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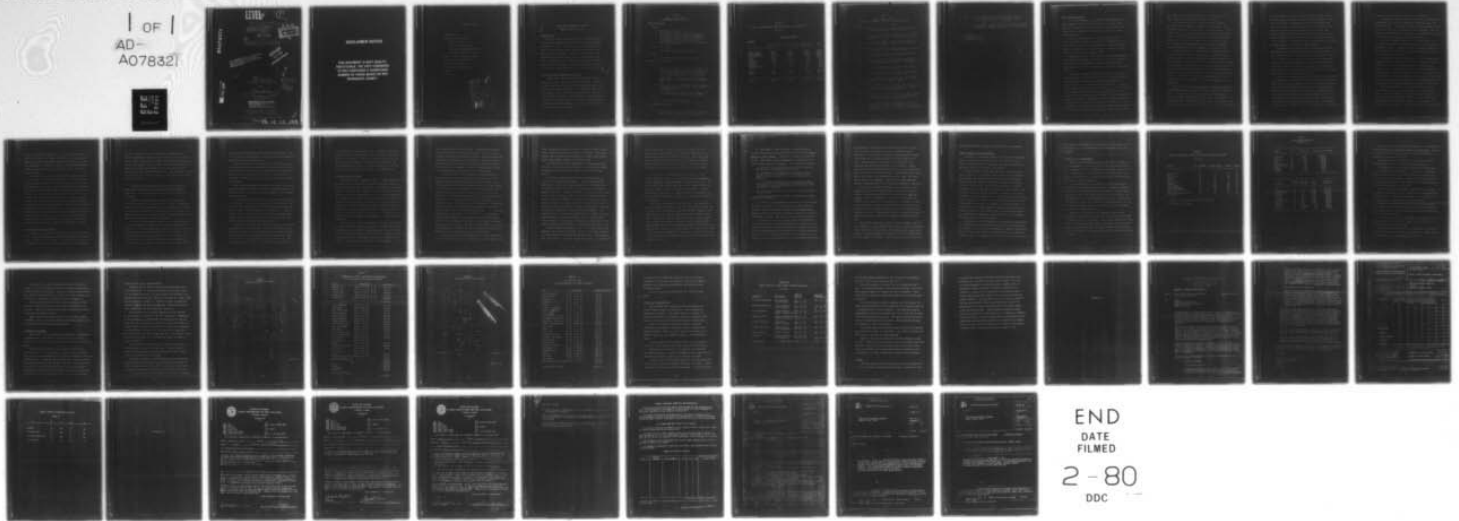
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NARL Animal Research Facility
Annual Report for FY78.

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NAVAL RESEARCH LABORATORY

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by

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NARL ANIMAL RESEARCH FACILITY
ANNUAL REPORT FOR FY78

INTRODUCTION

The NARL Animal Research Facility is completing its fourth year of support from the Office of Naval Research Biophysics Program. The Animal Research Facility has provided scientists with unique opportunities to study northern animals maintained in an arctic environment. The Research animals live year round in outdoor cages where they are subjected to the temperature and light conditions found only in the arctic. This report documents the activities and accomplishments of the facility during FY78.

RESEARCH ACCOMPLISHMENT PROJECT STATUS

During FY78, the Animal Research Facility (Figure 1) supported sixteen research projects (Table 1a). A total of 12,102.5 man hours were spent by the research support staff on ongoing projects (Table 1b). Ten different scientists were associated with studies at the facility. Projects included in-house research, investigations of visiting scientists, and logistical support for field studies. Twenty-two publications were produced as a result of the in-house research staff program (Table 2).

TABLE 1a

ANIMAL RESEARCH FACILITY
FY78 CONTINUING PROJECTS BY TITLE

POSTDOCTORAL PROGRAM

Follmann

1. Cold adaptation in arctic foxes.
2. Comparative metabolism of arctic and red foxes.
3. The effects of activity and ambient air temperature on the internal body temperature in wolverines.
4. The effects of activity and ambient air temperature on the internal body temperature in wolves.
5. Arctic fox carcass analysis for disease, reproduction, diet, and age structure.

Follmann, Philo, Reynolds

1. Cold adaptation of arctic grizzly bears.

Chappell

1. Energy budgets of small arctic homeotherms.

VISITING SCIENTIST PROGRAM

Albert

1. Studies on the influence of: 1) normal hibernation and 2) plasma from hibernating animals on the extent of regional heterothermy and metabolic rate in the arctic marmot, Marmota broweri, during acute cold exposure.
2. Establishment of a breeding colony of arctic marmots, Marmota broweri, at the Naval Arctic Research Laboratory (NARL).
3. Influence of season and chronic cold exposure (hibernation) on the blood chemistry of the arctic ground squirrel, Spermophilus parryi.
4. Health maintenance of arctic marmots, groundhogs, and arctic ground squirrels kept as laboratory animals.

Laurson

1. Decomposition in Arctic Environments.

RESEARCH VETERINARIAN PROGRAM

Philo

1. The effects of fasting length and exercise on water dynamics and compartmentalization in arctic wolves.

TABLE 1 b

WORK DISTRIBUTION OF ANIMAL RESEARCH FACILITY STAFF

FY 1978

MAN HOURS WORKED

PROJECT

	Animal Tech.	Tech./Aide	Supervisor	Total
Animal Care	4907.0	128.5	127.0	5162.5
Office/Admin.	28.5	839.0	1518.5	2386.0
Office/Maint.	53.0	933.5	32.0	1018.5
Philo	207.0	1232.5	13.0	1452.5
Albert	103.5	135.5	5.0	244.0
Follmann	40.0	17.5	20.0	77.5
Chappell	0	24.0	0	24.0
Reynolds	4.5	0	22.0	26.5
77025N/Grizzly	0	20.0	0	20.0
Tours	6	8	52	66.0
Debush	531	465.5	425.5	1422.0
LWOP	43	160.0	0	203.0
TOTAL	5923.5	3964.0	2215.0	12102.5

TABLE 2

ANIMAL RESEARCH FACILITY
FY78 PUBLICATIONS AND PRESENTATIONS OF IN-HOUSE RESEARCH

<u>Category</u>	<u>Citation</u>
P	Albert, T.F. 1978. Veterinary medicine in the Alaskan Arctic. Presented at School of Vet. Med., Univ. Penn.
P	_____. 1978. Monitoring hibernation of marmots (<u>Marmota broweri</u> , and <u>M. caligata</u>) in artificial dens. Am. Soc. Mammalogists, 58th Annual Meeting, Athens, Georgia.
PSP	_____. 1978. Management and health maintenance of group indoor-housed woodchucks, <u>Marmota monax</u> . AAAS 29th AK. Sci. Conf., Fairbanks, Alaska.
AP	Chappell, M.A. 1978. Energy budgets for small arctic mammals. AAAS 29th AK. Sci. Conf., Fairbanks, Alaska.
J	_____. Insulation, radiation and convection in small arctic mammals. Submitted to Ecology.
PSP	Follmann, E. H. (1978). Behavioral thermoregulation of arctic foxes in winter. Fourth Int'l Symp. on Biotelemetry, Garmisch-Partenkirchen, Germany.
J	_____. Annual reproductive cycle of the male gray fox. Submitted to Biol. of Reproduction.
J	_____, and Buitt, J.M. (In Press). An adjustable radio collar for foxes. J. Wildlife Mgmt., 42(4).
AP	_____, Philo, L.M., and Reynolds, H.V. 1978. Annual variation in body temperature of grizzly bears. AAAS 29th AK. Sci. Conf., Fairbanks, Alaska.
J	Magaki, G., Albert, T.F., and Casey, H.W. (In Press). Histology of the ringed seal, <u>Pusa hispida</u> . Am. Registry of Path., Armed Forces Institute of Pathology. (Syllabus with 97 microslides) Washington, D.c.
APJ	Philo, L.M. 1978. Clinical evaluation of xylazine for chemical restraint of captive arctic wolves (<u>Canis lupus</u>). 29th Annual Session of Am. Assoc. Lab. Animal Sci., New York. J. Am. Vet. Med. Assoc. 173(9):1163-1166.
AP	_____, Follmann, E.R., and Reynolds, H.V. 1978. Comparison of two techniques for surgical implantation of temperature-sensitive radio transmitters in arctic grizzly bears, (<u>Ursus arctos</u>). AAAS 29th AK. Sci. Conf., Fairbanks, Alaska.

PSP _____, Patterson, D.F., and Buchanan, J.W. 1978. Mitral valve insufficiency in an arctic fox (Alopex lagopus). Symp. on Comparative Path. of Zoo Animals.

J _____, Wolfe, D.L., and Fassig, S.M. (In Press) Treatment of an acquired abdominal hernia in a polar bear (Thalarctos maritimus). J. Wildlife Diseases.

- A = Abstract
- J = Journal Publication
- P = Presentation
- SP = Symposium Publication

51 publication
 8 J
 4 A
 3 SP
 11 P
 5 Reports

POST DOCTORAL PROGRAM

Dr. Erich Follmann's study entitled Cold Adaptation in Arctic Foxes (22917/78-x-01) terminated in May 1978 after data were collected on animal activity and on abdominal and radio-collar temperatures for one year. Analysis of data began during FY78.

Three wolverines housed at the ARF were instrumented with temperature-sensitive transmitters. Objectives of the study were to relate body temperature with activity and ambient air temperature. Monitoring began on April 1, 1978 and will continue until December 1978.

Beginning April 18, 1978, five male wolves instrumented with abdominal implants were monitored to related activity and ambient air temperature to changes of internal body temperature; also, two of these wolves were fitted with radio-collars.

A study to compare metabolism of red foxes and arctic foxes was initiated through funding from the Energy Research and Development Administration (currently Department of Energy) via the Los Alamos Scientific Laboratory. Three red foxes were obtained to conduct the study. The project consists of two parts: controlled feeding experiments during four seasons, and determining upper and lower critical temperatures during four seasons. The winter, spring, and summer feeding experiments were conducted to determine differences in food consumption and digestive efficiencies between the two species. Due to problems with gas analyzers, determinations of upper

and lower critical temperatures have not been conducted to date. These studies will be initiated this fall.

Four grizzly bears were instrumented with abdominal and radio-collar temperature-sensitive transmitters. Two additional bears were fitted with temperature-sensitive radio-collars only. All were monitored through the 1977-78 denning season. Monitoring continued when the bears abandoned their winter dens. In June 1978 four bears (two from last year) were equipped with subcutaneous and abdominal temperature-sensitive transmitters and a temperature-sensitive collar.

Fifty-five arctic fox carcasses were collected during 1977-78 trapping season. Funds are being sought from the Outer Continental Shelf Environmental Assessment Program and the Department of Energy to fund a three-year project to study male and female reproduction, diet, disease and age structure. Carcass collections would be made from a low fox population year (1977-78) through two years of increasing population size (1978-79, 1979-80). This study will provide significant insights into the cyclic nature of the North Slope arctic fox population.

The study entitled Cold Adaptation in the Arctic Grizzly Bears (22917/78-X-07) headed by Follmann, Philo, and Reynolds set out to characterize the acclimatization and adaptation of free-ranging grizzly bears to the arctic environment. To accomplish this, the amounts, energy values, and chemical composition of the food species that bears eat need to be determined.

An understanding of the utilization effects of these foods and the changes in physical condition and fat deposition that occur in the bear in preparation for winter dormancy also need to be studied. The main objective of the grizzly calorimetric survey segment of the study is to evaluate the caloric content of principal plant foods of grizzlies in the Naval Petroleum Reserve-Alaska (NPR-A), thus providing input to the evaluation of the habitat and forage quality in an area characterized by relatively low productivity.

Simultaneous evaluation of scat contents will provide information on the digestive efficiency of grizzly bears. This is an important aspect in determining the bioenergetic status of the species and its ability to adapt to North Slope food sources. Energetic information obtained from concurrently conducted calorimetric survey of principal food sources and scats will aid in evaluating the energy efficiency and temperature regulation of arctic grizzly bears.

In October, Reynolds continued to track the six grizzlies instrumented with heat-sensitive radio transmitters. Internal body and radio-collar temperatures were calculated from field data recorded during the period from June to September 1977. The field camp was closed for the winter. Preparations for radio monitoring grizzlies in dens from NARL aircraft began. Data were obtained from all ten transmitters on six bears in their dens by flying over the Driftwood area. The adiabatic bomb calorimeter, which is used to determine energy contents of

food items and bear scats, was set up in December.

A successful flight to the Driftwood area to monitor six dened bears was made and temperatures were calculated from the digital data. A proposal to continue radio-telemetry work on grizzly bears was initiated with Harry Reynolds. Two Yagi antennas were mounted on a Cessna 180 in preparation for flights to the radio-fitted bears in the Driftwood area.

Bear food specimens collected last summer (1978) near Driftwood were dried, ground and stored for later determination of caloric content. Analysis of blood serum for phosphorous was completed for all bears. New transmitters were received and calibrated for temperature.

In September 1978, Project Whales: RU-379, Biotelemetry, submitted by Dr. Follmann was initiated. Twenty-five radio-transmitters and two receiver/scanners were ordered from Telonics, Inc. Information on another telemetry system was obtained from Ocean Applied Research Ltd. The telonics facility was visited and discussions held on the new design transmitter-dart. A meeting with all the project's principal investigators and the Bureau of Land Management was attended in Anchorage.

The prime objective of Dr. Mark Chappell's project, Energy Budgets of Small Arctic Homeotherms (22917/78-X-02), was to define and quantify all the major pathways of heat exchange between small arctic animals and their environment. The principal factors of heat exchange are radiation and convective losses to wind. Conductive losses to the ground are

usually of secondary importance. Once the heat exchange parameters are quantified, they can be used in an energy budget equation to evaluate metabolic requirements in any given set of environmental conditions. Also, the maximum environmental limits for the animal can be determined, given a known metabolic capability.

Dr. Chappel installed and modified the equipment needed for his project. A vacuum chamber to be used for measuring radiant energy exchange was wired and tested; the wind tunnel was modified, wired, tested, and calibrated; the flow chamber was narrowed and lengthened and a thermocouple grid was added. Fur-covered, heated metal casts were constructed of two least weasels, one ermine, and three lemmings. The surface areas of the casts were measured, as were radiant-energy exchange surfaces and convection coefficients. These laboratory measurements were tested by placing casts of the animals in natural situations and comparing predicted with observed energy requirements for homeothermy. In tests in snowcaves and on sunny, windy days on the snow surfaces, the estimated energy requirements were always within 10-15% of the experimental values.

RESEARCH VETERINARIAN PROGRAM

During the first quarter the research time of Dr. Michael Philo's Water Metabolism in Captive Arctic Wolves was primarily spent in preparing the proposal. The remaining research time was divided among several studies including providing support

for Dr. Follmann's study of the effects of exercise and ambient temperature on body core temperature in arctic foxes. In two foxes, nonfunctional radio-transmitters were surgically removed and replaced with new ones. Blood was taken from six adult arctic foxes to complete the two-year collection of hemotological and blood biochemical data. The polar bear, Irish, was the subject of Dr. Folk's study of renal effects of a three-day all fat diet.

A squeeze cage was successfully designed and tested on eight adult wolves to allow venapuncture without chemical restraint. An X-ray system was also selected, ordered and installed.

Research time was devoted in preparation for the data collection segment of the water balance project. Temperature-sensitive radio transmitters were received, potted, calibrated and surgically implanted in the abdomens of five wolves. The implants were then used to monitor body temperature hourly for 24 hours post-surgery in three of the wolves.

In order to estimate the initial dose of tritiated water for the experimental animals, a trial run was performed on a sixth wolf. The five experimental wolves were placed in metabolism cages for a minimum 14-day conditioning period. The diet was approximately maintenance level, as determined previously in one of the experimental wolves. All procedures were performed as planned for the experimental wolves. This

involved daily weighings, urine and fecal collections, a two-hour access to food and snow, and twice-weekly blood collection with the use of the squeeze cage.

The water balance study began in early February with all the animals receiving approximately one-half maintenance diets. Each animal received 150 uCi tritiated water intravenously on the first day. Maintenance diets began in mid-February. At that time an additional 450 uCi tritiated water was introduced intravenously.

When twice maintenance diets were instituted, two animals vomited consistently with any level of excitement after eating. After six days, one of these animals dropped his food consumption by one-half.

The experimental procedures were carried out as specified in the proposal. The success of urine and fecal water collection was less than expected. The intravenous injections and blood sampling using the squeeze cage worked well. There was minimal time for data reduction and sample evaluation (Final liquid scintillation counting, fecal and urine drying, calculation) during the actual experimental period.

Samples taken during the February and March water balance experiment were also processed. This included drying urine and fecal samples. All the plasma samples collected for body water turnover and total body water were prepared for liquid scintillation counting shortly after blood collection. The samples were grouped according to the individual animal. One

set of samples was counted at a time. Standards were interspersed among the samples and all the vials were counted ten times for ten minutes. Each set of samples required five to six days for equilibration and counting. A tentative plan was prepared for revision of the experimental design for the winter 1978-1979 portion of the wolf water balance study.

VISITING SCIENCE PROGRAM

The research of Dr. Thomas F. Albert, a visiting scientist on leave from the University of Maryland, has been concerned with Studies on the Role of Regional Heterothermy in the Energy Balance of Selected Arctic Mammals. The major portion of this study has been concerned with the role of regional heterothermy as a defense during acute cold exposure and how this defense is influenced by the infusion of plasma taken from a hibernating mammal. The blood of hibernating mammals appears to contain a "hibernation trigger" substance which may or may not affect an animal's response to acute cold exposure. In this study, two groups of eight woodchucks, Marmota monax, were utilized as recipients.

One group received an intravenous infusion of saline while the other group was infused with plasma collected earlier from hibernating arctic marmots, Marmota broweri. The animals were then each surgically implanted with five thermocouples to monitor tissue temperatures and thereby the extent of regional heterothermy. Each animal was exposed to room temperature for two

hours and then OC air for 12 hours. Preliminary examination of the data reveals no enhanced resistance to cold in those animals receiving the hibernation plasma. Detailed statistical evaluation of these data are in progress. Additional work is planned whereby the dosage of hibernation plasma infused will be increased in an attempt to detect a physiological response to the hibernation plasma during acute cold exposure.

In early January, five consecutive 24-hour periods of monitoring marmot body temperatures were completed. Body temperatures of hibernating arctic and hoary marmots in outside artificial dens, were recorded twice daily for the remainder of the month. Blood samples were taken from eight hibernating ground squirrels and sixteen squirrels kept at room temperature. Eight arctic marmots were nested together in two groups of four in the hope that they would reproduce. Two litters of groundhogs were born. The collection of tissues from ringed seals was completed with seals provided by Burns and Ealey of the Alaska Department of Fish and Game. Cardiac blood samples were taken from 22 ground squirrels in a continuing blood chemistry study. Five thermocouples were implanted in each of five groundhogs infused with either plasma from hibernating marmots or saline. The heat rate and extent of regional heterothermy were monitored in the groundhogs for sixteen-hour periods to assess resistance to acute cold exposure.

Work on the regional heterothermy project was continued in April and concluded in May. Arrangements have been made to have

Seven scientists cooperate in the examination of whale tissues to be collected in Barrow in the fall and spring. Two radiologists were enlisted to participate in a study involving the normal radiographic anatomy of the arctic wolf.

Data pertaining to den temperature fluctuations as they relate to animal torpor were presented at the American Society of Mammalogists annual meeting held during June in Athens, Georgia.

Particular attention has been paid to maintaining the health of the experimental animals. Caging limitations and experimental design have together resulted in the opportunity to assess group indoor housing as it pertains to woodchucks. Housing allows for: minimal investment in caging, animal access to the entire enclosure, animal free interaction where interactions lessen the likelihood of torpor occurring, and a substantial reduction in labor required for animal care. Unfortunately a rather low level of fighting persisted which required an extensive commitment to animal health maintenance. The commitment had to be of such a magnitude as to render the group indoor method of housing woodchucks to be of limited value. Data pertaining to the method of housing were presented at the Alaska Science Conference held in Fairbanks during August, 1978.

During November and April a total of 10 ringed seals, Pusa hispida, was examined at autopsy. These animals were collected by Alaska Department of Fish and Game personnel. Tissue samples were collected from all major organs and tissues. In cooperation

with George Migaki, D.V.M., Registry of Comparative Pathology, Armed Forces Institute of Pathology, Washington, D.C., histological study sets have been prepared. The study sets each consist of 96 microslides and an accompanying syllabus. Such a slide series will be available to interested persons as normal reference material concerning this marine mammal.

Dr. Tim Casey of Rutgers University made use of the Animal Research Facility for his project entitled Biophysics of Heat Exchange in Arctic Mammals, beginning on July 15. This project was funded by AINA/ONR and lasted 4 weeks at NARL. The first two weeks consisted primarily of equipment set up and instrument calibration. Dr. Casey traveled to Fairbanks (Institute of Arctic Biology) to obtain "span gas" for the repaired CO₂ analyzer.

Data collection began on July 29, 1978. CO₂ production and body temperatures before and after runs of ten minutes and at several velocities were measured to estimate metabolic heat production and the rates of heat loss and heat storage in the body. The animals used were the least weasel, Mustela rixosa, and its major prey species, the brown lemming, Lemmus trimucronatus and tundra vole, Microtus oeconomus. High speed motion pictures were taken of the lemming running at various velocities to determine the kinematics of running and to analyze the relationship between heat production and stride frequency at several running velocities.

Dr. John Baust of the University of Houston made use of ground squirrels collected for his project entitled Heterothermy in Arctic Mammals. During the 10 days of the project at NARL, the extent of limb heterothermy was determined in arctic ground squirrels, Citellus. The objectives included:

1. To define the time course (integrity of heterothermic function) in peripheral appendages.
2. To determine the effects of simultaneous contralateral hetero- and normothermic exposures on peripheral vascular response (I.E. the Low's Hunting Phenomenon).
3. To identify and quantify the analogous vasodilatory action of nor-epinephrine in heterothermic tissues as compared to its usual vasoconstrictive action under normothermic conditions.
4. To collect and freeze for enzyme analyses peripheral nervous tissue.

The above listed objectives were accomplished utilizing twenty-four specimens.

Dr. Ohtake of the Geophysical Institute of the University of Alaska used Bldg. 350 to set up and maintain monitoring equipment used by his project entitled Arctic Circle Pollen Analysis studying ice crystal formation using pollen grains as condensation nuclei. The facility was used for seven days.

The project of Dr. Gary Laursen, entitled Decomposition of Natural Litters in Arctic Environments, is concerned with evaluating the unit loss of the principal components in arctic grass and sedge species in the laboratory to obtain analytical data that can be used to predict biological degradation as it relates to arctic and cold-persistent environmental conditions,

the presence of lignilytic and cellulolytic fungi, and time and oil-induced perturbations on the decomposer (fungal) populations. Litter bags, containing approximately ten grams fresh weight of the three principal graminoid species were used. They consisted of standing live (first year) and standing dead (second year) plant leaf/culm parts. Litter bags with new and old litter were placed on the 12 plots early during the first field season (1975). Samples have been collected at one-, two-, and three-month and one-, two-, and three-year intervals for analysis. Not all litter bags have been analyzed completely due to the three-year duration of the study.

Sixteen soil samples (800 fields) were prepared, microscopically examined for fungal hyphae, and their lengths recorded. Twenty-nine dried second- and third- year Dupontia fisherii litter bag samples, retrieved from the field, were weighed and ground and run in replicates to determine, by quantitative chemical methods, the contents of the neutral soluble components, acid soluble components, cellulose, hemi-cellulose, lignin, and silica. Analyses were sent to Virginia Polytechnic Institute and State University for computer reduction of the data.

The chemical analyses of several lignin-cellulose samples were completed. Fungal biomass sums were continued. One-hundred-fifty new litter bags containing Arcto-phila fulva, Carex aquatilis, and Salix pulchra were prepared to be put into the field at 4 cm depths on 15 plots. Preparations were made for the 1978

field season and for a fungal collecting trip to Driftwood.

ANIMAL RESEARCH FACILITY WORKSHOP

On August 8, the Animal Research Facility, affectionately known in our world of acronyms as the ARF, held its first Animal Review Workshop in conjunction with the ONR/NARL Third Quarterly Meeting at the NARL (7-9 August).

Several guests attended this meeting. Dr. Joseph Bloom, Capt. (USN) and CO of the Naval Medical Research and Development Command, and his Technical Director, Dr. Jack Schmidt attended with Dr. Arthur B. Callahan, Director of Biophysics Division, ONR Code 444, and Dr. Theodore Malinin, Professor of Surgery at the University of Miami School of Medicine. Other visiting scientists and ARF users who attended were Dr. Larry Underwood of AEIDC, University of Alaska; Dr. John Baust, University of Houston; Dr. Timothy Casey, Rutgers University; and Dr. Thomas Albert, University of Maryland. In-house attendees included Drs. Erich Follmann and Mark Chappell, ARF Post-Doctoral Research Associates; Dr. Michael Philo, Research Veterinarian; Mr. George Selby, Supervisor of the ARF, and Dr. Gary Laursen, Assistant Director for Science/NARL.

The purpose of the workshop was to develop multi-discipline and integrated research programs related to the acclimatization and adaption of native Arctic Homeotherms to ambient temperature and light conditions. One or two mammals will be selected for intensive study. In addition, the group will develop a five year

ARF facility development plan to direct its construction and arrangement to best accommodate its research philosophy and programs.

ANIMAL CARE AND MAINTENANCE

The NARL Animal Research Facility provided a community pet clinic which provided both routine and emergency pet care for 97 people. A total of \$888.80 was recovered to cover the cost of medical care, facility use and technician time. Dr. Philo provided the bulk of the pet care and Dr. Albert filled in during Dr. Philo's absence.

The various species and numbers of animals housed and maintained at the Animal Research Facility changed according to the needs of scientists using the facility. Table 3 shows the current population status of species at the facility and the costs for feeding are delineated in Table 4. The ARF was visited by the USDA Animal and Plant Health Inspection Service. The resulting Animal Report of Research from U.S. Government Facilities is given in Appendix 1.

There were no changes in the numbers of polar bears, wolverines or snowy owls during FY78. One litter of wolf pups was born in June; all were male. Three wolves died in FY78; one adult male wolf was found to have a tumor attached to the left kidney and laboratory tests indicated probable renal failure. Two other wolves, an adult and a pup, died of injuries received in fights.

TABLE 3

ANIMALS MAINTAINED AT THE NARL ANIMAL RESEARCH FACILITY

FY 1978

SPECIES	1977 NUMBER	ACQUISITIONS	LOSSES	TOTAL
Polar bear	1	0	0	1
Wolf	23	4	3	24
Arctic fox	15	0	6*	9
Red fox	0	3	0	3
Ermine	4	0	1	3
Least weasel	0	1	1	0
Marmots	34	20	10	44
Ground hogs	0	33**	10	23
Brown lemmings	7	55	59	3
Collared lemmings	4	6	8	2
Snowy owl	1	1	1	1
Arctic ground squirrel	65	33	35	63
Wolverine	3	0	0	3

* Loan of 5 to Institute of Arctic Biology

** 2 litters of 5 each

TABLE 4
ANIMAL RESEARCH FACILITY
FEEDING COSTS

Animal	No.	Daily Cost	Annual Cost Per Animal
Polar Bear	1	\$4.71	\$1,695.60
Wolves	23	1.16	301.60
Wolverines	3	1.01	262.60
Foxes	18	.35	91.00
Ground Hogs	24	.25	90.00
Ground Squirrels	20	.23	82.80
Marmots	29	.22	79.20
Lemmings	3	.09	32.85
Weasels	3	.06	21.90

Food Type	Species Eating	Cost Per Unit (lb)	Total Weight	Total Cost Per Annum
Fish	5	.55	16,512	9,081.60
Feline Diet	4	.46	5,712	2,561.28
Chicken Heads	1	.17	11,040	1,876.80
Rat Chow	2	.37	2,880	1,065.00
Cabbage	2	.15	4,320	648.00
Apples	3	.24	2,304	576.00
Chicken Necks	3	.17	2,592	440.64
Dog Food	3	.25	1,338	334.50
Carrots	3	.15	1,536	230.40
Vitamician	4	2.60	74.5	193.44
Eggs	4	.54/doz.	352	190.08
Stew Meat	1	1.00	50.5	50.50

Three adult red foxes were live-trapped for Dr. Follmann's project Comparative Metabolism of Arctic and Red Foxes. There was one fox death: a two-year-old fox died of peritonitis caused by an intestinal blockage.

Five arctic foxes were loaned to Dr. Bob White at the University of Alaska for a winter metabolism project.

One ermine died and one least weasel was collected; however, it died shortly thereafter. A 12+ year-old snowy owl died, but was replaced by a younger first year animal brought to the facility for treatment. Examination of the owl led to finding a puncture wound of the sternum as the probably source of infection which led to its death.

Twenty additional marmots were added to the colony for Dr. Albert's hibernation study. Fourteen were trapped on Meat Mountain and one came from Anaktuvak Pass. Ten animals died, most during plasma collection via cardiac puncture.

Thirty-three arctic ground squirrels were acquired from various locations in the Brooks Range, most from the Driftwood area. These animals will be used by Drs. Baust and Albert for their respective projects.

Thirty-three ground hogs were shown in the records. Ten died in the course of the year. There were two litters of ground hogs born adding 10 animals.

Yearly physicals were done on all the wolves, foxes and wolverines, including blood work and prophylactic dental care. Animal health records were brought up to date.

During FY78 a program of upgrading animal care has continued. Animal diets were reviewed and changed as recommended by the resident veterinarian. A manual on Animal Care/Training was conceptually developed and written to provide valuable continuity to an expanding and complex facility (Appendix 2).

John Burns and Tom Ely of the Alaska Department of Fish and Game donated 1,000 lbs. of seal meat and blubber to the facility. They had collected the animals to obtain information on age and reproductive status.

There were six incidents in which large animals escaped from their cages. Two animals left the fenced-in compound and in both cases were recaptured and returned.

FACILITY IMPROVEMENTS

During FY78, 135 work orders were submitted, re-submitted, completed and/or are pending. The Animal Research Facility (Figure 1) is now all but completed with respect to the building phase.

There were also several major projects started and/or completed in FY78. Construction of a new fox run was begun; this run will be approximately 50' by 250' providing two separate holding areas. A complete and connected fire detection system was ordered for Bldgs. 350 and 448. The ATCO trailer was again realigned for use as additional office and laboratory space. Work was also started on the utilidor connections to buildings 350 and 448. This connection will provide both fresh running

water and gray water sewage disposal.

Building 448 had several changes and improvements made to it during FY78. A new room was added to allow more space for the research animals, the water system was modified, a new workshop was added, and the food barn was moved to a much closer position (Figure 2, Table 5). The bear holding facility was repaired, updated and partially painted. The existing doors were strengthened and new hinges were installed.

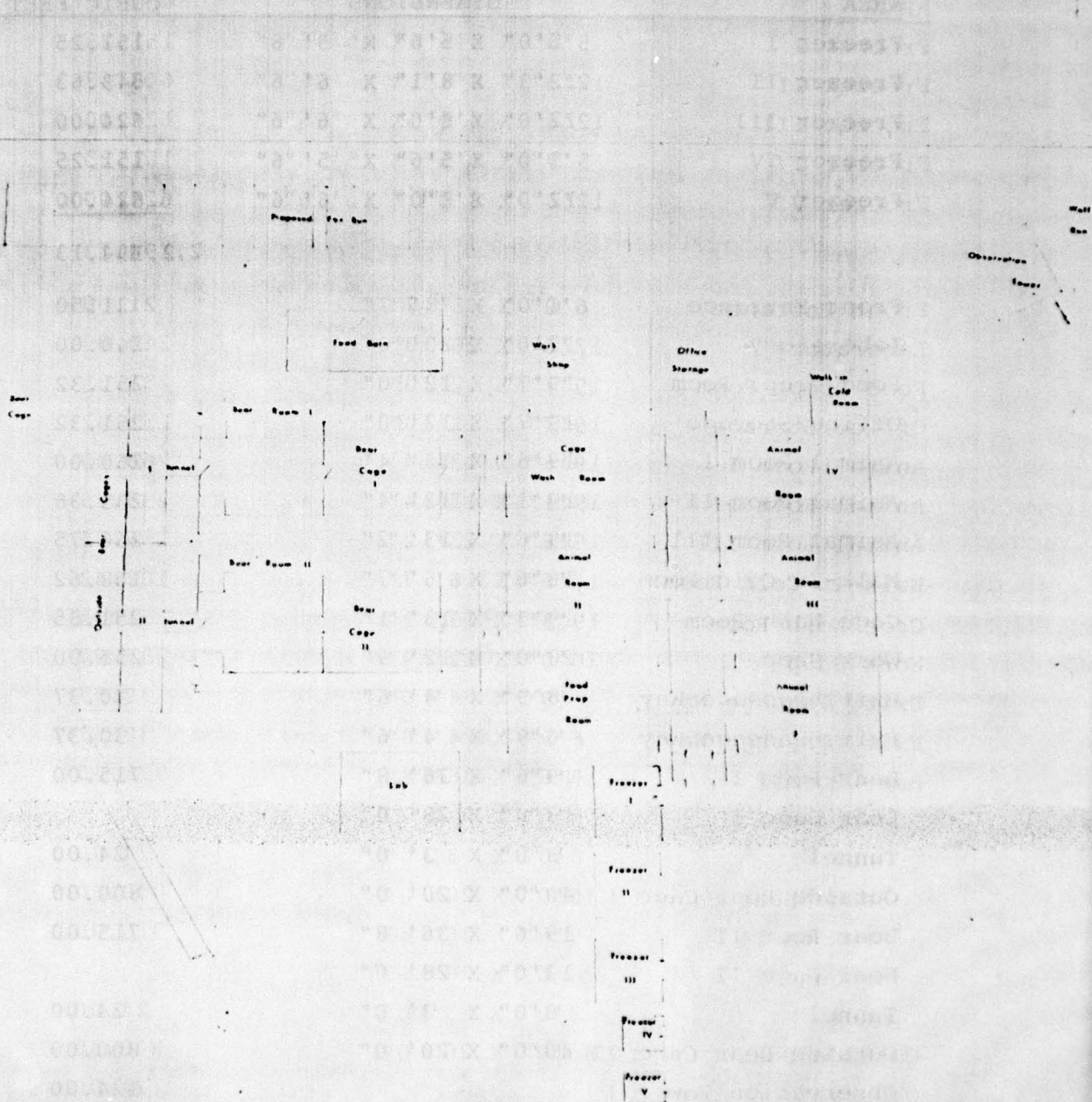
Other construction projects completed in FY78 include: 1) installation of lights for the wolf cage row, 2) completion of the stockroom in building 350, 3) construction of the new X-ray room, 4) construction of the wolf observation tower including lights, heating and paneling, 5) lights were installed in the food barn, building 351, side porch of building 350, back side of building 448 and building 453. Building 350 is now complete with respect to its construction phase as shown in Figure 3, Table 6.

Normal building maintenance was evident by extensive inside painting and repair of floor tile. Physical repair of animal cages and modifications to prevent and reduce injury due to the expanded metal were done.

Equipment purchased in FY78 included a new X-ray machine and the necessary accessories; a film processor has been ordered to arrive in late fall 1978. A variety of animal cages and support equipment was ordered and is expected this fall.

A twenty unit fox cage was modified to be used in the new

FIGURE 2
ARF Building No. 448 Complex



BUILDING 448

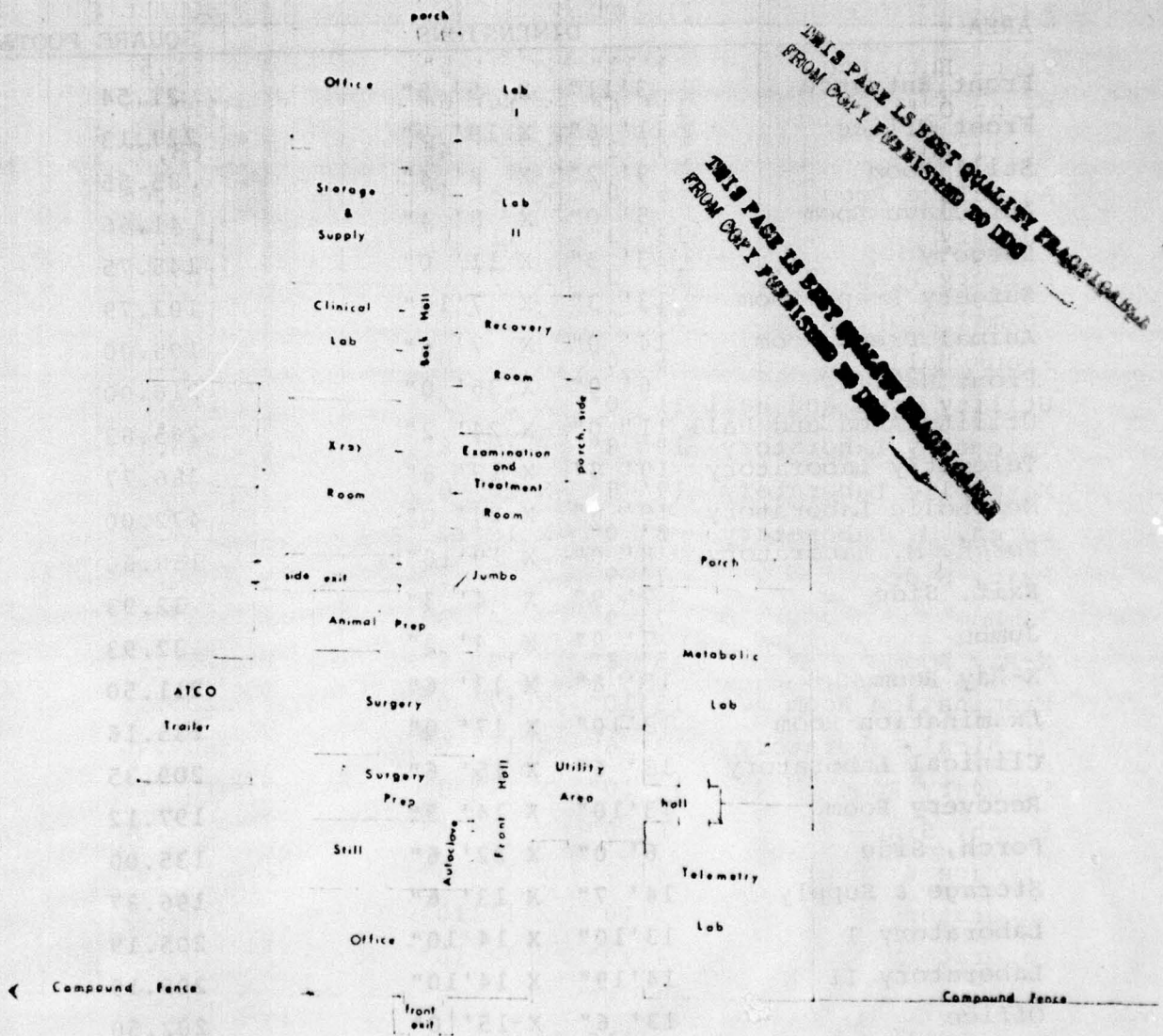
TABLE 5

Building No. 448 & associated outbuildings

Room designation and square footage

AREA	DIMENSIONS	CUBIC FEET
Freezer I	5'0" X 5'6" X 5' 6"	151.25
Freezer II	12'3" X 8'1" X 6' 6"	643.63
Freezer III	12'0" X 8'0" X 6' 6"	624.00
Freezer IV	5'0" X 5'6" X 5' 6"	151.25
Freezer V	12'0" X 8'0" X 6' 6"	<u>624.00</u>
		2,194.13
Front Entrance	6'0" X 3' 7"	21.50
Laboratory	12'0" X 20' 0"	240.00
Food Prep. Room	19'7" X 12'10"	251.32
Office/Storage	19'7" X 12'10"	251.32
Animal Room I	19'6" X 13' 4'	260.00
Animal Room II	19'1" X 12' 4"	235.36
Animal Room III	19'6" X 13' 2"	256.75
Walk-In Cold Room	16'6" X 6' 7"	108.62
Cage Wash Room	19'3" X 13' 1"	251.85
Work Shop	20'0" X 12' 9"	255.00
Exit, Passage Way	6'9" X 4' 6"	30.37
Exit, Passage Way	6'9" X 4' 6"	30.37
Bear Room I	19'6" X 36' 8"	715.00
Bear Cage I	13'0" X 28' 0"	
Tunnel	8'0" X 3' 0"	24.00
Outside Bear Cage I	40'0" X 20' 0"	800.00
Bear Room II	19'6" X 36' 8"	715.00
Bear Cage II	13'0" X 28' 0"	
Tunnel	8'0" X 3' 0"	24.00
Outside Bear Cage II	40'0" X 20' 0"	800.00
Observation Tower I		124.00
	II	120.00
	III	164.00
Barn		280.00
Aviary		2,304.00
Isolation		160.00
Bldg. 351		828.00
TOTAL SQUARE FOOTAGE		9,250.00

FIGURE 3
ARF Building No. 350 Complex



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*THIS PAGE IS BEST QUALITY TRACEABLE
FROM COPY FURNISHED TO DDA*

BUILDING 350

TABLE 6

Building No. 350
Room designation and square footage

AREA	DIMENSIONS	SQUARE FOOTAGE
Front Entrance	3'11" X 5' 5"	21.54
Front Office	11' 6" X 19' 9"	227.13
Still Room	9' 2" X 8' 4"	85.55
Autoclave Room	5' 0" X 8' 4"	41.66
Surgery	13' 3" X 11' 0"	145.75
Surgery Prep. Room	13' 3" X 7'10"	103.79
Animal Prep. Room	14' 0" X 7' 6"	105.00
Front Hall	6' 0" X 36' 0"	216.00
Utility Area and Hall	11' 0" X 24' 2"	265.83
Telemetry Laboratory	19' 8" X 19' 8"	386.77
Metabolic Laboratory	19' 8" X 24' 0"	472.00
Porch, M. Laboratory	8' 0" X 19'10"	158.66
Exit, Side	7' 9" X 4' 3"	32.93
Jumbo	7' 9" X 4' 3"	32.93
X-Ray Room	15' 8" X 13' 6"	211.50
Examination Room	13'10" X 17' 0"	235.16
Clinical Laboratory	13' 6" X 15' 6"	209.35
Recovery Room	13'10" X 14' 3"	197.12
Porch, Side	6' 0" X 22' 6"	135.00
Storage & Supply	14' 7" X 13' 6"	196.87
Laboratory I	13'10" X 14'10"	205.19
Laboratory II	14'19" X 14'10"	205.19
Office	13' 6" X 15' 0"	202.50
Back Hall	6'11" X 66' 6"	459.95
Back Porch	3'11" X 7'11"	31.00
ATCO Trailer (Offices)	38' 0" X 9' 0"	<u>342.00</u>
TOTAL SQUARE FOOTAGE		4,926.37

fox run and five metabolism cages were sent out for modification. The facility has obtained additional telemetric equipment for measuring physiological parameters in unrestrained animals.

A cell-counter was purchased for the clinical laboratory.

OFFICE AND ADMINISTRATION

Staff changes have occurred in every position at the Animal Research Facility during FY78. These changes are summarized in Table 7. The staff currently consists of a facility supervisor, one research aide, one laboratory technician, two animal caretakers and two research associates.

Both of the research positions and the laboratory technician are funded by the Office of Naval Research Biophysics Program. There is also a resident veterinarian, Dr. Michael Philo, who is a member of the U.S. Army Veterinary Corps.

A second post doctoral position was filled in January, 1978 by Dr. Mark Chappell who comes from Stanford University.

Modification to the ARF S.O.P. dealing with personnel and radiation safety, as well as changes in animal care policy concerning suspected illness in new animals were made.

In May, 1978 an experimental policy of allowing controlled tours from 3-5 pm on odd numbered Saturdays was begun. It was found that this policy prevented disruption of ongoing research

TABLE VII
STAFF CHANGES AT THE ANIMAL RESEARCH FACILITY.
 FY 1978

<u>POSITION</u>	<u>INDIVIDUAL</u>	<u>DATE OF ARRIVAL</u>	<u>DATE OF DEPARTURE</u>
Facility Supervisor	Pat Reynolds	Nov. 1, '76	Feb. 25, '78
	George Selby	Feb. 14, '78	
Research Associate	Erich Follmann	Dec. 13, '76	Jan. 6, '79
	Mark Chappell	Jan. 6, '78	Dec. 30, '78
Lab Technician	Sally Manning	Apr. 11, '77	Apr. 1, '78
	Debby Fitzpatrick	Mar. 6, '78	
Research Aide	Salena Brotherton	Nov. 3, '76	Apr. 25, '78
	Barbara Jackson	May 4, '78	
Animal Caretaker	Tim White	Aug. 8, '77	Apr. 15, '78
	Daniel Coffey	May 1, '78	
Animal Caretaker	Craig George	May 12, '77	Apr. 15, '78
	Mary Meininger	Jul 24, '78	
Summer Intern	Connie Carter	Jun 26, '78	Sep. 7, '78
C.E.T.A.	Steve Oomittuk	May 15, '78	Aug. 25, '78
	Art Oomittuk	Jun 12, '78	
Veterinarian	L. Michael Philo	July 1, '75	July 1, '79

and allowed maximum exposure for the facility to interested parties. This is now a part of the S.O.P.

The ARF took part in a local C.E.T.A. program and was able to employ two workers, Steve and Art Oomittuk. Both men have worked primarily in animal care and maintenance. Steve Oomittuk has continued on with the program on a part-time basis into FY79.

An Animal Research Facility workshop was held August 7-9, where it was decided to write a proposal with a central theme of "thermoregulation in arctic mammals." The proposal would be submitted as a five-year research plan for a total cost of about 3-450 thousand dollars per year. The funding agency identified as most appropriate was NSF; however, the package may be split and submitted to NSF, DOE and NIH.

A proposal dealing with bowhead whale research was approved and preparations begun for September. Drs. Albert, Follmann and Philo are all involved in Project Whales.

Tours of the facility were given to 292 official visitors in FY78. These included scientists, state and federal officials, military visitors and local residents of the base and Barrow. The "self-guided" tour outside the facility compound was discontinued as it caused disruptions to some research programs.

SUMMARY

The NARL Animal Research Facility is currently supporting an active in-house research program of four scientists as well

as supporting the work of several visiting scientists and operating as a logistics base for field studies. With the growth and expansion of research support capabilities, an increasing variety of arctic biological research can be supported. Because of its location, this facility offers unique opportunities for studies on arctic acclimatized and adapted animals. The NARL ARF is the only facility in North America where northern species of mammals can be and are maintained in an arctic environment with its unique temperature and light regimes. These conditions cannot be duplicated in artificial light-dark rooms or temperature chambers. The research that is done on these specialized mammals, whose physiology and behavioral processes of adaptation are highly magnified under arctic conditions, will allow a better understanding of how these same processes function in man.

APPENDIX I

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE

Veterinary Services
530 Center St. N. E., Suite 415
Salem, Oregon 97301

CERTIFIED - RETURN RECEIPT REQUESTED

Subject: Annual Reports of Research from U.S.
Government Facilities

November 21, 1978

To: Director
Animal Research Facility
Naval Arctic Research Laboratory
Barrow, AK 99723

The 1976 Amendments to the Animal Welfare Act require the submission of an annual report of research by Departments, agencies, or instrumentalities of the United States, even though such Federal agencies cannot be registered under the Animal Welfare Act. Revised section 2.28 of Chapter 1, Title 9, Code of Federal Regulations (CFR), which became effective September 15, 1977, reflects this requirement in the Animal Welfare regulations.

Each reporting facility shall submit on or before December 15, to the Veterinarian in Charge, an annual report signed by a legally responsible official covering the previous Federal fiscal year of October 1 through September 30. This report is to include information to show that professionally acceptable standards governing care, treatment, and use of animals, including appropriate use of anesthetics, analgesics, and tranquilizing drugs during experimentation are being followed by the research facility during actual research or experimentation.

Many Federal Government research laboratories have been instructed by their own Department to forward all completed copies of the annual report to their respective headquarters. However, two copies should be sent to Dr. R. L. Evinger, Area Veterinarian in Charge, USDA, APHIS, VS, Suite 415, Equitable Bldg., 530 Center St., N. E., Salem, Oregon 97301. (Telephone: 503/399-5871).

To clarify your responsibilities as outlines in the regulations, the following guidance is offered:

- (1) Method of Preparation
 - (a) Reporting facilities.

The reporting facility is that segment of the entire research facility for which an attending veterinarian or animal care committee has responsibility. This may be the entire facility

or some organizational portion, that is campus, college, school subsidiary, or department. For example, University X is the registered facility, (headquarters research facility). There are three separate campus locations--the main campus, the school of medicine, and the school of dentistry--each with an attending veterinarian and animal care committee. Each campus location would be a reporting facility for the purposes of this report. Each reporting facility will submit an original and one copy of the annual report from to the headquarters research facility.

(b) Headquarter Research Facility

The completed report from received from the reporting facility is to be signed and dated by the certifying headquarters research facility official at the lowest level of legal responsibility. His signature verifies that the report has been properly completed, signed, and submitted prior to the due date. The original is to be submitted to the Veterinarian in Charge located in the Area in which the headquarter research facility is located. Enclose one carbon copy with the original, and retain the third copy for your files.

(2) The attending veterinarian or the veterinarian on the animal care committee has responsibility to see that appropriate anesthetics and/or analgesics are used where relief of pain does not interfere with tests or experiments. It is not necessary that the veterinarian have direct knowledge of the use of such drugs for each and every experiment or procedure but he must be able to provide reasonable assurance that pain relieving drugs are being used as required by regulations. The regulations assign such veterinarians this responsibility without the liability (which is that of the institution) for the proper use of such drugs.

The research facility may wish to establish an internal reporting procedure requiring the principal investigator to report the use of appropriate pain relieving drugs or justify the lack of their use.

(3) The animal care committee has responsibility to review each research protocol to assure that neither pain or distress is experienced by the experimental animals unless the use of pain relieving drugs will hinder objectives of experiment, study or procedure.

Please distribute the enclosed VS Forms 18-23 and instructions for completion to those reporting facilities for which you are responsible. If you need additional assistance or information, please contact this office.

Sincerely,

Patricia L. Miller
Patricia L. Miller, DVM
Animal Care Specialist
Area 19

Enclosures

UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
VETERINARY SERVICES

1. DATE OF REPORT
12 December, 1978

FORM APPROVED
OMN NO. 40-8177

ANNUAL REPORT OF RESEARCH FACILITY
Required For Each Facility (Site) Where Animals Are Held

RCS # 14-VS-56

2. HEADQUARTERS RESEARCH FACILITY (Name & Address, as registered with USDA, include Zip Code)

Naval Arctic Research Laboratory

INSTRUCTIONS: Reporting Research Facility (Site)
1. Complete and submit to the nearest Area Veterinarian in Charge (AVIC) in the area where the research facility is located.
2. Submit a copy of this report to the Area Veterinarian in Charge for the state where the research facility headquarters is registered.

3. REGISTRATION NO. 96-01 research site #2
REPORTING FACILITY (Name and Address, include Zip Code)

Animal Research Facility
N.A.R.L.
Barrow, Alaska 99723

REPORT OF ANIMALS USED IN ACTUAL RESEARCH OR EXPERIMENTATION

Section 2143 of Animal Welfare Regulations requires appropriate use of anesthetics, analgesics, and tranquilizing drugs during experimentation. It is necessary to report the use of these drugs without use of these drugs must be reported and a statement explaining the reasons.

ANIMALS COVERED BY ACT	NO PAIN		PAIN AND DRUGS		PAIN - NO DRUGS		TOTAL
	Number of Animals Used Where No Pain, Distress, Or Use of Pain Relieving Drugs Was Involved.		No. Animals Involving Pain or Distress Where Appropriate Anesthetic, Analgesic, or Tranquilizer Was Used		No. Animals Involving Pain or Distress Without Use of Approp. Anesthetic, Analgesic, or Tranquilizer. (Attach brief explanation)		
A	B	C	D	E			
5. Dogs	0	0	0	0			
6. Cats	0	0	0	0			
7. Guinea Pigs	0	0	0	0			
8. Hamsters	0	0	0	0			
9. Rabbits	0	0	0	0			
10. Primates	0	0	0	0			
Wild Animals, Specify							
11. Polar Bear	1	0	0	1			
12. Wolves	0	5	0	5			
13. Arctic Foxes	3	4	0	7			
14. Red Foxes	3	0	0	3			
15. Weasles	0	2	0	2			

CERTIFICATION BY ATTENDING VETERINARIAN OF RESEARCH FACILITY OF INSTITUTIONAL COMMITTEE

I certify that the type and amount of analgesic, anesthetic, and tranquilizing drugs used on animals during actual research or experimentation were adequate and appropriate to relieve all unnecessary pain and distress for the subject animals.

16. SIGNATURE OF ATTENDING VETERINARIAN: *Michael J. Hill, VMD*
17. TITLE: Resident Veterinarian
18. DATE SIGNED: 17 Dec 78
19. SIGNATURE OF COMMITTEE MEMBER: *George Martin Selby*
20. TITLE: Facility Supervisor
21. DATE SIGNED: 14 Dec 1978
22. SIGNATURE OF COMMITTEE MEMBER: *Ray C. Hansen*
23. TITLE: Assistant Director for Science
24. DATE SIGNED: 18 Dec 78

CERTIFICATION BY HEADQUARTERS RESEARCH FACILITY OFFICIAL

I certify that the type and amount of analgesic, anesthetic, and tranquilizing drugs used on animals during actual research or experimentation were adequate and appropriate to relieve all unnecessary pain and distress for the subject animals.

25. SIGNATURE OF RESPONSIBLE OFFICIAL: *Ray C. Hansen*
26. TITLE: Technical Director
27. DATE SIGNED: 19 Dec-78

US FORM 1-73 (1/77)

PREVIOUS EDITIONS MAY BE USED

ANNUAL REPORT OF RESEARCH FACILITY

page 2

A	B	C	D	E
Marmots	0	14	0	14
Ground Hogs	0	16	0	16
Ground Squirrels	0	25	0	25
Wolverines	0	3	0	3

APPENDIX II



STATE OF ALASKA
ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

PERMIT

to

- | | | | |
|-------------------------------------|--------------------|-------------------------------------|---------------------|
| <input type="checkbox"/> | TAKE | <input checked="" type="checkbox"/> | BIRDS OR THEIR EGGS |
| <input checked="" type="checkbox"/> | POSSESS | <input type="checkbox"/> | MAMMALS |
| <input checked="" type="checkbox"/> | HOLD ALIVE | <input type="checkbox"/> | FISH OR THEIR EGGS |
| <input type="checkbox"/> | BAND OR TAG | | |
| <input type="checkbox"/> | IMPORT INTO ALASKA | | |
| <input type="checkbox"/> | EXPORT FROM ALASKA | | |

FOR SCIENTIFIC, EDUCATIONAL, OR PROPAGATIVE PURPOSES, as described below.

Issued February 2, 1978 Expires December 31, 1978
 Permit No. 78-189 Authorizing Dr. Gary Laursen
Assistant Director for Science
 of Naval Arctic Research Laboratory
 Representing Barrow, Alaska 99723

To conduct the following described activities, SUBJECT TO THE CONDITIONS, EXCEPTIONS, AND RESTRICTIONS EXPRESSED HEREON AND ON THE REVERSE SIDE HEREOF, in accordance with the "Fish and Game Code of Alaska" (Chapter 94, SLA 1959): Authority is granted to: hold and possess 5 live snowy owls for research. Dead migratory birds may be salvaged and retained at the NARL Vertebrate Museum. Federal Permit PRT 2-24 Ak must be in possession.

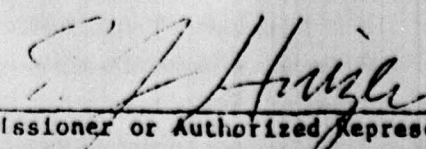
THIS PERMIT DOES NOT ALLOW PEREGRINE FALCON, ALEUTIAN CANADA GOOSE, EAGLES OR THEIR EGGS.

THIS PERMIT MUST BE CARRIED BY THE PERMITTEE WHEN OPERATING THEREUNDER and be exhibited to any person authorized to enforce state or federal laws who requests to see it. This permit is nontransferable, and will be revoked, or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit.

A DETAILED REPORT, including numbers, species, dates, and disposition of each specimen; the dates and places collected, their sex, age and breeding condition, lengths and weights of fish, and weights of birds and mammals SHALL BE SUBMITTED WITH RETURN OF THIS PERMIT WITHIN 10 DAYS AFTER ITS EXPIRATION DATE. Permits will not be renewed until such report has been received by the Commissioner.

ALASKA DEPARTMENT OF FISH AND GAME


 Division Director


 Commissioner or Authorized Representative



STATE OF ALASKA
ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

PERMIT

to

- TAKE
- POSSESS
- HOLD ALIVE
- BAND OR TAG
- IMPORT INTO ALASKA
- EXPORT FROM ALASKA

- BIRDS OR THEIR EGGS
- MAMMALS
- FISH OR THEIR EGGS

FOR SCIENTIFIC, EDUCATIONAL, OR PROPAGATIVE PURPOSES, as described below.

Issued July 25, 1978 Expires December 31, 1978

Permit No. 78-343 Authorizing Dr. Gary Laurson, Asst. Director for Science
of Naval Arctic Research Laboratory, Barrow, AK 99723

Representing Same

To conduct the following described activities, SUBJECT TO THE CONDITIONS, EXCEPTIONS, AND RESTRICTIONS EXPRESSED HEREON AND ON THE REVERSE SIDE HEREOF, in accordance with the "Fish and Game Code of Alaska" (Chapter 94, SLA 1959):

Authority is granted to collect not more than two (2) specimens of the various species of migratory birds occurring in the Barrow area:

Federal permit PRT-2-74 AK, amendment 2 must be in possession.

THIS PERMIT DOES NOT ALLOW PEREGRINE FALCON, ALEUTIAN CANADA GOOSE, EAGLES OR THEIR EGGS.

THIS PERMIT MUST BE CARRIED BY THE PERMITTEE WHEN OPERATING THEREUNDER and be exhibited to any person authorized to enforce state or federal laws who requests to see it. This permit is nontransferable, and will be revoked, or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit.

A DETAILED REPORT, including numbers, species, dates, and disposition of each specimen; the dates and places collected, their sex, age and breeding condition, lengths and weights of fish, and weights of birds and mammals SHALL BE SUBMITTED WITH RETURN OF THIS PERMIT WITHIN 10 DAYS AFTER ITS EXPIRATION DATE. Permits will not be renewed until such report has been received by the Commissioner.

ALASKA DEPARTMENT OF FISH AND GAME

Jack W. Lentzer
Acting

Division Director

Carl R. Resier
For

Ronald O. Skoog

Commissioner or Authorized Representative



STATE OF ALASKA
ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

PERMIT
to

- TAKE
- POSSESS
- HOLD ALIVE
- BAND OR TAG
- IMPORT INTO ALASKA
- EXPORT FROM ALASKA

- BIRDS OR THEIR EGGS
- MAMMALS
- FISH OR THEIR EGGS

FOR SCIENTIFIC, EDUCATIONAL, OR PROPAGATIVE PURPOSES, as described below.

Issued February 1, 1978 Expires December 31, 1978
 Permit No. 78-184 Authorizing Assistant Director for Science
 of Naval Arctic Research Lab
 Representing Barrow, Alaska 99723

To conduct the following described activities, SUBJECT TO THE CONDITIONS, EXCEPTIONS, AND RESTRICTIONS EXPRESSED HEREON AND ON THE REVERSE SIDE HEREOF, in accordance with the "Fish and Game Code of Alaska" (Chapter 94, SLA 1959): Authority is granted to:

- 1) Possess and hold alive small mammals in numbers not to exceed those necessary to conduct the laboratory's research program. *Voles, Lemmings, weasels, ground squirrels, Marmots*
- 2) Trap and hold alive foxes so that a population of 10 red foxes and 15 arctic foxes is maintained. *3. Skags*
- 3) Trap and hold alive one wolverine to maintain a population of four animals.

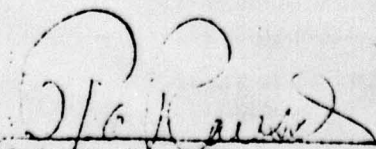
(continued)

THIS PERMIT DOES NOT ALLOW PEREGRINE FALCON, ALEUTIAN CANADA GOOSE, EAGLES OR THEIR EGGS.

THIS PERMIT MUST BE CARRIED BY THE PERMITTEE WHEN OPERATING THEREUNDER and be exhibited to any person authorized to enforce state or federal laws who requests to see it. This permit is nontransferable, and will be revoked, or renewal denied by the Commissioner of Fish and Game if the permittee violates any of its conditions, exceptions or restrictions. No redelegation of authority may be allowed under this permit.

A DETAILED REPORT, including numbers, species, dates, and disposition of each specimen; the dates and places collected, their sex, age and breeding condition, lengths and weights of fish, and weights of birds and mammals SHALL BE SUBMITTED WITH RETURN OF THIS PERMIT WITHIN 10 DAYS AFTER ITS EXPIRATION DATE. Permits will not be renewed until such report has been received by the Commissioner.

ALASKA DEPARTMENT OF FISH AND GAME


Division Director


Commissioner or Authorized Representative

Acting

Permit No. 78-184

- 4) Possess 27 wolves, 3 wolverines, 3 red foxes, 15 arctic foxes, and 1 polar bear already in possession.

Under no circumstances are any additional big game animals to be acquired or transferred without first obtaining an amended permit from the Dept. of Fish and Game.

Authority may be delegated by permittee to individuals under his supervision. Such delegation must be in writing with a copy to this office prior to beginning the collecting activities.

GENERAL CONDITIONS, EXCEPTIONS AND RESTRICTIONS

This permit is granted with the express understanding that all specimens taken under authority hereof are for deposit in a public museum or a public scientific or educational institution unless otherwise stated herein.

The holder of this permit shall keep records, available for inspection at all reasonable hours on request of any authorized representative of the Alaska Department of Fish and Game, correctly recording the required information for each item collected.

THIS PERMIT DOES NOT AUTHORIZE THE FOLLOWING:

The taking of specimens on Federal or State refuges, reserves, closed areas, parks, or monuments unless specifically stated herein.

The taking of birds, fish or mammals without such licenses as may be required by State regulations, or during the open seasons therefore, in any manner, or by any means or at any time of day not permitted by those regulations, unless otherwise stated herein.

The purchase or sale of any birds, their nests or eggs, mammals or parts thereof, acquired by virtue of this permit.

The capture or possession of live birds, game fish or game mammals unless expressly authorized herein.

REPORT OF SPECIMENS COLLECTED

Species	Specimen Number	Area Collected	Date	Sex	Age	Remarks and Disposition of specimens

Use continuation sheet if necessary

I certify that this is a true and complete report of activities as required by the terms of this permit.

Date:

11-5 Signature of Permittee



FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

NAVAL ARCTIC RESEARCH LABORATORY
BARROW, ALASKA 99723

2. AUTHORITY - STATUTES

16 USC 704
REGULATIONS (Attached)

50 CFR 21.23

3. NUMBER

PRT 2-24 AK

4. RENEWABLE

YES
 NO

5. MAY COPY

YES
 NO

6. EFFECTIVE

1/26/78

7. EXPIRES

12/31/78

8. NAME AND TITLE OF PRINCIPAL OFFICER (If not the holder)

DR. GARY LAURSEN
ASSISTANT DIRECTOR FOR SCIENCE

9. TYPE OF PERMIT

SCIENTIFIC COLLECTING

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

STATE OF ALASKA

11. CONDITIONS AND AUTHORIZATIONS

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE AND ANY PERSON WHO IS UNDER THE DIRECT CONTROL OF THE PERMITTEE. WRITTEN NOTICE OF SUB-DELEGATION AUTHORITY SHALL BE FORWARDED TO THE ISSUING OFFICER PRIOR TO ACCOMPLISHING THE PURPOSE AUTHORIZED HEREIN.

D. AUTHORIZED TO HOLD AND POSSESS FIVE (5) LIVING SNOWY OWLS FOR RESEARCH.

E. ALL DEAD MIGRATORY BIRDS SALVAGED ARE TO BE RETAINED AT THE NAVAL ARCTIC RESEARCH LABORATORY VERTEBRATE MUSEUM.

F. CARRY THIS PERMIT WHENEVER EXERCISING ITS AUTHORITY.

G. DOES NOT AUTHORIZE TRESPASS ON PRIVATE PROPERTY, NOR AREAS SELECTED FOR CLAIM BY NATIVE CORPORATIONS AND VILLAGES.

H. THE AUTHORITY GRANTED BY THIS PERMIT IS INVALID UNTIL LIKE AUTHORITY HAS BEEN GRANTED BY THE ALASKA DEPARTMENT OF FISH AND GAME, IN THE FORM OF A WRITTEN PERMIT. CONTACT DIRECTOR OF GAME, SUBPORT BUILDING, JUNEAU, ALASKA 99801.

ADDITIONAL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY

12. REPORTING REQUIREMENTS A REPORT MUST BE PROVIDED THE DIVISION OF LAW ENFORCEMENT, U. S. FISH AND WILDLIFE SERVICE, 813 D STREET, ANCHORAGE, ALASKA 99501, ON OR BEFORE JANUARY 10, 1979. THE REPORT MUST BE SUBMITTED ON A FORM 3-430A, SUPPLIED BY THE U. S. FISH AND WILDLIFE SERVICE.

ISSUED BY *Larry L. Hood*
LARRY L. HOOD

TITLE
ASS'T. SPECIAL AGENT-IN-CHARGE

DATE
1/26/78

ORIGINAL

SAC LE; ANCH LE; JUN LE; FBX LE; NOME LE;
ADFGG JUN;



FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

NAVAL ARCTIC RESEARCH LABORATORY
BARROW, ALASKA 99723

2. AUTHORITY

16 USC 703

REGULATIONS

50 CFR 21.23

3. NUMBER

PRT 2-24 AK

AMENDMENT # 1

4. RENEWABLE

XX YES

NO

XX YES

NO

5. EFFECTIVE

5/24/78

12/31/78

8. NAME AND TITLE OF PRINCIPAL OFFICER (If not a business)

9. TYPE OF PERMIT

DR. GARY LAURSEN, ASST. DIRECTOR FOR SCIENCE

SCIENTIFIC COLLECTING

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

STATE OF ALASKA

11. CONDITIONS AND AUTHORITY

A. GENERAL CONDITIONS OF THIS PERMIT ARE: TO COLLECT AND SELECTIVE BREEDING ONLY. THIS PERMIT IS VALID FOR THE PERIOD OF 12 MONTHS FROM THE DATE OF ISSUANCE. THIS PERMIT IS MADE A PART OF THE PERMIT. THE PERMITTEE MUST COMPLY WITH ALL APPLICABLE FEDERAL AND STATE LAWS AND REGULATIONS. THIS PERMIT IS VALID ONLY FOR THE PURPOSES SPECIFIED HEREIN. THIS PERMIT IS NOT VALID FOR THE COLLECTION OF ANY SPECIES OF WILDLIFE OR PLANTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONTINGENT UPON STRICT COMPLIANCE WITH ALL APPLICABLE FEDERAL, STATE, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE, AND ANY PERSON WHO IS UNDER THE DIRECT CONTROL OF THE PERMITTEE. WRITTEN NOTICE OF SUB-DELEGATION AUTHORITY SHALL BE FORWARDED TO THE ISSUING OFFICER PRIOR TO ACCOMPLISHING THE PURPOSE AUTHORIZED HEREIN.

D. COLLECT UP TO FOUR (4) EACH NEWLY-HATCHED CHICKS OR EGGS OF THE FOLLOWING SPECIES: DUNLIN, WHITE-RUMPED SANDPIPER, PECTORAL SANDPIPER, SEMIPALMATED SANDPIPER, BAIRD'S SANDPIPER, AND RED PHALAROPE.

E. ALL OTHER CONDITIONS OF THE PERMIT REMAIN THE SAME.

A REPORT MUST BE SUBMITTED TO THE DIVISION OF LAW ENFORCEMENT, U. S. FISH AND WILDLIFE SERVICE, 1011 EAST TUDOR ROAD, ANCHORAGE, ALASKA 99503, ON OR BEFORE JANUARY 10, 1979. THE REPORT MUST BE SUBMITTED ON A FORM 3-430A, SUPPLIED BY THE U. S. FISH AND WILDLIFE SERVICE.

ISSUED

Larry L. Hood
LARRY L. HOOD

ACTING SPECIAL AGENT-IN-CHARGE

5/24/78

ORIGINAL

SAC LE; ANCH LE; FBX LE; NOME LE; KET LE; ADF&G JUN;



FEDERAL FISH AND WILDLIFE PERMIT

1. PERMITTEE

NAVAL ARCTIC RESEARCH LABORATORY
BARROW, ALASKA 99723

2. AUTHORITY - STATUTES

16 USC 704
REGULATIONS (Attached)

50 CFR 21.23

3. NUMBER

PRT 2-24 AK
(AMENDMENT # 2)

4. RENEWABLE:

YES
 NO

5. MAY COPY

YES
 NO

6. EFFECTIVE

6/14/78

7. EXPIRES

12/31/78

8. NAME AND TITLE OF PRINCIPAL OFFICER (If not a business)

DR. GARY LAURSEN, ASST. DIRECTOR FOR SCIENCE

9. TYPE OF PERMIT

SCIENTIFIC COLLECTING

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED

IN THE VICINITY OF THE NAVAL ARCTIC RESEARCH LABORATORY, BARROW, ALASKA

11. CONDITIONS AND AUTHORIZATIONS

A. ALL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY OR RENEWAL OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE REGULATIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, AND FEDERAL LAWS.

C. PERMIT IS FOR USE BY PERMITTEE NAMED ABOVE AND GEORGE E. HALL.

D. AUTHORIZED TO COLLECT NOT MORE THAN TWO (2) SPECIMENS OF THE VARIOUS SPECIES OF MIGRATORY BIRDS OCCURRING IN THE BARROW AREA. ALL SPECIMENS COLLECTED ARE TO BE DEPOSITED AT THE UNIVERSITY OF ALASKA MUSEUM, FAIRBANKS, ALASKA.

E. ALL OTHER CONDITIONS OF THE PERMIT REMAIN THE SAME.

ALL CONDITIONS AND AUTHORIZATIONS ON REVERSE ALSO APPLY

ADDITIONAL REQUIREMENTS: A REPORT MUST BE PROVIDED THE DIVISION OF LAW ENFORCEMENT, U. S. FISH AND WILDLIFE SERVICE, 1011 EAST TUDOR ROAD, ANCHORAGE, ALASKA 99503, ON OR BEFORE JANUARY 10, 1979. THE REPORT MUST BE SUBMITTED ON A FORM 3-430A, SUPPLIED BY THE U. S. FISH AND WILDLIFE SERVICE.

ISSUED BY

Larry L. Hood
LARRY L. HOOD

TITLE

ACTING SPECIAL AGENT-IN-CHARGE

DATE

6/14/78

ORIGINAL

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