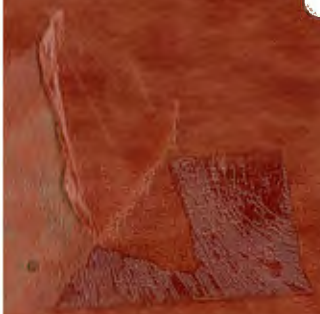
ARCTIC NATIONAL WILDLIFE REFUGE

Fairbanks, Alaska

ANNUAL NARRATIVE REPORT

Calendar Year 1991



United States Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

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REVIEW AND APPROVALS

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Refuge Manager Date

Associate Manager Date

Regional Office Approval Date

INTRODUCTION

The Arctic National Wildlife Range was established by Public Land Order Number 2214 on December 6, 1960 for the purpose of preserving unique wildlife, wilderness and recreational values. The Arctic National Wildlife Range, located in the northeastern corner of Alaska, contained approximately 8,900,000 acres. The area was withdrawn from all forms of appropriation under the public land laws, including the mining but not the mineral leasing laws. This was the culmination of efforts begun over a decade earlier to preserve this unique part of Alaska.

The National Park Service began a survey in 1949 of Alaska's recreational potential while the Navy was searching for oil and gas in the Naval Petroleum Reserve Number 4 (now National Petroleum Reserve-Alaska) and adjacent areas. The survey was directed by George L. Collins, Chief of the National Park Service's Region 4 State and Territorial Recreation Division.

Collins recommended to the National Park Service in 1954 that the northeast corner of Alaska be preserved for its wildlife, wilderness, recreational, scientific and cultural values following field work and consultation with prominent conservationists such as Olaus Murie and A. Starker Leopold. Collins also recommended that the area be an international park, to include contiguous lands between the Alaska-Canada border and the MacKenzie Delta.

There ensued a political struggle over the future of the Arctic wilderness during the next seven years. There was considerable support for such an action, but there also was strong opposition from those concerned with future industrial development in the territory and the restriction that such a designation would require. The oil industry and those branches of government that promote energy development already recognized the oil and gas potential of the area. There was some disagreement among conservationists and federal representatives over which agency should manage the land. George Collins had originally proposed a park, while Olaus Murie felt that rather than promoting "mass recreation" and related economic development, the area should be managed as wilderness by the United States Fish and Wildlife Service. It was ultimately agreed that Fish and Wildlife Service management should be sought.

Public support for establishment of the Arctic National Wildlife Range continued to grow while opposition also increased from mining interests who desired entry and Alaskan politicians who feared a growing federal role in Alaska. In the final days of the Eisenhower administration, Secretary of the Interior Fred Seaton acceded to increasing public pressure during his final days in office and signed Public Land Order 2214 creating the Arctic National Wildlife Range and closing it to entry under existing mining laws.

Opposition from Alaska's congressional delegation over the next eight years successfully blocked appropriation of funds to manage the Arctic National Wildlife Range. Funds for management of the wildlife range were appropriated for the first

time in 1969. Efforts were made during the next decade to add unreserved public lands in Alaska to the National Park, National Forest, National Wildlife Refuge, and National Wild and Scenic Rivers Systems as an outgrowth of the Alaska Native Claims Settlement Act of 1971.

President Jimmy Carter signed into law the Alaska National Interest Lands Conservation Act on December 2, 1980. This act was a compromise piece of legislation. It re-established the range as the "Arctic National Wildlife Refuge" encompassing the existing 8.9 million-acre Arctic National Wildlife Range and an additional 9.1 million-acres of adjoining lands west to the Trans-Alaska Pipeline corridor and south to the Yukon Flats (Figure 1). An area of approximately 8 million acres, comprising most of the original wildlife range, was designated as wilderness. Approximately 1.6 million acres of the Arctic coastal plain within the Refuge was opened to a limited exploration program (seismic testing) for oil and gas (Alaska National Interest Lands Conservation Act, Section 1002). Exploratory drilling, leasing, development and production of oil and gas in the Refuge were prohibited.

Section 1002 required an assessment of the resources of the coastal plain of the Refuge (Figure 2). An initial report and subsequent updates on the results of a continuing baseline study of fish, wildlife and habitat resources of the coastal plain were legislatively mandated. The results were to guide the development of an environmental impact statement and guidelines governing the seismic exploration program, and an assessment of impacts from any future oil and gas development. The legislation also required a report by the Secretary of Interior to Congress no later than September 2, 1986, on the oil and gas potential and an assessment of the impact that oil and gas development may have on the fish and wildlife resources on the Refuge's coastal plain. The report was issued in April 1987 and recommended oil and gas leasing of the entire 1002 area.

The Alaska National Interest Lands Conservation Act established the purposes of the Refuge as follows:

> (i) to conserve fish and wildlife populations and habitats in their natural diversity including, but not limited to, the Porcupine caribou herd (including participation in coordinated ecological studies and management of this herd and the Western Arctic Caribou Herd), polar bears, grizzly bears, muskox, Dall sheep, wolves, wolverines, snow geese, peregrine falcons and other migratory birds and Arctic char and grayling;
>
> (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 quantity within the Refuge.

The surface estate of approximately 83,098 acres of an authorized 92,160 acres within the boundaries of the Refuge along the Arctic coast have been conveyed to the Kaktovik Inupiat Corporation (KIC) under the provisions of the Alaska Native Claims Settlement Act. The surface estate of approximately 2,854 acres on Barter Island was conveyed to the Kaktovik Inupiat Corporation under provisions of the Alaska National Interest Lands Conservation Act. The sub-surface estate of the 2,854 acres was simultaneously conveyed to the Arctic Slope Regional Corporation. Secretary of the Interior James Watt signed an interim conveyance on August 9, 1983, to the Arctic Slope Regional Corporation (ASRC) for the subsurface estate to lands previously conveyed to the Kaktovik Inupiat Corporation aggregating 65,292 acres. ASRC is entitled to the subsurface estate of the lands conveyed to KIC as the total of 92,160 acres are conveyed. The conveyance was in exchange for the surface estate of Chandler Lake and surrounding lands, which was conveyed to the National Park Service.

An inholding of approximately 971,800 acres was added to the Refuge as a donation by the State of Alaska in 1983. A 325,000 acre block of public land was added by the 100th Congress when it enacted Public Law 110-395 on August 16, 1988.

The Refuge offers unique wildlife, scientific, recreational, and aesthetic values in the Alaskan Arctic. It is the only area where people may practicably travel on foot or by boat and traverse a full range of north slope landscapes and habitats due to the close proximity of the Arctic coast and mountains. Mt. Isto, (9,049 ft), Mt. Chamberlin, (9,019 ft), Mt. Hubley (8,914 ft), and Mt. Michelson, (8,855 ft), the four tallest peaks in the Brooks Range, are located in the Arctic National Wildlife Refuge. The Refuge contains the only extensive glaciation in the Brooks Range as well as a full complement of Arctic flora and fauna. This includes portions of the calving grounds for the Porcupine caribou herd, one of the largest in Alaska (approximately 180,000 caribou), reintroduced muskoxen, habitat for the endangered peregrine falcon, snow geese and other migratory bird species, grizzly and black bears, Dall sheep, wolverines, moose, and a complete complement of the other wildlife species common to Arctic and sub-arctic Alaska. In addition, the waters offshore of the Refuge harbor summering bowhead whales, and the coastal lagoons provide year-around habitat for polar bears and ringed and bearded seals. Other marine mammals which may be found in the coastal lagoons or offshore waters include walrus, spotted seals, gray whales and beluga whales. Polar bears den on refuge land.

Major habitat types include alpine tundra and rocky areas, wet and moist Arctic tundra, boreal spruce forest, muskeg bogs, coastal brackish lagoons, shrub thicket areas and numerous types of coastal and inland wetlands.

INTRODUCTION

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G. WILDLIFE

H. PUBLIC USE

A. HIGHLIGHTS

Intense interest on the Refuge by the national press continues. (Section H.2)

Frantic VIP schedule on the North Slope. (Section H.1)

Refuge Operational Review completed. (Section E.8)

Deputy Refuge Manager Don Voros transferred to the W.O. (Section E.1)

Underselections by villages affects the Arctic Refuge. (Section C.3)

Fairbanks breaks record for snow fall. (Section B)

Work continues on River Management Plan. (Section D.2)

Peregrine falcon survey completed with interesting results. (Section G.2)

BLM releases revised estimates of 1002 oil reserves. (Section H.1)

Volunteers man the Coldfoot Visitor Center. (Section H.6)

Staff and media float the Hulahula River. (Section H.1)

Five oil companies apply for six surface geology permits. (Section J.2)

Hunting guide permits to remain status quo for 1991. (Section H.8)

B. CLIMATIC CONDITIONS

Little accurate climatic information is available within the 30,469 square mile (19.5 million acre) Refuge. In fact, there are no sites in Alaska within 60 miles of the refuge that collect complete weather information. Two stations within the Yukon Territory, Canada, however, are representative of the meteorological conditions on the Arctic Refuge.

Weather on the north side of the refuge is most closely represented by that collected at Komakuk Beach, Yukon Territory, less than 20 miles east of the Refuge/international border.

South of the Brooks Range, the refuge experiences weather most similar to Old Crow, Yukon Territory, located about 30 miles east of the refuge border.

Yearly precipitation on the coastal plain of the Arctic Refuge averages an arid 6.5 inches. Half of this precipitation arrives as rain or snow during the 4 summer months, the rest falls as snow during the winter. Snow cover persists about 8 months of the year. Strong winds may occur during any month, but are particularly prevalent from October through February. The combination of strong winds and low temperatures, even in summer, produce extreme weather conditions throughout the year. Located on an island, the Refuge's field station at Kaktovik is more subject to maritime influence than other parts of the coastal plain. During the summer months, Barter Island is frequently fog bound when the coastal plain is clear.

A low overcast clears from the North along the Beaufort Sea. L. Van Slyke

Within and south of the Brooks Range, the climate is more typical of the northern Alaska interior, with higher rainfall and greater temperature extremes than the coastal plain. Winds are calmer and less persistent.

Tables 1 and 2 present 1991 temperature information for the Komakuk Beach and Old Crow stations.

Refuge weather this year reflected unusual spring and summer events. Above average temperatures in April and May caused rapid melting of snow on both the north and south sides of the mountains. During this time, the offshore ice also began to break up. This two-month pattern was halted in June and reversed in July and August, when unseasonably cool temperatures caused the Beaufort Sea ice pack to stop melting. Prevailing on-shore winds kept the ice pack close to shore. The continued presence of this massive ice body in the path of the prevailing summer wind continued to influence the adjacent continent with cool temperatures for the remainder of the summer. The Beaufort Sea had not retained summer ice pack this extensive since 1975.

Fairbanks (and the Refuge headquarters) experienced a very white winter in 1991. Officially, 147.3 inches of snow fell on the city (with more in the adjacent hills) breaking the old record by over 4 inches. Numerous buildings around the city collapsed due to the weight of the snow. Most of the staff experienced the fun of clearing the snow from their roofs and a few even made money at it.

C. LAND ACQUISITION

1. Fee Title

Nothing to Report

2. Easements

Nothing to Report

3. Other

Native Allotments. Until 1971, individual Natives could claim up to 160 acres, separated into several parcels, of unreserved land under the Native Allotment Act of 1908.

The Bureau of Land Management (BLM) reported one allotment parcel action within ANWR during 1991; an administrative hearing action rejected one parcel. Allotment actions by BLM have decreased greatly since 1989, when parcels claimed by 53 individuals received action. Seven parcel actions occurred during 1990. No allotment related actions were initiated by the Refuge during the year.

Table 1. Temperature (°F) data for Komakuk Beach, Yukon Territory, Canada, 1991.

Month	Min.	Max.	Average	Change from
Jan	-44	33	-11.5	2.2
Feb	-49	15	-19.2	-1.7
Mar	-49	10	-16.2	-1.2
Apr	-30	25	3.0	3.8
May	14	49	29.8	7.9
Jun	24	69	39.3	1.5
Jul	29	60	39.9	-5.6
Aug	23	69	37.4	-5.4
Sep	23	62	34.5	1.2
Oct	-4	43	17.7	2.4
Nov	-32	21	-7.9	-6.8
Dec	-37	40	-18.3	(-7.6)

Table 2. Temperature (°F) data for Old Crow, Yukon Territory, Canada, 1991.

Month	Min.	Max.	Average	Change from
Jan	-52	35	-15.3	12.3
Feb	-47	18	-18.8	3.7
Mar	-43	20	-6.1	5.5
Apr	-23	53	20.4	10.2
May	31	71	46.4	12.2
Jun	29	84	54.3	2.5
Jul	32	73	54.7	-2.9
Aug	27	71	49.0	-2.1
Sep	23	64	40.3	3.3
Oct	-22	50	16.5	0.3
Nov	-37	7	-16.1	-5.8
Dec	-45	5	-23.4	(-3.0)

Our allotment tracking and file system continued to improve through the year. Each allotment inholding is now identified in Refuge files on a 1:250,000 or larger map or recent official land plat. Information on each parcel was entered into a Lotus 123 database, enabling the allotments to be updated as needed. A composite 1:250,000 scale wall map of ANWR locating all allotment parcels is used for general locations, and more detailed, 1:63,360 maps and land plat copies for exact locations. The map also incorporates cabin, wildfire and other locations significant for management.

The Bureau of Land Management's ALRS computer records system lists 93 individuals as having active (not rejected) allotments. These 93 individuals have 147 parcels totalling 14,000 acres within the Refuge. However, many of these allotments are overlaid by regional, historical or village selections which will be transferred to Native corporations. The allotments take precedence in almost all of these conflicting selections. Thus acreage figures include multiple selections of the same area by different interests; they become non-additive and confusing. Land claims are gradually moving toward an eventual conclusion. Native allotments present a significant management problem since the owners can do virtually anything they wish with the land after it is conveyed.

Relatively few of the ANWR allotments have been conveyed and less than a handful are surveyed. However, one patented allotment, located on Old John Lake, was offered for sale in 1990. The owner, a resident of Arctic Village, was unable to obtain his price of $80,000 and is now planning to build a lodge. He is currently planning to construct a landing strip for light planes and develop the parcel to accommodate non-hunting recreational use. The lake, which lies near Arctic Village, is virtually surrounded by allotments, appearing much like a plat map for lake development.

Another allotment, which the owners say is definitely not for sale, is located along the Hulahula River within the 1002 area of the coastal plain. The Hulahula River is currently the second most popular waterway on the Refuge for river trips. It flows through a pristine area. Intense interest and numerous protests were generated by the environmental and wilderness interest groups in 1989 when the residents of Kaktovik decided to place a sizeable shelter building on the allotment, which lies adjacent to "first fish hole," a camping site used since prehistoric times. The City of Kaktovik and the allotment owner jointly obtained Refuge and State permits for mechanized access, which

is provided for by ANILCA. The building was skidded up the frozen Hulahula River by a caterpillar tractor in the spring of 1991.

This survival shelter, placed on an allotment along the Hulahula River, is visible for miles across the coastal plain. G. Elison

The Division of Realty completed an update of inholdings in 1989. Maps at the 1:250,000 scale showing sections containing inholdings were produced along with an update of the BLM ALRS system from the title plats. Correcting and updating the ALRS system has been useful to Arctic Refuge. The Refuge was furnished a set of the realty maps which serve as a general guide to inholdings, although the maps do not locate allotments even to quarter section, necessitating the Refuge system discussed previously.

Historical Sites. Notices were received from BLM on 21 actions, 7 conveyances and 14 relinquishments. Relinquishments totalled approximately 28,273 acres and conveyances 1,715 acres. All involved lands lie on ANWR's south side and consist of gravesites, caribou fences and other historical sites. No comments were necessary on any of the proposed actions.

Village Corporation Selections. The Village of Kaktovik is approximately 2,100 acres under-selected. RM Elison met with Division of Realty personnel on November 18 to discuss a method for dealing with Kaktovik under-selections on the Arctic Refuge. There will be a set period in 1992 in which the village can make its additional selections.

Regional Corporation Selections. Nothing to report.

The Alaska Submerged Lands Act Acquisition Priority System Project. The final Submerged Lands Act report, which identifies, estimates acreage, and places a priority for acquisition on all Native and state lands within conservation units, was released early in 1990. Unfortunately time constraints did not allow an update for the Arctic Refuge land status information in the report, thus the acreages shown are not correct. However, the priorities identified by parcel are valid.

Mining Claims. Bureau of Land Management records currently show 9 mining claims on the Refuge. They consist of four lode, two placer, and three mill site claims. All claim sites were located, observed, and photographed from the air this year. No mining or mill activity was identifiable at any of the sites; consequently all sites are believed to have been inactive. One mill site was investigated in detail on the ground. This site appears to be used periodically for recreation rather than mining. The Refuge and BLM are investigating the site.

Burnt Mountain Public Land Withdrawal. The Burnt Mountain Research Site is a military site, located partly within Yukon Flats and Arctic Refuges. It was established by a public land withdrawal in 1972. The site consists of small buildings and several bore holes with sensors designed to detect ground motion, such as those caused by nuclear blasts in the USSR. Automated machinery at five locations is powered by sealed nuclear energy sources. Personnel are on site only intermittently for maintenance. No emissions or other pollution sources appear to exist at the site.

While checking a permit application from the Air Force in 1990, it became apparent the site may not have been built on the land reserved by the Public Land Order but on Refuge lands. The question was referred to Realty.

Late in the year the Refuge was approached as a possible source of gravel for repairs at the site, which is having subsidence problems due

to improper construction on permafrost. No correspondence has been received after an initial telephone call.

Distant Early Warning (DEW) Sites. U. S. Army Corps of Engineers cleanup planning for the abandoned DEW sites continued during the year (see section D.4).

We welcome the cleanup project, however, because of the remoteness of the sites and competing national priorities, cleanup may be years away.

D. PLANNING

1. Master Plan

Nothing to Report

2. Management Plan

As the year began, the Refuge began to draft the River Management Plan. Initial work included staff discussions, research and a summary/analysis of the 671 responses to Workbook II, which was distributed in late 1990, and listed seven preliminary alternatives.

An internal review copy of the Draft River Management Plan was completed and forwarded to the Regional Office in late May. The draft plan was also made available to the State of Alaska. In June, RM Elison briefed the Regional Director and other key Regional Office personnel on the provisions of the plan. Other work and travel schedules then delayed the project for several months. In October ORP Edgerton, primary author of the plan, began to revise the document, incorporating review comments from the Regional Office and the state. The draft plan is scheduled to be released in spring 1992.

In January ORP Edgerton traveled to Anchorage to help the Togiak NWR staff review its final Public Use Management Plan. The review also provided information that was useful in developing the Refuge's River Management Plan.

At year's end the final version of the Refuge Wildlife Inventory Plan, completed by WB Mauer in February, was awaiting final approval. The plan consolidates all current inventory procedures and identifies additional program needs.

The Hulahula River, one of the refuge's most popular waterways.
T. Edgerton

The spring Waterfowl Law Enforcement Plan was completed and submitted to the Regional Office in April.

In July the Refuge provided internal review comments for the Draft Subsistence Environmental Impact Statement that was distributed to the public in the fall.

3. Public Participation

In October a public hearing on the Draft Subsistence Environmental Impact Statement was conducted in Kaktovik by personnel from the Service's Subsistence Division.
In March, planners from Washington, D.C. conducted a public scoping meeting in Fairbanks on the Refuge System Environmental Impact Statement, Refuges 2003.

4. Compliance with Environmental and Cultural Resource Mandates

Compatibility determinations and subsistence use evaluations were completed for all activities requiring special use permits on the refuge.

During a float trip inspection of the Hulahula River, refuge staff encountered one group of recreationists. G. Elison

The Refuge posted two abandoned military sites, Camden Bay and Beaufort Lagoon Dewline Sites. A variety of contaminants (PCB's, asbestos, hydrocarbons and organoclorine pesticides) were determined by Corps testing to be present and may exceed EPA maximum levels for human exposure. Contamination warnings were posted for area residents and visitors advising that the sites were under study. Camping, use of water and FWS activity was prohibited at the sites during the year.

RM Elison met with the Corps to review other sites they proposed to sample. The Refuge requested a 20% increase in the number of samples which included several new sites. The baseline study of contaminants continues and the Corps is developing plans for cleanup. We welcome the project, although actual cleanup may be years away due to the remoteness of the sites and competing national priorities.

ARM Weiler developed an oil spill contingency plan specifying how spills from refuge storage tanks would be handled.

Abandoned DEW site at Camden Bay. All FWS activity is prohibited due to contaminants.
M. Willms

5. Research and Investigations

In 1991, research on mammals, birds, fish, vegetation, and water resources continued within the 1002 area of the ANWR coastal plain. Work was conducted by USFWS biologists from ANWR, Fisheries, the Alaska Fish and Wildlife Research Center (AFWRC), Alaska Department of Fish and Game (ADF&G), Canadian Wildlife Service, Yukon Territory Division of Renewable Resources and University of Alaska-Fairbanks (UAF). Scientific permits were issued to seven institutions and organizations conducting geological studies, two groups carrying out biological studies, and six others whose work ranged from archaeological surveys to the collection of specimens for contaminants analysis.

6. Other

Planners from Washington D.C. met with the staff to discuss issues regarding the National Wildlife Refuge System EIS, Refuges 2003.

A. 1002 STUDIES

I. Potential impacts of petroleum exploration and development on the numbers, distribution and status of caribou populations on the arctic coastal plain.

Brad Griffith, AFWRC, Fairbanks, Alaska
Thomas R. McCabe, AFWRC, Fairbanks, Alaska
Noreen E. Walsh, AFWRC, Fairbanks, Alaska
Kenneth R. Whitten, ADFG, Fairbanks, Alaska

Ia. Population dynamics and demographics of caribou in developed and undeveloped areas of the arctic coastal plain.

The first successful census of the central arctic herd (CAH) since 1983 was conducted in late June, 1991. A stratified random sample method was used and yielded an estimate of 19,056 animals with an 80% confidence interval of 15,659-22,432. Based on a 1983 population estimate of 12,900, herd growth rate has been about 5% per year. This is equivalent to the growth rate observed for the Porcupine caribou herd (PCH) during the same period. Calf:cow ratios for the CAH in 1991 averaged 53.5:100 with no significant difference between areas east and west of the Sagavanirktok River. The average calf:cow ratios for the CAH were the second lowest recorded since 1987.

The biennial photo census of the PCH was conducted in early July, 1991. Because there were problems with photo quality, location of bulls, and non-overlap of photo transects, the census will be repeated in July 1992.

Sixteen caribou from the central arctic herd and 27 caribou from the Porcupine herd were captured in Alaska and Canada in April, 1991 and marked with radio collars to maintain sample size for the two herds.

Ib. Effect of potential displacement of caribou from the 1002 area on mortality rates of calves.

The annual PCH calving survey was conducted in late May and early June, 1991. Of the 74 monitored cows, 74.3% had calves and 25.7% were barren. This pregnancy rate was slightly lower than the 81% average for the past 9 years. Calving occurred farther west than in any previous year and 89% of collared cows calved in the 1002 area. This was the highest percentage of calving in 1002 that has been recorded. Only 18% of the calves of collared cows had died by the end of June.

Part of the Porcupine Caribou Herd near the Kongakut River. G. Elison

This was the second lowest calf mortality recorded. Half of this calf mortality occurred during the first two days of life.

Reports, papers and publications:

Fancy, S. G., and K. R. Whitten. 1991. Selection of calving sites by Porcupine herd caribou. Can. J. Zool. 69:1736-1743.

Fancy, S. G., K. R. Whitten, and N. E. Walsh. 1991. Population dynamics and demographics of caribou in developed and undeveloped areas of the Arctic coastal plain. Pages 1-18 *in* T. R. McCabe, B. Griffith, N. E. Walsh, and D.D. Young, *eds.* Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Draft Interim Report - 1988-1990.

Whitten, K. R., S. G. Fancy, and N. E. Walsh. 1991. Effect of potential displacement of caribou from the 1002 area on mortality rates of calves. Pages 19-36 *in* T. R. McCabe, B. Griffith, N. E. Walsh, and D.D. Young, *eds.* Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Draft Interim Report - 1988-1990.

Ic. Differential impacts of predators (brown bears, wolves, golden eagles) on caribou calving in the 1002 area and potential displacement areas: an assessment of predation risk.

Donald D. Young, AFWRC, Fairbanks, Alaska
Thomas R. McCabe, AFWRC, Fairbanks, Alaska
Gerald W. Garner, AFWRC, Anchorage, Alaska
Harry V. Reynolds, ADFG, Fairbanks, Alaska

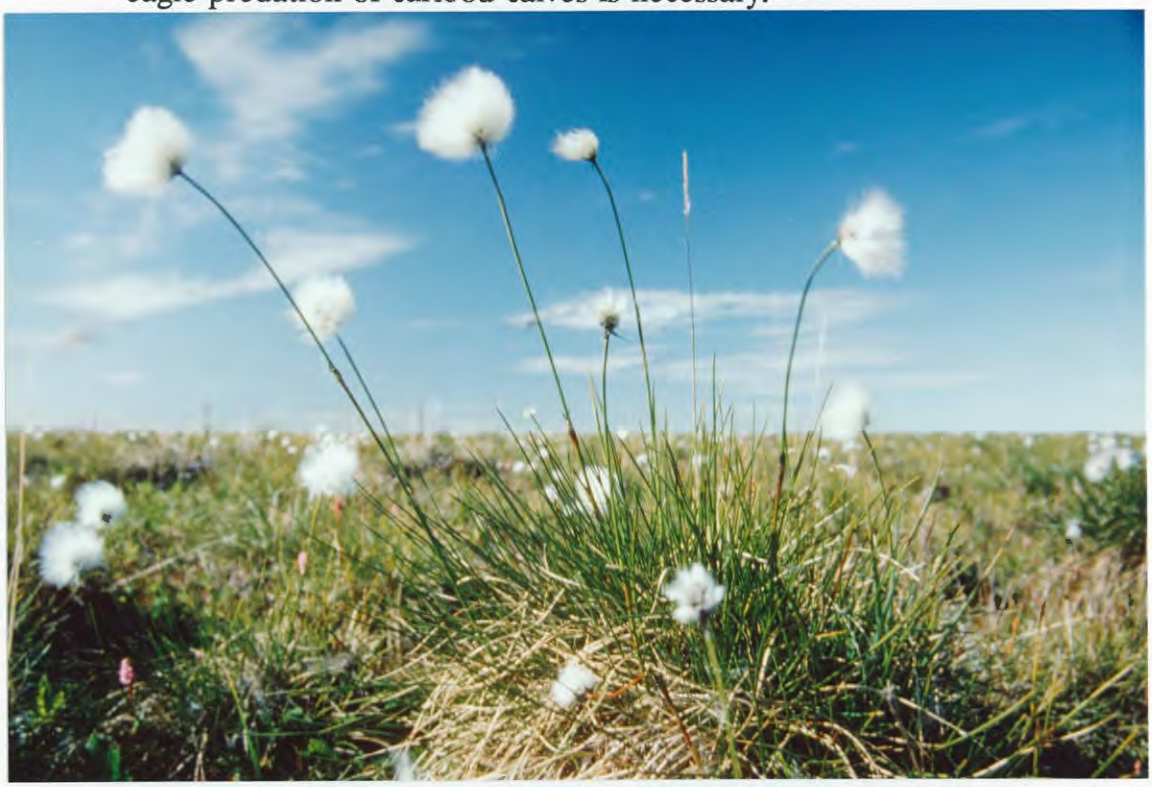
Predator research on the coastal plain of ANWR was continued through 1991 with an emphasis on brown bears. Seventeen brown bears were captured in May and late June to replace failing radio transmitters in an effort to maintain an adequate sample size. Instrumented brown bears and wolves were relocated at 5-day intervals between 28 May and 24 June and once in July/early August to assess distribution patterns and movements in relation to radio-collared caribou.

Preliminary analysis indicated that the ANWR bear population has been stable between 1982 and 1990. Analyses of bear distribution noted that collared bears were relocated in the foothill zone (300-900 m elevation) significantly more often than was expected and were located on the coastal plain and in the mountains significantly less often than was expected. The significance of greater brown bear abundance in the foothills as compared to the coastal plain relates to predation risk to caribou calves.

Spatial distribution analyses showed that brown bear spatial distribution patterns differed among years and that the distribution patterns of bears and caribou were independent during the calving period. Although spatial distribution patterns of instrumented bears and caribou were independent, the mean differences between collared caribou and bears during calving appeared to be related. Further data collection and analysis are planned to assess the calving caribou/brown bear relationship.

Only a small sample of wolves have been collared on the north slope of ANWR and monitoring of these animals has found that they were most often associated with their dens during the calving period in June. Although wolf packs with access to traditional caribou calving grounds were shown to make movements associated with calving caribou, productivity analysis indicates that pup production between wolves with access to traditional calving grounds (4.3 pups/litter) and those without ready access (4.0 pups/litter) were not significantly different.

Golden eagles, which are known to prey on caribou calves, have only been surveyed during the present 1002 studies. Nine active nests have been observed in the foothills and mountains adjacent to the coastal plain of ANWR. The number of young per successful pair (1.27) has been consistent among years (1988-1990), but is lower than that reported (1.45 - 1.5) in interior Alaska. Numerous (50-100) immature golden eagles have been observed in association with the coastal plain during caribou calving. This segment of the population has proven to be the most difficult to study. Further emphasis on the impacts of eagle predation of caribou calves is necessary.



Cotton Grass (*Eriophorum vaginatum*) is an important food item for caribou in the spring. M. Emers

Reports, papers and publications:

Young, D. 1991 Differential impacts of predators on caribou calving in the 1002 area and potential displacement areas. in T.R. McCabe, B. Griffith, N.E. Walsh and D.D. Young, eds. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Draft Interim Report -1988-1990.

III. The distribution and seasonal quality of habitat available for key wildlife species on the arctic coastal plain

III a. Snow melt, plant phenology and seasonal availability of forage nutrients and biomass in concentrated and peripheral calving areas of caribou on the Arctic Refuge Coastal Plain

Thomas R. McCabe USFWS Research
Janet C. Jorgenson USFWS Arctic NWR

A survey of phenology and biomass of major forage species was conducted June 3 to 13, during the caribou calving period. Forty-five study sites were located systematically across the historic concentrated caribou calving area and the adjacent peripheral area that has the highest probability of being used for calving if displacement from the preferred area occurs due to oil development. Each site was sampled in two time periods and data were analyzed for differences between the two areas. The results support the conclusion from three previous years of the study that important differences exist between the concentrated calving area and the adjacent area. The concentrated calving area had significantly greater biomass of tussock cottongrass flowers, the only readily available forage during the calving period. It also had significantly more sites with partial snow-cover, the condition in which plants are in earlier, more nutritious phenological stages. Diamond-leaf willow was significantly more phenologically advanced in the peripheral area, but did not leaf out enough during the study period to measure biomass. *Eriophorum angustifolium* and *Carex aquatalis*, had little new growth and showed no consistent differences between areas.

III b. Vegetation mapping from LANDSAT-TM satellite imagery data for delineating wildlife habitat availability and distribution.

Thomas R. McCabe, USFWS Research
Peter Joria, USFWS Research
Janet C. Jorgenson, USFWS Arctic NWR

Vegetation sampling was conducted in the Prudhoe Bay and Kuparuk oil field areas to acquire ground data to develop a digital satellite vegetation map of the area between the Sagavanirktok and the Ugnuravik Rivers on the arctic coastal plain. Four biological technicians collected data during July and August from 165 plots at 11 different study sites, including 51 intensive and 114 abbreviated vegetation survey plots.

Additional ground data were collected for the LANDSAT-TM scene covering the eastern part of the ANWR coastal plain. Two biological technicians collected plant cover data during July and August for 151

Wooley Lousewort (*Pedicularis lanata*) Sheep herders believed that this plant harbored lice which then infested their sheep. N. Felix

plots located at 9 study sites. These areas were chosen to contain map classes that required further information to be assigned to vegetation types. Classification and mapping of the LANDSAT-TM data for the eastern coastal plain proceeded throughout 1991. Results of a preliminary classification and accuracy assessment were used to improve the vegetation classification scheme. Classes were further evaluated by comparing map class distributions on an ERDAS computer system with color-infrared aerial photographs. Classes that did not correspond to just one vegetation type were subdivided using ancillary data such as

slope, elevation, terrain type, or proximity to pixels of known vegetation type.

Reports, papers and publications:

Janet C. Jorgenson and Mark Udevitz. 1991. The distribution and seasonal quality of habitat available for key wildlife species of the Arctic Coastal Plain in T.R. McCabe, B. Griffith, N.E. Walsh and D.D. Young, eds. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Draft Interim Report - 1988-1990.

IV. Potential effects of petroleum exploration and development on muskoxen using the arctic coastal plain.

Patricia E. Reynolds, Arctic NWR, Fairbanks, Alaska.

In 1991, a pre-calving census was flown, and radios and satellite collars were replaced on nine previously marked muskoxen and three new animals. Ground composition counts were made in early July and muskoxen were radio-tracked in February, April, May, June, August, October and November. Location and activity data were collected from 5-7 satellite collared cows every other day throughout the year. A minimum of 326 muskoxen were present in the Refuge, and about 150 muskoxen were seen west of the Refuge in April 1991. Numbers of muskoxen within the Refuge have stabilized at about 350 animals, and muskoxen are dispersing into areas east and west of the Refuge. In 1991, 53 calves per 100 cows were counted in mid June. Calves comprised 20% of the sampled population. Mean productivity during the past 5 years was 51 calves per 100 cows. Survival of calves and yearlings was estimated to be greater than 75% in 1991. Analysis of seasonal distribution and movements of muskoxen showed that the Sadlerochit River and Kongakut River are important wintering areas for muskoxen. Muskoxen have small home ranges in winter and do not move long distances during the dark cold months of mid-winter.

Reports, papers and publications:

Patricia E. Reynolds. 1991. Winter distribution, movements, and habitat use of muskoxen on potential petroleum lease areas of ANWR in T.R. McCabe, B. Griffith, N.E. Walsh and D.D. Young, eds. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Draft Interim Report - 1988-1990.

Patricia E. Reynolds. 1991. Population dynamics of muskoxen on the Arctic coastal plain: productivity and dispersal as a natural regulator of population size in the 1002 area of ANWR in T.R. McCabe, B. Griffith, N.E. Walsh and D.D. Young, eds. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Draft Interim Report - 1988-1990.

Muskox occasionally wander across the Brooks Range to the south side of the refuge. This bull was seen along the Chandalar River. F. Mauer

Patricia E. Reynolds. 1991. Seasonal differences in the distribution and movements of muskoxen in northeastern Alaska. Paper presented at the Arctic Ungulate Conference, 3-8 Sept. 1991, Nuuk, Greenland.

Patricia E. Reynolds. 1991. The dynamics of muskox social groups in northeastern Alaska. Paper presented at the Arctic Ungulate Conference, 3-8 Sept. 1991, Nuuk, Greenland.

Patricia E. Reynolds. 1991. 1991 Survey and inventory report of muskoxen in the Arctic National Wildlife Refuge. Unpub. rep. US Fish and Wildlife Service, Fairbanks, AK.

IVc. Assessment of the characteristics of muskox winter habitat in potential lease areas of the Arctic National Wildlife Refuge.

Kenneth J. Wilson, Master's degree student, UAF, Fairbanks, Alaska.

During 1991, no field work was conducted, but analysis of snow and vegetation data continued and thesis preparation began. Preliminary results indicated that muskoxen selected areas of shallow snow with maximum biomass of preferred plant species. Sedges were an important component of the winter diet.

Reports, papers and publications:

Wilson, Kenneth J. 1991. Assessments of the characteristics in potential lease areas of the Arctic National Wildlife Refuge, Alaska in T.R. McCabe, B. Griffith, N.E. Walsh and D.D. Young, eds. Terrestrial research: 1002 area - Arctic National Wildlife Refuge, Draft Interim Report -1988-1990.

Wilson, Kenneth J. 1991. The characteristics of muskox winter habitat in the Arctic National Wildlife Refuge, Alaska. Paper presented at the Arctic Ungulate Conference, 3-8 Sept. 1991, Nuuk, Greenland.

VI. Potential impacts of petroleum development on lesser snow geese staging on the Arctic coastal plain.

Jerry W. Hupp, AFWRC, Anchorage, Alaska.

In 1991, studies of snow goose staging ecology continued. A statistical model that classified snow goose feeding habitat based on vegetative characteristics was developed and tested. The model was found to accurately predict whether a tundra plant community was suitable as feeding habitat. These studies will serve as the basis for further sampling of feeding habitat availability on a larger scale in 1992. Captive snow geese were used in studies of forage intake. Analysis of forage intake data from 1990 indicated that geese consume a large amount of food (up to 25% of their body weight) on a daily basis during fall staging on the ANWR. The demand for large amounts of forage, combined with limited feeding habitat availability, suggest that snow geese require a large staging area in which to secure food. Studies of Eriophorum angustifolium revegetation indicated little regrowth during a 2-year period following removal that simulated snow goose feeding.

Reports, papers and publications

Jerry W. Hupp, and Donna G. Robertson. 1992. Forage site selection by lesser snow geese in an Arctic tundra ecosystem. Paper presented at the 7th North American Arctic Goose Conference, 9 Jan. 1992, Vallejo, California.

Alan W. Brackney, and Jerry W. Hupp. 1991. Fall diet of snow geese staging in northeastern Alaska. Manuscript submitted to the Journal of Wildlife Management.

VIII. Migratory bird use of potential port sites on the Beaufort Sea coast of the Arctic National Wildlife Refuge.

Mark A. Willms, Arctic NWR, Fairbanks, Alaska.

No field activity occurred in 1991. The first half of the year was spent analyzing data collected between 1988-90, while the second half of the year was devoted to writing. A few major findings of this study are as follows. Oldsquaw were the most abundant of the 61 bird species recorded on shoreline surveys. Largest concentrations of birds were found around the tips of barrier islands/spits and in the waters of Camden Bay southwest of Anderson Point. Selection of shoreline roosting sites appeared related to leeward protection from wind and waves. Biomass of potential food items exhibited significant temporal and spatial variation within and among marine habitats. However, no clear relationship was found between waters having the highest prey biomass and those used by oldsquaw.

Phalaropes exhibited strong annual and seasonal variability in numbers. Phalarope flocks preferred to feed within 10 m of shore. Some evidence suggests that wind and water currents locally concentrated small invertebrates such as copepods along the shore. Phalaropes apparently exploited these sites, and shifted their feeding areas as the location of these food resources changed with time.

Shorebird numbers were highest in July within wetland and riverine habitats. Use patterns by shorebirds later broadened to include most other shoreline habitats. Loons tended to use coastal wetlands and riverine sites more than other habitat types.

A final copy of this report is expected to be released in 1992 in conjunction with the 1002 interim report.

Reports, papers and publications:

Mark A. Willms. 1991. Habitat use of molting oldsquaw in relation to food availability and roosting sites. Paper presented at the Alaska Bird Conference, 21 Nov. 1991, Anchorage, Alaska.

Phillip D. Martin and Mark A. Willms. 1991. Phalaropes staging on the Beaufort Sea coast of Alaska. Paper presented at the Alaska Bird Conference, 21 Nov. 1991, Anchorage, Alaska.

IX. Fish studies in the 1002 area of the Arctic National Wildlife Refuge

IXa. Inland fisheries studies

David W. Wiswar, Fisheries Biologist, U.S Fish and Wildlife Service Fisheries Assistance Office, Fairbanks, Alaska.

In 1991, fisheries investigations were conducted in 20 tundra streams, the Sadlerochit River, Itkilyariak Creek, and 19 lakes for species composition, fish distribution, and biological characteristics. Arctic char and ninespine stickleback were the most numerous and widespread fish species in the tundra streams, although Arctic grayling and fourhorned sculpin were also captured. Juvenile Arctic char, but no young of the year or adult, were found in 12 streams, indicating that these streams are used for rearing. Two sampled lakes in the Canning River delta which were river-connected had the greatest species diversity: ninespine stickleback, Arctic char, Arctic grayling, juvenile Arctic cisco, least cisco, and fourhorned sculpin were captured. Ninespine sticklebacks were found in 16 lakes.

Arctic grayling, Arctic char, and ninespine sticklebacks were captured in the Sadlerochit River and Itkilyariak Creek, and young of the year Arctic grayling were found in the tributaries in August but not in July. By contrast, young of the year had emerged by early July in the Akutoktak River in 1989 and 1990.

IXb. Fish population characteristics of Arctic National Wildlife Refuge coastal waters, summer 1991.

Tevis J. Underwood, Fisheries Assistance Office, Fairbanks, Alaska.
Judith A. Gordon, Fisheries Assistance Office, Fairbanks, Alaska.
Laura Thorp, Fisheries Assistance Office, Fairbanks, Alaska.

During the 1991 field season, Fishery Assistance Office personnel fished nets at Camden Bay, and Kaktovik, Jago, and Beaufort lagoons during the open water season from July 12 - September 15. Heavy sea ice precluded gill net operations in the Camden Bay area. Twenty three species were collected during 1991. Catches were enumerated and fish were measured. Weights, sex, maturity, and ages were collected on five species: Arctic char, Arctic cisco, Arctic cod, fourhorn sculpin, and Arctic flounder. Large individuals of these five species were tagged with orange, numbered Floy anchor tags.

X. Water Resource Investigations, Arctic National Wildlife Refuge

Steven Lyons, USFWS Water Resources Branch, Fisheries Management Service, Fish and Wildlife Enhancement, Anchorage, Alaska.

In 1991, discharge data were collected at 10 stream gaging sites. Eight of these have been monitored for four consecutive years, and two have been monitored since 1989. Discharge rates, discharge frequency distribution, average monthly water yields, and flood magnitudes and frequencies will be calculated at the conclusion of the study period in 1992. A draft progress report documenting daily average discharge, time of maximum discharge, maximum discharge, time of minimum discharge, and minimum discharge was prepared. Record breaking maximum discharges were recorded at three stream gaging stations during a July flooding event. One record breaking maximum discharge was recorded in conjunction with spring breakup.

B. OTHER REFUGE STUDIES

I. Effects of seismic exploration activities on vegetation

The 1991 field season was the seventh year of follow-up study on effects of winter seismic exploration on plant communities of the arctic coastal plain. This year's field crew included a project leader, three seasonal technicians and a volunteer from Russia. During eight weeks of field work the study followed past years' protocol to collect data on the following aspects of disturbance: vegetative cover, permafrost depths, shrub heights and biomass and nutrient concentrations both on and off old seismic trails. Other aspects of the study included an evaluation of visual disturbance ratings, track depression analysis, and an examination of recolonizing species on the trails. After the field season, three people worked on data entry, data analysis, and identification of unknown species.

Laura Welp documents recovery of seismic trails. M. Emers

Preliminary results show recovery in those sites which had low levels of initial disturbance (usually diffuse traffic patterns in wetter habitats). Those areas showing slower or no recovery include narrow traffic patterns in shrubby habitat types and those areas which received less snow cover. Plants most affected by disturbance include evergreen shrub, mosses, and lichens. Those showing more resilience to disturbance include sedges and grasses. Thaw depths are generally deeper on disturbed areas than off the trails. In some plots on highly disturbed moist sites an increased cover of sedges and standing dead sedge leaves resulted in shallower thaw depths than control plots.

C. OTHER RESEARCH AND INVESTIGATIONS

I. Geological studies

John S. Oldow and Hans G. Ave Lallemant, Dept. of Geology and Geophysics, Rice University, Houston, Texas: a. Mapping and structural analysis of Precambrian and Paleozoic-Tertiary rocks in the Porcupine River canyon; b. Assessment of the structural relationship between the uplift and deformation of Proterozoic through Tertiary age rocks of the northeastern Brooks Range and their structural and stratigraphic

relation to formation of the Mesozoic and Tertiary basin underlying the North Slope.

Rocky Reifenstuhl, Dept. of Natural Resources, Div. of Geological and Geophysical Surveys, Fairbanks, Alaska: Geological research between the Canning and Sadlerochit Rivers and between the Egaksrak and Clarance Rivers.

James Dover, U.S. Geological Survey, Branch of Alaskan Geology, Anchorage, Alaska: Geological research on Coleen and Porcupine rivers.

Wesley Wallace, Dept. of Geology and Geophysics, University of Alaska, Fairbanks, Alaska: Geological research on the north side of the Brooks Range.

Tim Parker, Dept. of Geological Sciences, Univ. Southern California, Los Angeles, California: Paleoflood deposits along the Porcupine River.

Mark Johnson, U.S. Geological Survey, Branch of Petroleum Geology, Menlo Park, California: History and evolution of the Brooks Range foothills (Galbraith Lake area).

Nina Harun, Dept. of Geological Sciences, University of Texas, Austin, Texas: Petrography, provenance, digenesis, and origin of microporous chert of the Ivishak Formation in Ignek Valley.

II. Biological Studies

Bob Pollard, LGL Alaska Research Associates, Inc. Anchorage, Alaska: Low-level caribou surveys of the Porcupine caribou herd.

Kenelm W. Philips, Institute of Arctic Biology, University of Alaska, Fairbanks, Alaska: Collection of butterflies and moths near the Dalton Highway.

III. Other scientific studies

1. Chad P. Gubala, U.S. Environmental Protection Agency, Corvallis, Oregon: Lake sediment sampling to estimate historical patterns of pollution in the Arctic.

2. Jesse Ford and Susan Allen, Department of Fisheries and Wildlife, Oregon State University, Corvallis, Oregon: Collection of fish, ground squirrels and vegetation/soils for contaminant analysis.

3. Mary R. Farrell, Geophysical Institute, University of Alaska, Fairbanks, Alaska: Retrieval of scientific payloads and debris from rockets launched from the University of Alaska Poker Flats Research Range.

4. Rodger Leo, New England Science Center, Worcester Natural History Society, Worcester, Massachusetts: Photography and plant collection.

5. Michael Kunz and John Cook, Bureau of Land Management, Steese/White Mountain District, Fairbanks, Alaska: Archaeological survey and testing in vicinity of Elusive Lake.

6. Rob Fatland, Radar Sciences Group, Jet Propulsion Laboratory, Pasadena, California: Deployment of aluminum trihedrals used for calibrating satellite data acquisition.

E. ADMINISTRATION

1. Personnel

1. Glenn W. Elison, Refuge Manager, GM-14, Entered on Duty 8/13/89.

2. Donald J. Voros, Deputy Refuge Manager, GS-12, Entered on Duty 9/27/87, Transfer 11/1/91 to Washington.

3. Donald P. Garrett, Assistant Refuge Manager, GS-12, Entered on Duty 3/18/84.

4. Greg Weiler, Refuge Operations Specialist, GS-12, Entered on Duty 1/22/84.

5. Tom Edgerton, Outdoor Recreation Planner, GS-11, Entered on Duty 3/25/90.

6. Roger W. Kaye, Public Use-Subsistence Coord./Pilot, GS-12, Entered on Duty 12/23/84.

7. David Sowards, Pilot, GS-12, Entered on Duty 2/28/88.

8. Francis J. Mauer, Wildlife Biologist, GS-11, Entered on Duty 6/28/81.

9. Patricia C. Reynolds, Ecologist, GS-11, Entered on Duty 11/1/81.

10. Harvey Heffernan, Fish & Wildlife Biologist, GS-12, Entered on Duty 6/5/88.

11. Cathy Curby, Wildlife Biologist, GS-09, Entered on Duty 4/1/83.

12. Dave Cox, Biological Technician, GS-07, Entered on Duty 5/6/90.

13. Janet Jorgenson, Botanist, GS-12, Entered on Duty 7/28/91.

14. Julia McIsaac, Clerk-Typist, GS-04, Entered on Duty 6/2/91.

15. Donna Christensen, Office Automation Assistant, GS-05, Entered on Duty 10/28/91.

16. Sheryl Waln, Budget Assistant, GS-07, Entered on Duty 8/27/89.

17. Elizabeth Sztajer, Financial Assistant, GS-05, Entered on Duty 3/10/91.

18. Patricia Stroud, Clerk-Typist, GS-04, Entered on Duty 6/25/89 and terminate on 2/23/91.

19. Kathy Geisman, Clerk-Typist, GS-03, Entered on Duty 2/19/91 and terminate on 7/19/91.

TERM APPOINTMENTS

1a. Mark Willms, Wildlife Biologist, GS-09, Entered on Duty 7/31/90.

2a. Beverly Reitz, Biological Technician, GS-06, Entered on Duty 6/16/91.

3a. Mike Emers, Botanist, GS-09, Entered on Duty 6/7/91.

4a. James Akaran, Biological Technician, GS-07, Entered on Duty 9/8/91.

Back Row: 10, 12, 3, 6, 5, 2a
Middle Row: 1a, 4, 1, 3a
Front Row: 4a, 11, 15, 14

SEASONAL

1. Laura Welp, Biological Technician, GS-07, 5/28/91 to 11/27/91.

2. Joel Cooper, Biological Technician, GS-05, 6/16/91 to 12/15/91.

3. Robert Burckhalter, Biological Technician, GS-07, 6/10/91 to 12/09/91.

4. Christine Bossio, General Clerk, GS-04, 6/02/91 to 9/30/91.

5. Steve Barnum, General Clerk, GS-03, 6/02/91 to 9/30/91.

6. William Way, General Clerk, GS-03, 6/02/91 to 9/30/91.

7. Jeffery Rupert, General Clerk, GS-03, 6/02/91 to 7/1/91.

8. Andrew Keller, Biological Aid, GS-04, 5/22/91 to 9/21/91.

9. Janet Keirn, General Clerk, GS-03, 8/05/91 to 9/30/91.

10. Kathleen Roush, Biological Technician, GS-05, 6/02/91 to 12/01/91.

11. Laura Van Slyke, Biological Technician, GS-05, 6/16/91 to 8/30/91.

12. Mark Hare, Biological Technician, GS-05, 6/16/91 to 12/15/91.

13. Peter Clement, Biological Technician, GS-05, 6/18/90 to 6/15/91.

14. Monette Boswell, Biological Technician, GS-05, 6/18/90 to 5/03/91.

15. David Crowly, Biological Technician, GS-05, 5/06/90 to 4/17/91.

16. Odile Kramer, Biological Technician, GS-05, 6/10/91 to 12/09/91.

17. Andrew Brown, Biological Technician, GS-05, 4/21/90 to 10/20/91.

18. Linda Schultz, Statistical Assistant, GS-07, 2/11/90 to 2/10/91.

VOLUNTEERS

1. Willa and Walter Halperin, Kongakut River Monitors, June-July 1991.

2. Evelyn and Don Redfearn, Visitor Information Specialists, June-August 1991.

3. Pat King, Visual Aids Assistant, Began November 1991.

4. Alexander Badyaev, Botanist, June-January.

2. Youth Programs

Nothing to Report

3. Other Manpower Programs

Nothing to Report

4. Volunteer Program

Throughout winter 1990-91, the Refuge responded to numerous letters from people interested in volunteering. In February a request was sent to the Student Conservation Association (SCA) for a summer volunteer at the Coldfoot Interagency Visitor Center. The Refuge initially planned to select at least seven public use volunteers, including the SCA and three teams of river monitors. Scheduling conflicts and other unforeseen problems dropped the final number to four.

Volunteers were screened and interviewed in April and May. Willa and Walter Halperin from Seattle were selected to monitor public use on the Kongakut River during July (see Section H-12). Evelyn and Don Redfearn, (Don was former Refuge supervisor in Alaska) were selected to work at Coldfoot for the summer with other agency personnel (see Section H-6). The four volunteers donated approximately 1,500 hours to the Refuge's public use program during the summer, a significant drop from 1990 when the Refuge had eight river monitors and two volunteers at Coldfoot.

Two other people donated time to the Refuge this year. Alexander Badyaev from what was, at that time, the Soviet Union contributed nearly 800 hours working on botany projects with the seismic crew from late June to early August and from late September through October. Fairbanks resident Pat King began as a volunteer in November. Pat, who served as a river monitor on the Kongakut during July 1990, helped upgrade the Refuge slide/photo files and audiovisual resources.

Welcoming letters and orientation packets were sent to the public use volunteers before they started. All volunteers that worked in the field completed the training outlined in Section E-6. Public use volunteers also participated in sessions related to their public relations duties. In December, letters and certificates of appreciation were sent to the volunteers.

5. Funding

Refuge funding increased by approximately 16% in FY91 (Table 3). The total allocation was $2,014,000, with $401,000 identified for 1002 studies. A total of $249,000 was received for non-1002 projects including the Porcupine caribou herd, surveys for moose, peregrine falcons, snow geese, Dall sheep, public use data collection, contaminants, law enforcement, subsistence management and a challenge grant for computer software development. Funding in the amount of $86,000 was received for maintenance management, safety coordination and field equipment.

Table 3. Funding summary, FY 87 thru FY 91

Program	FY87	FY88	FY 89	FY90	FY91
1111		32			
1120		290	290	285	160
1221				69	
1261	687	863	1,267	890	1,127
1262	377	371	370	460	557
1411		200			92
9120				16	9
Total	1,064	1,756	1,917	1,651	2,014

6. Safety

Regular safety meetings were held during the non-field season. Safety meeting topics included winter survival, disposal of hazardous materials, radon testing, outboard motor operation and maintenance, aircraft passenger safety, AIDs, woodstove operation and maintenance, computer hazards, and cabin fever/winter depression. Safety meetings were held at the Kaktovik fieldstation for field crews. Subjects were boat, aircraft, and camp safety.

Coordination of meetings is handled by the Arctic National Wildlife Refuge with participation and responsibility for presentation shared by the six different Fish and Wildlife Service offices in the Fairbanks Federal Building.

All summer temporaries and newly hired term employees were given orientation and safety training in June. Topics included Refuge administration, 1002 overview, CPR, First Aid, camping ethics, Refuge and wildlife regulations, aircraft safety, firearms orientation and safety, and water safety. The Region Seven Bear Safety Policy was incorporated into this year's training. All summer temporaries were given 16 hours of classroom instruction on bear safety, biology, and behavior. The training also included two practical firing exercises at the shooting range.

7. Technical Assistance

Nothing to Report

8. Other

Arctic Refuge Operational Review

A complete operational review was conducted for the Arctic National Wildlife Refuge in February. The review concentrated on: 1) examining Refuge operations to ensure compliance with established policies, administrative guidelines, and public initiatives; 2) reviewing established goals, objectives, and management strategies to ensure they conformed with current policy; 3) assessing the staff's efforts to properly manage the Refuge towards attainment of Refuge objectives; and 4) providing opportunities for in-depth discussions between the Regional Office and the Refuge staff on ways to improve operations and identify situations or issues that are or may soon become management problems.

The review team consisted of Paul Schmidt, Deputy Assistant Regional Director for Refuges and Wildlife; Robyn Thorsen, Associate Regional Director; George Constantino, Associate Manager; Bill Seitz, Deputy Center Director, Alaska Fish and Wildlife Research Center; Fred Nolke, Program Coordinator; and John Martin, Refuge Manager, Alaska Maritime National Wildlife Refuge.

The pre-inspection questionnaire prepared by the Refuge staff was a great aid in preparing for the review and in focusing the team on the issues that were of greater concern. The outside interviews conducted by the review team were representative of the groups and individuals that have an interest in how the Refuge is managed and that deal with the Refuge staff on a frequent basis. Interviews included Alaska Fish

and Game, Audubon Society, Northern Alaska Environmental Center, British Petroleum, and hunting and river guides.

The review found: the staff is doing an excellent job of managing the Refuge; reports and assignments are properly submitted within deadlines; the staff is knowledgeable of Service policies, guidelines, and public initiatives and is implementing them in a proper manner; external communications were excellent with the various agencies, groups, and individuals that they deal with; the Refuge staff is composed of individuals who work well together and consistently produce excellent products, recommendations, and other work. Overall, the staff has done an excellent job of managing the Refuge in the face of one of the nation's most controversial environmental issues.

F. HABITAT MANAGEMENT

1. General

The Arctic Refuge is our nation's single repository of an undisturbed continuum of arctic and subarctic ecosystems. Management is oriented toward preserving and maintaining these systems in their original state, allowing for natural processes to continue with minimum intervention. Collection of appropriate base information on plant and animal communities is integral to current and future management requirements. There are no habitat manipulation practices currently employed on the Refuge.

Several habitat investigations are currently underway on the Refuge. A major study of the vegetative characteristics of the calving grounds and post-calving areas of the Porcupine caribou herd is being conducted by Refuge and research personnel (See Research and Investigations). Use of the Refuge coastal plain by staging snow geese is also being investigated by Research. An assessment of muskox use of winter habitat is the subject of a master's degree thesis (Univ. of Alaska). All of these efforts are oriented to provide additional information related to potential oil and gas development impacts and mitigation.

2. Wetlands

Nothing to Report

3. Forests

Nothing to Report

4. Croplands

Nothing to Report

5. Grasslands

Nothing to Report

6. Other Habitats

Nothing to Report

7. Grazing

Nothing to Report

8. Haying

Nothing to Report

9. Fire Management

Three wildfires were reported on the Refuge in 1991. All fires occurred in "limited suppression" fire management areas. The Alaska Fire Service, the fire fighting arm of the Bureau of Land Management, monitored the fires by air as time and manpower permitted and kept the Refuge informed of the fire status. Close coordination with the Alaska Fire Service was maintained by Fire Management Officer Fred Deines, Yukon Flats National Wildlife Refuge.

The first wildfire (B437) occurred on June 24 about 6 miles west of the Chandalar River (Section 23, R31N, T6E, FM). The fire was extinguished by the Alaska Fire Service after the suppression area was temporarily changed from limited to modified due to increased fire danger in accordance with the interagency fire plan. Four acres were burned.

Fire B562 started in June on the Yukon Flats NWR and burned onto the Refuge in July. The fire eventually was extinguished by weather in September after burning 123,890 acres.

Fire B709 began on July 20 and continued to burn during the remainder of the month. The location was T32N, R15E, Sec.24, just west of White Snow Mountain. A total of 22,800 acres burned by September 27, when the fire was declared out.

10. Pest Control

Nothing to Report

11. Water Rights

The Water Resources Branch of the Fish and Wildlife Enhancement Office collected information for future Federal Reserved Water Rights assertion on the Refuge with the continuation of a five-year study to measure flows of ten streams. This was the fourth year of the study. (See Section D.5.A.X. Water Studies)

12. Wilderness and Special Areas

The vastness, remoteness, scenic grandeur, wildlife, and the unexcelled opportunity for wilderness experience all combine to make the Arctic National Wildlife Refuge the nation's premier wilderness Refuge.

The Refuge contains nearly one-half of all the Congressionally designated refuge wilderness in Alaska. The approximately 8 millon acres of designated wilderness within the Arctic Refuge is more than in all refuges in the continental U.S. combined. The designated wilderness includes north slope Arctic tundra, mountain peaks, glaciers, alpine valleys, spruce forests, river valleys, and a host of diverse habitat types in these areas. It contains an undisturbed portion of the Arctic environment large enough to be biologically self-sufficient.

G. WILDLIFE

1. Wildlife Diversity

The proximity of the Brooks Range to the Arctic Ocean in northeast Alaska and northern Yukon Territory affords a unique assemblage of Arctic plant and animal communities which is repeated nowhere else in the entire circumpolar region. The southern boundary of the Refuge extends well into the northern boreal forest life zone, combining Arctic and subarctic lifeforms within a single land management unit--the Arctic National Wildlife Refuge. An example of this unusual diversity

There's a land (have you seen it?) It's the cussedest land that I know. From the big dizzy mountains that screen it, to the deep deathlike valleys below. - Robert Service G. Elison

of wildlife occurrence is the presence of all three species of North American bears - black, brown, and polar - on the Refuge. Ungulate species such as moose, Dall sheep, muskox and caribou often are found in close proximity and overlap on certain habitats. The Refuge supports the northernmost breeding populations of golden eagles and the northernmost distribution of Dall sheep in North America. The northernmost distribution of several plant species also occurs here. The Arctic Refuge supports an unusual diversity of wildlife and habitats, the majority of which remain undisturbed.

2. Endangered and/or Threatened Species

Bowhead Whale

Inupiat whaling crews at Kaktovik killed one bowhead whale during 1991. The fall migration of bowheads through the Kaktovik area was later than usual in 1991, and ice conditions were not favorable for whale hunting. On October 2, a crew under the leadership of "acting" whaling captain Lillian Akootchook, killed a whale measuring 35 feet, 4 inches. The official captain, Daniel Akootchook, (Lillian's husband),

not feeling well that day, was at home watching General Hospital on TV when his crew took the whale.

Peregrine falcon

Two surveys of the Porcupine River were conducted in 1991, one in late May to determine total nesting attempts, and one in mid-July to determine nesting success and productivity. Nineteen of 26 peregrine pairs produced a total of 46 young in 1991. Peregrines were documented at 8 new nest sites. Peregrine abundance in 1991 was substantially higher than all previous years. (Table 4). Because the two survey methodology enhances detection of nests, and since the last time it was used was 1983, part of the 1991 increase is a function of the method rather than a single year increase. Never the less, it is obvious that the Porcupine River peregrine falcon population is continuing to increase and expand to new nest sites.

Twenty-three peregrine nestlings were banded. The presence/absence of leg bands on adults was determined for 43 peregrines, and 11 (26%) had been previously banded. Band identification codes were determined for two color-banded adults, which confirmed that one was originally banded as a nestling in 1987 at a site on the Colville River, Alaska, and the other was banded as a nestling in 1988 on the Yukon River, Alaska. These records confirm that north slope and interior peregrines are mixing and suggest that a sub-species distinction may not be warranted.

Table 4. Peregrine falcon productivity, Porcupine River, Alaska 1991.

Productivity parameter	1990	1991	12 year avg.
Total pairs	16.0	26.0	13.0
Pairs with young	14.0	19.0	11.5
Total young	32.0	46.0	23.8
Young fledged/total pairs	2.0	1.77	1.83

3. Waterfowl

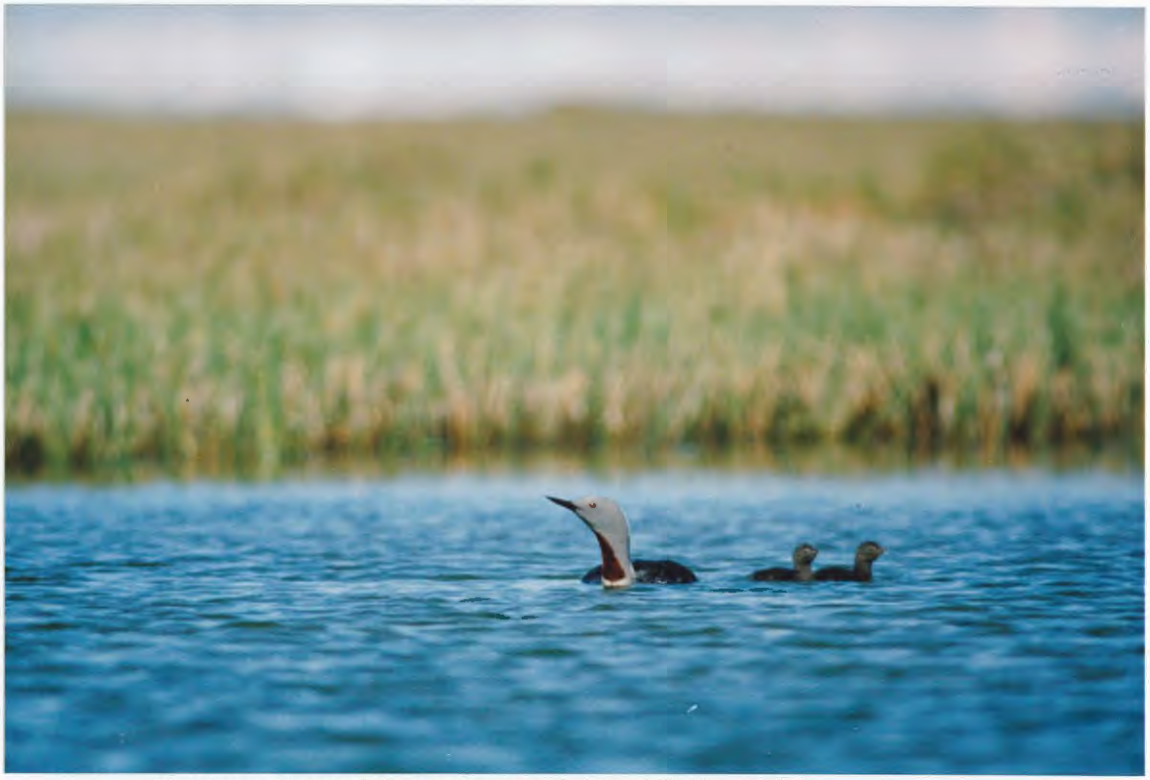
Tundra swan nesting and brood surveys were not performed this year. Staging snow geese from the Western Canadian Arctic population were first seen on the Refuge approximately 25 August. Geese remained on

the Refuge until about 10 September when freezing temperatures and snow caused most birds to depart. Due to inclement weather, aerial surveys of staging snow geese were not conducted in 1991, therefore their numbers and distribution on the Refuge are not known.

The 1991 breeding pair survey was conducted on the coastal plain of the Refuge by the Migratory Birds Office-Fairbanks in early June. It provided population indices for 8 waterfowl species. Numbers included an estimated 144 tundra swans, 172 greater white-fronted geese, 29 Canada geese, 13,251 northern pintails, 9,153 oldsquaw, 77 scaup, 207 king eiders, and 115 red-breasted mergansers.

4. Marsh and Waterbirds

The 1991 breeding pair survey conducted on the coastal plain of the Refuge by the Migratory Birds Office-Fairbanks provided population indices for 2 loon species. Numbers included 316 Pacific loons and 57 red-throated loons.



Red-throated loon and chicks on the coastal plain. J. Hollingsworth

5. Shorebirds, Gulls, Terns, and Allied Species

Nothing to Report.

6. Raptors

Surveys of raptors on the Porcupine river were conducted during late May, and mid-July (See Endangered Species, G.2). Two of 17 golden eagle nests produced a total of 2 young eagles (1.0 young/active nest). A pair of Swainson's hawks were observed at a stick nest in a spruce tree on the Porcupine River in May. There are only a few records of this species nesting in Alaska. The nesting effort was apparently unsuccessful, as no birds were observed during the July survey.

7. Other Migratory Birds

Nothing to Report.

8. Game Mammals

Caribou

Nearly all caribou of the Porcupine herd spent the winter of 1990-91 in the Richardson Mountains/Eagle Plains region of Canada. Some caribou thought to be of the Central Arctic herd wintered on the Refuge in the vicinity of the Middle Fork of the Chandalar River and the Wind River. This was the first year that significant numbers of caribou from this herd used winter ranges south of the Brooks Range divide.

The 1991 spring migration of the Porcupine herd was accommodated by moderate snow conditions enroute. Snow melt on the Alaskan coastal plain was sufficiently advanced to allow for a more westerly and northward distribution of calving than has been measured in recent years. The high density calving area extended from the Jago River on the east to Marsh Creek on the west. The southern margin of the high density calving distribution was VABM Bitty, and the northern margin was within 15 miles of Barter Island.

Most caribou calves were born during the last few days of May and June 1. The westernmost calving site of a radio-collared female caribou was the Katakturuk River, and the easternmost site occurred at the Aichillik River. No radio-collared females gave birth in Canada this year. Ninety per cent of calving sites for radio-collared adult females

occurred within the "1002" study area; currently the subject of legislative debate in Congress for possible oil and gas leasing and development. Initial survival of caribou calves was high. Mortality of new born calves (up to 48 hours old) was 9%, and an additional 9% of the calves died by the end of June. This high rate of survival (similar to that of 1990), has been associated with northerly distribution of calving where predators are less common than in areas closer to the mountains.

Large groups of caribou began to form during mid-June in the foothills region between the Sadlerochit Mountains and Schrader Lake. These groups shifted north to the vicinity of the Canning River delta in late June. Large, dense aggregations of caribou began moving east, across the Refuge coastal plain on 1 July. By 6 July, a huge aggregation of over 100,000 animals massed on the Refuge plain directly south of Demarcation Bay.

On 7 July, a snow storm moved across the north slope of the Refuge, and caribou aggregations splintered, and moved rapidly south and east into Canada. Several thousand bulls remained south of the continental divide in 1991, and there was no significant movement of bulls across the mountains, as has been the case in other years. Most of the herd stayed in Canada for the remainder of the year. It moved south along the Richardson Mountains in late summer, and completed a clock-wise movement around the Old Crow Flats by late September. In early November, the Porcupine herd was primarily in the Eagle Plains and Nahoni Mountains region of northern Yukon Territory, Canada. This is the second consecutive winter in which nearly the entire Porcupine caribou herd has remained in Canada.

Moose

Moose surveys were conducted during October on the north slope of the Refuge from the Canning River to the Dalton Highway, and during early November in the southern Brooks Range. Additional surveys were completed by Alaska Dept. of Fish and Game biologists in select forested habitats of the lower Coleen, Sheenjek and East Fork of the Chandalar Rivers. On the north slope, the Canning River area continued to show low abundance of moose calves (6 calves/100 adult cows), while calf abundance over the remaining areas averaged a moderate 28 calves/100 adult cows. This is the sixth consecutive year of poor calf abundance for the Canning moose population. The relative abundance of bulls on the Canning River improved from 36/100 cows in 1990 to 49/100 cows in 1991, suggesting that reduced harvests have occurred in recent years. On the Kongakut River, calf abundance was

Senator Tim Wirth (D-Colorado) watches caribou near the Kongakut River.
G. Elison

23/100 adult cows.

Southern Brooks range moose populations appear to be in better condition than those of the north slope. Calf abundance regionally averaged 37/100 adult cows with a high of 50/100 adult cows (Mancha Creek). The relative abundance of bulls remained high, 99 bulls/100 adult cows. Apparently the moose commonly found during surveys in the south Brooks Range during November are not subject to significant hunting pressure during the fall hunting season.

Relatively few moose were found during surveys conducted by ADF&G in the forested habitats of the Sheenjek, Coleen and East Fork of the Chandalar Rivers. Of the moose observed, calves were present at moderate abundance (29/100 adult cows) on the Sheenjek, and bulls were 46/100 adult cows. The reduced relative abundance of bulls likely reflects greater harvest pressure for moose populations in these areas. In general, the habitat in this zone appeared to be quite good and one would expect that higher densities of moose would have been found there. Additional work is planned to collect more biological

information, and to design annual moose population trend areas for this part of the Refuge.

Muskox

A total of 310 muskox were counted in the Refuge during census operations in April. An additional 143 muskox were found west of the Refuge. An incomplete fall census recorded 210 muskoxen on the Refuge, and 179 west of the Refuge. It appears that the Refuge musk ox population may have peaked in 1986 when 399 were counted in the Refuge. More muskox are dispersing from the Refuge to new habitats, and the number remaining in the Refuge has stabilized in recent years. Single adult males have been observed at several locations in the Refuge south of the continental divide, yet it remains to be seen if any viable sub-populations of muskox will become established there.

Age and sex composition counts conducted by Refuge staff in late June indicated that production of calves in 1991 was 57 calves/100 cows $\geq$ 3 yrs old, which is near the 5 year mean. The survival of calves (1990 cohort) to yearlings was estimated to be 75%. Yearling mortality was in the range of 20-30%, and was considerably greater than the five year mean (16%). Winter conditions with heavy snow on the coastal plain in 1990-1991 may have reduced yearling and adult over-winter survival.

Dall sheep

The status of the Atigun gorge sheep population was monitored by Refuge biologists for the fourth consecutive field season. Age and sex composition data for a sample of 503 sheep was collected by ground survey in mid-June. Production of lambs in 1991 was similar to 1990 (63 lambs/100 ewes in 1991, 62 lambs/100 ewes in 1990). Rams, 3 or more years old, made up 15% of the composition sample, and 1.2% were rams having horns 7/8 curl or greater. This area of the Refuge is immediately adjacent to the Dalton Highway where hunting pressure is relatively high.

In March, 1989, the Alaska Board of Game revised the minimum horn curl requirements from 7/8 curl to full curl for sheep harvested in all areas of the state except the Brooks Range, where the 7/8 curl requirement remains in effect. It is anticipated that in the near future a full curl requirement will be established for the Brooks Range (including the Refuge). This would create a uniform standard for the entire state, and improve the quality of sheep hunting opportunities in the Refuge.

The dust flies from rocks kicked loose by sheep visiting mineral licks in Atigun Gorge.
F. Mauer

Work towards establishment of a second sheep population trend area continued south of the continental divide of the Brooks Range in the Chandalar drainage. Aerial surveys were conducted in June to obtain distribution information, measure relative densities, and identify potential areas for age and sex composition surveys. Six adult females were captured and fitted with radio-collars during late September (See G-16) to augment an original sample of 15 sheep that were marked in 1990. A third trend area was initiated on the Hulahula River where 15 sheep (10 females and 5 males) were radio-collared in late September. The marked sheep of both areas will provide information necessary to define the trend area subpopulation(s), and seasonal distribution/movements relative to trend area boundaries. The ultimate goal is to establish a system of trend areas which is representative of the Refuge Dall sheep populations.

9. Marine Mammals

During October and early November polar bears were abundant along coastal areas of the Refuge. Two polar bears were harvested by Inupiat hunters at Kaktovik in 1991. (see Section G.2).

Nutrient-rich shales support abundant forge for Dall sheep near Red Sheep Creek.
F. Mauer

10. Other Resident Wildlife

Nothing to Report

11. Fisheries Resources

Fish studies of relative abundance, distribution, population dynamics, and habitat characteristics of Camden Bay, and Kaktovik, Jago, and Beaufort Lagoons were carried out for the fourth year by the USFWS Fisheries Assistance Office, Fairbanks. Another study of the spatial and temporal distribution of Arctic fishes in Refuge rivers was conducted by the same office in 1991. Both studies are described under the section on Research and Investigations (D.5).

12. Wildlife Propagation

Nothing to Report

13. Surplus Animal Disposal

Nothing to Report

14. Scientific Collections

During the 1991 field season approximately 100 plants were collected and added to the Refuge's collection. These included approximately 30 vascular plants (mostly graminoids and willows) and approximately 70 non-vascular plants (mostly mosses and lichens).

15. Animal Control

Nothing to Report

16. Marking and Banding

In 1991, mammals, birds and fish were captured and marked as part of continuing field studies in the 1002 area of the Arctic NWR and other areas of the Refuge. These studies are described in the sections on Research and Investigations (D.5) and Game Mammals (F.8).

Caribou

Sixteen caribou were captured from the Central Arctic herd and 27 caribou were captured from the Porcupine herd in Alaska and Canada in April 1991 and fitted with radio-collars.

Dall sheep

Twenty one Dall sheep were captured between 26 September and 1 October 1991 in the Brooks Range along the Hulahula River, Water Creek, Spring Creek, Cane Creek, Flat Rock Creek, and the East Fork of the Chandalar River. Four were ewes aged 1-3, seven were 5 year old ewes and five were ewes aged 6-11. All five rams captured were between 1 and 2 years of age. The sheep were collared with conventional radio-collars and red visual collars with yellow numbers.

Muskox

Twelve muskoxen were captured and collared in and near the coastal plain of the Arctic NWR in April 1991. Eight were recollared cows, three were cows captured for the first time and one was a young bull. Satellite-collars were deployed on five cows. The other seven were

Base camp for Dall sheep capture operations on the Chandalar River. F. Mauer

marked with conventional radio-collars.

Brown bear

Eighteen brown bears were captured in the Arctic NWR in May and June 1991. All were captured between the Canadian border and the Jago River on the north side of the Brooks Range. Collars were replaced on all 18 of these bears. Eight were adult females, two were 3 year old females and eight were males, age 4 or older.

Peregrine falcon

Twenty-three peregrine falcon nestlings were banded along the Porcupine River between the U.S.-Canadian border and Graphite Point from 13-16 July, 1991. Birds were banded by Refuge biologist Fran Mauer with size 7A aluminum leg bands. Band numbers 1807, 005, 46-68 were used. The nestlings were estimated to be 10 -25 days old. Sex was undetermined.

Fish

Fisheries Assistance Office biologists, working in Camden Bay, and Kaktovik, Jago and Beaufort Lagoons, tagged with orange numbered Floy anchor tags the following; Arctic char (996), Arctic cisco (290), Arctic flounder (143), and fourhorned sculpin (189).

17. Disease Prevention and Control

Nothing to Report

H. PUBLIC USE

1. General

Tours

Senator John Seymour (R-Ca.) toured the Coastal Plain on April 6th. He was accompanied by Jim O'Toole (Senate Energy Committee staff), Warren Matumeak (NSB), Tom Cook (Chevron), and RM Glenn Elison.

RM Elison met on May 22 with the Northern Alaska Environmental Center, to discuss the 1002 program and VIP tours on the Refuge. The environmental community has long criticized orientation trips for Congressional members. They contend that their interests are not adequately represented. The Service doesn't agree.

On July 2, DRM Voros accompanied a Congressional Staff tour, and on the following two days he was host to the Secretary of Energy.

RM Elison toured the 1002 area with Senator Tim Wirth (Colorado) on July 5-6. The Senator was able to see approximately 130,000 caribou from the air and ground, plus other assorted wildlife.

On July 9 RM Elison accompanied Dana Rasmussen, EPA administrator for the Northwest Region, and other EPA staff on a coastal plain tour.

On July 21st RM Elison toured the 1002 area with DOI Assistant Director for Environment, Ralph Morganwick.

On July 24th DRM Voros toured the 1002 area with Lt. Governor Coghill and a group of State Legislators.

Senator Baucus takes in the view from 4,000 feet above Peters/Shrader Lakes. G. Elison

On the 29th of July, RM Elison hosted a group of state legislators on an overview of the Refuge.

On August 5-6, Senator Baucus (D-MT) and staff toured the refuge.

On August 7, Senator Stevens (R-AK), Senator Biden (D-DE), Senator Grassley (R-IA) and staff toured the coastal plain. Later that day Congressman Peterson (MN) toured the coastal plain.

On August 8-9 a large group from the House Merchant Marine Committee toured the refuge and Prudhoe Bay. Members included Tallon (D-SC), Unsold (D-WA), Anderson (D-CA), Jefferson (D-LA), Abercrombie (D-HI), Weldon (R-PA), Herger (R-CA), Goss, (R-FL), Hastert (R-IL).

On August 13, the Comptroller General, James Duffus, and his staff toured the 1002 area.

On August 26, Congressmen Synar (D-OK), Harris (D-AL), Klug (R-WI), Barton (R-TX), and staff toured the 1002 area.

On August 27, Scott Sewell, Director, Minerals Management Service toured the refuge.

On August 28, Congressmen Marlence (R-MT), and Laughlin (D-TX) toured the refuge.

On August 30, Tom Weiner, Chief of Staff to Secretary Lujan; Mike Hayden, Assistant Secretary, FWP; and Jim Fitzhenry and Gary Blumenthal, White House staff toured the refuge.

In early June, a crew from ABC World News Tonight spent most of a week fog bound at Kaktovik. They were unhappy campers.

The American Oceans Campaign staff, including its founder Ted Danson (a.k.a. Sam Malone, Cheers) toured Prudhoe Bay and the Refuge coastal plain on September 15-16.

Alaska Governor Walter Hickel is interviewed by CBS's 60 Minutes. D. Voros

Media

Several free-lance writers visited Kaktovik and the coastal plain in 1991. Some of their articles are included in the appendix.

A film crew from KING-TV (NBC) in Seattle toured the Coastal Plain and Wilderness area on April 25. They obtained video which was aired in mid-May.

On May 23-25, Elizabeth Arnold, National Public Radio in Washington, D.C., visited Kaktovik, but bad weather prevented any overflights of the coastal plain.

RM Elison, WB Heffernan, ORP Edgerton and Fairbanks Daily News-Miner reporter Kelly Bostian floated the Hulahula River on the north slope of the Refuge from June 18-26 (See section H.12). During July the News-Miner printed three news articles as a result of the trip.

During June RM Elison or DRM Voros participated in field tours/briefings of the 1002 area for the Public Policy Group staff, radio talk show hosts, CNN, Governor Hickel, CBS's 60 Minutes and MacNeil/Lehrer. They also briefed Tom Sansonetti, Department of Interior Solicitor, and Mike Bear, Federal Inspector for the Federal Natural Gas Transportation System.

Meetings

ORP Edgerton met with BLM and NPS personnel on January 14 to discuss the content and development of a standard interagency slide show for use by personnel working at the Coldfoot Visitor Center during the summer.

On February 27th, ORP Edgerton met with other agency personnel to talk about implementing monthly "round-table" discussions about public use issues. The first and only meeting occurred in March.

In March, RM Elison spoke to a gathering of British Petroleum (BP) executives about the Service's perspective on the 1002 issue. BP had assembled key staff from around the world in Anchorage to focus on the coastal plain issue.

RM Elison met with BLM and 1002 office personnel to discuss the recent reassessment of oil potential of the 1002 area. BLM released information in February that increased the estimated mean recoverable oil on the 1002 area from 3.2 to 3.6 billion barrels and the probability of finding oil from 19% to 42%.

On March 28, ORP Edgerton participated in a meeting with personnel from the State and BLM to discuss the State's Comprehensive Outdoor Recreation Planning effort.

On April 4th, Service personnel from Arctic, other interior Refuges and the Regional Office met with BLM staff to learn about and discuss agency interpretive needs and plans for the Dalton Highway Corridor and the Coldfoot Visitor Center.

Manager Elison attended a meeting with Fairbanks Project Leaders and Associate Manager Constantino to discuss an initiative for public outreach/environmental education in Fairbanks. Elison later coordinated development of a funding initiative.

Manager Elison attended the North Slope Borough Fish & Game Management Committee meeting in Barrow April 11th. He briefed the committee on the Service's upcoming research efforts on the Arctic Refuge and discussed spring waterfowl enforcement policy.

On May 3rd, personnel from Arctic, other interior Refuges and the Regional Office met with BLM staff to be briefed on and provide input to the nearly-completed Dalton Highway Recreation Area Management Plan. Formal input was later provided through a memorandum from the Regional Director.

ORP Edgerton represented the Service at a planning meeting with BLM and NPS personnel on May 24 to discuss future facility needs of the three agencies at the new Marion Creek site north of Coldfoot.

ARM Weiler met with the Kaktovik village council in May. He briefed the council on the Refuges upcoming research efforts and discussed the spring waterfowl enforcement policy.

In October, ORP Edgerton met with BLM personnel to brainstorm and discuss ideas for a training package to be developed for tour bus drivers operating on the Dalton Highway.

On September 13, ORP Edgerton attended a meeting in Anchorage to help brainstorm and discuss concerns about the Service's environmental education program. The information gathered was used to help the new Office of Training and Education in Washington develop a national education plan to submit to Director Turner.

RM Elison participated in a meeting on October 4 with the Alaska Visitor's Association. The group explored opportunities for increased tourism on public lands.

On October 23, ORP Edgerton attended a meeting at the Regional Office to help identify and clarify Region 7's environmental education policies, objectives and activities. The meeting was a follow up to the Service's National Environmental Education Workshop held in St. Paul in late September.

ARM Weiler attended a public hearing on the draft subsistence EIS in Kaktovik on October 28. The meeting was conducted by Jim Kurth, Cheryl Cline, and Bob Seemel from Subsistence Division. Eleven people were present during the presentation by Kurth and the following question and answer session. Only five people gave statements for the record. Overall the subsistence team did a very good job and the meeting went smoothly. Attendance was high considering that many people were out of the village.

Presentations

In late February, Ann Rappaport from the Regional Office presented a Refuge slide program (put together by the Refuge) at an Anchorage conference on the Refuge oil and gas issue.

In March, WB Patricia Reynolds presented a talk on muskox studies to the student chapter of the Wildlife Society and a lecture to the wildlife 101 class at the University of Alaska-Fairbanks on wildlife studies being conducted in ANWR. RM Elison presented the Service's perspective on the 1002 issue to a group of British Petroleum executives gathered in Anchorage.

On April 12th, ORP Edgerton delivered a presentation and answered questions about the river planning process for a natural resource planning class at the University of Alaska.

On May 2, RM Elison briefed James Meisner, Regional Director, Government Accounting Office, on the 1002 program. On the 30th, he gave a briefing about Arctic Refuge programs and participated in a discussion about management of the Refuge System with a panel assembled by Defenders of Wildlife to look into management of the Refuge System.

ORP Edgerton conducted a one-hour program for 22 students in a natural resource planning class at the University of Alaska on October 16. The program, which focused on how recreation fits into the mission of the Fish and Wildlife Service, included a valuable question and answer session about the Refuge's river management planning process.

On November 4, Pilot Kaye made a three-hour presentation on public involvement in planning to a graduate seminar at the University of Alaska.

Dalton Highway Corridor (Haul Road)

In 1991, the Arctic Refuge increased its involvement in the interagency planning and management efforts for the Dalton Highway Corridor and the Coldfoot facility. From June 10-12, ORP Edgerton traveled the Dalton highway with two other Service employees and three BLM Staffers to discuss specific interpretive needs and potential sites along the road north of the Yukon River.

In late July, ORP Edgerton joined BLM employee Jan Burris on a two-day bus trip, courtesy of Princess Tours, from Fairbanks to Prudhoe Bay. The purposes of the trip were to obtain first-hand knowledge of the needs and interests of the average Dalton Highway bus tourist and to find out what information the tourists were receiving on board the bus and from the oil companies at Prudhoe Bay. The information will be used when planning and developing interpretive waysides and kiosks along the Dalton highway.

Other Activities

BT Dave Cox represented the U.S. Fish and Wildlife Service and Region 7 at the Pacific Northwest Sportsman Show during February 6-10 at Portland, Oregon. The purpose of the involvement by Region 7 was to inform the public about the mission of the Service, and the opportunities available to them on Alaskan Refuges.

Throughout the year the Refuge responded to nearly 300 letters, telephone calls and personal requests for information about Refuge resources, visitor opportunities and issues such as oil development. Standard letters and an item check-off sheet were used to facilitate quick responses to visitor inquiries with minimal staff time. Three Freedom of Information Act requests were also handled, complete with file searches and copying of documents.

2. Outdoor Classrooms - Students

Nothing to report.

3. Outdoor Classrooms - Teachers

Nothing to report.

4. Interpretive Foot Trails

Nothing to Report

5. Interpretive Tour Routes

Nothing to Report

6. Interpretive Exhibits/Demonstrations

Coldfoot Visitor Center

The Coldfoot Interagency Visitor Center serves as an information center for bus tourists and others traveling the Dalton Highway. The center offers exhibits, interpretive programs, a variety of free publications and a small sales outlet of the Alaska Natural History Association (ANHA). The center was open June 10th - September 10th from about 1:00 p.m. to 10:00 p.m. During that time 3,216 visitors came to the center, only slightly more than in 1990.
This was the third year that the Service worked with BLM and NPS to staff and operate the center. Don and Evelyn Redfearn volunteered for the Service from June 3 to August 21st. They did a superb job serving the public, improving the visitor center and grounds, and otherwise helping to ensure the smooth operation of the facility. This year the Refuge housed the volunteers in a brand new 30-foot two-bedroom trailer parked at the nearby Coldfoot Services campground.

In late June, BLM personnel arranged for the Redfearns to join a commercial bus tour from Coldfoot to Prudhoe Bay. The trip provided the couple with valuable information and a perspective which helped them conduct evening programs for the tour groups.

Fairbanks Public Lands Information Center (FPLIC)

The FPLIC, which has an impressive array of exhibits applicable to the Refuge, provides visitors with information and brochures about various

Volunteer Don Redfearn talks to visitors at the Coldfoot Interagency Visitor Center.
G. Elison

public lands in Alaska, including the Arctic Refuge. The center also hosts a variety of programs (lectures, slide shows, children's activities and movies) throughout the year and is a popular stop for tourists and local residents.

On May 20th, ORP Edgerton delivered a 20-minute slide program about the Refuge for FPLIC employees and other Federal employees. The program was part of a 3-day seasonal, interagency training session hosted by the FPLIC.

Other Activities

BT Cox and ORP Edgerton set up and helped staff an information booth at the first annual Interior Sportsman's Show at the Carlson Center April 19th-20th in Fairbanks. The Service cooperated with the State Department of Natural Resources, Alaska Department of Fish and Game, and the FPLIC in operating the booth. Although hundreds of people were contacted, they were primarily interested in obtaining the 1991 Alaska Fishing Regulations.

WB Curby, BA Waln and ORP Edgerton planned and coordinated the Service's booth at the Tanana Valley State Fair held August 10th-17th. A total of 19 employees from five offices helped staff the booth, which was much simpler than in past years. The booth utilized an exhibit about Alaskan Refuges from the Regional Office and had lots of open floor space for visitors to look around, browse through the brochure rack and talk with Service employees. WB Curby added some artistic humor related to the fair's theme ("Days of Swine and Roses") which was appreciated by fair-goers. The Service also sponsored a contest centered around an aerial census photograph of part of the Porcupine caribou herd. Fair-goers were invited to guess the number of animals in the photograph and win one of several prizes donated by ANHA. The contest was the single most important change to the fair booth this year because it acted like a magnet for visitors to the booth. Nearly 1,400 people participated in the contest. All totalled, Service personnel contacted nearly 3,000 fair-goers (almost three times the number during 1990), distributed a good amount of written material and sold 12 duck stamps.

In 1990 the Refuge received a challenge grant under the America the Beautiful Wetlands Initiative to create an interactive computer program to inform elementary school children about the tundra ecosystem. The Service's grant of $20,000 is being matched by a generous donation of $23,000 in time and technical expertise from Monarch Software of Fairbanks. Significant progress was made on this project during the year. In the spring, WB Curby developed and distributed for comment the preliminary script for the software. During the summer, she accompanied Mike and Barbara Kelly, owners of Monarch Software, on several trips to the Refuge to videotape wildlife and habitat scenes to use in the software. Contract design of the packaging and diskette labels was completed in the fall. At year's end, editing and refinement of the draft scripts was progressing, in preparation for graphic and speech digitization and the programming of the final product. Since this is the first time the Service has created a software package, there are no set project standards, including the use of forms and necessary approvals. As a result, coordination of the project with the Regional and Washington offices has been unduly confusing and time-consuming.

In November, ORP Edgerton helped Regional Office personnel review and refine the text and layout of a new fire management exhibit to be used by field stations.

7. Other Interpretive Programs

February - ORP Edgerton was interviewed by two students from the University of Alaska-Fairbanks seeking public use management information for class research projects. WB Curby and Ecologist Reynolds judged the Alaska Science Fair for the Fairbanks School District. WB Curby also judged the local Science Fair at Ryan Junior High School.

March - RM Elison gave a presentation about the Arctic Refuge to a local cub scout group.

April - On the 29th, WB Curby gave three 20-minute presentations about wolves to fourth graders at Twin Bears Recreational Camp, located near Fairbanks.

May - While on detail as Refuge Manager of the Selawik NWR, ARM Garrett presented a program about oil and gas exploration on the Arctic Refuge to the fifth grade class at the Kotzebue Elementary School. WB Curby traveled to Twin Bears Camp twice to present six 45-minute talks to fifth graders about wolf behavior and rabies. She gave a similar program to a class of second graders in Fairbanks on May 1. Pilot Kaye made a presentation to Kaktovik Middle School students on Refuge projects.

July - Early in the month, ORP Edgerton conducted a one-hour program for 23 high school students involved in a six-week field study of the Arctic Refuge and the oil development issue. The study, sponsored by the Institute for Global Awareness from Wyoming, is an annual event that involves students from across the United States.

September - On the 3rd, ORP Edgerton gave a one-hour presentation about the Refuge and the 1002 issue to 40 people involved in the local Elderhostel program sponsored by the University of Alaska.

8. Hunting

Sport hunting is one of the most popular recreational activities on the Refuge. Hunting use has grown steadily during recent years, although the number of persons hunting Arctic Refuge's most popular species, Dall sheep, decreased in 1990 and 1991. We speculate this small decrease may be a short term aberration more indicative of the economic status of hunters than a change in the general trend. The overall number of non-resident hunters, who are required by State law

to have a guide when hunting sheep or brown bear, are limited by the Service's interim guiding policy.

Hunting within ANWR by both non-resident and resident hunters is predominantly for Dall sheep, grizzly bear, and moose. Multi-species hunts are quite common with some guides, especially those catering to European hunters. Occasionally caribou or black bear are the primary species being sought, but most commonly they are of secondary interest. Wolf and wolverine are occasionally taken while hunters are seeking other species.

Dall Sheep

Dall sheep is the premier species attracting hunters to the Refuge. Perhaps nowhere else in the world are large numbers of this animal found under such favorable hunting circumstances. However, the maximum size of Brooks Range rams is usually less than rams found in more southerly Alaska areas, such as the Chugach and Alaska mountain ranges.

The 1991 sport sheep hunting season for 7/8 or larger curl rams began on August 10 and ended on September 20. Subsistence hunters were allowed three sheep from October 1 through April 30.

Sheep sport hunter and harvest numbers from Alaska Department of Fish and Game's voluntary harvest reports for the 1970-1991 period are shown in Figure 1. Few additional reports are expected, although the 1991 information shown in the graph is preliminary. Generally late reports are from unsuccessful hunters, thus the number of reported hunters may increase somewhat but the number of sheep taken should increase very little.

A minimum of 312 sheep hunters reported hunting in the Refuge during 1991. This number has increased steadily since 1970. Sheep hunt success decreased from approximately 70% during 1970-1989 to 59% in 1990, and 56% in 1991 (Figure 2). Several factors are likely responsible for the decline. The number of walk-in hunters using Refuge lands adjacent to the Dalton Highway increased from 19 in 1989 to 48 in 1991. Hunt success in this part of the Refuge has been relatively low for several years. There has also been a disproportionate increase in hunter density at certain convenient air access points such as the Canning River during the past 7 years (Figure 3.). Hunter success on the Canning River has been correspondingly less than in other areas of the Refuge such as the Hulahula River where hunter density

Figure 1

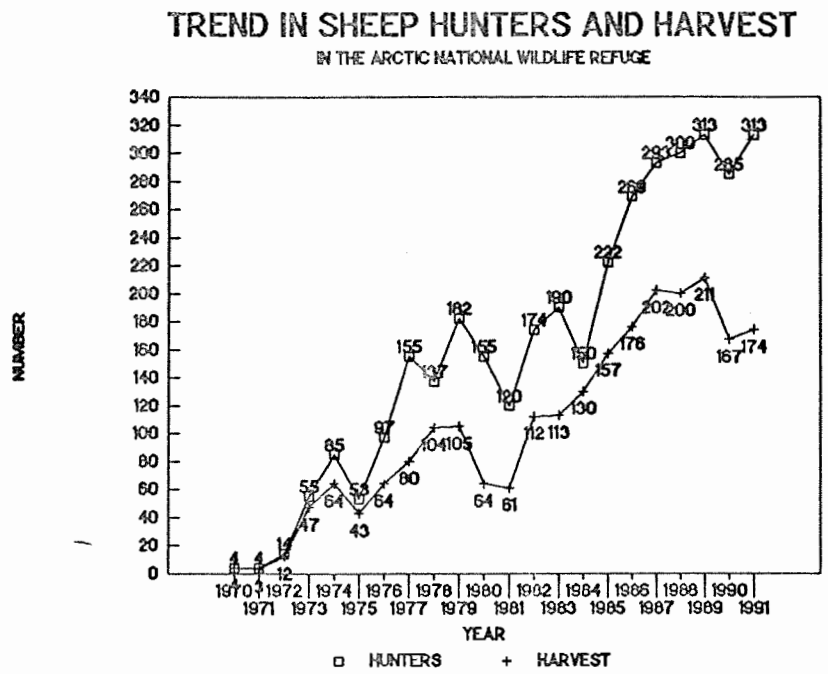


Figure 2

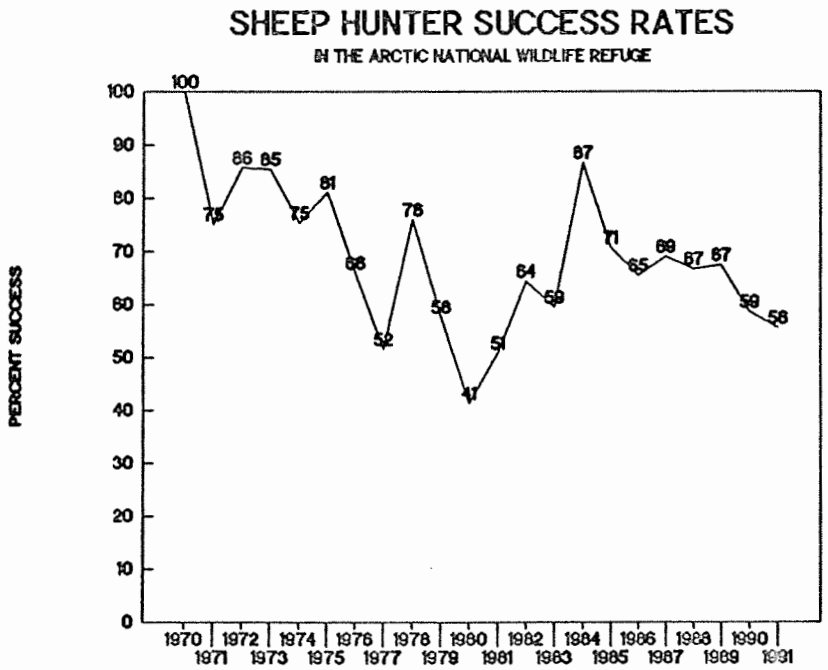


Figure 3

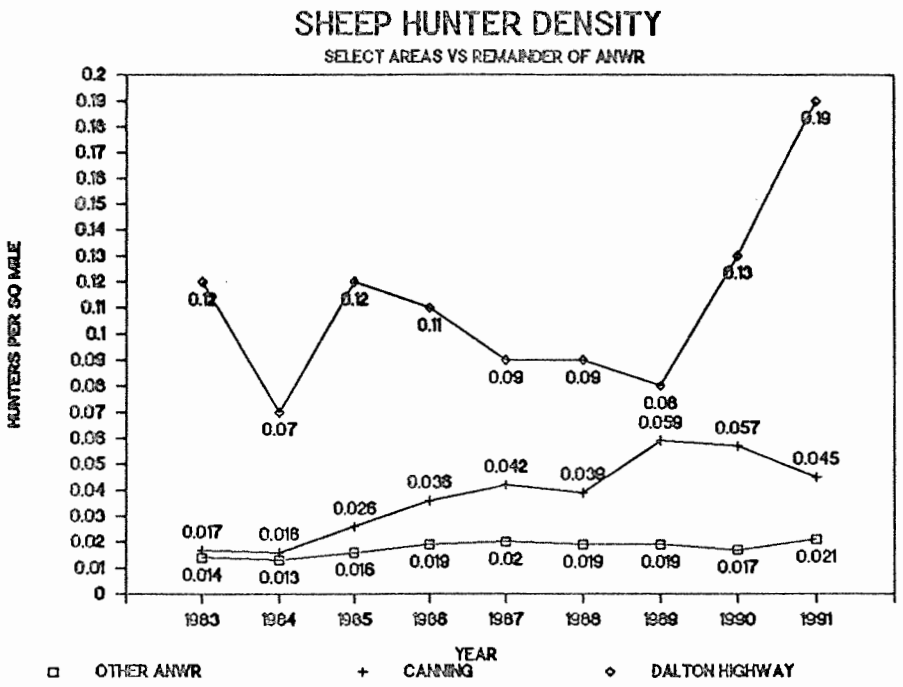
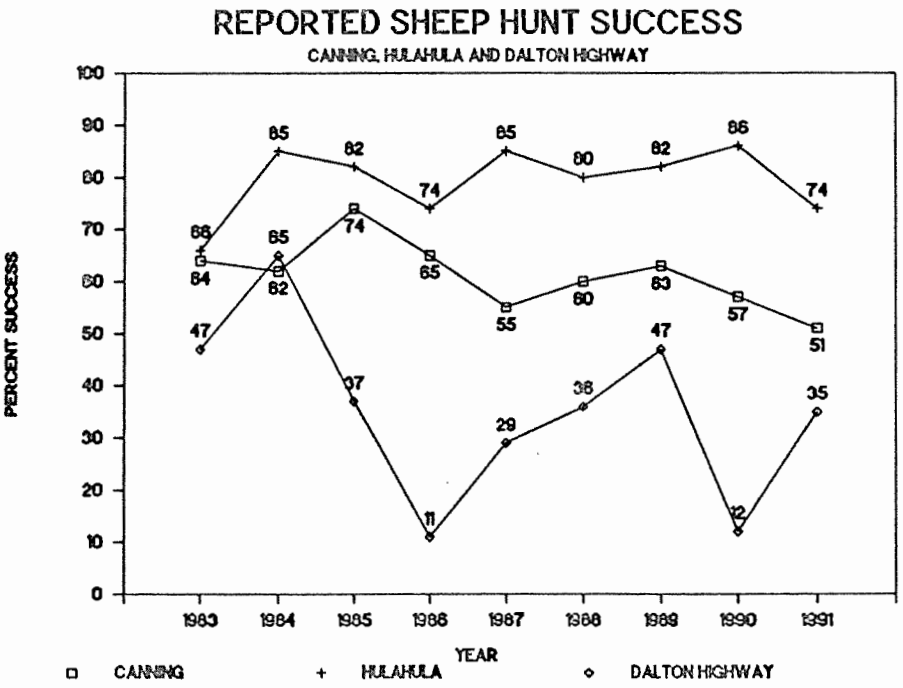


Figure 4



remained stable. (Figure 4.) In addition, the number of winter killed sheep reported suggests that sheep mortality was higher than the average in some areas of the Brooks Range during the winter of 1990-1991. Reduced abundance of mature rams may have had a negative effect on hunter success in those areas.

The subsistence sheep season for the 1990-91 regulatory year (July 1-June 30) continues through April 30. Subsistence sheep are taken on the Refuge by residents of two villages which lie in close proximity to the Refuge. Estimates at this time are less than 10 sheep taken by Arctic Village and less than 15 for the village of Kaktovik last fall. However, Kaktovik hunters usually do most of their sheep hunting during spring.

Moose

The number of moose hunters and harvest for the Refuge roughly doubled from 1983 (55 hunters, 34 moose) through 1987 (96 hunters, 76 moose), then dropped during 1988 and again in 1989 (55 hunters, 29 moose). The number of moose hunters increased to 103 in 1990, a new high. The 103 hunters took 64 bulls in 1990. Preliminary 1991 figures, are 73 hunters who took 50 bulls.

Hunting pressure on moose from 1983 to the present, has increased disproportionately on some Refuge areas causing declines in hunter success. The number of hunters on the north slope from the pipeline east has increased at a rate much greater than that for the Refuge as a whole. Hunters and harvest in this area increased over five-fold during the 5 years from 1983 to 1987. We suspect the easier, more open hunting terrain, good access and the presence of trophy bulls contributed in luring greater numbers of hunters to the north side of the Brooks Range.

Surveys in these north side areas (see section G.8) indicate that large bull moose may have been heavily harvested in some of the drainages. This situation was closely examined in conjunction with the Alaska Department of Fish and Game. One guide operating in the area also reported seeing a drop in trophy bulls and proposed to the State and the Refuge that only bulls over 50 inches should be taken, creating a trophy hunt area. The Alaska State Board of Game took action in March 1990, reducing the seasons in Units 26(B&C) by 20 days (to 10 days) and limiting non-residents to bulls with antlers over 50 inches. These changes should have reduced the pressure on the north slope,

but the data are too incomplete to confirm this. Data for the northern drainages will continue to be closely monitored.

Bears

No bears are known to have been taken on Arctic Refuge this year in defense of life and property (DLP) and no bear incidents were reported. One DLP bear was taken in 1990 by the Refuge staff. This is quite a change from 1989, when 6 bears were taken on the Refuge under the State's defense of life and property law.

Caribou

The preliminary sport caribou take for the 1990-91 regulatory year was 78 animals taken by 98 reporting hunters. These preliminary figures will undoubtedly increase.

The subsistence caribou take for the 1989-90 regulatory year was estimated to be 150-200 animals for Kaktovik and about 200-300 animals for Arctic Village and Venetie. The Porcupine caribou herd moved out of the village's hunting area relatively early in 1990-91, thus take was considerably less than during the 1989-90 winter, when many caribou wintered in the village's area.

Alaska Department of Fish and Game, Subsistence Division, conducts a harvest survey in Kaktovik during the fall following each regulatory year, and interprets the information the following winter. Fifty-seven Kaktovik households were contacted during the 1990-91 season. Seven chose not to participate in the survey or were not available. Twenty-seven reported no caribou harvest. The remaining 23 households reported harvesting 90 caribou. Subsistence Division's estimate of total take, after adjusting for the non-reporting households, is 110 caribou harvested in the 1990-91 season.

Muskox

Muskox were declared a subsistence species in 1990 and hunted only under a Tier II permit in 1991. Tier II permits are issued by the state only to local residents of an area for subsistence purposes. All permits were issued to people living in Kaktovik. Hunters were given the choice of hunting in fall (October) or spring (March). Nine bull permits were issued for hunting within the Refuge in state Game Management Unit 26(C), and at least 5 bull muskoxen were taken

during the 1990-91 season. Two bull muskoxen were taken west of the Refuge.

Guiding

The Refuge has been divided into exclusive guiding areas for a number of years by State regulation, which also requires that all nonresident hunters pursuing sheep and brown bear must hunt with a guide. These exclusive guiding areas were challenged in 1988. The State Supreme Court, in the Owsichek Decision, declared them unconstitutional. The State failed to successfully apportion guide areas in 1991.

The Service, to protect big game from over harvest by an unrestricted number of guides, has continued the existing guide areas on Refuges through the use of Special Use Permits. The numbers of both guides and outfitters under this status quo policy are limited to those who had been issued special use permits in 1988. Additionally, client numbers for all hunting operators were limited to the maximum annual number of hunting clients each operator guided in the areas during the 5 years previous to 1988.

During 1991, the strengths and weaknesses of the 1989 State Guide/Outfitter law continued to become apparent. The fundamental distinction between guides and outfitters was that outfitters could not accompany hunters into the field, i.e., assist with the hunt. Outfitters could merely provide transportation and equipment. Essentially the law placed additional limitations on outfitters and made numerous other changes in the state requirements for various other commercial operators who deal with wildlife use. The new state law required outfitters (who were not covered under the old law) to obtain guide licenses. New requirements included insurance coverage, business licenses, and commercial use permits by some businesses. The State administrative machinery, which was not geared-up to handle the demand in 1989, reached equilibrium in 1990 and improved during 1991. Nevertheless, it did not provide for limitations of guides within specific big game hunting areas; something the Service insists on.

Thirteen hunting guides and one outfitter obtained Refuge permits this year. We continue to receive inquiries from guides who could not qualify under the moratorium placed on new commercial hunting operators. One former outfitter obtained an outfitting only permit for the Refuge. Both guides and outfitters are required to submit reports for the season's activities. Table 5 gives compilations of the guiding and outfitting special use permit reports.

Table 5. Hunting Guide and Outfitter Special Use Permits.

	SHEEP	GRIZZLY	BLACK BEAR	MOOSE	CARIBOU	WOLF	CLIENT DAYS	NO. OF CLIENTS	AVERAGE HUNT PERIOD	NON-HUNTING CLIENTS	
										CLIENT DAYS	NO. OF CLIENTS
HUNTING GUIDES											
Andreis, Art(Brooks Range Adv.)							29	3	9.6		
Grasser, Ed (AK Guides & Out.)	15	1			1		120	15	8.0		
Helmericks, Harmon ("Bud")	2						22	2	11.0		
Hendricks, Joe (Fair Chase Hunts)	8						69	10	6.9		
Jameson, Sandy			1		4		50	5	10.0	32	15
Knutson, Howard (Sea Hunter)	4	2					50	8	6.3		
Koontz, Keith	4	2		7	1		142	10	14.2	34	1
Peterson, John	1						5	1	5.0		
Rivers, Larry (A.W. Enterprises)	9				9		107	10	10.7		
Schetzle, Harold	5					2	45	6	7.5		
Troutman, Don (AK N. Sport & Rec.)	21	6		3	3	1	286	28	10.2		
Want, Joe				1			16	1	16.0		
Witt, Eugene (Brooks A. Hunts)	1						17	2	8.5		
OUTFITTER											
Mackler, Len (Wilderness Vent.)	4						88	8	11.0		
TOTALS	74	11	1	11	18	3	1,046	109	10.6	66	16

Local Fairbanksan, R. McGregor, samples the char fishing on the Kongakut River. G. Elison

9. Fishing

Sport fishing for grayling, Arctic char, lake trout and northern pike occurs incidental to other recreational activities, particularly river floating. Fishing is not a primary recreational activity because of the remoteness of the area and better fishing opportunities elsewhere in the state.

Volunteers at egress points monitored fish take on the Kongakut River. Information was shared with the State in continuing efforts to monitor the char population, which appeared to be reduced in 1989. Subsistence fishing for both saltwater and freshwater species is important to local residents. Whitefish, grayling, and Arctic char are the species primarily sought on the Refuge for subsistence. For Kaktovik, fishing occurs in the coastal lagoons during summer and at a series of traditional fishing holes, primarily on the Hulahula River, in spring. Arctic Villagers net whitefish and grayling in the Chandalar River in the summer and actively pursue lake trout at Old John Lake during the winter.

10. Trapping

Trapping is allowed Refuge wide without a permit, but due to limited furbearer habitat, less than a third of the Refuge is actively trapped. Trapping may be the Refuge's predominate public use measured in terms of use days.

Villagers from Arctic Village, Ft. Yukon and Kaktovik run traplines out from their villages. Four non-village based families and one individual live on the Refuge most or all of the year and continue a life style based largely on trapping. Each has cabins under permit from the Refuge. Fur take by trappers on the south side is not closely monitored but is thought to be considerably less than the maximum sustained yield. The primary evidence for this is the fact that during the period when trapping dominated the entire region's economy and lifestyle (1890-1950), it continually sustained greater harvest than today. Furbearers trapped on the south side, in order of economic importance, include marten, lynx, fox, beaver, wolverine, wolf, mink, muskrat, otter and ermine.

PUSC/Pilot Kaye continues to make regular visits to trapline camps. The four day trips are primarily preventative law enforcement, trapper education, and to ensure that cabin permittees comply with permit conditions. Kaye has been documenting trapping operations requiring cabins, and photographing, mapping and describing all existing cabins, and collecting oral history from trappers.

11. Wildlife Observation

Wildlife observation is an integral part of every wilderness trip on the Refuge. Visitors express a particularly strong interest in seeing wilderness associated animals, such as caribou, brown bear, Dall sheep,

wolf, wolverine and muskox. Prospective visitors often call or write asking how they can plan a trip that will intercept the migration of the Porcupine Caribou Herd.

In May, Willow Ptarmigan trade white plumage for brown. T. Edgerton

12. Other Wildlife-Oriented Recreation

The Refuge is an important destination for visitors seeking a unique wildlife and wilderness experience. River floating and backpacking are the most popular non-hunting activities, but camping, photography, wildlife observation and day-hiking also occur. People access the Refuge with aircraft, by backpacking or, on rare occasions, by using dogsleds in winter. People use motorboats to access south slope rivers, however most motorboat users are local residents involved in hunting, fishing and trapping. Visitors must be self-sufficient and able to meet the mental and physical challenges of wilderness since the area is unencumbered by trail signs, designated campsites or other developments.

This year the Service lifted the interim use restrictions placed on commercial river guides in 1990, and use by floaters and backpackers increased to a level slightly above the previous high of 1989. Float use accounted for most of the increase, which was more evenly spread

among Refuge rivers than in past years. As expected, the Kongakut, Hulahula, Sheenjek and Canning rivers received most of the activity. Use by backpacking groups was about the same as 1990. Guided use by floaters and backpackers (obtained from permit reports) from 1984 to 1991 is shown in Table 6.

Recreational use by the 16 commercial guides is shown in Table 7. Guides took an average of 3.8 trips. River float groups ranged from 3 to 12 persons (average 7.6) on trips from 4 to 20 days long (average 10.4). Backpacking groups ranged from 3 to 14 persons (average 7.2) on trips from 8 to 16 days long (average 11).

Private recreational use documented from air charter and transporter reports is shown in Table 8. The data represents an unknown percentage of the total private use that occurs, since access is not limited and no requirements exist for check in or out.

Public use activity on the Kongakut River was monitored for three weeks during July. A volunteer couple stationed at Caribou Pass contacted recreationists to gather baseline trip information to be used in the river planning process and for other purposes. Their presence was very worthwhile, both from the public relations standpoint and for the information they collected.

Refuge staff floated two rivers this year. The trips enabled key personnel to, among other things, become familiar with the river corridors, evaluate their recreation potential and document human impacts within or adjacent to the river corridors. From June 18-26, RM Elison, WB Heffernan, Kelly Bostian, staff writer for the Fairbanks Daily News-Miner, and ORP Edgerton floated the Hulahula River 75-80 miles from Grasser's Strip near the continental divide to a tundra airstrip approximately six miles from the Beaufort Sea coast. DRM Voros and ARM Garrett conducted a 47-mile raft trip on the Coleen River July 8-12 from Pass Creek to the old Campbell Cabin near Coleen Mountain. Significant human impacts were not expected or found on the Coleen. On the Hulahula, they were somewhat less than expected, except for two native allotments which have been historically used as subsistence hunting and fishing camps. The allotments were severely trashed, representing a land ethic unfamiliar to most of us. A major source of frustration is the fact that the Service had recently helped cleanup one of the allotments through a challenge grant program. The cleanup was short lived.

Table 6. Guided Recreation Visitor Use Days 1984 - 1991
(F=Floaters; H=Hikers)

Area	Users	1984	1985	1986	1987	1988	1989	1990	1991
Kongakut River	F	169	355	330	425	1287	1684	731	1,014
	H	75	270	189	81	28	10	184	74
Hulahula River	F	65	116	6	167	410	1032	671	736
	H	8		44	36	126	220	112	60
Sheenjek River	F	190	60	241	607	461	424	274	580
	H	8		4		10		211	40
Canning River	F					190	494	308	486
	H	44		16		123	90	12	
Aichilik River	F							94	36
	H	6	30	8	153	52	120	81	104
Jago River	F								238
	H	27		38		24	163	160	42
Wind River	F					106			
	H							7	
Chandalar River	F			18				6	
Coleen River	F			74	36	70	140		
Junjik River	F							24	35
	H			8					
Porcupine River	F					36			
Turner River	F							28	
	H								12
Katakturuk River	H					24		60	
Sadlerochit/Shublik Mts.	H	21	75		134		53	196	521
Other Areas/Brooks Range	H						167	608	768
Schrader/Peters Lake	H	89	94	204		182	278	390	317
Totals		702	1000	1180	1639	3129	4875	4157	5,063

Table 7. Recreational Guide Special Use Permits, 1991. Page 1 of 3

PERMITTEE	PERMIT NUMBER	USE*	RIVER OR AREA** PUT IN	RIVER OR AREA** TAKE-OUT	TRIP#	JUN	JUL	AUG	SEP	TRIP DAYS	PARTY SIZE	USE DAYS	TOTAL PERSONS/ SEASON	TOTAL PERSON DAYS
Adams, Macgill	91-R16	H	U SHEENJEK R	U SHEENJEK R	1	3-15				13	5	65		
(Wilderness Alaska)		H	JOE CREEK	TURNER R	2	17-30				14	6	84		
		F	U CANNING R	L CANNING R	3		7-15			9	6	54		
		F	U CANNING R	L CANNING R	4		15-24			10	7	70		
		F	U CANNING R	U CANNING R	5		24	3		11	7	77		
		F/H	PORCUPINE L	ARCTIC VILLAGE	6			7-21		15	5	75	36	425
Ash, Chuck	91-R13	H	U AICHILIK R	L AICHILIK R	1	22-29				8	3	24		
(Hugh Glass Backpacking)		H	L AICHILIK R	DRAIN CREEK	2	29	14			16	3	48		
		F	DRAIN CREEK	CARIBOU PASS	3		14-23			10	5	50		
		F	DRAIN CREEK	CARIBOU PASS	4		25	3		10	10	100	21	222
Decock, John	91-R11	H	SUNSET PASS	SUNSET PASS	1	9-19				11	9	99		
(Sierra Club)		H	CAMDEN BAY	SUNSET PASS	2	21	1			11	12	132		
		H	JAGO R	AICHILIK R	3		26	6		12	9	108		
		H	JAGO R	AICHILIK R	4		26	9		12	7	84		
		H	IVISHAK R	SPRING CREEK	5	11-22				12	12	144	49	567
Dittrick, Bob	91-R9	F	DRAIN CREEK	CARIBOU PASS	1	22	1			10	9	90		
(Wilderness Birding Adventures)		F	GRASSER'S	HULAHULA DELTA	2		4-13			10	11	110		
		F	DRAIN CREEK	CARIBOU PASS	3		14-23			10	5	50		
		F	DRAIN CREEK	CARIBOU PASS	4		23	1		10	4	40		
		F	UPPER JAGO R	BITTY	5		18-27			10	7	70	36	360

Table 7. Recreational Guide Special Use Permits, 1991. Page 2 of 3.

PERMITTEE	PERMIT NUMBER	USE*	RIVER OR AREA** PUT IN	RIVER OR AREA** TAKE-OUT	TRIP#	JUN	JUL	AUG	SEP	TRIP DAYS	PARTY SIZE	USE DAYS	TOTAL PERSONS/ SEASONS	TOTAL PERSON DAYS
Finnoff, Ramona	91-R5	H	LOWER AICHILIK R	DRAIN CREEK	1	6-17				12	6	72		
(Arctic Brotherhood Ent.)		F	DRAIN CREEK	CARIBOU PASS	2	17-26				10	8	80		
		H	OKPILAK LAKE	OKPILAK LAKE	3	19-26				8	7	56		
		H	GRASSER'S LS	EAST PATUK CR	4	19-26				8	4	32		
		F	GRASSER'S LS	L HULAHULA R	5	28	8			13	8	104		
		F	UPPER JAGO LS	BARTER ISLAND	6		8-19			12	7	84		
		F	GRASSER'S LS	L HULAHULA R	7		22	1		11	12	132		
		H	IGNEK CREEK	CAMDEN BAY	8		29	9		12	5	60	57	620
Kasza, Carol	91-R8	F	GRASSER'S LS	L HULAHULA R	1	10-18				9	8	72		
(Arctic Treks)		F	DRAIN CREEK	CARIBOU PASS	2	14-21				8	6	48		
		F	OLD WOMAN CREEK	L HULAHULA R	3	26-29				4	8	32		
		F	GRASSER'S LS	L HULAHULA R	4	30	9			10	6	60		
		F	GRASSER'S LS	L HULAHULA R	5			2-10		9	7	63		
		H	AICHILIK R	GRASSER'S LS	6			12-23		12	5	60	40	335
Jensen, Mark	91-R14	F	DRAIN CREEK	CARIBOU PASS	1	29	8			10	7	70		
(Alaska River Expeditions)		F	DRAIN CREEK	CARIBOU PASS	2		8-17			10	5	50	12	120
Letarte, Joe	91-R16													
(Wilderness Enterprises)				NO TRIPS										
Parker, Robert	92-R4	H	SCHRADER LAKE	PETERS LAKE	1		27	5		10	14	140		
(North Star)		F	U MF CANNING R	CANNING R DELTA	2		11-22			12	5	60		
		F	GRASSER'S LS	L HULAHULA R	3	18-27				10	5	50	24	250

Table 7. Recreational Guide Special Use Permits, 1991. Page 3 of 3.

PERMITTEE	PERMIT	USE*	RIVER OR AREA**	RIVER OR AREA**	TRIP#	JUN	JUL	AUG	SEP	TRIP	PARTY	USE	TOTAL	TOTAL
Leghorn, Ken	91-R10	F	DRAIN CREEK	CARIBOU PASS	1	26	5			10	12	120		
(Alaska Discovery)		F	DRAIN CREEK	CARIBOU PASS	2		5-14			10	12	120		
		F	DOUBLE MT	OLD WOMAN CK	3		14-23			10	12	120		
		F	DOUBLE MT	OLD WOMAN CK	4			26	4	10	9	90	45	450
Heim, George	91-R13	F	DOUBLE MT	LOBO LAKE	1			1-9		9	3	27		
(AK River Adventures)		F	U AICHILIK LS	L AICHILIK LS	2	24	2			9	4	36	7	63
Holzwarth, Rachel	91-R15	F	GRASSER'S LS	L HULAHULA R	1	22	2			11	5	55		
(AK Women of the Wilderness)		F	DRAIN CREEK	CARIBOU PASS	2		15-24			10	5	50	10	105
Kofinas, Gary	91-R12	F/H	SUNSET PASS	L CANNING R	1		19	2		15	11	165		
(Exp. for Global Awareness)		F/H	SUNSET PASS	L CANNING R	2		19	2		15	12	180	23	345
Yarnell, Ron	91-R2	H	GRASSER'S LS	E PATUK CREEK	1	10-17				8	5	40		
(Wilderness Alaska/Mexico)		F	E PATUK CREEK	AREY ISLAND	2	17-28				12	6	72		
		H	GRASSER'S LS	U JAGO R	3	28	8			11	5	55		
		F	U JAGO R	JAGO SPIT	4		8-19			12	7	84		
		H	DRAIN CREEK	DRAIN CREEK	5		12-19			8	6	48		
		F	DRAIN CREEK	CARIBOU PASS	6		19-29			11	12	132		
		F	U CANNING R	L CANNING R	7		9-18			10	11	110	52	541
Ford, Don	91-R1	F	DOUBLE MT	KONESS R	1		28	9		13	11	143		
(Nat. Outdoor Leadership School)		F	DOUBLE MT	OUTLOOK POINT	2			10-29		20	10	200		
		H	AICHILIK R	DOUBLE MT	3		29	11		14	10	140	31	483
Benson, Gary	91-R7	H	SCHRADER LAKE	SCHRADER LAKE	1	7-15				9	13	117		
(Sourdough Outfitters)		H	SCHRADER LAKE	SCHRADER LAKE	2			16-24		10	6	60	19	177
TOTALS AND AVERAGES					61	26	38	19	1	10.8	7.6	5,063	462	5,063

* Use types are: F - river; H - hike; F/H - combination, river and hiking.

** Abbreviations and symbols used

C	Coastal	MT	Mountain	CK	Creek	MF	Marsh Fork
E	East	R	River	L	Lower	U	Upper

Table 8. Private recreation reported in charter aircraft and transporter special use permit reports, 1991.

Company	Use Type				Animals transported for private hunters				
	Hunters	Floaters	Hikers	Other Rec.	Sheep	Caribou	Moose	Wolf	Grizzly
Air Taxi									
Bursell, Bob (Wright Air)	24	7			7	7	9		1
Dix, Drew (Tundra Air)	4				3				
Dowding, Roger (Yukon Air)	25	28	61	8	13	7	10		
Firmin, Joe (Porcupine Air)	31	28	11	2	13	14	6	1	
Lynch, Mark (Tatonduk Air)			8	4					
McDonald, Marty (Alaska Flyers)		NO	REPORT						
Miller, Dennis (Caribou Air)				2					
Porter, Steve (Trans-Porter Alaska)	10	10	31	4	9				
Ross, Don (Canning Air)		18	11	11					
Ruff, Steve (Brooks Range Aviation)	10								
Seeley, Chris (Floatplane Tours)		NO	FLIGHTS						
Smith, Eleanor (Umiat Enterprises)	18				6				
Totals	117	91	122	31	51	28	25	1	1

13. Camping

Nothing to Report

14. Picnicking

Nothing to Report

15. Off-Road Vehicling

Four Kaktovik villagers were issued five-year special use permits in 1989 which allow ATV seasonal access to inholdings. This was a precedent-setting action because these were the first ATV permits issued for Refuge use in Alaska. Particularly significant is the fact that the permits were issued for access to Native allotments (private lands). ATV use on Refuge lands for subsistence was not authorized.

Refuge efforts to help villagers clean up allotments, which are not subject to regulations related to littering, have met with only partial success. T. Edgerton

Off-road vehicle use issues have remained quiet since the permits were issued, in contrast to the series of meetings and intense interest displayed before the permits were issued in 1989. No ATV use is known to have occurred this year, nor have any additional villagers applied for permits.

16. Other Non-Wildlife Oriented Recreation

Nothing to Report

17. Law Enforcement

The Arctic Refuge has five Refuge Officers on staff. This is the third year we have conducted extensive law enforcement (LE) patrols on the Refuge during hunting season. We feel our increased presence has paid off, not only in violations discovered and prosecuted but also in preventing violations.

All collateral duty Refuge officers attended one week of law enforcement refresher training at Marana, Arizona.

A draft spring Waterfowl Law Enforcement Plan was completed and submitted to the Regional Office.

Law enforcement patrols on the south side of the Refuge were often conducted out of the Char Lake cabin located near the Junjik River. On May 15, 1991, we were notified by a state law enforcement officer that the Char Lake cabin had been burned. On May 17, Refuge Officers Harvey Heffernan and Dave Sowards flew to Char Lake to investigate. The cabin had been burned and was a total loss. This investigation is still in progress. The National Fish and Wildlife Foundation had been contacted about providing a reward for information leading to conviction of the arsonists. At the end of the year the Foundation's decision was pending.

RO Heffernan investigated two suspected cases of commercial operations without a special use permit. One Notice of Violation

RM Elison and WB Heffernan on the Hulahula float trip. Proper use of a fire pan helps preserve the wilderness aspect of the area. T. Edgerton

(NOV) was issued by SA Webb for a violation after a significant amount of effort from several staff members. An investigation by RO Heffernan and a detailed investigation by SA Webb resulted in the issuance of an NOV for an illegal grizzly kill during the fall of 1990. A reward was processed through Alaska's SAFEGUARD program for a charter pilot who reported the violation and expended flight time in connection with the case.

Information on employment of a illegal alien by a commercial operator investigated by RO Heffernan was passed on to the Department of Immigration at their request.

Coordination with the Alaska State Troopers, Fish and Wildlife Protection Division regarding the fall enforcement effort is an on going program.

Refuge Officer Sowards views the remains of the Char Lake cabin. H. Heffernan

ARM Garrett and SA Webb conducted range firing for requalification with sidearms for Refuge Officers on August 28th.

RO's Heffernan and Kaye performed an on-site investigation of land clearing for an aircraft landing area on August 3. A large number of trees and brush had been cleared and trash left at the site. A pink slip was forwarded to the Service's LE office in Fairbanks.

In August, ARM Garrett and SAC Crane accompanied two BLM employees on an inspection of mining claims and a mill site claim situated on the Refuge. ARM Garrett had requested assistance from BLM mineral examiners to evaluate the validity of mining claims on the Refuge. No mining activity was found, and additional efforts will be made to have BLM declare the claims null and void.

The Refuge Super-Cub at the L.E. base camp on the Chandalar River. Officers Sowards and Weiler's story: the weather was too bad to go on patrol. G. Weiler

RO's Heffernan and Kaye performed two law enforcement flights to check hunter camps and document mining claims. One violation of special use permit conditions was detected and action is being taken. Inclement weather forced the cancellation of several flights during mid September.

On August 13, 1991, RO's Greg Weiler and Dave Sowards assisted S.A. Mark Webb in the investigation of an illegally taken caribou, shot same day airborne, and wanton waste of the meat. The investigation resulted

in a $2500.00 fine, a $1500.00 donation to Safeguard, one year probation, and loss of Alaskan hunting privileges for one year.

A letter was sent to guides and outfitters holding SUP's. The letter recounted instances of blocking airstrip access, hunter harassment, and aircraft buzzing and advised operators that every effort would be made to prosecute such activities. Reports of such instances were linked to SUP holders, though prosecutable cases could not be made.

18. Cooperating Associations

The ANHA outlet at the Coldfoot Interagency Visitor Center was administered by the National Park Service until early December. At that time, outlet responsibilities were transferred to BLM, the lead agency at Coldfoot. The outlet brought in $3,793.93 during 1991, an increase of $382 (10%) from 1990. The selection of items included: 33 publications, 31 maps, postcards, posters and a video. Several new titles were added and slow sellers were discontinued. No interpretive projects were funded through ANHA this year. In December, the Board of Directors approved proposals to spend funds in 1992 on new shelving for sales items, donations of interpretive resources to tour bus companies, furniture for the visitor center, and possibly an interpretive trail to and brochure about the old Coldfoot town site, an early gold mining community.

19. Concessions

Nothing to Report

I. EQUIPMENT AND FACILITIES

1. New Construction

Work was completed on the Jet fuel pumping system at Barter Island. The system includes an electric fuel pump, hose reel, static line reel, outlets for warming of aircraft in cold weather. This system greatly improved safety and efficiency of operation over the old, now enclosed motorized pump.

A 40' x 40' gravel pad was constructed adjacent to the field station at Barter Island to facilitate easy access to the CONEX storage units and for staging of equipment.

The CGS office assisted the Refuge with purchasing a cabin kit from Pan Abode for construction at Galbraith Lake on the north side of Atigun Pass. The cabin will be used for a variety of Refuge projects, including law enforcement, sheep surveys, and public use projects on the Dalton Highway. The cabin kit was delivered to Galbraith Lake and off-loaded. It will remain stored until spring, when we hope to have a gravel pad for its construction.

2. Rehabilitation

Nothing to Report

3. Major Maintenance

The field station at Barter Island was spray coated with wood preservative and all fuel storage tanks were cleaned/chipped, primed and painted.

4. Equipment Utilization and Replacement

The lease on the joint use Fish and Wildlife hangar in Fairbanks expired and we were forced to vacant the hangar which had served Service pilots since the 1950's. A new lot was developed at the

Fairbanks airport for aircraft parking for Law Enforcement, Migratory Birds, Yukon Flats, Kanuti and Arctic Refuges. Funding for a new hangar was approved and construction is to begin in the summer of 92.

5. Communications System

The permanent mountain top repeaters continued to work well, providing much improved radio communications over most of the Refuge coastal plain.

6. Computer Systems

Computer use at the Arctic National Wildlife Refuge is dictated by the Refuge's diverse needs. Computers not only do word processing, but also spreadsheets, data management, advanced statistics, desk-top publishing, GIS (computer mapping), telecommunications and language programming. Both the biological and administrative sections of the Refuge use IBM look-alikes running MS-DOS. The Refuge has accumulated a diverse mix of some 23 brand name 80386, 80286 and 8088 computers, in desktop, laptop and notebook styles along with laser, dot-matrix and color printers.

The emphasis this year was to create a rudimentary desk-top publishing platform. A 20 MHz ALR 386 desktop computer was used for graphics and advanced statistics. Attached to this machine is a Proscan PS-3000C color flatbed scanner, a mouse, an internal modem, an HP Paintjet XL color printer and a Polaroid Digital Palette slide maker. This is the only computer that has Windows, since much of the graphical software requires the Windows system. The software for this machine includes SAS statistical software, Windows 3.0, Freelance, WordPerfect and WordPerfect for Windows, Corel Draw and GeoWorks. Refuge staff are just beginning to learn how to use these components and programs to their best advantage.

7. Energy Conservation

Nothing to Report

8. Other

Nothing to Report

J. OTHER ITEMS

1. Cooperative Programs

The Refuge staff cooperated through the year on a number of endeavors, including studies, articles and projects. More information on studies is found in Section D. 5.

International Relations

Alexander Badyaev, a USSR citizen from Moscow, was placed with the Arctic NWR by the USFWS Office of International Affairs. Alexander assisted in several studies out of Kaktovik during the summer field season.

State of Alaska

A cooperative agreement was developed with ADF&G to provide Arctic Refuge with a 5 year furbearer harvest and population density report for GMU's 25 and 26. The effort will include providing site specific information wherever possible. This information will be used to assist the staff in developing federal subsistence regulations in the future.

North Slope Borough

DRM Voros assisted with the development of a North Slope Borough video tape that was presented to the U. S. Congress during August. The video presents the Inupiat Eskimo views of oil and gas exploration and development on the coastal plain of the Arctic National Wildlife Refuge.

Career Awareness Institute

Arturo Tenorio participated in field studies as a student from the Career Awareness Institute. His primary duties were to assist the Fisheries Assistance Office with their summer field activities.

Research

Arctic Refuge and Research personnel cooperated on a number of studies and projects during the year. The Refuge continued to provide office, administrative, aircraft, and field support to the Alaska Fish and Wildlife Research Center through 1991. Conversely, Research provided their newly acquired aircraft for several Refuge projects. Refuge facilities in Kaktovik, which are covered under a Memorandum of Agreement with Research, were used extensively during the year.

University of Alaska

For a number of years the Refuge has issued a permit to allow the University of Alaska Geophysical Institute's Poker Flat Research Range to impact and retrieve rocket payloads on the Refuge. The Refuge is a tertiary impact site. Several launches took place during the year. Most launches occur during the winter, including all those impacting on ANWR. Generally the rockets are flown under contract with NASA for investigations of the upper atmosphere, specifically the aurora and events in the magnetosphere.

Geologic studies on the Refuge again were carried out by several graduate students in the Geology Department of the University of Alaska Fairbanks working under Dr. Wesley Wallace. This multi-year effort will continue next year. We also cooperated with six other geological teams conducting research, including three universities (Texas, UCLA and Rice) two USGS teams and the Alaska Department of Natural Resources. Information from past geological mapping studies is being used in our sheep studies to establish habitat relationships to substrates.

Local Media

RM Elison, WB Heffernan, ORP Edgerton and Fairbanks Daily News-Miner reporter Kelly Bostian floated the Hulahula River during June (Section H.1). The purpose of the trip was to gather first hand information about human impacts along the river and become familiar with the area, which is popular with recreationists. The News-Miner printed three news articles with a focus other than oil, as a result of the trip.

Fairbanks Newspaper reporter Kelly Bostian: "Thoughts about the issues didn't come easy in ANWR. My senses were too busy soaking in other, more pleasurable thoughts." G. Elison

Fairbanks Facilities

RM Elison is responsible for overseeing the combined Fairbanks offices' warehouse space. Inspections and written reports are being performed on a periodic basis to ensure compliance with regulations and guidelines.

A combined conference room/library continues to be jointly funded and used successfully by Fairbanks based Service offices. Other shared facilities include the former aircraft hangar, aircraft parking ramp and basement laboratory and office storage area.

Barter Island Facilities

Arctic Refuge field station personnel coordinated the efforts of five separate projects working in the field during the height of the field season. A total of sixty-seven crew members representing these projects utilized the bunkhouse facilities and field station during the peak month of July.

Coldfoot Visitor Center

This facility is being operated jointly by the NPS, FWS and BLM under a cooperative agreement signed in 1990. (Section H.6)

Fairbanks Public Land Information Center

ORP Edgerton coordinated with the facility's staff through the year. Refuge personnel gave a number of presentations to center audiences (Section H.6).

School Presentations

ANWR staffers visited a number of village and Fairbanks area schools to give talks, slide shows and other presentations in 1991. The public use section contains more information (Section H.7).

WB Curby, working with ORP Edgerton and a cooperator, Monarch Software, successfully obtained FY91 funding under the "America the Beautiful" wetlands initiative for state-of-the-art educational computer software program development. (Section H.6)

Tanana Valley State Fair

WB Curby, BA Waln and ORP Edgerton planned and coordinated the Service's booth at the Tanana State Fair held August 10th-17th. The Refuge had good participation with a total of 19 employees from five Fairbanks FWS offices helping to staff the booth (Section H.6).

Interior Sportsman's Show

BT Cox and ORP Edgerton set up and helped staff an information booth at the first annual Interior Sportsman's Show at the Carlson Center April 19-21. The Service cooperated with the State Department of Natural Resources, Alaska Department of Fish and Game, and the Fairbanks Public Lands Information Center in operating the booth (Section H.6).

Fairbanks Fisheries Assistance Office

Arctic Refuge continued to work with Fisheries on several studies through the year. The Refuge supplied quarters in our Kaktovik facility, logistics, transportation, and other items.

Ecological Services

Numerous project and permit consultations, including work on contaminants, the 1002 area, and other items occurred. Logistics and support sharing were commonly carried out in all combined projects.

ADF&G Sport Fisheries

Sportfishing information on the Kongakut River obtained by river monitors was provided to ADF&G.

Law Enforcement

Arctic Refuge worked closely with the Fairbanks Law Enforcement Office on a number of cases and Refuge law enforcement operations. Law Enforcement continued to be responsive to Refuge law enforcement needs, assisting us on numerous occasions and conducting Refuge patrols. These arrangements included sharing Refuge facilities and logistics. (Section H.17)

Refuge law enforcement personnel also worked closely with Alaska Fish and Wildlife Protection and FAA on a number of investigations through the year.

Information Requests

The Refuge cooperated with a number of environmental groups and ADF&G during 1991 by supplying information on various subjects. These included several file searches resulting in compilations of data on public use and various environmental subjects.

2. Other Economic Uses

Guided recreation is the largest economic use on ANWR. Guided hunting probably grosses the most money, followed by guided backpacking and float trips. Changes in both guided hunting and in river operations have occurred during the past three years.

The Owischek Decision, handed down by the Alaska Supreme Court on October 21, 1988, declared that the exclusive guide areas established by the State's Guide Board were unconstitutional and without force. The decision generated quite a bit of activity in our office, which lasted through much of the spring and summer of 1989 and into 1990, as hunting guides called, wrote or came by to discuss the various items required for their permits.

Alaskan National Wildlife Refuges continued to operate under the "status quo" policy for guided hunting through 1991. This policy was

established early in 1989 to protect wildlife resources from the unrestricted numbers of guides allowed in any area by the Owischek Decision. The status quo was maintained to give the state time to adopt new laws and regulations to deal with guiding to the satisfaction of Federal land managers. A satisfactory system has not yet been adopted by the state. Permits for guides were restricted to those who had operated on the Refuge in 1988, and areas were like-wise restricted. Client numbers also were restricted to the maximum number a guide had taken in any one year during the past five years. Insurance was required in 1989 for the first time. All commercial operators supplying on-Refuge client services had to produce proof of insurance before being issued a permit. The work load increase in issuing guided hunting permits caused by the Owischek decision abated somewhat during 1990, and lessened again in 1991, since no major changes occurred in the permitting procedure.

The number of guided clients decreased from 124 in 1990 to 109 in 1991. Three guide areas were vacant during 1991. Tabulations of the commercial big game guide's client use, game take and other information are presented under Hunting, Section H.8.

Recreational guides operating on rivers, who faced changes brought on by ANWR's popularity during recent years, returned to pre-restriction operations this year because the interim quotas on the most heavily used Refuge rivers were lifted. See the Planning (D.2) and Public Use (H.12) sections for more information on river use and the ongoing river plan.

Surface Geology

Geological interest was definitely up in 1991. Six surface geology permits (three in 1990) were issued to five oil companies for work during the summer season, plus eight tour permits issued to oil companies (or combined oil interest groups) for the 1002 area. All surface geology permits were for Arctic Refuge areas outside the 1002 area (which has been closed to exploratory activity since completion of the Coastal Plan Resource Assessment in 1985). Several oil companies

have worked on the Refuge for several years. Most of the activity occurred on lands near the 1002 area. Table 9 lists these permits.

Navigation Tower Permits

Temporary navigation towers are established on survey bench marks. The towers transmit radio signals which are used to precisely locate the positions of offshore seismic exploration vessels, drilling ships and land vehicles. Generally these are used during the summer, but are occasionally used during the colder months. Two tower permits were issued during 1991, but no towers were erected (Table 9).

Air Taxi Operators

Air taxi operators were first required to have Special Use Permits in 1987, when three permits were issued. The number of operators remained at three in 1988, then grew to eight in 1989, eleven in 1990 and twelve in 1991. The increase in permits was probably due to increased compliance as well as increasing public use. Operators continue to increase, although recent entrants reported few flights this year.

Aircraft use reports are required from all charter operators under the terms of their special use permits. Reports were used to compile an estimate of unguided visitor use on the Refuge during 1991 in Table 8 (See section H-12). Only drop-off's (arrivals) in the Refuge were considered in compiling the table.

Scientific Studies

Each year a variety of scientific research occurs on the Refuge, carried out by a range of agencies and groups, and by other offices of the Fish and Wildlife Service. Most of these investigations must be covered by special use permits, including all non-Service operations requiring helicopter landings or plant, animal or rock collections. Fifteen special use permits were issued for research activities in 1991, compared to seven in 1990. Seven of the fifteen permits dealt with various aspects of

Table 9. Special Use Permits issued in 1991. Page 1 of 3.

Permit Number	Permit Type / Individual and Company Names	Purpose	Permitted Period
			JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
	Air Taxi		
91-A12	Bursiel, Bob (Wright Air)	Air Taxi	12 – 31
91-A1	Dix, Drew (Tundra Air)	Air Taxi	1 – 31
91-A10	Dowding, Roger (Yukon Air)	Air Taxi	10 – 31
91-A2	Firmin, Joe (Porcupine Air)	Air Taxi/Transporter	1 – 31
91-A3	Lynch, Mark (Tatonduk Air)	Air Taxi	1 – 31
91-A7	McDonald, Marty (Alaska Flyers)	Air Taxi	15 – 31
91-A5	Miller, Dennis (Caribou Air)	Air Taxi	1 – 31
91-A9	Porter, Steve (Trans-Porter Alaska)	Air Taxi	10 – 31
91-A8	Ross, Don (Canning Air)	Air Taxi	1 – 31
91-A11	Russ, Steve (Sourdough Air)	Air Taxi	15 – 31
91-A6	Seeley, Chris (Fairbanks Floatplane)	Air Taxi	1 – 31
91-A4	Smith, Eleanor (Umiat Enterprises)	Air Taxi/Transporter	1 – 31
	Hunting Guides		
91-H12	Andreis, Art (A&L Outdoor Entriprises)	Guided Hunts, Photo.	1 – 31
91-H5	Grasser, Ed (AK Guides & Outfitters)	G.Hunt, Hike, & Photo.	20 – 10
91-H6	Helmericks, Bud	Guided Hunts	5 – 30
91-H9	Hendricks, Joe (Fair Chase Hunts)	Guided Hunts	1 – 30
91-H3	Jameson, Sandy (Bushcraft, Inc.)	G.Hunt, Hike, & Photo.	1 – 20
91-H8	Knutson, Howard (Sea Hunter, Inc.)	Guided Hunts	5 – 5
91-H7	Koontz, Keith (Chandalar River Outfitters)	Guided Hunts	4 – 5
91-H2	Peterson, John A.	Guided Hunts	1 – 15
91-H11	Rivers, Larry (AW Enterprises)	Guided Hunts	5 – 5
91-H10	Schetzle, Harold (Kichatna Guide Service)	Guided Hunts	1 – 30
91-H1	Troutman, Don (AK N. Sport & Rec.)	Guided Hunts, Photo.	1 – 31
91-H13	Want, Joe	Guided Hunts	10 – 15
91-H4	Witt, Eugene (Brooks Range Arc. Hunts)	Guided Hunts	1 – 30
	Outfitter		
91-O1	Mackler, Len (Wilderness Ventures)	Outfitted Hunts	1 – 30

Table 9. Special Use Permits issued in 1991. Page 2 of 3.

Permit Number	Permit Type / Individual and Company Names	Purpose	Permitted Period: JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
	Miscellaneous													
91–M9	Aglow, Bob (CBS News, Peter Jennings)	Helio. Landings (Photo.)						4–6						
91–M20	Bowler, David (Conoco, Inc.)	Helio. Landings (Tours)							8					31
91–M22	Burns, John (US Army Corps of Engineers)	Contaminants Sampling (Helio.)								17–19				
91–M3	Cincotta, Joe (Shell West. E&P)	Helio. Landings (Tours)							4–19					
91–M12	Farmer, Mark (Governor Hickel)	Helio. Landings (Tours)						19–25						
91–M16	Gallant, Joseph (ARCO Alaska, Inc.)	Helio. Landings (Tours)							1–31					
91–M6	Gray, Ardie (AOGA)	Helio. Landings (Tours)					15				30			
91–M23	Gustafson, Stu (Exxon)	Helio. Landings (Tours)								28–30				
91–M17	Hochberg, Lee (MacNeil, Lehrer News Hour)	Helio. Landings (Photo.)							2–5					
91–M4	Mayn, Rory (BP Exploration)	Helio. Landings (Tours & Photo.)				18					30			
91–M10	McManus, John (Cable News Network)	Helio. Landings (Photo.)						10–19						
91–M24	Menard, Jean (Canadian Broadcasting Co.)	Helio. Landings (Photo.)									1–10			
91–M5	Miller, Scott (King 5 TV)	Helio. Landings (Photo.)				21–27								
91–M15	Pierson, Fred (Mobil Exploration & Producing)	Helio. Landings (Tours)							22	15				
91–M21	Prindeville, Dennis (Alyeska)	Oil Spill Exercises (Helio.)										15	5	→
91–M14	Ringland, Natalie (North Slope Borough)	Helio. Landings (Photo.)							11–14					
91–M7	Schindler, Mark (ARC0)	Helio. Landings (Tours)						1						31
91–M18	Smith, Richard (Canadian Broadcasting Corp.)	Helio. Landings (Photo.)						27	10					
91–M1	Stauffer, Mark (National Geog. Soc.)	Helio. Landings (Photo.)		25	1									
91–M2	Thoeni, J. E. (Chevron USA, Inc.)	Helio. Landings (Tours)			15						30			
91–M8	Toohey, Robert (CR–Nexus)	Helio. Landings (Photo.)					28	10						
91–M11	Van Gilder, Bonnie (60 Minutes)	Helio. Landings (Photo.)						19–25						
91–M13	Yoshida, Fumihiko (Asahi Shimbun)	Helio. Landings (Photo.)						20–24						
	Recreational Guides													
91–R6	Adams, MacGill (Wilderness Alaska)	River Float/Backpack						1		15				
91–R3	Ash, Chuch (Hugh Glass Backpacking)	River Float/Backpack						20		6				
91–R9	Dittrick, Bob (Wild. Bird Adv.)	River Float/Backpack						8		31				
91–R5	Finnoff, Ramona (ABEC)	River Float/Backpack						1			1			
91–R1	Ford, Don (NOLS)	River Float/Backpack							7	15				
91–R11	Hardy, Charles (Sierra Club)	River Float/Backpack						6		12				
91–R13	Heim, George (Alaska River Adventures)	River Float/Backpack						20		15				
91–R15	Holzwarth, Rachael (AK Women of the Wild.)	River Float/Backpack						18	24					
91–R14	Jensen, Mark (Alaska River Expeditions)	River Float/Backpack						26		4				
91–R8	Kasza, Carol (Arctic Treks)	River Float/Backpack						3		31				
91–R7	Ketscher, Dave (Sourdough Outfitters)	River Float/Backpack					15				15			
91–R12	Kofinas, Gary (IFGA)	River Float/Backpack							13	12				
91–R10	Leghorn, Ken (Alaska Discovery)	River Float/Backpack						22			10			
91–R16	LeTarte, Joseph (Wilderness Enterprises)	River Float/Backpack							15		15			
91–R4	Parker, Robert W. (North Star)	River Float/Backpack					15				30			
91–R2	Yarnell, Ron (Wilderness AK/Mex.)	River Float/Backpack						5		5				

Table 9. Special Use Permits issued in 1991. Page 3 of 3.

Permit Number	Permit Type / Individual and Company Names	Purpose	Permitted Period
			JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
	Surface Geology		
91–G4	Barker, Peter (ARCO #1)	S. Geology/Mapping	1–31
91–G5	Decker, John (ARCO #2)	S. Geology/Mapping	1–31
91–G1	Hooper, John (Conoco, Inc.)	S. Geology/Mapping	1–31
91–G3	Mortgridge, Deau (EXXON)	S. Geology/Mapping	1–31
91–G6	Pierson, Fred (Mobil E&P)	S. Geology/Mapping	22 7
91–G2	Thoeni, Jack (Chevron USA)	S. Geology/Mapping	8 5
	Temporary Navigation Towers		
91–T2	Roberts, Mike (Western Geophysical)	Temp. Nav. Towers	15 1
91–T1	Walker, Bill (Alaska Telecom)	Temp. Nav. Towers	15 31
	Scientific		
91–S5	Dover, James ((USGS – AK Geology)	Surface Geology	7 15
91–S1	Farrell, Mary (Poker Flat)	Impact/Retrieve Rockets	25 1
91–S15	Fatland, Rob (Jet Propulsion Laboratory)	Satellite Reflectors	5 through May 30, 1992 --->
91–S13	Ford, Jesse (U.S. Environmental Prot. Agency)	Contaminants: bioassay	10 31
91–S2	Gubala, Chad (EPA Research)	Sample Lake Sediment	12–23
91–S12	Harun, Nina (TX Dept. of Geological Sciences)	Surface Geology	12 4
91–S8	Johnson, Mark (USGS Pet. Geology)	Surface Geology	22–26
91–S14	Kuntz, Mike (BLM, Archeology)	Sample flint	15 30
91–S11	Leo, Roger (New Eng. Science Center)	Collect Plants	1–31
91–S3	Oldow, John (Rice University)	Surface Geology	1 15
91–S7	Parker, Tim (UCLA – Geology Dept.)	Surface Geology	6–26
91–S10	Philip, Kenelm (UAF, Arctic Biology)	Collect Insects	15 15
91–S9	Pollard, Bob (LGL Alaska)	Aerial Caribou Survey	2–5
91–S4	Reifenstuhl, Rocky (AK DNR)	Surface Geology	1 8
91–S6	Wallace, Wes (U of A, Geology Dept.)	Surface Geology	1 7
	Cabins		
91–C1	Paternak, Melissa	Trapping Cabin	November – April for 5 years --->

reference file91narsup.wk1

geology. The geological topics under investigation this year included crustal tectonics, marine sediments and geologic mapping. Several Alaska areas are apparently made up of bits and pieces of the earth's crust which has been aggregated after riding for eons on the rift edges of the Pacific plate. The geologic forces resulting from plate tectonics have wrought huge, impressive formations in many areas of the Brooks Range.

Other scientific special use permits included two for plant and animal collections. The EPA collected several plants, small mammals and fish samples for trace contaminants analysis in an effort to shed light on global warming. The remaining permits were issued for a variety of studies and scientific uses. All scientific permits, including their purposes, are listed in Table 9.

Cabin Permits

One five-year cabin permit was issued this year (Table 9). The permit was issued for an existing cabin which had been used for over three years. No new trespass cabins were found during the year, nor were any claims received for the 7 abandoned cabins advertised last year, as required by the cabin policy.

Miscellaneous Permits

Twenty-three special use permits (fourteen in 1990) were issued for a variety of purposes during the year. Ten (six in 1990) were issued for tours of the 1002 coastal plain, eight for the media, three for helicopter landings in association with commercial photography, and one each for contaminant sampling and practice oil spill drills by the Alaska pipeline company. Table 9 lists the miscellaneous permits issued.

3. Items of Interest

Nothing to Report

4. Credits

The following personnel drafted the indicated sections of this narrative.

Introduction		Phil Garrett
A.	Highlights	Greg Weiler
B.	Climate Conditions	Cathy Curby
C.	Land Acquisition	Harvey Heffernan
D.	Planning	
	1,4,6	Roger Kaye
	2,3	Tom Edgerton
	5	Pat Reynolds
E.	Administration	
	1,2,3	Sheryl Waln
	4	Tom Edgerton
	5,7,8	Phil Garrett
	6	Dave Cox
F.	Habitat Management	
	1-8	Fran Mauer
	9	Phil Garrett
	11	Tom Edgerton
	12	Roger Kaye
G.	Wildlife	
	1,2,6,8,9,10,17	Fran Mauer
	3,4,5,7,11	Mark Willms
	14,16	Pat Reynolds
H.	Public Use	
	1,10,11	Roger Kaye
	2,6,7,12,18	Tom Edgerton
	8,9,15	Harvey Heffernan
	17	Dave Sowards
I.	Equipment and Facilities	
	1-5,7,8	Dave Cox
	6	Cathy Curby

J.	Other Items	
	1,2	Harvey Heffernan
	3	Phil Garrett
	4	Greg Weiler
K.	Feedback	ANWR Staff

Individual researchers provided project summaries. Editing: Glenn Elison, Greg Weiler, Roger Kaye. Selection of photographs: Tom Edgerton, Greg Weiler. Typing: Julia McIsaac, Donna Christensen.

K. FEEDBACK

The midnight sun, looking north over Peters Lake. T. Edgerton

Its the great big broad land 'way up yonder,
Its the forests where silence has lease,
Its the beauty that thrills me with wonder,
Its the stillness that fills me with peace.

- Robert Service

Fairbanks Daily News-Miner 2/20/91

Bush energy plan would open refuge to drilling

WASHINGTON (AP)—Presi-
nt Bush today unveiled a national
ergy strategy that relies heavily
promoting new energy produc-
on and only modestly on con-
rvation.

Bush called the plan "a strategy
an energy future that is secure,
ficient and environmentally
und."

Among other features, the plan
lls for opening new areas for oil
d gas production and increased
liance on alternative fuels.

The blueprint was released after
months of public hearings and internal administration debate.

Bush acknowledged that his proposal will be criticized by some but said "none of them will propose a plan that is more comprehensive or in my view more carefully thought out."

Energy Secretary James D. Watkins said the plan was designed to reduce U.S. oil consumption by 3.4 million barrels a day by the year 2010 while increasing domestic production by 3.8 million barrels a day by that year.

"The reality is that the United States and the rest of the world will continue to rely on oil for the foreseeable future and Persian Gulf producers will remain critical players in the world oil market," Watkins said.

"Over the next two decades," Bush said, "this strategy will make us more energy efficient without new energy taxes and it will mean savings for consumers in energy costs and it will improve our energy security and reduce our vulnerability in the years ahead."

Even before its release, however, the administration came under fire Tuesday from environmentalists and from Democratic and Republican lawmakers for not embracing conservation measures more strongly.

Ten Republican senators sent a letter to Bush calling energy conservation "a crucial factor in establishing energy independence." They urged the president to restore a number of conservation measures—such as new federal energy standards for lighting—that reportedly were deleted from a final draft.

The plan proposes:

- Opening new areas, including the Arctic National Wildlife Refuge in Alaska, for "responsible" development of oil and gas resources.
- Easing regulatory barriers for construction of nuclear power plants and the disposal of atomic wastes to "revitalize the nuclear option" as an energy source.
- Streamlining regulations to speed the construction of natural gas pipelines and overhaul electric utilities regulations to increase competition at the wholesale market level.
- Require fleet operators to use alternative fuel cars and trucks if the vehicles and fuels are readily available.

But the administration's energy strategy is expected to be judged on Capitol Hill as much for what it does not contain as for what it does.

☐ Sen. Frank Murkowski says royalties from ANWR oil development should go to state, not federal treasury, as proposed by President Bush. Page 3

'ARTIAL CLEARING
Light wind
HIGH 22 LOW 20
Weather, A2

The Anchorage Times
Alaska's Best Newspaper

WEDNESDAY
March 13, 1991

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VOLUME 77 NO. 72

Open ANWR or face vetoes, Bush warns

By BERT TARRANT
and E. MICHAEL MYERS
TIMES WRITERS

WASHINGTON — President Bush may veto energy legislation that fails to open the Arctic National Wildlife Refuge to oil and gas exploration, Energy Secretary James Watkins told a Senate panel on Tuesday.

The Energy Department, meanwhile, released a study Tuesday saying that if ANWR is not opened within six or seven years, the trans-Alaska oil pipeline could close by 2009 for lack of oil to transport.

Gov. Walter J. Hickel, also speaking Tuesday to the Senate Energy and Natural Resources Committee, said the coastal plain of ANWR could be "a small Middle East" of oil production that must be developed in the national interest.

Watkins said drilling in the refuge is essential to "any kind of a viable energy strategy that makes any sense at all."

Congress is considering several energy bills this year, including the opening of ANWR and some to require large increases in the current minimum acceptable average auto gas mileage.

Hickel, testifying at one in a series of energy strategy hearings called by Sen. Bennett Johnston, D-La., the committee's chairman, said ANWR "might be empty. You have to look."

"I am not saying this part of the world is the Middle East. It could be a small Middle East," Hickel said.

Johnston and Sen. Frank Murkowski, R-Alaska, noted that the issue of ANWR is well known — it was the 11th session on development of the coastal plain in the last few years.

Hickel said little is known about ANWR because of environmental restrictions Congress has upheld for a decade blocking oil and gas development.

Environmentalists have successfully argued that the arctic environment is too fragile to risk, and the oil would do little to curb dependence on imports.

Hickel said the state "is tired of those who distort the arguments about ANWR's coastal plain, who proclaim it to be a Yellowstone Park laden with wildlife, mountains and trees, when in fact it is a barren, marshy wilderness in the summer, infested with mosquitoes, and locked in temperatures of 60 and 70 degrees below zero for up to nine months of the year."

See ANWR, back page

ANWR

Continued from page A1

The oil companies' environmental record in production elsewhere on the North Slope shows that the arctic refuge can be protected, Hickel and members of the Alaska congressional delegation

or Department estimates may be more than 9.3 [illegible] barrels of recoverable oil in the 1.5 million-acre plain that the administration and Hickel agree is vital to Bush's national energy plan. The Interior Department has estimated the chances of finding oil there at about one in five. If there is any oil, the chances are even that there is at least 3 billion barrels, the department has said.

Revenue from oil leases in the refuge would total more than $3.1 billion and royalties could eventually be has much as $30 billion, according to the Energy Department.

The Energy Department study said 2009 "will be the year when the flow of oil from currently producing fields in the region, plus those expected to begin production, dwindles to below the minimum throughput rate of the pipeline."

The study was conducted by the department's Office of Fossil Energy and took more than a year to complete. It uses information from the U.S. Department of the Interior, several Alaska state agencies, the petroleum industry in Alaska and the University of Alaska.

It was developed by the Energy Department during its preparation of the National Energy Strategy, which was released by Bush in February.

"If there is one message coming from this study, it is that delaying exploration or development on Alaska's North Slope may be tantamount to permanent shut-in of the entire region," Watkins said.

The news "comes as a surprise" to Alyeska Pipeline Service Co., which operates the pipeline, said spokeswoman Marnie Isaacs.

Isaacs said Alyeska could not comment on the study's figures because it relies on its owner companies for production projections.

Alyeska President James B. Hermiller, in testimony Tuesday before the Senate committee, said the pipeline currently is transporting 1.9 million barrels of oil per day, a figure that is expected to gradually decline over the next 10 years to about 800,000 barrels per day.

"If ANWR could be in production by the end of this decade, there would be sufficient capacity in TAPS to carry approximately 1.3 million barrels per day of additional crude oil," he said.

The Associated Press contributed to this report.

ASSOCIATED PRESS

Gov. Walter J. Hickel testifies before the Senate Energy Committee on Capitol Hill Tuesday. Hickel told the committee that ANWR's coast is 'a barren, marshy wilderness in the summer, infested with mosquitoes.'

Hickel said the oil companies' record shows that the arctic refuge can be protected.

Hickel says he is prepared to deal on 90-10 ANWR split

By DAVID FUTCH
TIMES WRITER

Alaska is prepared to negotiate its 90-10 share of oil royalties with Congress, Gov. Walter J. Hickel told U.S. senators Tuesday.

But the state will want more federal land or some other trade-off in exchange for lowering its take of the Arctic National Wildlife Refuge royalties from 90 to 50 percent, Hickel told the Senate Energy and Natural Resources Committee.

Alaska Department of Natural Resources Commissioner Harold Heinze said the best deal would be to trade for a 50 percent share of lease and oil royalties from federal offshore leases in the outer continental shelf. The state currently receives nothing from offshore leases or from oil production, he said.

By dealing for a 50 percent share of the shelf, the state would be hedging its bets by hoping oil wells in either ANWR or off the coast of Alaska would produce, Heinze said.

"This is an apple-apple trade because you're trading for a place with good potential for a another place with good potential," Heinze said. "From a strategy point of view it makes sense for us to spread the risk."

Sen. Bennett Johnston, D-La., has written a bill calling for the opening of ANWR. The bill says the federal government would receive 50 percent of the oil royalties while Alaska would get the other half. Federal lawmakers have promised that opening ANWR would be a longtime coming if Alaska refuses to lower its royalty expectations.

Some of the federal royalties from Johnston's bill would be set aside to pay for research into alternative sources of energy.

At the time of the statehood compact Alaskans voted on a 90 percent royalty share for oil and minerals removed from state or federal lands.

Backing off Alaska's 90 percent share in an effort to open ANWR would require approval from Alaska residents, Heinze said.

"It would be nice to get more land out of the federal government, but the best quid pro quo would be a 50 percent share in OCS," Heinze said. "If property has oil and gas potential you make money two ways: leases and oil royalties."

Heinze said the state also would consider offers of a land swap with the federal government. There are lands the state prizes, in particular, federal lands offering transportation corridors to southeastern Alaska and the North Slope, he said.

The state has approximately 84 million acres of land and about 20 million more to choose to meet the 104 million deeded Alaska by Congress at statehood, Heinze said. None of the 20 million acres can come from federal or Native lands, which presents the state a problem in its attempts to fi right-of-way, Heinze said.

The state would like to nego ate for a corridor or corrido through federal lands, he said.

Some of those lands inclu the Tongass National Forest, t Chugach National Forest and t National Petroleum Reser west of Prudhoe Bay on t North Slope, Heinze said.

The administration is expl ing a number of different are that have to do with access, a cording to Hickel special assi ant Malcolm Roberts. The ne move is in the hands of Congre he said.

"There are chunks of land t state would love to have," R berts said. "But I'm not going lay them out."

Jane Robbins, press secreta for Sen. Ted Stevens, R-Alask said Stevens supports the state current 90-10 split.

But Stevens realizes the sta may have to settle for a 50- split in ANWR royalties, sh said.

Stevens and Sen. Frank Mu kowski, R-Alaska, have propose the Ocean and Coastal R sources Enhancement Act b cause of the proposed split.

The act would require the fe eral government to share on third of the revenue generate from oil and gas developme offshore. Federal officials ha estimated the state's take fro the Chukchi and Beaufort seas $12 billion, Robbins said.

Fairbanks Daily News-Miner 4/9/91

ANWR bill not dead, senator says

WASHINGTON (AP)—The chairman of the Senate Energy and Natural Resources Committee said Monday he will not allow a proposal to open the coastal plain of the Arctic National Wildlife Refuge to oil exploration to die in committee.

Committee members soon will vote on whether to send the ANWR proposal to the full Senate as part of President Bush's energy plan, said committee Chairman Bennett Johnston.

Johnston, D-La., said the level of support is uncertain but he believes the full Senate will consider the measure by May.

"There is something like 44 for and 40 against," he said about a coming Senate vote.

Johnston spoke at a conference of the National Ocean Industries Association, an energy development group.

(Continued from page 1)

"We don't plan on allowing it to die in committee," he said. "We want to bring it out, pass it by a big vote. I mean by a good margin."

The committee has 20 members. One is freshman Republican Sen. John Seymour of California, who visited the refuge last weekend.

President Bush's proposed national energy policy includes opening ANWR to oil exploration and development. It also includes provisions for conservation, transportation fuel efficiency and alternative fuels.

Sen. Frank Murkowski, R-Alaska, said last week he wasn't sure if Johnston had the votes to move the issue out of committee. But Johnston said Monday he is sure he can.

Ben Beach, a spokesman for the Wilderness Society, said the prospects of killing ANWR in Johnston's committee are fading.

"It will be very hard fought, but probably Las Vegas would say the smart money is on the oil industry in the energy committee," Beach said. "It is a place that has been pretty receptive to the industry. It is a tough forum for someone trying to save a piece of America. We're underdogs."

Johnston wants the energy bill on the Senate floor by early May, he said. He said it may be next year before the House approves a bill and the competing versions are reviewed in a joint committee.

"But clearly we need to be through the Senate this year — and I expect to be," Johnston said.

Energy Secretary James Watkins also spoke to the development group.

"Let me say here, for the first time since becoming secretary of energy, I see some real opportunity for moving forward in ANWR," Watkins said. "We must convince the American people that energy development, done correctly, is fully compatible with environmental quality."

The federal government and oil industry say huge new oil reserves can be found under ANWR's coastal plain.

The environmental community says the area should be left undisturbed and that development would threaten a fragile ecosystem.

Johnston dismissed environmentalists' concerns that opening ANWR will devastate its Porcupine caribou herd and ruin the refuge.

Fairbanks Daily News-Miner 4/10/91

White House raises ANWR fight

BY BRIGID SCHULTE
States News Service

WASHINGTON—While the Bush administration has never hidden its desire to allow oil and gas drilling in the Arctic National Wildlife Refuge, officials have just kicked their campaign into overdrive.

In the first of several appearances and speeches scheduled for this week, both Energy Secretary James Watkins and Interior Secretary Manuel Lujan said on Monday that ANWR leasing is the centerpiece of President Bush's National Energy Strategy.

"At the Department of Energy, we are making our case to the Congress in the most forceful terms," Watkins said Monday at the annual National Ocean Industries Association convention. "Both OCS (Outer Continental Shelf) and ANWR are key elements in the NES . . . Help us spread the message in a responsible way."

Watkins told the like-minded representatives of offshore oil companies that drilling in ANWR, where an estimated 3.6 billion barrels of oil are located, would be the first step toward exploiting the vast oil reserves under the Chukchi and Beaufort seas in the Arctic.

The intense lobbying to open what some have called the last great oil field in North America comes just as the Senate Energy Committee is scheduled to put finishing touches on legislation outlining the nation's first comprehensive energy policy.

It comes also just as two Senate Environment and Public Works subcommittees, many of whose members have pushed to preserve the refuge as wilderness, make recommendations on the fate of ANWR.

Watkins is scheduled to testify before the Senate Energy Committee today and Lujan testifies next Friday.

Watkins also criticized the environmental community, which has made preserving the refuge as wilderness its most pressing goal. Watkins called the refuge its latest "pet rock."

Both Watkins and Lujan said that without ANWR oil, about 1 billion barrels of dwindling Prudhoe Bay oil reserves could not be fully exploited. Because the pipeline must pump at least 300,000 barrels of oil per day in order to maintain enough pressure to flow, without ANWR oil, the pipeline would be shut down, he said.

"In the case of ANWR, if we choose to forego its promising resources, the economic impact will be multipled," Watkins said. "Not only will we lose ANWR's potential, with a mean estimate of 3.6 billion barrels, but we could also lose the trans-Alaska pipeline system around the year 2009."

FDNM - 4/15/91

State pitches ANWR ads as way to sway policy

By BRIAN S. AKRE
Associated Press Writer

JUNEAU—Television advertisements and a lobbying campaign are part of the Hickel administration's $5 million plan to sway national public opinion in favor of oil drilling in the Arctic National Wildlife Refuge.

The proposal had its first hearing recently in the Senate Finance Committee, which took no immediate action on the bill.

Hickel's plan would spend about $3.4 million for television ads, and $750,000 to hire a Washington lobbying firm to target key congressional districts. The rest of the money would be used to hire public relations firms and for staff, travel and other expenses.

During a hearing Thursday, Alaska truckers and a coalition of business groups testified in support of the plan. Several environmental groups and individuals spoke against it.

With Congress about to debate opening the refuge's 1.5 million-acre coastal plain to oil exploration, the lobbying and public relations campaign must start soon, said Malcolm Roberts, Hickel's deputy chief of staff.

Roberts said the TV campaign would assure Americans that Alaskans can be trusted to be good stewards of the environment.

Hickel last month reversed his stand against spending state money on a PR campaign. Roberts said the governor did so because of the Persian Gulf War, President Bush's strong support of opening the refuge, and stronger oil industry support for ANWR drilling.

"For the first time we feel the industry as a whole is going to back this effort," Roberts said.

But the campaign should not be left just to industry, whose interests are not necessarily the same as the state's, he said.

Environmentalists and some lawmakers expressed skepticism.

"It's nothing but a propaganda campaign," said Karen Jettmar of The Wilderness Society.

Sen. Pat Pourchot, D-Anchorage, questioned whether Americans would buy a TV campaign urging development in a land that the state for years has been advertising as an untouched wilderness.

"It seems there's a contradiction of messages," he said.

Roberts said that was a problem, but that it can only be corrected by trying to change the stereotypes Americans hold about Alaska.

"We have allowed ourselves to be stereotyped," he said. "In the past, tourism advertising has given the impression that nobody lived up here."

Sen. Rick Uehling, R-Anchorage, said he doubted a brief television campaign in a few markets would be enough to change those stereotypes.

"I think it's just money going down the drain," he said.

Representatives of the Alaska Truckers Association and Alaskans for Energy Security, a coalition of business and development groups, testified in support of Senate Bill 209.

O.K. Gilbreth of the energy group said the campaign should stress that exploration would occur only on the coastal plain, which is just a portion of the vast refuge.

After the hearing Roberts said he is optimistic the bill will be passed. He said he would like to start the campaign in the next few weeks.

FDNM – 4/17/91

Lobbyists press views of ANWR

By BRIGID SCHULTE
States News Service

WASHINGTON—The battle over the Arctic National Wildlife Refuge is heating up as congressional committees prepare this week to put finishing touches on the first-ever comprehensive national energy policy.

The Senate Energy Committee is pushing to finish members' energy proposals and President Bush's National Energy Strategy before energy policy fervor wanes in the aftermath of the Persian Gulf War and before fears subside over U.S. dependence on imported oil.

ANWR is the cornerstone of both energy policy proposals. Its lease sale revenues form the sole funding source for research into alternative, and renewable fuels.

At press conferences, at hearings, at lunches with congressional staffers and in private meetings with lawmakers, lobbyists on both sides of the ANWR debate are pressing hard for their disparate points of view: one to develop the 1.5-million-acre coastal plain as an oil field and the other to preserve it as wilderness.

The Natural Resources Defense Council, a non-profit environmental organization, on Monday released a report that, although vague on specifics, declared that oil development in the refuge would alter or destroy thousands of acres of wildlife habitat and pollute the fragile Arctic ecosystem.

"The Bush administration would have the American public believe oil development can be done in a surgical manner—no pain and few scars," said Lisa Speer, NRDC senior scientist and author of the report. "That's a myth. 'Environmentally sound' oil development is a fantasy."

"Tracking Arctic Oil: The Environmental Price of Drilling the Arctic National Wildlife Refuge" is the environmental community's alternative to the Department of Interior's reports that claim a more than 40 percent chance that ANWR holds at least 3 billion barrels of oil.

Last week, two Alaska Natives who live near the refuge were in Washington telling reporters and lawmakers that oil development has brought heat, schools and hospitals to their villages and that ANWR development is key to their future.

"We don't think the environmentalists are fair when they say ANWR is of great beauty," said Oliver Leavitt, vice president of the Native-owned Arctic Slope Regional Corp. "For a wildlife refuge, you don't see much wildlife there."

Leavitt and North Slope Borough Mayor Jeslie Kaleak Sr. handed out posters to illustrate their viewpoint.

"The Myth of the Arctic Coastal Plain," shows sketches of wolves and grizzlies, caribou, musk oxen and snow geese lying around streams and verdant pastures.

"The Reality" poster, however, shows two grainy black and white photos of a windswept, barren plain.

Taking another tack, Secretary of Energy James Watkins last week told a group of offshore oil company officials that without ANWR oil, the 800-mile-long trans-Alaska pipeline will become obsolete after the turn of the century.

Speer of the NRDC said that pipeline owners only expected it to last 30 years

Watkins and oil company officials maintain that because of improved technology, ANWR facilities would be substantially more compact than oil extraction facilities at nearby Prudhoe Bay.

In answer, Jay Hair, speaking at a press conference Monday, demonstrated the "take-no prisoners" attitude that characterizes both sides: "How about if we put an oil drilling pad on the White House lawn? Certainly that would change the nature of what we think the White House symbolizes."

Fairbanks Daily News-Miner 5/23/91

ANWR bill moves ahead

Senate panel supports refuge oil exploration

By BRIGID SCHULTE
States News Service

WASHINGTON—The Senate Energy Committee today voted to allow drilling in the Arctic National Wildlife Refuge as the centerpiece of a proposed national energy policy.

The vote is the first step on what is expected to be a long and rocky road in Congress for legislation opening the refuge to oil drilling.

The committee voted 17-3 to pass the nation's first comprehensive energy policy. The bill includes provisions for arctic drilling, reform of the electric utility system and guidelines for the Strategic Petroleum Reserve, among other provisions.

The committee voted 11-8 against Sen. Tim Wirth, D-Colo.'s motion to strike the ANWR drilling provision from the energy policy bill. Wirth and his supporters have argued that drilling in the refuge is misguided, that only oil companies stand to profit and that a comprehensive energy policy should be based on alternative energy research and conservation.

Drilling supporters, including committee chairman and bill sponsor Sen. Bennett Johnson, D-La., on the other hand, argued that drilling on the coastal plain of ANWR was the first step toward tapping greater reserves in the Arctic offshore areas, and would further extend the life of the trans-Alaska pipeline.

"Clearly, Alaska scored a big

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(Continued from page 1)

victory today and we're quite pleased. ANWR needs to be part of a rational national energy policy and the committee recognized that," said Mike Heatwole, spokesman for Sen. Frank Murkowski, R-Alaska.

Voting against the entire energy policy bill were Sens. Paul Wellstone, D-Minn., Bill Bradley, D-N.J., and Dale Bumpers, D-Ark.

The bill, which now goes to the Senate floor for consideration, has two major drawbacks that may ultimately doom its passage, observers said.

Johnston failed 13-6 today in his second attempt to pass fuel efficiency standards for automobiles. Without this conservation measure, undecided senators are less likely to support the controversial prospect of arctic drilling.

Also, Murkowski succeeded in passing an amendment to allow the state of Alaska to sue the federal government on the question of how to divide the revenue from lease sales and oil drilling. If the courts decide in favor of Alaska and allow a 90-10 split of revenue instead of the 50-50 now in the bill, many lawmakers may no longer support arctic drilling.

The refuge has been the subject of a bitter struggle between environmental groups, who say it is the last intact arctic ecosystem in the world, and oil interests who claim the estimated 3 billion barrels of oil underneath the 1.5-million acre coastal plain is the last great oil field in North America.

The vote came as no surprise to either oil industry representatives nor environmental groups who kicked lobbying efforts into high gear once the Persian Gulf War put energy policy legislation on the front burner.

Arctic refuge debate generates oil controversy

Critics say state fails to enforce

By BRIGID SCHULTE
States News Service

WASHINGTON—Although the oil industry promises to drill for oil in the Arctic National Wildlife Refuge without disturbing the environment, critics doubt that the state of Alaska can make them keep their word.

Officials from state agencies on Tuesday assured a House panel here that they are enforcing Alaska's "strict environmental laws." They urged Congress to give the state joint responsibility for managing the refuge should lawmakers vote to open it for oil and gas production.

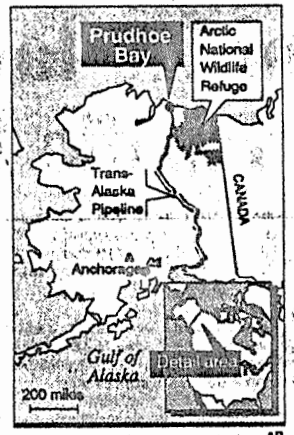
But critics from environmental groups pointed to the state's record at nearby Prudhoe Bay, which, with 270 oil spills last year, they described as dismal.

Rep. Nita Lowey, D-N.Y., member of the House Merchant Marine and Fisheries Committee, questioned state officials about 300 plugged oil wells at Prudhoe Bay that no one has removed.

"Why should we have confidence that the state will rehabilitate this new area when so many other wells have been plugged and closed and no effort to rehabilitate has been made?" she asked state officials.

Her question is one of many Congress is now grappling with at a spate of hearings on whether to allow drilling in the Arctic refuge. Pro-development lawmakers, as well as the Bush administration, said that national security is threatened without the 3.2 billion barrels of oil estimated to lie under the refuge.

Other lawmakers, however, said that the pristine nature of the refuge should be preserved and that the refuge may not hold enough oil to make the nation energy independent.



AP

"At Prudhoe Bay there are problems with sewage treatment, injection of toxic drilling mud, disposal of millions of gallons of toxic brines and air pollution permits—all of these under the enforcement of the state," said Randall Wiener, attorney with Trustees for Alaska in Anchorage.

"The state is incapable of responding to all these problems on the North Slope (even) without taking ANWR on as a responsibility," he added.

Trustees for Alaska currently is fighting the oil industry and state over problems with waste—both disposing toxic drilling muds in open pits and human wastes in a natural lake—on the North Slope.

The question of resources—both human and financial—is a key sticking point. Neither the state Department of Environmental Conservation nor the Department of Fish and Game have officials on the North Slope at all times.

Fish and Game spends less than $1 million of its $82 million budget on North Slope research and enforcement, officials said.

Svend Brandt-Erichsen, DEC regional administrator and former aide to Sen. Ted Stevens, R-Alaska, said the DEC staff for the North Slope has increased from five to 10 people.

Although they are stationed mainly in Fairbanks, he said, DEC expects officials to be on the North Slope at least 300 days this year, up from 230 days last year.

"We would anticipate some staff increase with ANWR, but probably not that many," Brandt-Erichsen said. "They'd be dealing with the same environmental issues and the same waste products."

Lisa Speer, senior scientist for the Natural Resources Defense Council, said that while the state environmental presence on the North Slope has been lacking, the federal government has been even worse.

Only a handful of U.S. Environmental Protection Agency officials track issues on the North Slope, she said. "It's really appalling," she said. While EPA officials review oil industry projects for impacts on wetlands, they have done little to enforce discharge, hazardous waste and air pollution regulations.

According to "Tracking Arctic Oil," a report written largely by Speer, drilling activity on the North Slope each day produces 40 million gallons of toxic brine, 40,000 cubic yards of liquid oily waste, 3,000 cubic yards of drilling muds and 300 cubic yards of contaminated solid waste.

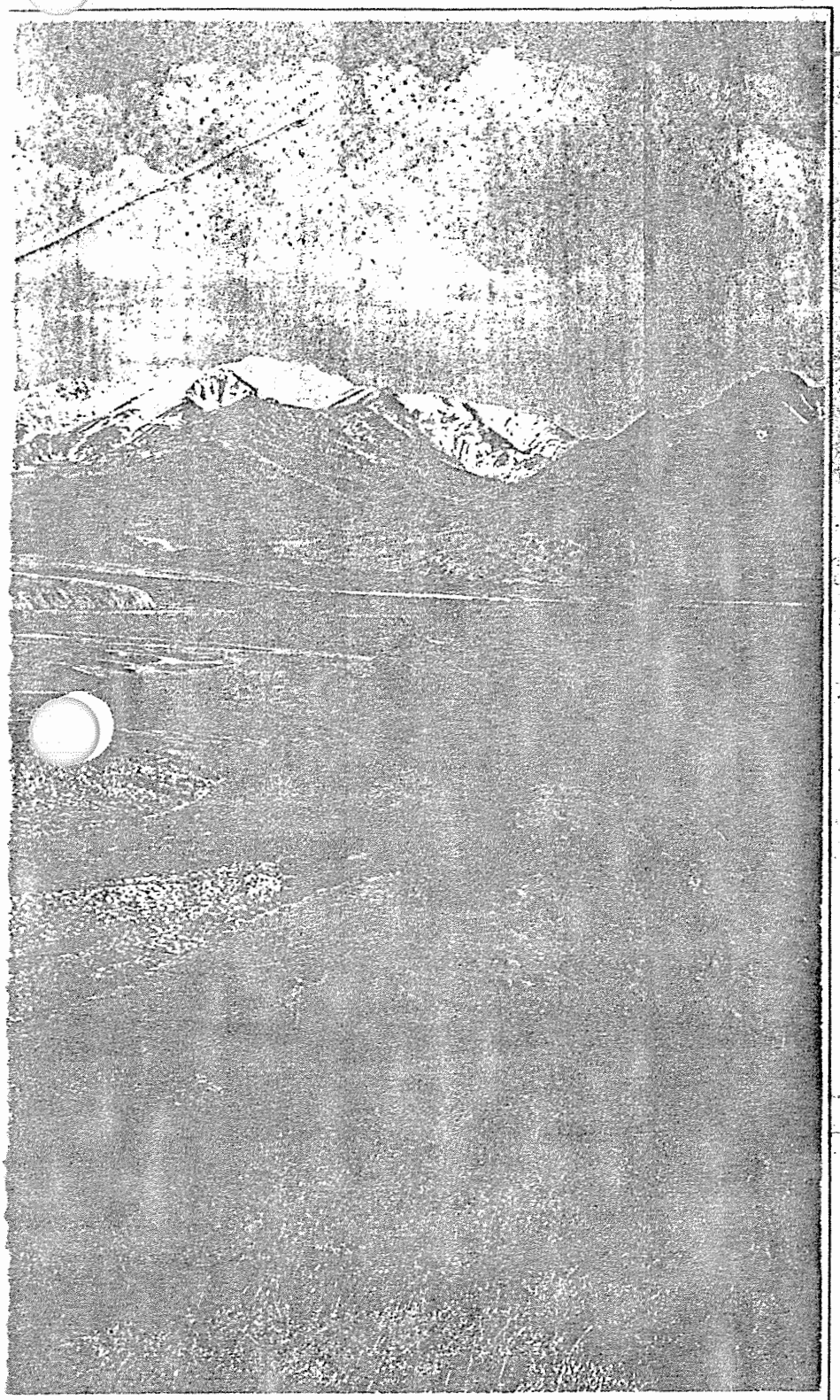
Brandt-Erichsen said waste disposal and rehabilitation of abandoned wells are two major problems on the North Slope that DEC is just beginning to address. New regulations require that oil companies surround open toxic waste pits with liner. And two pilot projects are underway to either inject the waste back into the ground or bury it below ground where it would be permanently frozen, he said.

Wildlife could also be hurt by drilling, according to testimony. Bear biologists told lawmakers that oil drilling in ANWR could disrupt some of the on-shore dens used by the 2,000 polar bears that roam the Beaufort Sea.

However, Ron Somerville, deputy commissioner of the Alaska Department of Fish and Game, said that drilling outside coastal areas and the areas used by caribou during calving probably would not significantly harm wildlife.

OIL IMPACT—Environmentalists and the oil industry both mention Prudhoe Bay as an example when they argue about whether oil exploration should be allowed in the Arctic National Wildlife Refuge. Environmentalists allege that the industry record at Prudhoe Bay is a bad one, while the oil industry says it has done a good job in protecting the environment of the North Slope.

OUTDOORS



Kelly Bostian/News-Miner

—The ...ks of the Brooks Range frame the course of upper Hulahula River Nat... ...ldlife Refuge. The river offers one of the most popular float trips ...e.

CAMPSITE CHECKUP

Group evaluates camper damage on ANWR river

By KELLY BOSTIAN
Staff Writer

The morning stroll on the river's gravel bar was a letdown after the short scenic hike into the midst of the Brooks Range the night before.

At midnight on June 18, the low angle of the sun played across mountain peaks, changed hues and threw long shadows across the valleys. Dall sheep grazed on grassy slopes. A pair of caribou bulls trotted along the gravel bars.

In the morning, the sights included trash, old campsites and excavations.

But then, this wasn't a trip solely to enjoy the wilderness.

The Hulahula River is one of several Arctic National Wildlife Refuge waterways that have experienced an overturn in reputation among adventurers, from that of routes through unspoiled wilderness to byways choked with adventurous crowds.

Our party was looking not only for any crowds, but what they left behind. We were to raft 70 miles of the North Slope stream, survey the area for camp damage, and learn more about the river.

Glenn Elison, ANWR director, organized the rafting trip along with Tom Edgerton, ANWR outdoor recreation planner, and Harvey Heffernan, ANWR biologist.

This trio recently helped write a draft of the ANWR River Management Plan, which will spell out conditions of future use on ANWR rivers, with the exception of the Porcupine River. This plan may restrict the number of people who may travel to the rivers or, at least, control their activities.

The plan will cover several areas, including: commercial vs. private uses; aircraft traffic; size of groups and numbers of people allowed on the river; camping regulations; and hunting, fishing and trapping.

Interest in oil development in the Arctic refuge brought more people to see for themselves what was proclaimed "The Last Great Wilderness." But some visitors were disappointed by what they found. The pristine wilderness they anticipated was, on some days, abuzz with low-flying planes. Hikers or river runners would bump into each other. Old campsites and trash were everywhere, they told Fish and Wildlife planners.

It was complaints from rafters and kayakers that spurred the planning process in September 1989.

□ □ □

On our morning stroll, near Grasser Airstrip on the upper Hulahula River, we found camp trenches, fire rings, and bits of miscellaneous trash.

Not far from our camp, two egg-shaped patches on the ground showed where 10-foot-diameter tents had been pitched. The outline of each tent was marked by large rocks, apparently placed to hold down the tent edges. A shallow trench was dug around the perimeter of each tent site, evidently to channel off rain water.

Throughout the trip we stopped at gravel bars that looked like good camping spots.

In the mountainous area of the river, the "rocks in a circle" were common. As the trip progressed, we began to joke that the circles marked "official campsites."

Also near Grasser strip were several "fire rings," the black stains that remain on the gravel bar long after the campfires are gone.

The following morning we camped at East Patuk Creek. There, a large gravel bar was home to many old campsites. I spotted an

(See RIVER, Page C-3)

RIVER: Looking for trash, crowds

(Continued from Page C-1)

old pair of socks, some orange flagging tape snagged in the bushes, and a plastic sack with the faded words "frozen strawberries" on the top.

Edgerton struck a garbage motherlode. A grizzly bear had undone the work of campers who buried their trash. Plastic, paper, metal and other garbage the bear dug up was strewn across the gravel bar.

□ □ □

On the river we met one other group—a party of six rafters—and saw them several times during our trip.

When we first spotted the group, they were camped near where Elison had planned to camp. "Wilderness etiquette dictates that we move on," Elison said.

Picking another campsite wasn't a problem for us. But for someone on a once-in-a-lifetime trip, moving on could mean passing up a hiking area the explorer intended to visit.

The group we met was led by guide Ron Yarnell, owner of Wilderness Alaska/Mexico Fairbanks. Yarnell said the river has looked worse. Barrels that held oil or other chemicals used to be the principal trash along the river. "I used to take photos of the barrels and send them off to the companies with a letter," he said.

Yarnell said the Hulahula has lost some of its commercial appeal. Because of its popularity, people think it's not "wild" enough, he said.

"I have to tell people we won't necessarily have the river all to ourselves," Yarnell said. "There's always a possibility you might run into another group.

"Some won't go because they feel the river's too popular," he said.

Joan Reiss, state director of the California-Nevada Wilderness Society, was traveling in Yarnell's group. She wasn't too upset about the old campsites, until she rounded a bend and spotted what Eskimos call Fish Hole Two, a private inholding.

"That was absolutely awful," she said. "I can't understand why they have to leave it such a mess."

At Fish Hole Two, oil drums were scattered about, several old Dall sheep hides rotted on the ground, a brown patch of vegetation about 12 feet in diameter reeked of fuel oil, and the ground around the area was littered with cans, wrappers and boxes. Wind had spread some of the litter along the banks of the river opposite the campsite.

Fish Hole One, located a day's travel downstream, has a large cabin. The grounds around that camp also were littered.

Refuge director Elison had heard complaints about the private inholdings, but even he seemed surprised at the condition of the area. He said he planned to work with Kaktovik villagers to see what could be done.

Fish and Wildlife worked with villagers in 1989 and 1990 to clean up the two spots. Seven helicopter slingloads of abandoned fuel barrels and trash, along with hazardous wastes, were taken from three inholdings along the Hulahula and within the wilderness area of the refuge, said Edgerton.

Kelly Bostian/News-Miner

TRASH PICKUP—Tom Edgerton, outdoor recreation planner for the Arctic National Wildlife Refuge, collects a bagful of trash from a popular camping spot on the Hulahula River.

Kaktovik Mayor Herman Aishanna said villagers would welcome cleanup help from Fish and Wildlife.

"There is no way of going up there besides by helicopter in the summer. We can't afford that," Aishanna said. "We would be glad to (clean up the areas) if there were a way we could do it."

Aishanna said the Fish Holes are winter camping sites, usually used in October for subsistence sheep hunting and fishing. Arctic char is plentiful in the river's deep pools.

Aishanna said the trash is placed in barrels, but often spread out later by grizzly bears or wolverines. The garbage is left behind, he said, because the space on snowmachines and sleds is needed for meat and cargo on return trips. Fish Hole Two is two days' snowmachine travel from Kaktovik.

Aishanna said the discarded animal hides were probably too bloody to be of value. "If they're fairly clean then we take them," he said. It's difficult to burn the hides, but he suggested that hunters could leave the hides on the river ice to be washed away in spring.

□ □ □

After seven days on the river, Elison left with the impression that the Hulahula is not only an outstanding recreational river, but that crowding and trash problems might not be so bad as some believe.

"The junk largely appears to be from fall sheep hunters along the upper river in fall and subsistence hunters along the lower river in the winter," he said. "Use of the river doesn't appear to be excessive at this point, and if there is a problem with crowding it seems that it is perceived by visitors with unrealistic expectations. I don't know if people have a God-given right to not see other parties when they're on public land."

Elison would not elaborate on details of the river management plan because the document is still too far from its final form.

The public has had ample opportunity to help in the river plan process. A total of 680 comments, 70 percent from Alaskans, were considered in the initial draft. When ready for public review, the first draft will be mailed to 1,200 people, Edgerton said.

Edgerton said that any ANWR proposal is bound to generate high interest. The level of comment on this plan, however, is outstanding in comparision to similar plans, he said.

The initial river plan draft was finished last month and is going through Department of the Interior reviews. It should be available for public review in September. The final plan is due for approval in 1992.

Learn to go camping with care

By KELLY BOSTIAN
Staff Writer

To some, a camp with fire ring and tent platform is a welcome sight at the end of a day of paddling or hiking.

To others, it's an eyesore, a human insult to what should be wilderness.

Tom Edgerton, outdoor recreation planner with the Arctic National Wildlife Refuge, keeps a file of information to help travelers with "low-impact camping" techniques.

The motto of today's environment-conscious camper is "leave it as you found it" and with no trace that you ever were there.

Following are tips garnered from Edgerton's file, which contained information from the U.S. Fish and Wildlife Service, the National Park Service, and the REI sporting goods company.

HOW TO

Campsites

Selection of a campsite is probably the most critical decision you will make if you want to do the least harm to the land. Gravel bars make excellent campsites because they are durable and well-drained, and often have fewer mosquitoes. Spring flooding will erase most signs of your presence.

If you must use a vegetated site, select a spot with hardier plants, such as moss or heath, rather than more fragile lichens. Shift camp every two to three days or before the area is trampled.

Wear soft-soled shoes around camp. Trenching for tents is unnecessary. Carry plastic to use as a ground cloth. Using branches for beds or caches also is unnecessary. Before you leave, try to restore the area to a natural appearance.

If there is an obvious campsite, use it to eliminate expansion of the camp.

Campfires

Fires, where allowed, should be used only in a fire pan and where fallen dead wood is abundant. If the area is over-camped or near timberline where wood regenerates slowly, choose an alternate site or use a stove.

Fires should never be built in litter or duff. If there is a ground cover of duff, be sure to dig through it well into the mineral soil when constructing a firepit. Be sure the pit is large enough to keep embers from smoldering in the duff.

To avoid blackened rocks and burned plants, fires should not be ringed with rocks or built against reflective rocks.

Erase traces of fire before you leave. Remove all bits of foil, wire and other unburned material from the ashes and pack them out.

When in doubt, use a stove.

Latrines

For large groups, a community latrine is most easily managed. For small groups, individual "cat holes" work well.

Latrines should be located at least 100 feet away from rivers, lakes, creeks, and marshy areas to allow human waste to decay and be filtered through the soil without polluting.

Latrines should be a maximum 10 to 12 inches deep, or not deeper than the organic soil. Latrines should be covered before they are two to four inches from full.

Feces should be covered with topsoil and compressed by foot or shovel.

Urinating should be done well away from trails and water sources, although not necessarily in a latrine. Urinate in areas with thick humus layers and good drainage.

Toilet paper should be burned. In areas where there's a danger of wildfires, paper should be bagged and packed out. When available, snow, leaves, and other natural toilet paper substitutes are preferable.

Tampons can be burned, but only in an extremely hot fire. In most cases tampons should be bagged and packed out.

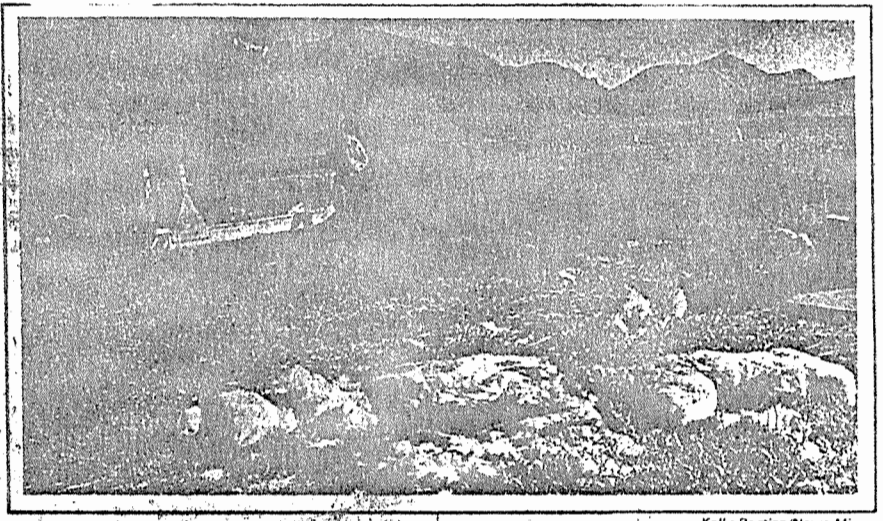
Waste disposal

Food can be packaged in plastic bags instead of cans, glass bottles or foil. The bags should be carried out or burned.

Dishwater or cooking water should be dispersed away from any body of water.

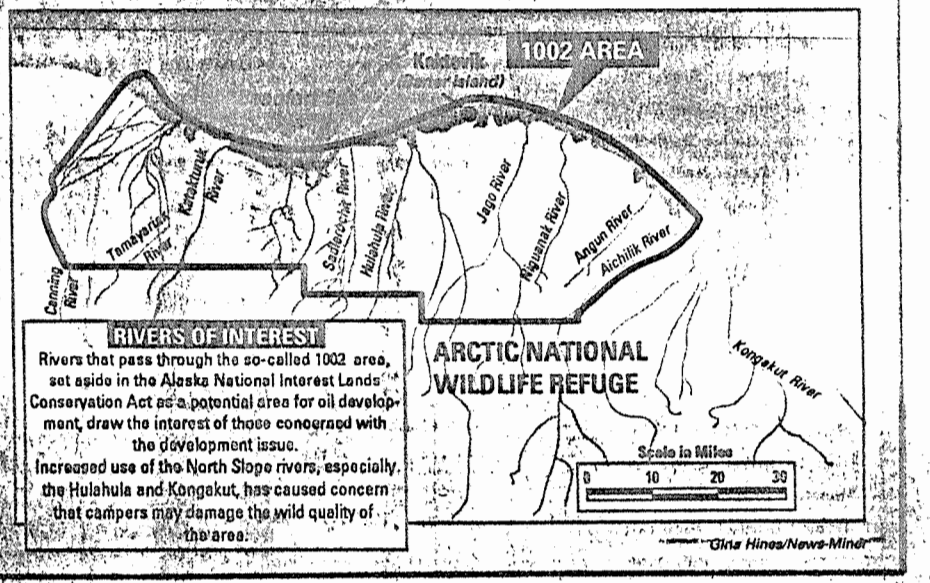
Plan meals to avoid leftovers. Leftovers should be burned or carried in plastic bags for later use. Make sure the fire is hot if attempting to burn food; partially burned food will attract animals.

A general rule: If you pack it in, pack it out.



Kelly Bostian/News-Miner

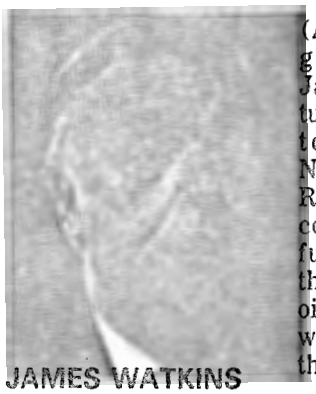
PRIVATE LAND—Floaters of the Hulahula often complain about trash left at two Native inholdings. At Fish Hole Two, Dall sheep hides lie rotting on the ground amid litter.



Gina Hines/News-Miner

FDN-M 7/7/91

Energy secretary backs drilling in ANWR after first visit there


JAMES WATKINS

ANCHORAGE (AP)—U.S. Energy Secretary James Watkins, returning from a trip to the Arctic National Wildlife Refuge, said he is convinced the refuge can become the nation's newest oil exploration site without harming the environment.

"I had to have my own feel for it as this debate picks up and will be quite heated," Watkins said Friday night after visiting the refuge for the first time Wednesday and Thursday.

"I needed to go up there and talk to the local people, I needed to see the range myself, I needed to get a feel for how sensitive the oil industry is up there."

Watkins flew on a BP Exploration Inc. plane, he said, and met with officials from the National Park Service, North Slope Borough and some villages.

He did not meet any environmentalists.

"We met them many times in Washington," Watkins said.

Opening the refuge's coastal plain to oil development is a key plank in President Bush's proposed national energy policy. The Senate Energy and Natural Resources Committee has approved the proposal, which calls for drilling in the refuge but limits it to 3,000 acres.

The full Senate will take up the issue this fall.

Sen. Tim Wirth, D-Colo., who has opposed opening the refuge, toured it Thursday, Watkins said.

If drilling is not allowed in the refuge, Watkins said, he will recommend Bush reject the whole policy. Watkins said the administration wants the country to develop other energy sources, but that will take at least 20 years. In the meantime, he said, the United States must reduce its dependency on foreign oil.

Watkins toured Alyeska Pipeline and Yukon Pacific facilities in Valdez on Friday, and also traveled to the Kenai Peninsula. This weekend he planned to see the Usibelli coal mine. He has scheduled meetings in Anchorage Monday and Tuesday before returning to Washington.

Watkins and Gov. Walter Hickel had dinner Tuesday in Juneau with Sen. Frank Murkowski, R-Alaska.

"The governor and I are very much in synchronism" about opening the arctic refuge, Watkins said.

Glenn Elison

Director of the refuge

ANWR's man in charge keeps an open mind

SPOTLIGHT

By KELLY BOSTIAN
Staff Writer

HULAHULA RIVER—It was 1 a.m. and Glenn Elison puffed lightly on a cheap cigar—mostly he just held it in his mouth—as he watched the sun paint colors across the north face of the Brooks Range.

He doesn't normally smoke, he explained, but saves the cigars for special outdoor trips.

Elison rested on a ridge downstream of Old Woman Creek, off the Hulahula River in the Arctic National Wildlife Refuge. A north wind blew from the Arctic pack ice, visible as a white line on the northern horizon 20 miles away, on the other side of Alaska's northern coastal plain.

The muddy, churning Hulahula shone placid blue in the valley below, a trick of the Arctic summer sun.

Elison commented on the beauty, took some photographs and happily soaked up the atmosphere.

A U.S. Fish and Wildlife Service employee for 15 years, Elison has been director of this, the nation's largest and most controversial of refuges, since 1983.

While Elison enjoyed the scenery on this hillside June 22, a battle raged over the future of very ground on which he rested. But the battle's heart was thousands of miles away.

The U.S. Congress is in the midst of debates over whether to open the coastal plain of ANWR for oil exploration and development or to designate the area as wilderness.

Thoughts of that quarrel are far from Elison's mind on endless summer days like this. That is, until a pesky reporter reminds him of the issue.

"I don't dwell on it," he said. "Because of my job it's something that is over-present. But when I'm out like this I don't think about it."

He doesn't torture himself with constant thought because so much is speculation, he said. "Nobody can say for sure if oil is present, and if it is, where," he said.

Ranking the values

Environmental groups have accused the U.S. Fish and Wildlife Service of supporting oil development on the refuge, and, at first glance, Elison's personal views might be interpreted that way as well.

But he doesn't say outright, and he drops just enough hints to make any listener uncertain.

In the Alaska National Interest Lands Conservation Act of 1980, Fish and Wildlife was charged with the duty of researching wildlife in the so-called "1002 area," a 1.5 million-acre area on the coastal plain set aside for consideration as oil land.

As refuge director, Elison had a large part in creating and reporting those studies. He said they indicated that wildlife would not be significantly harmed by oil development.

The studies were completed while President Ronald Reagan sat in the White House, and partly while the controversial James Watt was Secretary of the Interior. Those two facts themselves make some environmentalists wary of the results.

But Elison said he honestly agrees with the service's position "after looking at this thing a heck of a long time."

"People try to use fish and wildlife arguments against (oil development,) and the service just can't buy into that," he said.

"I'm not saying there won't be any effects, but the level of impacts would be within acceptable limits, given the potential oil reserves," he said. "The impacts can be mitigated."

For example, he said, oil companies can use suitable garbage sites or possibly fence off areas of high human use to prevent conflicts with bears.

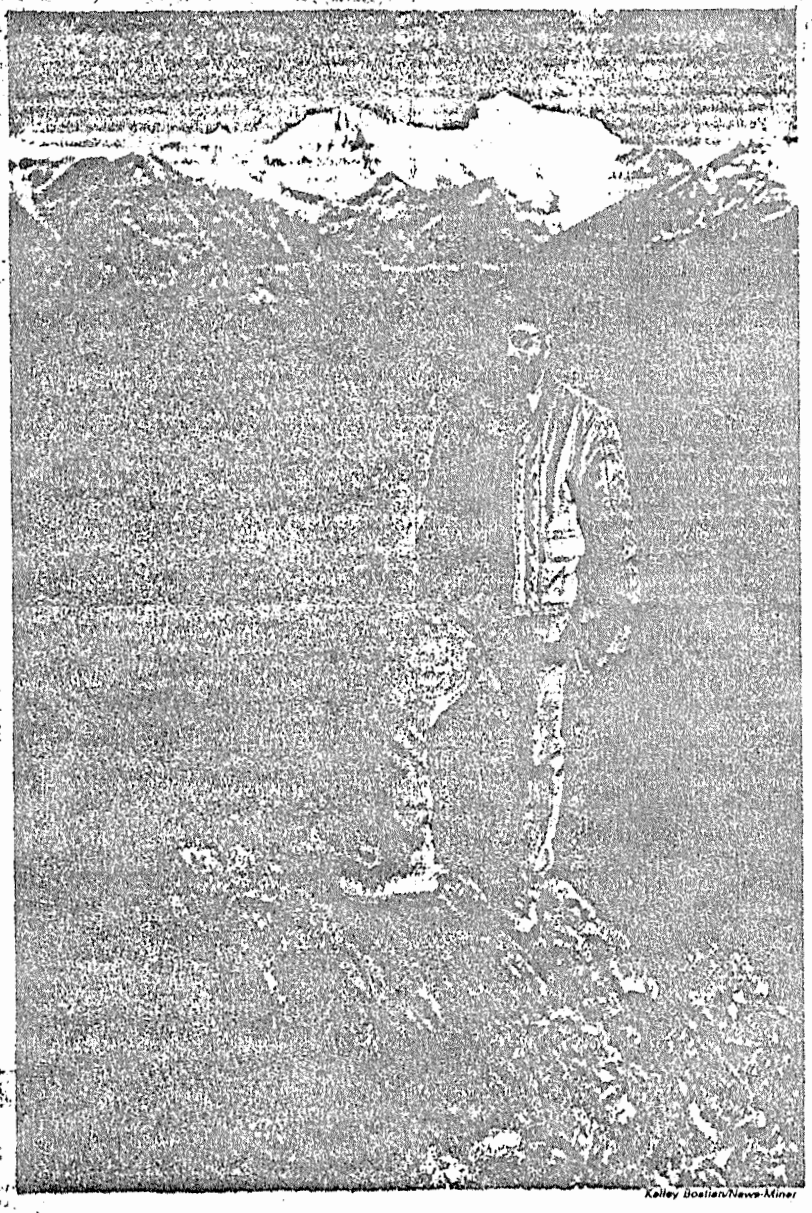
In addition, pipelines and roads can be designed to allow better passage of migrating caribou, and construction activity can be curbed during the calving season, he said.

However, just when it seems that Elison would welcome the oil rigs, he points out that another, less tangible reason exists for protecting the ANWR coastal plain—its wilderness character.

He wouldn't give his own view on whether the coastal plain should be spared for the sake of wilderness alone. However, he pointed out during the conversation that he obviously didn't become a biologist to build oil wells.

"Wilderness is a very legitimate land use. The same goes for oil development or other uses. It's simply a choice the public has to make," he said.

Unlike wildlife, the wilderness character of the land cannot be preserved around an oil field, he said.



Kelley Bostian/News-Miner

IN HIS 'OFFICE'—Glenn Elison, a U.S. Fish and Wildlife Service employee for 15 years, directs the Alaska National Wildlife Refuge, the nation's most controversial refuge.

> *"Wilderness is a very legitimate land use. The same goes for oil development or other uses. It's simply a choice the public has to make."*

Glenn Elison

Age: 41

Occupation: Director, Arctic National Wildlife Refuge

Family: Wife, Denise; daughter, Heather, 12; son, Travis, 9.

Hobbies: Outdoor-related sports, hunting with muzzle-loader.

Sports: Ice hockey—"I'm not good at it but I enjoy it."

Memberships: Ducks Unlimited, Nature Conservancy.

Start out young

Elison never had a doubt that he would someday be a biologist. A native of Williamsport, Pa., he enjoyed hunting, fishing and a host of other outdoor activities as a youth.

The Williamsport area is mountainous, by eastern standards, he said. He still returns every few years to hunt white-tailed deer.

He visits a hunting cabin that has been in the family more than a century. It was built by a distant relative in the 1880s. "The same group is there every year. It's a big social event," he said.

Elison's father, now in his 60s, comes to Alaska often to hunt. He shot a Dall sheep on a hunt in the Brooks Range. "He got a nice sheep. A real beautiful animal," Elison said.

His wife, Denise, is an outdoor enthusiast as well, and his daughter, Heather, 12, and son, Travis, 9, are well on their way into a life of outdoor adventure.

Travis shot his first caribou last year. The framed photo of the smiling boy and his big game trophy hangs on the wall in his father's refuge office in Fairbanks.

"You've gotta start them out young," he said with a smile.

Fairbanks Daily News Miner 7/30/91

Fund chief boosts ANWR development

ANCHORAGE (AP)—Permanent Fund chief executive David Rose says development of the Arctic National Wildlife Refuge is needed to stave off declining oil revenues and the eventual pressures such a decline would put on the fund.

"Exploration for and development of new oil fields would further delay the disruption of the fund," Rose told about 200 people at the Anchorage Chamber of Commerce luncheon. "So, when it is truly needed, it will be large enough to do the job."

As oil production declines on the North Slope, pressure on the Legislature will continue to mount from different groups to take money out of the Permanent Fund, Rose said. Legislators will be tempted to take the fund's reserves, then its profits used for dividends and inflation protection, and finally, the principal, he said.

"One day, the Permanent Fund revenue will exceed petroleum revenues," Rose predicted. "Stress will be placed on the fund to fill the gap left by oil declines."

That will create more pressure on Permanent Fund officials to earn larger returns on investments, a move that inevitably leads to riskier strategies, he said.

Over its 13-year life span, the Permanent Fund has grown only when it got new funds from oil revenues, a $1.3 billion appropriation by the Legislature in 1986 and inflation-proofing, or annual additions, to offset inflation.

The principal of the fund, set up as a statewide oil wealth savings account, is now at about $12 billion.

"The only real new growth in the fund comes from oil money," said Fund spokesman Jim Kelly.

Inflation ate up 5.41 percent of the fund last fiscal year.

Kelly said the Permanent Fund would reap 50 percent of state ANWR monies, compared with the 25 percent taken from Prudhoe Bay revenues.

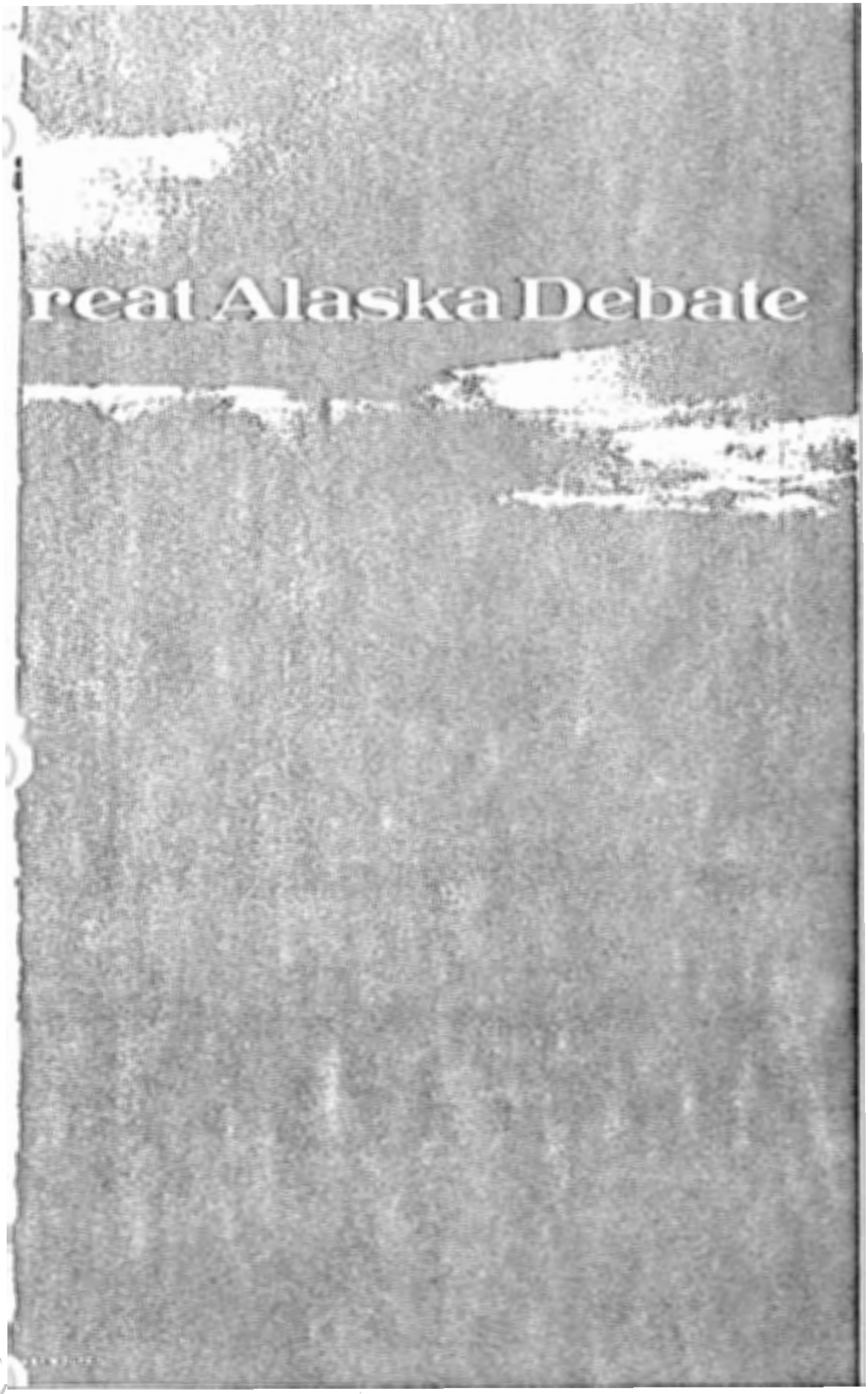
Fairbanks Daily News-Miner 8/1/91

State hires ANWR lobbyist

JUNEAU—Becky Gay, executive director of the Resource Development Council for Alaska, will leave that post to become coordinator of the state's efforts to open the Arctic National Wildlife Refuge to oil exploration, the Hickel administration announced Wednesday.

Gay, who will be based in Anchorage, will take a six-month leave from RDC to take the ANWR job, which will pay $5,650 a month.

The New York Times Magazine
AUGUST 4, 1991



Can Oil and Wilderness Mix?

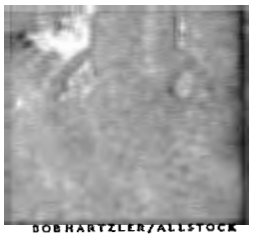
BY TIMOTHY EGAN

THE BEST-KEPT SECRET in the oil industry lies under a steel pipe, six inches in diameter, that pokes out of the tundra inside one of the world's last truly wild places. Eight months of the year, the pipe is surrounded by the frozen chop of snow and blue ice that covers the coastal plain of the Arctic National Wildlife Refuge in northeast Alaska. A desert, with less than 10 inches of annual precipitation, the flat land bordering the Beaufort Sea holds the imprint of a savage wind for most of the year: snowdrifts contorted and hardened, a landscape like paste from a blender.

In the summer, when the sun circles the horizon but never sets, the snow melts, wildflowers rise in the plain and great masses of caribou arrive to give birth to their young, seeking the coastal wind as refuge from swarms of mosquitoes. Driven by biological imperative, the animal herds gorge themselves on grass and flowers, storing fuel for the long migration through the Brooks Range in mid-summer.

In September, the tundra

Timothy Egan is Seattle bureau chief of The Times.



BOB HARTZLER/ALLSTOCK

The coastal plain of the Arctic National Wildlife Refuge may contain vast amounts of oil, but many fear that drilling will destroy America's "last frontier."

Above: The spoils of oil-prospecting profits line the main thoroughfare of Kaktovik, the only human community inside the refuge. Chevron's exploratory well was drilled just a few miles from this village of 200 Inupiat Eskimos.

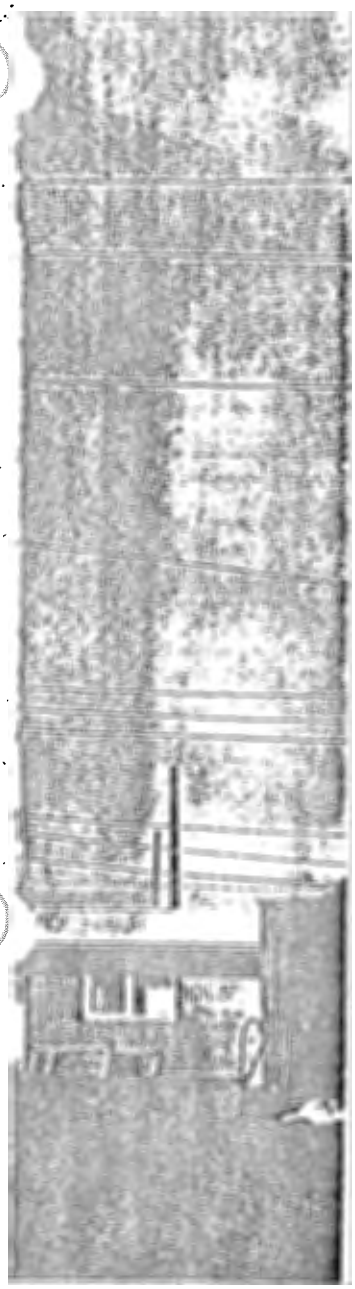
freezes again, the sea hardens, grizzly bears hibernate in pockets of warmer air near the mountains, daylight is squeezed from the sky. Through the seasons, the pipe remains — a totem of the great mystery whose resolution may determine the future of American energy policy. The five-foot shank of steel marks an exploratory oil well, called KIC-1, that was drilled by a partnership led by Chevron U.S.A. in 1985 and 1986 at a cost of more than $40 million. The oil companies drilled to a depth of 15,200 feet on land owned by an Eskimo regional corporation in order to peek beneath the permafrost. They may have discovered the largest recoverable oil field in North America, or they may have struck out, reaching only natural gas or water in a reservoir mapped out by geologists.

Fewer than 10 people know what was found beneath the pipe, says Tom Cook, a geologist who is Chevron's exploration representative in Alaska. The oil company considers the information obtained from its exploratory well proprietary and will not share its findings. Test drilling for oil, like trying to forecast the weather, is risky, an inexact science. Nobody, not even the Chevron geologists, knows for sure how much oil there may be under the refuge, or how much of it is recoverable. But the test results must have been tantalizing enough, prompting the intense lobbying now underway in Congress by the major oil companies.

"What you get from that kind of well is a better understanding of the geology," Cook says, poker-faced. He lights a cigar inside one of the drab huts latched to the tundra in the oil town of Deadhorse, at Prudhoe Bay, 65 miles west of the refuge. "Hopefully that puts us at a competitive advantage when — if — we start production," he says.

The question of whether the nation's second-largest wildlife refuge (the biggest is the Yukon Delta Refuge in western Alaska) will be opened to roads, drilling pads and the clank of industry pursuing another jackpot is up to Congress. In May, the Senate Energy Committee passed legislation that would allow drilling in the refuge, and the full

PHOTOGRAPHS BY ART WOLFE FOR THE NEW YORK TIMES



Senate is expected to take up the matter in the fall. For the time being, by law, the 19-million-acre refuge is for the predominant use of wildlife so abundant inside the Arctic Circle that the area is often called the American Serengeti. *(Map on page 26.)* In a symmetry so perfect it suggests a modern parable, the refuge also happens to contain what many geologists consider the last great untapped oil field on the continent — with a potential for yielding up to nine billion barrels, nearly matching that of Prudhoe Bay, America's biggest. More than 180,000 caribou, a herd that is to the native Gwich'in people what the Great Plains bison were to the Lakota Sioux, migrate annually to calving grounds in the same general area where the oil is supposed to be. Chief among the questions now before Congress is whether oil production and caribou can share the same patch of cold ground.

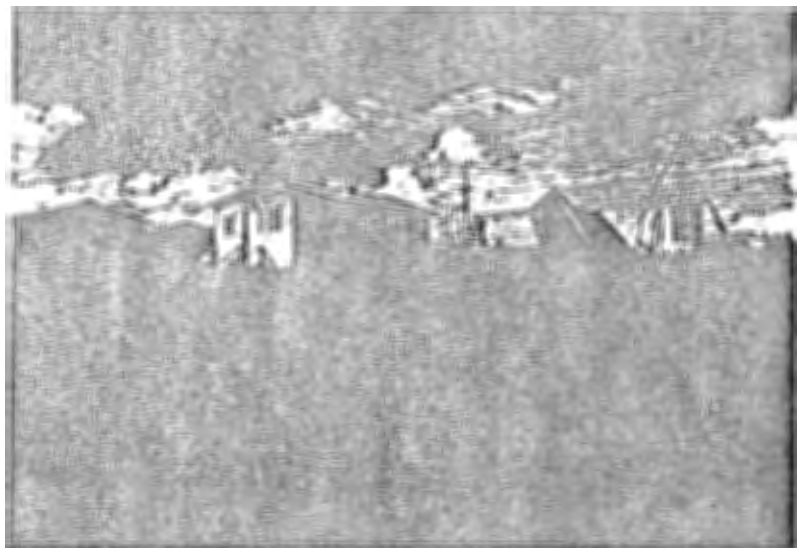
Beyond that, the fight over the Arctic refuge has once again raised the question of just how far Americans are willing to go for more domestic oil — how many more wilderness areas, pristine beaches and wildlife refuges will be violated as the oil runs out. Eighteen years have passed since the oil crisis of 1973, but American energy policy has barely changed. More than 100 years ago, when oil production began in earnest in this country, the wells were located on industrial land, close to cities. Now drillers are knocking at the door of an Arctic wilderness in the most remote corner of the continent. For conservationists who would draw the line around this vast home for caribou and musk oxen, all other environmental battles are dwarfed by this epic struggle over the Arctic refuge. It may be the last big land fight of its kind.

PRESIDENT BUSH has made drilling in the refuge the centerpiece of his national energy policy; Democrats, joined by many Republicans, are pushing fuel efficiency as an alternative. Increasing the average fuel-economy standard for new cars from 27.5 to 34 miles a gallon by the year 2001, the argument for conservation goes, would save more oil than could ever be pumped from the refuge. But the President will veto any energy bill, according to Energy Secretary James D. Watkins, that does not include lifting the restrictions on Arctic oil development.

For those who want cheap Alaskan crude to keep flowing into the next century, the argument is simple. As Tom Cook says, "Do you want your energy policy always to be, 'Shoot the guy who's got the oil,' or should we develop our own resources?"

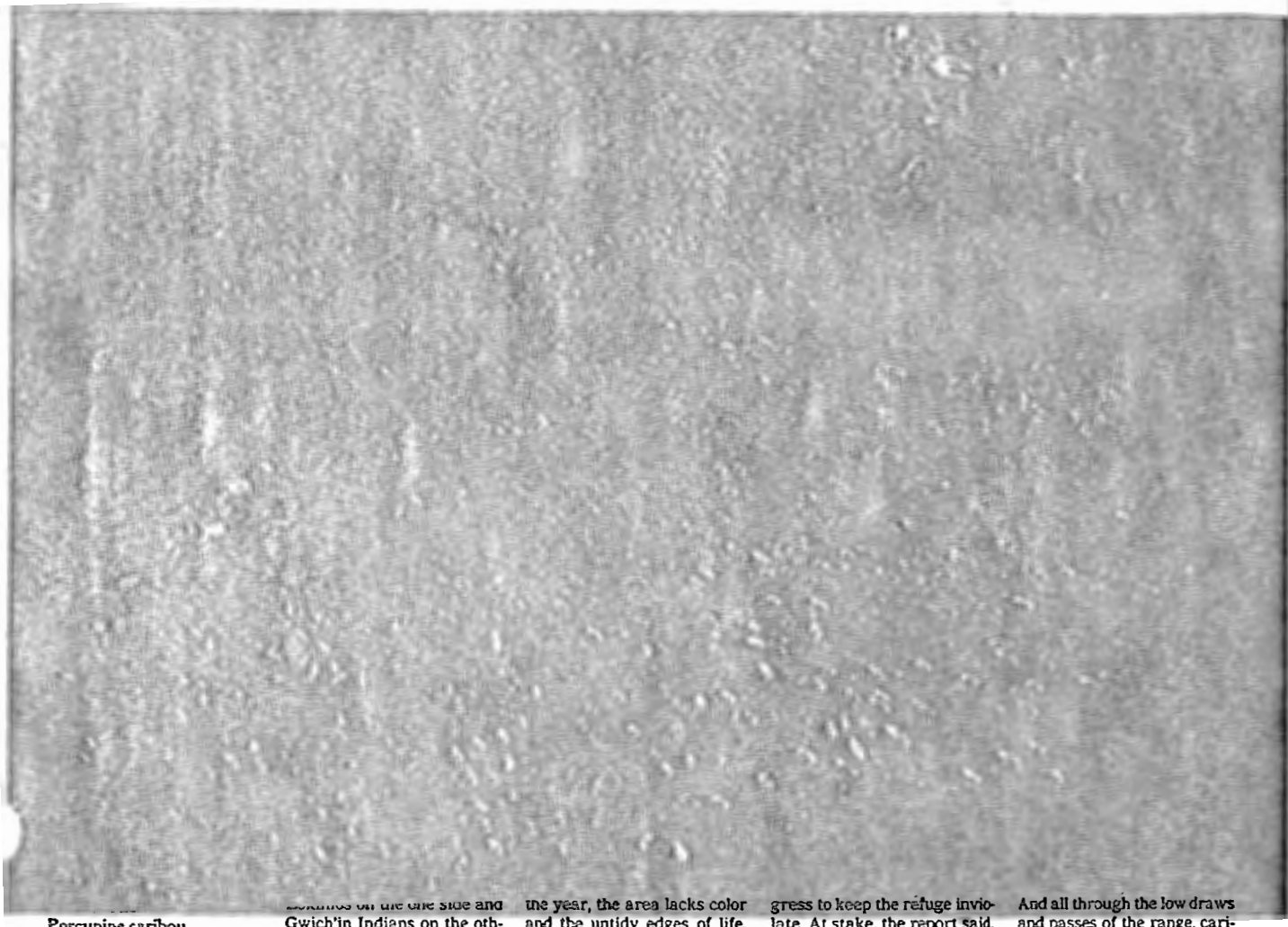
Sixty-five percent of the world's known oil reserves are in the Middle East; the United States has only about 4 percent. Conservationists point out that even if the Arctic refuge proved to be a bonanza as big as Prudhoe Bay, which produces about 1.5 million barrels a day but is declining at a rate of roughly 10 percent a year, the United States will continue to have to import up to half its oil. "We simply cannot drill ourselves to energy independence," says George T. Frampton Jr., president of the Wilderness Society.

The Arctic refuge — with its prehistoric-looking musk oxen, millions of migratory birds, Dall sheep, wolf packs, moose, majestic caribou herds and fearsome polar bears — has taken on an importance well beyond its potential ability to keep gas prices down and soldiers out of foreign lands. The ancient human cultures of Inupiat



Below: Arctic Village, just south of the refuge, is home to the Gwich'in, an Indian nation that depends on the caribou herd as its primary food source.

Bottom: The Davidson Mountains in the southeastern part of the refuge, one of the largest protected wildlife areas in the nation.



Porcupine caribou herd, named for the Porcupine River, calves on the coastal plain in the refuge. Biologists are uncertain what effects an industrial complex would have on pregnant caribou cows.

...on the one side and Gwich'in Indians on the other are also part of the refuge's ecology. As metaphor, the refuge is a sort of frozen Eden, the last paradise at the far northern edge of the Final Frontier. Larger than 10 of the states, it is without the industrial footprints that cover the rest of the globe — the "geography of hope," as the writer Wallace Stegner defined wilderness.

Even the most poetic of nature writers find themselves straining to describe the coastal plain — 8 percent of the total refuge — which is where oil drilling would take place if Congress gives its approval. Few would call it majestic. "Grave, austere and beautiful" is how Peter Matthiessen described it recently. Unlike the rest of the refuge, which enjoys the more moderate climate of the south and abounds with spruce trees, flowering heathers and alpine crags, the 1.5 million acres of the coastal plain are flat and harsh. For most of the year, the area lacks color and the untidy edges of life. "A barren desert," in the words of Alaska Senator Ted Stevens, perhaps the most vocal proponent in the Senate of opening the refuge to drilling. But its emptiness is what some people find so redeeming. They see value in what the plain does not have — the heavy metal and caterwauling tools of the oil industry. Of the 1,100 miles of northern Alaska coast along the Arctic Ocean, only the 125-mile stretch inside the refuge is off limits to development.

"Oil and gas development would destroy this area, with all its wild and spectacular diversity, forever," Sydney J. Butler, a vice president of the Wilderness Society, wrote in a letter to United States Senators in May. At the same time, three major environmental groups — the National Wildlife Federation, the Natural Resources Defense Council and Trustees for Alaska — released a report in which they pleaded with Congress to keep the refuge inviolate. At stake, the report said, is "the biological integrity of America's only Arctic sanctuary and the future of the wildlife it protects."

FLYING LOW OVER the snow on a day when the surface is crackling under 24-hour sun, we leave the intersecting roads around Prudhoe Bay and enter a white wilderness. The landscape seems to be in a hurry to make the elemental transformation from ice to water — alive with "breakup," a word used by Alaskans to describe late spring. The snow pack is surprisingly low, less than a foot on average. Bits of grass show here and there. The Beaufort Sea is just starting to reveal itself through broken ice; offshore, Eskimos have begun their annual hunt for seals. Inland, about 25 miles from the coast, grizzly bears are rousing themselves from a winter slumber in the foothills of the Brooks Range. And all through the low draws and passes of the range, caribou, led by pregnant cows, are heading north.

A large, picked-over piece of whalebone, a remnant of a spine bigger than most living rooms, is perched on the beach outside the town of Kaktovik, the only human community inside the refuge. Entering the village of 200 people, you can see the two worlds, past and future, of the Inupiat, a name that means "the Real People." They still hunt bowhead whales, their centuries-old source of subsistence. But the town has satellite dishes, off-road vehicles, new housing — all spoils of oil money. Chevron's exploratory well was drilled just a few miles from this village, on lands for which the mineral rights are owned by the Arctic Slope Regional Corporation, whose shareholders are Eskimos. Any further drilling would require Congressional approval.

"We don't want to return to the past," says Archie

PHOTOGRAPH BY HANS-JURGEN BURKARD/BILDERBERG/SABA

Brower, a Kaktovik resident, toothless and chain-smoking. "Oil is the future."

In 1980, 20 years after the refuge was set aside, Congress designated the northernmost 1.5 million acres as a "special study area" for its oil and gas potential. In 1987, the Interior Department estimated there was about a 20 percent chance of recovering large quantities of oil in the Arctic refuge. This year, citing more accurate geologic studies and recent wells drilled on the periphery of the refuge, the department upped the odds to 46 percent — a move environmentalists label political, timed to influence the legislation now making its way through Congress.

The Government places the amount of recoverable oil in the refuge at between 600 million and 9.2 billion barrels. The mean, estimated at 3.57 billion barrels, would be enough to meet the United States' total oil demand for 200 days. But if that oil were pumped at a rate of only 1 million barrels a day, it would keep the Trans-Alaska Pipeline — the vital artery on which Alaskans depend for everything from an annual check to performing-arts subsidies — busy for another decade or two. For the companies that run the pipeline, timing is crucial; the vast oil complex inside the Arctic Circle must be fed a steady diet of North Slope crude. If the refuge were opened to drilling today, it would take 8 to 12 years in exploration and construction time before oil could flow from the coastal plane to the pipeline.

In one report, the Interior Department drew a picture of what oil development in the refuge would be like. The handful of oil companies expected to be involved would need about 100 miles of pipeline, 120 miles of main roads and 160 miles of less-developed spur roads, two airfields, some 60 drilling pads and up to 50 million cubic yards of gravel, used to make hard surfaces over the tundra. The coastal plain is underlaid by up to 1,500 feet of permanently frozen water, rock, sand and loose soil — called permafrost. The thin layer atop this, which thaws to a depth of several feet, is considered extremely vulnerable to environmental damage. To minimize the industrial footprint, the oil companies have said they would try to do much of the construction work in winter, using ice roads instead of those made of gravel. They say new technological advances make it possible to put all the drill pads and service centers closer together and to use about half the space required for the construction at Prudhoe Bay in the early 70's.

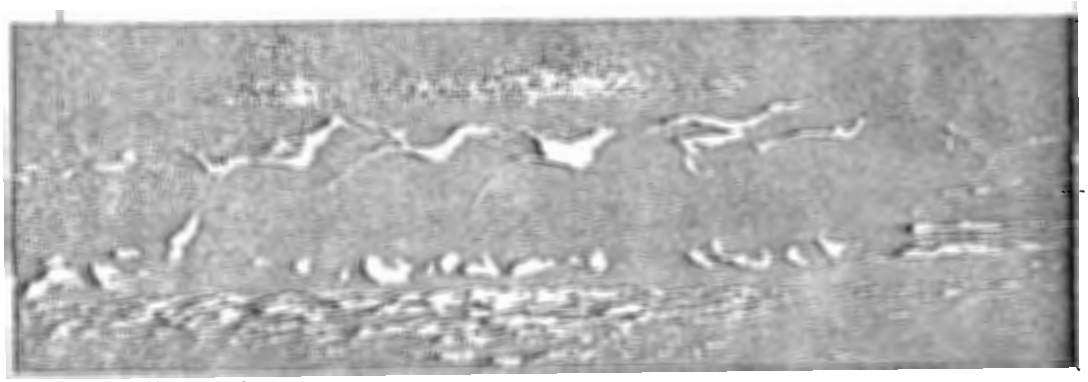
The oil would be sent to the lower 48 states through the Trans-Alaska Pipeline, which dissects the state and runs 800 miles from its origin in Prudhoe to the ice-free port of Valdez. What happens after the oil leaves the frozen north, of course, has as much to do with the politics of opening the refuge as what may happen near the drill sites. Legislation to allow drilling cleared the Senate Energy Committee once before, in 1989 — eight days before the Exxon Valdez struck a reef and ruptured, spilling nearly 11 million gallons into Prince William Sound. The nation's worst oil spill, killing more than 260,000 birds, at least 3,500 sea otters, 200 harbor seals and staining a marine wilderness with blankets of crude, caused many in Congress — and in Alaska — to think twice about the pursuit of black gold inside the Arctic Circle. The measure to open the refuge died in the 1989 Congressional session.

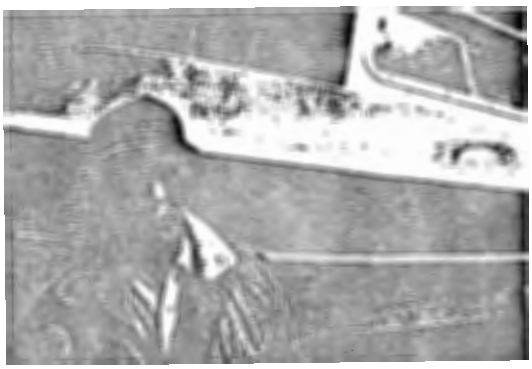
"After the spill, when I went to give talks about oil development in the refuge, I had some people spit on me, call me every name in the book," Cook, the Chevron geologist, says. "It was rough."

One who did not change his mind about Alaska's relationship with oil was Walter J. Hickel, the state's new Governor. He dismisses the Exxon spill as a "mechanical thing" that would never have happened if there had been tugs escorting oil tankers all the way through the sound. Running on the plat-

Left: As humans advance into the wilderness, residents like grizzly bears beat a retreat.

Below: Musk oxen have thrived in the refuge since their reintroduction 20 years ago. There is concern that gouging streams to build new roads in the refuge would displace them, but the oil companies disagree.





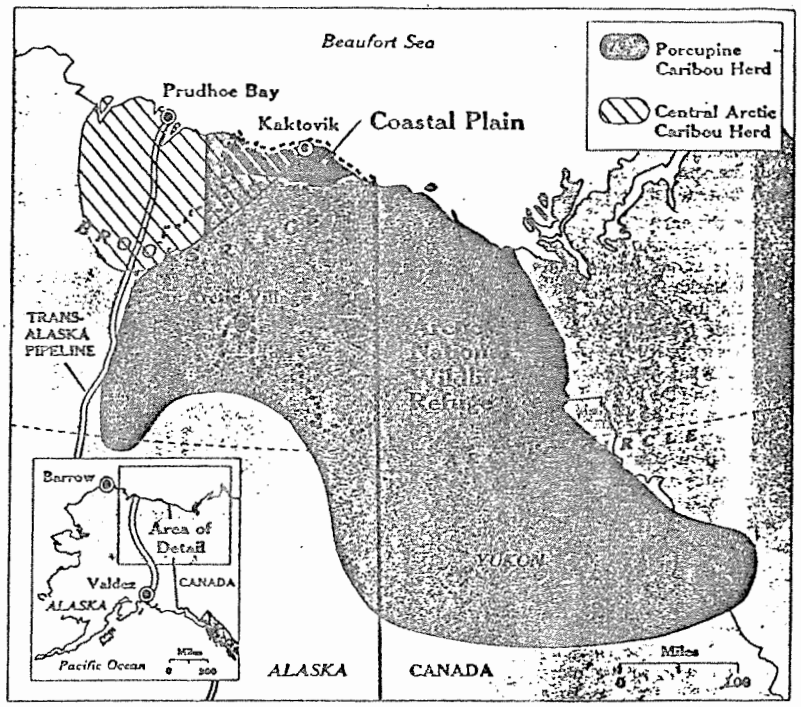
Above: Archie Brower in Kaktovik: "Oil is the future." Left: Sarah James in Arctic Village: For too long "no one wanted to hear about the Gwich'in."

PHOTOGRAPHS BY ART WOLFE FOR THE NEW YORK TIMES

form of Alaska's Independence Party — which advocated secession from the Union, an idea he later disavowed — the 71-year-old Hickel was returned to the Governor's mansion last fall, more than 20 years after an earlier term in the Statehouse. Elected with less than 40 percent of the vote in a three-way election, Hickel's vision for Alaska includes opening up the refuge, laying railroad tracks to the far north and constructing a pipeline to deliver fresh water from his state to the parched metropolises of Southern California.

The state controls less than one-third of Alaska's 370 million acres. The rest is tied up in national parks, wilderness preserves, wildlife refuges, military fields and land owned by native corporations, the 13 regional groups that represent 70,000 Aleuts, Eskimos and Athabascan Indians. In his inaugural address this year, Governor Hickel described Alaska as "a state on the brink of colony status once again — because we have let our rights be taken away by the Federal Government."

The Governor's plan for Alaska has been dubbed "Wally World" by the Anchorage press. He has just limped through a legislative session in which few of his initiatives were passed into law, and his deal to settle all legal claims against Exxon in return for a payment of $1.1 billion fell apart under a shower of criticism. Nonetheless, in his disdain for official wilderness areas, he speaks for a large segment of Alaskans. Wild areas, off limits to motorized vehicles and resource extraction, are, he says, "places where people have to break laws in order to see them."



SHOWDOWN For conservationists who draw the line around this vast home for caribou and musk oxen, other environmental battles are dwarfed by the struggle over the Arctic refuge.

CERTAINLY, FEW people have ever tried to see the Arctic refuge. Last year, only about 15,000 visitors were recorded, an amount equal to, say, the number of people who might cross the street in Times Square on a given morning. Hiking the coastal plain, in summer, has been compared to walking on a water bed. Those who do visit come to raft under the midnight sun, to camp in the foothills of the Brooks Range, to take pictures of the big animals or to exalt in the feeling of being an inconsequential part of nature.

Even if a million visitors a year came to the Arctic refuge, it would not change the core argument against oil development. For ANWR (pronounced an-whar), as it is called, is not primarily for people, but for animals.

In arguing that industry and wild animals can share the same land, the oil companies that want to drill in the refuge — Chevron, ARCO, British Petroleum, among the major ones — cite the experience of the Central Arctic caribou herd, just to the west of the refuge. The fear expressed during the last great Alaska lands debate, over the pipeline, was that North Slope production would harm this herd. But in the last 18 years, following large-scale development at Prudhoe Bay, the herd has grown from 3,000 to nearly 20,000. Pictures of caribou crossing under elevated pipelines and over gravel roads are regularly trotted out to show that oil drilling has had no discernable effect on the animals. During the 1988 Presidential campaign, George Bush proclaimed that caribou like to "snuggle up next to the pipeline."

The animals are a common sight at Prudhoe during the summer. "They cross pipelines and roads with very few problems," says G. Scott Ronzio, manager of environmental sciences for ARCO Alaska. While conceding that there is "a lot of mystery to these animals," Ronzio says, "I'm fairly confident that oil development can continue on the North Slope with no harm to caribou."

The expansion of the Central Arctic herd has been attributed by biologists to a retreat of predators, mainly wolves and grizzly bears, which keep their distance from humans, to a series of mild winters and to normal ups and downs of animal population cycles. Caribou have increased throughout Alaska. Most biologists, Ronzio among them, think the Central Arctic herd will eventually decline, and there is evidence that their growth rate is already shrinking.

The animals that migrate to the refuge, known as the Porcupine caribou herd (named for the Porcupine River, which flows through the southern edge of the refuge), are a different story. For one thing, the Porcupine herd is nearly 10 times larger than the Central Arctic herd. For another, the bigger herd does its calving in an area where oil development would take place; about half of the Central Arctic calving takes place away from oil facilities. Few biologists know exactly what would happen if pregnant caribou cows, given their limited time to give birth, tried to calve within sight and sound of an industrial complex.

"Among the Central herd, females have never adjusted to oil development," says Dr. David R. Klein, a biologist considered one of the nation's foremost experts on caribou. A frequent witness before Congressional hearings, Klein has been studying Arctic caribou for nearly 30 years. "What oil could mean to the Porcupine herd is that the females and their young would be deprived of their best feeding grounds," he says.

Caribou eat grasses and flower buds, at a rather intense rate, during the short Arctic summer. The swarms of mosquitoes that rise from the spongelike tundra have driven them to the coast for the relief of ocean breezes. If the animals were forced to scatter inland, says Klein, insects would likely harass them to a point where they would be unable to eat enough food for their return migration, a march of nearly 1,000 miles.

Of equal concern to Klein are the musk oxen, which look like creatures out of the "Star Wars" movies. The musk oxen are native to Alaska, but were hunted to extinction. Since their reintroduction 20 years ago, they have thrived in the refuge, where they live year round, eating shrubs and willows in the valleys of the Brooks Range. Now numbering about 500, the musk oxen in the refuge make up one of the largest populations in North America. Klein worries that gouging streams in the refuge to build new roads would displace the shaggy, lumbering oxen from their prime habitat, a concern that the oil companies say is ill-founded. According to Ronald W. Chappell, a spokesman for ARCO Alaska, gravel would most likely be taken from one or two central pits.

Klein speaks in the cautious language of science. Both sides of the refuge debate have tried to use his conclusions to bolster their arguments. When asked for his opinion on whether the Porcupine herd could survive oil drilling in the refuge, he says: "These animals are extremely complex, but I believe it would be very difficult for oil development to take place in the coastal plain without having a detrimental effect on them. How great that would be, no one knows."

For the Gwich'in Indians, who live in 15 tiny communities just south of Alaska's Brooks Range and the Canadian Yukon, the caribou are a matter of survival. Most Gwich'ins, who number about 7,000, live a subsistence life, depending on the Porcupine caribou herd as their primary food source, much the way some coastal Alaskan communities still survive on seasonal salmon runs. The Gwich'ins are the northernmost Indian tribe in North America, perhaps the last big aboriginal group to resist assimilation and modern ways.

"For too long this has been an issue about environment versus energy, and no one wanted to hear about the Gwich'in," says Sarah James, a native leader who lives in Arctic Village, just south of the refuge. In a statement before the Senate Energy Committee in April, James compared the Gwich'in to the buffalo-hunting Sioux of the Great Plains: "The Gwich'in are caribou people. For thousands of years we have lived with caribou right where we are today. We're talking about an Indian nation that still

(Continued on page 49)

(Continued from page 26)

lives on the land and depends on this herd. In my village, about 75 percent of our protein comes from caribou."

In Arctic Village, heat from the summer sun is used to dry caribou meat. Unlike other native people, the Gwich'ins do not own any mineral rights in the refuge and have not organized into a regional corporation. Caribou is the center of their lives. The Gwich'ins consider themselves part of the natural ecology of the Arctic refuge. "We think of it as a biocultural reserve, not just a wildlife refuge," James says.

The Gwich'ins, who have barely been heard from during the decade-long debate, came together for a meeting in the summer of 1988, the first time all the tribal communities had gathered in one place in more than 100 years. They signed a proclamation, agreeing to "speak as a single voice" against oil development in the refuge.

The other native people near the refuge, Eskimos on the northern border, take the opposite stand. Whale hunters represented by a powerful regional corporation, the Inupiat say oil has changed their lives for the better. They receive millions of dollars in royalties from drilling on the North Slope, and stand to gain additional millions if the refuge is opened. About 6,000 Inupiat live in eight villages inside the Arctic Circle, most of them in the town of Barrow.

"We used to be afraid of what the oil industry would do, but we saw that it has not harmed fish or wildlife," says Warren Matumeak, an Inupiat elder who lives in Barrow. "Things have changed for the better. We have schools, roads, firefigthing equipment. Our houses have kitchens and flush toilets and TV's. It's sad that some people think we should have to go back to the old ways."

Matumeak was with his grandson, fishing for char, a type of Arctic trout, four summers ago, when he suffered a heart attack. "I said, 'Grandson, I'm going to where Jesus is.' " His cholesterol built up, he said, because he was spending too much time in front of the television, dipping caribou fat in whale blubber — a tasty snack. He survived the heart attack, thanks to a helicopter from Barrow that airlifted him to a hospital — a search-and-rescue made possible by oil money. Matumeak still remembers when some Eskimos lived in igloos; now his grandchildren wear Los Angeles Raiders caps and the family takes occasional vacations to Disney World.

Some Inupiat are angry that they cannot lease their own land, inside the refuge, to oil companies. "We've lived here thousands of years," says Matumeak. "We should be able to do what we want with our own land. And what we want is to allow drilling. Oil is the best thing that ever happened to us."

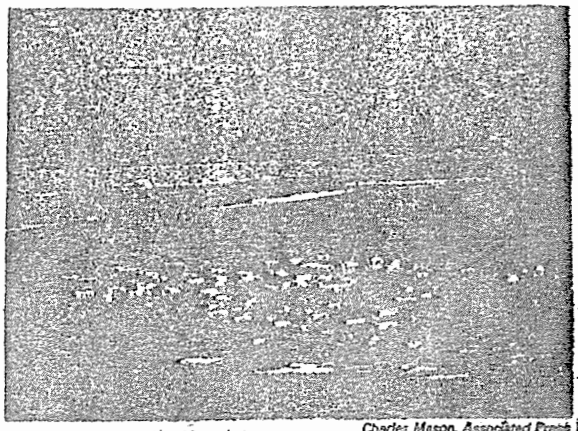
Despite such statements, the Eskimos take a somewhat contradictory approach to oil drilling in the far north. While they advocate opening the refuge, which would benefit them economically, they are among the strongest opponents of an Interior Department plan to allow offshore drilling in the Arctic Ocean, which poses a potential threat to their whale hunting.

For most Americans, it would be easier if all the remaining oil fields were in West Texas or Oklahoma. But the search for petroleum has now gone to the far edges, near pleasure beaches in Florida and California, off the wilderness coast of the Olympic Peninsula in Washington State and inside an Arctic preserve that was supposed to belong to wild animals. These potential drill sites, on or near national treasures, force the question of just how far the nation will go to satisfy its oil habit.

Those who want to open the Arctic to development see a peculiar form of American naïveté in the arguments for preservation. The idea of all that oil just sitting there, untapped, while the United States ups its trade imbalance with Middle Eastern countries is ludicrous, they say. But by keeping the refuge inviolate, the counter argument goes, Americans can take the first steps toward independence from a substance that, once pulled from the ground, inevitably spawns trouble — wars, foul air and dirty water. The debate, in itself, is familiar. What has changed is that we are running out of places over which to have the argument. ■

ANWR drilling divides Natives

Kaktovik villagers say oil exploration would bring money, jobs, opportunity



Charles Mason, Associated Press

The U.S. Senate this session is considering President Bush's proposed national energy policy, which includes opening the coastal plain of Alaska's Arctic National Wildlife Refuge to oil drilling. The noisy debate over development has centered in Washington, D.C., between politicians, oil industry lobbyists and environmentalists.

Far away but caught in the middle are two Native villages whose people have lived off the bounty of the coastal plain for centuries. To the Gwich'in Indians of Arctic Village in Alaska's Interior, drilling threatens the caribou at the heart of their culture. Many Inupiat Eskimos in the North Slope village of Kaktovik also hunt caribou, but oil drilling could bring much-desired economic opportunity.

This Associated Press report explores the conflict within these villages and between them as they try to balance tradition and economic change.

By T.A. BADGER
Associated Press Writer

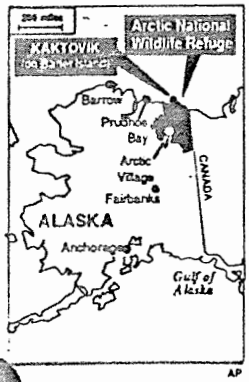
KAKTOVIK—It's hard to argue with what oil has done for this small Inupiat Eskimo village on the Beaufort Sea in Alaska's northeast corner.

When villagers get sick, they visit a spacious modern clinic.

When a house catches fire, trained and well-equipped firefighters come to the rescue.

When elderly residents need to go out or have something brought in, a minivan is available to them.

In many ways, the 225 people of Kaktovik—"seining place" in Inupiaq—live as their ancestors did. Their seasons still revolve around hunting, fishing and boating out among the ice floes in pursuit of seals and bowhead whales.



But they've grown to rely on modern conveniences that cost money—pickup trucks, four-wheelers, motorboats and gas-powered stoves. And in North Slope Borough—larger than Utah with a population under 6,000—nearly all the money flows out of the ground as black gold.

Kaktovik, a small grid of gravel streets and wood-frame houses on the northern edge of Barter Island, sits next to what could be a multibillion-barrel oil field on the coastal plain of the Arctic National Wildlife Refuge.

And with the decline of the giant Prudhoe Bay field, 75 miles to the west, drilling in the

(See KAKTOVIK, Page A-5)

Charles Mason Associated Press

PEDALS AND PARKA—Ekosik Tagarook, 6, rides his bicycle down a street in Kaktovik in July. Top photo, the Eskimo village of Kaktovik sits on Barter Island in the Arctic Ocean, off the northeast coast of Alaska. Behind it lies the coastal plain of the Arctic National Wildlife Refuge and the Brooks Range.

KAKTOVIK: Eskimos try to balance the modern, traditional

(Continued from Page A-1)

Arctic refuge is seen by many here as a way to pay the bills.

"We don't live in the 1950s any more. There's a lot of progress [illegible] outside Barter Island and [illegible] passing us," said Joe Soplu, a borough employee. "Our economy isn't keeping up."

Others aren't so concerned about keeping up. They fear that drilling on the coastal plain, where the 180,000 caribou from the Porcupine herd travel hundreds of miles each spring to drop their calves, could tamper with their traditions.

"I hope they don't start drilling," said Mickey Gordon. "They're going to go through the land I was born in, where my father was born and his father. I don't care about money—I just want to hunt on my land."

That land includes 92,000 acres owned by Kaktovik Inupiat Corp. adjacent to the coastal plain, giving the village corporation a potentially lucrative stake in any exploration.

Under the Alaska Native Claims Settlement Act, Barrow-based Arctic Slope Regional Corp. owns the subsurface rights to the land. But Herman Aishanna, vice president of the village corporation, said it could reap a healthy return from service contracts and surface leases, as well as a 2 percent royalty on the value of any oil pumped.

"Everybody needs money, and oil would provide employment for KIC shareholders," said Aishanna, who also is Kaktovik's mayor.

"We have a lot of young, energetic people here who don't have jobs. We need better snow removal and a [illegible]locking facility for boats. [illegible]natural gas hooked up to [illegible]use and better doors and [illegible]ws. All of these things cost lots of money."

Aishanna dismisses the notion that the Porcupine herd would be harmed by oil exploration.

"When they were having the first hearings about the (Arctic refuge) lease sales, everyone was against it, but it seems the fears aren't valid any more," he said. He believes the oil companies at Prudhoe Bay "have done everything they can to conserve the animals."

A couple of doors down from Aishanna's office is that of Jane Thompson, the village's most vocal opponent of refuge drilling.

"There will be rules and regulations where there aren't any now," said Thompson, who works for the borough. "Look at Prudhoe—you walk out into a field and a safety officer picks you up. There's going to be noise 24 hours a day, there's going to be metal trees (drilling rigs) sticking up. It's going to be ugly.

"It will take away the grounds where we go fishing and hunting and camping—that's the main thing for me," she said. "Those are our happiest moments—it's our way of life. But KIC is a corporation like all other corporations—it wants to make money."

Thompson said Kaktovik hasn't had enough say on decisions that could put the community at risk.

"We're just 200 people here and there are millions (in the United States) who want to run fancy cars on superhighways," she said. "The big companies and big government should comply with what we feel—we're the ones who live here. But we're not being heard."

Aishanna agreed the village needs a larger voice in faraway places.

"Whoever drew the (preliminary) infrastructure map didn't consult with North Slope Borough or Kaktovik," he said. "They want to build a seaport to the east to service the oil industry, but people here are worried about that because it's in the migration pattern of the bowhead whale."

The Inupiat may be willing to gamble with caribou, but there's n room for compromise in their figh against offshore oil drilling or othe activity that might jeopardiz whales, around which their cultur revolves.

"I don't mind drilling (in the Arc tic refuge), but not in the ocean," said Jimmy Soplu, one of Kakto vik's 10 whaling captains, who earned the village's gratitude when his crew landed a 34-foot bowhead last year.

And then there are fears that oi may push the isolated outpost o Kaktovik, in which alcohol is ban ned, into Alaska's mainstream and bring with it an unimagined crop o social problems.

"Mainly, I'm afraid of drugs and alcohol coming in," said City Clerk Mary Soplu, who says she is still undecided about drilling in the Arc tic refuge.

"If an area like Prudhoe is built, the workers will be allowed to bring in their own supplies. Eventually they'll bring things over here."

Already Kaktovik is evolving, getting busier. The city council recently voted to pay Aishanna a full-time salary to handle the seemingly endless phone calls and stream of out-of-town visitors.

Charles Mason/Associated Press

FAVORS DEVELOPMENT—Kaktovik Mayor Herman Aishanna supports oil drilling on the ANWR coastal plain. "Everybody needs money, and oil would provide employment," said Aishanna, who is also vice president of Kaktovik Inupiat Corp.

ANWR at a glance

■ **The Land:** The coastal plain of the Arctic National Wildlife Refuge is touted by environmentalists as a delicate wilderness vital to many species of wildlife, and by some proponents of oil exploration as a remote, mosquito-infested wasteland.

The 125-mile-long, 1.5-million-acre coastal plain stretches between the Beaufort Sea and the northern foothills of the Brooks Range, in the northeast corner of Alaska.

It represents about 8 percent of the 19-million-acre refuge, which itself is about the size of Maine.

■ **Environmental Issue:** Oil companies say no more than 12,000 acres, less than 1 percent, would be affected by drilling. They say drilling could be done in an ecologically safe manner.

But conservation groups say an industrial complex on the scale of nearby Prudhoe Bay, with its 1,500 miles of roads and pipelines, and tons of daily drilling wastes, would harm caribou, bears, birds, musk oxen, fish and other wildlife.

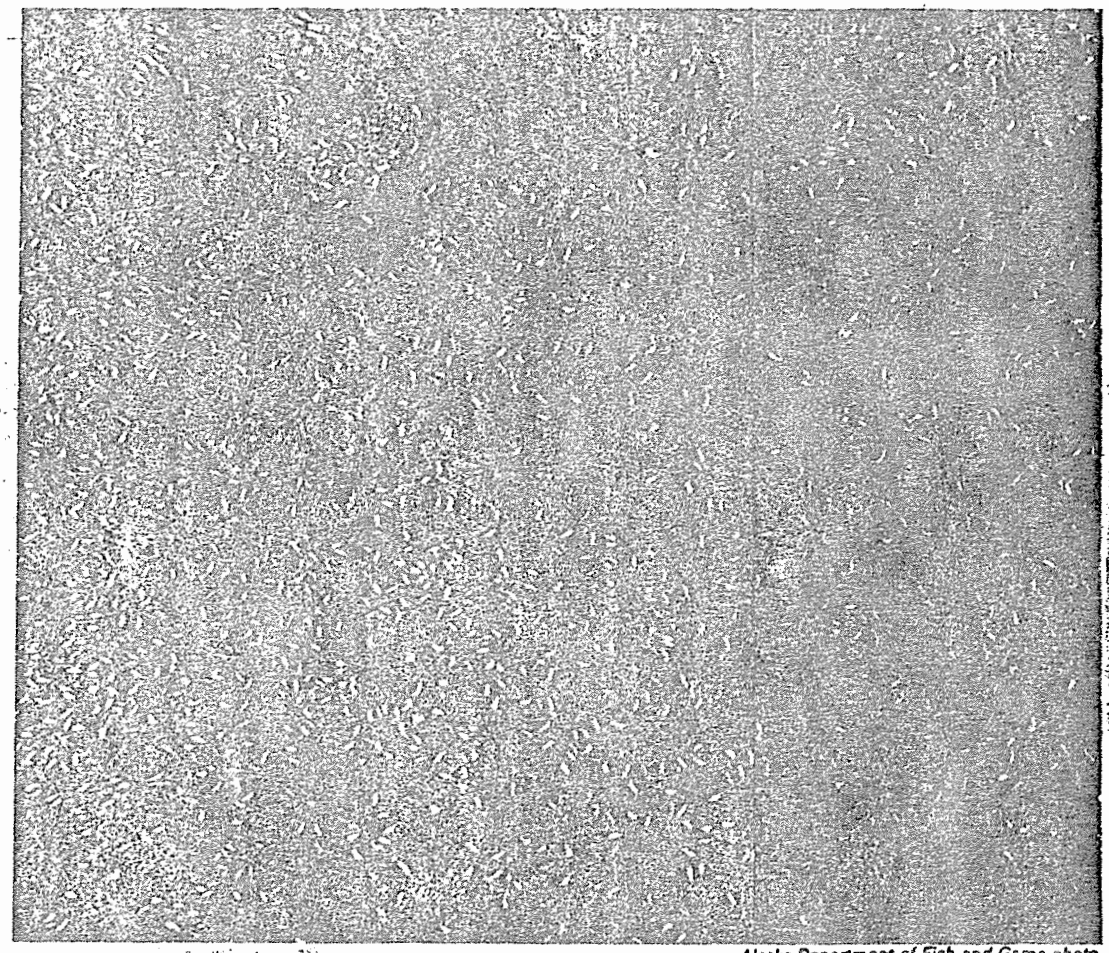
Environmentalists have accused oil companies of destroying hundreds of square miles of tundra on the North Slope already.

Congress made about 40 percent of the arctic refuge wilderness under the Alaska National Interest Land Conservation Act in 1980, and conservation groups are pushing to have the coastal plain similarly designated so it would be off-limits to oil drilling.

■ **Energy, Economic Benefits:** Drilling proponents include oil companies, federal and state governments, the North Slope Borough and the Arctic Slope Regional Corp. They cite the need for new sources of oil, especially since the Prudhoe Bay fields are declining.

The U.S. Interior Department has pegged the coastal plain's oil deposit at 600 million to 9 billion barrels, the high-end figure nearly the size of the Prudhoe Bay strike. A mean figure of 3.57 billion barrels is often quoted.

—The Associated Press



Alaska Department of Fish and Game photo

SPECKS ON TUNDRA—A caribou herd mills about on the North Slope in this 1989 photograph. Pictures such as this, taken with a 1950s-vintage Army surplus camera, are used by biologists to count the number of animals in herds around Alaska.

Caribou census takes good eyesight

Have you ever wondered how biologists count caribou herds? The answer is waiting at U.S. Fish and Wildlife's Tanana Valley State Fair booth.

Visitors to the booth are encouraged to try their own hand at estimating the number of caribou recorded in a recent census photo. It's all a contest, sponsored by the Alaska Natural History Association, which is awarding several books and posters to individuals with the closest estimates.

The picture on display in the fair booth is an enlarged version of the standard 9-by-9-inch census photos biologists use for their official counts. State caribou biologist Ken Whitten uses a 1950s-vintage Army surplus camera to shoot Alaska's two biggest herds: the Central Arctic and the Porcupine.

A census is conducted on each of the big herds in early July every other year.

"The photos take one or two days, but we're often in the field several weeks waiting for the right conditions," Whitten said. "What you want is hot, clear days where mosquitos cause the caribou to aggregate in large groups."

In 1989, the last year a complete count is available, the Porcupine Caribou Herd numbered about 178,000. The 1988 census measured the Western Arctic Caribou Herd at about 340,000.

The future of the Porcupine herd is at the center of debates over whether to drill for oil in the Arctic National Wildlife Refuge. Environmentalists and some Native groups say oil development will hurt the population, while oil interests and the state government say it won't.

Both herds have been growing recently, but the 1990 census photos have not been counted yet, Whitten said.

State and federal wildlife offices share the drudgery of compiling the actual counts on an alternating year basis, Whitten said.

Using a magnifying loupe and a plastic grid laid over the photo, biologists have to count each adult animal and calf, one by one, said Cathy Curby, a wildlife biologist with the U.S. Fish and Wildlife Service.

To correct for variances among biologists, a number of control census photos are included in each counter's batch. By comparing the variations in the control photo counts, officials assign a weight factor to each individual counter and use this to adjust the final census figures.

"Some people tend to always overestimate," Curby said. "Others always underestimate. The last time I did it, I was sort of half high and half low."

Scrutinizing all the tiny caribou blots also takes a personal toll on the counters.

"The worst I ever had was a photo with 9,000 caribou," Curby said. "You can't do it forever. By the end, I'm really nauseated."

Oil groups, environmentalists step up refuge lobby

By T.A. BADGER
Associated Press Writer

KAKTOVIK—They arrive by helicopter, cameras slung around their necks. A converted school bus picks them up for a short drive around the village's few gravel streets while a guide fields questions. Then the helicopters take them away.

But tourists they are not.

These are what the oil industry calls "third-party constituencies": representatives of public policy groups, business, trade associations — people with a financial stake in keeping the oil flowing from Alaska's North Slope and in opening the Arctic National Wildlife Refuge to exploratory drilling.

Dozens of them have traveled from outside Alaska this summer to this tiny Inupiat Eskimo village on the Beaufort Sea for whirlwind tours of the refuge's coastal plain, under which many believe may lie billions of barrels of oil.

The trips are paid for by the American Petroleum Institute, the nation's largest oil industry trade group, whose 250 members include all major U.S. oil companies.

API says it has earmarked $6 million for its arctic refuge campaign this year, of which it has spent about $2 million so far.

And it isn't the only pro-drilling player spending heavily to get the word out.

The state government favors drilling, and has set aside $3 million to fund its efforts on the stump in fiscal 1992. The Alaska Oil and Gas Association, which arranges API's Alaska trips, also has a war chest, though it won't say how big.

And oil companies like BP Exploration (Alaska) Inc. and Arco Alaska Inc., as well as local entities like the Arctic Slope Regional Corp. and North Slope Borough, are spending on visitors.

On the other side of the issue are environmental groups, which have been bringing their own supporters to the arctic refuge this year.

Anti-drilling visitors, however, usually pay their own way and sleep in tents while spending a week or more hiking in the Brooks Range or floating down one of the coastal plain's many rivers.

"We do what we can," said Rex Blazer, executive director of the Northern Alaska Environmental Center, in Fairbanks. "Even though we're outspent 20 to 1, when we get the chance to present the facts, we hold our own."

Opponents of drilling say the coastal plain is vital to many species of wildlife and should be declared wilderness.

The battle to reach decision makers heated up this summer when President Bush included drilling on the coastal plain in his national energy strategy. Bush's plan passed the Senate Energy Committee and is scheduled to go before the full body this fall.

"I'm going to contact my local senator when I get home," said Robert Smalley, president of Cruise America Inc., a Miami-based motorhome and van rental company, who recently visited the arctic refuge with API. "I went through one energy crisis, and don't want to go through another."

API says most of the $2 million it has spent was to bring allies and potential allies — including legislators, their staffs and sometimes reporters — to the proposed 1.5-million-acre coastal plain, about 75 miles east of Prudhoe Bay in Alaska's remote northeast corner.

"A lot of people don't have the chance to come up here — all they know they get from the press," said Carlton Jackson, director of external liaison for the Washington, D.C.-based API. "For us it's an educational effort. If after coming up here they feel that oil and gas shouldn't be drilled, that's fine."

But it's not the result API desires or expects.

"We hope that, based on what they see, they'll agree with us, and that they'll go back home and express their opinion for drilling," Jackson said.

One recent API group seemed filled with a missionary's zeal as it toured the Prudhoe Bay and Endicott oil complexes, the coastal plain and Kaktovik.

"Any doubts or skepticism that I had before coming up here have been erased," said Scott Pattison, director of the Washington office of Consumer Alert, a California-based non-profit group that promotes competition in markets.

"There is an incredibly meticulous protection of the environment at Prudhoe, and I'm sure it is going to be even stricter for (arctic refuge) drilling."

Pattison's views were echoed by others in his group.

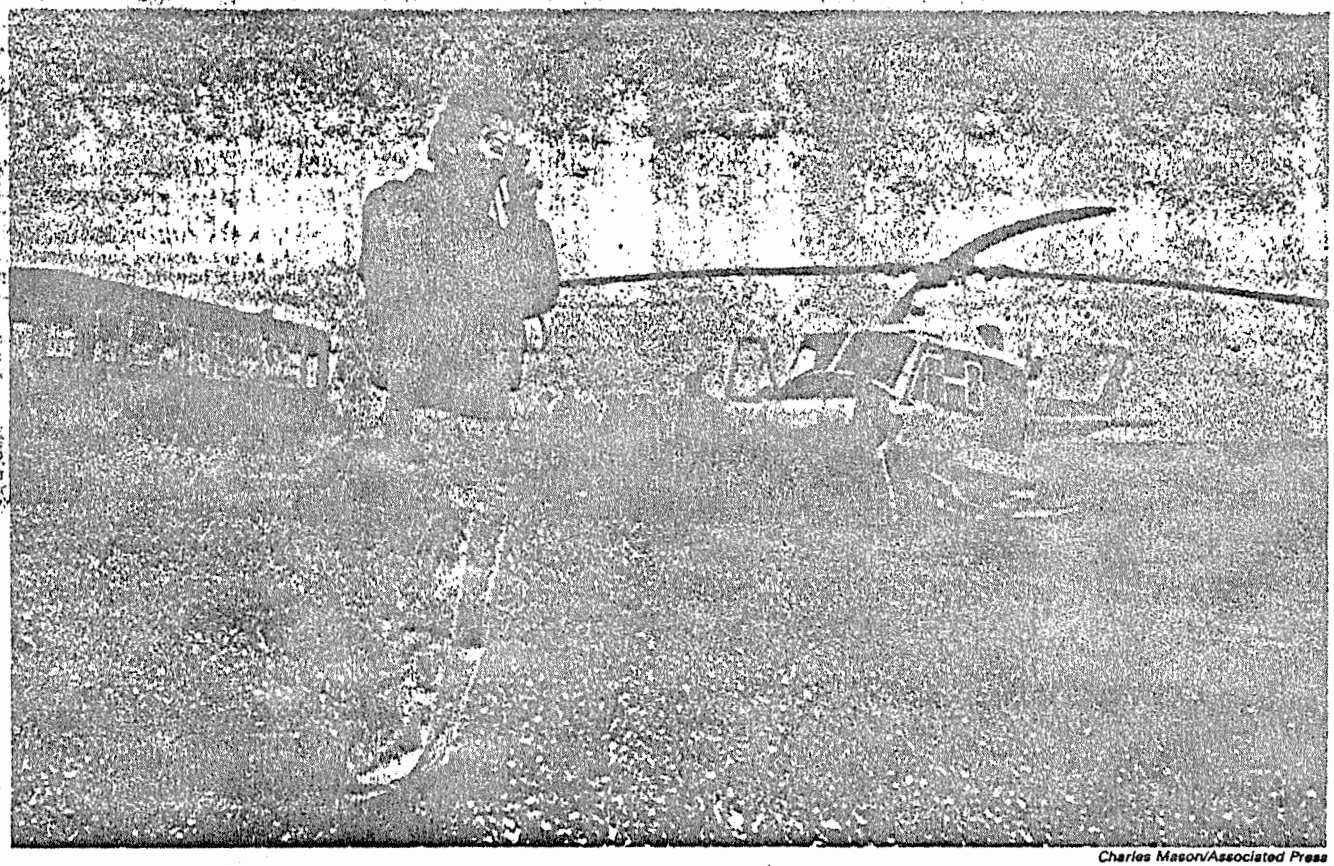
"What I saw here will refresh my effort to make the argument that responsible development in the arctic is possible and is a good thing," said Curry Ann Lawless, director of legislative affairs for the American Institute of Merchant Shipping.

The Sierra Club and the Wilderness Society are among other organizations using arctic refuge visits to further their cause.

"Our trips are a mix of the committed and the curious," said Jack Hession, the Sierra Club's Alaska representative. "We certainly hope they go back and become activists in the campaign to keep this place inviolate."

Hession said the Sierra Club charges about $1,000 per person for arctic refuge trips, while Allen Smith of the Wilderness Society said his group provides trips at cost to major contributors.

"They're in a position to donate funds or help with getting us more people interested in contacting legislators," Smith said.



Charles Mason/Associated Press

LOBBY TRIPS—A member of a tour group photographs Kaktovik before getting back on a helicopter recently during a trip to the Arctic National Wildlife Refuge on the North Slope. The oil industry and environmentalists have increased the number of tours they have sponsored in the area as part of a growing lobbying campaign about whether oil exploration should be allowed in a small portion of the wilderness area.

FDN-M 8/23-24/91

Caribou contest counters play a fair numbers game

Judging from the results of a recent caribou counting contest, visitors to the Tanana Valley State Fair are an understated lot.

Asked to guess the number of caribou in an enlarged 1987 census photo of a small portion of the Porcupine Caribou herd, estimates of the mass of rice-sized critters ranged from 6.79 million to just eight, said Cathy Curby, a biologist with the U.S. Fish and Wildlife Service.

"I think the person who guessed eight just didn't understand," she said.

Almost 1,400 people participated in the contest. After tossing out 186 wildly inflated estimates, Curby said the average estimate was 2,891 caribou.

"Most people guess low," the wildlife biologist said. "That's the general trend. Just to see what I'd get I tried to go high myself and guessed 3,680. But I was low too."

The photo actually contained 4,540 caribou, the biologist said.

Official census counts are made by laying a transparent grid over photos and counting the animals with a magnifying loupe.

The Alaska Natural History Association is giving out several books and posters as prizes for the contest.

While no one hit the number on the mark, Curby declared the following winners: 1. Bronwen Bell, of Whitehorse, who estimated the photo contained 4,550 caribou; 2. Luke Baltrusch, Fairbanks, 2,528; 3. (tie) Dick Bouillion, Joe Shadley, Fairbanks, 4,555; 5. Travis Parks, Fort Wainwright, 4,560; 6. June Thomasson, Fairbanks, 4,561.

Environmentalists enlist polar bears in refuge lobby effort

Industry predicts few problems

By T.A. BADGER
Associated Press Writer

ANCHORAGE—From the beginning, the caribou has acted as an unofficial mascot for those fighting to keep the Arctic National Wildlife Refuge off limits to oil and gas exploration.

Conservationists and others have long told all who would listen that the refuge's coastal plain is the main calving area for the Porcupine caribou herd—the primary food source for a number of Gwich'in Athabaskan villages in Alaska and Canada—and that oil drilling would destroy that purpose.

But as the issue moves closer to a vote in Congress, its seems the fate of the Porcupine herd alone might not be enough of a rallying point. Time to summon the polar bear from the bullpen.

A new campaign is under way to raise consciousness about dangers critics say arctic refuge oil drilling could pose for the great white hunters of the north.

"The information we've received indicates that there would be a significant impact on polar bears that until today has gone virtually unnoticed," said Robert Dewey, refuge program associate for Defenders of Wildlife, based in Washington, D.C.

"It's an important aspect of the arctic refuge debate, and we plan to alert as many legislators and decision makers to it as possible."

Recent reports, based on scientific research over the past decade, indicate that, while most of Alaska's female polar bears have their cubs in dens on offshore pack ice, the bear's leading onshore birthing area in the United States is along the refuge's coastal plain.

It is under the same 1.5-million-acre stretch of land between the Brooks Range and the Beaufort Sea in Alaska's northeast corner that many think could contain the nation's next giant oil field.

The U.S. Senate is expected to begin debate this fall on a proposed national energy policy that includes a key provision that would open the coastal plain to oil and gas exploration.

The measure is supported by federal, state and North Slope Borough governments, and opposed by conservation groups who see the coastal plain as vital to wildlife and want it designated wilderness.

Conservationists fear that noise and industrial activity accompanying the search for oil could limit polar bears' movement, expose them to oil spills, poisonous chemicals and other pollutants, and harm the animals that the bears depend on for food.

They also say drilling would raise the likelihood of increased bear-human contact, and could damage reproduction by driving female bears with cubs out of their maternity dens before the cubs are ready for the harsh arctic climate.

Alaska's polar bear population and its habitat is protected under the federal Marine Mammal Protection Act and the 1976 International Agreement on the Conservation of Polar Bears.

Defenders of Wildlife and the American Institute of Biological Sciences this month asked the Marine Mammal Commission, an advisory group that oversees the work of federal agencies regarding polar bears, to determine if ANWR coastal plain drilling would violate the act or agreement.

The commission has long reviewed polar bear research, and last week asked federal agencies to provide it with additional information on bear findings and management plans.

"Drilling at any one site may not cause a problem, but the collective drilling at a number of sites may," said Robert Hofman, the commission's scientific program director. "If polar bears are disturbed and caused to abandon the area, it is inconsistent with the 1976 agreement."

The work of wildlife biologists supports the argument that the coastal plain is important to the area's 2,000 polar bears, particularly denning females. But the scientists draw different conclusions regarding the potential impacts of oil exploration.

"The statistics point out very clearly that (the coastal plain) and adjacent Canada are significant in polar bear reproduction," said Steven Amstrup, project leader for northern polar bear studies for the U.S. Fish and Wildlife Service in Anchorage.

"But we have the technology and wherewithal, if applied carefully, that something like (oil and gas) exploration and development could proceed and still provide for the continued survival of polar bears and other animals," said Amstrup, who is putting the finishing touches on a report based on 11 years of studying Beaufort Sea polar bears.

Jack Lentfer, a former biologist for the state Department of Fish and Game and U.S. Fish and Wildlife Service with about 15 years of polar bear experience, has drawn a contrasting conclusion about drilling.

"The risk to polar bears is not worth taking," said Lentfer, a Homer resident and member of the Marine Mammal Commission. "(The coastal plain) doesn't need to be declared wilderness, but on the other hand, the activity necessary to support oil development is just too much activity."

Ann Browne, senior environmental scientist at BP Exploration (Alaska) Inc., said she sees little chance for disturbance because of the annual number of polar bear dens on the coastal plain is small.

"The most dens surveys have found in one year is four over 1.5 million acres, (but) those areas right for denning would be looked at," she said.

News-Miner library

ON THE ICE—Environmentalists are now arguing in Congress that oil development in the Arctic National Wildlife Refuge will harm Alaska's polar bears. But industry officials say that there are only a few bear dens at any one time in an area of 1.5 million acres and that the real problem will be keeping workers safe from polar bears.

TRACKING THE BEARS OF ANWR

By ROGER KAYE
Correspondent

Our Cessna rose with the updraft, rolling gracefully where the arctic wind encountered the steep rock face. Its wavering left wing pointed north to the coastal plain of the Arctic National Wildlife Refuge, and beyond to the still frozen Beaufort Sea. The right wing followed the northern side of a Brooks Range foothill, an austere, gray wall sweeping upward for 800 feet or more.

Wildlife Biologist Don Young listened to the signal from his radio-telemetry receiver as he searched the passing ravines and scree slopes. Somewhere, they hid bear No. 1516, a blond 4-year-old sow he knew well.

Young, a bear researcher with the U.S. Fish and Wildlife Service, is studying the ecology and movements of brown bears in areas of the Arctic Refuge that may be impacted by oil exploration and development. This past summer he recaptured radio-collared bears, replaced their aging radios with fresh ones and followed bear's travels with periodic relocation flights. His project seeks to compare the predation risks to the Porcupine caribou herd on their traditional coastal plain calving grounds with areas they may be displaced to should oil development occur.

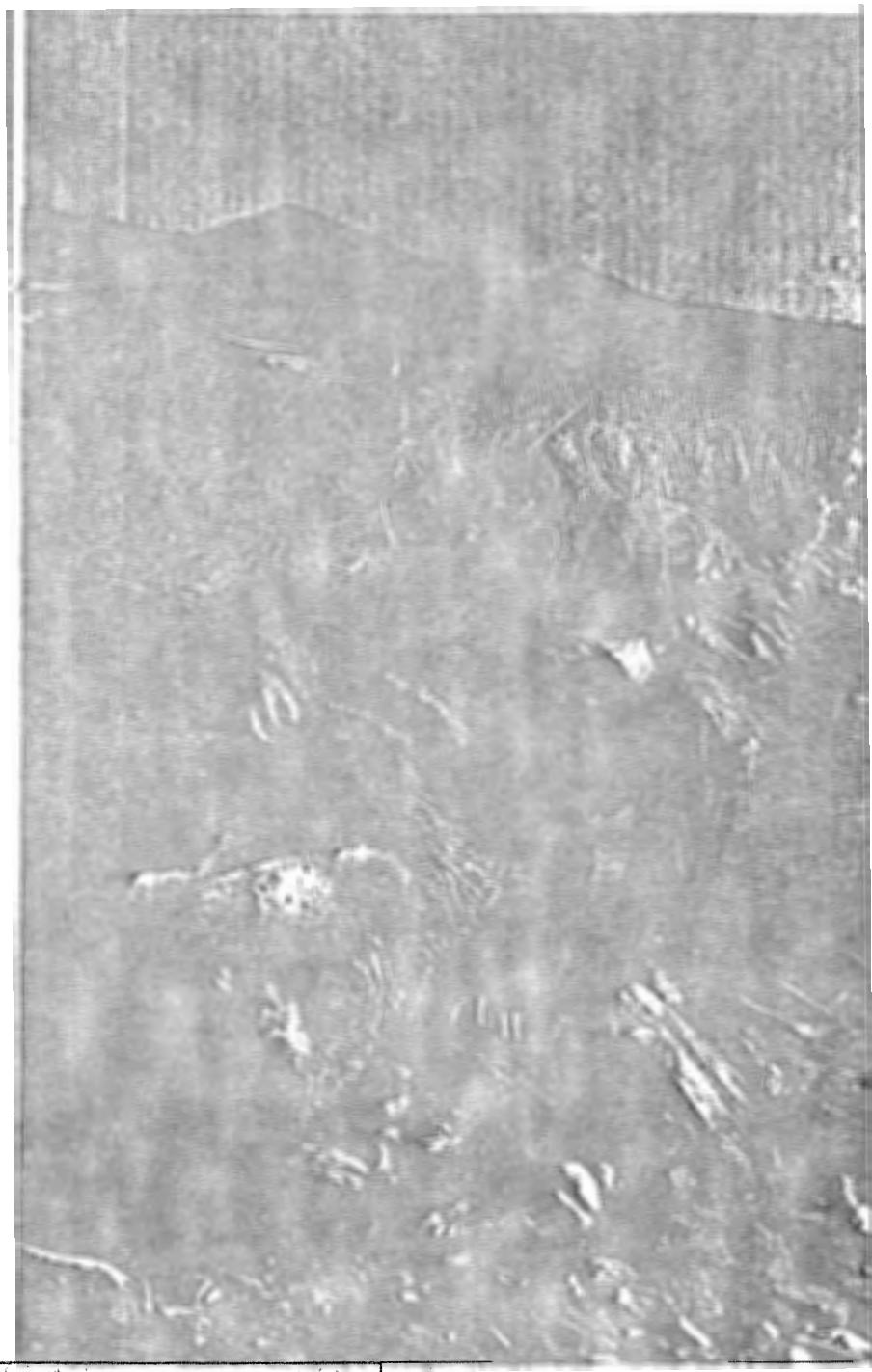
1002 CONTROVERSY

The welfare of the Porcupine herd, whose annual migration to the refuge's coastal plain is often described as North America's most spectacular wildlife event, is at the center of a debate that has captured the nation's attention for the past five years. The debate began in 1980 with passage of the Alaska National Interest Lands Conservation Act, which doubled the size of the Arctic Refuge. It also left the future of the Porcupine herd's historic calving grounds undecided.

Because of potential oil reserves, Congress set aside a 1.5 million acre section of the refuge's coastal plain, since termed the "1002" for the section of the act which addressed the question of oil development or preservation as wilderness. The legislation called for a full assessment of resources of the 1002 area and ordered an evaluation of potential environmental impacts of oil development.

In 1987 the Interior Department submitted a draft report of its 1002 study to Congress, along with the administration's controversial recommendation that "Congress authorize the Secretary to lease the entire 1002 area for oil and gas exploration and development."

Since 1987, Fish and Wildlife Service research has focused on assessing potential impacts on wildlife and habitat and developing options for lessening negative effects.



BEAR OF A JOB—Biologist Don Young prepares to process a tranquilized bear which became immobilized on the edge of a creek. Bears usually go down within five minutes of being hit with the tranquilizer dart.

BEAR FACTS

"The earlier baseline studies generated a wealth of general information on the numbers and biology of caribou and bears," Young said. "But this project was designed to answer specific questions about the interrelationships between caribou and predators, particularly bears."

The study's predominant question asks how caribou calf survival will be affected if petroleum related activity on the coastal plain causes pregnant females to move to the foothills of the Brooks Range, where bears are more numerous.

To answer that question, Young has spent much of the last three summers in small, specially equipped aircraft, radio-tracking 66 bears. That's a large sample size, he said, considering there are about 100 or so total bears in the study area. He estimate he has recorded more than 1,000 aerial relocations during the last three field seasons.

This year, Young's field season began in May with a recapturing project based out of a lakeside camp within the Franklin Mountains south of the study area. A small plane was used to track the bears. Then biologists in a helicopter were called in to capture the bears by shooting them with a tranquilizer dart.

Immobilized bears were given a brief physical exam, weighed and had a blood sample taken. They were then refitted with new collars, good for three years.

IN THE FOOTHILLS

It isn't always easy to find a bear, even if it is carrying a radio transmitter. As we searched for bear No. 1516, the pulsed radio signal indicated we were close, but we still couldn't see the bear. Bears exhibit a variety of responses to the tracking plane. Some run, some hide, some continue their activity with nonchalance.

This hider would be a lone female. Young had first captured her in May 1989 about 10 miles north. She was an 85-pound 2-year-old then, still living with her mother, who was radio-collared. Last July he found her mother being eaten by an adult male bear, who presumably had killed her. Three weeks before this flight Young had recaptured No. 1516 near the Okerokovik River, just a few miles away. She registerd 143 pounds on his scale, just a few pounds lighter than average for a 4-year-old Brooks Range grizzly.

On the third pass a movement at the base of the slope caught the biologist's eye. "I've got it— she's 1 o'clock now—running below the ridge."

As the plane closed in, the bear turned uphill. "She has something . . . has a calf in her mouth," Young matter-a-factly remarked.

We circled the bear as Young noted the habitat type: rocky slope interspersed with tundra vegetation. He mapped the location and searched to see if any other animals were in proximity. He recorded a group of about 20 caribou, 500 yards north in rolling tundra.

The disturbed bruin had captured her meal at the edge of the foothills.

(See BEARS, Page C-2)

FDNM - 10/19/91

Senators plan ANWR filibuster

By BRIGID SCHULTE
States News Service

WASHINGTON—Words from authors Barry Lopez and Debbie Miller may be used in Washington this week to save the Arctic National Wildlife Refuge from oil-drill bits and production pads.

Ten U.S. senators have vowed to talk to death a bill that would open controversial national energy policy bill, and their staffs are scrambling to gather everything from the sublime to the ridiculous to pass the time.

While no one can predict whether cots will be set up on the floor of the Senate chamber when the energy bill comes up for debate this week, Sen. Joe Lieberman, D-Conn., has written nearly six hours of original text just in case.

And his staff has gathered a waist-high stack of material for him to read once he runs out of steam—everything from author Lopez' award-winning "Arctic Dreams: Imagination and Desire in a Northern Landscape" to lists of all species on the barren North Slope tundra.

Other options are dry reports, such as the "Overview of North Slope Production Prospects 1990 to 2010, prepared for the Legislative Budget and Audit Committe of the Alaska State Legislature."

"As you can see, we're commit-

(See ANWR, Page A-7)

ANWR: Prose and poetry

(Continued from Page A-1)

ted to this," one staffer said.

Drilling for the estimated 3 billion barrels oil in the remote Arctic refuge is the centerpiece of the proposed energy legislation. Critics, like the filibustering senators, call the energy bill fatally flawed because it promotes oil drilling, eases regulations for nuclear and electric utilities, and does too little for alternative energy, fuel efficiency and conservation.

"I think there's plenty to talk about just about ANWR itself," said Marla Romash, spokeswoman for Sen. Al Gore, D-Tenn. "I hate to be humorless, but the thought of drilling in one of the last, most pristine wilderness areas provides more than enough for the senator. He won't have to rely on Shakespeare or modern poets."

Sen. William Roth, D-Del., plans to read newspaper articles and passages from Fairbanks resident Debbie Miller's "Midnight Wilderness; Journeys in Alaska's Arctic National Wildlife Refuge."

Roth's bill, which would designate as wilderness the same 1.5 million acres of the refuge targeted for drilling in the energy bill, passed the Senate Environment Committee on Thursday. The energy bill had earlier passed the Senate Energy Committee but is not scheduled to be sent to the Environment committee.

Although aides said they expect the energy bill's sponsor, Sen. Bennett Johnston, D-La., to try seek a "cloture vote" to limit debate, no one knows whether he has the 60 votes he needs to do so.

"That's the $64,000 question right now," said Steve Moore, spokesman for filibustering Sen. David Durenberger, R-Minn.

Some predict that Senate Majority Leader George Mitchell, who opposes ANWR drilling, may drop the energy bill if Johnston fails to get the votes to limit debate.

FDN-M 10/30/91

Congress may consider energy plan Thursday

WASHINGTON (AP)—The Senate debate on opening the Arctic National Wildlife Refuge to oil development could begin as early as Thursday, according to Senate leaders. A big fight is looming.

The first step in getting the Bush administration's energy bill before the Senate will come when Democratic leader George Mitchell of Maine seeks unanimous consent to do so.

Opponents promise a filibuster to delay consideration of the bill until Sen. Bennett Johnston, D-La., scraps the ANWR development portion of the package that passed his Energy and Natural Resources Committee in May.

Under Senate rules, Johnston would need 60 votes to end the filibuster. Opponents need only 41 to blunt him.

"I am confident we have the votes," Johnston said at a news conference Tuesday. "It is no answer to say there ought to be a filibuster."

Sen. Joseph Lieberman, D-Conn., said drilling for even possibly 9 billion barrels of oil at the risk of disrupting the extensive flora and fauna of the 1.5 million-acre coastal plain is not worth the environmental risk.

"A timeless resource is on the line here, a magnificent piece of God's good earth — for a quick oil fix," Lieberman said at a news conference.

The energy bill crafted by Johnston and backed by the White House calls for greater use of nuclear fuel, natural gas and competition among electric utility companies.

But its cornerstone is oil development in ANWR, where oil leasing could generate up to $6 billion and help underwrite other costly provisions of the measure.

FDN-M 10/31/91

Senators begin new fight on ANWR drilling plans

WASHINGTON—With a filibuster still possible and a compromise becoming more and more likely, the U.S. Senate this morning began its debate on national energy policy and its bitter fight over the Arctic National Wildlife Refuge.

At issue in the strenous three-hour debate is whether to even bring the controversial energy bill to the Senate floor.

Oil drilling in ANWR is the centerpiece of the bill. Revenues from lease sales are to fund many of the more progressive alternative fuel and renewable energy programs in the energy bill.

"It is not just the foolishness and greed of destroying the Arctic Wildlife Refuge, one of our last truly pristine wilderness areas. This bill is fatally flawed from start to finish," said Sen. Paul Wellstone, D-Minn.

Taking the opposite tack, Alaska Republican Sen. Frank Murkowski, called the drive to stop debate a "travesty" and urged his colleagues to authorize what he said would be the largest construction project in North America.

"I think we're seeing an extraordinary thing—we're debating whether this bill should even be taken up," Murkowski said angrily. "There are those who threaten to kill it before it even gets up for debate. And now we're hearing about this petty, jurisdictional squabble."

Senate blocks energy bill

ANWR proposal appears dead

By BRIGID SCHULTE
States News Service

WASHINGTON—The U.S. Senate today derailed the proposed national energy bill today because of opposition to opening the Arctic National Wildlife Refuge to oil drilling. The fate of the entire energy bill may remain unresolved this session.

The Senate voted 50-44 on a procedural motion that, in effect, kills further consideration of a comprehensive national energy policy, of which drilling in the ANWR was the centerpiece.

Bill sponsor Sen. Bennett Johnston, D-La. quickly took the floor to deliver a eulogy for his bill.

"In case anyone wants to know what this means, it means we lost," he said.

He said he would refrain from an attempt to end debate on the bill and would work with the opposition on "where we go from here." But, he said, "I fear, I really do, that where we go from here is where we've been."

"We may have defeated a comprehensive bill here today," he said, pounding the table. "But we have not defeated the problem."

Supporters of oil drilling, including Alaska's two senators, needed 60 votes to limit debate in order to stop a threatened filibuster that would have killed the bill. Under Senate rules, a vote to limit debate would ensure that a bill would be brought to the floor, considered and voted on its merits.

While the filibustering lawmakers called the vote an incredible victory, Sen. Ted Stevens, R-Alaska, called the 44 senators who voted to kill the bill "know-nothing and do-nothing" lawmakers. He said he looked forward to "undressing" their arguments in floor debate and he criticized them for stopping discussion.

"These people are extremists unwilling to do anything but stick their head in the sand," Stevens said after the vote.

Sen. Frank Murkowski, R-Alaska, said the vote would send OPEC countries laughing all the way to the bank.

Drilling for ANWR's estimated 3 billion barrels of oil on Alaska's remote Arctic coastline was the lightening rod in the energy bill that mobilized environmentalists, who called it the last great wilderness on Earth, and drilling advocates, who said the reserves would reduce "dangerous" U.S. dependence on

(See ANWR, Back Page)

(Continued from Page A-1)

Persian Gulf oil.

"This is a tremendous victory and it spells the beginning of the end of a 1950s style energy policy," said George Frampton, head of the Wilderness Society, shortly after the vote. "Those of us determined to protect the Arctic Refuge are one giant step closer to passing it on undamaged to future generations."

Bill sponsor Sen. Johnston said he would not ask for another vote to limit debate, called a cloture vote.

Unclear, however, is whether Johnston will agree to the filibuster group's offer to split Arctic drilling and auto fuel efficiency standards from the bill.

If Johnston agrees to split off ANWR drilling, he knows the Senate is unlikely to pass a stand-alone drilling bill—especially as elections near. And without ANWR in an energy bill, President Bush threatened to veto any bill that reaches his desk, and all of the energy conservation, efficiency and alternative fuel provisions will fall apart.

Lease sales from ANWR drilling were to have funded all these progressive renewable and alternative energy programs.

An angry Stevens said that by not authorizing Arctic drilling, the filibustering senators are telling American women not to work.

"We now have 65 percent of our women working out of the home. Instead of one family car, there's two. Then beyond that, there's probably one car for the kids," Stevens said. "Those do-nothings are going to say to those women, 'You can't have a car . . . and the electric dryer, washing machine and coffee pot can't be left on."

FDN-M 11/4/91

Conflicting interests kill energy bill

Arctic refuge drilling emerges as Senate plan's 'lightning rod'

By H. JOSEF HEBERT
Associated Press Writer

WASHINGTON (AP)—Sen. Bennett Johnston, D-La., one of the Senate's master tacticians, thought he had crafted an energy bill that had something for everyone, hoping that would smooth its way through the Senate.

Instead, his bill had so many things opposed by at least some senators that it died in a congressional crossfire.

The package's derailment last Friday, and the strong crosscurrents of interests that action represented, left many on Capitol Hill wondering whether Congress can enact significant energy legislation anytime soon.

The primary issue that doomed the bill was oil drilling in Alaska's Arctic National Wildlife Refuge, something Johnston advocated strongly.

Environmental groups such as the Sierra Club and Friends of the Earth mobilized letter-writing and telephone campaigns. A few days before the vote, 500,000 letters opposed to such drilling were hauled to Capitol Hill.

The Alaska refuge had become what Sen. Malcolm Wallop, R-Wyo., a cosponsor of the legislation, called "a lightning rod" that prompted at least eight senators to filibuster, forcing Johnston to get 60 votes, instead of a simple majority, to keep the bill alive.

He fell 10 senators short, 56-44, a surprisingly wide margin for such a vote.

What went wrong?

Johnston, who had spent a year crafting the bill as chairman of the Energy Committee, credited the environmentalists, saying they "wrote the textbook on how to defeat a bill."

But they were not alone. The coalition of opponents was an unusual alliance.

There were no solid party lines. The 35 Democrats who voted to kill the legislation got help from nine Republicans. Of the 50 senators who sought to keep it alive, 18 were Democrats.

Senators who want more fuel efficient cars voted with senators who have vowed to fight such moves.

Lawmakers who said the bill favored only special interests voted with those who opposed it because a special interest back home didn't like it.

The explanations for voting against the bill varied.

"With today's victory, the Arctic refuge will remain for the moment untouched by drills and pipelines," proclaimed Sen. Bill Roth, R-Del.

Sen. Paul Wellstone, D-Minn., argued the bill was both a gift to the energy companies and undemocratic because the people want more emphasis on energy conservation, and the bill gave that only lip service.

Sen. Donald Riegle, D-Mich., looking out for the automakers in Detroit, found the bill's reopening of the automobile fuel economy issue "poses great dangers to the U.S. auto industry and tens of thousands of U.S. jobs. That troubles me greatly."

Ironically, one vote against the bill came from Sen. Richard Bryan, D-Nev., who has zealously advocated increased auto fuel economy requirements. Bryan said the measure's fuel economy section was too weak and competed with his stronger fuel economy bill.

While environmentalists were unified, the business community was fragmented. The oil industry wanted it, the auto industry opposed it; some electric utilities liked the proposed overhaul in utility regulations while others feared them.

And while the Arctic wildlife refuge caught the spotlight, some lawmakers didn't like the proposed easing of regulations to build nuclear power plants or some other aspect that helped a specific sector of the energy industry.

Some of the bill's advocates found the White House support halfhearted. It backed the bill, especially drilling in the Alaska refuge, but some White House officials were concerned about the fuel economy issue.

In the end, said several senators, a coalition representing diverse interests kept the bill from even getting to the Senate floor—a major defeat for Johnston.

"I certainly have great admiration for those who fought the fight," Johnston said.

Sunday
Fairbanks, Alaska
July 28, 1991

HEARTLAND

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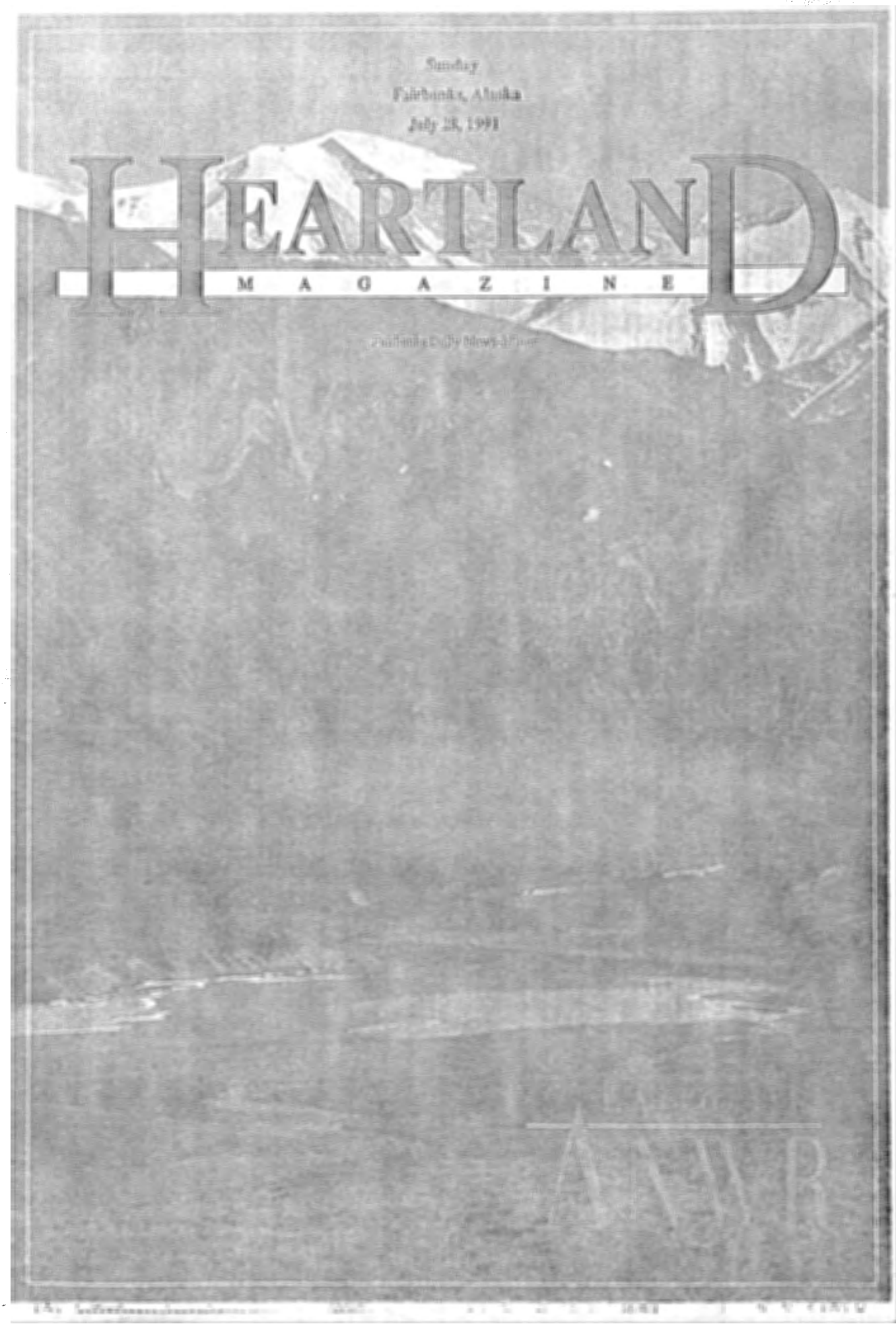


An ANWR Float Trip

Taking refuge from the politics

Story and Photos
By KELLY BOSTIAN

The dome looked lifeless. It was little more than a huge mound of flat, beige rocks, and grit and pebbles ground from the same. I looked up the ridge at Tom Edgerton, probably 50 yards ahead. His outline blurred in the heat waves.

My tongue felt like a dry sponge, but I'd already indulged too much in the dwindling contents of my canteen.

The tops of my ears stung in the sun. The left one felt blistered. I tried without success to tuck them up under my baseball cap.

I kept walking. "I didn't come to the Arctic to see a desert," I said aloud.

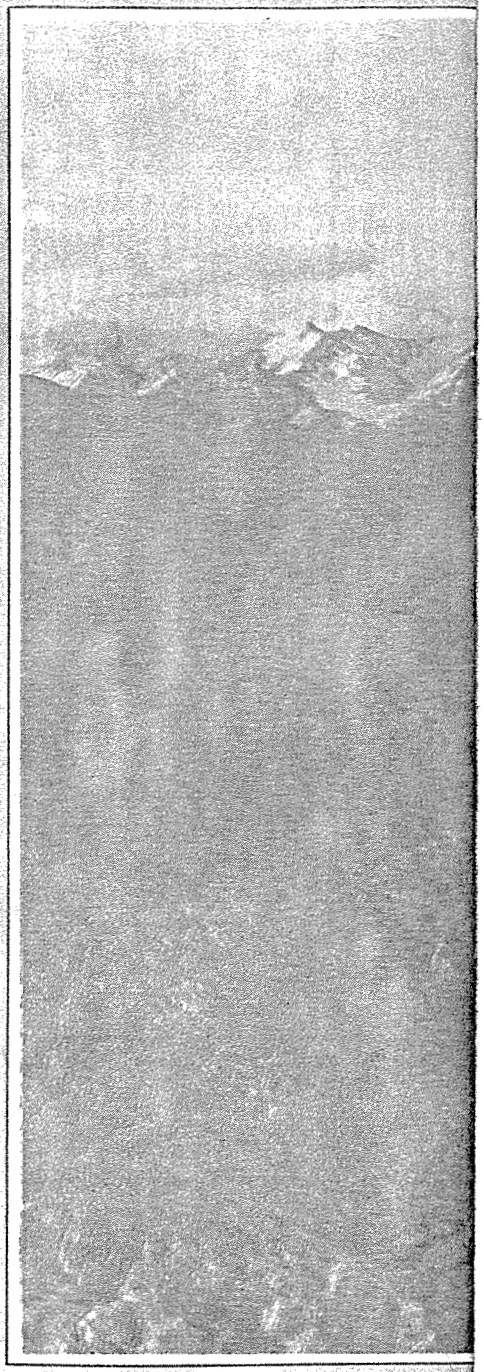
Maybe God heard me. A few steps later I saw the answer to unspoken prayers—a patch of snow.

I hurried over to it greedily, like a pirate who had found a chest full of gold. I pulled off my sweat-soaked T-shirt, filled it with the icy snow and rubbed it on my head, shoulders and chest. I picked up the snow in my hands and washed my face with it. It was cold and hurt so good.

Three days into a Hulahula River raft trip with three U.S. Fish and Wildlife Service employees, I was near the top of a 4,885-foot dome above Kolotuk Creek, in the Arctic National Wildlife Refuge.

We put in at Grasser Airstrip, not far below the Continental Divide, in near 80-degree weather on June 19. We pulled out six days later in a 17-degree windchill about 80 miles downriver on the Arctic Coastal Plain.

Three musk ox bulls graze on shrubs on a Hulahula River sandbar.



U.S. Fish and Wildlife Service biologist Harvey Heffer

A track on a gravel bar hints at the presence of wolves, which are common in the Arctic National Wildlife Refuge.

Glenn Elison, the refuge manager, orchestrated the trip. Edgerton, outdoor recreation planner for the refuge, and Harvey Heffernan, fish and wildlife biologist, accompanied Elison.

They were getting firsthand knowledge of the Hulahula, a glacial stream that is one of the refuge's most popular rafting rivers. Hikers and hunters also make use of the area. Its draw is second only to the Kongakut, a clearwater river to the east that is a good Arctic char fishing hole.

ıan glasses the mountains lit with midnight sunlight from a 5,400-foot peak above East Patuk Creek.

I would have several stories to write once I gave up my raft seat for my office chair, including this description of the Hulahula for others who might never get a chance to see the nation's largest, and most controversial, wildlife refuge.

Incredible View

ı that dome above Kolo- ek, I captured my first glimpse of the Beaufort Sea pack ice on the northern horizon. I pointed my camera lens toward it, but the vision wasn't striking, just a thin white line. Still, my soul was stirred by the thought that the white line was the demarcation of the northern boundary of the continent.

I sat beside the patch of snow on a recliner-sized boulder and enjoyed the view. I filled a small cup with snow and poured powdered, punch-flavored Gatorade over it and sipped and crunched the icy mixture. A snow bunting, in his tidy black-and-white plumage, stopped by to offer a short serenade.

A cool breeze kicked up from the north, and breathed life into me. I slung my pack over one shoulder and hurried to the top of the dome, expecting to see Edgerton and Elison there taking a break. But they were nowhere to be seen. I had no idea where they had gone.

I smiled. I didn't care where they had gone.

For the first time on this trip I was on my own. I didn't feel a need to be the reporter who was along to see what the Fish and Wildlife guys were up to. I could go anywhere and do anything I pleased.

I ate lunch on top of the dome and admired the view. The Mount Chamberlin massif dominated the scene west over the Hulahula valley. I could see only part of the Mount Michelson massif to the east. A huge snow-capped peak shot up to the blue sky blocking the view of Michelson's highest point. The mountain looked as if it slanted gradually upward toward the snowy summit. It

(Continued on Page H-10)

(Continued from Page H-9)

looked smooth and inviting, as if I could stroll to the top. I knew better.

Innumerable unnamed peaks, some snowcapped, some brown or black, reached for the sky as far to the east and west as the eye could see. It looked like the Grand Canyon inside-out. To the north, the range sloped away to the coastal plain and the offshore pack ice.

The refuge looked different than it had from the airplane, when Fish and Wildlife pilot Roger Kaye narrated the flight north from Arctic Village, over the divide to the upper Hulahula.

Kaye knows the refuge like a taxi driver knows his city. Valleys and rivers are streets, and mountain passes are intersections.

Mountain pilots land on flat gravel bars, some of which have semi-permanent airstrips. The strips—little more than a pair of tire tracks—don't show up on maps, but pilots talk about them as if they were established airports.

Grasser Airstrip, named for hunting guide Eddy Grasser who first established the runway, is a regularly used stop on the upper Hulahula.

The larger rocks have been removed from the landing strip, but still the two tracks in the gravel appear faint from the air. "It's only about 3 feet wider (than landing gear) in a couple places. If you get off those tracks you can easily flip," Kaye said. "These are decidedly Bush airstrips. They're unmaintained. I never encourage someone to land there because maybe they can, and maybe they can't."

In an airplane, the scenery rolls distantly by like it's projected on a giant-sized movie screen. But when walking through ANWR's mountains or kicking around the coastal plain, you feel the wind, you sweat, stumble, admire and smile and touch it, and you know it's real.

Wildlife Sightings

After finishing my lunch I strolled about the flat top of the rocky dome and considered routes for the afternoon.

To the east lay a green field, pocked with boulders and sliced by a hundred tiny streams and potholes. From my vantage point it looked like a wet putting green upon which were spilled a pocketful of pebbles.

It sloped toward the base of the dome, but the upper end formed a partially snow-covered ridge at 5,000 feet, slightly higher than the top of the dome I was standing on.

The field looked smaller than it actually was. Once on it I felt like I had stumbled into a land of giants. The field seemed to go on forever. It was about two miles across.

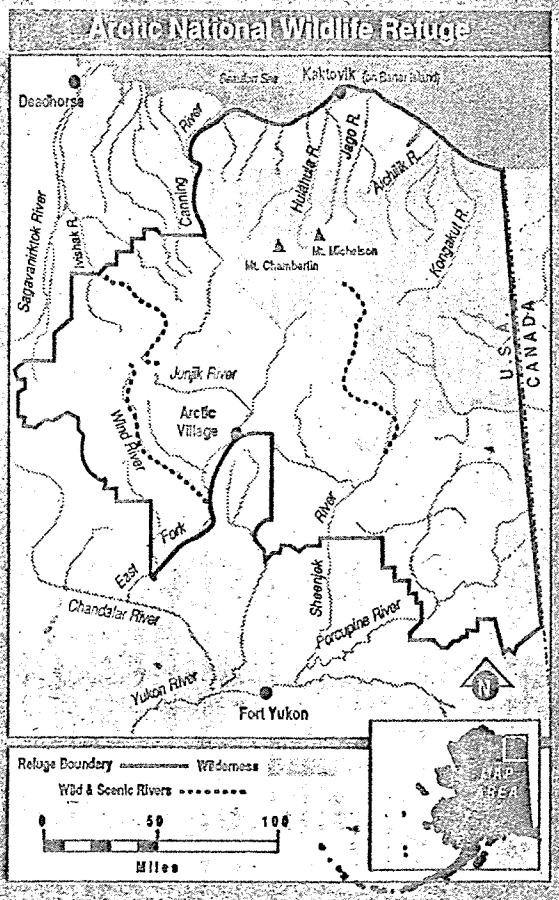
The maze of streams, fed by the melting snowfield and gurgling springs, flowed full with water so clear it seemed unreal. I stooped to drink at the first stream crossing, but thought better of it. Caribou droppings lined the edge of the stream.

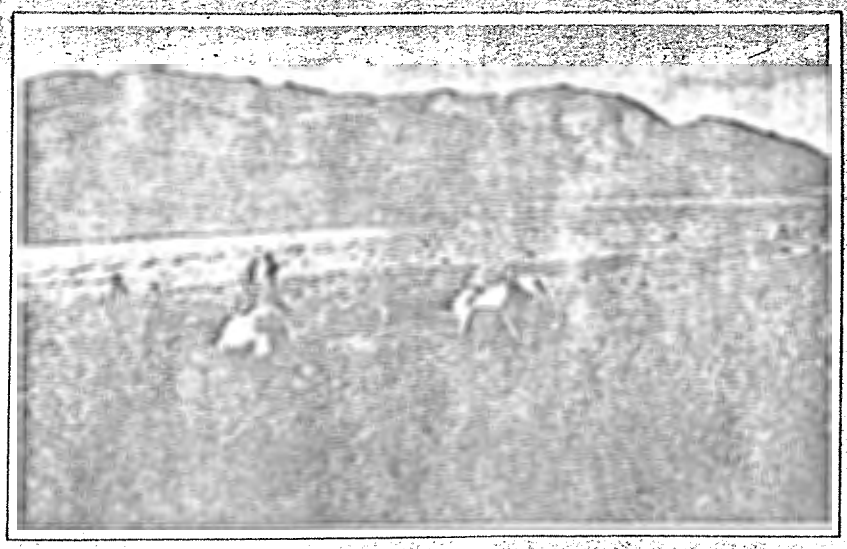
Following several game trails that crossed the pasture, I saw caribou sign, Dall sheep tracks and white fleece, bear tracks and wolf tracks. Lapland longspurs and snow buntings were plentiful. Nesting shorebirds flew about on their graceful, slender wings, but I didn't get close enough to identify the species.

Every day of the trip, we saw wildlife. The first evening we hiked from Grasser to a 3,800-foot peak just below the "Big Bend" where the Hulahula turns north from it's westerly course that parallels the Continental Divide.

From that peak we looked down on grazing Dall sheep, and on the hike back to camp spotted two caribou bulls trotting along the Hulahula.

The second evening we hiked to a 5,500-foot peak





From this camp on a gravel bar near Kolotuk Creek the party spotted several wolves and caribou.

above East Fork Creek. On the way I photographed Dall sheep. We watched a gyrfalcon soar above the cliffs, blasting us with whistles of disapproval.

The third evening, at Kolutuk Creek, we watched wolves and caribou. Ellen spotted them first. "Wolf!" she shouted. There was a dash for binoculars, cameras and spotting scopes. First we saw one large grey wolf, about a quarter-mile from camp at the base of a ridge. It was one of a group of three, two greys and a white wolf. They played and tussled, moving northward along the ridge until they faded from sight. They covered the mile or so of ridge effortlessly, with amazing speed.

Not 15 minutes passed after that first wolf sighting, another loner traveled the same route. A half-hour later a group of five caribou traveled the same trail on a dead run.

And, about 30 minutes later, another lone wolf ran the route. There would no doubt be an interesting meeting somewhere that evening.

As we floated the stretch past Kolutuk Creek and [illegible] Mountain we saw a group of four musk-ox bulls.

We stopped to watch and photograph them, but they had no time for us. They ran off, nudging and butting each other. Their long hair flowed in the breeze as they ran. Edgerton watched through his binoculars. "You just expect to look behind them and see some prehistoric man in a loin cloth carrying a spear," he said.

The four beasts stopped on a snowfield at the base of a ridge about a half-mile away. Two of them turned to face off at about 30 yards, ran at each other and crashed their horned heads together. The collision was audible over the rushing water of the Hulahula. It sounded like the pop of a softball against a wooden bat.

As the oxen ran up the distant ridge we noticed four blond spots on the hillside above—a sow grizzly with her three two-year-olds. Some time passed before the musk-oxen disappeared from our view and were spotted by the bears.

When the three youngsters spotted the musk-oxen they ran to Mama, then the whole clan made a short sprint up the hill. The bears paused awhile, then began digging roots again. We met up with the four musk-oxen again about a half-hour later, two miles downstream.

As we floated out of the mountains and onto the plains, the caribou sightings multiplied from two here and 10 there, to 200 here and 1,000 there.

We were surrounded by caribou as we set up camp our fourth night on the river. Fog rolled in and the temperature dropped shortly after we set up camp. We were with the caribou in their habitat and in their kind of weather.

The fog made photography a challenge, but the illusion created by mist was eerie. At any point I could stop, look around, and caribou would drift in and out of sight in all directions. At times I heard the

(Continued on Page B-12)

Writer Kelly Bostian took this self-portrait with the help of a timed shutter release on a ridge below Tugak Peak.

(Continued from Page H-11) clucking "browns" and bleating calls of ghost birds. Ptarmigan added to the chorus their croaking laugh.

A group of about eight cows walked up to investigate me. They came to within about 25 yards. I could see the whites of their eyes and hear their breathing as they tried to catch my scent. Several other lone females came to see me on that long evening. It didn't happen to anyone else in the party. I figured the curiosity stemmed either from my full camouflage raingear, or some wild quality I must exude.

I approached Edgerton in the log and he greeted me with: "Those lone females seem to have a thing for you."

If we stopped for any amount of time along the river the last 30 miles of the trip, sooner or later we would see a herd of caribou. But the sight I'll most remember is looking up to a bluff above the river to see a wolf sitting and watching us float past.

Endless Scenes

I saw no caribou in that rocky meadow below the dome, only the snow buntings, wheatears, and Lapland longspurs.

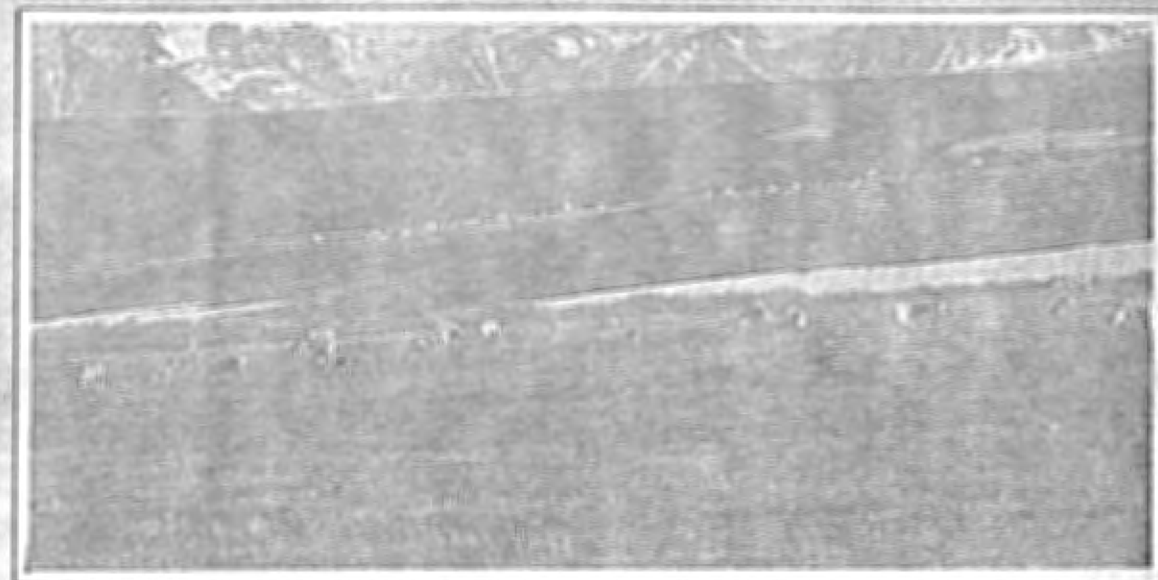
I grew fond of the longspurs, followed one around as it flew from boulder to boulder, and watched as it sang. The longspur's song was so soft and soprano it seemed misplaced in the raw country where it nests and rears its young.

But I hadn't decided to cross the field full of boulders to see birds. I wanted to see a peak that was only barely visible from the dome. It was a sharp peak, almost unnaturally steep on its sides, with dark gray glaciated snow fields below the summit. This, I said to myself, was the idealistic mountain. The type of mountain conjured in fairy tales and movie scripts.

I found out later that I was looking at 8,500-foot Pogok Peak, which rises from the miles-long Hubley Glacier. From my vantage on the ridge, I overlooked the glacier and the full northern face of the mountain was in view. I sat on a rock, and just looked.

ANWR is the kind of place where even the refuge manager becomes a sightseer. Harvey Heffernan said after the trip that he would always, and mostly, remember the evening the four of us hiked to a 6,000-foot peak above East Patch Creek.

We left camp on the Hulahula shortly after dinner that evening and didn't return until 6 a.m.



Caribou graze on rolling hills above the Arctic coastal plain in front of Mount Michelson.

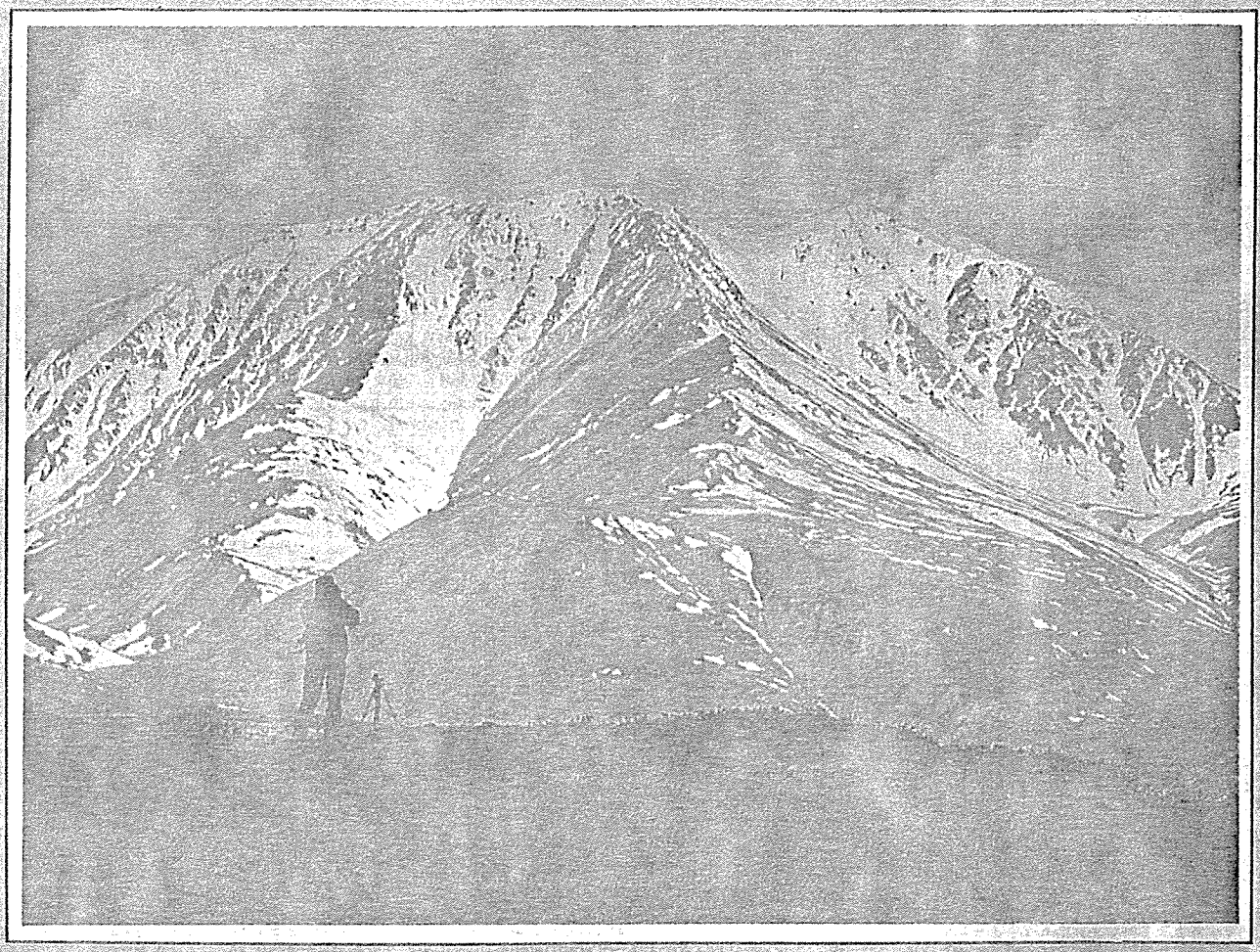
Ellison and Edgerton were on top well before Heffernan and me. We took our time on the way up and photographed Dall sheep, and a full moon showing in the blue sky beyond reddish cliffs.

We reached the summit just after midnight. The sun was still high over the northern horizon.

Ellison pulled out one of his favorite brand of quality cigars and puffed as we watched the sunlight dance across the peaks of the range. We laughed over the number of frames of film we exposed on that peak.

But there were many nights of watching the light, our schedules revolved around it. We typically went to bed well after midnight, rose mid-morning and traveled in the afternoon. The concept of days loses its meaning when the sun never sets and the landscape revolves through an endless array of fantastic scenes.

A group of curious caribou cows, mangy from shedding their winter coats, come close to examine the photographer.



Tom Edgerton, outdoor recreation planner for the Arctic National Wildlife Refuge, is silhouetted by late-evening sun against snow-capped peaks near the Continental Divide in the Brooks Range.

Going Home

As I sat there on that boulder, looking at Tugak Peak, I thought of a woman I met at the Fairbanks airport as I set out on the trip. She was former director of the Wilderness Society in Alaska, and she was bound for ANWR. "This is the first time I'll be going there for fun in years," she said.

She grimaced when I told her who I was and who I was going with. "Don't let them feed you a line," she warned. Environmentalists have long been critical of the U.S. Fish and Wildlife Service for supporting oil development on the coastal plain of the refuge and have accused the service of fronting for oil industry.

But she shook off the thoughts and tried to concentrate on her trip. "I'm not going to think about it," she said. "I'm not. I'm not."

And I didn't think about it while I surveyed Tugak Peak or enjoyed the view toward the pack ice.

Although the line that divides designated wilderness area from the coastal plain is marked clearly on maps, the only division in the refuge is one from a mountainous landscape to a plains landscape. It all looks wild. Thoughts about the issues didn't come easy in ANWR, my senses were too busy soaking in other, more pleasurable thoughts.

The weather changed drastically as I began taking photos of Tugak. A rainstorm washed the Chamberlin massif and was working my way. It was time to go. Tugak disappeared in the clouds.

I didn't want to leave. A hint of rainbow almost drew me back, but I had a long hike ahead of me, and my traveling companions would probably wonder where I was. Besides, I didn't want to be late for dinner.

The hike back was a big change from the start of the day. It was pleasantly cool—and it was downhill all the way.

The cool evening was only a taste of what was to come the last two days. Fog rolled in and the wind picked up. Later, we heard that the temperature was in the upper 30s, with a windchill of about 17.

We finally had reached the coast, and visibility was about a quarter-mile at best. I felt a little angry and cheated at first, but finally took the coastal plain for what it was—constantly changing, and unpredictable.

Elison radioed Kaktovik in the morning and tried to line up a helicopter. The weather was too harsh for airplane travel.

I barely had swallowed my first gulp of coffee when Elison said a chopper was on its way and that we needed to dismantle camp.

I took a minute to walk just a short way out onto the grassy tundra. It was still brown, mostly. In mid-June it was just recovering from the throes of winter. I was told it had snowed 6 inches on the plain a week earlier. That was easy to envision.

But there were caribou close to camp—again—and long-tailed jaegers, and a dozen other types of shorebirds, sparrows, and the longspurs.

I heard the chopper approach and I had that same feeling I experienced at the ridge over Tugak. I didn't want to leave. I wanted to stay and watch some more, just to see what I could see.

The woman at the airport came to mind again. Her motives were probably political, and I wasn't feeling too partisan at that moment, but her thought was on target. "Just go up there and fall in love with the place," she said.

Assignment complete.

Kelly Bostian is outdoors editor for the News-Miner.

U.S. FISH AND WILDLIFE SERVICE
REGION 7
BRIEFING STATEMENT

TOPIC: ANILCA Section 1002

BACKGROUND:

The Alaska National Interest Lands Conservation Act required that the Secretary of the Interior:

1) Conduct a baseline study of the fish, wildlife, and habitat on the coastal plain of Arctic National Wildlife Refuge;

2) Develop, implement, and administer an oil and gas exploration program on the 1.5 million acre area; and

3) Prepare a report to Congress by September 2, 1986, on the oil and gas potential, impacts of development, the national need for additional domestic sources of oil and gas, and recommendations on whether or not further exploration and development should be authorized.

CURRENT STATUS:

The U.S. Fish and Wildlife Service (Service) conducted baseline fish and wildlife studies on the coastal plain from 1981-85. Fifty-seven separate field studies were designed to define: 1) the ecology, distribution, and abundance of fish and wildlife species; 2) wildlife habitats within the coastal plain; and 3) the impacts of seismic exploration on tundra vegetation. The initial baseline report and update reports were published in 1982, 1983, 1984 and 1985. The final baseline report was published in December 1986.

Under a Service permit, Geophysical Services Incorporated (backed by 25 industry participants), collected 1,333 line miles of seismic exploration data on the coastal plain during the winters of 1984 and 1985. Exploration crews from 13 different companies collected surface geologic information during the summers of 1983-85. One permittee collected gravity readings along a 1 x 2-mile grid covering the entire coastal plain. All exploration activities were closely monitored by the FWS, and all companies were required to submit copies of data obtained.

An interagency memorandum of understanding with the Bureau of Land Management (BLM) and the U.S. Geological Survey (GS) provided for the assessment of the hydrocarbon potential of the coastal plain and assistance in developing the report to Congress. An "Interagency Advisory Work Group", chaired by the Service oversaw preparation of the report. The work group was made up of Service, GS and BLM representatives. The group called

on over 50 individuals within the three bureaus to write various sections of the report.

To help Congress weigh the hydrocarbon potential of the area and the national need for additional domestic sources of oil and gas against the environmental consequences of opening the area to oil and gas development, the report included a legislative environmental impact statement. Submission of the report to Congress was delayed when the Department of the Interior was sued by a coalition of environmental organizations (Trustees for Alaska, American Wilderness Alliance, Defenders of Wildlife, Northern Alaska Environmental Center, and the Wilderness Society) for failure to fully comply with the National Environmental Policy Act. The court decision in favor of that coalition was unsuccessfully appealed by the Department. Consequently, the Service was required to prepare an environmental impact statement and solicit public comments prior to submission of the report to Congress.

A draft report assessing the environmental consequences of five management options was released to the public November 24, 1986. Those options ranged from opening the area for oil and gas leasing to designating the entire area as wilderness. Options involving development of the 1002 area were based on the government's analysis of exploration data and oil development scenario for the coastal plain. Measures for mitigating the negative consequences of each option were also included. During the public comment period nearly 11,400 letters were received. Written comments were generally opinion statements, which favored development over wilderness designation by two to one.

The final report was released on April 20, 1987. The Secretary recommended the entire 1002 area be made available for oil and gas leasing. The recommendation was based on the national need for domestic sources of oil and gas, and the oil industry's ability to develop such resources in an environmentally sensitive manner as demonstrated by two decades of success at Prudhoe Bay and elsewhere.

The original estimate of mean recoverable oil was 3.2 billion barrels with a 19% probability of finding economically recoverable oil. The minimum economic field size was estimated to be 440 million barrels of recoverable oil. These estimates were revised recently due to reanalysis of some existing data and new information available from nearby areas. The revised estimate of the mean recoverable oil is 3.6 billion barrels with a 46% probability of finding recoverable oil. The minimum economic field size was reduced from 440 to 400 million barrels of oil.

This issue is currently being considered by Congress. Bills dealing with the 1002 area were considered in both chambers during the 100th and 101st Congress. The bills covered the spectrum from wilderness designation to full leasing of the 1002

area. The Exxon Valdez oil spill in March 1989 delayed further consideration of proposed 1002 legislation in the 101st Congress.

Concerns about stable world petroleum supplies, the recent war with Iraq, the release of the President's National Energy Strategy and successful passage of oil spill legislation have combined to renew interest in Congressional action on the 1002 area. Several bills have been introduced in the current Congress. As in past Congresses, the current bills represent a wide range of options for dealing with the 1002 area. The National Energy Security Act, S.341, is currently before the Senate Energy and Natural Resources Committee. It appears to be the likely vehicle for dealing with the 1002 area in the Senate. The National Fish and Wildlife Enhancement Act of 1991, HR 1320, has been introduced and referred to Merchant Marine and Fisheries, and Interior and Insular Affairs Committees. Other bills are also being considered in the House.

Should Congress decide to allow further oil and gas activities, a variety of regulatory and planning processes would immediately be initiated to implement associated legislation. Inherent in these processes are the development of site-specific environmental stipulations designed to mitigate potential impacts from oil and gas activities. Recognizing this prospect and existing statutory responsibilities, the Service continues to pursue a biological study program on the area. The goals of this study program are a better understanding of:

- the natural dynamics of the 1002 area ecosystem;
- the altered ecosystem dynamics that might result from oil and gas activities;
- the adverse effects associated with those altered dynamics; and
- the means by which to avoid, minimize, or rectify those adverse effects.

The current research focuses on species and habitats of primary concern, as identified by the 1002(h) report. The complex nature of arctic ecosystems, possible alterations to those ecosystems from development, and need for effective mitigation require that studies continue. The investigations build upon the information obtained during the 1002 baseline studies and summarized in the 1002(h) report. Many of the studies involve cooperative efforts with other resource management and research interests, and some of the studies represent components of more comprehensive investigations. Collectively, they represent an opportunity to develop a better understanding of fish, wildlife, and habitat relationships that will ultimately translate into improved resource management for the Arctic Refuge. The first three year segment of the post baseline studies was completed in 1990. Data are currently being analyzed and reports prepared. Studies

dealing with the following are currently being conducted by the Service:

Caribou population dynamics
Muskox population dynamics and habitat relationships
Polar bear population dynamics and denning characteristics
Lesser snow goose staging areas
Tundra swan nesting and brood rearing
Fish use of coastal areas
Migratory bird use of potential port sites
Thalaspi arcticum (completed)
Caribou habitat needs
Habitat delineation and classification
Vegetation recovery from seismic exploration
Contaminants in the environment
Water resource inventory and assessment

Issue Date
4/8/91

ARCTIC NWR FACT SHEET

History

1949 - The National Park Service (NPS) began a recreational survey in Alaska to determine areas deserving of formal protection under the national conservation unit system.

1954 - The NPS recommended that the northeast corner of Alaska be preserved as a unique ecosystem and important area for scientific studies.

1957 - As a result of support from various conservation groups and prominent conservationists, notably Olaus Murie, the Interior Department announced plans to seek legislation establishing an 8000 square-mile arctic wildlife refuge in the area identified by the NPS study.

December 6, 1960 - Following controversial debate in Congress and failure of legislation to establish the refuge, Secretary of the Interior, Fred Seaton signed Public Land Order 2214 withdrawing 8.9 million acres of land in northeast Alaska and establishing it as the Arctic National Wildlife Range.

September 6, 1969 - First Arctic NWR Manager, Ave Thayer, entered on duty.

December 2, 1980 - Through Section 303 of ANILCA, the Arctic National Wildlife Refuge was Congressionally established, encompassing 18,000,000 acres. Approximately 8,000,000 acres were designated wilderness. ANILCA Section 1002 mandated a baseline wildlife resource study and oil and gas assessment of an approximately 1,550,000-acre study area on the refuge's coastal plain.

May 1982 - Initial baseline report for ANILCA Section 1002 was published. Update reports were published yearly thereafter.

July 1, 1983 - Eight oil companies began surface geological studies on the ANILCA Section 1002 study area.

October 20, 1983	-	An inholding of approximately 971,800 acres was added to the refuge as a donation by the State of Alaska.
January 14, 1984	-	Seismic exploration began on the 1002 area.
August 10, 1985	-	Section 1002 oil and gas exploration ended.
April 21, 1987	-	Interior Secretary, Donald Hodel released the 1002(h) Report, and recommended Congress authorize full leasing of the Arctic Refuge coastal plain.
	-	Mean recoverable oil reserves were estimated to be 3.2 billion barrels.
August 16, 1988	-	The 100th Congress enacted Public Law 110-395 on August 16, 1988, adding approximately 325,000 acres to the Arctic National Wildlife Refuge.

Weather

Average minimum January temperature in the northern portion of the refuge is -20°F. In the southern portion it is -28°F.

Average maximum July temperature in the northern portion of the refuge is 47°F. In the southern portion it is 75°F.

Continuous daylight or twilight prevail on the refuge from late April to mid-August.

The sun remains below the horizon on the North Slope from mid-November until mid-January.

The northern portion of the refuge receives little precipitation, averaging only about 6 inches annually, but because of the underlying permafrost, which prevents water seepage, and a low evaporation rate, much of the area is wet or soggy during the summer.

During summer, permafrost may be 2 feet or less below the ground surface.

Snow cover usually isn't completely gone until the first week of June. Snow normally starts accumulating again by the first week of September. Snowfall and freezing temperatures may occur during every month.

The Land

The refuge spans over 200 miles in north-south and east-west directions.

The Brooks Range bisects the refuge creating a natural north-south division. The north slope is mostly treeless Arctic tundra. The south slope is sub-arctic boreal forest.

The proximity of the Brooks Range to the Arctic Ocean within the refuge creates a unique diversity of habitats offering exceptional wildlife, scientific, recreational and aesthetic values.

The refuge includes the four tallest peaks in the Brooks Range: Mt. Isto, 9049 ft.; Mt. Chamberlin, 9019 ft.; Mt. Hubley, 8914 ft.; and Mt. Michelson, 8855 ft.

Sadlerochit Springs, a warm spring (warm by Arctic standards; water temperatures are in the 50°F range year round) flows through an area with a unique plant community. It is the only location known north of the Brooks Range for several plant species.

About 173 applications have been filed for native allotments in the Arctic refuge, totaling 15,000 acres. Twenty-six allotment sites are found within the 1002 area. Kaktovik Inupiat Corporation Lands include approximately 91,000 acres.

The refuge area has an extremely complex and unique geology. Scientists speculate that commercial quantities of oil and/or gas may underlie the coastal plain. The estimated economically recoverable range is .6 billion barrels to 9.2 billion barrels. In place estimates are 4.8 billion barrels to 29.4 billion barrels.

The refuge contains an 8 million acre wilderness area, almost half of all Congressionally designated wilderness on refuges in Alaska and more wilderness than all refuges in the lower 48 combined. It is the second largest wilderness area in America and the largest within the National Wildlife Refuge System.

Much of the vegetated area is covered by a thick peat layer overlain by a mat of mosses, sedges and grasses. Trees rarely grow taller than a foot or so on the north slope. A few poplar groves occur in north slope mountain valleys. Larger spruce, birches and an assortment of other tree species occur on the south slope.

Wildlife

The "balance of nature" truly prevails on the Arctic NWR due to the pristine nature of this vast area.

There are no known non-indigenous or introduced species on the refuge.

One endangered species, the peregrine falcon occurs on the refuge. The bowhead whale, also an endangered species, occurs in offshore waters.

Two caribou herds utilize the refuge. The Porcupine herd, numbering over 165,000 animals, winters in the southern portion of the refuge and in Canada. Calving and post-calving occur on the refuge's coastal plain and adjacent portions of Canada during late May and early June. As much as one-quarter of the Central Arctic herd, which numbers 17,000 animals, spends considerable time on the western portion of the refuge.

Muskoxen were extirpated from northern Alaska in the mid-1800's. In 1969 and 1970 muskoxen were reintroduced in the refuge coastal plain area. From 35 surviving transplanted animals, the refuge herd is stabilizing between 300 and 400 animals, and has expanded its range off the refuge. The estimated north slope population is over 500 animals.

Polar bears commonly occur on offshore ice. A few pregnant females annually den on the refuge's coastal plain.

Five wolf packs totaling approximately 30 individuals occur on the northern portion of the refuge.

Moose are common along the refuge's north slope river drainages. In the most recent north slope moose survey, 629 moose were counted.

Snow geese that nest in the high Arctic islands of Canada stage for fall migration on the eastern coastal plain from mid-August through mid-September. The area is very important to the geese as they feed extensively to gather energy for their migration. Peak population averages 110,000, though it may exceed 300,000.

The grizzly bear population using the north slope of the refuge is estimated to be between 130 and 150. Bears prey and scavenge on caribou during early summer and shift to other foods later. Denning occurs primarily in the mountains.

Tundra swans nest extensively along the coast. Approximately 150 pairs utilize the coastal plain for nesting.

A variety of waterfowl nest on and otherwise utilize the coastal plain and coastal lagoons. The primary species is oldsquaw, but king and common eiders, pintails and other waterfowl are also found. Oldsquaw numbers may vary from 20,000 to 35,000.

Besides waterfowl, over 70 migratory bird species nest on or otherwise utilize coastal plain habitats in summer. Bird densities are high on the coastal plain, ranging as high as 400 per km^2 in certain habitat types.

Wolverines occur on the coastal plain, but are rare. The population level is apparently low compared to some other Arctic areas.

Large Dall sheep populations occur in the mountains of the refuge. No reliable population estimate exists. the Sadlerochit Dall sheep population is the furthest north population in North America.

Black bears occur on the south slope of the refuge but not on the north slope. A reliable population estimate does not exist.

People

Two Native villages occur adjacent to the refuge. Kaktovik, an Inupiat Eskimo village is located on the northern edge of the coastal plain. The population is approximately 200. Arctic Village, an Athabascan Indian village is located at the southern end of the refuge. The population is approximately 100.

Both villages hunt the Porcupine caribou for subsistence. Arctic

Village relies primarily on the herd for subsistence. Seventy percent of the caribou taken by Kaktovik residents come from the Central arctic herd, thirty percent is from the Porcupine caribou herd. Villagers also trap wolves, marten, fox, otters and other species. Limited fishing occurs.

Kaktovik residents have a more diverse subsistence base than south slope residents. The primary species is the bowhead whale. Other species utilized besides caribou include: polar bear, waterfowl, walrus, seal, Dall sheep, wolves, ptarmigan, and several species of fish.

Residents of Fort Yukon, Venetie, and Chalkyitsik also use the refuge for subsistence purposes.

Sport hunting occurs for Dall sheep, caribou, muskoxen, moose, and grizzly bear. Sixteen percent of the United States's Dall sheep harvest occurs on the Arctic Refuge.

Seventeen commercial hunting guides operate on the refuge. Ten to fifteen other commercial guides conduct guided float and backpacking trips on the refuge. Four air taxi operators also operate on the refuge.

An estimated 2500-3500 public use visits occur annually. Visitors include: subsistence and sport hunters, river floaters, backpackers, and anglers.

Eight trappers operate in remote refuge areas during winter and spring, in addition to the trappers which operate from the villages.

Approximate Air Travel Distances

Canadian border to Kaktovik	72 miles
Kaktovik to Prudhoe Bay	118 miles
Canadian Border to Prudhoe Bay	190 miles
Kaktovik to Sadlerochit Springs	38 miles
Canning River Delta (mid) to Prudhoe Bay	68 miles

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TRIP PLANNING INFORMATION
Arctic National Wildlife Refuge
March 1992

GENERAL

The refuge has no roads and therefore no access for cars, buses or trains. Summer recreationalists generally use charter aircraft to access the refuge, then backpack or float down one of the rivers.

Transportation to nearby villages that serve as departure points to the refuge is by commercial aircraft from Fairbanks or Anchorage. In past years, charter aircraft have been available from Ft. Yukon, Kaktovik and Deadhorse. Planes land on the refuge at various unimproved upland airstrips, river gravel bars and lakes (in float equipped aircraft). Extra time should be allowed for air travel into and out of the refuge due to possible weather delays, especially if visitors travel through the village of Kaktovik. Visitors are encouraged to correspond directly with the various air charter companies and commercial guides regarding availability and entry/exit locations. Information on various trip rates and equipment rentals can also be obtained from commercial guides.

RIVER FLOATING

Rafts, canoes, kayaks and Klepper boats can all be used on the rivers. However rafts are the most popular due to their easy portability in aircraft. Canoes and kayaks are very expensive to transport (unless they are collapsible) and are more hazardous in whitewater sections found on many rivers, especially on the north slope.

Refuge rivers must always be evaluated and run according to current conditions. River ratings are somewhat subjective and can change slightly depending on the stage of the river at any one time. Although rivers are generally open June through September, the safest water levels and best weather occur during July and early August. Visitors should be cautious of higher-than-average flows which can be encountered anytime of the year, especially after localized heavy rains upstream. Low water can be a concern on the Kongakut and Hulahula in August but is generally not a serious problem. It is possible to line through or portage the most difficult sections of the rivers.

Spring breakup generally occurs on north slope rivers during late May and early June. Water levels are often at flood stage during this time with ice floes and "aufeis" that make navigation hazardous. Aufeis are thick layers of ice formed by successive freezing of stream overflows during winter. During breakup, rivers carve vertical walled canyons through aufeis fields that can be a mile or more in length. During early summer or high water later in the season, it can be dangerous to attempt travel

through such areas. By mid to late June, the channels are generally carved and melted wide enough to allow passage. However, aufeis fields can be dangerous any time during the summer if river levels rise due to rains upstream. Therefore visitors should scout all ice areas prior to floating through to ensure that the river is not flowing under or through tunnels in the ice.

REFUGE RIVERS

Scenic grandeur, a variety of habitats and landscapes, wildlife, and opportunities for solitude, adventure and challenge all make refuge rivers appropriate and highly sought after for wilderness-oriented recreation. Most refuge rivers are relatively swift and possess boulder-strewn or braided gravel beds, especially on the north slope. Water quality is considered excellent, although rivers are high and turbid during spring and after summer storms. Some rivers, particularly the Hulahula and Okpilak, carry a substantial glacial silt load in the summer. Following is a brief introduction to the primary rivers used by refuge floaters and hikers.

Aichilik River - The Aichilik begins among the high glaciated peaks of the Romanzof Mountains and flows north to the Arctic Ocean. Steep sided valleys of the river's upper reaches provide scenic hiking, but poor access, rapids, braiding and low flows combine to discourage floating. On the coastal plain, the river is the eastern boundary between the 1002 area and designated wilderness.

Canning and Marsh Fork Canning Rivers - The Canning is the longest and has the greatest volume of the refuge's north flowing rivers. Both the Canning and its major tributary, the Marsh Fork, have good headwaters access and flow through scenic glaciated valleys. Through the mountains, the river contains generally flat steady current. The Marsh Fork has short stretches of whitewater. Some 15 miles before the Canning empties into the Arctic Ocean, it becomes extensively braided, widening up to three miles in some areas.

Hulahula River - The Hulahula originates in the highest peaks of the Brooks Range, flows north 40 miles through steep-walled glacial valleys, then abruptly breaks out onto the coastal plain. Swift and turbid with glacial silt in the summer, the river is the most technically challenging of the regularly run north slope rivers. At average flow rates, rapids on the Hulahula are generally class I and II, although there are stretches of class III. Since the lower river is a prime area to see caribou, most floaters travel through at least a part of the coastal plain and some travel all the way to Kaktovik.

Due to its scenery, accessibility and floatability, the Hulahula is the second most popular recreational river in the refuge. The river is generally accessed fairly high in the headwaters at a

place called Grassers Strip. A narrow twisting pass across the continental divide between the headwaters of the Hulahula and Chandalar Rivers provides a natural hiking route and a frequently used corridor for airplanes. The river is heavily hunted and fished by Kaktovik villagers.

Ivishak River - A designated wild river, the Ivishak flows from the Philip Smith mountains north for some 60 miles through the refuge. Fed by flows from relic hanging glaciers, the river develops a broad, braided flood plain typical of other north slope rivers. Although scenic, the river's shallow water, poorly defined channel and marginal access results in low use by floaters.

Kongakut River - The Kongakut is the only major refuge river whose entire course is within designated wilderness. Originating high in the mountains of the eastern Brooks Range, the river flows east for some 25 miles before heading north through 60 miles of rugged mountains to the coastal plain. Clear water, scenery, wildlife, fishing and fair access combine to make the Kongakut the most sought after and heavily used recreational river in the refuge.

The river is generally accessed fairly high in the headwaters at a place called Drain Creek. At average flow rates, rapids on the Kongakut are generally class I and II, although there are stretches of class III. Most floaters take out at Caribou Pass (an 8-10 day trip) although a few float all the way to the Beaufort Sea.

Okpilak River - The Okpilak travels north through a classic U-shaped valley in the heart of the most active glacial area of the refuge. The silt-laden river was recommended as a national natural landmark because of its prominent moraines, fans, sand dunes, outwashes and other glacial features. The upper river is too wild and dangerous for most river floaters and the terrain precludes aircraft access. These factors, however, offer hikers an uncommonly tranquil and scenic experience.

Coleen River - The clear, shallow Coleen, which flows south on the east side of the refuge, was a traditional route for Eskimos seeking trade with the Athabascan Indians. The river's upper tributaries are braided, have poor aircraft access and flow through scenic, but undramatic mountains. Although its forested middle and lower sections have good access, the Coleen is one of the refuge's less floated rivers.

East Fork Chandalar River - The Chandalar is a major Yukon River tributary. The East Fork of the river flows swiftly south from its high mountainous headwaters nearly 60 miles through a wide, mountain-rimmed valley. From there it meanders slowly through a forested lake-dotted valley. The river passes Arctic Village and serves as a highway to subsistence hunting, fishing and trapping areas.

Sheenjek River - The Sheenjek, originating from glaciers at the continental divide, drains the south side of the Brooks Range's highest and most massive mountains. This designated wild river flows nearly 200 miles through dramatic mountains and forested foothills to join the Porcupine River in the Yukon Flats National Wildlife Refuge. Single-channeled and relatively calm with numerous access points, the Sheenjek is the most popular of the refuge's south-flowing rivers. Most of the river is class I although a stretch in the upper reaches near Table Mountain is class II.

Wind River - This designated wild river begins across the divide from the headwaters of the Ivishak and flows 94 miles southeast to the East Fork of the Chandalar. Open tundra valleys fringed by limestone and shale mountains characterize its upper reaches. Forested hills, lakes and meadows dominate the lower river.

Other rivers - Many other rivers are scenic and have good wildlife viewing opportunities, but are not generally suitable for floating because of low water levels, extensive braiding and/or lack of aircraft access sites in the headwaters. They include the Aichilik, Egaksrak, Firth, Jago, Katakturuk, Sadlerochit and Tamayariak on the north slope and the Junjik on the south side. Stretches of these rivers may be navigable at certain times but it is difficult to anticipate when such conditions may occur. As a result, one cannot plan successful trips in advance.