

INNOKO NATIONAL WILDLIFE REFUGE

McGrath, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1989



US FISH & WILDLIFE SERVICE--ALASKA

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

REVIEW AND APPROVALS

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Calendar Year 1989

Philip J. Leiger
Refuge Manager

4/30/90
Date

Gary M. D.
Associate Manager Review

6/10/90
Date

Ann P. Rogers
Regional Office Approval

8-28-90
Date

US FISH & WILDLIFE SERVICE--ALASKA



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U.S. Department of the Interior
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NATIONAL WILDLIFE REFUGE SYSTEM

INTRODUCTION

Innoko National Wildlife Refuge was established December 2, 1980 with the passage of the Alaska National Interest Lands Conservation Act (A.N.I.L.C.A.). The refuge is located in west central Alaska, about 270 miles southwest of Fairbanks and 221 miles northwest of Anchorage. Refuge headquarters is in McGrath, a community located on the south bank of the Kuskokwim River approximately 70 miles east of the refuge boundary. The exterior boundaries encompass approximately 3.8 million acres. After the conveyance of native allotments, village and native regional corporation (Doyon, Inc.) lands, and state lands, the refuge will consist of approximately 3.5 million acres.

Innoko Refuge is a relatively flat plain with the highest point reaching 1461 feet. Water dominates the landscape. The Yukon River forms the western border of the refuge, while the Innoko, Iditarod, Dishna and Yetna Rivers flow through the Innoko Wilderness. These rivers tend to be slow-moving and silty with constantly meandering courses. Extensive wetlands with innumerable small lakes, streams and bogs occur over much of the refuge but are particularly abundant in the southeast portion. Many of the bogs support thick, floating mats of vegetation which give the appearance of solid ground. Much of this rich wetland area appears to depend on the yearly flooding and drawdown regime for nutrient input.

The vegetation of the refuge is a transition zone between the boreal forest of interior Alaska and the shrub-land and tundra types common in western and northern Alaska. White spruce occurs in large, pure stands along the rivers where the soil is better-drained. Numerous fires have set vast areas back to earlier seral stages consisting of aspen, birch and willow. Black spruce muskegs or bogs develop on the poorly-drained soils. Dense willow stands are common along the rivers and sloughs. The most conspicuous characteristic of the vegetation is the complex interspersing of types.

A primary focus of the refuge is the protection of the extensive wetlands which serve as nesting and breeding habitat for as many as 250,000 waterfowl; primarily wigeon, pintail, scaup, white-fronted geese, Canada geese, tundra and trumpeter swans. Innoko Refuge is well known for its large beaver population, and moose are abundant and provide an important source of meat for local residents. The success of the moose population is attributed to flooding that enhances the growth of willows which is the major winter food of moose. In addition to those species, wolf, black bear, grizzly bear, caribou and furbearers all use the refuge. Fish, especially northern pike, abound in refuge streams and lakes supporting subsistence and sport fisheries.

PURPOSES OF INWOKO REFUGE

Section 302.3.B of ANILCA sets forth the following major purposes for which the Inwoko Refuge was established and shall be managed:

(i) 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;

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

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

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

INNOKO NATIONAL WILDLIFE REFUGE STAFF



Above: Clerk-typist JUDITH E. STEEVES
Refuge Manager PHILLIP J. FEIGER

Below: Assistant Refuge Manager DENNIS E. PRICHARD





Above: Airplane Pilot PAUL E. LADEGARD
Wildlife Biologist ROBERT M. SKINNER

Below: Secretary SALLY JO COLLINS





Pilot Ladegard
Small Engine Repairman MARCUS R. MILLER

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A. HIGHLIGHTS

- New record low temperature of -75 degrees Fahrenheit set (Section B)
- Region's first local hire Wage Grade employee hired at Irmoko (Section E)
- Exxon Valdez Oil Spill disrupts summer field season (Section E-8)
- Stream monitoring equipment faces challenge of 38 foot level differential (Section E-5)
- Moose Census attempted again.... (Section G-8)
- Hunting activity down, sport fishing up (Section H-1)
- Common frequency negates radio system capability (Section I-5)

B. CLIMATIC CONDITIONS

Weather observations are not taken on the Irmoko Refuge itself, but weather there is usually very similar to that recorded in McGrath. This discussion is, therefore, based on official weather observations at the McGrath National Weather Service station.

The "Giant Omega Block" weather system of late January, created by extreme high pressure, received world-wide coverage. From January 15 through February 2, the minimum temperature ranged from -48 to -75 degrees Fahrenheit. The -75 degree reading on January 27 set a new record low temperature in McGrath, and was reported throughout the entire nation. Many people phoned friends and relatives in McGrath to see how we were surviving, and news agencies interviewed anyone that would talk to them! It was difficult to convince worried callers that our furnaces and wood stoves really could keep the inside of the house at 68 degrees above zero when it was 75 degrees below zero outdoors!

Snowfall for the 1988-89 season was average and spring break-up of the rivers proceeded normally. Freeze-up in the fall also was unremarkable though, as usual, it came before we really felt ready to cease work on the Refuge. (There is a period of a month or more each spring and fall during which we cannot land on the Refuge on either floats or skis).

One short period of 80-85 degree Fahrenheit weather occurred in late June and early July. Thunderstorm activity was far below normal with occurrences on only one day in June and one day in August. Wildfire activity was at a minimum.

The following are some of the weather highlights by month:

Month	High Temp.	Low Temp.	Average Temp.	Departure from Normal
January	32	-75	-27.6	-17.4
February	47	-46	7.8	9.5
March	36	-23	7.5	.2
April	56	3	33.5	6.8
May	69	22	43.2	-1.4
June	84	36	56.8	1.6
July	85	48	68.4	2.2
August	75	37	56.8	2.4
September	74	27	46.9	2.9
October	58	-17	25.6	8.6
November	34	-38	-4.3	-9.8
December	38	-46	1.2	10.6



Manager Feiger with cold water and Pilot Ladegard with hot water perform 'scientific experiment' at -60 degrees. Cold water does not freeze; hot water vaporizes!

D. PLANNING

2. Management Plan

We are still in the process of gathering basic data which we will use to write management plans. When sufficient data is available we will begin management planning. When sufficient staff is available, we will be able to gather the data.

E. ADMINISTRATION

1. Personnel

Irmoko Refuge Staff

PHILLIP J. FEIGER, Refuge Manager	GS-12	EOD 9/28/81	PFT
DENNIS E. PRICHARD, Assistant Refuge Manager,	GS-11	Term. 12/89	PFT
ROBERT M. SKINNER, Wildlife Biologist	GS-11	EOD 4/23/89	PFT
PAUL E. LADEGARD, Airplane Pilot	GS-12	EOD 5/31/87	PFT
SALLY JO COLLINS, Secretary	GS-5	EOD 12/22/86	PFT
JUDITH E. STEEVES, Clerk-typist	GS-3	EOD 6/13/88	INT
MARCUS R. MILLER, Small Engine Repairman	WG-8	EOD 6/18/89	INT

The Wildlife Biologist position, vacated late in 1988, was filled with a biologist from the Bureau of Indian Affairs in Montana. Dr. Robert Skinner was selected and came on board in April. He had not been here much more than a week when he was called to Kodiak to help with the Exxon Valdez oil spill (more on this in Section E.8). After the stint at the spill, Bob returned to Irmoko, taking charge of the only brood survey of the summer, preparing for the fall moose census, and the myriad other chores awaiting attention.

Authority to recruit and hire a maintenance worker from the local community was given in 1989 and Marcus Miller came on board as our first maintenance person and the Region's first local-hire wage-grade employee. Marc has many years of experience in aircraft and small engine repairs and jumped right into the mire of a backlog of much-needed repairs on outboard motors, facilities and equipment. His expertise and enthusiasm have been a boon to the station.

During two weeks in August Botanist John DeLapp returned as a volunteer to help with orientation of the new biologist. John was selected last year as botanist for the National Park Service in Florida. He was more than happy to leave the bugs and heat of the Big Cypress area to enjoy the bugs and slightly less heat of the Irmoko. He pointed out burn transects and held a non-stop botany course for Biologist Skinner and anyone else wishing to learn. Mapping procedures and resources were also much needed to understand where we stood and where the refuge intends to go in the future. A suggested method for re-stratifying duck brood plots was his final task before returning to the sunny South.

In September Assistant Refuge Manager Dennis Prichard was offered the new position of Outdoor Recreation Planner at the Arctic National Wildlife Refuge in

Fairbanks. He accepted and prepared for the move. Meanwhile another job was offered to him, this of the Refuge Manager at Santa Ana National Wildlife Refuge in Texas. This was too good to pass up, and Dennis graciously declined the Arctic offer to further his career in refuge management. His position was vacated in November. A vacancy announcement was prepared in October to fill it and before Christmas Ed Merritt, Assistant Refuge Manager at Shiawassee Refuge, accepted the position with a mid-January reporting date.

The staffing pattern for the past few years is summarized below:

Year	# Permanent Staff	# Temporaries	# Volunteers
1989	5	2	7
1988	5	1	16
1987	5	2	10
1986	5	2	8
1985	3	4	7
1984	3	3	4
1983	3	1	
1982	3	1	
1981	1		

2. Youth Programs

The Youth Conservation Corps Program was not utilized this year. This turned out for the best as the Oil Spill took all of our staff that would have served as supervisors to the crew. As it was, the shortened field season would not have served as a good work experience for either the refuge or enrollees.

4. Volunteer Program

Volunteer applications were noticeably fewer this year, but the number of people on these roles that had not obtained a paying job by the summer were even more limited. As a result, we hired only two volunteers for the summer season. Again, because of the Exxon Valdez Oil Spill, it was fortunate we did not have our usual compliment of a dozen or so. They would have been sitting in a sphagnum bog wondering what to do next.

The field season was cut drastically short, so our volunteers were assigned to work at both Kanuti and Innoko Refuges. After the single brood count was done, both volunteers were sent to Kodiak to help with oil spill chores. We told them before coming that they would have to be flexible, and were they ever surprised to find we meant it. The two girls travelled from Bettles in the foothills of the Brooks Range above the Arctic Circle, to the Kodiak Archipelago in the course of the short summer. They counted ducks, banded geese, identified dead wildlife in the morgue, conducted seabird surveys, worked visitor center desks, cared for and transported oiled otters and eagles, and ran errands. Now that's a summer experience few volunteers ever get, even in Alaska!

Five other volunteers helped during the year. Cabin maintenance and protection, boat transfer, botany lessons and article writing were a few of the chores taken on by the volunteers. A total of seven people volunteered 576 hours of their time for us in FY 1989. If a GS-5 salary were equated with this work, the volunteers provided \$4108 worth of service.

5. Funding

There is never enough. The following table showing the ebb and flow of our annual funding demonstrates the uncertainty with which we have learned to live.

<u>FY</u>	<u>O & M</u>	<u>ARMM</u>	<u>RPRP</u>	<u>TOTAL</u>
89	414,000			414,000
88	216,000	203,000	*18,000	425,000
87	265,000	170,000	12,000	447,000
86	195,000	65,000	81,000	341,000
85	233,600	86,400	65,000	385,000
84	164,000	80,000		244,000

(*non-additive)

6. Safety

The extreme cold weather in January made us all aware of safety as we worked to keep heating systems functioning. Dressing suitably for the weather was of paramount importance, and we all looked like "the abominable snowman" with heavy boots and mitts, snowsuits, warm hats and face masks. On the days when it was -60 degrees and colder, Administrative Leave was declared to avoid having personnel walking to work in the cold.



Our coat rack resembled a clothing store during the January "cold snap".

Pilot Ladegard attended the Air Force's Arctic Survival Training in February and shared with the rest of the staff some of the survival techniques he learned. You can be sure he was relieved that the Giant Omega Block had disintegrated before he headed north for the training! Since Inmoko Refuge is so isolated and accessibly primarily by air, the training provided in this course is essential for our employees.

The radio communications system has not proven reliable and is a subject of much concern to us. Use of a common frequency has created a "continuous loop" situation and renders our equipment useless. The only recourse has been to rely on the State Department of Natural Resources radio system for emergency situations, leaving no means of communication between the plane, the field and the office during non-emergency times. So long as only Inmoko Refuge's equipment was up and running it worked fine. As soon as the Koyukuk/Nowitna equipment was placed in service, the system became non-functional for us.

Probably the single most talked about safety topic this year has been "the regional bear policy". Draft policy, final policy, revised final policy...

The situation has evolved to require that we work in pairs "when in bear country". That covers the total Refuge area. Spray repellent has been purchased but ideas keep changing about its usefulness. Then a warning came out that some of the containers are leaking and instructions were provided about how to package each container to check for leaks. The policy also dictates the use of rifles when responsible for another person's safety, so now our firearms collection will have to be expanded to include rifles of a caliber suitable to stop charging bears.

7. Technical Assistance

Regional Hydrologist Steve Lyons travelled to the refuge to help set remote recording stream flow monitors on the Main and North Forks of the Inmoko River. One of the mandated purposes of the refuge is to insure water quality and quantity, and this is a way to record data for future use. The instruments read the water pressure, transfer this into a depth reading and record it at set intervals. Every fifteen minutes the reading is taken, then a daily average, highest and lowest reading and time of each is calculated to be retrieved later. A data storage pack is replaced with a new one in the spring to function for another year. Meanwhile the stored data is fed into a main computer in the Regional Office and the printed results are sent to the refuge.

Even though these pages have been set at two other refuges around the state, new problems unique to the Alaskan Interior confronted the hydrologist. Steep, high banks and water fluctuations of more than 30 feet were not anticipated. Eroding banks also pose a threat in the not-too-distant future as the cable transferring electrical impulses may become exposed to tearing teeth of beavers or ice flows. This necessitates the refuge staff to check the remote sites in the fall before freezeup to bury any exposed cable, and again in late winter before breakup to retrieve the units to avoid flooding. Another problem may arise when the temperature drops to -50 degrees or below. The unit shuts down at this temperature and must be reset to again record data. This may be eliminated if the unit is covered with snow insulating it from the severe cold.

In order to calibrate the readings with true depth, manual streamflow measurements will have to be done at least ten times on each stream profile. Once this is done we will be able to record cubic feet per second for the areas. Until then we have raw data that can be converted later. This portion of the project will require many man hours to complete as we plan on having at least four stations recording flows around the refuge.

8. Other:

Just after midnight on March 24, the oil tanker Exxon Valdez ran aground in Prince William Sound causing the largest oil spill in this nation's history. The resulting slick impacted beaches in four National Wildlife Refuges, three National Parks and one National Forest. A call for help went out from the Regional Office in April, and our staff unanimously volunteered for any jobs needed. Assistant Refuge Manager Prichard and Biologist Skinner were the first to be assigned. On May 5 they were in Kodiak learning the delicate techniques of identifying dead sea life from mounds of oily goo. When thoroughly trained (three days), Biologist Skinner was set afloat on a travelling morgue boat to circumnavigate the Kodiak Archipelago and cruise the Shelikof Straits along the Alaska Peninsula coast. He returned to McGrath in late June to meet his wife and children just moving to Alaska from their previous home in Montana.

Assistant Refuge Manager Prichard learned the bird morgue duties as well, so well in fact that he taught others to identify the animals so he could take over other tasks. He was assigned to a boat crew picking up birds from the beaches, but soon became the monitor for a cleanup crew along the western Kodiak coast. After this stint he returned to Kodiak Refuge headquarters to help in the morgue and fly with S.C.A.T. teams (Shoreline Cleanup Assessment Teams) to shorelines on both sides of the Shelikof Straits to determine the impact of the oil. In the last month of his service, Prichard was designated as the Assistant Oil Spill Coordinator to Jay Bellinger. This entailed tracking the daily efforts of 18 boats gathering sick and dead wildlife, insuring the speedy transferal of these animals to proper care facilities, acting as liaison to the many agencies involved, reporting to committees and the public on U.S. Fish and Wildlife Service involvement, and keeping a steady flow of Service personnel moving to and from the work sites. After three months he returned to McGrath. The field season at Innoko was over and only cleanup duties remained.

Secretary Sally Jo Collins was detailed to the Homer office of the Alaska Maritime Refuge to assist with paperwork generated by the Oil Spill. Sally arrived to find heaps of unprocessed oil-related purchase documents and other administrative paperwork towering on a desk. She jumped right in and had most of it on its way for processing when her month term ended. A natural spin-off from her duties had her training the staff in Homer in the use of the Lotus 123 financial tracking system and customizing it to fit their needs.

This task was continued by our Clerk-typist, Judith Steeves, when she replaced Secretary Collins at Homer for another two weeks. By the time Judy left, the office was well-versed in the financial tracking program and out from under the Oil Spill paperwork backlog.

Assistant Refuge Manager Prichard, Secretary Collins and Clerk-typist Steeves all received Special Achievement Awards for their efforts in assisting other locations during the oil spill crisis.



Refuge Manager Feiger presents much deserved recognition (and a check) to Secretary Collins for Oil Spill detail.

Pilot Ladegard attempted to fly Kodiak's aircraft to Kodiak to assist in aerial surveys during the oil spill, but bad weather prevented him from getting any farther than Homer. After a few days he returned to McGrath.

Refuge Manager Feiger was the last Refuge employee to be touched by oil. He was assigned for two weeks as cleanup monitor in the Pys Islands of the Alaska Maritime Refuge. It was not amusing to hear the same stories of the cleanup effort from him as the rest of the crew had experienced months previous. Our general consensus of the whole affair was exactly the same - what a waste!

Meetings attended and training attained during 1989 include:

February	Ladegard to Arctic Survival Training, Fairbanks, AK.
March	Prichard to Law Enforcement Refresher, Marana, Az. Prichard to Fire Effects Workshop, Fairbanks, AK.
April	Collins to Secretary's Workshop, Anchorage, AK.
May	Feiger and Prichard to Waterfowl Workshop, Fairbanks, AK. Feiger to Project Leaders Meeting, Anchorage, AK. Prichard to Hunter Education Instructor's Course, Anchorage, AK.
June	Feiger to Performance Management Workshop, Anchorage, AK.
July	Collins to Imprest Workshop, Anchorage, AK.
August	Prichard to Firearms Qualification, Fairbanks, AK.
October	Prichard, Collins and Steeves to MS-DOS class, McGrath, AK. Skinner to Furbearers Workshop, Fairbanks, AK. Feiger to Interior Regional Council and Advisory Game Boards Meeting, Fairbanks, AK. Miller completes Emergency Medical Technician I class

F. HABITAT MANAGEMENT

1. General

Management of the various habitat types found on Innoko Refuge is not yet an active, hands-on affair. Rather, it is in its initial stage of compiling data and correlating the information available to direct the future course of work. As outlined in the legislation creating it, the refuge shall be managed to conserve fish and wildlife populations and their habitats, and in the same manner, the quantity and quality of the water within the refuge.

Since we are wildlife-oriented professionals, we tend to focus our attention on the species of highest concern first. Innoko Refuge has been fortunate in being able to look first to the habitat and its relation to the particular animal before examining the specifics of an animal's ecology. To this end we have produced an excellent set of maps to help us in determining the habitats on the refuge. These maps include color-infrared and Landsat mapping techniques to cover the entire refuge. Extensive effort by seasonal Botanist John DeLapp and

volunteer assistants over the past years has ground-truthed these and enabled us to identify vegetation types on any given segment of the refuge.

We are now entering into the next phase of habitat management, that of specific data gathering on the animals in order of priority. With this vegetation information to work from, we can begin to correlate the animals' preferences to their necessary habitat components.

2. Wetlands

Duck Brood Plots

Botanist John DeLapp returned to lend his expertise in the area of plotting new survey sites for the duck brood counts. Biologist Skinner and DeLapp used the extensive mapping data on hand to request the Region 7 Information Resources Management division to stratify the refuge according to habitat types. This will be a big help in establishing new randomly-selected plots for use in the future.

3. Fire Management

A comparison of the past few years shows fire history:

<u>Year</u>	<u># of Acres Burned</u>	<u># of Fires</u>
1989	0	0
1988	81,993	5
1987	2	1
1986	15,083	7
1985	28,573	11
1984	52,975	15
1983	50,530	unknown

12. Wilderness and Special Areas

As 1989 marked the 25th anniversary of the Wilderness Act, requests for information and slides were honored.

Assistant Manager Prichard responded to a questionnaire from Professor Stephen McCool of the University of Montana in April. Mainly general in nature, the questions did focus on the problems we perceived in managing wilderness and the future outlook. Professor McCool gave a presentation at a conference entitled "Managing America's Enduring Wilderness Resource" held in Minneapolis in September.

G. WILDLIFE

1. Wildlife Diversity

The diversity of Inmoko Refuge typifies the transition between taiga (sparsely covered, low growing conifers) and tundra (a treeless mat of lichens and low bushes). Waterways bring in deciduous willow, birch, aspen and larch while gently rolling hills of the Kaiyuh Range add their complement of upland species. The mammal species of some importance are represented by wolves, black and grizzly bears, moose, marten, wolverine, caribou, lynx, fox, red squirrels, beaver and snowshoe hares. Over 130 species of birds have been recorded on the refuge. Fish include salmon, grayling, sheefish, whitefish and northern pike.

2. Endangered and/or Threatened Species

A peregrine falcon was sighted by Assistant Manager Prichard along the Inmoko River upstream from the field cabin in early September. The single adult was circling above a Harlan's hawk nest.

3. Waterfowl

Breeding Pair Survey

Personnel from Waterfowl Investigations in Juneau flew the annual spring breeding pair survey on May 31 in the Inmoko area. Some dramatic changes were illustrated by this survey. The pintail count was down 38% from 1988 figures, 26% below the ten-year average. Another red flag went up when scaup dropped 43% over last year's count. These changes were contradicted somewhat by the increases in shovelers (up 14%), green-winged teal (back to average after last year's slump), and a giant jump in canvasbacks (up over 450% from average). Explanations escape us as "change" could be our middle name.

Table 1 shows the comparison of pair counts from the last few years.

Table 1.

WATERFOWL BREEDING PAIR SURVEYS 1980 - 1989

STRATUM 5-INWICKO NWR (estimates x 1000)

Species	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Average
Mallard	12.2	10.3	6.4	8.3	24.7	13.2	14.9	7.4	8.3	13.7	11.94
Widgeon	74.3	40.5	21.7	50.9	45.1	18.4	60.9	20.7	20	24.2	37.67
G.W. Teal	16.2	20.6	7.4	23.6	10.3	14.7	51.5	24.3	11.8	20.6	20.1
Shoveler	29.1	40.9	13.6	20.8	10.1	5.9	33.1	8.2	33.2	38	23.89
Pintail	133.5	127.9	63.5	67.7	126.3	71.9	100.6	53.5	100.3	62.9	89.41
Redhead	0	0	0	0	0	0	0	0	1.7	0	0.17
Canvasback	1.5	3	0.8	1.9	2.2	0	1.9	0	4.9	13.7	2.99
Scaup	34.1	14.3	12.7	30.5	23.1	3.5	10.9	2.3	20.6	8.9	18.09
Ring-neck	0	0	0	0	0.6	0.6	0	0	1.5	0	0.27
Goldeneye	0.5	1.7	3.4	13.6	16.2	10.2	0.5	0	10.2	14.5	8.68
Bufflehead	2.9	2.9	0	2.5	2.5	0	1.3	0	2.9	0.4	1.54
Oldsquaw	3	5	1	2	1	2	0	0.3	0	0	2.23
Scoter	7	6	9.9	11.3	4.2	2.9	6.2	10.5	4.8	6	6.06
Merganser	0.3	0	0.3	0	0.1	0.3	0.9	0	1.5	0.3	0.67
TOTAL	322.6	273.1	146.7	233.1	255.4	149.6	304.7	135.2	221.7	203.2	224.53

Duck Brood Surveys

Background

Brood surveys were conducted for the seventh year on the refuge following standard techniques. These techniques were established by refuge personnel in 1983 for the Imvoko area, and as such, are slightly different than many other surveys performed on other Alaskan refuges. The Imvoko survey has fifty randomly-selected one-mile-square sample units (plots) scattered over the 3.8 million acres encompassing the refuge. Plots selected had to conform with some rules for logistics as well as habitat. For instance, the plot had to be accessible by float plane or boat to facilitate getting there. If the plot chosen was more than a mile from such an access point, it was withdrawn and a new plot selected. Thus the technique is not strictly random in its sampling.

Methods

Thirty-four plots was deemed to be a reasonable number for estimating the population since this is one percent of the total land area. Fifty plots were chosen to provide additional statistical support as well as contingency in case some of the original thirty-four could not be counted. The usual method of counting duck broods is to follow an aerial photo of the one-square-mile plot which has lakes and waterbodies numbered. One person walks around one side of the waterbody while another person walks around the other, staying as close to the edge as possible. When broods are flushed to open water, identification is made, numbers of young recorded and ages estimated according to those parameters set forth by Gollop and Marshall, 1954. Data is recorded for that particular lake so that the number of broods per waterbody may be tabulated later. All waterbodies are counted in this manner, and those leading off the plot are counted in the same way. Data reflects those broods seen off the one-square-mile plot to distinguish between broods-per-waterbody and broods-per-square mile.

In 1989, 11 plots were surveyed in the single count (July 4 - July 9). In addition, two drawdown lakes (those lakes that flood each spring and are regenerated with new nutrients then drop in water level as the rivers recede) were also surveyed. These are the most productive lakes on the refuge.

With information from previous years, we have determined which plots are our best producers (high strata), which are fair duck producers (medium strata), and which are low. River-connected lakes which get flooded almost every year tend to be in the high category. Muskeg bog ponds are the lowest producers. Thus we have been able to map out the areas on the refuge that fall into each strata. This year's survey sampled high and medium strata and, knowing the extent of each habitat, a population estimate was derived. The number of broods of a certain species in a particular strata are multiplied by the acreage of that strata to get the estimate. Since no low-strata plots were sampled this year, an average of one brood per square mile was figured into the data. This seems to be a conservative estimate, yet one that should not be totally ignored just because no plots were sampled in that strata.

After consultation with Biostatistician Lyman McDonald, the refuges in Alaska decided to try stratification and counting techniques for 1989. The Imvoko Refuge was to ease into the transition by sampling from previously selected plots, but the lack of personnel due to the oil spill necessitated a change of sampling high and medium strata only. Next year a whole new stratification

regime will include the drawdown lakes adding to the credibility of our counts.

Results and Discussion

A look at the last few years will show how the refuge compared in 1989 (Tables 2-5). Caution should be advised in comparing years of data in this manner. It is painfully obvious that each year is completely different than the past. For example, the 1983 count was the first, and only one week was surveyed. In 1984 more broods were sampled, but the sample units were different than those used today. The flood of 1985 showed how the three strata can change drastically as those river-connected lakes remained a part of the river throughout the breeding season negating most waterfowl production. The first count of 1986 was scheduled too early to hit the peak of hatching, thus only the second count was used to estimate population. In 1987 an impressive 49 plots were surveyed, but even the help of a helicopter assured us that success was not as easy as hovering over a pond. Broods could not be distinguished as they dove into the brush or underwater all as one group. In 1988, 198 broods were seen on 262 waterbodies of 30 plots. In addition, two drawdown lakes yielded 62 additional broods.

As explained earlier, only one brood count was performed in 1989 covering 11 plots and 39 waterbodies. This small sample size illustrates the ever-changing nature of brood-counting inherent to Innoko Refuge. Again, caution should be taken in drawing conclusions to the data.

Pintails were, by far, the largest percentage of broods - 51.85% (Table 2). This figure does not include those found on drawdown lakes. This species is becoming ever more important as a comparison of past years will illustrate. Pintail broods averaged 5.1 ducklings per brood closely followed by green-winged teal at 4.6, and wigeon at 5.5. The largest broods were found with Northern Shovelers (8.3/brood!). Mallards came out lowest with an even 4.

It is difficult to compare hatch dates with other years due to the fact that only one brood count was conducted. As the graphs in Figures 1-6 show, peak hatching dates for most ducks fell in the 26th Julian week as compared with the 27th week in 1988. Although there was some flooding of the Yukon River during break-up, rivers and ponds on the refuge seem to have been effected little.

If a population estimate is required, comparative figures for the last four years is available in Tables 2-5. Again, we caution the reader as to the accuracy of such a comparison, especially as it relates to an estimate. Still, this is a useful tool for management having been calculated using the same method for each year's data.

Goose Production

Little concerted effort is placed upon evaluating the goose production on Innoko Refuge. This year saw even less efforts towards this end. With staff gone on oil spill duties, other biologists were recruited for our waterfowl brood count and incidental goose banding. This is the usual time to determine the relative amount of goose production. Most effort was concentrated on the duck brood count so time ran out for the personnel to get any idea of how good or bad the production was.

Table 2.

Average brood size for each species on Inmoko National Wildlife Refuge, 1989.

SPECIES	NO. OF BROODS	PERCENT OF TOTAL	TOTAL DUCKLINGS	AVERAGE # OF DUCKS/BROOD
PINTAIL	28	51.85185	143	5.107142
WIDGEON	16	29.62962	83	5.1875
G.W. TEAL	3	5.555555	14	4.666666
SCUP	0	0	0	ERR
N. SHOVELER	3	5.555555	25	8.333333
MALLARD	4	7.407407	16	4
SCOTER	0	0	0	ERR
TOTAL	50	100	287	5.74

Only broods of known size were used to compute averages.

STRATA	So. Miles	X	Broods/So. Mile	Broods Extended
HIGH	165		7.8	1287
MEDIUM	448		2.666	1173.28
LOW	2300		1.5	3450
TOTAL	2913			5910.28

Broods Extended	X	Average Brood Size	=	No. of Ducklings
5910.28		5.74		33905.61

+ 11828.88 successful adults (2 X no. of broods extended)

43238.84 successful breeding population

+ 4728.832 unsuccessful breeders (10% of suc. adults)

47967.67 TOTAL DUCKS ON REFUGE IN 1989

Approximately 48,000

Table 3.

Average brood size for each species on Innoko National Wildlife Refuge, 1968.
First and second brood counts were combined for the averages.

SPECIES	NO. OF BROODS	PERCENT OF TOTAL	TOTAL DUCKLINGS	AVERAGE # OF DUCKS/BROOD
PINTAIL	49	31.2	226	4.244881
WIDGEON	38	24.9	154	4.052631
G.W. TEAL	26	16.6	140	5.384615
SCAUP	17	10.8	101	5.941176
N. SHOVELER	17	10.8	70	4.117647
MALLARD	6	3.8	21	3.5
UNITD. DUCK	3	1.9	7	2.333333
TOTAL	156	100	699	4.488769

*Only broods of known size were used to compute averages.

STRATA	Sq. Miles	X	Broods/Sq. Mile	Broods Extended
HIGH	165		10	1650
MEDIUM	440		5.8	2552
LOW	2300		1	2300
TOTAL	2905			6502

Broods Extended	X	Average Brood Size	=	No. of Ducklings
6502		4.488769		29133.96

+ 13204 successful adults (2 X no. of broods extended)

42137.96 successful breeding population

+ 5221.6 unsuccessful breeders (40% of suc. adults)

47359.56 TOTAL DUCKS ON REFUGE IN 1968
Approximately 47,500

Table 4.

Average brood size for each species on Innoko National Wildlife Refuge, 1987.
First and second brood counts were combined for the averages.

SPECIES	NO. OF BROODS	PERCENT OF TOTAL	TOTAL DUCKLINGS	AVERAGE # OF DUCKS/BROOD
PINTAIL	82	29.3	334	4.04878
WIDGEON	67	23.5	295	4.402985
G.W. TEAL	59	21	222	3.762711
SCUP	25	7.2	148	5.6
N. SHOVELER	16	8.5	88	5
MALLARD	13	7.7	66	5.076923
SCOTER	5	1.3	31	6.2
UNIDENT.	18	8.9	69	3.833333

TOTAL	285	100	1237	4.550877
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Only broods of known size were used to compute averages.

STRATA	Sq. Miles	X	Broods/Sq. Mile	Broods Extended
HIGH	165		13.25	2186.25
MEDIUM	448		4.18	1833.2
LOW	2300		2.3	5290

TOTAL	2905			9315.45
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Broods Extended	X	Average Brood Size	=	No. of Ducklings
9315.45		4.550877		42333.46

+ 18638.9 successful adults (2 X no. of broods extended)

61824.36 successful breeding population

+ 7452.36 unsuccessful breeders (40% of suc. adults)

69476.72 TOTAL DUCKS ON REFUGE IN 1987

Approximately 68,500

Table 5.

Average brood size for each species on Inmoko National Wildlife Refuge, 1986.
First and second brood counts were combined for the averages.

SPECIES	NO. OF BROODS	PERCENT OF TOTAL	TOTAL DUCKLINGS	AVERAGE # OF DUCKS/BROOD
PINTAIL	68	25	232	3.411764
WIDGEON	58	21	220	3.793183
G.W. TEAL	53	22	157	2.961816
SCALP	23	11	170	5.862668
N. SHOVELER	35	13	88	2.514285
MALLARD	16	6	43	2.6875
SCOTER	4	2	15	3.75

TOTAL	263	100	925	3.438661
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Only broods of known size were used to compute averages.

STRATA	Sq. Miles	X	Broods/Sq. Mile	Broods Extended
HIGH	165		16.5	2722.5
MEDIUM	440		5.42	2384.8
LOW	2300		1.25	2875

TOTAL	2905			7982.3
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Broods Extended	X	Average Brood Size	=	No. of Ducklings
7982.3		3.438661		27448.42

+ 15364.6 successful adults (2 X no. of broods extended)

43413.82 successful breeding population

+ 6385.84 unsuccessful breeders (40% of suc. adults)

49799.66 TOTAL DUCKS ON REFUGE IN 1986

Approximately 50,000

Figure 1.

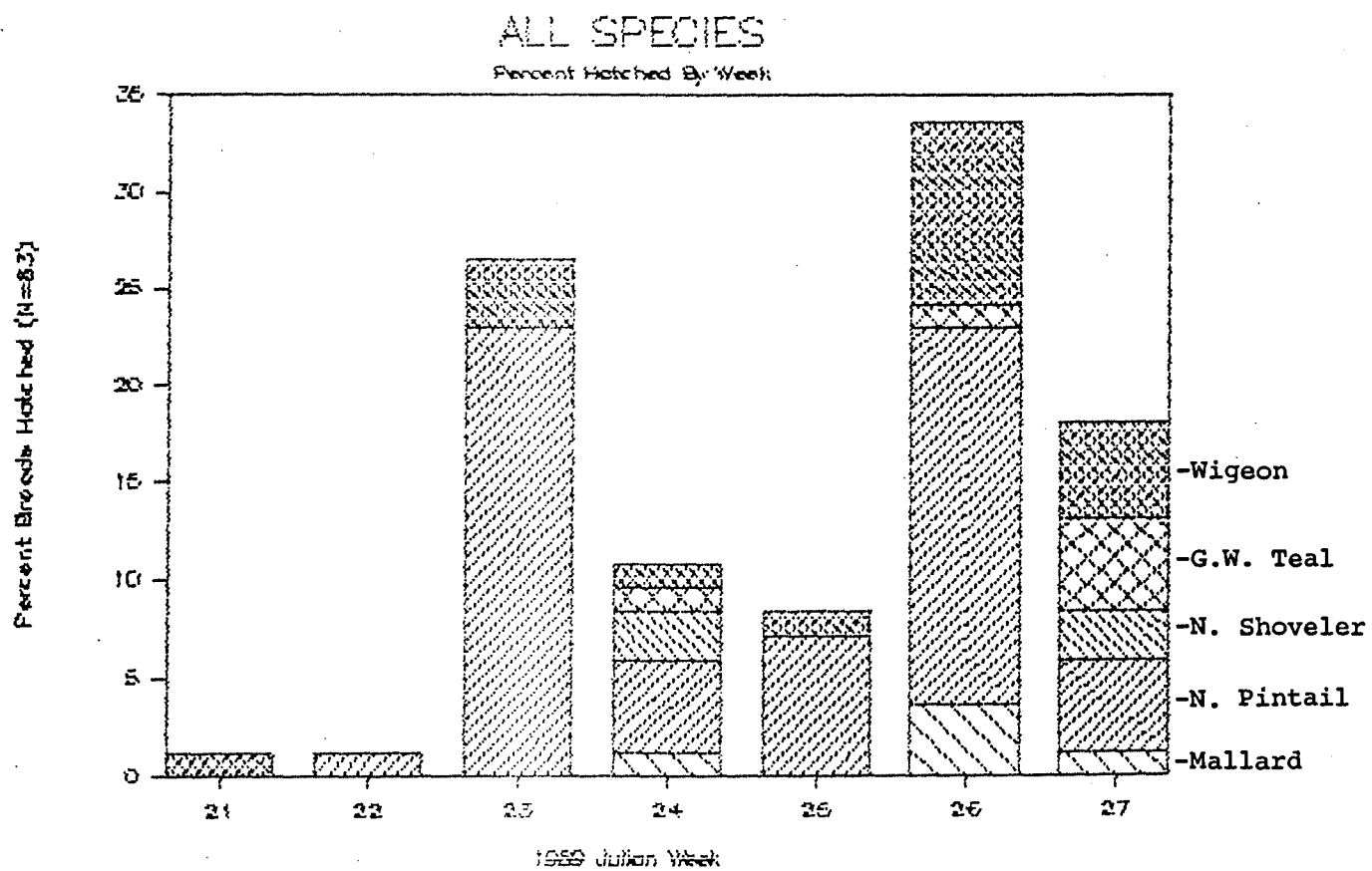


Figure 2.

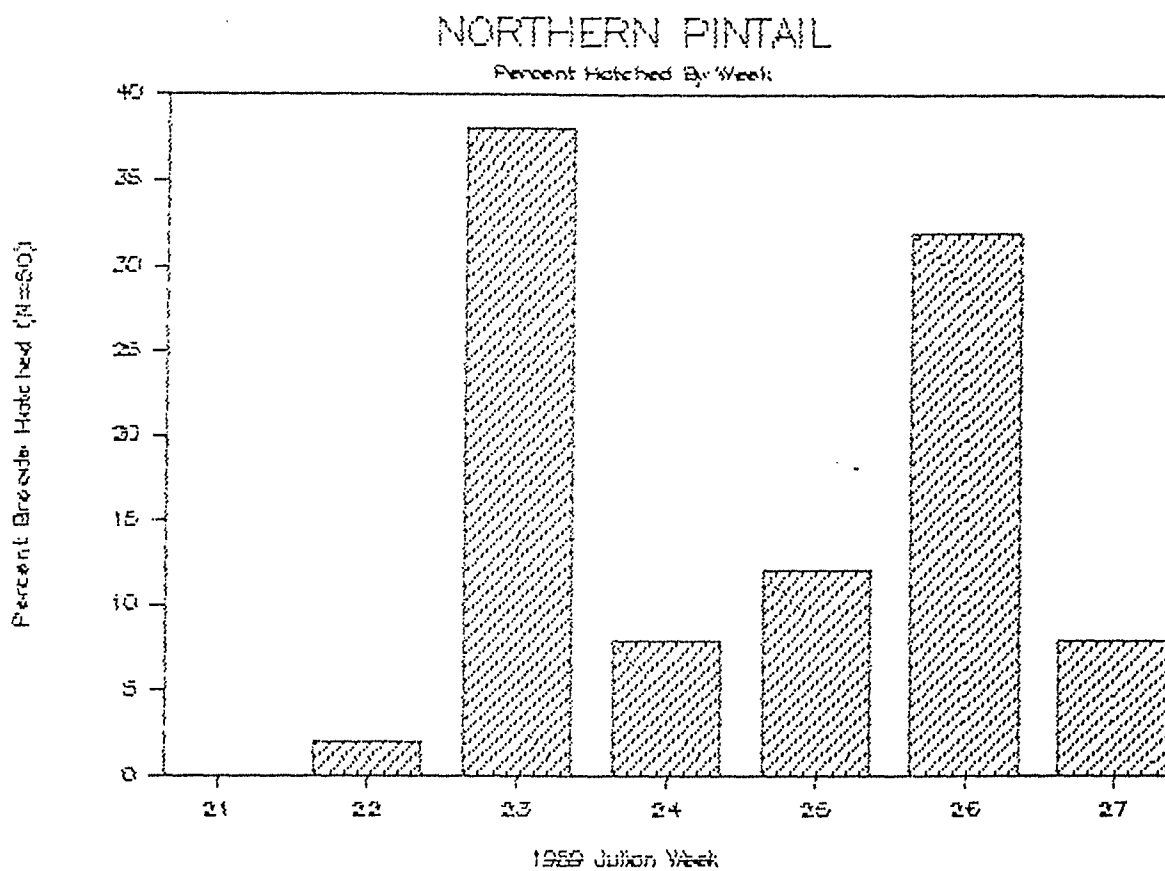


Figure 3.

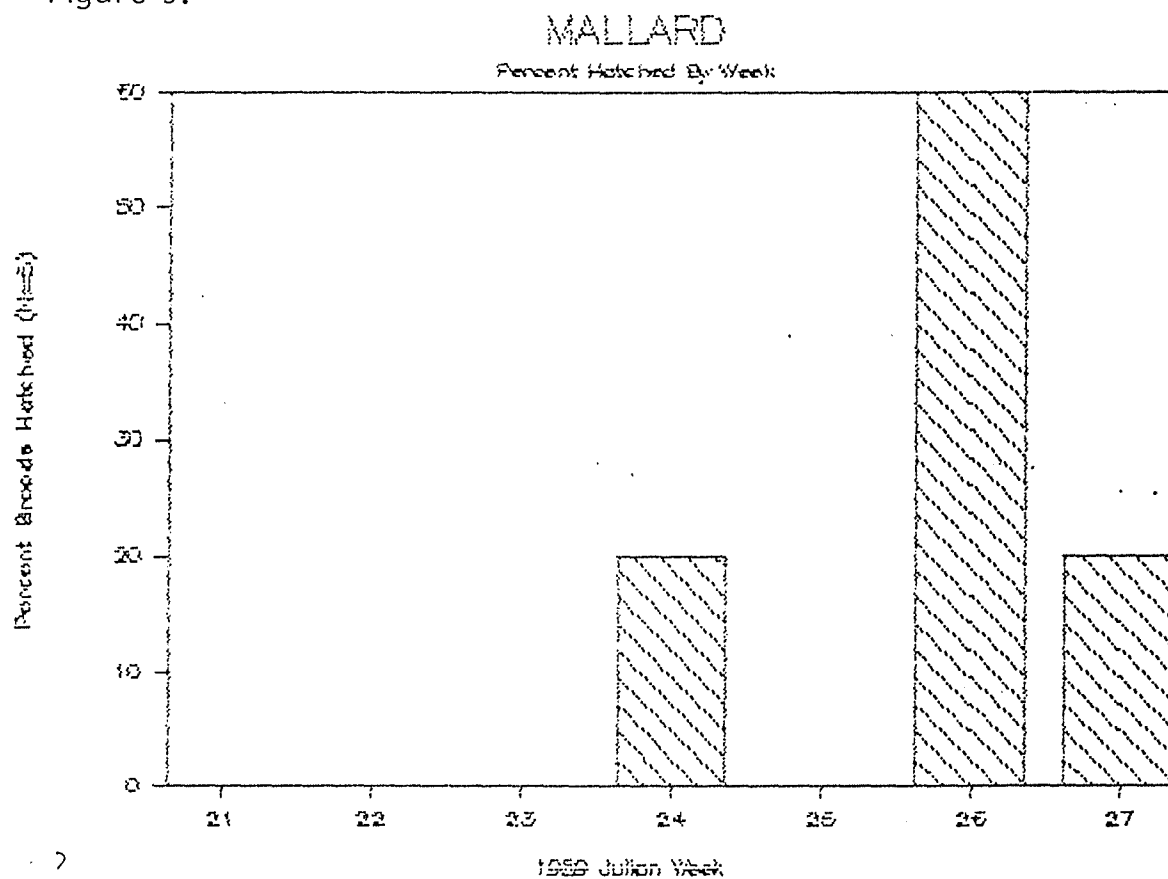


Figure 4.

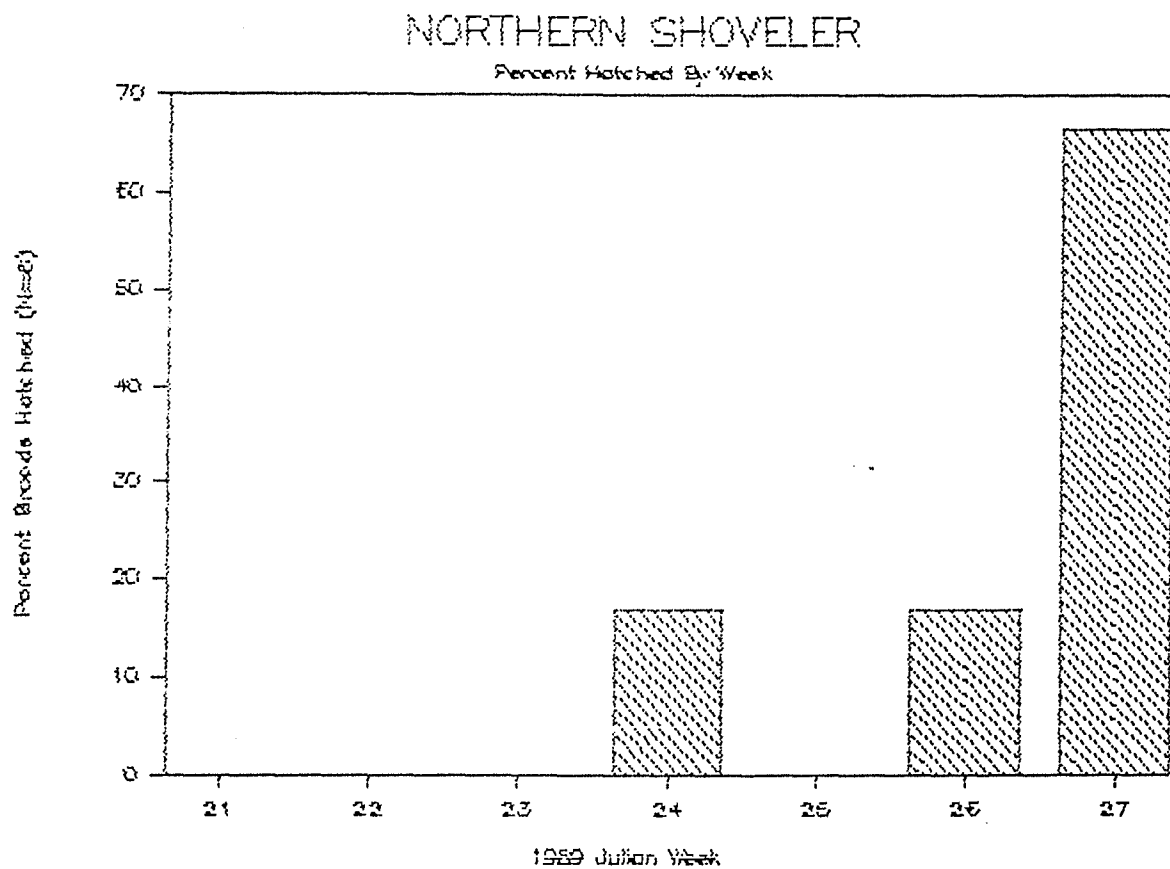


Figure 5.

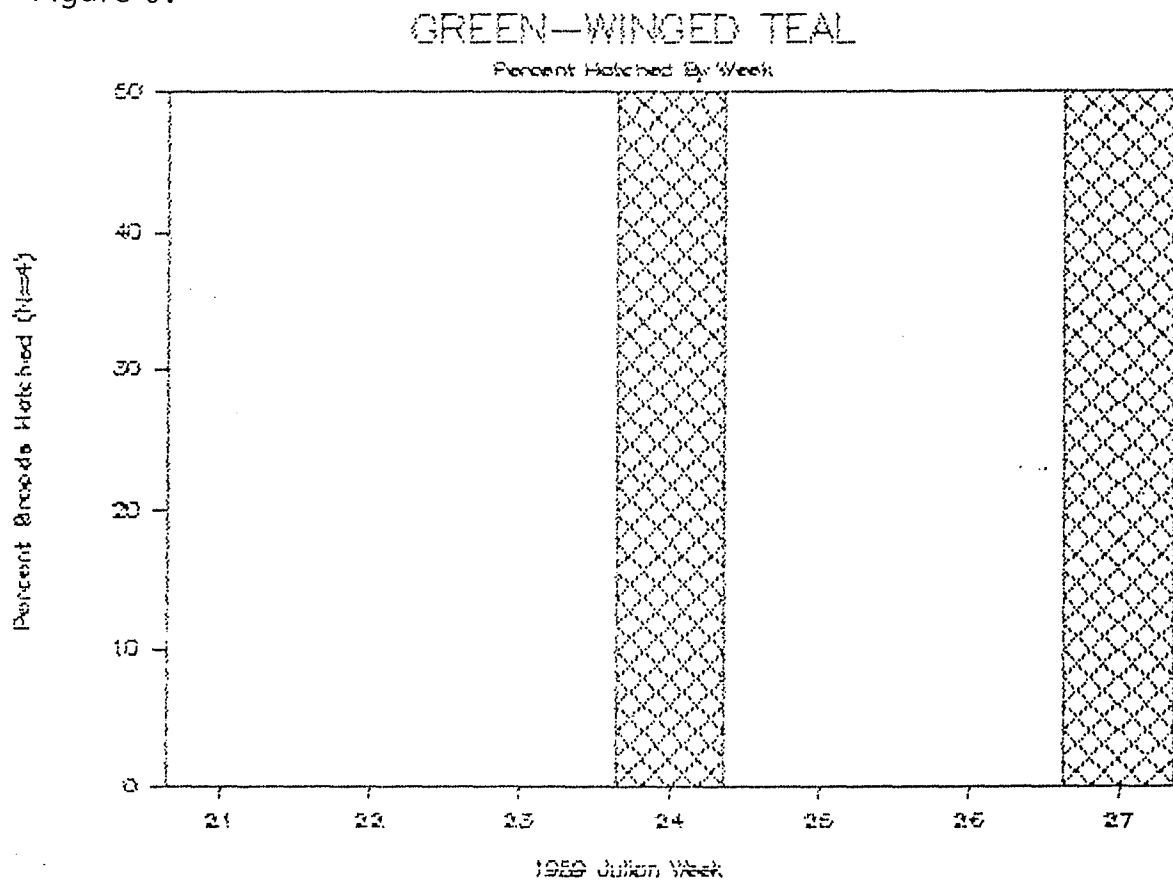
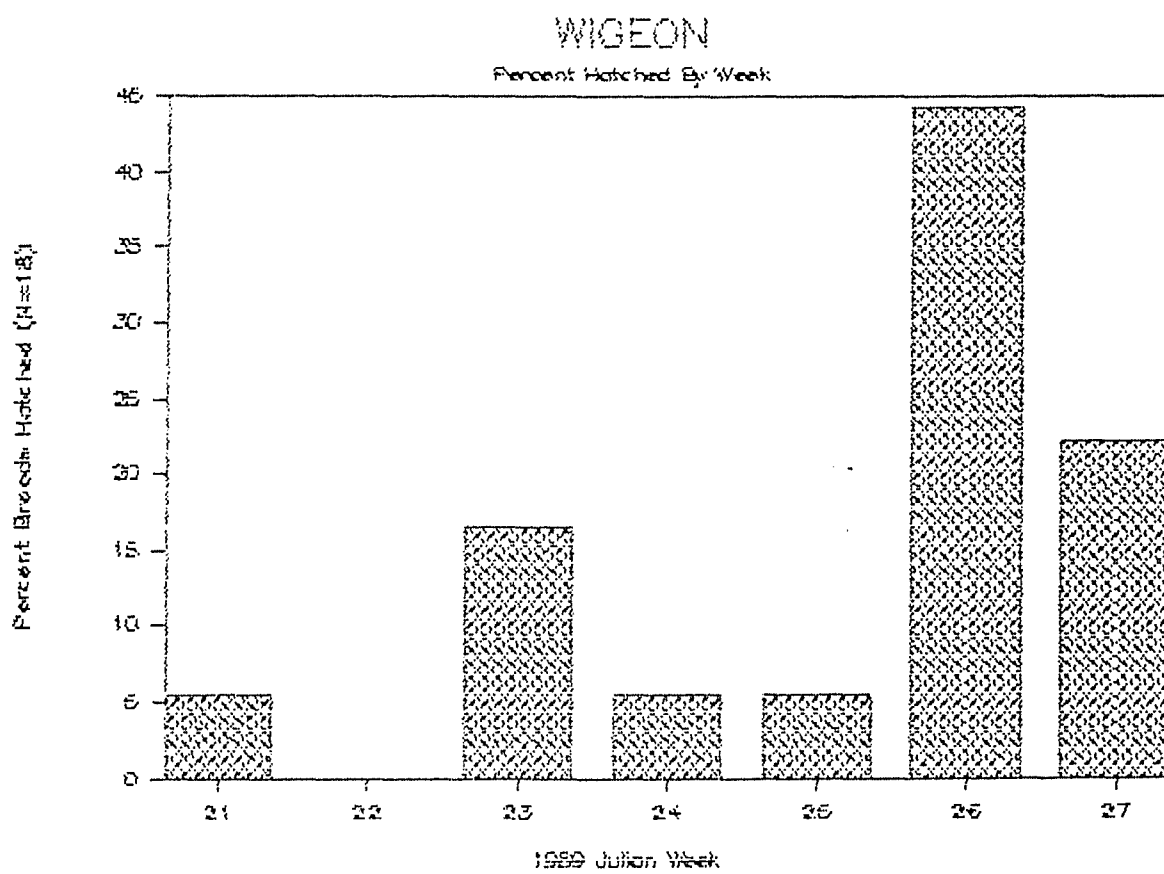


Figure 6.



5. Shorebirds, Gulls, Terns and Allied Species

With the field season cut short, time was spent concentrating more on waterfowl than shorebirds. The regular complement was seen, but no additional effort was made to locate rare species.

6. Raptors

Most abundant raptor species found on the refuge include Harlan's hawks, ospreys, Cooper's hawks, goshawks, and a whole host of owl species including short-eared, great horned, great gray and boreal.

On April 14, Pilot Ladegard spotted a pair of bald eagles on their nest along the Innoko River. There are three nest structures in the immediate area so we assume that eagles have been in the same spot for a number of years.

8. Game Mammals

1989 Moose Population Survey

The purposes of the moose population survey are to determine the size of the moose population, sex and age composition, distribution and in future years the rate of change of the population. This information will be used to manage the moose population by evaluating the effects of hunting seasons, fires, unusual weather and predators.

The most important public use of the Innoko National Wildlife Refuge is moose hunting. The information gained from this survey will be used to maintain or improve moose populations and hunting opportunity.

The procedures follow the publication "Estimating Moose Population Parameters from Aerial Surveys" by William C. Gasaway, Stephen D. DuBois, Daniel J. Reed, and Samuel J. Harbo, published in the Institute of Arctic Biology in December 1986.

The survey area is the Innoko National Wildlife Refuge. The Refuge is divided into northern and southern survey units. Each unit is divided into east and west sub-units.

The entire northern unit (2,740 square miles) was to be surveyed but due to long periods of bad flying weather, only the eastern subunit (1,063 square miles) was completed.

The eastern subunit encompasses portions of the Innoko, Dishna, and Mud River drainages. In this eastern subunit, there is a project of tracking 36 radio-collared moose by refuge personnel. Upon completion of the radio-collared moose study, the data will be compared with the moose population survey.

The eastern subunit has 85 sample units. Boundaries of sample units are lakes, creeks, ridges and straight lines between identifiable points. Sample units are drawn that have uniform moose distribution with boundaries that avoid habitat where moose are likely to concentrate.

A stratified sampling design method was employed by assigning each sample unit a

population density of high, medium, or low. The stratification was conducted with a Cessna 185 aircraft and a crew consisting of a pilot, navigator, and two observers.

Randomly selected sample units were surveyed at the recommended 4-6 minutes per square mile at 300-500 feet above the ground, using Super Cubs. Intensive searches of 10-12 minutes per square mile were conducted on randomly selected two square mile portions of these sample units to determine the sightability of moose.

The total moose population is estimated to be 1065 moose, or approximately one moose per square mile (Table 6). The confidence interval of the 90% level is + and - 30.44% or from 741 to 1390 moose. Twenty sample units, or 257.4 square miles) were sampled to obtain this level of confidence. The sightability correction factor was 1.15115.

Table 6. Estimated Population Size

Strata	Low	Medium	High	Total
# sample units	21	51	13	85
Area (square miles)	272	622	169	1063
Area surveyed	27.3	180	50.1	257.4
# moose seen	4	119	141	264
Density	0.1686	0.7610	3.2397	1.0021
Population size	45.9	473.6	545.5	1065.1

THE 1983 INNOKO REFUGE MOOSE CENSUS RELIVED



Our "home-away-from-home" during the moose census. The log cabin and two weatherports provided warm, comfortable housing for a crew of fifteen. While it was -20 degrees outside, the weatherport sleeping tents, with small oil heaters, were +70 degrees inside.





First you make
the map...

Then you color it.

Above: State Fish and Game
Biologist Jack Whitman, and
Imnoka Refuge Biologist
Skimmer prepare the census
area maps.

Right: Biologist Skimmer
color codes maps for
each survey team.





Above: The Imnoko Air Force - five Super-Cubs and a Cessna 185 - waiting for the right weather to take to the sky.

Below: Patsy Martin, Assistant Refuge Manager-Kanuti NWR; Biologist Skinner; and Mark Bertram, Biologist-Koyukuk/Noemina NWR plot the day's gathering of information.





George Constantino, Refuges and Wildlife Associate Manager from the Regional Office, melts snow to keep the water containers full.



Assistant Refuge
Manager Martin and
Secretary
Collins get
thanked for
the pizza.....

while all Pilot George
Walters (Yukon Delta NWR)
and Refuge Manager
Feiger get is K.P.!



9. Marine Mammals

Being in interior Alaska, the Imvoko Refuge rarely gets the opportunity to report on this topic. However, with most of our time and staff dedicated to the Exxon Valdez oil spill, we would be remiss if we did not mention our work with sea otters, sea lions, seals, and whales during our respective stints on the coast. Prichard and Skinner personally handled hundreds of dead and sick seals, sea lions and sea otters. Dall's porpoises and minke and gray whales were found dead around the Kodiak Archipelago. The numbers of animals and varying degree of decomposition made work in such a beautiful area bittersweet to say the least.

10. Other Resident Wildlife

Black bears tend to be numerous on the refuge, grizzlies not so. One black bear, as reported in the marking and banding section of this report, was trying to obtain an easy meal at the goose capture net. Other sightings were made during the year, many of which were right around our field cabin. This alerted us to the fact that stronger measures may need to be taken to prevent any accidents. The bear in question was given ample warning by shooting over his head, and a couple of times with plastic bullets. Each time the bear retreated quickly to his own habitat. Even so, we were prepared to protect property around the cabin area if it required. Luckily for the bear, he never showed up again, at least within shotgun range. Maybe the lessons will continue next year, but he has had ample warning.

11. Fisheries Resources

Jeff Adams and a crew from the Fisheries Division in King Salmon spent a few days in the upper Kuskokwim River area taking fish samples. They were housed at the State Department of Natural Resources base through our cooperative agreement with the Department. Unfortunately, the visit by Fisheries staff was too late to net enough king salmon to do their studies. They planned to make another trip in the fall when the silvers run, but never returned. This was probably a good thing as the date they proposed would have been too late for that run as well.

16. Marking and Banding

Since its beginning in 1985, Imvoko's waterfowl banding program has changed little. The concentration is on geese, mostly white-fronted, with drives being the preferred method. It was noted in previous reports that the Imvoko geese are more difficult to drive than those on the Yukon-Kuskokwim Delta, and this was true this year albeit for a different reason. The drives performed are of the run-and-net method we used in the past. But time only permitted a few short drives. One drive was thwarted by a black bear waiting at the net for us to bring him his dinner. This did not set well with the crew's psyche. As a result, only ten white-fronted geese were banded, the total of all our waterfowl banding for 1989.

From last year's exhaustive efforts when over 1000 birds were banded, 26 bands were returned to the bird banding laboratory. All were shot by hunters except one which succumbed to avian cholera (along with 7300 other feathered friends) on the Attwater Prairie Chicken Refuge in Texas. Of the states generating band returns, Texas had the most with eight white-fronts; Saskatchewan and Alberta

each had five; Mexican states had four; Alaska and California each had one; and Washington and Oregon each sent back reports of one small Canada goose. From these and previous returns, we know that birds from the Innoko utilize both the Central and Pacific flyways.

No attempt was made this year to band any ducks.

H. PUBLIC USE

1. General

With the refuge so isolated from all major population centers, and most minor ones as well, public use on Innoko Refuge is very low. The major use continues to be moose hunting during September, although this is beginning to wane somewhat. One activity that is on the increase is sport fishing. Almost all other public use is non-existent. When you calculate the cost of air fare to McGrath, plus air taxi fees to the refuge and back (if you can find a floatplane for hire), and equipment costs for having a "good time" in the swarms of mosquitoes, you come to realize why most people do not use the refuge. Couple this with maneuvering across the land by any means available and you get the picture.

2. Outdoor Classrooms - Students

In February, Pilot Ladegard and Assistant Manager Prichard helped several McGrath students with Science Fair projects dealing with aerodynamics, fish, plants, predators and wildlife population surveys. This range and scope of topics showed much prior thought on the students' parts.

Two classes of preschoolers were introduced to the concept of food chains by Prichard during April. In September he helped the fifth and sixth grades set up and investigate a Forest Learning Trail behind the McGrath School. Two days of activities focused on the five senses, while the concept of carrying capacity was presented with the aid of a Project WILD activity, "How Many Bears Can Live In The Forest".

In October, Prichard expounded on bats with the McGrath first grade class. This program was a repeat from last year and was just as well accepted and attended.

3. Outdoor Classrooms - Teachers

National Wildlife Week and Alaska Wildlife Week teaching packets were distributed to Iditarod Area Schools during February and March. It would have been very rewarding for refuge personnel to travel to the villages during these weeks but other activities were already scheduled.

7. Other Interpretive Programs

Secretary Collins presented an afternoon program to the Iditarod Historic Trail Committee as it met in McGrath October 24 and 25. Local history is Sally's forte and her subject for the committee reflected her vast knowledge of the area and events surrounding the Iditarod trail and gold rush. She included photos of old townsites, early maps, and a newspaper of 1908 vintage printed in a town that

existed a scant three months. Access to Bureau of Land Management history files and other resources were offered to Sally by some of the committee members. This should help her expand our historic files greatly. She is becoming the leading expert on this area's history which is a great asset to the refuge.

8. Hunting

Although not a great number of people hunt on Inmoko Refuge, this is the single largest use of any activity. Moose are the primary targets for hunting trips to the refuge, while caribou and black bears are incidental takes. The limit of one bull moose per hunter is most often filled by floating in rafts down the rivers after being dropped by floatplane. A week or so later the party is picked up and all gear and game is efficiently whisked away.

Rumors filter back to us that "several hundred" hunters are using the refuge each season, yet our patrols and those of the other wildlife protection officers do not agree with this. Although we do not have numbers to prove or disprove these rumors, we feel the pressure on moose has decreased over the last few years.



"The hunted"

9. Fishing

An activity that has increased surprisingly is that of sport fishing. One lodge in particular that charters fly-in trips to the refuge reported 170 clients visiting the lower Innoko and Iditarod Rivers in search of Northern pike and sheefish. This report also states that only five fish, having been hooked too deep to release, were kept. If this is true, we should have no problems with this increased use.

10. Trapping

Species of concern include the lynx, marten, red fox, beaver, otter and wolves.

As prices for furs drop year after year, pressure on this resource from the few trappers working the refuge drops accordingly. Marten are the most sought-after species bringing up to \$100 a pelt in good years. We have no records of the total pressure on the furbearers as many species have no tagging requirements. Even so, if prices on the world market continue to stagger, any detrimental effects on the populations will have to come from natural processes instead of the poor trapper without a market.

17. Law Enforcement

Our total effort in this field centers around the moose season when almost all visits occur on the refuge. Last year's State Supreme Court ruling against exclusive use areas for licensed guides did not affect the refuge hunting pattern much. Region 7's interim policy on this subject stated that the same level of guiding would occur on the refuges as in 1988. Thus we issued Special Use Permits to the two licensed guides operating the previous year. In our regular patrols we found this to be working fine. We also found a few groups of "friends" walking around in the woods, one of them without a weapon, looking for a good hunting experience. This is difficult to prove, but it surely seems like guiding to us. Still, everything appears to be legal so far, and without intense investigations, we may never know if there was illegal guiding or not.

No violations were noted by Assistant Manager Prichard, the only authorized officer on the staff, but a few cases were made by the State Fish and Wildlife Protection Officer while on the refuge. Wanton waste seems to be more prevalent among those looking for big racks and not worried about salvaging the meat. It often seems that they can get the antlers back to camp and then "a bear got the meat". This is also a tough one to prove, especially after a few days have passed since the kill and a bear really has visited the carcass.

A question was raised by a resident of McGrath when he purchased a raw, albeit old, seal pelt at a garage sale. He contacted this office to learn where he might get it tanned. Several phone calls to Special Agents could not completely clear up the issue. In this case the seller was Native and the skin was taken legally before the Act. The buyer was not Native. Some stipulation stated that only processed hides could be sold if made into handicrafts. Still, there are only a few tanneries allowed to process these pelts, and they will not accept them if there is any question of authenticity or legality. The gentleman finally returned the skin to the seller and they forgot about it altogether.

Another local trapper had his wolf pelt seized at the Canadian border as he was sending it to a tannery and buyer in that country. We learned that a permit for import/export must be filled out as well as a CITES permit when shipping wolf, otter and/or lynx to another country. He never got the skin back, but has found another buyer in this country that already has these permits. The individual may purchase the permits, but this would cut into his (and every small-volume trapper's) profits enough to put him out of business. It was a tough lesson to learn.

As stated earlier, the only person with law enforcement authority on the refuge staff is Assistant Manager Prichard. He attended the forty-hour refresher in Marana, Arizona, in March. Interaction with Region 2 law enforcement officers and the high quality facilities and instructors were two highlights of the session agreed on by all Alaska refuge officers. Prichard qualified with the Service revolver there and later in August in Fairbanks to keep up-to-date.

I. EQUIPMENT AND FACILITIES

3. Major Maintenance

The 1988 summer season left us with all of our outboard motors needing some level of maintenance ranging from tune-up to major overhaul. Unfortunately, we have no storage shop facility within which to work on equipment, so we have had to do our "mechanicing" during the summer field seasons. With the disruption of our summer season, caused by the oil spill, and the concurrent reduction in funds, we were not able to overhaul all of the outboard motors which needed it. Hopefully, 1990 will be better.



Outboard motors
racked for the
winter on the
side of the
storage cache.

Maintenanceman
Miller shutters
administrative
cabin windows
for protection
against nosey bears.



We purchased a test kit to help maintain the furnaces in our bunkhouse and residence. Small Engine Repairman Miller completed a six-hour video course in small boiler repair, maintenance and trouble shooting. The tape was produced by the Alaska State Department of Public Works and Miller rated it excellent.

4. Equipment Utilization and Placement

Two 4500 watt portable generators and three energy efficient oil space heaters were purchased for the residence and bunkhouse. We also installed telephone alarm systems which will alert us if there is a problem with electricity or heat in vacant buildings.

The arrival of a Chevy Astro mini-van has helped alleviate the constant hassle of six employees using just one vehicle. Now the manager doesn't have to walk as much. We had only used the vehicle for about two months when the windshield wiper motor gave up. It took a series of calls, first to the Anchorage dealer and then the West coast representative, to get a replacement sent out on warranty.

5. Communications Systems

Our \$45,000 radio system doesn't work! It seems that we were assigned the same frequency for our repeater as Koyukuk/Nemina, and our repeaters trigger each other to the exclusion of all intended conversations. About the time our frustration level had been exceeded, our repeater died. Hopefully, new frequency crystals, and probably new batteries, will put us back on the air in 1990. Radio communication, so vital to our safety, should not be managed so casually by our radio people.

We received our new Fax-phone equipment in November and soon began receiving "due today" messages, just as we anticipated. However, it has also proven useful for sending and receiving other messages expediently and is much superior to the computer modem system in operating ease and simplicity.

6. Computer Systems

We have not used the cumbersome Data General computer equipment since our hard disk died in 1987 and three tries to replace it failed. In December, the entire Data General 106P desktop system was boxed and shipped to Kenai Refuge at their request. This reduced our personal property liability by four pieces of equipment valued at \$18,084.00. The IBM compatible PC's that we now are using are entirely satisfactory for all of our computer needs - word processing, financial tracking, and data-base files.

B. Other:

Now that we have service-owned property and buildings, we have yard and driveway maintenance to consider. A riding lawnmower was purchased to keep the newly seeded lawns in trim, and a snowblower for winter driveway clearing has proven itself very useful.

We purchased a camcorder and VHS player, and were able to provide a taped view of the Refuge and of the town of McGrath, including the residence he would occupy, for our incoming Assistant Refuge Manager Merritt. This proved to be very useful to him and his family in planning their move from Michigan to Alaska. It is also being used to gather footage for a documentary (at some future date) of our activities on the Refuge.

J. OTHER ITEMS

4. Credits

Sections I and K were written by Refuge Manager Feiger. The remainder of the narrative was written by Assistant Manager Prichard. Most of the photographs were taken by Secretary Collins and the narrative was assembled by her.

K. FEEDBACK

Over the past 25 years, I have seen many changes in refuge management; some good like the expansion of inter-regional transfers of employees, some not so good like the centralization of finance operations into the Finance Center. This has been so dismal that we are now joining the ultimate - the Interior Finance Center.

I have seen the Service change from a resource orientation to a process orientation wherein it is more important to explain why wildlife populations are changing rather than trying to do something about it.

Computers and FAX machines have become used more than tractors and hip boots. We study problems now that we were doing something about when I started working, such as predator control. We have more people explaining what we are doing than we have doing the doing.

Gone is the idea that managing a refuge requires previous experience to be gained by a series of assignments. Now anyone with the degree and time in grade can be considered qualified. Experience counts for far less than the way you fill out reports.

I am reminded that change is not necessarily progress.

"Go ahead - throw me
in the briar patch.
Make me work out of
that 'rustic' cabin."





For the moment....PEACE AND TRANQUILITY.

L. INFORMATION PACKET - - (inside back cover)

UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
INNOKO NATIONAL WILDLIFE REFUGE
BOX 69
MCGRATH, ALASKA 99627
(907) 524-3251

Library
U.S. Fish & Wildlife Service
101 E. T. Road
Anchorage, Alaska 99503

ESTABLISHMENT:

The Innoko National Wildlife Refuge was established on December 2, 1980, as part of the "Alaska National Interest Lands Conservation Act" (ANILCA). With this act, Congress established nine new Alaska refuges and made additions to seven existing refuges. A unique situation exists in Alaska which this Act took advantage of: whereas most refuges in the Lower '48 were established to protect the few remaining acres of good wildlife habitat or to create habitat in areas where it once existed, Alaska refuges cover millions of acres of wildlands. No State or private land was withdrawn to create these refuges. Instead, those federal lands managed by the Bureau of Land Management (BLM) which were considered to have high wildlife values were transferred to the Fish and Wildlife Service for management as National Wildlife Refuges.

OBJECTIVES:

The Innoko Refuge was established: 1) to conserve fish and wildlife populations and habitats in their natural diversity; 2) to fulfill international treaty obligations of the United States with respect to fish and wildlife and their habitat; 3) to provide, in a manner consistent with the above, the opportunity for continued subsistence uses by local residents; and 4) to insure water quality and quantity.

DESCRIPTION:

The Innoko National Wildlife Refuge encompasses approximately 3.85 million acres. The refuge is in two units. The upper unit is bordered on the north and west by the Yukon River and on the east and much of the south by the Kaiyuh Mountains. Most of this unit consists of black spruce muskeg, bogs, marshes and wet meadows. The area bordering the Yukon River is forested by white spruce, birch, aspen and cottonwood with stands of willow and alder in the wetter areas. It is administered by the Koyukuk National Wildlife Refuge office in Galena.

The lower unit includes the middle portion of the Innoko River and its drainage. The Yukon River borders on the west and the Kuskokwim Mountains on the east. About one half of this unit consists of black spruce muskeg, wet meadow and sedge or horsetail marsh. There are many lakes and ponds of varying sizes in this area. The other half of this unit is mostly spruce and birch covered hills. Most of these hills do not exceed one thousand feet. The well-drained permafrost free slopes host stands of white spruce, paper birch and aspen.

The poorly drained areas and northern exposed slopes are usually covered with stunted black spruce woodland with an understory of lichens, mosses and shrubs. The Yukon River is vegetated on its banks and islands with a mixture of white spruce, paper birch, cottonwood and aspen. Willow and alder are present along most rivers and streams and bordering many wet meadows and marshes.

WILDLIFE:

The extensive wetlands of the Inmoko Refuge provide habitat each year for well over 100,000 waterfowl and shorebirds. This is an important nesting area for white-fronted and lesser Canada geese, pintail, widgeon, shoveler, scaup, scoters, red-necked grebes, lesser yellowlegs and Hudsonian godwits. This is also a very important area for moose, black bears and wolves. Beaver are very numerous with lodges common on all rivers and streams and most lakes, even in the muskeg areas where their normal food is scarce. Other fur-bearers include marten, lynx, red fox, river otter and wolverine. Caribou use the refuge, particularly in late winter when deep snow moves them down from the mountains.

The fishery resource of the refuge has not been thoroughly investigated as yet. Sheefish and grayling are suspected in the rivers, as are blackfish in the lakes. Whitefish are common in the rivers and connected lakes and pike are found in all waters save those isolated shallow lakes which freeze to the bottom in winter.

Perhaps the most common and abundant wildlife on the refuge is the mosquito. No binoculars will be needed to locate them!

PUBLIC USE:

Although the refuge is open to public use, it does not receive a great number of visitors. Any camping or backpacking is strictly primitive as no facilities or prepared trails exist, or are planned. A few trappers from the Yukon River villages or the old mining town of Flat on Otter Creek, a tributary of the Iditarod River, use the refuge in winter, and some bird hunting takes place both in the fall and the spring by subsistence users. Presently, however, the greatest use of this refuge is in September by moose hunters. Moose on the Inmoko River are relatively abundant and many local and non-local people come here to hunt. Many of these hunters are from Anchorage or the Lower '48, although a majority are from mid-Yukon villages and the regional centers of Bethel, Galena and McGrath.

Those who wish to visit the refuge can get there by chartered aircraft out of Anchorage, McGrath Bethel or Galena. (Access in summer is by float-plane, and in winter by ski-equipped airplane). McGrath is the most common access location for those visiting the refuge, or for someone coming from Anchorage. Accommodations are available in McGrath (see below) and reservations should be made in advance.

The following information may be of assistance to you:

Lodgings in McGrath

TAKUSKO HOUSE

Box 11
McGrath, Alaska 99627
Phone (907) 524-3198

MINERS CAFE AND BOARDING HOUSE

Box 274
McGrath, AK 99627
Phone (907) 524-3026

CAROLINE'S KITCHEN AND ROOMS

Box 45
McGrath, AK 99627
Phone (907) 524-3466

Airline Service from Anchorage-McGrath - Passenger

WILBUR'S

Twin engine aircraft
1 flt. daily Mon-Fri
McGrath - 524-3881
Ak. Toll Free - 800-478-7400

MARKAIR

Turbo-prop aircraft, Mon-Sat.
Anchorage - 243-6275
McGrath - 524-3923
Ak. Toll Free - 800-478-0800

Airline Service from Anchorage-McGrath - Freight

NORTHERN AIR CARGO

Anchorage - 243-3331
McGrath - 524-3778

MarkAir

Anchorage - 266-6224
McGrath - 524-3923

Local Air Taxi Charter Service

Walt's Air Service

Walt and Freda Walton
McGrath, Alaska 99627
(907) 524-3045

MarkAir Express

c/o Ben Magnuson
Box 210
McGrath, AK 99627
524-3340 or 1-800-478-3923

Williams Flying Service

Jim and Sandy Williams
Box 288
McGrath, AK 99627
(907) 524-3770

Locally based Guide

Innoko River Guide & Outfitters

Attn: Robert Magnuson
Box 111
McGrath, Alaska 99627
(907) 524-3866

(Fishing, float trips, photography
Summer and Fall trips - Cessna 206
and Cessna 185 on floats, Supercub
w/tundra tires, boats, motors,
river rafts)

If you are planning to camp on the refuge, you should be prepared for the environment. Much of the refuge that is accessible by aircraft or boat is in low-lying marsh or muskeg areas. Walking in these areas is made easier and more comfortable by using waterproof, preferably hip length, boots. Anticipate rain at any time during spring, summer or fall and carry rain gear. Dress appropriately for the weather and carry spare clothing. High temperatures may go over 80 degrees F. in the summer months, although 60 and 70 degrees are more common. A surprise freeze could happen even in the summer, particularly in June or August, so come prepared. During the moose season in September, expect cold, wet weather and hope for Indian Summer. Winters are cold - the temperatures may drop to -50 to -60 degrees. For more particular climate information, check with

the refuge manager.

Be sure to bring a tent and a warm sleeping bag. Although you may prefer a gas or propane camp stove, there is plenty of wood in most places. It is permissible to use any dead and down wood, or to cut any trees of less than three inches. In this regard, keep in mind the black spruce which grows in the muskeg areas and on permafrost soils grows very slowly. It is better to cut firewood in areas where it is most dense and will be naturally replaced sooner. A lantern will not be necessary from May through July as the daylight is nearly constant, with only a short twilight between sunset and sunrise.

Be sure to boil all drinking water as giardia may be present. There are purifying water pumps on the market which will also eliminate this organism. Carry a good first-aid kit and plenty of mosquito repellent. Bears are plentiful and, though few incidents have occurred, they are always to be considered dangerous. Cow moose with calves can also be dangerous and should be avoided. Most important of all, make sure someone knows where you are and when you are to come out. It would be appreciated if you checked with the refuge manager on your way in and out of the refuge area.

Topographic maps can be obtained from any U.S. Geological Survey Office. At the 1:250,000 scale, five maps will cover the refuge. They are: Ophir, Holy Cross, Iditarod, and Unalakleet for the lower unit and Nulato for the upper unit. Maps are also available at a scale of one inch to the mile.

Refuge Staff:

The refuge staff is headquartered in McGrath, approximately seventy air miles from the refuge, and consists of a Refuge Manager, Assistant Refuge Manager, Wildlife Biologist, Pilot and Secretary. The staff is bolstered during the summer by volunteers and seasonal employees to assist with biological work on the refuge.

The refuge staff is responsible for management of the refuge, which includes: enforcement of game laws, particularly during the moose season; issuing permits for special uses on the refuge such as cutting house logs, or commercial activities like oil exploration; inventorying and monitoring wildlife populations; and assisting the public in their use of the refuge.

The waterfowl population on the refuge is a very important aspect of our management since the U.S. Fish and Wildlife Service is responsible for these migratory birds and there is a great public demand for hunting and observing them. The staff spends much of the summer censusing the ducks and geese on the refuge to estimate their population and production. These numbers help in setting hunting regulations from Alaska to Mexico. In fact, most of the Lower '48 states are on the migration route or serve as wintering grounds for waterfowl that breed in Alaska.

The refuge staff will be glad to assist you with any additional information you may need. Please feel free to write or telephone.

(Revised 1/90)

Table 20. BIRDS OF THE INNOKO NATIONAL WILDLIFE REFUGE - January 1988

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

Abundance

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

Status

B Breeding only in summer
 R Resident. Year around-breeding
 W Winter resident. Non-breeding
 M Migrant

V Vagrant, casual or accidental