist effective the first of the year, leaving the refuge clerk position vacant. Local-hire Darcie Warden filled the clerk position from March until October. Krista Talley was selected as the refuge clerk in November. Administrative technician Rosie Cassou transferred to the Cabeza Prieta NWR, and was replaced by Lucy Williamson in May.

The refuge cooperated with the Fairbanks Fish and Wildlife Office-Northern Alaska Ecological Services, State of Alaska Dept. of Environmental Conservation, and the Huslia Tribe to begin clean-up efforts on a recently discovered cache of 176 old diesel fuel barrels on the Koyukuk NWR. A field reconnaissance was completed and plans were made for a major cleanup project.

The Alaska Migratory Bird Co-Management Council published initial regulations for the legal take of migratory birds in spring for subsistence. The refuge was actively engaged in the regulations formulation process due to our concern about the sustainability of the harvest of some species.

The regional greater white-fronted goose population, which had been declining for a decade, showed signs of recovery in 2003. Nevertheless, continent-wide, there remains a downward trend in the Central and Mississippi Flyways. The refuge participated in the final year of a cooperative satellite telemetry marking project. We assisted in deployment of satellite transmitters at Noatak National Preserve, Kanuti NWR, and on the North Slope.

Trumpeter and tundra swans on the refuge continued to increase. The refuge began discussions with Dr. William Sladen to study distribution and abundance of the two species which are sympatric on our refuges. The study also aims to document possible wild hybridization between the two species. Tundra swans are subject to a legal hunting season but trumpeters are not. Identification is difficult for hunters.

University of Alaska cooperator Dr. Paul Matheus published a scientific paper on the Palisades paleontological site. A field party made another visit to the Nogahabara Dunes archaeological site.

2003 was a light year for wildland fires- only two fires burned 483 acres on Koyukuk NWR.

Moose population trend areas showed continued declines in productivity and survival, along with localized depressed bull-cow ratios. This prompted the elimination of a harvest opportunity for antlerless moose in August and September. This was done through an emergency closure by the Alaska Dept. of Fish and Game (ADF&G) and through a special action request to the Federal Subsistence

Board. The refuge cooperated with ADF&G to formulate long term regulatory proposals to address the concerns.

Chinook, chum, and silver salmon returns were all above normal for the first time in many years. Most households met, or nearly met, their annual subsistence needs, and some commercial harvest opportunities were provided for the first time in several years.

The refuge had an active law enforcement presence in 2003, with patrols for spring waterfowl hunting, salmon fishing, sport fishing, moose hunting, and commercial permit compliance. One case involving wasted subsistence-caught pike was referred to the Huslia Tribal court for sentencing. In addition, the refuge issued one citation for possession of lead shot for waterfowl hunting and one moose hunting violation. Fairbanks LEO issued two citations for illegal harvest of migratory birds while doing a moose hunting patrol on the refuge.

Regional Office Realty personnel negotiated on behalf of the refuge for purchase of two native allotments, one each on Koyukuk and Nowitna NWRs. Both were in prime moose hunting locations; their purchase is important for habitat conservation and maintaining the wild character of the refuges. Sales were in negotiation by the end of the year.

With a combination of force account and contracts, we erected a 40 x 50 ft temporary aircraft storage building at the Galena airport. This will become the refuge's base for aircraft operations during the wheel and ski flying seasons.

Implementation of ABC and detailed updating of the Real Property Inventory were burdensome administratively.

The low point of the year was the acrimonious commercial big game guide permit renewal process. At the end of the year Nowitna permit selections were complete and appeals had been resolved. The Koyukuk permits were still under appeal. This process demanded an excessive amount of time from the refuge staff relative to the meagre benefits this activity provides to the public and the resource.

B. CLIMATIC CONDITIONS

The climate of western interior Alaska is subarctic/continental with warm pleasant summer weather during June, July and August, and generally cold weather from October to early April. The winters in the Galena area tend to fluctuate between periods of extreme cold and milder temperatures. Cold spells (usually -20 to -30° F, but sometimes to -40° F to -60° F or even -70° F), caused by clear skies and no wind, usually last a week or two, sometimes three. These are moderated by intervening milder weather (-20° F to +20° F), with clouds, snow, and light to moderate winds. The moderating effects of Bering Sea and Pacific storm fronts increase the farther west one proceeds across interior Alaska. By late winter, the snow pack in the valley bottoms averages 2-3 feet. The months of April and May are transitional, with the arrival of most waterfowl in late April-early May, and breakup of the Yukon River ice in mid-May. Green-up of the trees and shrubs begins in late May. Summer daytime temperatures in the Western Interior generally range from 50-70°F; however, extreme highs have exceeded 90°F. Summers

on the refuge Complex area are generally cooler, with more overcast skies and precipitation, compared to Fairbanks and the Eastern Interior. Perhaps the most pleasant time of the year is late August to early October with cool nights, warm days, and dying vegetation to signify the end of the bug season and the start of hunting season.

Climate 2003:

Table B.1. Break-up and freeze-up dates of the Yukon River at Galena, Alaska.

	Break-up (first ice movement)	Freeze-up (ice stoppage)
1983	May 10	
1984	May 18	
1985	May 22	
1986	May 19	
1987	May 17	
1988	May 7	October 14
1989	May 7	October 25
1990	May 7	October 25/26
1991	May 7	November 1
1992	May 25	October 20
1993	May 12	November 3
1994	May 7	November 4
1995	May 2	October 30
1996	May 14	October 21
1997	May 7	October 21
1998	May 8	November 5
1999	May 14	November 4
2000	May 15	November 19
2001	May 22	October 29
2002	May 14	November 13
2003	May 11	November 13
Mean	May 13	October 29

C. LAND ACQUISITION

In 2003 there were no land acquisitions which took place.

D. PLANNING

D.4. Compliance with Environmental and Cultural Resource Mandates

On August 12 & 13, RIT Huntington, Contaminant Biologist Keith Mueller, (Ecological Services – Fairbanks) and DRM McClellan boated up to the barrel site (a stockpile of 55 gallon barrels discovered in fall 2002 estimated to have been there since the 1960s) on Billy Hawk Creek. It is approximately 94 river miles from Huslia, the nearest village. A total of 176 barrels were located. During out site visit each barrel was spray painted or etched with a number. . The amount of liquid contents was recorded. One hundred and forty of the barrels were $\frac{3}{4}$ to completely full, 26 barrels were completely empty, and 5 barrels had a limited amount of liquid in them. The liquid in all the barrels appeared to be diesel fuel. Samples were taken from five of the barrels and submitted to a laboratory for analysis. The results from



Keith Mueller, Fairbanks ES, opening bung cap on a 55 gallon barrel at barrel stockpile site along Billy Hawk Creek, Koyukuk NWR



Numbered barrels at Billy Hawk Creek site along Billy Hawk Creek, Koyukuk NWR

the analysis determined it was “pure diesel product”. The barrels appeared in fairly good condition. No current leakage from any of the barrels was observed. The contamination appeared to be localized to the immediate area surrounding the two large grouping of barrels and a couple of smaller groupings (less than 10 barrels). With the assistance of Keith and Phil Johnson, (Ecological Services – Anchorage), a proposal was submitted for funding through the Service’s FY2003 refuge cleanup projects. Prior to the end of the fiscal year, we received word through Keith that funding to cleanup the site in 2004 looked promising.

D.5. Research and Investigations

Sympatric nesting range of trumpeter and Tundra Swans on Koyukuk National Wildlife Refuge in northwest Alaska. Alaska’s two most common swan species, trumpeter swan and tundra swan, both occur in the Western Interior, but little is known about the nesting distribution of the two species. This information has important management implications because in 2003 the U.S. Fish and Wildlife Service opened one of the species, tundra swan, to subsistence hunting under new regulations published in accordance with amendments to the Migratory Bird Treaty Act. trumpeter swans remain closed to subsistence hunting, the two species are difficult for hunters to identify in the field. Potential management implications of this overlap are significant because the tundra swan is a legally harvestable species and the trumpeter swan is not. Although current harvest of tundra swans is minimal, and believed to be sustainable, a potential increase of incidental harvest of trumpeter swans may not be sustainable and is thus of concern.

In September 2003, Dr. William Sladen, Professor Emeritus, Johns Hopkins University, visited the refuge to scope out possible study areas and refuge cooperators. At year's end refuge staff cooperated with Dr. Sladen to submit a Challenge Cost Share proposal to fund the Service's



Swan Nest

ecological knowledge from village elders.

portion of the work. Other cooperators would include Dr. Tom Wood and Dr. Patrick Gillevet, Assoc. Prof. George Mason University, Fairfax, Virginia (genetic analyses); Mr. Russ Canniff, Waterfowl Biologist, and Sue Murphy, Wildlife Rehabilitator, Washington Game and Fish Dept., who will monitor wintering flocks in Washington state and western Vancouver, B.C., Canada for collar re-sightings. Students from the Huslia and Galena Schools would benefit from environmental education efforts related to swans, and may participate in an effort to gather complimentary traditional

E. ADMINISTRATION

E.1. Personnel

E.1.A. Permanent

1. Michael Spindler, Refuge Manager/Aircraft Pilot (RM/Pilot), GS-485-13, EOD 2/11/90, PFT.
2. Greg McClellan, Deputy Refuge Manager (DRM), GS-485-12, EOD 3/18/01, PFT.
3. Brad Scotton, Supervisory
4. Wildlife Biologist/Aircraft
5. Pilot (SWB), GS-486-12, EOD 9/22/02, PFT.
6. Max (Joe) Huhndorf III, Aircraft Pilot (Pilot), GS-2181-12, EOD 3/28/99, CS Local Hire.
7. Jenny M. Bryant, Wildlife Biologist (WB), GS-486-9, EOD 5/25/97, PFT.
8. Melanie Hans, Wildlife Biologist (WB), GS-486-7, EOD 3/11/01, PFT.
9. Robert Lambrecht, Fire Management Officer (FMO), GS-401-11, EOD 5/19/02, PFT.
10. Geoff Beyersdorf, General Biologist/Pilot Trainee (GB/Pilot), GS-401-11, EOD 6/17/01, PFT. Promoted from General Biologist on 03/09/03.
11. Karin Lehmkuhl, Park Ranger (Environmental Education/Wilderness Issues) (PR), GS-025-9, EOD 5/23/99, PPT.
12. Wayne Strassburg, Maintenance Worker (MW), WG-4749-8, EOD 8/16/98, CS Local Hire.



2003 Staff Photo

13. Lucy Williamson, Administrative Support Assistant (ASA), GS-303-7, EOD 5/18/03, Local Hire PFT.
14. Rosie M. Cassou, Administrative Technician (AT), GS-303-6, EOD 6/12/95, Local Hire PFT. Transferred to Cabeza Prieta NWR in Arizona effective 3/22/03.
15. Krista Talley, Refuge Clerk (RC), GS-303-5, EOD 11/03/03, Local Hire PFT.
16. Darcie Warden, Refuge Clerk (RC), GS-303-5, EOD 3/17/03, Local Hire PFT. Resigned effective October 3, 2003.
17. Orville Huntington, Refuge Information Technician (RIT), GS-1001-8, EOD 11/12/95, CS Local Hire.

E.1.B. Temporary

18. Patrick Madros Jr., Refuge Information Technician (RIT), GS-1001-6, 02/03/03 – 9/30/03, Local Hire Seasonal Intermittent
19. Dominique Watts, SCEP/Student Trainee (SCEP), GS-499-4, 5/19/03 – 8/24/03.
20. Deborah Webb, graduate SCEP/Student Trainee (SCEP), GS-499-7, EOD 5/21/00, CPT.

E.1.C Volunteers

Julie Apodaca
 Aaron Birkholz
 Joe Hans
 George Lehmkuhl
 Judy Lehmkuhl
 Eric Mack
 Dan Odess
 Tim Pavlick
 Ross Sam
 Randy Shaw

E.4 Volunteer Program

Julie Apodaca. Julie, a friend of our seasonal SCEP Dom Watts, helped with the Kaiyuh Goose Production Survey during her visit to Galena in July.

Aaron Birkholz. FMO Bob Lambrecht was joined by his son Aaron to do maintenance on the Nowitna Administrative Cabin in June.

Joe Hans. Joe volunteered during his fall visit with his daughter, WB Melanie Hans. They delivered SCEP Deborah Webb to the Nowitna Moose Hunter Check Station by boat in September.

Judy Lehmkuhl. The parents of our Park Ranger, Karin Lehmkuhl, were volunteers in August and September. George and Judy joined other volunteers *Randy Shaw* and *Dan Odess* for an archaeological investigation in the Nogabahara sand dunes (Koyukuk Wilderness Area). The group cheerfully slogged through rain and wet sand during the physically exhausting but mentally stimulating field work. George

and Judy also helped with the Nowitna Moose Hunter Check Station in September, work that included preparing field gear and groceries, travel to the site by boat, and two weeks of meeting hunters, cutting firewood, and other camp chores.

Eric Mack. Eric, the news reporter at KIYU public radio in Galena, cooperated with the refuge to improve publicity about the Centennial celebration. Eric accompanied us to the Palisades and to a refuge open house. He produced several radio news segments about Koyukuk/Nowitna refuges, the Centennial, and other issues important to the Service.

Dan Odess. Dan, an archaeologist from the University of Alaska Museum, Fairbanks, came to the Nogahabara sand dunes to document and collect stone artifacts at the site discovered in 2001.

Randy Shaw. Randy assisted with the peregrine falcon survey and the Nogahabara sand dunes archaeological study.

Tim Pavlick and Ross Sam, both of Huslia, assisted RIT Orville Huntington with his projects, including subsistence harvest surveys. Ross was also very helpful during our Refuge Centennial visit to Huslia which included school presentations and a community potluck.

Staff turnover in 2003 was pleasantly mild compared to the previous two years. The biggest loss occurred in March with the departure of Rosie Cassou, a local person from Galena and our long-time administrative technician for the refuge. In addition, Rosie was our CPR/First Aid instructor. She transferred to the warm and sunny locale of Cabeza Prieta NWR in Arizona. Rosie and her husband Dave are planning to retire in southern Arizona. We wish them all the best and will greatly miss them. With the departure of Rosie, both of our administrative positions were vacant. The clerk position had been vacant since the first of the year with the promotion of Melanie Hans to a wildlife biologist position; however, Melanie continued to handle many of the clerk positions until it was filled. We advertised the vacant clerk position in January, but due to a lack of candidates, we re-advertised the position in February. In March, we selected Darcie Warden who had been working for the Loudon Tribal Council in Galena. Darcie overlapped with Rosie for one week before Rosie left. Lee Ann Andrew from Togiak NWR graciously agreed to a 2-week detail to Galena from April 21 – May 2, to help us catch up with our back-log of bills and payments due. Lee Ann also provided excellent training to Darcie as well as our tentatively selected new administrative support person. Lucy Williamson officially moved into that position on May 18. Lucy had been working as the city administrator in Ruby, the first village upriver from Galena. Darcie resigned as the refuge clerk on October 3. The position was re-advertised and we were able to select Krista Talley who had previously been working for the U.S. Air Force at the base in Galena. By the end of 2003, we were fully staffed for the first time since the mid 1990's.

Three staff persons received well deserved promotions in 2003. Wildlife Biologist Jenny Bryant was promoted to a GS-9 on May 18. Supervisory Wildlife Biologist/Pilot Scotton was promoted to a GS-12 on September 21. Brad was also converted from a pilot trainee to a fully functional Service pilot in 2003. Wildlife Biologist Melanie Hans was promoted to GS-7 on December 29. The subsistence coordinator position was revised to include pilot training duties and the position was advertised in

December 2002. Our incumbent subsistence coordinator, Mr. Beyersdorf, applied for and was selected for the new position. Geoff was promoted into that new position on March 9. With the acquisition of a used front-end loader, the position classification of our maintenance worker was amended to reflect occasional heavy equipment operation. Dick Kivi from Kenai NWR traveled to Galena in September to work with and certify Wayne Strassburg on front-end loader operation.

Several staff received performance awards during the year. PR Lehmkuhl received two performance awards, one for her efforts in completing the new Nowitna NWR brochure and the second for coordinating and leading the effort to host Centennial celebrations in five area villages. FMO Lambrecht received a performance award for his efforts in reinvigorating the station's safety program and assisting Regional Radio Coordinator Mike Lewis with coordination and installation of a new narrow band radio system on the Complex. RIT Madros received a performance award for his efforts in coordinating and helping with Centennial visits in five area villages and his efforts in helping to produce a refuge video that was a compilation of portions of interviews from various village elders. MW Strassburg received a performance award for his work repairing the boiler in Quarters #6 and all the damage resulting from frozen water pipes.

E.5. Funding

The total station budget generally increased from FY99 to FY03, offsetting inflation and increasing operational costs (Table E.5.1). The refuge did not receive any money from Migratory Birds in 2003 to collect subsistence waterfowl harvest information, but with our RITs we completed surveys in several area villages. Thirty-five thousand of the 1261 funding was one-time funding for this year. Five thousand was to cover a background investigation on RM Spindler and \$25K was for construction of the temporary aircraft storage building. Five thousand was also received for conducting our annual science camp. This \$5k is supposed to become part of our recurring base. The refuge received \$13K in funding for two challenge cost share projects. Ten thousand was received to complete the production of existing oral history recordings of Koyukon Athabascan elders previously interviewed by RM Spindler and to complete the archiving of produced oral history recordings onto a web-site at UAF's Rasmussen Library's oral history collection. Three thousand was received to create a display of ancient obsidian spear-points recovered from the Noghabara Sand Dunes and bones of large mammals recovered from the Palisades area. Of the 1262 money, \$10K was for a small equipment project to replace two old snowmobiles. The remaining \$31K was annual maintenance funding. Over \$20k of that funding was used to repair and transport the excess front-end loader from Fairbanks to Galena (see section 1.4.). An additional \$428K in MMS funding for a refuge project was directed to the RO to cover purchasing and installation of a new narrow band radio system (see section I.5.). The budget figure for 8610 was very limited this year as we had built up a deficit from the past couple of years going into this year.

Subsistence fishery money (1332) remained constant. The refuge had submitted a proposal through Federal Subsistence Fishery Information Service (FIS) to receive funding to conduct in-season salmon harvest surveys continuing a project started in 2002. The project was not funded, but the refuge still conducted the project using 1332 funding. Fire funding (9251) increased from over last year and was more similar to normal fire funding received in FY99 and 2000. Last year the fire funding was

decreased due to the vacancy of the FMO position for over half the fiscal year. The regional office/SCEP program funded four pay periods of SCEP student Dominique Watts's salary.

Table E.5.1 Koyukuk-Nowitna Refuge Complex Funding 1999- 2003.

<u>Program</u>	<u>FY99</u>	<u>FY00</u>	<u>FY01</u>	<u>FY02</u>	<u>FY03</u>
1231	15,000	20,000	20,000	9,000	
1261	1,113,000	1,255,000	1,316,000	1,368,000	1,381,000
1262	224,000		24,000	46,000	41,000
4960	2,108	3,277	744		3,782
8610	31,000	53,457	32,225	20,195	4,693
1937		15,000			
1332			45,000	45,000	46,000
9251	128,000	123,000	188,000	85,000	133,000
Total	1,513,108	1,469,734	1,625,999	1,573,195	1,609,475

The refuge also received some end of year funding for two projects. Thirty-one thousand was received and obligated to install vinyl siding on a refuge housing unit in 2004. Thirty-two thousand was received and added to refuge funding and obligated to lay a concrete floor in the temporary airplane storage facility in 2004.

In FY03, the Department of the Interior was directed to reduce travel. The cut for Refuges in Alaska was 7%. The station did not lose any money from this directive, but non-essential travel for numerous training sessions and meetings was cancelled for all station employees. There is supposed to be a more significant travel reduction in 2004.

E.6 Safety

The safety committee met quarterly. The committee addressed correcting the findings of the 2002 Safety Inspection and establishing a safety work agenda for the year. The safety committee members are: Joe Huhndorf, Greg McClellan, Jenny Bryant, Geoff Beyersdorf, and Robert Lambrecht.



***Lucy and Debra in the Dunker
During safety week***

CPR/first aid; aircraft, boat, and bear/firearms safety; and radio use training was given during "spring training" in May.

Fire extinguishers were maintained and inspected regularly in all residences, vehicles, and in the refuge office. No lost time accidents occurred during the year.

E.7. Technical Assistance

RM Spindler met with Carole Holley and Pat Sweetsir, Louden Tribal Council, to discuss a Tribal Natural Resources Planning grant proposal. The Council asked the refuge to review their proposal and provide a letter of support for Tribal involvement in a regional resource planning effort. RM Spindler provided the Council with an overview of the Service's National Wildlife Refuge Comprehensive Conservation Planning process and appropriate step-down planning. The refuge supplied the Council with copies of appropriate planning documents as examples. At year's end we did not know whether Louden would receive the grant.

The refuge also cooperated with Louden Council on the possible topics of a Tribal Wildlife Assistance grant from the Service. The Council decided not to apply for the grant in 2003.

RIT Orville Huntington has provided technical assistance to several tribes and tribal organizations in the past few years. See Section J, Cooperation with the Alaska Native Science Commission.

E.8. Other

Privatization. Koyukuk and Kanuti National Wildlife Refuges continue to be targets of efforts to privatize certain government functions, including operations of national wildlife refuges. Late in 2001 a loosely-organized group named the Koyukuk River Moose Co-Management Team ("K-River Team") began legal and legislative efforts to contract with the USFWS under PL-93-638 (the Indian Self Determination Education and Assistance Act, ISDEAA). This group came into existence in 1997 to represent native village interests during the Alaska Dept. of Fish and Game (ADFG) moose management planning process. The group had several meetings in 2001 and 2002 but as far as we know, was inactive in 2003. Nevertheless, legislation was reintroduced into Congress to pave the way for a mandated take-over of some refuge functions. The following article from the Fairbanks Daily News-Miner summarizes the 2003 action.

Bill seeks to boost Native contracts in parks, refuges

By SAM BISHOP News-Miner Washington Bureau

Monday, March 10, 2003 - WASHINGTON--Rep. Don Young has reintroduced legislation designed to force Alaska's federal park and refuge managers to contract out construction, maintenance and research work to Alaska Native tribes.

Young's legislation calls for 12 separate contracts over the next two years.

The bill also would specifically transfer employees of the Kanuti and Koyukuk national wildlife refuges to a consortium of village tribal governments known as the Koyukuk Moose Co-management Team Inc. Employees with those refuges work for the U.S. Fish and Wildlife Service in Fairbanks and Galena.

Young's original bill got a cool reception from the Bush administration last year at a hearing. An Interior Department official said agencies were doing a good job hiring local people to work on Alaska's parks and refuges.

Young and representatives of Alaska Native regional nonprofit groups, though, said the legislation was necessary to put a fire under the agencies.

Congress, when it created most Alaska parks and refuges in 1980, required the Interior Department to give Native corporations a preference in contracting for "visitor services." It also required Native corporation land to be used for visitor facilities, if the corporation agreed. And people with special knowledge of an area were exempted from federal training and education requirements for certain jobs.

Young's contracting bill has changed somewhat from the version he introduced last year.

The original said that only "inherently non-federal" functions could be contracted out. That has been revised to specify that tribes "may contract to perform construction, maintenance, data collection, biological research and harvest monitoring."

The new bill also prohibits federal agencies from granting tribes authority to oversee hunting and fishing guides.

The bill exempts Denali National Park, but no other conservation units, from the contracting requirements.

The Koyukuk and Kanuti refuges are the only conservation units for which a specific transfer is proposed. The Koyukuk Moose Co-management Team has twice sued the state Board of Game, unsuccessfully, over moose management in the Koyukuk River area. The village tribal consortium said the board's bag limits, seasons and goals violated the state subsistence law.

Young's bill says no federal employees are to lose their jobs in the proposed contracts. Rather, they would work with tribes under the terms of an intergovernmental employee-sharing program.

F. HABITAT MANAGEMENT

F.1. General

The rivers in the Refuge lowlands are characterized by low gradients, meandering courses, and heavy spring flooding. Flooding during spring is common, and it is often mid-summer before most of the flood waters subside on the Koyukuk. The Yukon, Nowitna and Koyukuk rivers carry a heavy silt load at flood stage. Meandering creeks with steep banks are typically slow and shallow. River and larger creek corridors present a dynamic, shifting mosaic of habitats supporting many important species of wildlife on the Refuge.

Extensive boreal forests, interspersed with numerous wetlands, form the pre-dominant habitat on Koyukuk, Nowitna and Northern Innoko NWR,s. Here the Kokrines Hills form a backdrop to the Yukon River floodplain on the north side of Nowitna NWR. (JB)



As rivers and creeks move through the flood plain, outside banks and vegetation are eroded into the river and inside banks are built up through the deposition of silt, sand, and gravel. Recent inside bank soil deposits along rivers and creeks are well

drained and are usually free of permafrost. Deeper bodies of water are also usually underlain by non-permafrost soils. These factors create a steep willow habitat gradient away from river and creek channels. Riparian vegetation usually includes willow (*Salix* spp.) and alder (*Alnus crispa*, *A. incana*) thickets along gravel bars on the water edge; stands of cottonwood (*Populus balsamifera*) trees higher on the bank, and bands of white spruce (*Picea glauca*) on the highest banks which vary in width depending on the size of the river. Further from the rivers and sloughs, white spruce stands typically grade into black spruce (*Picea mariana*), which grade into treeless bog and wet sedge habitats. On extremely winding rivers, large oxbows form; often concentric bands of the above-mentioned species in various stages of succession are intermingled with strips of grasses and sedges and open water. Stands of broadleaf deciduous forest often mix with white spruce forest along river corridors and are also typically found on south facing slopes, steep cliff faces, ridge tops, and on sandy deposits found throughout the northwestern portion of the Refuge in the Koyukuk Wilderness Area.

Treeless bogs resemble arctic tundra communities and are the predominant vegetation type in the center of the Koyukuk Refuge and in scattered locations on the Nowitna Refuge and Kaiyuh Flats (N. Innoko refuge). Bog vegetation on the Complex consists of various species of cotton-grass (*Eriophorum* spp.), dwarf birch (*Betula nana*, *B. glandulosa*), bog blueberry (*Vaccinium uliginosum*), Labrador tea (*Ledum palustre*), leatherleaf (*Chamaedaphne calyculata*), myrtle (*Myrica gale*), sedges, and mosses, especially sphagnum moss and peat. Other species of bog habitat include bog rosemary (*Andromeda polifolia*), bog cranberry (*Oxycoccus microcarpus*), and sundew (*Drosera anglica*, *D. rotundifolia*). On drier ridges, willow, alders, resin birch (*Betula glandulosa*), black spruce and American larch (*Larix laricina*) are found.

Extent of land cover types was mapped on units of the Complex in the mid-1980's, and estimates were included in the Refuge Comprehensive Plans (1987). Technical information for part of this mapping project was reported in Talbot, S. S., and Carl J. Markon (1986. Vegetation Mapping of Nowitna NWR, Alaska Using Landsat MSS Digital Data. Photogrammetric and Remote Sensing. Vol 52, No. 6. June 1986, pp 791-799.).

Refuge staff joined forces with Ducks Unlimited, the Bureau of Land Management, the U.S. Air Force, and Spatial Solutions, Inc. to form a multi-agency partnership to produce modern land cover maps from high resolution satellite imagery. The goal of this partnership is to map vegetation on over 16 million acres of land in Alaska's Western Interior by the summer of 2002. Included in the project is our entire 7.7 million acre Refuge complex. Field work for the Northern Unit of the Innoko NWR (731,634 acres) was completed in 1998 and a draft map product was produced in 2000. The field work for a 2.2 million acre portion of western Koyukuk NWR was completed in the summer of 1999. The remaining 2.3 million acres of the Koyukuk was completed in the summer of 2001. A finished product for the Koyukuk NWR was received in August of 2002. Fieldwork to map the Nowitna NWR (and the adjacent U.S. Air Force Galena military operations area totaling 5 million acres) was completed in summer 2000. A final map product for the Nowitna NWR was received in September of 2002. Work on the remaining 2.3 million acres of the Koyukuk was completed in the summer of 2001, which resulted in finished products for the entire Koyukuk NWR in 2002.

F.2. Wetlands

The floodplains of the Koyukuk, Nowitna, and Yukon Rivers form a major component of the Refuge Complex. The actions of these meandering rivers have created a high diversity of wetland habitats for fish and wildlife. Each of the main rivers in the Refuge units has distinct hydrological characteristics, which in turn create differences in floodplain and wetland characteristics. For example, the Nowitna River originates in limestone bedrock in the Kuskokwim Mountains, which contributes carbonates that buffer the acidic qualities of the river and make it more productive than many of its Interior Alaskan counterparts. The Yukon River runs through all units of the Complex, and is the fifth largest river system in North America. The Yukon is silty for most of the summer because of glacial sources in the Alaska Range and Wrangell-St. Elias Mountains. The Koyukuk River originates along the Arctic Circle in the Brooks Range, and is subject to later snowmelt runoff than the Yukon and Nowitna rivers. In early June, at the height of waterfowl nesting, water levels of the Yukon and Nowitna may be low, while the Koyukuk River may be flooding due to mountain snowmelt in the arctic and subarctic portions of the Brooks Range. In summer any of these rivers may respond to localized heavy thunderstorms or more extensive late summer weather fronts. There are about 14,000 lakes and ponds on the Nowitna Refuge, where wetland acreage is estimated at about 30,000. The Koyukuk and Northern Unit of Innoko NWR (Kaiyuh) have an estimated 15,000 waterbodies and 5,500 miles of rivers and streams. There are an estimated 280,000 acres of wetlands on the Koyukuk and Northern Innoko.



A major differentiating characteristic of wetlands on the refuge is whether they are river-connected, which is a key determinant of productivity. This wetland complex, connected to the Nowitna River, receives annual flooding and nutrients from the river.

Refuge wetlands include upland basins, ice-formed lakes on the flats, river flooded lowlands, oxbows, and bog lakes. Spring runoff, rain, and river flooding recharges lakes. Water depths and shorelines can vary from year to year. Lake depths seldom exceed 15 feet and are usually much shallower. Water temperatures in shallow lakes reach 70°F or more in mid-summer, creating ideal conditions for the growth of aquatic plants and invertebrates. Among the aquatic plants, duckweed (*Lemna* sp.), horsetail (*Equisetum* spp.), water milfoil (*Myriophyllum* sp.), mare's tail (*Hippuris vulgaris*), and smartweed (*Polygonum* sp.) are abundant. One or more of 12 species of pondweed (*Potamogeton* spp.) occur in almost all lakes. Indicators of bog lakes include water lily (*Nuphar polysepalum*), pygmy water lily (*Nymphaea tetragona*), water hemlock (*Cicuta douglasii*, *C. mackenziana*), water parsnip (*Sium suave*), buckbean (*Menyanthes trifoliata*), and bladderwort (*Utricularia macrorhiza*). Shorelines of bog lakes vary in character, but nearly always contain buckbean (*Menyanthes trifoliata*), wild calla (*Calla*

palustris), various sedge species (*Carex* spp.), and burreed (*Sparganium hyperboreum*). Several species of graminoids including sedge (*Carex*), bluejoint grass (*Calamagrostis canadensis*), and foxtail (*Hordeum* sp.) provide cover on exposed shorelines. A variety of forbs grow on recently exposed soils along shorelines. Cattail (*Typha latifolia*), is an invasive species on the Refuge, and has recently appeared near Galena.

Shallow seasonally flooded basins (locally called “grass lakes”) are common along the Koyukuk, Yukon, and Nowitna rivers. Grass lakes are usually wetlands during spring breakup and flooding, and in summer become dry meadows, many of which show the beginnings of shrub and forest succession. The drier portions of grass lakes are vegetated primarily by bluejoint grass and occasionally arctic-bentgrass (*Arctagrostis latifolia*), an important food for geese. *Carex aquatilis*, *C. rostrata*, *C. capitata* and other sedges, and marsh cinquefoil (*Potentilla palustris*) dominate in the wetter portions. During flooding, sedges, and occasionally bluejoint grass will survive as emergent vegetation in water depths exceeding four feet.

F.3. Forest

Forests cover 88% of the Nowitna NWR and 41 % of the Koyukuk/Upper Innoko. Portions of the lower Koyukuk and Nowitna River floodplains, and some islands in the Yukon River, contain especially high quality white spruce timber measuring over 18 inches in diameter and over 100 feet high. Local residents primarily use spruce for house logs and firewood, although small commercial sawmills have operated in Tanana, Ruby and Galena. The Comprehensive Conservation Plans for Refuge units preclude commercial logging. Local interest in commercial logging operations on islands of the Yukon River has been expressed. Each year, a few permits are issued to local residents for personal harvest of house logs.

Vegetation classes: Many classes of forest vegetation occur on the Complex including closed needleleaf, closed mixed deciduous, open needleleaf, and needleleaf woodland. Each of these forest classes are arbitrary. While there are pure stands dominated by a single tree species, stands typically mix and grade into one another, depending on underlying soil moisture regimes. Mixtures create the opportunity to recognize other subclasses of mixed forest. The above generalized forest classes are described in more detail below:

Closed needleleaf forests occur on moist to well drained sites from the lowlands to mountain slopes and are particularly well developed on alluvial sites along the major rivers. Closed forests typically have 60% to 100% cover. The dominant tree species is white spruce (*Picea glauca*), which may grow to 80-100 feet tall, forming the largest stature forest found on the Refuge Complex. Understory species include northern toadflax (*Geocaulon lividum*), highbush cranberry (*Viburnum edule*), azalea (*Rhododendron lapponicum*), prickly rose (*Rosa acicularis*), sweetvetch (*Hedysarum alpinum*), and various species of feathermoss. This type comprises about 2% of the Refuge Complex.

Closed deciduous forests occur in well to imperfectly drained sites. White birch, aspen, and balsam poplar dominate the overstory. Other types of broadleaf deciduous forests occur in hills where strips of birch forest line hillside streams, and aspen is present on south-facing sandy hillsides. This subclass

reaches its greatest extent on the Nowitna, where it covers 30% of the total surface area. Only 3% of the Koyukuk was classified as this type.

Mixed forests have 25-100% cover of deciduous broadleaf trees mixed with evergreen needleleaf trees. Mixed forests are distributed mainly along the major water courses, especially on islands in the Yukon and Koyukuk Rivers, and on relatively dry, south-facing hillsides where drainage is good and permafrost is absent. The forest type consists of moderately tall (50 feet) to tall (80 feet) paper birch (*Betula papyrifera*), aspen (*Populus tremuloides*) and cottonwood, mixed with white-spruce. Common understory species found in mixed deciduous forest include highbush cranberry, currant (*Ribes triste*), bunchberry (*Cornus canadensis*), and prickly rose. This type comprises 6% of the Koyukuk and 4% of the Nowitna Refuge.

Open needleleaf forests have 25-60% tree cover and are found on moderately to poorly-drained soils. This type is composed primarily of black spruce, but often includes larch (*Larix laricina*) and willows. This type is frequently found on north facing slopes and poorly drained lowlands usually underlain by permafrost. Ground cover species in this forest include bog blueberry, Labrador tea, sedges and mosses. In many areas a thick blanket of lichen species entirely covers the ground forming an open needleleaf-lichen association. This type dominates the Nowitna, making up 42% of the area. On the Koyukuk it occupies 7% of the area.

The boreal forest has considerable range in tree stature depending on slope, aspect, soil quality, drainage and presence of permafrost. Tree size ranges from quite small, such as these stunted black spruce, to large birch and spruce over 1.5 feet in diameter and 100 feet tall. Black spruce are characteristic of poorly drained sites with permafrost, while large birch and white spruce are characteristic of well drained soils without permafrost



Needleleaf woodlands, which are sometimes called "muskeg," have 10% to 25% tree cover, and are found on moderately to poorly drained soils. These woodlands contain low, sparse, tree growth (mainly black spruce, but larch may be present). The ground cover resembles a treeless bog community dominated by shrub species such as Labrador tea, bog rosemary, bog blueberry, low-bush cranberry, bog cranberry, and crowberry (*Empetrum nigrum*). Various graminoid and moss species also may be common including cotton-grass, sedges, and mosses (*Sphagnum* moss and peat). This type makes up 26% of the Koyukuk and 10% of the Nowitna Refuge.

Fire regeneration: Wildland fires are primary agents of disturbance in the boreal forest, initiating successional changes which impact a variety of plant and animal species. Years of fire have produced a mosaic of seral stages within the Refuges, which provides a diversity of wildlife habitats. The general sequence of plant communities that become established after fire is as follows:

Black Spruce Sites

0-1 years	newly burned
1-5 years	moss-herb
5-30 years	tall shrub-sapling
30-55 years	dense tree
56-90 years	mixed hardwood-spruce
91-200+ yr	spruce

White Spruce Sites

0-1 years	newly burned
1-5 years	moss-herb
3-30 years	tall shrub-sapling
26-45 years	dense tree
46-150 years	hardwood
150-300+ yr	spruce

These plant associations are described above and in section F6.

F.6. Other habitats

The Complex contains several non-forest shrub, herbaceous, and graminoid (grass-sedge) vegetation cover types. The most significant types are listed below:

Alluvial/lowland tall shrub: This type is dominated by deciduous shrubs ranging from 1.5 to 16 feet in height. It includes 'lowland broadleaf', 'alluvial broadleaf', and 'subalpine broadleaf' communities. Tall shrub communities are found primarily in floodplains, and are dominated by willows (*Salix alaxensis*, *Salix planifolia pulchra*, *Salix arbusculoides*, *Salix bebbiana*), and in some areas, alder (*Alnus incana*, *A. crispa*). Chief understory species include *Vaccinium vitis-idaea*, *Linnaea borealis*, *Calamagrostis canadensis*, and *Equisetum arvense*. This type makes up 4% of Nowitna and 3% of Koyukuk area.

Dwarf shrub-graminoid tussock peatland: This community contains slow-growing dwarf shrubs less than 1.5 feet tall, and frequently occurs on poorly drained organic soils. Mosses and lichens cover the surface. Dominant species include *Ledum decumbens*, *Chamaedaphne calyculata*, *Vaccinium uliginosum*, *V. vitis-idaea*, *Betula glandulosa* (or *B. nana*), *Eriophorum vaginatum*, *Carex bigelowii*, *Rubus chamaemorus*, *Sphagnum* spp., *Dicranum* spp., *Cladina* spp., and *Cetraria* spp. This is the dominant habitat type on the Koyukuk, comprising 27% of surface area, but makes up only 2% of the Nowitna Refuge.

Graminoid tussock-shrub: Plant composition is similar to above but dominated by *Eriophorum* tussocks, with lesser amounts of dwarf shrub and herbaceous cover. This type is transitional to arctic and alpine tundra in some areas. It is most common on the Koyukuk, and makes up about 14% of the cover there.

Prostrate dwarf shrub tundra characterizes relatively bare alpine communities dominated by low-growing matted dwarf shrubs. The habitat is also rich in lichens. Dominant species include *Dryas octopetala*, *Salix phlebophylla*, *Vaccinium uliginosum*, *V. vitis-idaea*, *Empetrum nigrum*, *Diapensia lapponica*, *Salix arctica*, *Arctostaphylos alpina*, *Sphaerophorus globosus*, *Cetraria nivalis*, *C. cucullata*, *Alectoria ochroleuca*, *Thamnolia subuliformis*, and *Stereocaulon* spp. This type comprises 1% of the Koyukuk and Northern Innoko and less than 1% of the Nowitna Refuge.

The herbaceous vegetation class is dominated by herbaceous plants and includes grasses, sedges, and flowering plants. The primary subclasses are 'graminoid bog,' 'marsh,' and 'meadow.' 'Graminoid

bog' has a mossy surface underlain by peat that is often saturated with water. Typical graminoids in this subclass are *Eriophorum russeolum*, *Carex limosa*, and *Carex chordorrhiza*. 'Graminoid meadow' is relatively dry and dominated by *Calamagrostis canadensis* and is often associated with old river meander scars. 'Graminoid marsh' primarily occurs at the margins of lakes and ponds. The most important graminoids in this subclass are *Carex aquatilis*, and *Carex rostrata*. This class occurs along the margins of most wetlands on the Refuges. Approximately 2% of the Nowitna and 2% of the Koyukuk are comprised of this class.

Other vegetative types occur in upland areas that surround the wetland floodplain basins that make up the Koyukuk, Kaiyuh, and Nowitna. On the Koyukuk NWR, small mountain ranges occur on the east, west, and north boundaries of the Refuge. On the Northern Unit of Innoko, the Kaiyuh hills occur along the southern boundary. On the Nowitna, hills occur along all four sides of the Refuge. Mountaintops in the Refuge typically are scarcely vegetated rock scree that may extend down the mountain in fingers of unstable rock slopes. Below the scree, communities of prostrate dwarf scrub tundra, alpine meadows, and dwarf shrub tussock tundra predominate. These communities grade into subalpine broadleaf scrub communities and a treeline composed of stunted white spruce. Alpine habitats are particularly rich in lichen species such as *Cetraria nivalis*, *C. cuculata*, *Alectoria ochroleuca*, *Thamnolia subuliformis*, *Stereocaulon* spp., *Cladina* spp., and *Cladonia* spp., of which several are an important food source for wintering caribou. Subalpine broadleaf scrub communities are dominated by alder and willow (*Salix planifolia* ssp. *pulchra*), a favored forage of moose. Estimated cover of these alpine and subalpine habitats is 3% on the Koyukuk and 1% on the Nowitna.

F.9. Fire Management

The fire management program for the Koyukuk/Nowitna Refuge Complex is described in the Koyukuk and Northern Unit of Innoko National Wildlife Refuge Comprehensive Conservation Plan, Environmental Statement, and Wilderness Review Final October, 1987 (pp. 125, 140, 153, 166-167 and 183); the Nowitna National Wildlife Refuge Final Comprehensive Conservation Plan, Wild River Plan, Wilderness



Fire # B328, Koyukuk NWR

Review, and Environmental Impact Statement 1987 (pp.122, 151, and 189) and the Alaska Interagency Wildland Fire Management Plan Amended October 1998 (AIWFMP). The Koyukuk and

Nowitna Fire Management Plans will be written in FY04.

No prescribed fires were implemented on the Refuge Complex during 2003. The focus of the Refuge Complex's fire management program has been the management of wildland fires for resource benefit.

The majority of fires in Interior Alaska are started by lightning strikes. Statewide fire activity during 2003 was relatively low with 465 wildland fires (75 lightning caused and 390 human caused) that burned 602,146 acres. There were only two fires on the Refuge Complex; both were on the Koyukuk National Wildlife Refuge. They burned a total of 483 acres.

Details for the individual 2003 fires on the Koyukuk NWR are found in Table F.9.1.

Table F.9.1 Wildfire Occurrence on the Koyukuk NWR during 2003.

Fire Number	Acres Burned	Cause	Protection Level	Discovery Date	Declared Out
B328	463	Lightning	Modified	6/22/2003	7/19/2003
B344	20	Lightning	Modified	6/25/2003	6/27/2003

Work accomplished during 2003 included: 1) conducted FIREWISE outreach during the winter months in Ruby, Nulato, Galena, Huslia, Kaltag and Koyukuk; One participant from Nulato attended the April FIREWISE conference in Fairbanks; 2) maintained the Koyukuk/Nowitna and Innoko Field Camp fire caches; added new equipment to each cache; 3) equipped two small water tanks (125 and 225 gallons) that were mounted on ATV trailers with pumps and stationed them at Quarters 1 and 4 during the fire season to provide additional fire protection for the six residences located in New Town (Galena); 4) established thirty permanent post-fire effects monitoring plots in two Innoko 2002 fires; 5) removed hazardous fuel accumulations from around the Lower Nowitna Cabin, the Ware Yard (Galena), Quarters #4 (Galena) and the Innoko Field Camp; 6) flew one fire detection/reconnaissance flight with AFS (over Koyukuk and Selawik fires); 7) assisted the Regional Telecommunications staff for one month with the installation of the Complex's new digital radio system on five different sites; 8) presented a fire ecology session at the McGrath Science Camp; and 9) spent a 21 day fire assignment on the Beaver Lakes Complex (Type I Team) near Missoula, Montana. 10) Lastly a major part of FMO Lambrecht's duties were to provide fire management support to the Selawik and Innoko refuges by: a) forwarding pertinent fire information to each Refuge Manager and Deputy Refuge Manager; b) performing hazardous fuels reduction work around the Innoko Field Camp; c) maintaining the Innoko Field Station fire cache; and d) meeting with Innoko Refuge staff in January to coordinate post-fire monitoring work.

F.12 Wilderness and Special Areas

Nogabahara Sand Dunes, Koyukuk Wilderness Area. In 2001 an archaeological site was discovered on the Nogabahara Sand Dunes. The site consists primarily of obsidian artifacts scattered on the surface sand in a small coulee. Sample collections of artifacts (~40 pieces total) were made in 2001 and 2002. In August 2003, UAF Museum archaeologist Daniel Odess accompanied PR Karin Lehmkuhl and three volunteers to map and collect artifacts. Volunteers on the project were George and Judy Lehmkuhl and Randy Shaw.

Since our last visit a substantial number of artifacts, primarily small pieces (flakes, microblades), had become exposed,. Also, several pieces of calcined and charred bone were collected, which may

provide a date estimate for the site. Small pieces of fire-cracked rocks were also present. Over 460 pieces were collected; tiny obsidian and chert flakes, larger obsidian tool performs, basalt cobbles and hammerstones, and small fragments of fire-cracked rock and charred bone. The collection will be studied, catalogued, photographed and hand drawn for archival purposes at the University of Alaska Fairbanks Museum.

In November 2003, eight obsidian artifacts from the Dunes collection were sent to the Northwest Obsidian Studies Laboratory (Corvallis, OR) for source testing. The artifacts were subjected to energy



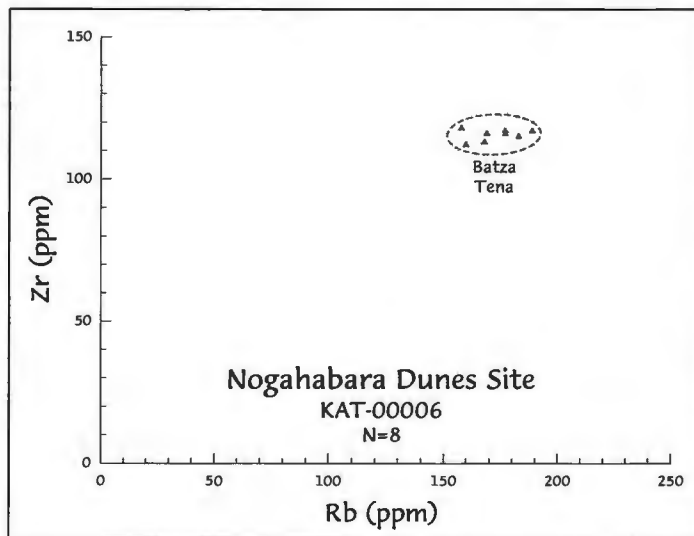
Judy, Karin and George Lehmkuhl Assist Dan Odess in collecting artifacts

dispersive X-ray fluorescence trace element provenance analysis, a non-destructive analysis which identifies diagnostic trace element values used to compare obsidian artifacts to possible source materials. Analysis was conducted by Craig Skinner, who prepared a report (on



Trash found in a moose hunters camp in the Koyukuk Wilderness area (KL)

file at Refuge Headquarters). A single obsidian source, Batza Tena, was identified for all eight artifacts. The Batza Tena site is located in the northeast portion of the Koyukuk Refuge, and was likely a primary source of obsidian for most of Interior Alaska.



Scatterplot of rubidium (Rb) plotted versus zirconium (Zr) for all analyzed artifacts

Three Day Slough, Koyukuk Wilderness Area. June 02-06, FMO Bob Lambrecht and PR Karin Lehmkuhl traveled through Three-Day Slough using the 22' Alweld. The purpose of the trip was two-fold. Because Three-Day

slough is popular for moose hunting and lies within the Koyukuk Wilderness, the Refuge is concerned about hunter impacts in the form of campsites and litter. Bob and Karin stopped at any observed campsites and removed as much trash as possible, including several fuel barrels, and documented the location of campsites using GPS. Another aspect of the trip was to look at vegetative communities, browse condition of willows, etc. in view of proposed use of prescribed fire as a management tool to enhance local moose populations.

For the most part we were pleased with the cleanliness of hunter camps on the Slough. The most common problems we saw were rope (esp. meat poles), nails in trees, and trash in fire pits (many of which showed evidence of excavation by animals). There were only a few excessively “trashy” camps. We did not take down tables or remove tent poles, etc. We recommend another cleanup following



Fuel Barrels collected from Three Day Slough (KL)

aerial reconnaissance to locate barrels and/or other problems. We made several transects inland from the slough to look at communities, and vegetative found the willows along grass lakes to be heavily browsed and decadent. There is concern that the wetlands will be difficult to burn without also burning the drier uplands, and that the willows may not have enough vigor to re-sprout after fire. Bob suggested we attempt some smaller burns in a few grass lakes to stimulate growth and to identify patterns of post-fire succession.



Remains of a moose hunters camp On Three Day Slough (KL photo)

Palisades Bluffs, Nowitna NWR. For nearly ten years, Paul Matheus, Quaternary Mammalogist at the University of Alaska Fairbanks, has led an investigation of the paleontological site at the Palisades Site (silt bluffs) on the Nowitna NWR. In 2003 a paper was published on the findings of this research:

Matheus, P., Begét, J., Mason, O., Gelvin-Reymiller, C. 2003. Late Pliocene to late Pleistocene environments preserved at the Palisades Site, central Yukon River, Alaska. Quaternary Research 60, 33-43.

[Abstract]

The Palisades Site is an extensive silt-loam bluff complex on the central Yukon River preserving a nearly continuous record of the last 2 myr. Volcanic ash deposits present include the Old Crow (OCT; 140,000 yr), Sheep Creek

Palisades silt bluffs, Nowitna NWR



(Refuge staff photos)



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1. Developing a paleomagnetic profile of the sediments. This would be useful for:
 - i. placing better dates on sections that do not contain tephtras or other chronostratigraphic markers.
 - ii. identifying gaps in the sediments, which is important for understanding the site's genesis and identifying periods of deposition and erosion and correlating them to local, regional, and global climatic oscillations. Continuing collection, identification, and dating of additional tephtras to refine the site's chronology

2. Focused ecological study of the buried forest units, including:
 - i. more thorough floristic analysis
 - ii. stable isotope and tree ring analyses of ancient wood
 - iii. collecting fossil beetles for certain types of paleoclimatic and paleoenvironmental data

4. Concentrated excavations of dated horizons for mammal fossils, including those of small mammals; this site currently stands as our best opportunity to gather information about pre-late Pleistocene fossils in Alaska.

G. WILDLIFE

G.1. Wildlife Diversity

The Koyukuk/Nowitna National Wildlife Refuge Complex has a high diversity of habitat types resulting from riverine erosion, deposition, and flooding, the actions of wildfire, and topographical variation. Baseline data continues to be collected to determine the status and distribution of bird, fish, and mammal species. Over 140 bird species, 30 mammal species, 14 fish species and 1 amphibian occur on Koyukuk and Northern Innoko NWR's. A Koyukuk NWR bird list was published in 1992 following a decade of active field surveys and local observations by staff living in Galena.

Thirty-seven species of mammals, 147 birds, 20 fishes, and 1 amphibian are known to occur on or near Nowitna NWR. A draft bird list for the refuge was completed in 1992. It will not be published until an adequate field and literature review can be accomplished. Particularly lacking are observations and documentation of upland and alpine-breeding species. Fish, mammal, and plant lists for both the Koyukuk and Nowitna, published in the refuge Comprehensive Conservation Plans, needs to be updated and revised.

Included among the biodiversity monitoring efforts on the Complex in 2003 were surveys of spring bird migration phenology (collection of arrival dates), the North American Migration Count, breeding birds (Standard BBS), inventories of wintering birds (Christmas Bird Count, see Section G.7), and small mammals (see Nowitna Section G.10).

G.2. Endangered and/or Threatened Species

The only endangered species, or formerly endangered species, to occur on the Complex are the arctic peregrine falcon and American peregrine falcon. The arctic peregrine falcon migrates across the region to its arctic nesting areas. The American peregrine falcon nests on all units of the Complex. The American peregrine falcon was removed from the endangered species list in June 1999. It will be monitored for a five-year period and re-evaluated for permanent removal. The threatened arctic peregrine falcon, which migrates across the refuge, was de-listed in 1994, and its monitoring period is over.

G.3. Waterfowl

Wetlands within the Koyukuk NWR, Northern Unit of the Innoko NWR (Kaiyuh Flats), and Nowitna NWR support large waterfowl populations. The most common breeding duck species include American wigeon, northern pintail, mallard, green-winged teal, northern shoveler, surf scoter, white-winged scoter, common and Barrow's goldeneye, bufflehead, and lesser scaup. Less abundant breeding ducks include red-breasted merganser, greater scaup, canvasback, ring-necked duck, redhead, black scoter, and long-tailed duck. Arctic, red-throated, and common loons also nest on the refuge, as do horned and red-necked grebes. Canada geese, white-fronted geese, trumpeter swans, and tundra swans are found on the refuge in moderate numbers. The greatest concentrations of waterfowl occur during spring and fall migrations on large, shallow floodplain waterbodies.

Weather Conditions and Waterfowl Migration Chronology

It is important to monitor arrival chronology and spring breakup conditions because these factors greatly influence waterfowl productivity. In 2003 white-fronted geese arrived in Galena on April 19, five days earlier than the mean arrival date, Canada geese arrived on April 21, eleven days earlier than average, mallards arrived on April 22, nine days earlier than the average date, while pintails also arrived on April 22, eight days earlier than the long-term mean.

Koyukuk/Kaiyuh. The upper Dulbi River was 80% snow free on April 18 with a lot of water flowing on top of the river ice. Areas downstream of Cottonwood Creek were only 30% snow free but still had a lot of water flowing on the river ice. Hozatka Lakes still had 95% snow cover with very little water showing anywhere except on the smallest ponds and the Natlaratlen River system. The lower Whakatna and Bear Creeks were open, although snow cover was still 90%. Most wetlands were showing overflow.

On April 23, Evans Creek was completely ice free. Snow cover northeast of Galena to Bear Creek was 30% and was 60% north of Galena to Hourglass Lake. Hozatka Lakes still had 75% snow cover with very little open water. Holtnakatna Creek was wide open with 70% snow cover around the lower sections. The ice on Dulbi River near Cottonwood Creek was ready to move and there was 75% snow cover. The flats near Dulbi Slough had 75% snow cover and areas of tussock/meadow were down to 50%. Willow Lake still had good white ice in the middle but had water around the edges. Snow cover in the grassy areas around the lake was 25-35% and up to 75% in the brushy or forested areas. Dulbi Slough ice was ready to move with water along the edges all the way up to Willow Lake. Arriving waterfowl were observed on Willow Lake.

Bear Mountain up to Hughes still had 100% snow cover on April 23. Very little water was observed on the Koyukuk River except patches of overflow. Considerable overflow was observed from the Little Indian River to the Big Indian River and there was 60% snow cover on the tussock tundra. The lower Hog River area still had 90% snow cover with just a trace of overflow. The Dakli River valley was 95% snow free with several large ponds open. The Dakli River was completely open and flowing. The Huslia River still had 80% snow cover. The Koyukuk River at Three-Day Slough had 80% snow cover with some overflow and weak spots in the ice. The mouth of the Kateel River and Long Stretch still had 100% snow cover with only small patches of overflow along the River. The Natlaratlen River flats had

60% snow cover in grassy areas and 80% cover in forested and brushy areas. Natlaratlen Lake had major overflow and a few lakes in the area were open. Nicholai Slough still had ice, but with a lot of water along the sides. The northern Kaiyuh Flats still had 95% snow cover with small amounts of overflow. Squirrel Creek was mostly open. The southern Kaiyuh also had 95% snow cover and the Khotol River was beginning to develop water along the sides. The eastern Kaiyuh was bare of snow with only 5% snow cover and a lot of open water coming down Eddy Creek and Bonanza Creek. The ice in the Big Lake district was getting rotten with water around the edges.

On April 29, the Nulato and Kaltag Rivers were mostly open and waterfowl were steadily arriving in the area.

On May 9, the ice on the Koyukuk River at Huslia was moving out. Willow Lake was 50% open and the water was just starting to move up into the willows. The larger lakes still had ice and the smaller, shallower lakes were open near Willow Lake and on the Dulbi Slough Flats. The snow cover in the area was almost gone with only patches occurring in heavy timber or where snow drifts accumulated at lake edges. The Dulbi River was completely open with no flooding. Sand bars were still visible and the water was unusually low for breakup. Hozatka Lakes were still mostly ice covered.

Nowitna. The Melozi River valley was 90% snow free by April 18, with only 10% snow in scattered spruce and shady spots. Considerable overflow covered most of the river ice.

On May 9 the Nowitna River was completely open with low water and no flooding.

Ducks.

Koyukuk Ducks

Production. Annual duck production surveys were conducted on the Koyukuk NWR and the Northern Unit of Innoko NWR from 1983 to 1993. The estimated number of ducklings produced on both refuges ranged between a minimum of 62,050 in 1989 to a maximum of 199,155 in 1990 (Saperstein, L.B. 1997. *A summary of ten years of duck production surveys, Koyukuk NWR, AK, 1983-93*). The estimated number of adults occurring on both refuge units between 1990-93 ranged from 61,664 in 1993 to 117,449 in 1992. Duck brood surveys were discontinued in 1993.

Breeding population. Duck abundance on the refuge is currently monitored using the aerial duck breeding pair survey conducted by the Service's Division of Migratory Birds in Juneau (DMB). Weather conditions in 2003 were good and the DMB expected average to excellent production due to an early spring and little flooding in the Koyukuk stratum. Generally, dabblers, divers, and the miscellaneous categories all increased in size this year. Pintails were the only duck to decline slightly from 2002 and is well below the average. It should be noted that the estimates apply to the entire Koyukuk stratum, of which Koyukuk NWR is only a part. A comparison of the breeding pair estimates for the Koyukuk stratum with estimates of adults summering on the refuge (based on 1990-93 brood survey extrapolations) suggested that, depending on the year, the Koyukuk NWR represented approximately 36-65% of the ducks estimated for the entire Koyukuk stratum. The May 2003 estimated breeding duck

population in the Koyukuk Stratum was 204,000 ducks. Using the percentages given above, the calculated mean estimated population for Koyukuk NWR was 73,440-132,600. These figures corresponded well with, and appear to be increasing above the July post-breeding estimates of 62,000-117,000 presented by Saperstein (1997). The DMB recommends caution when viewing the 2003 estimates. Survey timing was normal, but because of the early spring migration of waterfowl from southern wintering areas, it was probably advanced for some species such as interior scoters and scaup. In addition to this, there may have been some overflight of a few species from other areas further south as well.

Expanded breeding population survey. In 1996 and 1997, the Division of Migratory Birds conducted an expanded breeding population survey in the Koyukuk stratum, including Koyukuk and Kanuti NWR, and the Hog River/Pah River Flats. This intensive transect survey, which had parallel flight lines spaced every nautical mile over all wetland habitats in the Stratum, resulted in the best quality estimates of duck numbers available for the region. The 1997 expanded breeding population survey estimated 211,600 ducks in the Koyukuk stratum, while the standard breeding population survey estimated 199,000 ducks the same year.

Incidental Observations. Incidental duck observations are recorded during the annual early-July goose production float surveys conducted on Dulbi River. These observations are analyzed strictly as an index of the population and are not used to form an estimate of total population. Results from the Dulbi River incidental observations in 2003 show near average numbers of adults and young.

Nowitna Ducks

Duck production surveys were conducted on the refuge from 1983 to 1992, and were analyzed by Saperstein (1996) in a report entitled *A summary of ten years of duck production surveys, Nowitna National Wildlife Refuge, Alaska, 1983-1992*. Refuge-wide production estimates reported between 1987-1992 ranged between 4,209 ducklings (90% CI=14.5%) in 1989 and 17,140 ducklings (90% CI=15.9%) in 1988. Confidence intervals around production estimates were much wider following standardization of techniques and refinement of statistical procedures in 1990. Production estimates between 1990-1992 ranged from 4,855 (90% CI=63.4%) in 1991 to 14,270 (90% CI=57.4%) in 1990. The 1990 implementation of standardization and stratification methods that worked for other Alaska refuges to improve precision of estimates did not improve the quality of estimates for Nowitna. Any future duck production surveys on the Nowitna would likely benefit from a serious review of the earlier methods documented by Andy Loranger that were so successful.

The Nowitna NWR comprises <10% of the aerial duck breeding pair survey Tanana-Kuskokwim Stratum conducted by the Service's Division of Migratory Birds in Juneau, and therefore, these data will not be presented here.

Incidental Observations. Incidental duck observations are recorded during annual early-July goose production float surveys conducted on the Nowitna River. These observations are analyzed strictly as an index of the population and are not used to form an estimate of total population. Results from the 2003 incidental observations on the Nowitna River show average numbers of adults and young.

Geese

Abundance and productivity of white-fronted and Canada geese in Northwest and Interior Alaska are monitored by aerial and float surveys. Increases in abundance of adult and young white-fronted geese were observed on both aerial and float surveys in 2003. Canada geese remain stable at low numbers. The intensive aerial molting survey provided adult white-fronted goose abundance data without excessive variability, which should be useful for continued monitoring and evaluation of management actions. The intensive survey did not work as well for Canada geese on the Koyukuk. Totals of 1942 white-fronted geese and 305 Canada geese were banded in four areas: Innoko, Koyukuk and Selawik NWR and the north slope near Deadhorse. Satellite telemetry transmitters were implanted in seventeen white-fronted geese. A website available to provide real-time updates on the most recent position of each goose. Blood was drawn in from a subsample of white-fronts to determine prevalence of avian cholera.



Brad Scotton, Julian Fischer, and Jenny Bryant banding white-fronted geese at Selawik NWR

Abundance Surveys

May-June breeding population surveys. A regional perspective was obtained by extracting goose abundance data from the Interior and Northwest Alaska strata of the statewide waterfowl production aerial survey (Figs. 1-2, data from Conant and Groves, USFWS Division of Migratory Bird Management, pers. comm. July 2003). In the Koyukuk Stratum, abundance of white-fronts was lower in the 1990's compared to the 1980's. Some increase was observed in 2000 and 2001, but a decline occurred again in 2002 and 2003 (Fig. 3). No trend in abundance of Canada geese in the same strata was detectable using linear regression. We believe these May-June surveys can provide a good general picture of long-term abundance trends, but the survey was not designed for geese, which results in considerable short-term variability. This occurs because of variability in survey timing relative to chronology of nesting, which in turn relates to goose sightability (Bromley et al. 1995).

July aerial molting survey. Abundance of white-fronted geese is best monitored with an intensive aerial survey with the timing specifically adjusted to occur during the molt in early-mid July, when sightability is highest. July surveys were conducted in four areas: Selawik, Innoko, Koyukuk and Kanuti NWRs. In 2003, these areas were surveyed in cooperation with the involved refuges and the USFWS Division of Migratory Bird Management. This survey covers the most important white-front habitat in the Northwest/Interior Alaska region and is the most comprehensive aerial survey of geese in the region to date. The July molting survey has indicated a steady decline in abundance of white-fronted geese on Koyukuk NWR from 1994-2001 with slight increases in 2002 and a large increase in 2003 (Fig. 4). Abundance of Canada geese has varied considerably in the July molting survey. A decline of total white-fronted geese in the Koyukuk area is more pronounced when earlier minimum abundance estimates made during pre-banding reconnaissance flights in the 1970's are included, (*see* Lobpriess 1980). Collectively, the molting surveys of all four areas prior to 2003 also suggests a regional decline

of total white-fronted geese in the Western Interior and Northwest Alaska (Fig.5). The large increase in 2003 occurred mainly on the Innoko NWR and it is unclear where this large influx of birds originated.

Estimates of population size. During the years 1979-83, Lensink (1987) estimated a mean indexed estimate of 113,000 white-fronts in the Interior-Northwest Alaska region. In the last decade, the May-June aerial breeding population survey indicated a mean index of 24,752 white-fronted geese. Application of Lensink's (1987) 3.6 sightability correction factor resulted in a mean population index of 89,104 white-fronts for Interior-Northwest Alaska in the last decade. Similar application of this correction factor to the results of the July aerial molting survey for Innoko, Koyukuk, Kanuti, and Selawik NWR's yielded white-front indices of 89,719 in 2000, 80,251 in 2001, 50,980 in 2002, and 109,000 in 2003.

The May-June aerial breeding population survey indicated a mean of 21,326 Canada geese. This provided a sightability-corrected index of 76,774 Canada geese in the same region. Koyukuk NWR staff have documented poor representation of Canada geese in their molting survey, therefore no sightability-corrected estimates were attempted using these values.

Productivity. Float surveys to monitor productivity trends were completed on one river on Koyukuk NWR, one on Northern Innoko NWR, one on Nowitna NWR, and one on Kanuti NWR. We surveyed Dulbi River, but discontinued the Dulbi Slough count in 2002 because of concerns about disturbance of molting geese in that part of the refuge. The overall sample for historical comparisons has dropped from 539 miles to 470 miles.

White-fronted geese. All of the three survey areas had excellent production in 2003. Production was above average because of a normal to warm break up and minimal to no flooding in the Western Interior and Northwest Alaska. Counts of adults, goslings, and percent young were up in July 2003.

Canada geese. Productivity of Canada geese was also good in 2003. Canada goose adults remained average and the gosling count increased slightly. On all four survey areas Canada goose adult numbers have been relatively stable from 1996-2003.

Banding. Between July 7 and 17, 2003, a joint Division of Migratory Bird Management/ Refuges team banded 1,942 white-fronted geese and 305 Canada geese at Innoko, Kanuti, Selawik NWRs and the North Slope. Total white-fronts banded at each site varied in approximate proportion to total geese available, with the majority captured on the Innoko NWR and the North Slope.

Cholera study. During banding, blood and throat swab samples were taken from more than 260 white-fronted geese adults in 2003 to determine prevalence of avian cholera. Blood serology from 2001 showed that 5% of the sampled birds had cholera antibodies, suggesting exposure in the 3-4 months prior to molt. That exposure was probably occurring from late-winter to breeding. Swab samples analyzed from 2001 showed no presence of cholera. This study is being conducted by Dr. Mike Samuel and his student, Ms. Jennifer Grannick, of the USGS-BRD National Wildlife Health Center in Madison, WI. From 2001 data, Dr. Samuel made a preliminary conclusion which suggested that these birds were probably not carriers, but were likely infected by other individuals or species elsewhere.

Satellite telemetry study. Satellite telemetry transmitters were surgically implanted in 12 brood-patch female white-fronted geese in 2001, 22 in 2002, and 17 in 2003. Allocation of the sample corresponded

roughly to the pattern of regional abundance: Noatak 4, Kanuti 4, north slope 9. This telemetry effort is part of a broader University of Alaska study conducted by Dr. Eric Rexstad and his student, Ms. Deborah Webb. Their study, "*Measuring stopover length of mid-continent greater white-fronted geese in Alberta and Saskatchewan, Canada,*" utilizes collar resightings from the existing CWS database (1990-2000), plus additional observations from late August through late October 2001, 2002, and 2003. Deborah's field work was augmented significantly by assistance from the Canadian Wildlife Service. When field work is complete, they will estimate stopover time using reverse capture history modeling and compare these results with stopover data obtained from the satellite telemetry. In 2001, all 12 satellite-implanted Interior Alaska white-fronts remained in Canada for the entire six-week staging period. At Innoko NWR, 20 brood-patch female white-fronts were fitted with conventional VHF radio neck collars. Nesting ecology was conducted in spring 2003 to document nesting areas of Innoko molting geese. A University of Alaska website contains more details about the satellite telemetry and stopover studies: http://mercury.bio.uaf.edu/~eric_rexstad/satellitegeese/

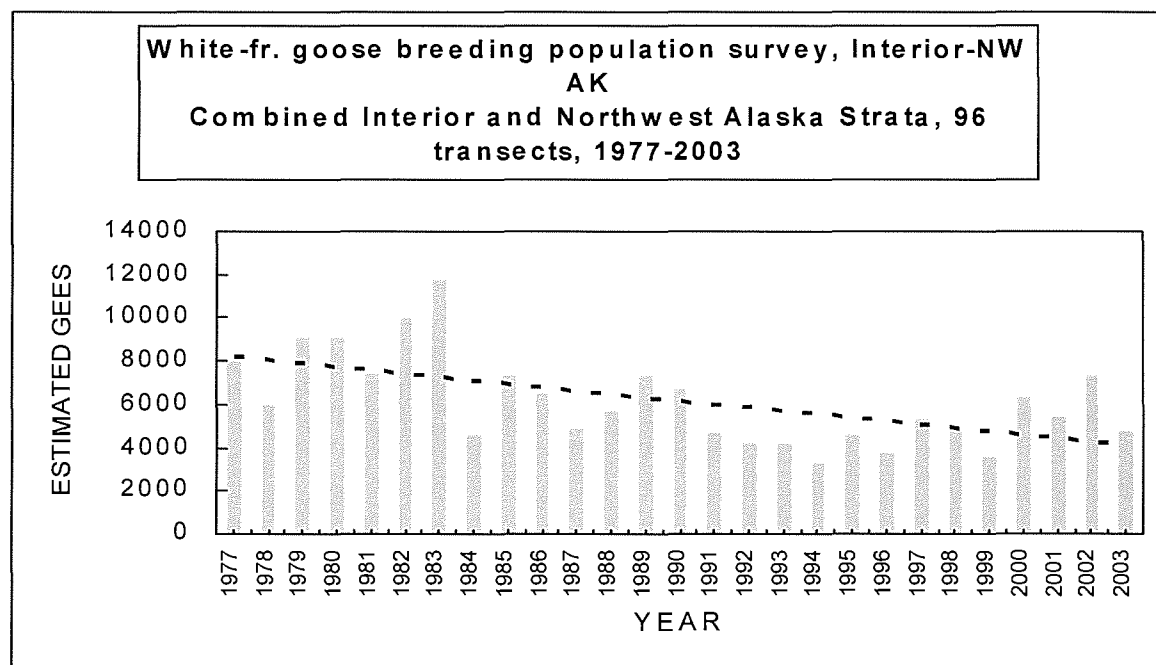


Figure G.3.1. White fronted goose breeding pair surveys, Northwest and Interior AK, 1977-2003

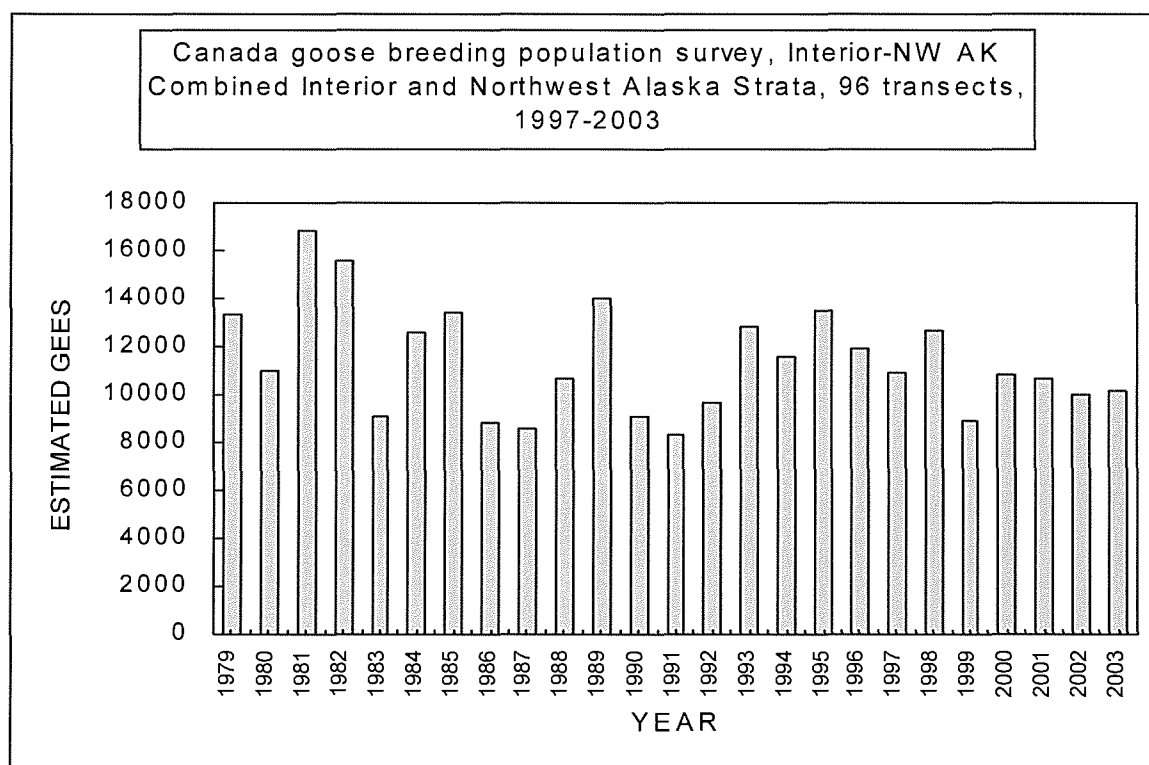


Figure G.3.2. - Canada goose breeding pair surveys, Northwest and Interior AK, 1979-2003.

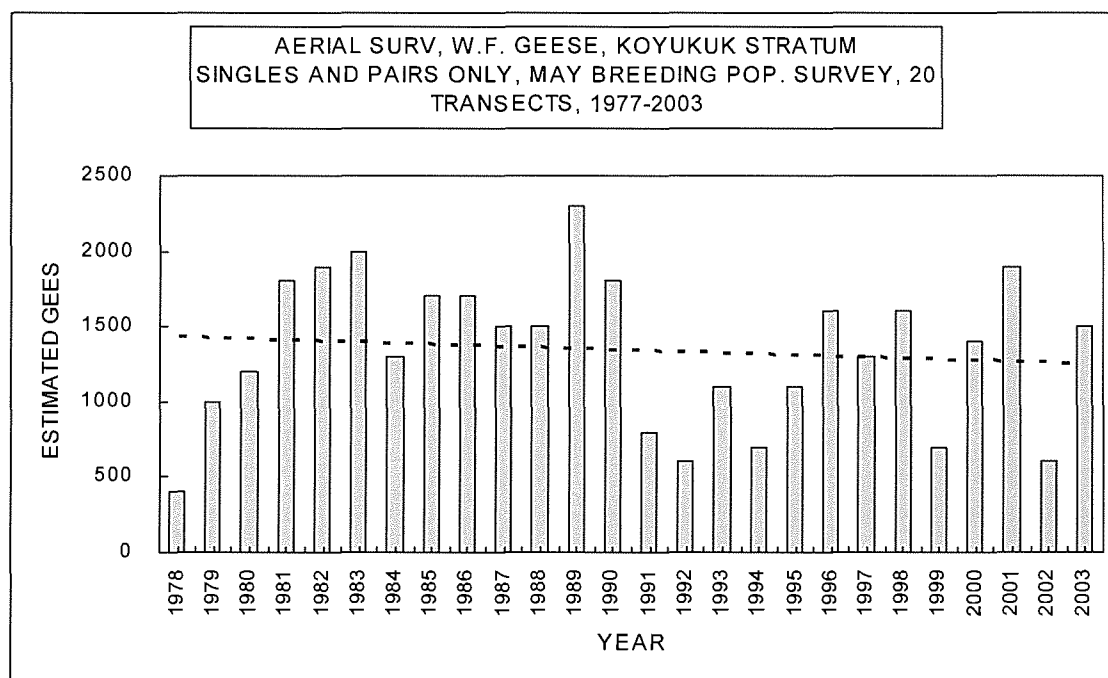


Figure G.3.3. - White fronted goose breeding population surveys, Koyukuk stratum, 1978-2003

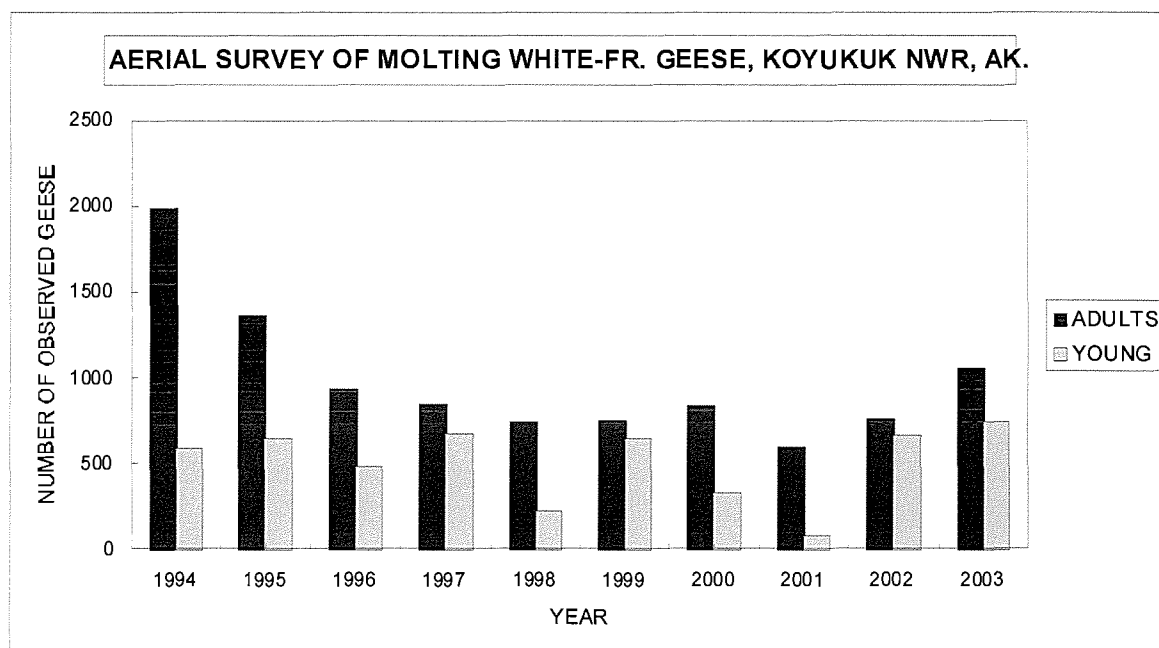


Figure G.3.4. - White fronted goose aerial molting surveys, Koyukuk NWR Alaska, 1994-2003

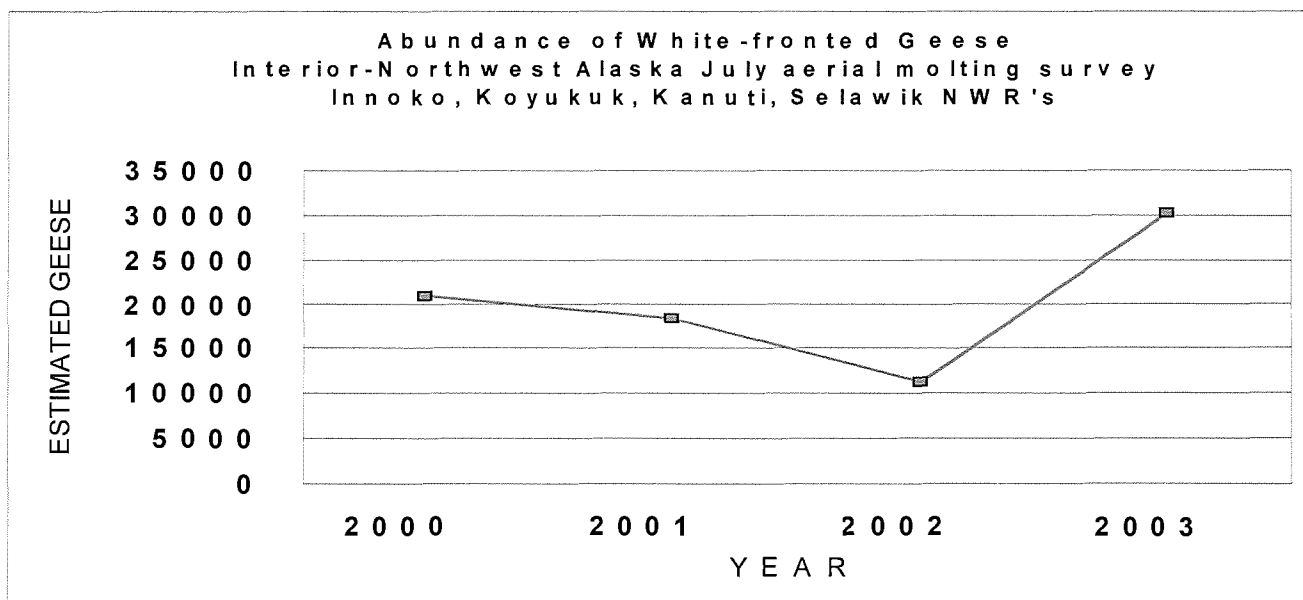


Figure G.3.5. - Aerial molting surveys Northwest and Interior areas combined: Innoko, Koyukuk, Kanuti, Selawik NWRs, AK; 2000-2003

Swans

Aerial swan trend surveys were flown on the Koyukuk/Nowitna NWR Complex during August 6-27,



2003. Aerial surveys are conducted to monitor trends in swan population and production on an annual or money-available basis. The 2003 trend surveys on the Koyukuk and Upper Innoko (Kaiyuh) show an increasing population with excellent production. The Nowitna NWR surveys also show a increasing population with excellent production.

WB Bryant leaving swan location

Koyukuk:

Four trend maps were flown annually on the Koyukuk from 1985 to 1995, then in 1998, 2000 to 2003. Results from the 2003 survey show a large increase in the number of young and is the highest ever observed during the survey. The number of paired swans decreased slightly but is still higher than average. Flocked and single swans decreased from that seen in 2002, but is still comparable to the average. Composition data shows excellent breeding effort (breeders/adults) and production (% pairs with broods).

Northern Unit of Innoko (Kaiyuh):

Two trend maps were flown annually on the Kaiyuh from 1989 to 1995 and from 2000 to 2003. Results from the 2003 survey, show a generally increasing trend in the number of adults with an all time high observed in 2000. The number of young also shows an increasing trend and is well above the mean. The number of flocked and singles increased slightly and is above the mean. Composition data show continued good breeding effort (breeders/adults) and excellent production (% pairs with broods).

Nowitna:

Seven trend maps were flown annually on the Nowitna from 1985 to 1995, 1998, and 2000 to 2003. Results from the 2003 survey show no change in the number of adults from 2002, although the number is still well above the mean. The number of young increased sharply and is the second highest observed in the survey history. The number of flocked and singles increased slightly from a low observed in 2002, and is comparable to the mean. Composition data shows excellent breeding effort (breeders/adults) and production (% pairs with broods).



Common Loon, North of Tom Cook Hill on Koyukuk NWR

G.4. Marsh and Water Birds

A number of marsh and water birds are commonly observed on the refuges, including: common, Pacific, and red-throated loons; red-necked and horned grebes; and sandhill cranes. Yellow-billed loons are occasionally observed. Past duck production surveys indicate that red-necked grebes, common loons, and sandhill cranes are the most common marsh and water bird species.

G.5. Shorebirds, Gulls, Terns, and Allied Species

The following shorebird species are commonly observed on the refuges: lesser and greater yellowlegs, Arctic tern, glaucous, Bonaparte's, mew, and herring gulls, long-tailed jaeger, semipalmated plover, common snipe, spotted, least, pectoral, and solitary sandpipers, northern phalarope, Hudsonian godwit, and whimbrel. A Hudsonian godwit nest was found at Birch Lake, six miles south of Huslia on June 1, 1997, during goose nest searches. The species is believed to be an uncommon nester on the Koyukuk NWR.

G.6. Raptors

The Refuge complex supports a diversity of raptor species, including rough-legged hawks, merlin, sharp-shinned hawks, northern harriers, red-tailed hawks, goshawks, great horned owls, great grey owls, boreal owls, northern hawk owls, American peregrine falcons, bald eagles, and golden eagles. Raptors are generally sensitive to disturbance and, therefore, act as important indicator species.

Peregrine falcons. Peregrine falcon surveys have been conducted periodically on the Yukon River between Ruby and Kaltag, and on the Koyukuk River above Koyukuk Village. The USFWS Endangered Species Office conducted the survey (as part of a larger survey of the Yukon River) between 1979 and 1991. Refuge staff conducted partial surveys from 1992-1994. In 2000, a thorough peregrine survey between Ruby and Tabernacle was conducted.


Beginning in 2001, surveys have been conducted annually on the Yukon River from just above Ruby to Galena. Presence of adults is documented as well as any nesting information (presence of young, age class, etc.) Karin Lehmkuhl and Randy Shaw (volunteer) conducted the survey on July 17-18, 2003.

We observed peregrine pairs at four sites, and heard them at a fifth. Young were heard at two nest sites, and three were seen at another. The latter were approximately 3 ½ weeks old. In general, the falcons were inactive due to the warm, sunny weather, making them difficult to detect. In August, R. Shaw noted that young were successfully fledged from the nest near Yuki Island (Andy's camp).

Owls. No owls surveys were conducted in 2003.

G.7. Other Migratory Birds


Landbird monitoring activities on the Complex through 1996 were summarized in a report by Buddy Johnson entitled "*A summary of landbird inventory and monitoring activities on the Koyukuk/Nowitna refuge Complex, 1992-1996.*" Reports in this narrative will focus on years subsequent to the 1992-96 report.



Monitoring efforts for passerines in the Galena area during 2003 included surveys of spring bird migration phenology (collection of arrival dates and North American Migration Count), breeding birds (Standard Breeding Bird Survey – BBS), and wintering birds (Christmas Bird Count). Migrant songbirds commonly seen in the summer include alder flycatcher, olive-sided flycatcher, tree swallow, bank swallow, ruby-crowned kinglet, American robin, Swainson's thrush, gray-cheeked thrush, varied thrush, northern waterthrush, yellow warbler, blackpoll warbler, orange-crowned warbler, yellow-rumped warbler, rusty blackbird, savannah sparrow, dark-eyed junco, American tree sparrow, white-crowned sparrow, fox sparrow, and Lincoln's sparrow. Common winter residents are common redpolls, common raven, gray jays, black-capped and boreal chickadees, and pine grosbeaks.

Phenology. These analyses are used to relate annual differences in temperature, precipitation, timing and duration of flooding, etc., with observed patterns in wildlife populations and productivity. Records of annual spring arrival dates for common and conspicuous birds were summarized to compare spring migration phenology among years (in Refuge files). In 2003, four species for which we have long-term data arrived earlier than their mean arrival date, one species arrived later than the mean, and the remaining five species arrived right on the average date.

Migration Counts. The North American Migration Count began in 1992 to provide a “snapshot” of spring migration across the continent. Always held on the second Saturday in May, the count coincides with International Migratory Bird Day and provides a good opportunity for public involvement. The migration count was not organized in 2003.




Breeding Bird Survey. The refuge assists with national monitoring of songbirds, many of which are neotropical migrants, by conducting standardized Breeding Bird Survey (BBS) routes in taiga habitats near Galena. Three BBS routes were conducted on the refuge Complex: two at or near Koyukuk NWR and one at or near Nowitna NWR.

Off-road Point Counts (ORPC). Boreal Partners in Flight has developed survey methods for off-road Breeding Bird Surveys to assist in monitoring landbird populations in Alaska. The survey is similar to BBS, in that singing birds are counted at a series of listening stations. However, the route is established in areas without roads. In 2003, two ORPC routes were surveyed on the Koyukuk Refuge (Two-lakes Burn, Caribou Woodland).

Koyukuk NWR.

The Galena road BBS route has been run continuously since 1985. It is the longest-running route on/near Koyukuk NWR. It covers 12.5 miles on much of the available road system. This route is considered by USGS-BRD as an unconventional *half-route* (25 stops instead of 50 stops) and is therefore not analyzed nationwide with other full BBS routes. The Galena route is useful for monitoring local birds even though its diversity is lower than the other Koyukuk NWR route- Nikolai Slough. The Nikolai Slough survey route is 4-10 miles northwest of Galena and is run by boat, which makes it especially challenging to complete within the allotted time limits. However, the route encompasses some excellent songbird habitat and is one of the most productive in terms of species diversity and abundance. Both ADF&G and USFWS Division of Migratory Birds have been particularly interested in the counts of long-distance neotropical migrants (particularly flycatchers) from this route.



Galena road BBS. This survey was conducted on June 09, 2003 by RM/Pilot Mike Spindler. A total of

360 individuals of 32 species was recorded. Both total individuals and the number of species observed increased and are just above the average. Notable increases in the 2003 counts compared to the mean or last year's observations were observed for four species: Swainson's thrush, orange-crowned warbler, common redpoll, and common raven. Two species decreased from the mean: alder flycatcher and yellow warbler.

Nikolai Slough BBS. This survey was conducted on June 10, 2003 by SWB Mike Spindler, HB Melanie Hans, and SS Dom Watts. A total of 530 individuals of 44 species was observed in 2003. Total individuals increased from the long-term average, but the number of species was average. Counts above the long-term average were observed for three species: buffelhead, ruby-crowned kinglet, and fox sparrow. No species were recorded below previous years or below the long-term average.

Two Lakes ORPC. In 2002, two Off Road Point Count (ORPC) routes were established adjacent to a lake on the Koyukuk National Wildlife Refuge to monitor songbird and other breeding bird populations. The study area is located south of Hozatka Lake ("Three Lakes") and adjacent to a pair of lakes historically called "Two Lakes" by pilots traveling between Galena and Huslia. East Two Lakes is the site of the Huslia-Galena trail Shelter Cabin. The ORPC routes (2) are located in an area that burned in 2000 and an unburned area adjacent to the lake. Our goal is to document bird populations (primarily songbirds) in a habitat type that is not represented in other monitoring efforts, and to identify changes in bird species occurrence/abundance throughout post-burn succession..

Two Lakes Burn ORPC. This route is located within the Natlaratlen River fire (A292) which burned in late summer 2000. The route is adjacent to three vegetation monitoring transects established in 2001 to document successional changes in flora (see Section 8 Caribou). The area is primarily burned black spruce woodland (with 60-100% tree mortality) interspersed with lakes, wetlands, and sphagnum bogs. The ORPC survey was conducted on June 18, with 155 individuals of 19 bird species detected (Table G.7.1). Birds observed on the burn and not on the caribou woodland survey include long-tailed jaeger, three-toed woodpecker, bank swallow, ruby-crowned kinglet, gray-cheeked thrush, and Lincoln sparrow. Lesser yellowlegs, alder flycatchers, American robins, American tree sparrows, and white-crowned sparrow were detected more frequently in the burn than in the unburned woodland.

Caribou Woodland ORPC. This survey route lies mainly within black spruce woodland with an understory of sphagnum, lichen, and low shrubs. There are several extensive lakes and bogs adjacent to the route. During the Caribou Woodland ORPC survey on June 19, 126 individuals of 19 species were detected (Table G.7.1). Two additional species were observed outside the count period. Ruby-crowned kinglets, warblers (orange-crowned, yellow, and Myrtle's yellow-rumped), rusty blackbirds, and common redpolls were only observed in the woodland. Mew gulls, arctic terns, and common ravens were more frequently observed in the woodland habitat.

Table G.7.1 . Birds encountered during Two Lakes Burn and Two Lakes Caribou Woodland ORPC surveys, Koyukuk NWR, AK 2002. A “p” indicates species was present but not detected during count periods.

Species	Burn		Woodland	
	2002	2003	2002	2003
Common Loon	2	1	6	4
Red-necked Grebe	1	3	2	1
Canada Goose	1	0	0	0
White-Fronted Goose	0	0	p	0
Northern Shoveler	0	0	p	0
American Widgeon	1	0	1	0
Lesser Scaup	0	p	p	0
Surf Scoter	0	p	0	0
White-winged Scoter	0	p	0	0
Greater Yellowlegs	0	0	1	0
Lesser Yellowlegs	13	9	4	1
Solitary Sandpiper	0	0	1	0
Sandhill Crane	p	4	2	6
Common Snipe	9	7	9	8
Long-tailed Jaeger	p	1	0	0
Bonaparte's Gull	0	0	0	0
Mew Gull	0	4	4	10
Arctic Tern	3	4	3	10
Three-toed Woodpecker	0	1	0	0
Olive-sided Flycatcher	5	0	0	0
Alder Flycatcher	5	6	5	2
Tree Swallow	1	0	1	0
Bank Swallow	p	p	0	0
Gray Jay	4	1	5	4
Common Raven	5	0	p	0
Boreal Chickadee	0	p	2	0
Ruby-crowned Kinglet	0	0	3	1
Gray-cheeked Thrush	0	1	1	0
American Robin	11	13	0	1
Bohemian Waxwing	2	1	0	p
Orange-crowned Warbler	0	0	0	1
Yellow Warbler	0	0	0	p
Myrtle Warbler	1	0	5	1
American Tree Sparrow	11	16	7	11

Savannah Sparrow	6	10	7	9
Fox Sparrow	3	0	0	0
Song Sparrow	<i>p</i>	0	0	0
Lincoln Sparrow	1	1	1	0
White-crowned Sparrow	30	50	23	17
Slate-colored Junco	20	22	20	25
Rusty Blackbird	3	0	10	5
White-winged Crossbill	0	0	2	0
Common Redpoll	7	0	3	9
Total	145	155	128	145

Wintering birds. Resident songbirds were monitored with the standardized Christmas Bird Count conducted by refuge staff and local volunteers on December 22, 2003. The 2003 counters observed 260 individuals of 14 species, down from last years number of individuals, but exactly the same number of species. Participation was average, with 10 people spending 22 person-hours and traveling 122 miles. Weather conditions were mild for mid-December, a minimum temperature of -10° F (average is -8.5° F).

Nowitna NWR.

Just west of the refuge boundary is a 40-mile State-maintained gravel road that connects the village of Ruby with a major gold mining district. Since 1994, refuge staff have conducted a standard Breeding Bird Survey along this road, which represents the only significant length of roadway in western and northern interior Alaska. This affords an opportunity to have a standard BBS route in an area of the state that is poorly represented.

Ruby Road BBS. The 2003 survey was conducted on June 11 by WB Jenny Bryant, WB/Pilot Brad Scotton, and BT Dominique Watts. A total of 412 individuals of 28 species was recorded, an increase over the long-term mean of 375 individuals. Notable increases in the 2003 counts compared to the long-term means were observed for three species: Common redpoll, varied thrush, and gray-cheeked thrush. Notable declines were observed in: Slate-colored junco and Myrtle warbler. Three new species were observed this year; 1 belted kingfisher, 1 black-capped chickadee, and 2 Wilson's snipe. Weather conditions were good with partly cloudy skies, light wind, and light rain on only the last two stops. Temperatures were 48°F at the start and 52°F at the end.

G.8. Game Mammals

Moose

In the most important moose hunting areas, trends in density, age and sex composition are monitored annually by aerial surveys of trend count areas (TCA's) along river drainages where moose concentrate in late fall and early winter. Moose abundance is generally highest in riparian habitats along the river and lowest away from riparian habitats. Within the river corridors, moose abundance is lowest in northern Koyukuk NWR, and highest in the central part, near the Dulbi River Mouth and Three Day Slough. Similarly, moose abundance is highest in the lower Nowitna River corridor and lowest in the surrounding benchlands and upper river stretches.

Since the mid-1980's, aerial surveys of the moose TCA's have emphasized consistent application of methods and standardized survey areas that are aimed at sampling identical units each year to simplify comparisons.

Koyukuk NWR

Previous large-scale population estimation surveys estimated the Koyukuk/Kaiyuh moose population at 11,750 in the late-1980's for the entire refuge, 8,500 in 1997 for 3,090 mi² area (Kaiyuh and West Galena sub-units) within the refuge, and 8,925 in 2001 for 5,526 mi² area (Kaiyuh, West Galena, and Huslia River sub-units) within the refuge.

Trend Counts. Aerial moose trend surveys were conducted on the Koyukuk/Nowitna NWR Complex in November and December 2003. Despite a slow start, we were able to complete five TCA's on the Koyukuk. Overall results indicate stable cow numbers, good calf production, and good recruitment on all TCA's. Low bull:cow ratios were observed on 2 of the 5 TCA's surveyed. The Three-Day Slough TCA showed signs of not only decreases in bulls, but in cows as well.

Northern Innoko (Kaiyuh Flats)

The total moose population on the Northern Unit of Innoko NWR was estimated at about 1,500 in 1997 and 1,800 in 2001.

Trend Counts. Trend count areas included in the 2003 survey were: Kaiyuh Slough, Squirrel Creek, and Pilot Mountain Slough. Moose observations in the Northern Unit of Innoko NWR (Kaiyuh) TCA's suggest that cow numbers appear stable, while bull:cow ratios decreased on two of the three TCA's surveyed. Calf and yearling bull numbers were good.


Nowitna NWR

On the Nowitna, the 1995 population estimate for the northern half of the refuge indicated about 1,000 moose and 1,308 in 2001. The southern half of the Nowitna Refuge has not been censused since 1990.

Trend Counts. In 2003, trend count area surveys were completed on two TCAs on the Nowitna NWR; Novi/Sulatna River Confluence and the Nowitna River Mouth. The results show below average numbers of both bulls and cows in 2003. The large and medium bull:cow ratios are the lowest numbers ever observed. The post-hunt bull:cow ratio of 12 per 100 is of concern. Many of these bulls were yearlings and the large bull per 100 ratio was only 6 per 100. The recently improved calf and yearling bull numbers are encouraging. Another estimate is planned for fall of 2005.

Caribou


Two caribou herds normally occur on the Koyukuk and N. Unit of Innoko NWR's: the Galena Mountain Herd (GMH) and the Western Arctic Herd (WAH). The GMH is a small resident herd of approximately 300 animals that winter north of Galena and calve east of the Koyukuk NWR in the western Kokrines Hills. The WAH is currently estimated at about 500,000 caribou. Portions of the WAH winter on northern and western sections of the Koyukuk NWR, but in the winters of 1989-1990, 1990-1991, 1992-



1993, and 1998-99 WAH caribou wintered southeast of the Koyukuk River from the mouth of the Koyukuk River, northeast to the village of Hughes. Normally, caribou hunting is closed in Game Management Unit 21D in winter to protect the GMH, which is not large enough to sustain a significant harvest. When the WAH enters the Unit in sufficient numbers (so that GMH numbers are only 10% of total caribou), ADF&G may open a hunting season by emergency order.

No winter/spring caribou distribution surveys were flown on the refuge in 2003.

Past distribution and calving surveys (1999-2001) of the GMH indicate a decline in herd size and production (G. Stout, ADF&G, pers. comm.). Inadequate information concerning herd status prompted the initiation of a cooperative study with ADF&G in 2002 to monitor the movements and size of the Galena Mt. Herd (GMH), including range overlap effects with the Western Arctic Caribou Herd and the Wolf Mt. Caribou Herd (WMH), on the Koyukuk NWR and adjacent lands. Radio telemetry collars were deployed on 10 GMH caribou and 10 WMH caribou on April 10-11, 2002. Unfortunately, four GMH caribou and seven WMH caribou died immediately from apparent capture mortality, and though we suspect renarcotization, the cause was never fully understood. Subsequent natural mortality decreased our sample size to one surviving WMH caribou and three GMH caribou by the end of 2003. Monthly telemetry tracking of the surviving caribou has so far shown no mixing of the GMH with either the WMH or the WAH, although because the sample size is so small, conclusions about herd mixing cannot be made. Herd movements, to date, appear to coincide with the findings from earlier studies reported in Saperstein (1997).




Caribou Habitat. In 1994 and 2000, seven permanent vegetation transects were established near Hozatka Lakes on the Koyukuk NWR to estimate vegetative cover and biomass of the Galena Mountain Caribou Herd (GMH) wintering habitat. Each transect is 100 meters long containing 10 plots per transect. In August 2003, PR Karin Lehmkuhl and WB Jenny Bryant visited three of the permanent vegetation transects in a burn south of Hozatka Lakes. Methods and results are reported in annual summaries and are also filed upstairs in the Refuge biological files.

Bear


Black and interior Alaska grizzly bears inhabit the Koyukuk, N. Unit of Innoko, and the Nowitna NWRs. Grizzly bears are regulated according to the Northwest Alaska Management Plan implemented by ADF&G. All grizzly bears are required to be sealed, but only black bears taken out of the State are required to be sealed. There are many bears on the Complex, but no inventory has been conducted due to the high expense (mark-recapture) and perceived abundance. ADF&G and the refuge are working on estimating the subsistence harvest of bears through a household harvest survey.

G.10. Other Resident Wildlife

Wolves



Wolves are common to abundant on the refuge and are sought after by local hunters and trappers. Wolf furs are prized for parka ruffs and a wolf pelt is a distinguished gift in local Koyukon Athabascan memorial potlatch ceremonies. Wolves are one of the most significant predators of the refuge's major subsistence resources, moose and caribou, therefore population and predation rate information is important to refuge ungulate management decisions. Wolf populations on the Koyukuk NWR appear




stable at high numbers. Wolf density on the portion of Koyukuk NWR within GMU 21D was estimated at 8.7 wolves/1000 km² in March 1994, and most recently at 13.7/1,000 km² in March 2000. Wolf populations on the northern Nowitna NWR were estimated at 8.4 wolves/1,000 km² in 1991 and most recently at 9.1 wolves/1,000 km² in 1996 and appear to be stable at high numbers. The southern Nowitna has not been censused since 1980. A wolf population estimation survey was scheduled for the Nowitna in spring 2001, 2002, and 2003, but all three were cancelled due to poor snow conditions. We will try again in 2004. Although a large-scale population estimate survey has not been flown lately, survey crews from ADF&G were able to fly a wolf reconnaissance flight (although conditions were very marginal) on April 13-14, 2001. They observed wolf pack locations and sizes very similar to those seen during the 1996 population estimation survey.

Beaver

Beaver populations in much of interior Alaska were high in the early 1990's. In the mid to late 1990's fur prices declined and trapping effort has decreased significantly throughout the interior. As a result, many local people have reported an increase in beaver populations. Beaver are an important resource to the local people, supplying food, clothing, and income.

When time and money permit, beaver cache surveys are flown in October to determine trends in relative abundance. No surveys were flown in 2003. Future plans are to survey the Kaiyuh in 2004, Koyukuk in 2005, and the Nowitna in 2006.

Small Mammals




No small mammal research was conducted on the Refuge Complex in 2003.

G.11. Fisheries Resources

The Fisheries Resource Monitoring Program funds studies to gather, analyze, and report information needed to manage and conserve subsistence fisheries resources, address fisheries issues and priorities identified by the Regional Advisory Councils, minimize fisheries conflicts, and address regulatory actions before the Federal Subsistence Board (BOARD). The Board has adopted a unified approach where Federal agencies work together with State, Tribal, and local organizations. The Monitoring Program is multi-disciplinary, blending together the biological and social sciences with traditional ecological knowledge to manage and conserve fisheries resource and ensure priority is given to subsistence users on Federal Conservation Units in Alaska.

Regional Advisory Councils for the Yukon River region have identified many issues and information needs. Much of this interest is centered on the salmon resources, including in-season run assessment in mainstem rivers, distribution and abundance of spawning escapements, and causes for stock declines. Improved documentation is desired regarding changes in subsistence harvest patterns, and improved use of traditional knowledge is recommended.



In 2003, refuge staff worked in conjunction with the Yukon River Drainage Fisheries Association (YRDFA), ADF&G, and the Fairbanks Fisheries Office (FRO) on the following salmon projects: 1) assess run timing, stock status, and trends using weirs on the Nulato and Gisasa rivers, 2) monitor

subsistence salmon harvest and the prevalence of *Ichthyophonus* through field visits, and 3) staff participation in weekly YRDFA teleconferences.

In 2003, refuge staff expanded their involvement in the fisheries programs. The National Marine Fisheries Service, ADF&G, and FRO were assisted by staff in conducting a tagging/radio telemetry project to determine distribution and abundance of chinook salmon. An in-season salmon harvest assessment program with YRDFA and the FRO was continued this year. Staff assisted ADF&G in collecting chinook age, sex, and length information in local villages. Refuge staff provided logistic support to the FRO on a whitefish telemetry project conducted on the Nowitna drainage to determine species, distribution, and spawning areas.

Contaminants

A technical report entitled *Contaminant baseline data for water, sediments, and fish of the Nowitna National Wildlife Refuge, 1985-1988* was completed in August 1992 by Northern Alaska Ecological Services (NAES) in Fairbanks, with cooperation of refuge staff. Further study based on sampling in 1991 was analyzed in a 1996 report by K. Mueller, E. Snyder-Conn, and M. Bertram entitled *Water quality and metal and metalloid contaminants in sediments and fish of Koyukuk, Nowitna, and the Northern Unit of Innoko National Wildlife Refuges, Alaska, 1991*. They found that concentrations of beryllium, cadmium, copper, lead, manganese, and nickel were lowest in sediment samples from the Nowitna. Copper concentrations exceeded 25 mg/kg at all Northern Innoko and Koyukuk sites, and at two of four sites on the Nowitna. Nickel concentrations exceeded 31 mg/kg at all sites except Sulukna River and Sulukna adjacent pond, which exceeded 28 mg/kg. Mercury was detected in each fish regardless of location, except for the one Alaska blackfish collected. Mean concentrations of mercury in muscle samples were from 3.3 to 8.6 times greater than the mean background concentrations reported by other investigators. The report demonstrated that considerably more baseline work needs to be done to identify the sources of contamination and to have a solid baseline should any threats occur in waters upstream from the refuges.

Some pike sampled on the Kaiyuh Flats in 1993 by Paul Headlee of Tanana Chiefs Conference had elevated tissue mercury levels. The observed levels were below the human consumption guidelines set by the Minnesota Dept. of Health (no Alaska or national standards exist). However, Headlee recommended caution for consumption of large amounts of larger sized fish. There was a statistically significant relationship between fish size and mercury level. According to Headlee, if the average size of a pike eaten is 32 inches long, the estimated mercury concentration would be 0.73 ppm (wet tissue weight). The Minnesota guidelines recommended that the amount of muscle tissue from fish of that size class "that could be consumed over a year long period without any adverse effect" would be approximately 23 lbs. ADF&G estimated annual per capita pike consumption in Galena and Huslia at 5.2 and 28.8 lbs., respectively. Details can be obtained in Headlee's final report entitled: *Mercury and selenium concentrations on fish tissue and surface waters of the northern unit of the Innoko National Wildlife Refuge (Kaiyuh Flats), west-central Alaska, 1993*.

G.16. Marking and Banding

Total banding activities are summarized in Table G.16.1. Banding was divided into three main efforts: geese, ducks, and songbirds (MAPS project).

Geese. In 2003, refuge staff assisted Migratory Birds staff to band white-fronted geese and Canada geese on the Innoko, Kanuti, Selawik NWRs, and the North Slope as part of the regional goose study. No goose banding occurred on the Koyukuk/Nowitna Complex in 2003.

Ducks. A total of 367 ducks (321 northern pintail, 10 green-winged teal, 30 mallard, and 6 American wigeon) were banded at Willow Lake, 8 miles east of Huslia on the Koyukuk NWR, between August 1-11, 2003. Incidental catch included two peregrine falcons, shorebirds, and a few songbirds (savannah sparrows). All birds were captured in medicine-hat traps.

Songbirds. No songbirds were banded on the Complex in 2003.

Table G.16.1. Summary of bird banding at Koyukuk/Nowitna NWR during 2003.

Species	2003
Greater White-fronted Goose	0
Canada Goose	0
Ducks	367
Total	367

H. PUBLIC USE

H.1. General

All three refuge units, Koyukuk, Nowitna and the Northern Unit of the Innoko (Kaiyuh Flats) receive subsistence and recreational public use. Subsistence dominates use with activities ranging from harvesting meat, fish, and berries to cutting house logs. Recreational activities include sport fishing for pike and grayling and hunting for moose, bears, and wolves. Some recreational canoeing and kayaking takes place on the Koyukuk and Nowitna Rivers.

Commercial use permits are issued each year (Table H.1.). Virgil Umphenour continued his big game guide/outfitting operations in KOY-04, 05 & 06. Gilbert Huntington continued his big game/guide outfitting operation in KOY-02 and Fred Bifelt continued his big game/guide outfitting operation in KOY-3. Alex Tarnai continued his big game guide/outfitting operation in NOW-01, 02 & 03.

A total of eight different air-taxi/transporter operations were permitted among the three refuge units in 2003. Sportsman's Air Service, Wrights, and Yukon Eagle Air all had permits to operate on all three units. Willow Air, Alaska Air Taxi, Shadow Aviation, and Marina Air only operated on the Nowitna NWR. Mavrik Aire only operated on the Koyukuk Refuge. The year 2003 was the first year Special Use Permits had been issued to Shadow Aviation and Marina Air for air-taxi operations on the Complex.

A total of two fishing guide operations were permitted among the three Complex units. Green Fishing and Transporting was permitted on all three units. North County River Charters was permitted for the Nowitna Refuge.

In 2003, for the first time, a permit was issued for boat transportation of moose hunters. Mr. Charlie Green from Galena received the permit for transporting moose hunters into the Koyukuk NWR.

Table H.1. Commercial Use Permits issued in 2003 for Koyukuk/Nowitna/Northern Innoko NWR.

Permittee	Year	Use	Fee Collected	Clients/	Species Taken
<u>BusinessName</u>					
Virgil Umphenour,	03	Guide/Outfitter		KOY-6: 0	
Hunt Alaska			\$2,424.85 user fee	KOY-5: 23, 10 moose, 1 wolf, 5 blk bear, 2grz	
				KOY-4: 5	2 moose
Gilbert Huntington,	03	Guide/Outfitter	\$0.00 user fee	KOY-2: 0	
Koyukuk Guide Service					
Fred Bifelt,	03	Guide/Outfitter	\$323.35 user fee	KOY-3: 3moose	
Koyukuk River Guide Service					
Alex Tarnai,	03	Guide/Outfitter	\$602.10 user fee	NOW-3: 6, 3moose	
Timberwolf Guiding Service				NOW-1&2 : 0	
Joe Schuster,	03	Air Taxi	\$100.00 admin fee	Koy – 2 1 moose	
Sportsman's Air Service			\$13.50 user fee		
Bob Bursiel,	03	Air Taxi	\$100.00 admin fee		
Wright's Air Service					
Colin Brown,	03	Air Taxi	\$100.00 admin fee	UI – 2 1 moose	
Yukon Eagle Air			\$49.50 user fee	Now -8 5 moose	
Steve White,	03	Air Taxi	\$100.00 admin fee		
Willow Air					
Jack Barber,	03	Air Taxi	\$100.00 admin fee		
Alaska Air Taxi					
Craig Schweitzer,	03	Air Taxi	\$100.00 admin fee		
Mavrik Aire					
Andy Greenblatt,	03	Air Taxi	\$100.00 admin fee	Now – 10, 4 moose	
Shadow Aviation			\$22.50 user fee		
Rick Gold,	03	Air Taxi	\$100.00 admin fee	Now – 2 Floaters	
Marina Air			\$9.00 user fee		
Charlie Green,	03	Fish/Guide	\$100.00 admin fee	UI – 4 Northern Pike	
Green Fishing & Transporting			\$45.00 user fee		
Bill O'Halloran,	03	Fish/Guide	\$100.00 admin fee	Now– 8 Northern Pike & sheefish	
North Country River Charter			\$81.00 user fee		
Charlie Green,	03	Boat Transp.	\$100.00 admin fee	Koy – 6 5 moose	

\$13.50 user fee

In addition to the commercial permits noted above, the following non-commercial special use permits were issued. A permit was renewed for use of a tent platform on the Nowitna NWR. The number of logging permit requests has increased as lumber and transportation costs have increased. Most requests for logging permits have targeted the few islands in the Yukon River that are refuge lands and are located up-river of most of the villages to enable the down-river rafting of the cut logs. We also noticed that logging efforts were concentrated on just a few islands near the mouth of the Nowitna River. In 2003, Fire Management Officer Robert Lambrecht, a professional forester, evaluated the sustainability of past subsistence logging activities that have been conducted under refuge SUP's.

FMO Lambrecht estimated that the annual growth increment of white spruce on these Yukon River islands was about 96 board-feet per acre. *This translates to an estimated sustainable harvest of one average cabin-log spruce tree per 2.5 acres per year along the shores of the accessible islands.* In his surveys Bob noticed some localized overharvesting of white spruce. To disperse logging efforts in the future Bob recommended establishment of assigned cutting blocks:

"I recommend that cutting blocks be designated for the future harvest of cabin logs. These cutting blocks can be designated either by marking with tree marking paint or the use of colored tags – both placed on mature trees. The cutting blocks will be located along specified sections of Florence, Doyle, and the un-named Islands....Annually 36 trees can be harvested from the total designated harvest area of Florence Island. Thirty-two trees can be cut annually from the designated harvest area on Doyle Island. On the un-named island, 8 trees can be harvested annually. Harvested trees should be widely spaced (a minimum of 100 feet apart). No group harvesting should occur. All slash should be lopped and scattered i.e. all branches cut off of the bole and the remaining bole be cut every four feet. Avoid concentrations of limbs – scatter if necessary. The lopping and scattering of slash will avoid fuel accumulations and eliminate potential *Ips* beetle habitat. We should encourage more utilization of material cut. To date a fair amount of useable material has been left in the woods. The permitted areas should be checked during and after harvest activity to ensure compliance with the special use permit specifications."

Two individuals were issued logging permits to construct and occupy subsistence cabins. A permit was issued to BLM to conduct boundary surveys of Native allotments. Three subsistence cabin permits were renewed. Five permits were issued for harvest of house logs. A total of 165 white spruce trees were reported harvested. Trees were harvested on four different islands off the mouth of the Nowitna River and along Bering Creek.

Koyukuk NWR Big game guide renewal process

Significant time was spent in 2003 by RM Spindler and DRM McClellan concerning selection of refuge big game guides as part of the statewide big game guide selecting process. Refuge guide use areas that were originally permitted in 1993 were up for competition, with new five year permits to be issued for the period January 1, 2004 - December 31, 2008. Refuge guide use areas KOY 04, 05, and 06 were all up for competition during this process. The permits for KOY 02 and 03 are still valid through the end of 2004 and both permittees are eligible for a non-competitive 5-year renewal. All three guide use areas on the Nowitna, NOW 01, 02 & 03 were up for competition. The guide use area for the Kaiyuh Flats, KOY 01, was not offered during this process and would remain closed to permitted big game guiding as has been the case since 1993.

During the last half of March 2003, DRM McClellan was part of a ranking panel scoring the guide applications for Tetlin, Yukon Flats, Arctic, Koyukuk, Nowitna, and Innoko NWRs. Initially two applicants for the Koyukuk Refuge were disqualified for not noting previous violations on their applications. Both applicants appealed their disqualifications to the Regional Director, one lost his appeal while the second applicant had his appeal upheld. An applicant for KOY-04 was not given a minimum score on one of the seven scoring criteria by the ranking panel and was disqualified. Mr. Virgil Umphenour was initially selected as the permittee for KOY-04, as he was the only qualified applicant that applied for the area and met the minimum scores. For KOY 06 and 05, RM Spindler initially selected Mr. Fred Bifelt from Huslia over the other qualified applicant, Mr. Virgil Umphenour. Mr. Umphenour appealed the selection of Mr. Bifelt for KOY 06 and 05 and provided information alleging that Mr. Bifelt provided false information in his application, primarily related to his guiding experience in KOY 06 and 05. Refuge staff compared the information supplied by both Mr. Umphenour and Mr. Bifelt as part of Form E of their application with client use reports previously submitted to the refuge as a condition of their big game guiding permits. A review of our files found significant discrepancies in the amount of experience documented in our files compared to the experience claimed by Mr. Bifelt. The review also found numerous discrepancies in the information documented in Mr. Umphenour's files and what he claimed on his Form E. Both applicants were provided an opportunity to explain the discrepancies. As the year came to a close, the Regional Director found that Mr. Bifelt should be disqualified, but that Mr. Umphenour should not. In January 2004, Mr. Umphenour was then tentatively selected as the winning applicant for KOY 06 & 05. Mr. Bifelt still had an opportunity to appeal his disqualification.

The applicant for KOY-04, Mr. Huntington, appealed his scoring by the ranking panel and subsequent disqualification for not meeting a minimum score to the Regional Director. In January 2004, Mr. Huntington was informed by the Regional Director that his appeal was upheld and RM Spindler was directed to review the applications and other materials of Mr. Umphenour and Mr. Huntington and select one of the two applicants as the winning permittee for KOY-04. Thus, as calendar year 2003 came to a close, none of the three guide use area selections on Koyukuk NWR for new five year permits were finalized.

Nowitna NWR Big game guide renewal process

On the Nowitna NWR, the guide selection process went somewhat smoother, but there were still a few bumps along the road. Mr. Alex Tarnai, the incumbent, was selected and awarded the new five year permits for NOW 01 & 02. For NOW-03, Mr. Alex Tarnai and Mr. Nate Turner, were forwarded by the ranking panel to the RM for his consideration. After reviewing the application and other information, RM Spindler found that both candidates ranked almost identically with little separating one candidate from the other. It was a very difficult decision, but ultimately RM Spindler tentatively selected Mr. Turner to be the winning applicant. Mr. Tarnai appealed the selection of Mr. Turner to the Regional Director. The Regional Director reviewed the new information Mr. Tarnai presented and RM Spindler's original selection memo and upheld RM Spindler's original decision and denied Mr. Tarnai's appeal. Thus, unlike the Koyukuk Refuge, the selections for the new five year big game guide permits on the Nowitna Refuge were finalized before the end of the calendar year.

Permit Compliance

In September 2002, a warning letter was issued to Mr. Umphenour concerning his use of an airplane as part of his permitted big game guiding operation which was not part of his approved plans of operation. Mr. Umphenour, responded to the refuge with a request to amend his plans of operation allowing use of

an airplane. In January 2003, RM Spindler informed Mr. Umphenour of his intent to deny Mr. Umphenour the opportunity to amend his plan of operation. Further discussions were conducted between the refuge and Mr. Umphenour. Mr. Umphenour was allowed to propose changes to his plans of operations that would allow limited airplane use outside the Koyukuk Controlled Use Area, but none inside the controlled use area. Mr. Umphenour was not able to provide all the information he needed about his proposed changes to his plans of operation until early August. On August 27, RM Spindler responded to Mr. Umphenour approving his proposed changes to his plans of operations for the fall 2003 big game guiding activities pursuant to complying with specific conditions.

In July 2003, warning letters were issued to Sportsman's Air and Alaska Air Taxi for not reporting previous violations on their SUP applications.

In 2002, refuge staff had discussions with staff from the Selawik and Innoko NWRs to try and be more consistent in managing special use permits across our neighboring refuges as we have many of the same air-taxi/transporter permittees operating on multiple refuges. In 2003, we instituted an application period of April 15 - May 15, 2003 for the acceptance of applications to provide one year air-taxi/transporter or other recreational special use permits for the summer/fall 2003 time period. Any requests for a permit for these activities that was submitted outside this application period would be denied. Advertisements were printed in the Fairbanks Daily News Miner, Anchorage Daily News and weekly publications Arctic Sounder, Tundra Drums, and Bristol Bay Times which are published through Alaska Newspapers. Letters were also sent to all current and previous permit holders for the past three years informing them of the application period.

In fall 2003, RM Spindler and DRM McClellan flew up to Kotzebue and met with Selawik staff to try and come up with a primary set of standard special conditions that would be used on all air-taxi/transporter permits whether issued by Selawik, Koyukuk/Nowitna, or Innoko NWRs. Each refuge could still have unique permits specific to meet their refuge needs. A draft set of conditions were formulated and emailed to Innoko staff, the LE office in Fairbanks, and Tony Booth in the regional office, for their review and comments. The conditions were still being reviewed by the end of the year.

In fall and winter 2003, RM Spindler had discussions with several permitted air-taxi/transporters for Koyukuk/Nowitna NWRs about their feelings of trying to set voluntary limits on the number of moose clients any one permittee could drop off on any one refuge each year. The permittees RM Spindler talked to were generally favorable to the idea.

H.2 Outdoor Classroom – Students

Classroom visits. Themes for this year's classroom visits included "respect for land and culture," Junior duck stamp, waterfowl migration, and the history and purpose of Wildlife Refuges. Many of the classroom visits were conducted in conjunction with other Centennial events (see Section H.7). Each of the area village schools was visited at least once during the school year. As a science fair project, several Galena high school students collected samples from Pleistocene mammal remains (from the Nowitna NWR) to be carbon dated. The samples were sent to the University of Georgia for analysis. There, another group of high-school students (Greene County High School) learned about the dating process and toured the lab. These activities were coordinated by Volunteer Nathan Schwalen. Results were presented in a display at Galena's City Hall (See Section H.6)

Local Galena High School students who worked on science fair project

Summer camps. Another successful “Galena Science Camp” was held July 28-August 7, 2003. Cooperators included Debbie Koontz (Galena City Schools), Eleanor Yatlin (Louden Village Council), and PJ Simon (Boys and Girls Club), who assisted PR Karin Lehmkuhl, GB Geoff Beyersdorf, and Clerk Darcie Warden from the Refuge staff. The theme of this year’s day camp was “For the Birds,” and activities centered on bird identification, habitat and behavior. A total of 22 students were involved in the program.



H.6. Interpretive Exhibits, Demonstrations

In 2003 a new refuge brochure of the Nowitna National Wildlife

Refuge displays of obsidian

artifacts collected on Koyukuk Refuge



Refuge was developed and printed as part of our celebration of the Refuge System Centennial.



On March 18, 2003 a display of prehistoric stone tools and Pleistocene animal remains from the Koyukuk and Nowitna Refuges was unveiled at Galena’s new City Hall. The display includes obsidian artifacts collected on the Koyukuk Refuge, and various fossils and two large mammoth tusks collected on the Nowitna Refuge. Nathan Schwalen prepared text for the displays.

RM spindler and PR Lehmkuhl at unveiling of refuge display at Galena City Hall as part of Refuge Centennial celebration

Ironwork mounts for the tusks were crafted by Galena resident, Phil Koontz. Refuge Manager Mike Spindler gave an eloquent speech at the unveiling, describing the rugged pre-historic environment and tenacity of our predecessors, the qualities of good stewardship of natural resources that exist in our communities today, and role of Wildlife Refuges in continuing this legacy in the future. The Project

Education Residential School provided snacks for the following open house. A public radio segment was broadcast on KIYU and the statewide network APRN.



H.7. Other Interpretive Programs In 2003, the National Wildlife Refuge System celebrated its centennial year. As part of the nation-wide celebration, staff from

Residents of Koyukuk starting a buffet line as part of Refuge Centennial celebration in Koyukuk Refuge posters in background

(Koyukon Athabascan) culture and the National Wildlife Refuge System share a commitment to, and legacy of, caring for our lands and wildlife. At each event we showed a video titled "Celebrating our Land and Culture". The ½ hour video produced by



Koyukuk elder, Eliza Jones with plaque presented to village. Mrs. Jones provided the translation printed on the plaque

PR Karin Lehmkuhl and RIT Patrick Madors Jr., contains segments of elder interviews collected by and PJ Simon interspersed with slides of the refuge complexes set to music. Community events also included a cover-dish meal, door prizes, informal poster presentations, and the presentation of a plaque to each community. Eliza Jones (Koyukuk village) assisted in translation of text for the plaques, which reads:

Yegge doneets'e ede duhut'aan ts'en'
go nenkokk'e behoolaanee yet go look'e yet
k'eghoyeneets'eghaalneek
yegge donle'hegheneet

As we've been doing from way back
we take care of fish and game
for the future

The positive atmosphere and informal conversations that occurred during these events made them quite successful, and we hope to have similar events to foster better communication between refuge staff and local residents in future years.

Refuge Centennial "road show" village visits

Nulato, February 20, 21

Ruby, March 10

Koyukuk, March 13

Galena Centennial Pleistocene display, March 18

Galena Spring Carnival (Service Sponsored in recognition of Centennial), March 20-22

Hughes, March 24
 Huslia, March 28
 Kaltag, April 9
 Galena Louden Tribal Council General meeting, April 26

H.8. Hunting

Koyukuk/Nowitna/Northern Innoko NWR

Waterfowl. On October 23, 1997 the U.S. Senate approved subsistence hunting amendments to the Migratory Bird Treaty with Canada and Mexico. These Treaty Amendments provide a basis for legal spring and summer waterfowl harvest for rural Alaska residents. The Treaty Amendments also call for subsistence users to be involved in the regulation of subsistence migratory bird harvest through participation in a cooperative management body. However, initial regulations need to be established. The Alaska Migratory Bird Co-management Council (Council), established in 2000, currently consists of one Federal, one State and 11 Native members. The Council made recommendations for statewide regulations for spring and summer subsistence harvest beginning in spring of 2003. These regulations became effective July 21, 2003 by publication of the Final Rule in the Federal Register. These regulations apply to the spring and summer subsistence harvest of migratory birds in Alaska until August 31, 2003. Migratory bird hunting from September 1, 2003 through March 10, 2004 is managed under separate Federal regulations.

The 2003 regulations established that permanent rural village residents were eligible to harvest migratory birds and their eggs for subsistence purposes in the spring and summer within specified harvest areas (generally non-urban areas). Eligible subsistence users must possess and comply with any licenses and stamps required by Federal and State regulations when participating in the subsistence spring/summer migratory bird harvest. The regulations define what harvest methods and means may be used to hunt waterfowl. Regulations also provide region specific dates for harvest. For the Interior Region the season is April 2-June 14, July 16-August 31, and May 1-June 14 for egg gathering. The season is closed from June 15-July 15. Lastly, the regulations provided a list of species which were open for harvest. The Council will review and recommend any needed modifications of these harvest regulations on an annual basis, working within the schedule of the Federal late season migratory bird hunting regulations.

In order to develop reasonable and sustainable waterfowl seasons and bag limits, estimates of regional and total harvest by species and estimates of average consumption per household and village are needed. In addition, the Central Flyway Technical Committee has expressed a need for more accurate estimates of spring harvest of white-fronted geese in response to the Service's concern over a regional decline of that species. In October 2000, the Council appointed a harvest survey technical committee to design a standardized, annual statewide subsistence harvest survey for the subsistence eligible areas of Alaska. In 2001 and 2002, meetings were held, statisticians were consulted, and pilot projects were begun to determine how best to survey the subsistence eligible areas. On October 1, 2003, the harvest survey technical committee presented its Recommendations for a Statewide Alaska Migratory Bird Subsistence Harvest Survey to the Council, and these recommendations were approved.

In January 2003, during the development of the final rule for subsistence harvest regulations, the Service and Council were ordered to stop all subsistence harvest surveys. The survey was postponed until the

Federal Office of Management and Budget (OMB) approved the survey forms and methodology under provisions of the Paperwork Reduction Act. That is why no statewide harvest surveys were conducted during 2003. The refuge did conduct local surveys in the spring before they were made aware of the OMB restrictions to stop surveys.

On October 2, 2003, the OMB approved the proposed statewide harvest survey. So we will be able to conduct harvest surveys again in 2004. The big difference from 2002 and earlier years, besides the increase in coverage to statewide, is that survey forms must now have OMB control numbers printed or pasted on them to be used legally. This is an important change from previous surveys. It assures that the terms of the Paperwork Reduction Act are being met.

In spring 2003, household interviews were conducted in Kaltag, Nulato, Koyukuk, Huslia, Hughes, Ruby, and Galena. Interviews were completed in May and early June to estimate spring 2003 harvest. In 2003, the overall spring subsistence waterfowl harvest was estimated at 1,234 birds. In 2003, more geese (55%) were harvested than ducks (45%). Species most commonly harvested were Canada goose, Greater white-fronted goose, mallard, American wigeon, and Northern pintail.

Harvest estimates in this study are much lower than estimates from surveys conducted in the Koyukon region in the early 1990's. The reported decline in harvest is likely due to changing socio-economic conditions in the region, such as the availability of jobs, freezers, and moose, which have increased in the past 20 years.

Steel Shot Clinics. Steel shot clinics are outreach education efforts aimed at increasing the acceptance to use and shooting skills of hunters who use steel shot. In April 2003 in conjunction with the Refuge Centennial celebration, Huntington and Madros conducted steel shot clinics in Kaltag and Hughes. In April/May 2003, RIT Madros assisted with clinics in Bettles, Allakaket, Ft. Yukon, and Kaktovik. In May 2003, RIT Madros assisted with a hunter education and steel shot clinic held in Arctic Village. The goals of the clinics were to familiarize residents with how steel shot shoots differently than lead, help them become more efficient hunters and reduce wounding loss, and provide an opportunity for outreach about the decline of greater white-fronted geese. In all the villages the clinics entailed an evening classroom session followed the next day with an outdoor shooting session. About 12 people in each village participated in the evening classroom session and outdoor shooting session. The clinics were well received.

Moose. Since 1983, ADF&G has operated a hunter check station at Ella's Cabin, which is just inside the refuge boundary on native corporation land along the Koyukuk River. The entire Koyukuk River floodplain within the Koyukuk NWR boundary is part of the Koyukuk Controlled Use Area (CUA), where aircraft access for moose hunting is prohibited. Therefore, the Ella's Cabin check station provides



Hunters waiting for gas in Galena

a consistent source of harvest information for the majority of refuge hunters who gain access to the refuge via the Koyukuk who gain access to the refuge via the Koyukuk River. This includes most residents on the Yukon River and virtually all non-resident hunters, except for those who float downriver from above the Controlled Use Area boundary. The check station has been a mandatory stop since 1990.

Weather during the September 2003 moose season consisted of predominately cool nights with clear, sunny days ranging from the 40's to 60's. In addition to the ever popular Three-Day Slough the hunting effort was mainly concentrated in other localized areas of the drainage between Gisasa River and Dulbi Slough. Meat was checked thoroughly by staff at the check station in 2003. Although some poorly cared for meat was encountered, the majority of meat came out in game bags and was in good condition.



Moose praying for spring in Fairbanks

A total of 596 permits were issued for the combined subsistence and general drawing hunts in the Koyukuk Controlled Use Area in 2003 (507 at Ella's, 78 in Huslia, and 11 in Hughes). Numbers of registered hunters in 2003 increased by 113 hunters or 23% compared to 2002 numbers (483). This is still a reduction from the 731 hunters in 2000 which originally prompted regulation changes. These changes came about as a result of the Koyukuk Moose Hunters Working Group and were approved by the Board of Game at their Spring 2000 meeting. The working group used the number of hunters and moose harvested in 1998 in the lower Koyukuk River area as a baseline for the maximum number of hunters and moose harvested in any future years. The biggest change in regulation was instituting a drawing hunt to replace the RM830 general registration hunt.

In 2003, a total of 401 RM832 subsistence permits (AK resident) were issued while only 258 drawing permits (DM827-830; AK resident and Non-resident) were made available. Of the 258 hunters who drew permits, 143 hunters hunted with them and 115 hunters did not hunt or use their permits. Hunters harvested 248 moose (0 cows, 246 bulls, and 2 unknown) in the lower Koyukuk drainage during the 2003 registration/drawing hunts. The 2003 harvest was a significant decrease from the 2000 record harvest and was 27% below the twelve year average (1990-2001) of 256 (Tables H.8.1 & H.8.2). ADF&G and refuge staff were concerned about the number of cows being harvested in the lower Koyukuk. Cooperative moose surveys by ADF&G and USF&WS in Units 21D and 24 from 1998 through 2002 indicated poor recruitment (less than 20 calves: 100 cows and less than 8 yearlings bulls: 100 cows). In a population estimation survey that was conducted in November of 2001, the calf: cow ratio was estimated at 18:100 and the yearling bull: cow was estimated at 7:100 for the 5,526-mile square area (Unit 21D and the southern 1/3 of Unit 24) that was surveyed. Survey conditions in November 2002 were poor, severely limiting trend data. Management decisions for September-August 2003 were based mainly on the November 2001 census results. Due to the decline of moose numbers in this area, conservative management is required. Both ADF&G and the refuge staff were in support of actions to reduce or cease all cow harvest in the unit until productivity and recruitment increased. Alaska Department of Fish and Game issued an emergency order to close the August and September antlerless moose season in all of Unit 21D and in portions of Unit 24 outside Gates of the Arctic National Park. Parallel action was needed on Federal lands within this area in order to protect the continued viability of the moose population and prevent conflicting regulations and eliminate potential confusion among hunters.

In August 2003, the Koyukuk/Nowitna (NWR) and the Federal Subsistence Board announced the closure of the Federal subsistence fall cow moose hunt starting Aug. 27, within Unit 21(D) and portions of Unit 24. The Aug. 27 – Aug. 31 fall cow season within the Koyukuk Controlled Use Area and the Sept. 21 – Sept. 25 fall cow season outside the Controlled Use Area were subsequently closed. This closure was necessary to protect the continuing health of the moose population in these areas and to align Federal regulations with an emergency order issued by the Alaska Department of Fish and Game (ADF&G) closing State lands to cow moose hunting in these areas. This action did not affect the winter moose seasons.

In 2000, ADF&G and the Koyukuk River Moose Hunters Working Group prepared a five-year management plan providing guidelines for managing harvest when conservation measures are necessary. The USFWS participated and supported this process and both the Federal Subsistence Board and the Western Interior Regional Advisory Council endorsed the five-year plan. This closure follows the plan's approach for reducing antlerless moose hunting opportunities.

On the N. Unit of Innoko NWR, most hunting on the Kaiyuh Flats and Bishop Creek drainage is done by residents of Kaltag, Nulato, Koyukuk and Galena. The majority of hunting there is for subsistence purposes by local residents. Some non-locals do hunt in the area, but harvest is thought to be minimal. Hunting pressure in the Kaiyuh Flats was estimated at about average in 2003 with good water conditions allowing for easy access throughout the area.

Table H.8.1. Number of moose hunters by residency class checked through the Koyukuk River Check Station.¹ Data courtesy ADF&G, Galena.

Regulatory Year	Non-local AK. Residents	Non-Residents	Local Rural Residents	Total Hunters
1989-90	125	23	154	302
1990-91	133	36	137	306
1991-92	189	55	136	380
1992-93	173	39	145	357
1993-94	132	34	115	281
1994-95	194	56	106	356
1995-96	260	63	124	446
1996-97	306	89	213	608
1997-98	278	89	157	524
1998-99	344	126	179	649
1999-00	383	173	198	754
2000-01	261	44	220	525
2001-02	287	35	207	529
2002-03	227	24	220	471
2003-04	326	40	238	604
Mean	241	62	170	473

¹ Checking in and out of Ella's Cabin was not mandatory until 1990, and compliance was lower during the initial years 1983-89.

Table H.8.2. Harvest by moose hunters and harvest rate by residency class checked through the Koyukuk River Check Station¹. Data courtesy of ADF&G, Galena.

Regulatory Year	Non-Local AK. Residents ²	Non-Residents ²	Local Rural Residents ²	Total Harvest ²
1989-90	89 (71%)	14 (61%)	55 (36%)	158 (52%)
1990-91	105 (79%)	30 (83%)	48 (35%)	183 (60%)
1991-92	121 (64%)	38 (69%)	49 (36%)	209 (55%)
1992-93	103 (60%)	19 (49%)	45 (31%)	167 (47%)
1993-94	109 (83%)	28 (82%)	48 (42%)	185 (66%)
1994-95	127 (65%)	41 (73%)	34 (32%)	202 (57%)
1995-96	188 (72%)	50 (79%)	49 (40%)	287 (64%)
1996-97	198 (65%)	66 (74%)	90 (42%)	353 (58%)
1997-98	185 (67%)	55 (62%)	66 (42%)	306 (58%)
1998-99	213 (62%)	74 (59%)	62 (35%)	349 (56%)
1999-00	210 (55%)	91 (53%)	73 (33%)	374 (51%)
2000-01	180 (73%)	26 (59%)	72 (33%)	278 (54%)
2001-02	124 (70%)	14 (07%)	49(26%)	187(34%)
2002-03	133 (61%)	18 (08%)	67 (31%)	218(45%)
2003-04	148(45%)	20 (50%)	80(35%)	248(42%)

¹ Checking in and out of Ella's Cabin was not mandatory until 1990.

² Moose harvest is followed by estimated percent hunter success in parentheses.

Nowitna NWR



Refuge staff conduct outreach on hunting regulations at the Nowitna check station (USFWS photo)

The single largest public use of Nowitna NWR is the fall moose hunt. Most of the moose hunting pressure observed on the northern portion of the Nowitna NWR occurs on the Nowitna River from the canyon area downstream to the river's mouth. The majority of moose hunters using the Refuge are from Fairbanks and other non-local Alaska locations. Most of the local hunters using the lower Nowitna River drainage are residents of Ruby and Tanana.

The refuge staff and ADF&G have operated a hunter check station at the Nowitna River mouth on the northern border of the refuge since 1988. The majority of the Nowitna River is within the refuge boundary, and the check station provides a consistent source of harvest

information for the majority of refuge hunters who gain access to the refuge from the Yukon River. The check station is a voluntary stop, except in 1997 when it was a mandatory stop for a registration hunt. In 2003, the check station opened for business September 2 and remained open until September 26.

In September 2003, 208 hunters checked in 56 moose at the check station (Table H.8.4). Twenty-two hunters were from local villages, 80 from Fairbanks, 80 from other areas in Alaska, and 26 were non-residents (Table H.8.3). The number of hunters increased by 64 or 31% from the fifteen-year average.

The increase primarily occurred in the number of Fairbanks and other Alaskan residents, and the number of non-residents almost doubled from 15 to 26. Similar to last year, a number of the hunters reported they usually hunt the Koyukuk, but had elected to try their luck on the Nowitna this year to avoid crowding and the subsistence registration hunt requirement of destroying the trophy value of bull racks. A number of hunters also reported they usually hunted the Palmer/Wasilla area but that it was becoming overrun by ATV's and they wanted an "uncrowded" hunt experience. It was also noted that many of the successful hunters were those whom had hunted the drainage before, concentrating on grass lakes. Many of the new hunters to the area did not have as high of success due to unfamiliarity with the area and concentrating their hunting efforts on the river corridors.

Weather during the September 2003 moose season included predominately cool nights (low 19°F) with clear, sunny days with air temperatures ranging from the 40°F's to 60°F's. Water levels were a little low at the beginning of the season and about four feet below the season high by the end of the moose season. The harvest total of 56 bulls was tied with the highest on record and was 20% above the fifteen year average of 47 (Table H.8.4).

Additional observations

Check station staff also asked hunters to report bear observations and harvest this year. No black bear were recorded harvested, and hunters observed two bears and/or their tracks. No wolves were recorded harvested, and hunters observed one set of wolf tracks.



Patrick Madros Jr. helps out at the Nowitna Moose hunter check station (USFWS photo)

Due to concerns expressed by local residents and Regional Advisory Council members, meat care was checked and documented thoroughly by staff at the check station in 2003. Evaluations documented if the meat was clean, dry, and the overall care. Meat care was ranked on a scale of 1-5 with one as the lowest value and five as the highest. Hunter meat care this year was very good. Forty-six hunters were evaluated and hung their meat an average of almost five days (4.78). Overall care was ranked as 4.24 on a scale of 5.

Table H.8.3. Number of moose hunters by residency class checked through the Nowitna River Check Station.¹

Regulatory Year	Non-local AK. Residents	Non-Residents	Local Rural Residents	Total Hunters
1988	137	8	33	170
1989	123	12	31	166
1990	93	14	23	130
1991	116	17	21	155
1992	91	10	24	125
1993	93	21	19	133
1994	104	13	16	134
1995	107	9	16	132
1996	90	20	19	129
1997	78	7	16	101
1998	84	22	17	113
1999	117	14	24	155
2000	115	28	11	154
2001	110	23	27	160
2002	101	15	18	134
2003	160	26	22	208
Mean	107	16	21	144

¹ Checking in at the Nowitna River mouth check station only mandatory in 1997.

Table H.8.4. Harvest by moose hunters and harvest rate by residency class checked through the Nowitna River Mouth Check Station¹.

Regulatory Year	Non-Local AK. Residents ²	Non-Residents ²	Local Rural Residents ²	Total Moose Harvest ²
1988	42 (31%)	5 (63%)	9 (27%)	56 (33%)
1989	38 (31%)	6 (50%)	6 (19%)	50 (30%)
1990	44 (47%)	4 (29%)	7 (30%)	54 (42%)
1991	35 (30%)	2 (12%)	9 (43%)	46 (30%)
1992	29 (32%)	2 (20%)	3 (13%)	34 (27%)
1993	45 (48%)	1 (5%)	7 (37%)	53 (40%)
1994	43 (41%)	5 (38%)	6 (38%)	54 (40%)
1995	33 (31%)	5 (38%)	3 (19%)	38 (29%)
1996	33 (37%)	2 (10%)	2 (11%)	36 (28%)
1997	37 (47%)	3 (43%)	1 (6%)	41 (41%)
1998	43 (51%)	3 (14%)	4 (24%)	50 (44%)
1999	38 (32%)	4 (29%)	3 (13%)	45 (29%)
2000	39 (34%)	6 (21%)	2 (18%)	47 (31%)
2001	29 (26%)	5 (22%)	0 (0%)	34 (21%)
2002	45 (45%)	3(20%)	3(17%)	51(38%)
2003	48 (30%)	4(15%)	4(18%)	56(27%)

¹ Checking in and out of Nowitna River mouth check station was not mandatory, except 1997.

² Moose harvest is followed by estimated percent hunter success in parentheses.

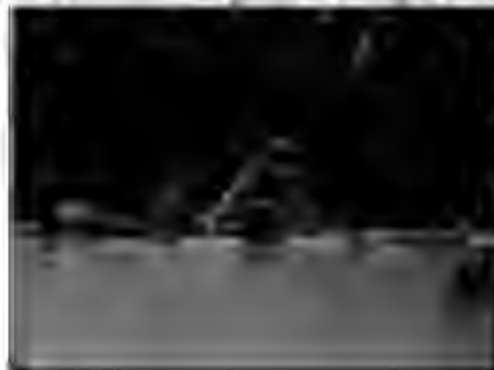
NA - Not Available

H.9. Fishing

Most fishing within the boundaries of the units takes place as a subsistence activity. Most fish are harvested using set gill nets and drift gill nets in traditional fishing spots respected and recognized by local residents. Locally recognized fishing rights are passed down through family ties, and remain in the immediate or extended family.

The pre-season outlooks for the chinook, summer chum, and fall chum salmon runs were for below average to poor runs, in large part due to the low productivity trends experienced in recent years. At the Alaska Board of Fisheries (BOF) January 2001 meeting, Yukon River chinook and chum salmon were identified as stocks of concern. In addition, a "windowed" subsistence salmon fishing schedule was implemented to increase the quality of the escapement, spread the harvest throughout the run, and spread subsistence opportunity among users along the length of the river. The strategy used during the 2001 and 2002 seasons was continued for the 2003 season.

Chinook. Ice breakup on the lower Yukon was about one week early, and occurred around May 18. Initially, the chinook salmon runs were assessed to be low in abundance. Subsistence fishing time was placed on the BOF "windowed" schedule and implemented sequentially up-river as the run progressed, approximately one week earlier than in 2002. ADF&G test nets, Pilot Station sonar, and reports from subsistence fishers, also indicated that the chinook salmon run was entering the lower river about one week earlier than normal, in conjunction with low water levels and light debris loads. Low water and less debris may have made monitoring projects more efficient than in previous years. Some Lower Yukon River subsistence fishers reported being finished with chinook as early as June 5, while others were just beginning to fish at that point in time. By June 9 (determined post-season to be three days before the quarter point), it was determined that the 2003 chinook salmon run would provide for escapement and subsistence needs, and by June 16, managers determined that the chinook salmon run could provide for a small commercial fishery. As is typical, subsistence fishers' success rates were variable, ranging from poor to excellent. By June 16, those who were able to



fish were able to meet their chinook salmon subsistence needs, and many fishers reported on the YRDFA teleconferences that the chinook salmon were larger and healthier than those seen in the previous year. Chinook salmon escapement goals, as well as Canadian border passage goals, were met on all the tributaries that were monitored.

Ruby area fishwheel (GB)



Fishwheel on the Yukon River above Ruby. (GB)

Summer Chum. The summer chum run timing was normal for 2003, and subsistence fishers in the lower Yukon River started catching summer chum around June 5. Assessment of the summer chum run was confounded by inconsistencies with the monitoring projects. The Pilot Station sonar counted a

cumulative passage of 1.2 million summer chum salmon, which was similar to the 2001 and 2002 count, while lower Yukon River escapement monitoring projects reflected a run strength of about half that. Escapement goals on the East Fork Andreafsky and Anvik rivers were not met. Escapement estimates for the Nulato, Gisasa, Henshaw, and Tozitna Rivers were also below historical averages. Unfortunately, flooding hindered upriver escapement monitoring projects and accurate escapement estimates for upriver systems could not be determined. Summer chum are not as heavily utilized for subsistence needs as chinook and fall chum salmon, however, based upon discussions with YRDFA teleconference participants, it appears that subsistence fishers who fished did meet or nearly meet their summer chum salmon needs.

Fall chum. The five year average for fall chum salmon past the Pilot Station sonar was approximately 400,000 fish. It was anticipated that the 2003 fall chum salmon runs would also follow this trend, therefore, early in the fall season the subsistence fishing schedule was reduced to one-third of the BOF schedule in the lower districts and reduced chronologically up the river (Coastal District, Koyukuk River, and District 5D were reduced to one-half). This was supported by YRDFA teleconference participants. The fall chum run continued to develop slowly until August 5, 6, and 7 when a large pulse of approximately 190,000 fall chum passed the Pilot Station sonar. This was a day or two before the average midpoint of the fall chum run in the lower river. On August 16, 17, and 18 about three-quarters of the way through the fall chum run, another large pulse of 280,000 fall chum passed the Pilot Station sonar. These pulses were confirmed by both Kaltag test net project, and Rampart/Rapids project. At that time it was determined that the fall chum salmon run would provide for escapement and subsistence needs, and that the coho salmon run was at least as strong as the 2002 run. Therefore, the subsistence fishing schedule was placed back on the full BOF “windowed” schedule, starting in the lower Yukon River and moving chronologically up the river. In late August, the fall chum run showed unexpected strength and the coho run was assessed to be well above average. A small commercial fishery was opened in District 1 and Subdistricts 4B and 4C, and the subsistence fishing was liberalized beyond the BOF “windowed” schedule in the lower districts first and liberalized chronologically up the river. Escapement monitoring projects in both Alaska and Canada showed that escapement goals and interim goals were met on all projects with the only exception being the Sheenjek River, which was only six thousand fall chum below the low end of the Biological Escapement Goal range of 50,000 to 104,000 fall chum salmon.



Andy Gribben, subsistence fishing across from Yuki River Mouth (GB)

Coho. The coho salmon run finished strong with an above average run. The late strength of the fall chum run and strong coho run, allowed most subsistence fishers to meet or nearly meet their subsistence goals for the fall season as indicated by YRDFA teleconference participants.

The opportunity to harvest non-salmon species seven days per-week throughout the fishing season was provided for by allowing restricted gill net mesh size of four inches or less and of limited length of sixty feet. This also provided law enforcement officers the ability to enforce the salmon fishing period closures.

In-season Harvest Assessment. Yukon River federal and state fishery managers have indicated a need for collecting and reporting in-season subsistence salmon harvest information in a standardized format for use as an in-season management tool. The 2003 salmon fishing season marks the second season of the Refuge collecting qualitative in-season subsistence harvest information in a standardized format from active fishing households.

The project used local hire RIT's and refuge staff in Emmonak, Holy Cross, Nulato, Galena, and Huslia to survey fishermen about their harvest of chinook and summer chum salmon. Subsistence fishermen were able to contribute traditional knowledge about salmon harvest, abundance and run timing, and provide information on whether or not their subsistence needs were being met. Present year abundance and harvest were compared to previous years' fishing experiences and rated on the basis of the harvest being very good, normal, or poor. The primary goal was to determine subsistence fishing households' in season progress in meeting their subsistence salmon harvest needs. Progress was assessed through weekly household interviews. Interviews were conducted in Emmonak, Holy Cross, Nulato, Huslia, Galena and Circle between June 1 and August 31.



RIT Orville Huntington conducting survey

Sixty-three households were interviewed for chinook salmon and seventeen households were interviewed for chum salmon harvest progression. Reported chinook salmon interview results were: 36 households (57%) at 100%, one household (2%) at 75%, three households (5%) at 50%, one household (2%) at 25%, and 22 households (35%) with a completion status of unknown. Reported chum salmon interview results were: 10 households (59%) at 100%, three households (18%) at 75%, three households (18%) at 50%, and one household (6%) with a completion status of unknown. Unknown status indicates an incomplete interview or lack of multiple interviews where harvest progress could not be inferred. In 2003, the chinook and summer chum salmon returned in sufficient numbers to allow for liberalization of the windows schedule. In general, in-season interview data indicated that most households met or nearly met their subsistence chinook and chum salmon needs for the 2003 season and that the 2003 fishing season was better in comparison to the 2002 fishing season.

H.10. Trapping

Trapping on the Koyukuk, N. Unit of Innoko and Nowitna NWRs provides a source of supplemental income for some residents in the villages of Ruby, Tanana, Galena, Huslia, Kaltag, Nulato, Koyukuk, and Hughes. Also important to village residents is the opportunity to trap and teach their trapping techniques to youth as part of their customary and traditional practice. Recently, trapping activity on the refuges has decreased, but there are still a few families that rely primarily on trapping for their livelihood.

Trapline territories are not registered, but are generally passed down through families from generation to generation. Thus, claims to certain areas for trapping are usually recognized and respected by local residents. The traplines are usually associated with a cabin or camp of some sort. Occasionally, traplines and accompanying cabins and equipment are sold to newcomers. Beaver trapping however, is

not always done within strictly controlled trapping territories. Areas are often shared by several people, perhaps because of the importance of beaver as a survival food.

Snowmobiles are the primary means of transportation for trapping. Some individuals travel up to 200 miles round-trip on the trapline. Most dog teams in the Galena area are used for recreation or racing; however, some dog teams are used for trapping near Ruby and on the Nowitna. Some trappers use airplanes for access and a few simply walk their traplines. Marten are the most frequently harvested species and are generally taken using pole sets and/or cubby sets. Beaver are taken with traps or snares through the ice, and most wolves are shot, trapped, or snared around moose kill sites.

H.17. Law Enforcement

During 2003, the Refuge Complex had only one collateral duty law enforcement officer on staff. RO McClellan attended the annual mandatory 40 hour LE refresher training at Marana, Arizona from February 19 – 24 and completed mid-year firearms re-qualification in Anchorage on July 16.

On January 21, RO McClellan attended a tribal council meeting in Huslia to discuss whether the Huslia Tribal Court was willing to hear and rule on a case of a Huslia Tribal member wasting 17 northern pike within Koyukuk National Wildlife Refuge. On April 21, RO McClellan and Senior Resident Agent Corky Roberts attended a tribal court hearing in Huslia concerning the wasting of the 17 northern pike. After the hearing, SRA Roberts and RO McClellan investigated a possible illegal trap set for marten. We were guided by a local resident. On May 8, the Tribal court issued their decision to include that the individual conduct one hour of community service for each of the wasted pike. The community service is to involve educational programs in community schools concerning fishing and proper utilization of caught fish. The refuge was requested to provide logistical help for travel to the neighboring villages. On November 17, 2003, the individual, assisted by RIT Huntington made a presentation to 15 junior high/high school students.

RO McClellan and RM/P Spindler conducted several patrols (last couple days of April and first couple days of May) during the spring subsistence waterfowl season. The patrols were conducted over the Kaiyuh Flats area and the southern part of the Koyukuk Refuge up to Huslia. We did not conduct any patrols on the Nowitna Refuge. One hunter from Nulato was issued a violation notice for possession of lead shot while hunting waterfowl. By September, the individual had yet to pay his fine. The U.S. District Court issued an "Order to Appear" requiring the individual to either pay the fine or appear in court on November 20. RO McClellan worked with the Assistant U.S. Attorney's office to ensure and document that the individual received the "Order to Appear" notice. The issue was yet to be resolved by the close of the calendar year.

On the evening of May 30th while conducting aerial biological surveys over the Kaiyuh Flats, SWB/P Scotton observed several individuals butchering a moose. Neither RO McClellan or the local State F&WP Officer were available. RO McClellan and RM/P Spindler flew out to the site on May 31. The carcass was located. All the meat and the nose of the moose had been salvaged. On the next day, it was discovered that a resident of Nulato had earlier called ADF&G in Fairbanks letting them know hunters would be out harvesting a "potlatch" moose. The Fairbanks office never informed the local ADF&G office or F&WP office. This moose carcass was the potlatch moose.

On June 16, RM/Pilot Spindler and RO McClellan conducted an aerial LE patrol of the Nowitna Refuge. We stopped at several permitted cabins to ensure they were complying with permit conditions. We also stopped at the permitted big game guide's permitted camp in NOW-03.

On June 24, RO McClellan conducted a boat patrol from Galena to Kaltag and back during the Federal subsistence fishing season. Several set net sites were checked with no violations observed. No fishers were observed fishing during the closed period.

On July 15, RO McClellan attended a meeting in the Regional Office in Anchorage concerning the development of a refuge law enforcement deployment model with a representative from the International Association of Chiefs of Police.

In early August, muddy foot prints were noted on the top surface of the wings of the refuge 206 which was parked at the floating dock in the Yukon River in front of our office. No damage to the wings or the plane was noted. RO McClellan alerted the Galena City Police and asked them to include checking our floating dock as part of their routine evening patrols.

September is the prime time for law enforcement effort on our refuge units during the big game hunting season. RM/Pilot Spindler and RO McClellan conducted aerial patrols of the refuge units on six days during the September 5–25 moose hunting season. From September 11–15, Regional Law Enforcement Coordinator, Ray Portwood, assisted RO McClellan with a boat patrol of the Koyukuk Refuge primarily around the Three Day Slough area. From September 16–19, Special Agent Dave Rippetto from the LE office in Fairbanks assisted RO McClellan with a boat patrol of the Nowitna Refuge basing out of the Refuge administrative cabin. During this effort, we checked over 98 hunters. RO McClellan issued one citation to a moose hunter for failing to have evidence of sex. SA Rippetto issued two citations to two moose hunters who shot two gray jays that were hanging around their meat rack.

On the Nowitna NWR, SA Rippetto and RO McClellan checked on a party of hunters that were using a permitted cabin that was not theirs. SA Rippetto used his satellite phone to call the cabin permittee. The permittee hadn't given permission to the hunters to use the cabin. Initially, the permittee was interested in pressing trespass charges, but he personally knew a couple of the hunters and ultimately decided he didn't want to press charges. We allowed the hunters to stay at the cabin overnight, but required them to leave the next day. We also checked out a report of a dead moose in the Nowitna River. We found the moose intertwined among woody debris next to a high cut bank. We were able to untangle the carcass and pull it to shallow water on the other side of the river by a gravel bar. SA Rippetto completed a field necropsy on the carcass. We could not find any evidence or indication that it was shot.

On the Koyukuk NWR, RLIC Portwood and RO McClellan were camped on a gravel bar one evening and was woken up after midnight by several people calling for moose. When we got out of our tents, the boat was heading upriver and shining a spotlight on shore. We assume they were trying to spotlight for moose. It was too dark to get any description of the boat and not feasible to try and catch them with our boat.

During the month, RO McClellan investigated a possible case of illegal guiding on the Kaiyuh Flats. One of the permitted big game guides on the Koyukuk Refuge reported a possible case of illegal guiding. By the time we were able to respond to the complaint one of the camps had departed and the

other camp was just composed of resident hunters and one non-resident hunter who was an immediate family member of several of the resident hunters.

During the month we received several reports from Native allotment owners of hunters trespassing on their Native allotments.

A State Fish & Wildlife Protection Officer, Jay Sears, is stationed in Galena. Throughout the year, but especially during the September moose seasons, we try to coordinate our activities so we are covering as much area as possible and not duplicating effort. Officer Sears was very active and made several cases on and off the refuge. We have a good working relationship with Officer Sears.

On September 29, RM/Pilot Spindler and RO McClellan conducted an after season check of the Koyukuk River specifically checking the permitted big game guide camps in KOY-03 and 05 and also hunting camps along Three Day Slough for litter problems. We documented compliance problems with permit special conditions at all three permitted big game guide camp sites. We are pursuing issuing a citation for the condition of one of the camps.

H.18. Cooperating Associations

Refuge staff continued operation of our small branch of the Alaska Natural History Association, selling books of regional interest and shirts/mugs/tote bags bearing the Complex logo. Items were donated by ANHA for our community Centennial events, to be used as door prizes, as well as Refuge Centennial pins which were given away.

H.20. Subsistence Management

Due to the State of Alaska subsistence law being inconsistent with the Federal subsistence provisions in the Alaska National Interest Lands Conservation Act (ANILCA), the Federal government assumed, in July, 1990, responsibility for implementing Title VIII of ANILCA on federal public lands in Alaska. In October of 2000, the Federal government also assumed responsibility for subsistence fisheries management for waters in or adjacent to refuge boundaries. The affected public lands in Units 21 and 24, collectively referred to as Federal Conservation Units, are comprised of the Innoko NWR, Koyukuk NWR, Nowitna NWR, Kanuti NWR, Gates of the Arctic National Park and Preserve, and significant areas of land managed by the Bureau of Land Management.

The Federal Subsistence board was established to implement a subsistence priority for rural residents on Federal lands and waters consistent with ANILCA. In the spring of 2000, an Interim Memorandum of Agreement (MOA) was signed by management authorities representing the State of Alaska and Federal agencies, established the guidelines for coordinating fish and wildlife subsistence management of Federal public lands in Alaska. This provides the platform for using state management plans and regulations to implement management actions, so long as they provide for subsistence priorities under state and federal law.

The Koyukuk/Nowitna Complex supports many subsistence uses which occur on a checkerboard of Federal, State, Native corporation, and privately owned lands within refuge boundaries. In terms of use-days, the most significant public use of Federal lands within the Complex is subsistence by rural residents. *Wildlife* subsistence activities occurring on Federal lands and waters and subsistence *fishing*

activities occurring on navigable waters within or adjacent to Federal lands are administered by the Service. On State and Native corporation lands, navigable waters, and certified Native allotments within the Complex, subsistence and other recreation/consumptive use of *wildlife* are managed by ADF&G. ADF&G also manages sport and commercial fisheries on these same lands and waters. Since 1990, the arrangement of dual Federal-State subsistence management has presented residents of the area and the Service with many new challenges.

In 2003, Geoff Beyersdorf served as the Subsistence Coordinator/Pilot Trainee for the Complex. In fiscal year 2003, the refuge received approximately \$66,500 in subsistence funds. These funds were used for subsistence waterfowl harvest surveys (\$6,000), subsistence fisher surveys (\$14,000), salary costs for fisheries program support (\$31,000), steel shot clinics (\$2,500), and for travel to meetings, seminars, and villages (\$13,000).

Federal Advisory Council. The Western Interior Regional Advisory Council (WIRAC) represents the residents of the western interior Alaska region with nine seats. The function of the Council is to convey the needs and opinions of its constituency to the Federal Subsistence Board and to submit fish and wildlife regulation proposals and comments. Council members in 2003 were Chairman Ronald Sam, Allakaket; Vice-Chair Ray Collins, McGrath; Secretary Jack Reakoff, Wiseman; Carl Morgan, Aniak; Angela Demientieff, Holy Cross; Benedict Jones, Koyukuk; Robert Walker, Anvik; Michael Stickman, Nulato; and Emmitt Peters, Ruby. The Council held two regular meetings in 2003. The spring meeting was held in Aniak on March 18-19, and was attended by GB Beyersdorf. The joint fall meeting with the Eastern Interior and Yukon-Delta RAC's and was held in Wasilla on October 12-16, and was attended by RIT Huntington and GB Beyersdorf.

Spring 2003. WIRAC meeting. The primary issues expressed at the spring 2003 meeting were proposals to limit non-local ungulate harvest in the region and liberalize predator regulations. Council member concerns, particular related to the refuge, included US Air Force Base(Chugach) employees inviting non-local hunter's participation in the winter moose hunt, expanding drift gillnetting to Subdistrict 4B/4C, and commercial representation on the WIRAC to be in compliance with the Federal Advisory Committee Act.

The following proposals concerning the Koyukuk/Nowitna Complex were discussed:

Wildlife Proposals. Proposal 1: Adopt a statewide provision allowing the taking of wildlife for use in traditional funerary or mortuary ceremonies. Passed as amended to exclude the name of the decedent(s) and adopt the existing State regulation for religious ceremonies.

Proposal 2: Standardize the designated hunter regulations for ungulates for all units. Passed as amended to read in part: A federally qualified subsistence user (recipient) may designate another Federally qualified subsistence user to take deer, moose, and caribou on his/her behalf unless the recipient is a member of a community operating under a community harvest system or Unit specific regulation in Section 26, preclude the use of the designated hunter system.

Proposal 54: Increase the harvest of brown bears in parts of Unit 21 (D). Withdrawn

Proposal 30: Align with State regulations to include meat-on bone restrictions for caribou in Unit 24. Passed as modified.

Proposal 34: Align with State regulations to include meat-on bone restrictions for moose in Units 21 & 24. Passed as modified.

Proposal 35: Closure of Federal public lands to nonsubsistence hunting of moose in Unit 21D and 24. The proposal was rejected and recommendation made to address the submitter's concerns through the Koyukuk River Moose Management Plan.

Proposal 36: Align the Federal season and harvest limits for coyotes in Units 19, 21, and 24. Passed as written to extend the season from August 10th-April 30th with a ten coyote limit.

Proposal 38: Increase the wolf harvest limit in Unit 24. Passed as amended to allow the use of firearms in National Parks. Season amended to 5 wolves from August 10th to Oct. 31st and 15 wolves from Nov. 1st - April 30th.

Proposal 39: Increase wolverine hunting harvest in Unit 24 from one to five wolverines. Passed as amended to harvest one wolverine from Sept. 1st-Oct. 31st and five wolverines from Nov. 1st-March 31st.

Proposal 28: Delete the trophy devaluation requirement for harvested subsistence brown bear in the Western Alaska Brown Bear Management Area. Rejected and made the recommendation to address the submitter's concerns through the Western Alaska Brown Bear Management Area Working Group.

Fisheries Proposals before the Federal Subsistence Board.

Proposal 27: Subsistence take of fish for ceremonial/potlatch purposes. Approved by the Board with modification.

Proposal 28: Proposal to facilitate cooperation between Federal and State fisheries managers ensures that in-season regulations are coordinated. Approved by the Board with the modification that it apply only to the Yukon and Kuskokwim drainage at this time.

Proposal 2: Allow the use of rod and reel to subsistence fish for salmon in Yukon River tributaries. Approved by the Board with the modification to include all Federal waters in the Yukon River drainage.

Fisheries Topics. The Koyukuk Tribal Council submitted a proposal to extend the drift net fishery to area 4B/4C. This was supported in resolution by the Nulato Tribal Council. The motion was carried by the RAC to support the proposal when presented to the BOF. A motion was also made to submit this proposal to the FSB.

Fisheries Resource Monitoring Program: Yukon Winter Performance Report. To ensure studies are scientifically sound and address subsistence priorities, the Federal Subsistence Board (Board) has developed a process where interested parties submit study proposals that address management issues and information needs identified by the Regional Advisory Councils (RAC). Proposals are evaluated by Fisheries Information Services division staff and the Technical Review Committee (TRC) using four ranking factors: strategic priorities, technical-scientific merit, past performance-administrative expertise, and partnership-capacity building. Once passed by the TRC a detailed Investigative Plan is submitted, the proposal then goes before the RAC who makes recommendations to the FSB for funding. The

following section contains a list of projects conducted during the 2002 field season. Detailed information can be found in GB Beyersdorf WIRAC meeting notes or in the corresponding WIRAC meeting booklet.

Project 00-003 Effects of *Ichthyophonus* on Chinook Salmon

This project found that the *Ichthyophonus* infection rate of chinook salmon entering the Yukon River in mid June is over 25%. The final report is available from OSM.

Project 01-015 Yukon River Salmon Traditional Ecological Knowledge

This project collected local information on salmon from knowledgeable individuals in the villages of Alakanuk, St. Mary's, Holy Cross, and Nulato. A draft final report was submitted, reviewed and the final draft is forthcoming.

Project 01-029 Nulato River Weir

Project 01-038 Kateel River Weir

Project 01-050 Kaltag-Middle Yukon River Chinook Salmon Sampling Project

Project 01-200 Effects of *Ichthyophonus* on Survival and Reproductive Success in Yukon River Chinook Salmon

Project 02-121 Run Timing, Migratory Timing, and Harvest Information of Chinook salmon stocks within the Yukon river

This is a cooperative study expanding the existing allozyme database and developing a DNA database for chinook salmon in the Yukon River.

Project 02-122 In-season subsistence Harvest Assessment of Yukon River Chinook and Chum Salmon

Project 00-004 Humpback Whitefish/Beaver interactions

These results suggest that fish actively exploit lentic (lake) habitat despite periodic restrictions to their movements caused by beaver dams and low flows.

Project 01-100 TEK and Contemporary Subsistence Uses of Non-salmon Fish in the Koyukuk River

Customary Trade Briefing. The Federal Subsistence Board at their January 14, 2003 meeting adopted new regulations clarifying customary trade practices of subsistence-caught fish, their parts, and their eggs. The board's final rule sets enforceable regulations that protect the traditional practices of customary trade of subsistence-harvested fish, but reduces the potential for commercializing those fish by prohibiting customary trade with any business or re-sale by nonrural individuals. The new regulation allow customary trade transactions between rural subsistence users to continue but limits transactions between rural residents and others in that the fish sold must be used for personal or family consumption.

Fall 2003. The primary issues expressed at the fall 2003 meeting were declining moose population in the Koyukuk drainage, non-local hunter's moose taking opportunities away from local hunters, and *Ichthyophonus*. As is usual for the fall meetings, subsistence fisheries were the primary focus with seven fishery proposals addressed by the tri-councils. Four proposals affected refuge areas.

The following proposals concerning the Koyukuk/Nowitna Complex were discussed:

Fisheries Proposals before the Federal Subsistence Board.

Proposal 5: Expand the drift gillnet fishery area to include a portion of Subdistricts 4B/4C. The Western Interior voted to support with the following amendments. Drift gillnetting only applies to the Federal waters from Kala Slough to Cone Point, mesh size cannot exceed 7" nor more than 35 meshes deep, and commercial drifting in this area with this gear type will not be allowed.

Proposal 8: Close Federal public waters of the Yukon river to any commercial harvest for six years. The Councils did not recommend support for this proposal.

Proposal 10: Close Federal public waters of the Yukon River to any commercial harvest when Chinook salmon harvest exceeds 65,000 or chum salmon harvest exceeds 80,000. The Councils adopted the OSM staff recommendation to oppose this proposal.

Proposal 11: Remove subsistence restrictions in Yukon River Districts 1-4 tied to before, during, and after commercial openings. The Councils adopted the OSM staff recommendation to oppose this proposal.

Wildlife Proposals. Remove the restriction that moose may not be taken within ½ mile of the mainstem Yukon river during the February season. WIRAC approved.

Modify the Koyukuk Controlled Use Area boundary to align with the State. Motion made to match the State description passed by the WIRAC.

Customary Trade Proposals. Proposal 2: Prohibit customary trade of salmon from the Yukon river when there is a designation of "stock of concern". The Councils adopted the OSM staff recommendation to oppose this proposal.

Proposal 3: Prohibit customary trade in salmon eggs and clarify that section 13 does not apply to limited entry and crew license permit holders. Again the Councils could not reach consensus. The Western Interior and Yukon Delta Councils voted to adopt the OSM staff recommendation to oppose the proposal.

Fisheries Topics. Resolution 03-01: The Tri-council requested the FSB and the BOF to implement precautionary principles involving Ichthyophonus. This is to include a mortality allocation for Ichthyophonus when determining escapement. It also included a request that OSM continue funding Dr. Richard Kocan's research on "Ichthyophonus in Yukon River Chinook" in 2004 and future years."

Draft Fisheries Resource Monitoring Plan 2004. The Technical Review Committee (TRC) recommended funding the following Stock, Status, and Trend projects of local interest.

04-209 Abundance and Run Timing of Adult Salmon in the Gisasa River
 04-231 Chinook Radio Telemetry Project, Abundance and Distribution
 04-228 Genetic Stock ID for Fall Chum Salmon, Yukon River
 04-234 Kaltag Chinook salmon Scale Sampling Project

The TRC recommended funding the following Harvest Monitoring and Traditional Ecological Knowledge projects of local interest.

04-269 A Traditional Ecological Knowledge and Radio Telemetry Study of Whitefish in the Kanuti National Wildlife Refuge

04-263 Yukon River Drainage Fisheries Association Teleconferences and In-season Harvest Assessment

04-265 Traditional Ecological Knowledge of Customary Trade of Subsistence fish on the Yukon River

04-255 Traditional Ecological Knowledge of Upper Yukon River Salmon Fishery

Federal Subsistence Board's response to the 2002 Annual Report. The WIRAC, during its October 2002 meeting in Fairbanks, drafted a list of topics to include in this report. During their meeting on March 18-19, 2003 in Aniak the WIRAC approved this annual report. The following topics were pertinent to the Koyukuk/Nowitna NWR Complex. Detailed information can be found in GB Beyersdorf's WIRAC meeting notes or in the corresponding WIRAC meeting booklet.

Issue 2: Law Enforcement Decline in Unit 24

The Regional council requests board support to increase federal law enforcement presence in Unit 24.

Issue 4: Chinook Salmon Spawning Concern

The Regional Council is requesting a re-evaluation of the escapement passage of the first portion of the salmon run.

Topic-Issues for the 2003 Annual Report

- Customary Trade concerns
- *Ichthyophonus* be considered when establishing escapement goals
- Restrict non-federally qualified moose hunters on the Nowitna River and Kaiyuh Flats

Koyukuk River Moose Management Plan. The Koyukuk River Moose Management Plan (KRMMP) was developed through the cooperative efforts of the Koyukuk River Moose Hunters' Working Group (KMWG), ADF&G, and other agencies. A citizen-based group, the KMWG is composed of representatives of local and non-local State Fish and Game Advisory Councils, representatives from the Western Interior Regional Advisory Council, and commercial guides. In addition, numerous Federal land management agencies including Koyukuk/Nowitna NWR have participated in the planning process as technical advisors by providing harvest and population survey data and other biological information. The recommendations of the KMWG were developed through a consensus decision-making process.

ADF&G's Division of Wildlife Conservation initiated the planning process in response to concerns about increasing numbers of hunters and harvest levels and potential affects on moose populations, primarily in the lower section of the of the Koyukuk River. As a result of the planning effort, moose hunting regulations in the lower river within the Koyukuk CUA have changed significantly. The general registration hunt on the lower Koyukuk River has been changed to a drawing hunt with separate resident and nonresident drawing pools. Separate resident and nonresident drawing hunts help to retain opportunity for nonresidents and commercial guides, but at a much lower level than has occurred in recent years. Additionally, those hunting under the subsistence permit must saw through the palm of one

of the antlers. This regulation is designed to reduce the number of trophy hunters to the area. The KMWG did not have any working meetings during 2003.

State Fish and Game Local Advisory Committees. The Middle Yukon, Koyukuk River, and Ruby local Fish and Game Advisory Committees encompass the area covered by the Refuge Complex. Refuge staff continued to work with the Committees and attempted to attend meetings whenever possible. GB Beyersdorf attended the Middle Yukon Committee meeting in Galena on November 20th, the Ruby Advisory Committee in Ruby on November 24th, and the Koyukuk Advisory Committee via teleconference on November 21st.

I. EQUIPMENT AND FACILITIES



Overview of lease lot with airplane storage building foundation in place and the arch members laying on the ground awaiting installation. 10/03



Looking at front (west) end of airplane storage building with all arches in place and one sheet of fabric installed 10/03



Richard Hannah, Alaska Structures, in City of Galena truck placing rope to pull last sheet of fabric. P Huhndorf to the left holding end of rope. 10/03



P.Huhndorf and WB/P Scotton getting sheet of fabric started in slots in preparation for pullin over the arches. 10/03



Richard Hannah, Alaska Structures, and WB/P Scotton bolting main overhead brace on west end of airplane storage building. P Huhndorf and MW Strassburg placing post. 10/03



Richard Hannah Alaskal Structures, in box on forklift, MW Strassburg Operating forklift and WB/P Scotton on ladder. 10/03

I.1. New Construction

The Refuge finally saw the fruition of a project started in 2000 with the completion of a 40 foot by 50 foot Weather Port temporary aircraft storage facility (Hangar) at Galena's Edward G. Pitka, Sr. Airport. In 2003, a bid was put out for construction of a foundation for the structure. The Service received only one bid which was determined to be not acceptable by the Division of Engineering. They were able to negotiate with another construction company that put in an acceptable bid for the foundation work and also to lay a concrete floor. Kanag'iq Construction Company out of Anchorage was awarded the contract. In August and September, a two person crew with the assistance of Airplane Pilot Huhndorff completed a wood and concrete foundation for the structure. The foundation included a two-foot "pony wall" to increase the height of the overhead door opening to allow a high enough door opening so the Refuge 206 and future Found Bush Hawk could be brought into the storage facility. The cement floor will be installed in 2004.

In early October, MW Strassburg worked with local gravel contractor Russ Sweetsir to install an impermeable liner in the gravel within the newly completed foundation. Mr. Sweetsir smoothed out and compacted a gravel base over the liner.

In October and early November, Airplane Pilot Huhndorf, WB/P Scotton and MW Strassburg assisted Richard Hannah with Alaska Structures to erect the steel frame structure. We contracted with a local construction vendor, Sweetsir's Construction, to rent an excavator and operator to erect the overhead arches of the structure. We contracted with the City of Galena to rent their "cherry picker" truck to



Complete hanger looking from west

install the braces between the overhead arches. MW Strassburg constructed a platform to use with a fork lift to install the mid-level braces. The crew completed construction of the structure by November 10. The large



Complete hanger looking from east

overhead doors were installed by contractors with RAM Services and Weldin Electric installed and hooked up all the electrical wiring for the structure, outside outlets, fuel tank and outside lights. The airplane storage facility was greatly appreciated by the moose survey crew later in the month by being able to keep snow off the planes and to not have to deal with wing covers every day. During the winter, Airplane Pilot and Huhndorf and MW Stassburg constructed a plywood wall above the cement pony wall and constructed several shelving units.

MW Strassburg constructed a nice wooden outhouse that was installed at the Refuge's check station site at the mouth of the Nowitna River.

I.2. Rehabilitation

In FY02, Phukan Consulting Engineers & Associates in Anchorage was given the contract to plan and design the rehabilitation of the 1940s vintage house used as a bunkhouse and the 1960s vintage house used as a single family residence. Refuge staff reviewed the 15% design presentation in 2002. In June of 2003 we submitted our comments on the 35% design. At this stage, the Division of Engineering determined that it would be more cost effective to demolish both buildings and start from scratch versus a major rehab. By the decision to demolish the buildings and start from scratch, delayed the planned start of the project from 2004 & 2005 to 2005 for both buildings (#109 and #111). New 35% design presentations were provided to the Refuge in November and comments were submitted to the Division of Engineering by the end of the month.

In July, contractors with Kanag'iq Construction Company installed vinyl siding on Quarters #4 and #6. The buildings were originally constructed in 1986 and 1987 and the wood siding is showing extensive wear. We hope to be able to side one or two of the remaining four residences each year.

I.3. Major Maintenance

On January 2, it was discovered the boiler was out in quarter's #6 with temperatures down to -30° F. Unfortunately, numerous water pipes and the water pump froze. MW Strassburg replaced the water pump and fixed over 20 leaks in the water lines running in the ceiling of the garage, water and sewer tanks storage room, laundry room and both upstairs bathrooms. The toilets in both bathrooms cracked requiring their replacement. B/SC Beyersdorf moved into the residence in February. Throughout the winter MW Strassburg battled problems with air in the fuel lines for the quarters #6 boiler.

In February and March, zone valves were replaced in quarters #2.

In May, MW Strassburg painted the interior portions of the west half of the duplex. SCEP student Webb moved-in in June.

During the summer, MW Strassburg worked on the sump pumps in quarters #4, 5 & 6 and ultimately had to replace the motor in the sump pump in quarters#4.

Khhotol Services, the landlord repainted the building during the summer. MW Strassburg removed and replaced, after the painting was completed, the large plastic logo on the side of the office building which includes the Refuge name and a stylistic moose scene.

I.4. Equipment Utilization and Replacement

At the end of 2002, the Refuge acquired a Case W14 front-end loader as excess Federal property from DRMO Fort Wainwright in Fairbanks. In late February, the front-end loader was taken to Yukon Equipment in Fairbanks which is the Case service center in Fairbanks. They inspected the machine and found several problems including recommended replacement of the engine. After \$18K in repairs including a rebuilt engine, the loader was repaired. In June, the loader was trucked to Nenana to Inland Barge Company and barged out to Galena, arriving on July 9. MW. Strassburg picked up the loader on the 10th and while using it, the water pump broke. After several phone calls with CGS and Yukon Equipment, they finally agreed to come out to Galena and fixed it at no charge to the Service.

Equipment Operator Richard Kivi from Kenai NWR came out in September and officially certified MW Strassburg to operate the front-end loader.

On March 12, the U.S. Postal Service used our heated garage to work on a postal vehicle that they will be excessing.

In April, a new trash compactor was bought to replace the old compactor in quarters #1.

In May, MW Strassburg replaced the rear brakes on the Ford 350 crew-cab truck.

In June we acquired an excess snowmachine from Kenai NWR.

We purchased a new Cannon copier for the office. The copier needed to be plugged into a special three-prong outlet; thus we had to contract with a local electrician to change out the breaker and install a new outlet.

Through the Division of Engineering, the refuge acquired a new double-walled 200 gallon tank to be used to store diesel fuel for our front-end loader and herman nelson type heater.

I.5. Communications Systems and Weather Stations

The Bureau of Land Management (BLM) Alaska Fire Service maintained the refuge's radio communication (5 sites) and RAWS (4 sites) systems for the eighth year. Radio maintenance was done in June.

A new narrow-band digital radio system was installed by a team including Mike Lewis (USFWS) and the National Park Service Radio Shop personnel during the months of July-August. Five new repeaters were installed (at Totson, Kokrines, Hill 2321, Roundabout, and Tough Mt.) along with a new base station and 8 new mobile units in the vehicles (5) and boats (3). Twelve Motorola XTS 5000R handheld radios and two camp radio sets completed the new communications system. The radio team trained refuge personnel in the use of the new radio system upon completion of installation. The "old" and "new" radio systems were both operational during the year. Some problems were encountered with the new system, particularly with the aircraft radios. These problems were addressed by National Park Service Radio Shop personnel.

I.6. Computer and Network System

As technology keeps on advancing our computers do as well. The Refuge acquired two new computers in 2003. One Gateway, with Windows XP Professional edition operating system went to the Biological staff and one Dell Optiplex GX270T, with Windows XP Professional edition operating systems went to the Administrative staff. An HP Laserjet 4100 printer was purchase to replace an inoperative printer in the administrative staff office.

I.8. Other (Aircraft)

The Complex used four airplanes in 2003: one Cessna 185 (N714KH), one Cessna 206 (N9798Z), two Piper Super Cubs (N83669 and N3874Z). N714KH, the long-time assigned Cessna 185 was temporarily

replaced with a Cessna 206 (N9798Z) in June. The Cessna is on wheels in winter and floats in summer. The Piper Super Cub airplanes are configured with floats during the summer and skis during the winter. Wheels are used on the Cubs only for a few weeks during transitions between seasons. The four refuge pilots flew a grand total of 1019 hours in FY 2003, the majority of which was in the three refuge airplanes (Table I.8.1). All this flight activity was accomplished without incident, which represents this station's 20th year without an aviation accident or incident.

For the second year, the refuge has entered into the shared Cub agreement with Innoko NWR. Innoko will have the Cub (N83669) on floats from May through September. Koyukuk/Nowitna NWR will have N83669 the rest of the time on wheels or skis for fall/winter/spring surveys. Moose surveys in November/December and wolf surveys in February/March typically create the refuge complex's highest demands for Cubs. During summer months, the refuge requires Cubs to fly aerial goose surveys, pre-goose banding reconnaissance, moose and caribou calving and twinning surveys and swan surveys as well as other miscellaneous survey and logistics missions over the complex.

Four pilots worked on the staff in 2003: one dual-function Refuge Manager/Pilot (Spindler), one full-time permanent GS-2181 Airplane Pilot (Huhndorf), one dual-function GS-486 Supervisory Wildlife Biologist/Pilot (Scotton), and one dual-function GS-401 Biologist/Pilot Trainee (Beyersdorf). Mr. Beyersdorf will be acquiring training and anticipates meeting FWS and OAS aviation requirements to fly resource missions during FY 04. Keeping pilots on the refuge complex's staff and using DOI fleet aircraft provides the flexibility to schedule and conduct several types of work simultaneously, or to conduct similar comparative work in several areas of the Complex, and accomplish it despite the unpredictable weather and limited daylight of the subarctic winter. The refuge complex still needed to charter local bush pilot Colin Brown (a former employee) with Yukon Eagle Air. Charters are operationally most effective when refuge staff and airplanes cannot simultaneously fly all required missions, such as during the extremely busy months of June and July, or during special moose and wolf censuses. Many of these types of missions can only be accomplished during a short time window for biological reasons.

U.S. Department of the Interior "fleet" aircraft are "owned" and maintained by the Office of Aircraft Service (OAS) who bills the Fish and Wildlife Service for hourly flight time and monthly availability rates for each individual airplane. In fiscal year 2003 the total cost of operating the refuge complex's three airplanes for Koyukuk/Nowitna Refuge's operations a billed-total of 672 hours (includes N9798Z) was about \$97,409 for an average cost of per flight hour (not including pilot salary) of \$145. Various additional fleet airplanes were "borrowed" from the RAM and other agencies to cover for times when the three assigned airplanes were away in Anchorage or Fairbanks for maintenance, during major surveys or field projects, or when pilot training was being conducted in Anchorage or Fairbanks. These aircraft were flown a total of 115 hours at an additional cost of \$12,735. The grand total cost to the refuge (excluding charter flights) was approximately \$110,145 including availability for the assigned airplanes.

Maintenance for these remotely-located airplanes was complicated and expensive because there was no private mechanic contractor residing in Galena who could perform scheduled maintenance or field maintenance to remedy unexpected breakdowns. The Cessna 185 N714KH was used 75 hours this year from January 1 through June 23rd. Numerous mechanical discrepancies, many of which were aging-aircraft related, were noted during the year. Several of the discrepancies interfered with the timely execution of planned flight missions. Many of the flight missions flown in N714KH this winter/spring

were missions supporting U.S. Fish and Wildlife Service Centennial events in the surrounding villages and scheduled weeks or months in advance with the local tribal and city governments. The new Aerocet 3500 floats previously on N714KH in 2002 have been converted to fit the C-206 for summer 2003. The 206 N9798Z performed adequately as a temporary replacement for the old 185 while Regional Aviation Manager Sarvis and Regional Aviation Trainer Akola worked with OAS to find a more permanent long-term solution for the refuge's heavy logistics airplane.

After a lengthy search for a decent replacement 185 or 206, the directorate determined it would be most cost-effective and best to replace N714KH with a new airplane. Unfortunately, Cessna quit manufacturing the rugged 185 Skywagon in the early 1980's due to product liability issues and poor market conditions. OAS asked for competitive bids to replace the aircraft with a new one. In the end, Found Aircraft of Canada won the bid and was tasked with providing a replacement with their new Bush Hawk XP. The new Bush Hawk XP design now being manufactured in Ontario, Canada is actually a greatly improved and modernized version of an old airframe originally manufactured in the 1960's. The refuge used N9798Z, the C-206, until mid-December when it had to be returned to OAS.

The Koyukuk/Nowitna NWR conducts logistics missions year-round including all of the winter season. The geographical isolation of the surrounding communities served by the refuge staff necessitates a heavy reliance on the one logistics airplane. The airplane is used frequently during winter months for transporting personnel and cargo to village advisory council meetings, hunter education training/seminars, and local grade and high school events where staff can provide environmental education. The logistics airplane is also important for conducting radio telemetry flights, high and/or low-level reconnaissance flights where more vast distances must be covered and aircraft-related sightability issues are not as critical. Such can be the case for monitoring caribou herd movements either visually or by radio telemetry. The new Bush Hawk N753, like N714KH, will be specially fitted at the factory for telemetry work. Literally tons of personnel and cargo are transported to and from the field each year, particularly during summer float season to support numerous field studies. Many of these field studies are mandated by the refuge inventory plans and must be done on an annual basis. Logistical flights in support of the Gisasa River Fish Wier Site are also provided on a workload-permitting basis when requested by the FRO office in Fairbanks.

Super Cub N83669 was delivered to Koyukuk/Nowitna NWR in May 2002. Pilots Spindler, Scotton and Huhndorf flew N83669 a total of 317 hours during the calendar year. The airplane is a partially refurbished Cub from within the fleet and has been equipped with a standard fleet-Cub instrument panel with new Garmin and Technisonic radios as well as a mode-c transponder. Cub N83669 has been a fairly reliable airplane during the year with nearly all of the gremlins having been found and fixed. The oil filter and stainless steel primer lines have more than exceeded expectations for performance with far less down time resulting from engine wear-related problems or broken primer lines. Since installation of the new lines in 2002, there has been no down time on either Cub caused by failed primer lines. This retrofitted improvement by OAS represents a significant long-term cost savings and keeps the Cubs more dispatch-ready for the refuge.

Cub N3874Z was flown a total of 419 hours this year, mostly by pilots at Koyukuk/Nowitna NWR, up 47 hours from last year. The majority of the hours were aerial wildlife surveys although a small portion were for logistics missions in support of field activities and village meetings. There were no serious problems noted with this airplane in FY 03.

For the last three years refuge staff has been working with the regional directorate, engineering, realty and contracting offices to lay the ground work for construction of a 40 foot by 50 foot Weather Port temporary aircraft storage facility (Hangar) at Galena's Edward G. Pitka, Sr. Airport. By late August, a suitable foundation was designed jointly by FWS Regional Engineers with assistance from construction company Kanagiq. This company was awarded a contract by CGS in late August to help design and then to construct a suitable foundation which would be able to keep the building in place during high winds, yet afford the door frame two more feet of clearance to accommodate an airplane with a higher tail than the old 185. This modification was necessary due to the required replacement of N714KH with the Found Bush Hawk planned for 2004.

Kanagiq was successful in completing construction of the concrete and wood foundation wall by the end of September with the assistance of Airplane Pilot Huhndorf as roustabout/laborer. During the last half of October, Airplane Pilot Huhndorf, Sup. Biologist/Pilot Scotton, Maintenance Worker Strassburg, and FMO Lambrecht worked under the direction of Alaska Structures Foreman Richard Hannah to erect the steel frame structure of the Hanson Weather Port on the foundation. The crew was able to erect the 2000 square foot structure, install all fabric panels and batts of fiberglass insulation as well as personnel doors and a window by November 10th. The large overhead doors had been installed and all electrical wiring completed by contractors RAM Services and Weldin Electric respectively.

Charles Grant in Engineering worked with CGS to purchase an above ground DOT and Fire Marshal approved AVGAS fuel dispensing tank appropriate for use at the new hangar site. The service-owned and operated AVGAS dispensing tank will be the most cost effective and operationally efficient way for flight crews to refuel the airplanes before and/or after each flight mission. The new tank manufactured by Greer Tank and Welding of Tacoma, WA was installed and connected to electrical power by early November. Due to a misunderstanding, the incorrect type of shaft seal was factory installed in the fuel pump. A non-arctic grade hose was also installed which had no flexibility in below freezing weather and was extremely difficult to handle during fueling in winter. The pump shaft seal not designed for cold weather and pumping extremely cold fuel, failed as soon as the ambient temperature went down to -20 F. The pump was promptly sent to Anchorage for installation of a new arctic-grade shaft seal on warranty. The non-arctic grade hose was switched with an arctic grade API 1529 pipeline hose in use at the Alexander Lake fuel tank. Engineer Grant has since decided to add arctic-grade seals and hoses to the specifications on all future orders of fuel pumps and hoses destined for the Alaskan Arctic or Sub-arctic Climates. Since the new seal was installed, the pump has been used in below freezing weather without any further problems.

Table I.8.1. Summary of flight hours by refuge pilots in government aircraft at Koyukuk/Nowitna NWR Complex, 1990-2003.

FY	M. Spindler	C. Brown	P. Leidberg	J. Huhndorf	J.D. Baxter	B. Scotton	G. Beyersdorf	Total
1990	442	547	245	n/a	n/a	n/a	n/a	1234
1991	308	545	212	n/a	n/a	n/a	n/a	1065
1992	436	497	295	n/a	n/a	n/a	n/a	1228
1993	183	467	199	n/a	n/a	n/a	n/a	849
1994	315	397	232	n/a	n/a	n/a	n/a	944
1995	288	250	122	n/a	n/a	n/a	n/a	660
1996	306	206	40	n/a	n/a	n/a	n/a	552
1997	207	225	n/a	n/a	n/a	n/a	n/a	432
1998	252	249	n/a	n/a	n/a	n/a	n/a	501
1999	98a	50b	n/a	163	80	n/a	n/a	391
2000	318	43b	n/a	416	n/a	n/a	n/a	777
2001	211	43b	n/a	353	n/a	n/a	n/a	607
2002	329	44b	n/a	462	n/a	n/a	n/a	835
2003	279	28b	n/a	273	n/a	330	137	1047

a Low hours due to broken leg

b Charter hours with Yukon Eagle Air.

J. OTHER ITEMS

J.1. Cooperative Programs

The Service cooperated with Alaska Dept. of Fish and Game to bring non-toxic shot clinics to the villages of Kaltag and Hughes in 2003. We also cooperated with ADF&G on moose, wolf, and caribou surveys, and WB Bryant co-authored a moose census report with ADF&G biologist Glenn Stout.

In 2003 the Regional Director signed a Memorandum of Understanding between the Service and the Alaska Native Science Commission. The agreement allows RIT Orville Huntington to hold the position of Vice Chairman on the Commission. The Service pays for Orville's salary while serving on the Commission, but the Commission pay for travel and related expenses. The Alaska Native Science Commission was created to bring together research and science in partnership with the Native community. It serves as a clearinghouse for proposed research, an information base for ongoing and past research and an archive for significant research involving the Native community. The commission provides information, referral and networking services for researchers seeking active partners in the Native community. Orville's participation in the organization provides a bridge between the Service and Commission as well as an assortment of other research organizations conducting resource and other research involving tribes. As a Refuge Information Technician (and formerly as Wildlife Biologist) for

the Service, Orville was in a good position to facilitate communication regarding science, subsistence, and Native issues between the Service and the Commission.

In 2003, the refuge continued to cooperate with the University of Alaska to host the white-fronted goose project website: http://mercury.bio.uaf.edu/~eric_rexstad/satellitegeese/

Using this website, biologists and students followed marked geese as they migrated from Alaska, across Canada and the U.S. lower-48 states to Mexico. The satellite telemetry project was possible only because of the good cooperation the refuge has had with the Galena, McGrath and Selawik Schools, the University of Alaska, Innoko and Selawik NWRs, and USFWS Division of Migratory Bird Management.

SCEP Deborah Webb continued her write-up of field work from her Master's research project. Field work on Deborah's project would not have been possible without the tremendous cooperation of Dan Nieman and his Canadian Wildlife Service staff at the Northern Prairie Wildlife Research Centre, Saskatoon, Saskatchewan. The Wildlife Management Institute facilitated transfer of funds to the CWS. The CWS invested staff and travel costs, well above the level required in the WMI contract, to assist Deborah with fall migration collar observations.

The Refuge staff has had an excellent cooperative relationship with the Galena City School District. In past years they have provided a teacher to join our staff's PR Karin Lehmkuhl to conduct the annual science camp. That camp continued in 2003.

Late in 2003, the refuge submitted a challenge cost share proposal to cooperate with the City of Galena, University of Alaska, and Loudon Tribal Council to establish a Galen Environmental and Cultural Learning Center. The Center would establish a facility that could benefit cultural, environmental, and community education. The refuge has had an interest in establishing a gathering point for interpretive events in a setting that provides museum-quality displays of fish, wildlife, and natural history. The Loudon Tribe has had a similar interest to curate and display cultural artifacts of interest. The University needs community-centered classroom space. In fall 2002, the City of Galena vacated their former office building and occupied a new City Office and Clinic building. The Old City Office, located near the Galena City School, was offered to other agencies in Galena for use as a single or joint use office. Several partners, including Loudon Tribal Council, University of Alaska Interior-Aleutians Campus, Koyukuk-Nowitna NWR, and the City of Galena believed that because of its location, the facility would make a good cultural and educational center. Refuge staff are interested in using a portion of the facility to support environmental education programs for children (science camps) and adults (community education, special events, seminars, etc). The University needs local liaison office space and a small classroom. The partners believed that the intersection of their varied missions form a natural mix that can be housed in one building. None of the partners have sufficient resources to perform the project alone. This would allow the partners to leverage their resources to create a Community Environmental and Cultural Learning Center in Galena.

Cooperation with entities in Mexico also continued in 2003. The refuge issued small contracts with Mexican researchers to describe habitat and hunting pressure in areas where satellite marked geese wintered in the highlands and coastal plain. Former refuge volunteer and University of Tamaulipas alumnus Fabiola Yopez covered the Gulf coastal plain. Former refuge volunteer and University of Chihuahua student Manuel Ochoa, and advisor Dr. Rod Drewien, covered the central highlands. Both

teams did way more than their contracts specified, and provided significant additional matching time and in-kind work

The Refuge continued a Challenge Cost Share project with Galena public radio station, KIYU, and the University of Alaska Fairbanks Library Oral History Collection. The goal of this final cost share project was to archive all original recordings and produced CD's. The Library also provided on-line cataloging of these contributions, and distribution via streaming audio on their website: <http://uaf-db.uaf.edu/Jukebox/ravenstory/START.htm>

J.4. Credits

- A. Highlights
 - Michael Spindler
- B. Climate Conditions
 - Jenny Bryant
- D. Planning
 - D.4 Greg McClellan
 - D.5 Jenny Bryant
- E. Administration
 - E.1, E.5 Greg McClellan
 - E.4 Karin Lehmkuhl and Greg McClellan
 - E.6 Robert Lambrecht
 - E.7, E.8 Michael Spindler
- F. Habitat Management
 - F.1, F.2, F.3, F.6 Jenny Bryant
 - F.9 Robert Lambrecht
 - F.12 Karin Lehmkuhl
- G. Wildlife
 - G.1 to G.5 Jenny Bryant
 - G.6, G.7 Karin Lehmkuhl
 - G.8, G.10 Brad Scotton and Jenny Bryant
 - G.11 Geoff Beyersdorf
 - G16. Jenny Bryant
- H. Public Use
 - H.1, H.17, Greg McClellan
 - H.2, H.6, H.7, H.18 Karin Lehmkuhl
 - H.8, H.9, H.10, H.20 Geoff Beyersdorf
- I. Equipment and Facilities
 - I.1, to I.4 Greg McClellan
 - I.5 Robert Lambrecht
 - I.6 Krista Talley
 - I.8 Joe Huhndorf
- J. Other Items
 - J.1 Michael Spindler
 - J.4 Krista Talley
- K. Feedback
 - Michael Spindler

Entire document was edited by Greg McClellan, Melissa Robinson and RM Michael Spindler

K. FEEDBACK

Preservation of pre-history remains, modern day subsistence, habitat conservation and our place in the communities near Koyukuk-Nowitna National Wildlife Refuges

Twenty-eight thousand years ago, wooly mammoths and giant bison walked along the Yukon and Koyukuk Rivers, areas that are now part of the Koyukuk-Nowitna National Wildlife Refuges that we manage. Along with the mammoths were several kinds of old-world wildlife, such as horses, lions, camels, short-faced bears and saber toothed cats. Also living with these were familiar animals such as moose and caribou. It was a time when the landscape was a dry, cold, grassland instead of the boreal forest and wetlands we find today. That's because glaciers to the north and south robbed the winds of their moisture. At that time in central Alaska an incredible variety of large mammals prospered, because they found easy access to grasses and other foods not available in many parts of North America that were glaciated. Ancient people probably also prospered in the wildlife-rich environment, as evidenced by the recent discovery of obsidian stone tools on Koyukuk NWR.

As part of the Refuge Centennial celebration in 2003, the Koyukuk-Nowitna NWR staff worked to study, restore, and display Pleistocene animal remains from the Palisades of Nowitna NWR and an obsidian stone tool kit from the Nogahabara site on Koyukuk NWR. We did this for several reasons. These artifacts came from the refuges we manage. Our staff felt strongly that they should be displayed publicly in a community near the refuge. The artifacts illustrate the need to preserve, inform, educate, and connect. These artifacts represent a connection through time. They speak of extinctions; of life and death struggles for some, and of survival for others. Today, some of the species in the Centennial display are long extinct, while others still exist in Asia, and a few, like the caribou, are little changed.

Carbon dating places the mammoth and bison 25,000-28,000 years ago, while the caribou bones may have been left 14,000 years ago. Similar dating of associated bone fragments at the stone tools discovery site indicated 12,690-13,800 years ago. Archaeologists theorize that native people coming from Asia walked across this ice-free part of Alaska, on their way to populating the rest of North America. The intricacy and variety of the obsidian collection tells us that these tool-makers showed a tremendous level of ingenuity and the skill to adapt and survive. I find myself staring at the luster, structure, and variety of the tool collection, and then at the mammal remains, including the huge bones and tusks. I can imagine groups of hunters cooperating to take down a mammoth or a bison. It is hard not to be in awe of the challenges these people faced to subsist.

The land we inherited from our predecessors was left to us intact, pristine, and productive. Without a doubt there were times when these early people had to use the land *intensely* and caused damage to the resources in order to survive. We can only guess whether the prehistoric people cared for the land intentionally or whether these thoughts were ever part of their life. But we do know that their successors, the Koyukon Athabascans, cared for the land immensely, because land and animals are held high in their beliefs and teachings that were passed on orally. One of the many examples of aboriginal reverence for resources I experienced was when an Athabascan elder hunter placed the unused bones of a moose kill gently on a hidden mossy clump and recited a prayer for the remains to come back as another animal. In my brief 15-year time as a biologist and manager at this station I too have found

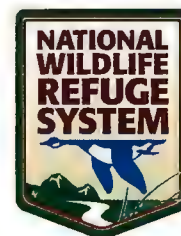
myself taking to heart these thoughts as I subsisted. For these reasons and many more, during the Refuge Centennial our staff believed that the Fish and Wildlife Service needed to recognize the people of the Koyukon region for their role in maintaining the lands that surround us, healthy and productive.

The Koyukon people left us a landscape that is valuable for subsistence, conservation, and renewable economic uses. It is a land with some of the highest moose densities in the State. A land that supports significant human harvest along with natural predator prey relationships. In 2003 the big game, predator, and furbearer resource is healthy, well used, and managed to be renewable. The wetlands are fertile with annual flooding from rivers undammed. The rivers at times are full of migrating fish going unimpeded to spawn. Large numbers of valuable and highly prized salmon pass through our refuges each summer on their way to spawning areas only recently identified and studied because of a worrisome decline. And just before freeze-up, an unimaginable biomass of whitefish fills the rivers as they move from lakes to spawning routes yet to be discovered and understood. There are unknown plant varieties and invertebrate fauna waiting to be documented on the refuges. We are indeed fortunate that the lands around Koyukuk-Nowitna NWRs have not been as greatly impacted by modern human kind as have the lands in much of the rest of the world.

In 1903, when President Theodore Roosevelt saw that our maturing nation was starting to ruin some of the landscapes and game populations that were part of our heritage, he began a campaign that was much more significant to our nation than a political election campaign. Among his many acts of conservation, on March 14, 1903 President Roosevelt established the first National Wildlife Refuge, Pelican Island, Florida. He went on to establish many other refuges and conservation units. Twelve presidents later, in 1980 President Jimmy Carter signed the Alaska National Interest Lands Conservation Act that was passed by Congress. We owe a debt of gratitude to these two leaders, and many others in between, along with the Koyukon Athabascans for their initial stewardship, for establishing the legacy of conservation we now inherit and steward like a precious gem.

In the field work of my 30 year career I had the fortune of flying, walking and boating across the pristine landscapes of the Koyukuk, Nowitna, Selawik, Innoko, Kanuti, Arctic, and Alaska Maritime, and Tetlin refuges. Each time, I took delight in the beauty, the natural patterns and processes, and the diversity including winding streams, floodplains, wetland basins, expansive forests, fire mosaics, coastlines, tundra, and snow capped ridges. Always a special treat to me were the sightings of wildlife, such as a large group of rutting bull moose in fall, a pack of wolves traveling over fresh snow in March, a herd of migrating caribou, or a flock of geese and swans on an recently thawed wetland. I was glad to be part of Service's effort to lead in resource conservation as we managed this part of the National Wildlife Refuge System. I looked at it as a wonderful privilege and a big responsibility to be one of the people tasked with managing Alaska's refuges from the time of their establishment in 1980 to the turn of the millennium. It was a time that bridged the wide open frontier land, when people could subsist without a permit, to a more complicated time with dual management, separate State and Federal regulations, and a plethora of permits required for subsistence and recreational uses. It was always my goal to continue good land stewardship and make the refuge friendly to its users, no matter how difficult or complicated the political and administrative landscape became. I frequently said to my coworkers "If there is any doubt about what is the right thing to do in a resource decision, we need to ask what the taxpayers would expect." I believe they expect good land stewardship and the knowledge that a professional staff is looking after the refuge, and caring about it. In a way that's not too far off from the stewardship practiced by the Koyukon people.

A final reason that we built the Centennial display was so that the Service could present to the people of the villages around our refuges a lasting symbol of our connection with the past and our hope for cooperation in the future. With our staff's efforts at environmental education, outreach, resource inventory and monitoring, research, and law enforcement, I hope that the Galena office of the Fish and Wildlife Service has established a solid foundation for conservation in the future. It is my sincere hope that when the Centennial time capsule is opened in the year 2103, the refuge lands will still be pristine, healthy, and productive. I hope that humankind will have found a way to balance conservation of these resources with our people's need for sustenance. I pray that our human ingenuity will have prevailed, so that like our predecessors, we will have adapted a lighter footprint on the planet and that we too will have left a refuge and a landscape intact for generations to come. *(Adapted from a speech given by Refuge Manager Mike Spindler at the Galena City Hall, March 18, 2003.)*

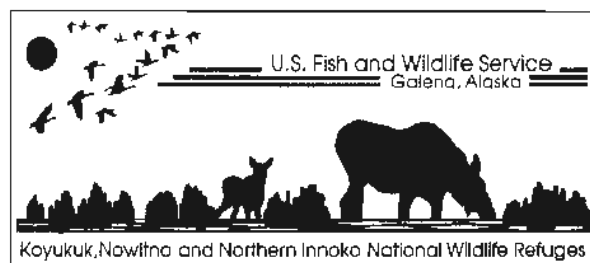


CELEBRATING A
CENTURY
of CONSERVATION



The unveiling of a display of Pleistocene tools and bones from Koyukuk and Nowitna NWRs was held to celebrate the Refuge

1 City of Galena



You are invited to a public unveiling of a display that depicts the pre-history of the Koyukon region. The display includes prehistoric stone tools and Pleistocene animal remains from the Koyukuk and Nowitna National Wildlife Refuges. These items will be presented to the people of the Koyukon Region in commemoration of the National Wildlife Refuge System Centennial.

March 18, 2003, 12 noon to 2 pm. Light snacks will be served.
Atrium, new City Hall, Galena

*A symbol of the enduring legacy of wild
places, these items are presented to the people of the Koyukon Region in honor of their
stewardship of fish, wildlife, and land resources in the past and future.*